The Cenozoic evolution of the South Vietnam margin of the South China Sea and the origin of coastal placer deposits

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A thesis submitted for the degree of Doctor of Philosophy in the Department of Earth and Planetary Sciences

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Declaration of Authorship

I, Hiep Huu Nguyen, declare that this thesis and the work presented in it are my own, unless otherwise stated. I confirm that:

• This work was done part-time while in candidature for a research degree at Birkbeck.

• Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.

• I have acknowledged all main sources of help. This includes Chapter 4, which is based on my paper published in Sedimentary Geology (Appendix B). The work is my own, although my co-authors/supervisors suggested ideas to better present and interpret the results, and helped me to improve the writing.

Signed:

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Date: August 28, 2018

Abstract

Vietnam mineral reserves contribute significantly to its economy and South Vietnam is especially rich in these resources. Whilst this region is well known as a source of oil and gas, extracted from offshore basins it is also an exporter of titanium ore extracted from coastal sands rich in heavy minerals. Despite decades of exploitation there remain fundamental questions about the origins of these resources that form the aims of this thesis. Specifically, 1) Where did the titanium bearing mineral known as ilmenite found in the heavy mineral sands come from? 2) How is the sedimentation history of the hydrocarbon basins connected to the uplift and erosion history of South Vietnam? To answer these questions an extensive set of rock and sand samples were collected from across the region and analysed using a combination of detrital zircon geochronology, petrology, geochemistry and apatite thermochronometry. In answer to question one results showed that the placer sands along coastal southern Vietnam came from local river catchments rich in outcrops of Cretaceous granites. The geochemical and petrological data also showed ilmenite titanium contents increased to the south, explained by a wider continental shelf that increased exposure to weathering during glacial sea-level lowstands before rising sea- levels remobilised the sand. Question two was answered by apatite thermochronometry data that detected increased rock uplift between 25-15 Ma across most of South Vietnam. This timing is significant as local marine basins also show inversion and a regional unconformity at the Oligocene/Miocene boundary. Following inversion basins subsided under the load of thick sands produced by erosion of the onshore region. These data provide the first solid link between basin sedimentation and onshore erosion. The cause of uplift is likely related to a change in regional stress field linked to ocean spreading in the South China Sea.

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This work is dedicated to my family; my parents, my wife and my lovely daughter for their unlimited trust, encouragement and patience while I carried out my research. Especially, many thanks and love to my wife, she always stood by me and had take care of our child during my absences that enabled me to complete this work.

Contents

Declaration of Authorship

Abstract

Acknowledgement

CHAPTER 1: INTRODUCTION 19

1.1. Project Background 19

1.2. Sands rich in heavy minerals 21

1.3. Aims and objectives 22

1.4. Methods and Approach 25

1.5. Samples 26

1.6. Organisation of thesis 32

CHAPTER 2: GEOLOGICAL SETTING 33

2.1. Introduction 33

2.2 Gondwana Assembly and breakup 35

2.3. Rifting and separation of Indochina and adjacent regions from Gondwana 36

2.4. Amalgamation 38

2.5. Post collision: Mesozoic geology 39

2.6. India collision and extrusion 42

2.7. Rifting and opening of the South China Sea 44

2.8. Marine Basins 47

2.8.1. Phu Khanh Basin 48

2.8.2. Cuu Long Basin 48

2.9. Geology of the study area 49

2.9.1. Meso- Neoarchean 50

2.9.2. Palaeoproterozoic- Middle Neoproterozoic 50

2.9.3. Late Neoproterozoic-Silurian 51

2.9.4. Devonian – Middle Permian 53

2.9.5. Late Permian- middle Jurassic 54

2.9.6. Late Jurassic- Cenozoic 55

2.10. Structural trends 56

2.11. Summary 59

CHAPTER 3: METHODOLOGY AND APPROACH 60

3.1. Introduction 60

3.2. Sample separation 60

3.3. Sample mounting and polishing 61

3.4. Closure temperatures 62

3.5. Zircon U-Pb dating 64

3.5.1. Zircon U-Pb analysis by LA–ICP–MS 65

3.6 Apatite Thermochronometry 67

3.6.1. Fission Track Analysis 67

3.6.2 Apatite U-Th/He dating 74

3.7 Sandstone bulk mineral analysis 80

CHAPTER 4: PROVENANCE, ROUTING AND WEATHERING HISTORY OF HEAVY MINERALS FROM COASTAL PLACER DEPOSITS OF SOUTHERN VIETNAM 81

4.1. Introduction 81

4.2. Regional geology and geomorphology 83

4.3. Methods and Approach 87

4.4. Results and interpretation 90

4.4.1. Petrology 90

4.4.2. Garnet and ilmenite geochemistry 92

4.3. Detrital zircon U-Pb river sand results 94

4.4. Detrital zircon U-Pb coastal sand results 97

4.5. Discussion 98

4.6. Conclusions 103

CHAPTER 5: CRETACEOUS MAGMATISM 104

5.1. Introduction 104

5.2. Geological setting 104

5.3. Samples 107

5.4. Results and Interpretation 108

5.5. Discussion 113

5.6. Summary 116

CHAPTER 6: CENOZOIC EROSION HISTORY OF CENTRAL AND SOUTHERN VIETNAM: THERMOCHRONOMETRY RESULTS 117

6.1. Introduction 117

6.2. Approach 118

6.3. Results 120

6.3.1. Apatite fission track 120

6.3.2. Apatite (U-Th)/He 125

6.3.3. Combined AFT and AHe datasets 128

6.3.4. Thermal history models. 130

6.4. Summary 132

CHAPTER 7: CENOZOIC EROSION HISTORY OF CENTRAL AND SOUTHERN VIETNAM 133

7.1. Introduction 133

7.2. Stratigraphy onshore Cenozoic sedimentary rocks 134

7.3. Stratigraphy of the marine basins 135

7.3.1. Cuu Long Basin 135

7.3.2. Phu Khanh Basin 144

7.4. Stratigraphy and rifting 149

7.5. Regional exhumation history 153

7.6. Discussion 158

7.7 Summary 161

CHAPTER 8: CONCLUSIONS AND FURTHER WORK 162

8.1. Introduction 162

8.2. Origin of coastal placer deposits of southern Vietnam 162

8.3. Cretaceous magmatism 163

8.4. Cenozoic erosion history of central and southern Vietnam 163

8.5. Further work.. 165

REFERENCES.. 166

List of Figures

Figure 1.1: Major Cenozoic sedimentary basins offshore Vietnam (Nguyen Hiep., 2007).. 20

Figure 1.2: Map to show the main locations of heavy mineral rich sands (Dao. N.D. et al., 2008).. 22

Figure 1.3: Location of the main study area... 23

Figure 1.4: Locations (blue dots) of bedrock samples (mainly granitoids) collected for apatite thermochronometry. These samples compliment a previous AFT study of central Vietnam (blue dashed lines) by Carter et al., (2000). 30

Figure 1.5: Locations of river sands and heavy mineral samples. Pink dots are the locations of samples of river sands and black dots the heavy mineral sands. 31

Figure 2.1: Geological map of Indochina (Wongsomsak, 2000). 34

Figure 2.2: Palaeogeography of east Gondwana in the Ordovician with the position of Indochina between Tarim and South China in the northern hemisphere (Metcalfe, 2011).I: Indochina, SC: South China, NC: North China, T Tarim, QI Qiangtang, S: Sibumasu, L: Lhasa, GI: Greater India, SWB: South West Borneo. 35

Figure 2.3: Palaeogeography of east Gondwana in the Ordovician showing the position of Indochina outboard of Qiangtang and south of South China in the southern hemisphere (Usuki et al., 2013).IC: Indochina, SC: South China, NC: North China, T Tarim, QT Qiangtang, S: Sibumasu, L: Lhasa, SWB: South West Borneo, GI: Greater India.. 36

Figure 2.4: Reconstruction of Gondwanaland for Late Devonian- Early Carboniferous (Metcalfe, 2011).IC: Indochina, SC: South China, NC: North China, T Tarim, QI Qiangtang, S: Sibumasu, L: Lhasa, SWB: South West Borneo... 37

Figure 2.5: Palaeogeographic model for collision between Qiantang-Sibumasu and Indochina–South China. This caused rotation of South China–Indochina leading to closure of the Song Pan Sea (Palaeotethys) and final accretion between North and South China. (Carter et al., 2001). 40

Figure 2.6: Palaeogeographic reconstruction for Indochina and adjacent regions in the Cretaceous. SG: Songpan Ganzi accretionary complex, SWB; South West Borneo, NP; North Palawan and other small continental fragments now forming part of the Philippines basement, SC: South China, I: Indochina, PS: Proto- South China Sea, N; Natuna, S: Sibumasu, L: Lhasa (Metcalfe, 2006). 42

Figure 2.7: The two main classes of model put forward to explain the extension and opening of the South China Sea: A: Rifting and sea-floor spreading are due to a left-lateral pull-apart mechanism (Tapponier et al. 1982; Taylor B., 1983). B: Trench retreat, back arc basin as a result of the subduction of old oceanic lithosphere beneath Borneo (Fyhn et al., 2009). 43

Figure 2.8: 3D Diagram to show the main geomorphologic features of the South China Sea. (Wang et al., 2009) 44

Figure 2.9: Reconstruction at 90 Ma when the Luconia-Dangerous Grounds block docked with the Asian margin (Hall, 2012). 45

Figure 2.10: Opening of the South China Sea induced by regional extension related to subduction and retreat of the Pacific plate (Taylor B., 1983) 46

Figure 2.11: A) Tectonic setting of Phu Khanh Basin; B) Broad configuration of the Phu Khanh Basin and its relationship to the regional tectonic elements (white lines are faults). Lines A and B in Figure B are the two seismic cross-sections shown in Figure C (Kjell, 2011). 47

Figure 2.12: A) Location of the Cuu Long Basin; B) Configuration of the Cuu Long Basin and its relationship with other regional tectonic elements. Line C-D in Figure B is the cross-section described in Figures C (Lee and Lawver, 1995). 49

Figure 2.13: Location of major fault zones in Vietnam (Tran et al., 2011). 58

Figure 3.1: Flow chart of the heavy mineral separation process. 61

Figure 3.2: Thermochronometers and their effective closure temperatures (adapted from Gehrels *et al*., 2002). The three methods used in this study are highlighted in blue. 63

Figure 3.3: A concordia plot showing the main types of measured age. The ellipses represent the uncertainties on measured ratios. The plot is also sometimes called the Wetherill plot after the person who invented it. 65

Figure 3.4: Computer screen controlling Laser Ablation (left) and ICP-MS (right) with Glitter 4.0 calculating the fractionation correction and results of $^{207}Pb/^{206}Pb$ and $^{206}Pb/^{238}U$ ratios. 66

Figure 3.5: A: Illustration of the closure temperature concept (T_c) in relation to the daughter/parent (D/P) ratio B: Closure temperatures in relation to cooling rate for U-Th/He and AFT methods used in this study (Reiners and Brandon, 2006). 70

Figure 3.6: Cartoon illustrating the stages used in the external detector method (Hurford & Carter 1991) 71

Figure 3.7: A typical stack of samples packaged for thermal neutron irradiation 71

Figure 3.8: Apatite mount and mica detector prepared for counting 72

Figure 3.9: The Zeiss Axioplan microscope and stage system used in this study 73

Figure 3.10: Schematic of He- ejection, retention and possible implantation based on the position of the recoil sphere (Farley, 2002) 76

Figure 3.11: Apatite grains of sample 30-03-16-06 77

Figure 3.12: A) Rows of platinum tubes pressed into parafilm ready to be loaded with apatite grains. B) close up of a tube which is 0.8 mm in diameter. 77

Figure 3.13: Loading the platinum tubes into the copper planchet ready for outgassing... 78

Figure 3.14: The Bbk UCL helium extraction line. The laser cell is located in the box on the left... 79

Figure 4.1: Locations of placer and beach sands samples and main commercial extraction sites in southern Vietnam. Samples with illmenite composition data, and mineralogical data reported in Table 1, are also indicated. 82

Figure 4.2: Locations of river sand samples collected from each of the main river outlets along the coast of Vietnam. Sample prefixes are given in brackets. 84

Figure 4.3: Map of study area geology showing locations of sand samples..... 88

Figure 4.4: Abundance of amphiboles in river sands from central Vietnam as a fraction of total grains scanned on the Qemscan slide. 92

Figure 4.5: Example of detrital garnet compositional data from river sands samples F and K from central Vietnam. Both have small catchments that drain z metamorphic and granite rich terrain. 93

Figure 4.6: Ti and Fe contents of ilmenite grains from river and coastal sand samples... 94

Figure 4.7: Kernel density and Multidimensional Scaling plots of the detrital zircon U-Pb results from the river samples shown in Figure 4.2....................... 96

Figure 4.8: Kernel density and Multidimensional Scaling plots of detrital zircon U-Pb results from coastal sands. Prefix Q indicates a Quaternary sand and MB modern beach sands. KDE plots show the extent of similarity between River K and the Quaternary sands... 97

Figure 4.9: MDS plot of heavy mineral (densities > 3.2) concentrations of sands comparing rivers in central Vietnam (blue circles) with nearby Quaternary sands (red circles). 98

Figure 4.10: Relationship between late Pleistocene to Holocene sealevel change, shorelines and locations of the heavy mineral sands. The lower plot shows the link between OSL dated sands and Holocene sea level based on data from Quang-Minh et al. (2010) and Stattegger et al. (2013). 100

Figure 4.11: Multidimensional Scaling plot combining all detrital zircon samples apart from the Mekong and Red rivers that have been excluded due to their markedly different age spectra that rule out these rivers as sand sources. 102

Figure 5.1: Simplified geological map of Southern Vietnam showing the distribution of sample location and published zircon U-Pb ages. 106

Figure 5.2: Plate setting that explains the origin of the main types of granite bodies in Southern Vietnam (from Shellnutt et al., 2013). 107

Figure 5.3: KDE plot showing all Cretaceous aged zircons present in river sands. This distribution represents the time span for Cretaceous magmatism in Southern Vietnam. Cretaceous zircon age distributions for each river are shown in Figure 5.4. 108

Figure 5.4: KDE plots of Cretaceous zircons present in sands from river mouths along the coast of Southern Vietnam (see Chapter 4 for further details, river locations are shown in figures 4.3, 5.5 and 5.6.). 109

Figure 5.5: Representative concordia plots for granite samples showing the range of MSWD values. Further details in table 5.1. 110

Figure 5.6: Geological map to show location of samples dated for this study as well as published data. 111

Figure 5.7: Geological map of the catchment area of the river Cai – Nha Trang (sample 07-05-15-09) collected near to the river mouth. Two granite bedrocks samples (14-03-15-15 and 16) were collected for analysis at proximal and distal tributaries of the main river. 112

Figure 5.8: Geological map of the catchment area of Song Cai- Hai Long (Phan Thiet) (sample 31-03-16-17) collected near to the river mouth. A bedrock

sample (13-05-15-34) collected from one of the upper tributaries provides a representative sample of the local granite age (106.9±0.4 Ma). 113

Figure 5.9: CL images of some zircons from samples 07-05-15-6B and 11-05-15-29 that include grains with inherited cores. 115

Figure 6.1: Topography of study area with samples, locations of previous work and relationship to offshore sedimentary basins. 117

Figure 6.2: Locations of rocks collected for apatite thermochronometry. 119

Figure 6.3: Plot to compare track etch pit size (a proxy for composition) and AFT central age. The plot shows not systematic relationship. 122

Figure 6.4: Plot to compare AFT central age with elevation. The grey shading represents the standard deviation (11 Myrs) of the mean age (38 Myrs). 123

Figure 6.5: Plot to compare AFT central age with lattitude. No trend is seen. 123

Figure 6.6: Shows the regional geology and apatite FT ages and lines of cross-section shown in figure 6.7 124

Figure 6.7: Topographic sections across the study area showing apatite FT ages and sample number. The location of each line is shown on the map in figure 6.6. 125

Figure 6.8: Plots comparing grain date with effective uranium content and grain radius. 126

Figure 6.9: Plot of AFT and all (unfiltered) raw and corrected AHe ages against sample elevation. 128

Figure 6.10: Location of samples from an elevation profile near Nha Trang. . 129

Figure 6.11: Representative thermal history models 131

Figure 7.1: Location of onshore samples (red dots this study, green dots Carter et al., 2000) and offshore basins. Yellow stars are well locations. 133

Figure 7.2: Isopach map of Tra Cu Formation in northeast of Cuu Long Basin (Hoang, N. H., 2011) 139

Figure 7.3: Isopach map of Tra Tan Formation in the northeast of Cuu Long Basin (Hoang, N. H., 2011) 140

Figure 7.4: Fence diagram showing the spatial relationship between the Tra Cu and Tra Tan formations in the northeastern part of the Cuu Long Basin. (Hoang, N. H., 2011) 141

Figure 7.5: Stratigraphy of the Cuu Long Basin, (Tran L.D, 2000) 143

Figure 7.6: Stratigraphic framework of Phu Khanh Basin (Tran L.D., 2000) ... 144

Figure 7.7: Cartoon to show the carbonate dominated Oligocene depositional environments in Phu Khanh Basin (after Fyhn et al., 2009). Legend at Figure 7.9 145

Figure 7.8: Cartoon to show the change in depositional environment in Phu Khanh Basin from early to late Miocene (from Fyhn et al., 2009). Legend at Figure 7.9..... 147

Figure 7.9: Legend for cartoon of facies maps (Fyhn et al., 2009) 148

Figure 7.10: Comparison of well stratigraphy in the Phu Khanh Basin. Note the arrival of sands in the middle Miocene in well BT-1X. (Nguyen, H., 2007) 149

Figure 7.11: Cartoon to show the relationship between spreading and extension along southern Indochina. PK shows location of the Phu Khanh Basin. 149

Figure 7.12: Reconstruction of spreading history of the South China Sea based on magnetic anomaly data showing the location of the Phu Khanh Basin (from Barckhausen et al., 2014). 150

Figure 7.13: Summary of regional basin stratigraphy and changes in rifting orientation (adapted from Hennig et al., 2014; Savva et al., 2014). 151

Figure 7.14: Cartoon to explain spreading history of the South China Sea (modified from Pourhiet et al., 2018). 153

Figure 7.15: Results of inversions to infer variations in regional exhumation rates in space and time. 157

List of Tables

Table 1.1. Sample list.. 29

Table 4.1. QEMSCAN mineral percentages (by volume) for untreated river and Quaternary beach sands from central and southern Vietnam. 91

Table 5.1. Summary of representative granite zircon U-Pb ages measured in this study. 112

Table 5.2. Summary of zircon inherited ages found in samples from the Deoca and Dinhquan plutons. 114

Table 6.1. Apatite fission track analytical data 121

Table 6.2. Summary of apatite (U-Th)/He analyses.. 127

Table 6.3. Samples with both AFT and AHe data that were used for modeling. No data in track length column refers to numbers of track length measurements < 50 which are considered unsuitable for modeling. 130

Table 7.1. Thickness distribution of Tra Cu Formation from well data 136

1

INTRODUCTION

1.1. Project Background

The geology of Vietnam has a long history that can be traced back to the Archean (Carter et al., 2001). The most important events relate to Gondwana assembly, Devonian rifting of the Indochina block, drift and later collision with the Asian (South China block) margin during the Triassic (the Indosinian orogeny, see chapter 2). These events and associated faulting created the main structural fabric (major faults trend NE-SW) that served as lines of weakness during later Cenozoic reactivation events driven by a combination of strain arising from the India-Eurasia collision (Tapponnier et al. 1982) and extension and rifting associated with the opening of the South China Sea. The most famous event, related to India-Asia collision, involved the extrusion of the Indochina Block (most of Vietnam) towards the southeast. It has been suggested that this tectonic event may have also driven the opening of the South China Sea (Tapponnier et al. 1982), although later tectonic models, based on more quantitative datasets, argued that the forces arising from India-Asia collision were not strong enough to trigger the opening of the South China Sea and that the subduction of the proto South China Sea was major driving force for the opening of this basin (Hall 1996, Clift and Lin 2001, Hall 2002, Barckhausen and Roeser 2004). Although debate continues about the mechanism for opening of the South China Sea most geoscientists agree that the Cenozoic tectonic evolution of Vietnam is closely linked to the India-Asia collision.

Whilst Cenozoic deformation is clearly important exactly how it affected Vietnam is not well known. Apatite thermochronometry studies, which document rock uplift and erosion, have focused mainly on the famous Red River Fault zone (Maluski et al., 2001; Viola and Anczkiewicz et al., 2008) that records an early Oligocene rapid exhumation event. Away from the Red River Fault Zone it would be expected that regional rock uplift would have been more affected by rifting and extension associated with the opening of the South China Sea. Viewed in this context the coastal-shelf margin of eastern Vietnam represents a rifted (passive) margin and is therefore an ideal area for study as it forms the transition zone between the continental lithosphere of the Indochina block and oceanic lithosphere of the western margin of the South China Sea. The offshore margin is also economically important as it hosts a number of Cenozoic sedimentary basins (Fig. 1.1) including the Phu Khanh and Cu Long basins (section 2.8 in chapter 2) that contain important reserves of hydrocarbons. The main reservoir rocks are sandstones but it is unclear if the sands are directly linked to onshore denudation related to the rifting and extension, local tectonic events or eustatic sea level changes.

Figure 1.1: Major Cenozoic sedimentary basins offshore Vietnam (Nguyen, 2007).

Also of economic importance are deposits of Neogene to Quarternary sands enriched in heavy minerals, especially high-Ti ilmenite. The origin of these sands, found mainly along the coastal margins (both onshore and offshore) is unknown. They may have come directly from local river drainages and were concentrated by wave reworking or concentrated by a process of longshore drift from more distant locations in northern Vietnam, such as the Red River delta.

1.2. Sands rich in heavy minerals

According to the Ministry of Natural Resources and Environment, ilmenite-rich sand is mainly found along the coast from central Thanh Hoa province to the northern area of southern Ba Ria -Vung Tau province. Up to 83 percent of the sand is found in central Ninh Thuan and Binh Thuan provinces and the northern area of Ba Ria - Vung Tau (Fig 1.2). It has been estimated that there are 650 million tons of reserves of ore (titanium – zircon) in the heavy mineral rich sands found along the coastal margins from Mong Cai in the north to Vung tau in the south. On land the economic sands occur as bands 1-3 km wide from the coast that are up to 10 km in length. The ore bearing sand is usually 1-4 m thick, in some places up to 9 m (Dao, 2010). The ore bearing sands lie at topographic surface, or are just below a thin bed of sand that is low in heavy minerals. The deposits also extend offshore where minerals surveys of the South Central coastal region over an area of ~10.000 km^2 in water depths up to 30 m identified nine locations that hold up to 18.6 million tons of ore (titanium, zircon, gold and casiterrite) (Dao et al., 2008)

Onshore sands with the highest concentrations of heavy minerals, especially ilmenite, are found in (Fig. 1.2): Hoang Hoa, Quang Xuong (Thanh Hoa province), Cam Xuyen, Ky Anh (Ha Tinh province) Vinh Linh (Quang Tri province) Phong Dien, Quang Dien, Phu Vang (Thua Thien Hue province) Quang Nam, Mo Duc (Quang Ngai province) Phu My- Phuoc Mai (Binh Dinh province), Song Cau (Phu Yen. Prov.), Cam Ranh (Khanh Hoa province), Ninh Phuoc (Ninh Thuan province) Bac Binh (Binh Thuan province) and Dat Do (Ba Ria-Vung Tau province).

The concentrated heavy minerals include; ilmenite, lecoxene, rutile, monazite and zircon. The ilmenite content varies from 10 to 100 kg/m^3, in some place up to 200 kg/m^3. Leucoxene and rutile contents are usually less than 1 kg/m^3, although in some places it can reach up to 3-4 kg/m^3 (coastal areas of Thua Thien-Hue province). Zircon abundances also vary; the highest average content occurs in the coastal band of Thua Thien Hue Province and in Ham Tan (Binh Thuan Province) reaching up to 12kg/m^3. The mineral grain sizes are mostly in the range of 0.16-0.25 mm (Dao, 2010).

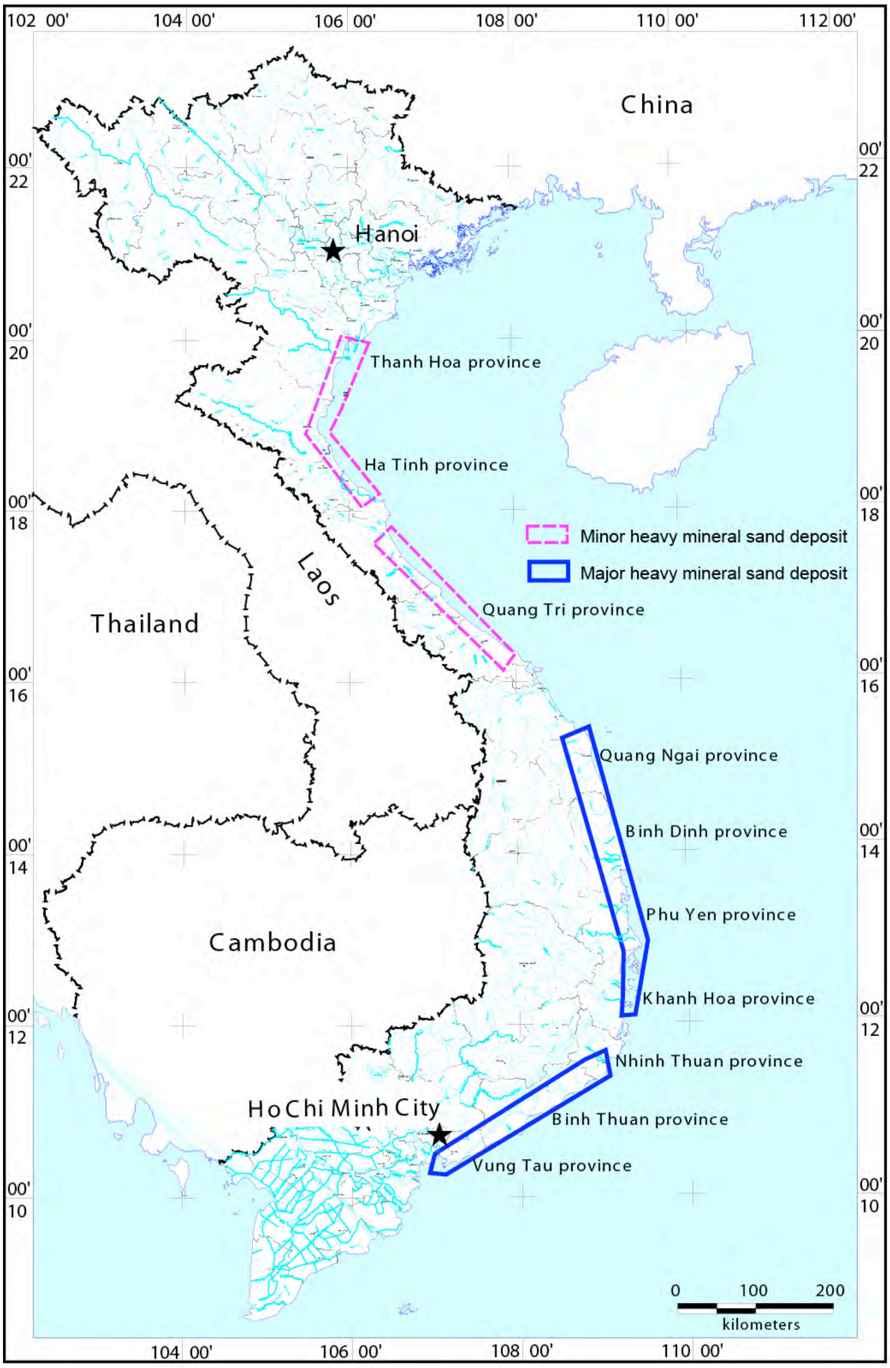


Figure 1.2: Map to show the main locations of heavy mineral rich sands (Dao et al., 2008)

1.3. Aims and objectives

This thesis has two main aims. One is to determine the Cenozoic erosion history of central and southern Vietnam. This information will be used to test how opening of the South China Sea controlled or contributed to regional onshore erosion. The other is to determine the origin of the heavy mineral rich coastal sands. To help answer this question and identify the sediment source areas I will also compare the mineralogy and zircon U-Pb ages in the coastal sands with river sand samples collected from the main drainages of Vietnam. Figure 1.3 defines my study area, which is based on proximity to the offshore hydrocarbon basins (mainly the Phu Khanh Basin) and the major deposits of the heavy mineral sands.

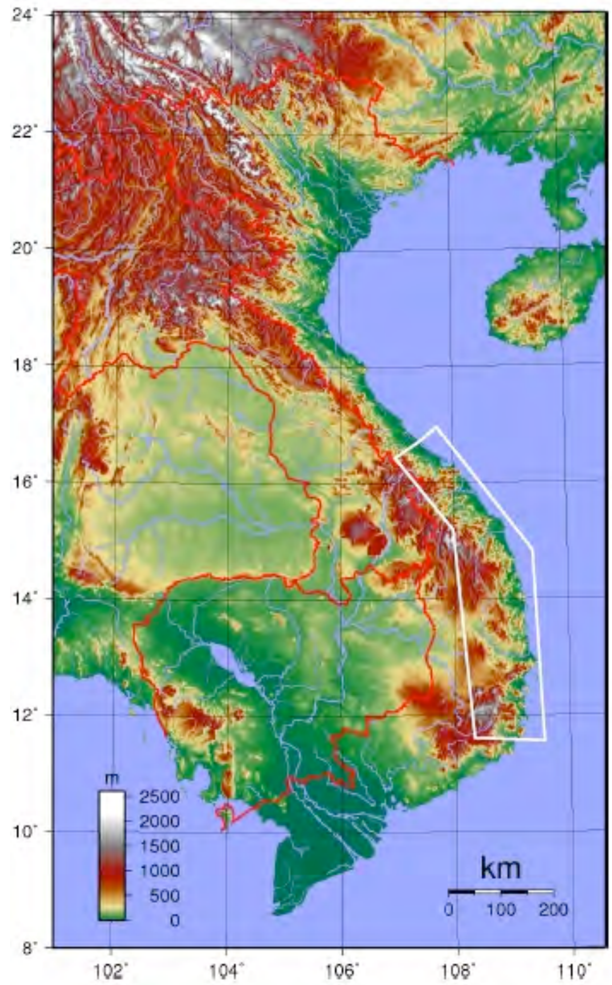


Figure 1.3: Location of the main study area

To achieve the aims I have six main objectives;

1. Collect bedrock samples for apatite thermochronometry as a series of coast to interior transects across the study area. These will include where possible vertical profiles of samples to constrain timing and rates of rock uplift

and Palaeogeothermal gradients. Figure 1.4 shows the locations for the sample transects. Horizontal transects are needed to determine if the coastal margin has a characteristic rift related pattern of erosion of increasing depths of erosion towards the continental shelf (Gallagher and Brown, 1999).

2. Collect samples of the heavy mineral sand deposits from the main mining areas for petrography and zircon U-Pb dating to determine sand provenance. Figure 1.5 shows the target locations of heavy mineral sands for sampling.

3. Collect sand samples from all of the main rivers in the study area that drain into the South China Sea for petrography work and zircon U-Pb dating. The river sands will be used to characterize the catchment geology for comparison with the heavy mineral sands. This will help to locate the main sources for the heavy mineral sands. Figure 1.5 shows the location of the main rivers and catchment areas and local geology. It will also be necessary to include river sample data from northern Vietnam, mainly the Red River, Song Ma, Song Da and Song Gianh. There are some published data from these rivers but I also collected additional samples to improve on the quality of the datasets.

4. Produce apatite fission track and (U-Th)/He thermochronometry data and thermal history models for the bedrock samples to identify the main periods of erosion and to test if there is a direct link to the opening of the South China Sea.

5. Use the apatite thermal histories to identify the periods of erosion for comparison with basin sediment accumulation histories. This will identify if there are connections between basin sedimentation, sea level changes and local or regional tectonic events.

6. Use the heavy mineral sand and river sand provenance data to identify likely sand source areas and define the pathways of sediment transport.

1.4. Methods and Approach

Low temperature thermochronology methods such as apatite (U-Th)/He and apatite fission track dating are widely used to reconstruct rock cooling histories through the uppermost 1-5 km of the crust. In most cases cooling is due to rock uplift and exhumation by erosional denudation. Thermochronometry data can be used to quantify timing and rates of erosion and thereby determine equivalent sediment flux rates and to identify links to changes in regional tectonics and deformational regime.

Apatite thermochronometry has been successfully applied to the Kontum region in central Vietnam (Carter et al., 2000). The results indicated regional surface uplift in the late Miocene associated with contemporaneous basaltic magmatism. This onshore uplift and increase in erosion rates produced a significant increase in clastic sediment delivered into in the offshore Phu Khanh Basin (Lee and Watkins, 1998), demonstrating how onshore erosion can be linked to basin sedimentation. The Kontum study was based on apatite fission track data and although this provided useful information it lacked resolution of cooling through the 60-70°C range which means that it could not provide accurate constraints on the last stages of rock uplift and exhumation (roughly the top 1 to 1.5 km of crust). The best thermochronometry interpretations are based on using both apatite fission track and (U-Th)/He methods since this combination allows for rock uplift to be followed through the uppermost 1-5 km of crust. This is the approach that I will use to study the uplift and erosion history of central and southern Vietnam.

To monitor sediment provenance, mainly for the coastal sands that are mined for heavy minerals, I used a combination of petrographic and heavy mineral analysis and zircon U-Pb dating. The mineral analysis was done by automated energy-dispersive X-ray spectroscopy using a QEMSCAN® instrument which allows micron-scale mapping and mineral identification of samples (Pirrie, & Rollinson, 2011). Some samples were repeated to test for reproducibility and compared against conventional petrography. Some samples were analysed by electron microprobe to determine the compositions of garnet and illmenite to help define the source lithologies. Detrital zircon U-Pb geochronology is an established and widely used method in provenance studies e.g. Rittner et al., (2016).

1.5. Samples

Samples were collected during several field visits made between May 2014 and June 2017. For bedrock samples sampling was made from the coast to between 20–40 km inland across the elevation range. Although any apatite bearing rock type is suitable Mesozoic granitoids are common throughout the study area and therefore more often than not this was the main lithology collected. Each sample was between 3-5 kg. In locations where there was a rapid increase in elevation over a short distance samples were collected every 300-500m rise in elevation. For the river sand samples I collected 2-3 kg of medium sand from locations close to the river mouth. In some cases the river mouths had been disturbed by human activities (including cement covering the river banks) and so samples were collected inland away from any disturbance. The darker ilmenite rich heavy mineral sands were collected after removing the topmost less dense layer. Again 2-3 kg were collected per sample. Mineral separations were then made using the facilities of the North Vietnam Division of the Geological Survey.

No.	Sample	Rock type	Latitude	Longitude	Elev. (m)	Zir.	Apat.
1	12-03-15-01	granite	N12 51 47.7	E109 23 51.7	111	X	X
2	12-03-15-02	granite	N12 14 37.0	E109 15 47.4	69	X	X
3	12-03-15-03	granite	N12 39 03.5	E109 24 54.5	14	X	X
4	12-03-15-04	granite	N12 40 35.4	E109 08 13.6	60	X	X
5	13-03-15-05	granite	N12 10 04.1	E109 02 59.2	53	X	X
6	13-03-15-06	granite	N12 07 52.2	E109 00 57.8	141	X	X
7	13-03-15-07	granite	N12 06 45.1	E108 59 22.4	439	X	X
8	13-03-15-08	granite	N12 06 50.3	E108 58 38.0	836	X	X
9	13-03-15-09	granite	N12 07 37.5	E108 57 51.1	1187	X	X
10	13-03-15-10	granite	N12 07 12.5	E108 56 52.7	1474	X	X
11	13-03-15-11	granite	N12 12 08.4	E109 02 21.6	44	X	X
12	13-03-15-12	granite	N11 58 05.6	E109 06 41.6	40	X	X
13	13-03-15-13	granite	N11 59 03.1	E109 01 06.4	314	X	X

No.	Sample	Rock type	Latitude	Longitude	Elev. (m)	Zir.	Apat.
14	13-03-15-14	granite	N11 58 12.0	E109 00 04.8	598	X	X
15	14-03-15-15	granite	N12 10 05.1	E109 11 30.9	3	X	X
16	14-03-15-16	granite	N12 13 52.1	E108 47 33.3	245	X	X
17	14-03-15-17	granite	N12 14 02.7	E108 46 22.9	615	X	X
18	14-03-15-18	granite	N12 11 41.0	E108 43 54.0	1098	X	X
19	14-03-15-19	granite	N12 07 43.3	E108 37 12.6	1638	X	X
20	14-03-15-20	granite	N12 07 59.4	E108 35 56.9	1524	X	X
21	14-03-15-21	granite	N11 56 29.9	E108 29 09.9	1608	X	X
22	14-03-15-22	granite	N11 56 10.6	E108 24 22.9	1586	X	X
23	14-03-15-23	granite	N11 59 21.0	E108 12 06.0	1489	X	X
24	14-03-15-24	granite	N12 10 34.2	E108 22 44.3	1369	X	X
25	14-03-15-25	granite	N12 06 09.7	E108 22 39.1	1788	X	X
26	15-03-15-26	granite	N11 55 53.5	E108 21 33.9	1250	X	X
27	15-03-15-27	granite	N11 54 14.5	E108 18 19.8	1201	X	X
28	15-03-15-28	granite	N11 54 26.6	E108 14 04.5	980	X	X
29	15-03-15-29	granite	N11 55 29.8	E108 10 24.4	1226	X	X
30	15-03-15-30	granite	N12 15 44.7	E108 05 30.0	565	X	X
31	15-03-15-31	granite	N12 27 27.6	E108 12 59.2	532	X	X
32	16-03-15-32	granite	N16 08 38.6	E108 08 09.7	80	X	X
33	16-03-15-33	granite	N16 11 23.8	E108 07 52.0	457	X	X
34	07-05-15-06a	mafic rock	N13 03 37.0	E109 17 23.1	9	X(few)	No
35	07-05-15-06b	mafic rock	N13 03 37.0	E109 17 23.1	9	X	X
36	08-05-15-10	granite	N11 49 14.8	E109 08 43.0	10	X	X
37	08-05-15-12	granite	N11 45 07.6	E109 12 49.5	141	X	X
38	08-05-15-13	granite	N11 28 36.0	E108 56 55.9	69	X	X
39	08-05-15-15	granite	N11 21 31.0	E109 00 04.8	67	X	X
40	08-05-15-16	granite	N11 20 01.1	E108 51 42.5	22	X	X
41	09-05-15-22	granite	N10 30 03.6	E107 30 27.2	9	X	X
42	09-05-15-24	granite	N10 22 51.6	E107 15 09.8	20	X	X
43	11-05-15-26	granite	N10 51 27.2	E107 36 03.3	93	X	X
44	11-05-15-27	granite	N10 58 25.0	E107 37 36.6	148	X	X
45	11-05-15-28	granite	N11 17 27.4	E107 39 01.0	229	X	X
46	11-05-15-29	granite	N11 24 59.7	E107 35 08.7	193	X	X
47	11-05-15-30	granite	N11 43 19.5	E107 43 32.3	1016	X	X
48	12-05-15-31	granite	N11 49 14.8	E107 58 54.0	752	X	X
49	13-05-15-32	granite	N11 25 02.7	E108 05 08.3	1019	X	X
50	13-05-15-33	granite	N11 17 41.2	E108 06 00.2	589	X	X
51	13-05-15-34	granite	N11 09 46.2	E108 08 50.2	66	X	X
52	18-06-15-10	granite	N12 54 33.1	E109 26 33.9	22	X	X
53	18-06-15-11	granite	N12 54 55.3	E109 26 41.8	28	X	X
54	18-06-15-12	granite	N12 54 44.1	E109 27 02.7	72	X	X
55	19-06-15-13	granite	N11 48 42.1	E109 09 53.0	88	X	X

No.	Sample	Rock type	Latitude	Longitude	Elev. (m)	Zir.	Apat.
56	19-06-15-14	granite	N11 47 45.9	E109 10 40.1	35	X	X
57	30-03-16-02	granite	N11 52 16.6	E109 04 31.9	57	X	X
58	30-03-16-03	granite	N11 50 50.9	E108 57 37.5	186	X	X
59	30-03-16-04	granite	N11 49 17.3	E108 42 31.0	158	X	X
60	30-03-16-05	granite	N11 50 56.0	E108 40 42.5	463	X	X
61	30-03-16-06	granite	N11 50 28.0	E108 39 31.8	866	X	X
62	30-03-16-07	granite	N11 42 40.7	E108 48 41.6	40	X	X
63	31-03-16-10	granite	N11 28 52.4	E108 50 31.3	41	X	X
64	31-03-16-11	granite	N11 29 19.5	E108 47 48.8	81	X	X
65	31-03-16-12	granite	N11 23 24.4	E108 53 53.8	35	X	X
66	31-03-16-14	granite	N11 17 06.5	E108 39 11.0	72	X	X
67	31-03-16-15	granite	N11 23 02.4	E108 38 49.9	174	X	X
Heavy mineral sand							
68	07-05-15-07	sand	N12 42 10.4	E109 23 58.2	23	X	
69	07-05-15-08	sand	N12 38 21.4	E109 24 40.6	30	X	
70	08-05-15-11	sand	N11 51 51.7	E109 11 08.8	13	X	
71	08-05-15-14	sand	N11 24 54.8	E108 59 46.6	48	X	
72	08-05-15-17	sand	N11 10 56.9	E108 41 50.9	15	X	
73	09-05-15-18	sand	N10 55 26.2	E108 06 54.2	7	X	
74	09-05-15-19	sand	N10 51 23.3	E108 02 56.0	10	X	
75	09-05-15-20	sand	N10 42 21.7	E107 50 51.8	15	X	
76	09-05-15-21	sand	N10 37 07.8	E107 39 23.5	42	X	
77	09-05-15-23	sand	N10 29 34.9	E107 27 38.2	21	X	
78	09-05-15-25	sand	N10 20 38.5	E107 05 48.2	9	X	
79	13-05-15-35	sand	N10 56 41.6	E108 16 14.0	12	X	
80	13-05-15-36	sand	N11 00 58.8	E108 21 20.9	11	X	
81	13-05-15-37	sand	N12 04 54.1	E109 10 51.7	21	X	
River sand							
No.	**Sample**	**River name**	**Latitude**	**Longitude**		**Zircon**	**Apatite**
82	06-05-15-01	Cua Dai	N15 52 35.4	E108 23 30.8	3	X	
83	06-05-15-02	Tra Khuc	N15 08 05.9	E108 48 03.2	12	X	
84	06-05-15-03	Song Ve	N15 02 27.0	E108 51 10.2	1	X	
85	06-05-15-04	Bong Son	N14 24 41.4	E109 00 25.9	10	X	
86	07-05-15-05	Da Rang	N13 03 37.0	E109 17 23.1	9	X	
87	07-05-15-09	Song Cai	N12 16 05.3	E109 02 10.8	16	X	
88	14-05-15-38	Song Cau	N13 28 06.3	E109 11 35.8	15	X	
89	30-03-16-01	Song Can	N11 50 11.4	E109 06 35.5	1	X	
90	30-03-16-08	Kinh Dinh	N11 36 12.7	E108 55 40.0	8	X	
91	31-03-16-09	Song Lu	N11 31 11.7	E108 55 19.2	13	X	
92	31-03-16-13	Dai Hoa	N11 14 22.6	E108 43 37.3	1	X	
93	31-03-16-16	Song Dong	N11 11 51.6	E108 32 42.7	3	X	
94	31-03-16-17	Song Cai- Hai Long	N10 58 20.7	E108 08 30.0	5	X	

No.	Sample	Rock type	Latitude	Longitude	Elev. (m)	Zir.	Apat.
95	31-03-16-18	Ca Ti	N10 55 56.0	E108 04 34.5	2	X	
96	01-04-16-19	Song Phan	N10 44 26.7	E107 52 28.1	1	X	
97	01-04-16-20	Song Dinh	N10 41 12.9	E107 45 45.4	1	X	
98	01-04-16-21	Long Huong	N10 29 40.8	E107 09 55.1	4	X	
99	03-04-16-22	Sai Gon	N10 51 42.8	E106 51 01.7	9	X	
100	14-11-16-01	Me Kong (N Lao)	N19 58 16	E102 14 35		X	
101	14-11-16-02	Me Kong (S Lao)	N16 41 28.35	E104 46 7.87		X	
102	14-11-16-03	Song Ma	N19 47 22.87	E105 49 34.72		X	
103	12-03-17-04	Song Huong	N16 34 8.99	E107 37 29.98		X	
104	13-02-17-05	Song Lam	N18 40 29.97	E105 43 42.46		X	
105	26-06-17-06	Me Kong (Viet Nam)	N10 16 55.27	E106 6 51.63		X	
106	26-06-17-07	Song Hong	N20 17 19.06	E106 33 2.75		X	
107	26-06-17-08	SongGianh	N17 42 51.84	E106 26 40.34		X	

Table 1. 1. Sample list

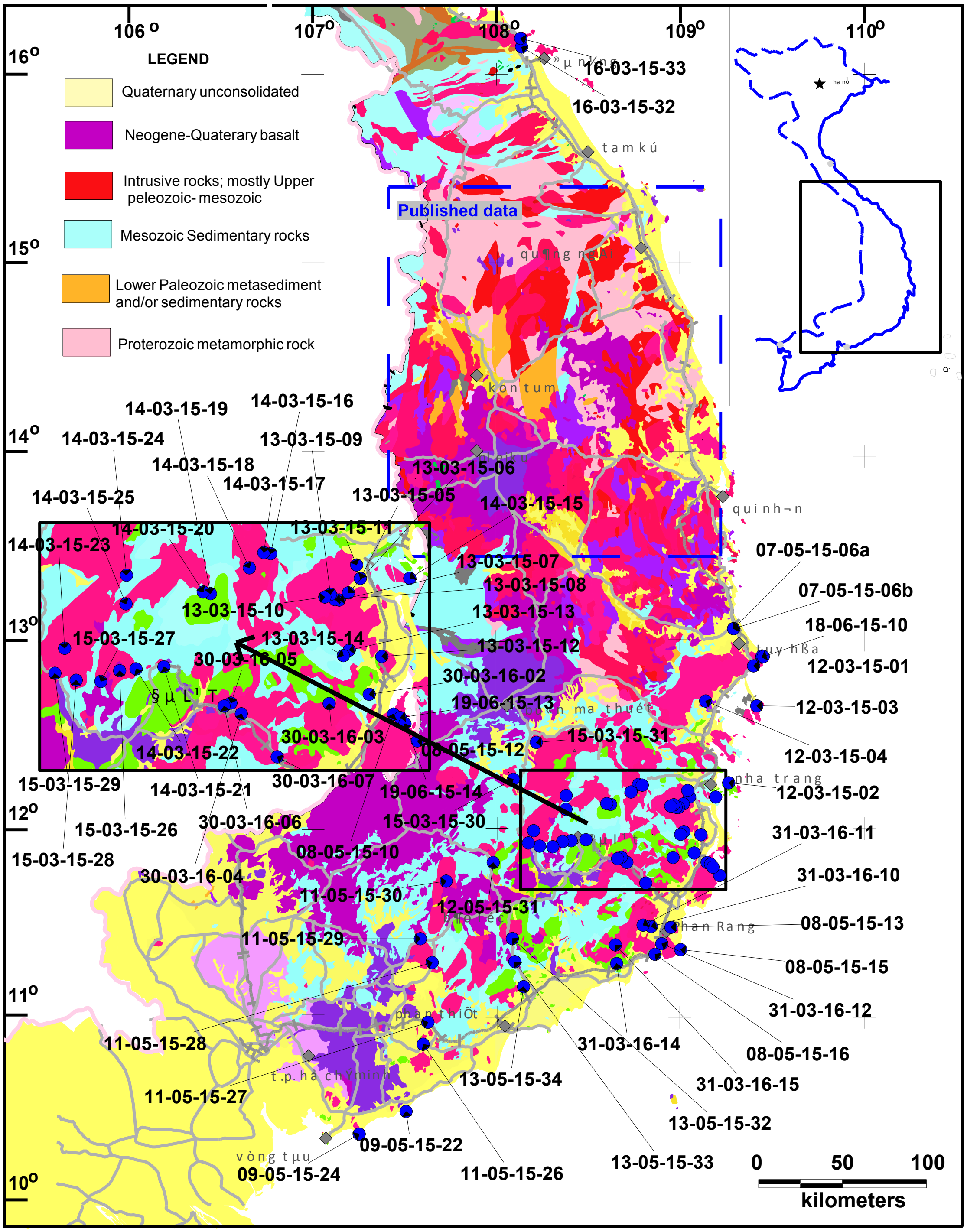


Figure 1.4: Locations (blue dots) of bedrock samples (mainly granitoids) collected for apatite thermochronometry. These samples compliment a previous AFT study of central Vietnam (blue dashed lines) by Carter et al., (2000).

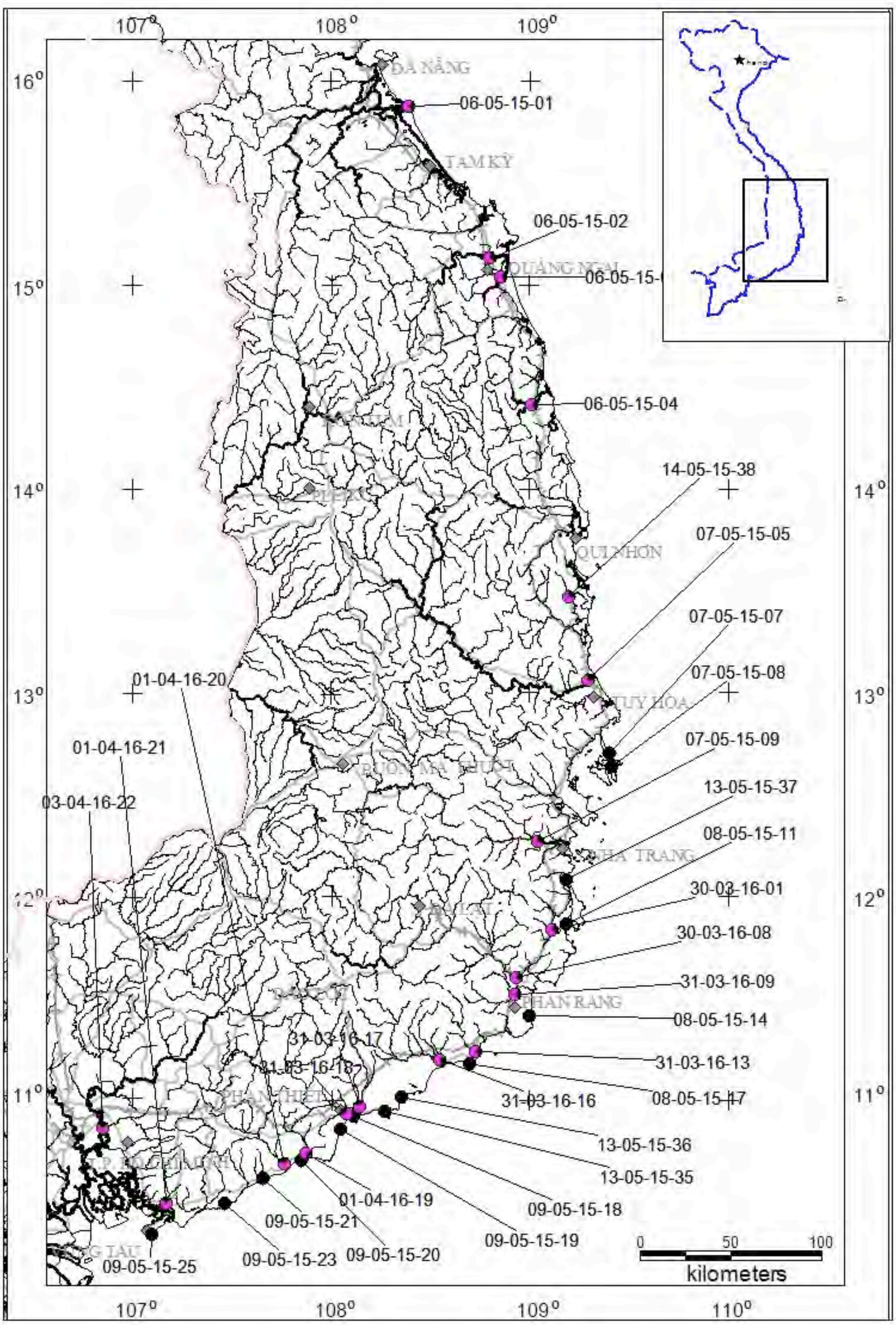


Figure 1.5: Locations of river sands and heavy mineral samples. Pink dots are the locations of samples of river sands and black dots the heavy mineral sands.

1.6. Organisation of thesis

There are eight chapters in this thesis. Chapter 1 provides an introduction to the main aims and objectives. Chapter 2 outlines the geological setting of the study area and Chapter 3 explains the methodologies and approach used. These include the apatite fission track and apatite (U-Th)/He methods, detrital zircon U-Pb geochronology and sand petrology based on Qemscan analyses.

Chapter 4 is the first data and interpretation chapter based on my recent publication in Sedimentary Geology (Appendix B). This work explains the provenance, routing and weathering history of heavy minerals from coastal placer deposits of Southern Vietnam.

Chapter 5 covers Cretaceous magmatism which so far has not been well described for southern Vietnam. The river data from chapter 4 provides an ideal way to capture, at the large scale, the range of ages representative of magmatism across the study region.

Chapters 6 and 7 are about the Cenozoic erosion history of central and southern Vietnam. Chapter 6 presents the apatite thermochronometry results and identifies the main features that are used in Chapter 7 to define the Cenozoic erosion history of central and southern Vietnam and compare timings with rifting history of the East Sea and associated with sedimentary archives in the offshore basins.

Chapter 8 present the main conclusions from my research and includes suggestion for further work.

There are two appendices, one of which contains sample information and raw analytical data, and the other contains a published paper based on Chapter 4.

2

GEOLOGICAL SETTING

2.1. Introduction

Indochina, defined as the region covered by modern-day Vietnam, Laos, Cambodia, and eastern Thailand, rifted from Gondwana in the Palaeozoic and Mesozoic. The geology of Vietnam (Fig. 2.1) reflects the tectonic history of Gondwana assembly, rifting, drift and later collision with the Eurasian margin. The structures associated with this history influenced how later Cenozoic rifting associated with the opening of the South China Sea affected the eastern margin of Vietnam. This chapter outlines the main geological framework of Vietnam in the context of these events. I will begin by first reviewing the history of geological mapping in Vietnam.

The first geological maps were mainly from reconnaissance mapping studies made in the early 20th century by French geologists. Fromaget introduced the concept of Indosinian Orogeny in 1927 based on his mapping work in North Vietnam. Mapping stopped from 1941 until the end of 1954 due to wars with Japanese (1941-1945) and French colonialists (1945-1954). Systematic regional mapping programs at scales 1:500.000 did not start until the 1960’s (Dovjikov et al., 1965) and 1:200.000 (Nguyen, 1969), and a program of systematic geological mapping at the 1:50.000 scale by the Department of Geology and Minerals of Vietnam continues at present-day.

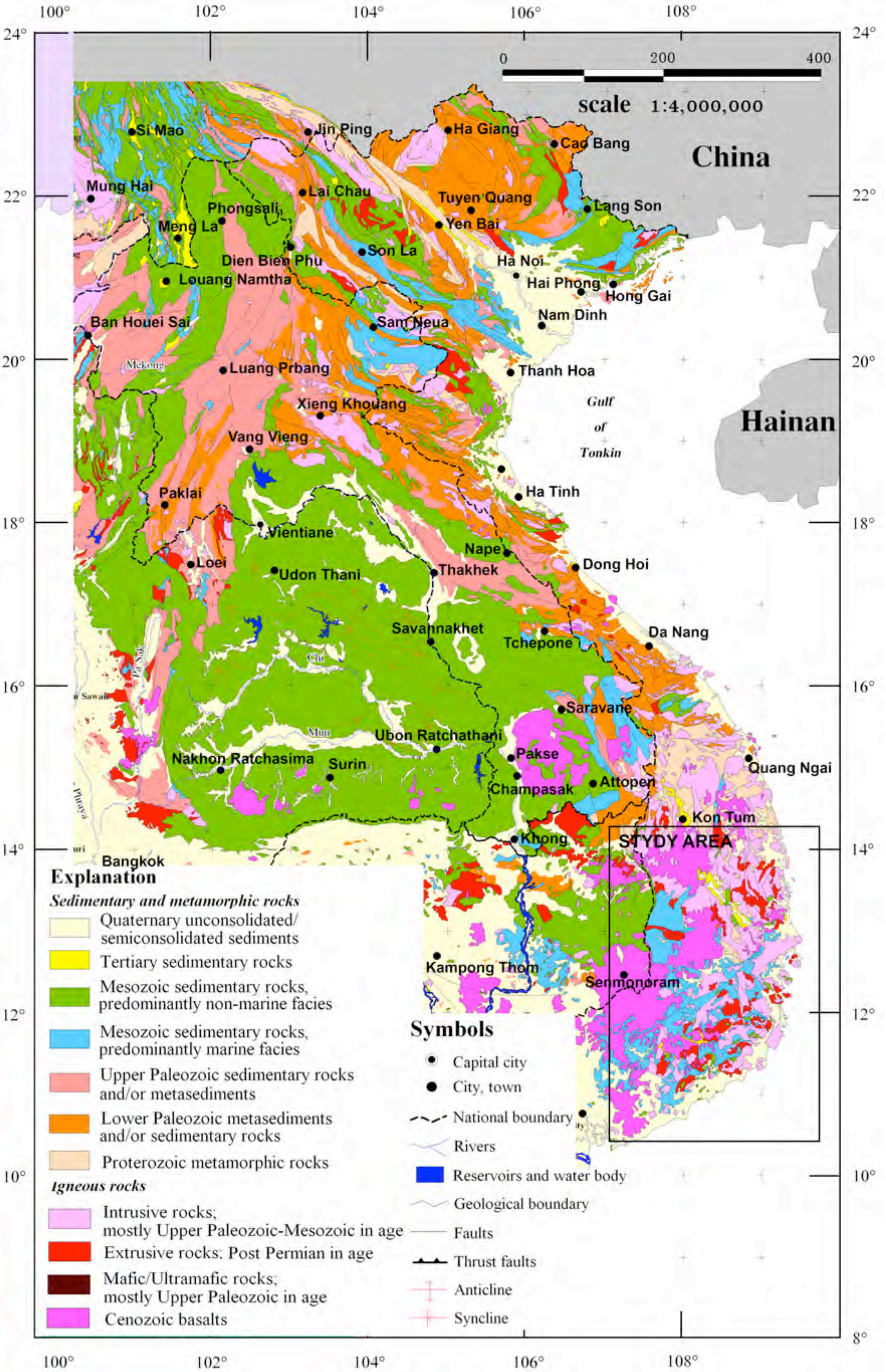


Figure 2.1: Geological map of Indochina (Wongsomsak, 2000).

2.2 Gondwana Assembly and breakup

The Indochina terrane originated in Gondwana and probably formed by earlier accretion events during Gondwana assembly. There is still uncertainty about the exact location of Indochina within Gondwana during the Cambrian-Ordovician period, Metcalfe, (1999) favours a location for Indochina, accompanied by South China, North China, Tarim, Qiangtang and Sibumasu along the northern margin of Gondwana (Fig. 2.2). In contrast, a recent study by Usuki et al., (2013) of detrital zircons from the Truong Son Belt (U-Pb and Hf isotopes) found similar age distribution and Hf isotope compositions to the Tethyan Himalaya, western Cathaysia, and Qiangtang block that suggested Indochina was located outboard of the South China segment of Gondwana during the Early Palaeozoic (Fig. 2.3).

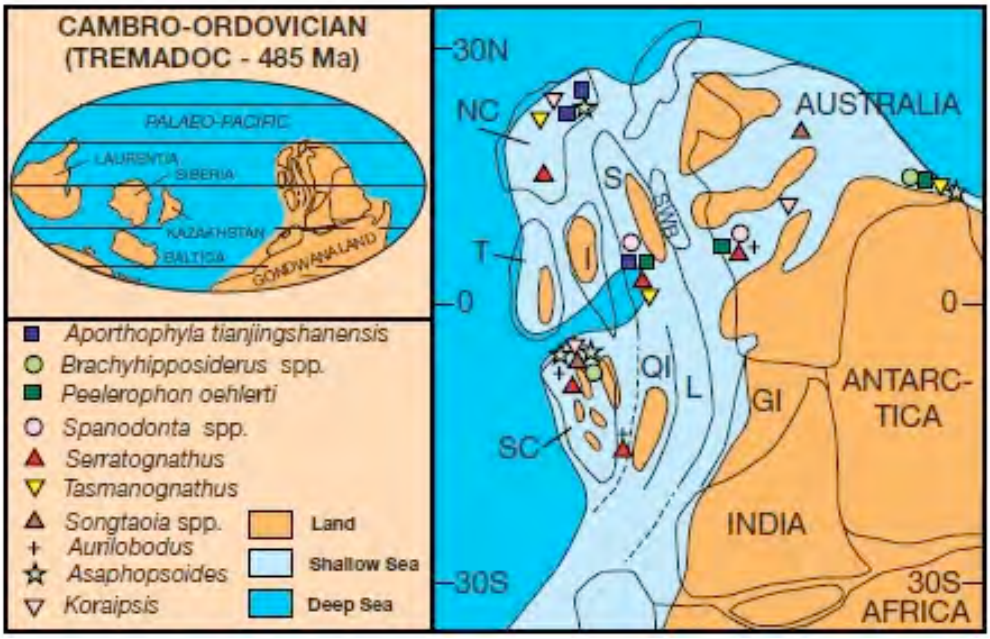


Figure 2.2: Palaeogeography of east Gondwana in the Ordovician with the position of Indochina between Tarim and South China in the northern hemisphere (Metcalfe, 2011). I: Indochina, SC: South China, NC: North China, T Tarim, QI Qiangtang, S: Sibumasu, L: Lhasa, GI: Greater India, SWB: South West Borneo.

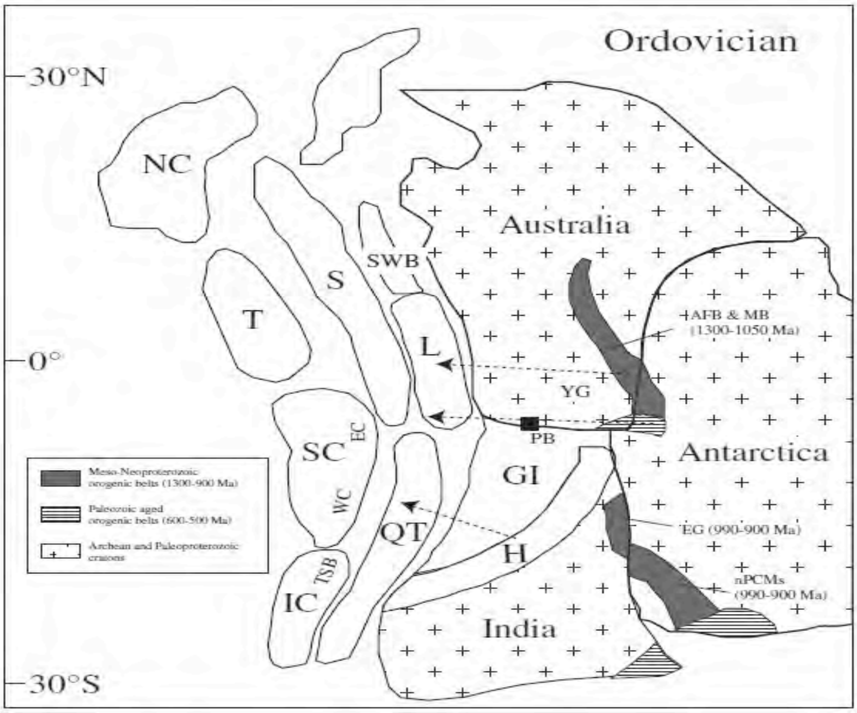


Figure 2.3: Palaeogeography of east Gondwana in the Ordovician showing the position of Indochina outboard of Qiangtang and south of South China in the southern hemisphere (Usuki et al., 2013). IC: Indochina, SC: South China, NC: North China, T Tarim, QT Qiangtang, S: Sibumasu, L: Lhasa, SWB: South West Borneo, GI: Greater India.

2.3. Rifting and separation of Indochina and adjacent regions from Gondwana

The Indochina Terrane is interpreted to have rifted and separated from the outer margin of northern Gondwana in the Early Devonian, along with the East Malaya and South China Terranes, and to have started drifting and separating northwards by opening of the Palaeotethys ocean (Metcalfe, 2005, 2006). This is supported by multidisciplinary data that record Australian affinities of Cambrian-Caboniferous fauna and flora, for North China, South China, Indochina and the Sibumasu terranes (Metcalfe, 1988, Burrett et al., 1990). From Carboniferous time onwards, the fauna and flora of North China, South China and Indochina resembled one another but not Gondwana (Metcalfe, 1988).

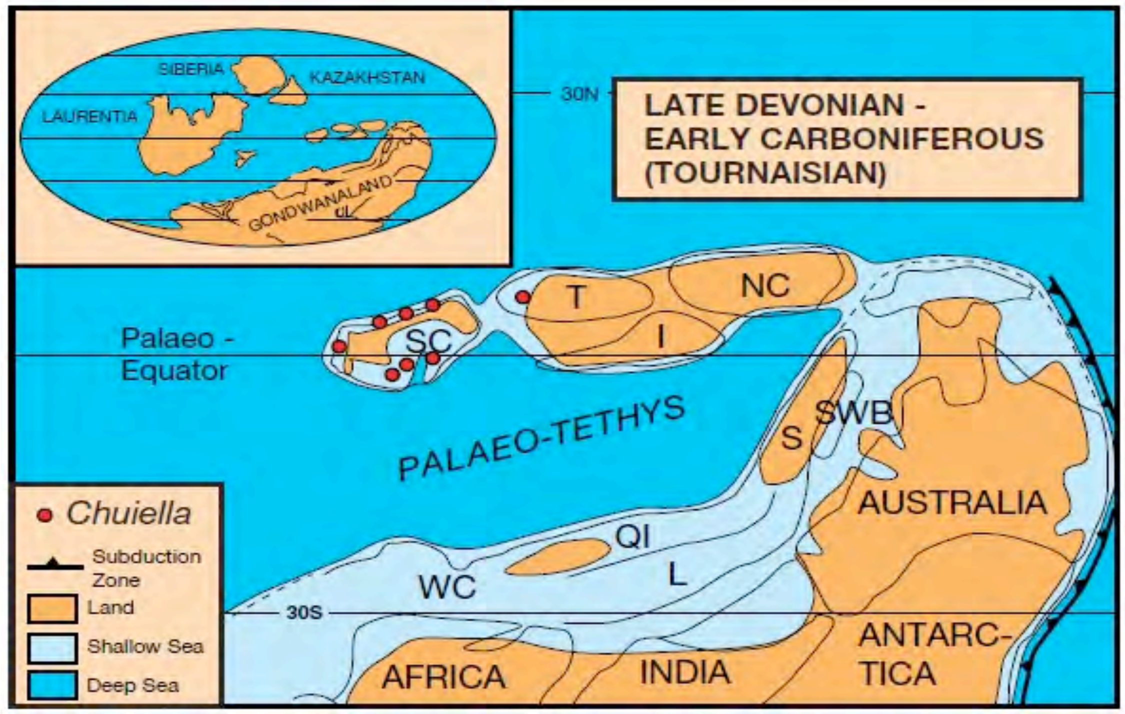


Figure 2.4: Reconstruction of Gondwanaland for Late Devonian- Early Carboniferous (Metcalfe, 2011). IC: Indochina, SC: South China, NC: North China, T Tarim, QI Qiangtang, S: Sibumasu, L: Lhasa, SWB: South West Borneo.

The exact position of South China, East Malaya and Indochina during the early stages of break-up are uncertain, but based on Palaeomagnetic data (Zhao, et al., 2015) it has been suggested that in the Late Palaeozoic South China was located at an equatorial latitude whereas early and middle Palaeozoic data show that it was positioned in equatorial to low northern Palaeolatitudes. This evidence is consistent with drifting northward from southern high latitudes, towards the equator.

However, the time of rifting of the Indochina and South China blocks from Gondwanaland is still controversial. Metcalfe's view (1999) suggested that Indochina and South China began to rift away from Gondwanaland in the Devonian. A number of other scenarios have also been proposed and some studies suggest that rifting commenced as early as the Ordovician or Silurian (e.g., Hutchison, 1989).

Another terrane, known as Sibumasu (which includes western Thailand) separated from Gondwana after South China and Indochina, It remained attached to Northwest Gondwana until Early Permian times (Metcalfe, 2011). After that Sibumasu separated and moved northwards during the Permian, constrained by changes in Devonian flora and faunal characteristics from cool-water and cool-climate Gondwana biotas in the Early Permian to endemic Sibumasu province faunas in the late Early Permian- early Middle Permian and then to warm - climate equatorial Cathaysian province faunas in the Late Permian (Metcalfe, 2013). Drifting of Sibumasu was helped by the opening of the Meso - Tethys ocean between Gondwana and the Cimmerian continent.

2.4. Amalgamation

Timing of amalgamation of Indochina, South China and Sibumasu terranes has also been controversial due to a lack of an identifiable suture zone and ambiguous ophiolite type rocks. Many believe collision occurred during the Middle Palaeozoic to Early Mesozoic. There is now broad agreement that collision between the Indochina and South China terranes took place along the Song Ma suture zone in Northwest Vietnam and Northeast Laos (e.g., Metcalfe, 1999; Hutchison, 1989) based on rocks with an ophiolitic character, but timing is poorly constrained due to strong overprinting events that make dating these rocks problematic. Previous studies have given the age of collision as Devonian (Janvier et al., 1998, Tong et al., 2005) to Carboniferous (Metcalfe, 2011) to Permian (Thanh, 2014) to Triassic (Lepvrier et al., 1997).

Further work on rocks of the Song Ma zone is required to find out exactly when collision took place. What is clear is that collision must predate the Triassic sequences found in northern Vietnam as these are relatively undeformed and blanket the whole region.

2.5. Post collision: Mesozoic geology

The sedimentary environment changed in the Mesozoic, from marine to continental. From the Late Proterozoic to the Triassic both Indochina and South China terranes were mainly in a shallow marine environment setting. From the Permian to Middle Triassic the Yangtze Platform, a part of the South China terrane was dominated by shallow marine carbonates, including reefs, carbonate ramps and platform (Enos et al., 1998 and Lehrmann et al., 2005). The same environment is found in the North Vietnam with Early- Middle Triassic limestone sequences comprising dark-grey thin-bedded limestones and light-grey massive limestones that attain thicknesses between 650 m and 1000m. Age control is good and common fossils are; *Mentzelia mentzelii*, *Cuccoceras cuccense, Paraceratites subtrinodosus, Daonella elongata, D. sturi* (Vu, 1984).

By the end of the Late Triassic, marine sedimentation had finished and the stratigraphy records a change from a shallow marine shelf clastic environment to a terrestrial fluvial environment. During the Late Triassic, folding and uplift along the northern margins of the Indochina terrane resulted in a marine regression (Fig. 2.1; Fontaine, 1978). Evidence for the transitional period is seen in the Hon Gai and Suoi Bang Formations comprising coquinoid siltstone, conglomerate, gritstone, interbeds of siltstone, shale sandstone, siltstone, interbeds of gravelstone, coaly shale, and coal seams (with commercial value) in Quang Ninh Province. Fossils include *Clathropteris meniscioides, Podozamites lanceolatus, Taeniopteris nilssonioides; Dictyophyllum nathorstii, Thaumatopteris remauryi; Cycadites saladini, Taeniopteris jourdyi, Glossopteris indica* (Vu, 1984). Subsequently, the erosion of the folded and uplifted areas supplied sediment for the continental red-bed facies that covered Indochina during the Late Triassic to Cretaceous (Fig. 2.1; Fontaine, 1978).

Jurassic rocks occur in northwest and central Vietnam, and are mostly continental red-bed facies comprising conglomerate, greenish-grey sandstone, pebble-bearing sandstone, silty sandstone, siltstone, interbeds of brownish sandstone, quartz sandstone, chocolate siltstone and claystone, some interbeds of arkosic sandstone, polymictic sandstone, and calcareous siltstone.

Common plant fossils are *Phyllocladoxylon vietnamense, Protophyllocladoxylon thylloides , Brachioxylon* sp (Vu, 1984).

The changing Palaeogeography of Indochina in the Mesozoic may be related to the collision and welding of Sibumasu terrane with the Indochina terrane. Accretion began in the latest Permian, continued in the Early - Middle Triassic (Metcalfe, 2011) and ended with the collision between Sibumasu and South China in the Late Triassic (Dong et al., 2013). Initial stages of collision began with convergence through subduction and closure of the Song Pan Sea (eastern Palaeotethys) (Fig. 2.5). The western part of Sibumasu, which faced Palaeotethys, was unconfined and drifted northward faster than the remaining part, which was tied to Indochina–South China as the Indochina–South China block rotated clockwise (Carter et al. 2001). It caused a large part of the continental crust in Vietnam to undergo high temperature metamorphism and movement on northwest-southeast oriented faults that run parallel to the regional schistosity. Deformation pre-dated deposition of late Mesozoic sediments (Fig. 2.1) (Rangin, 1995). On the basis of ductile deformation in the Truong Son belt, an oblique convergence arrangement is favoured (Lepvrier et al., 1997).

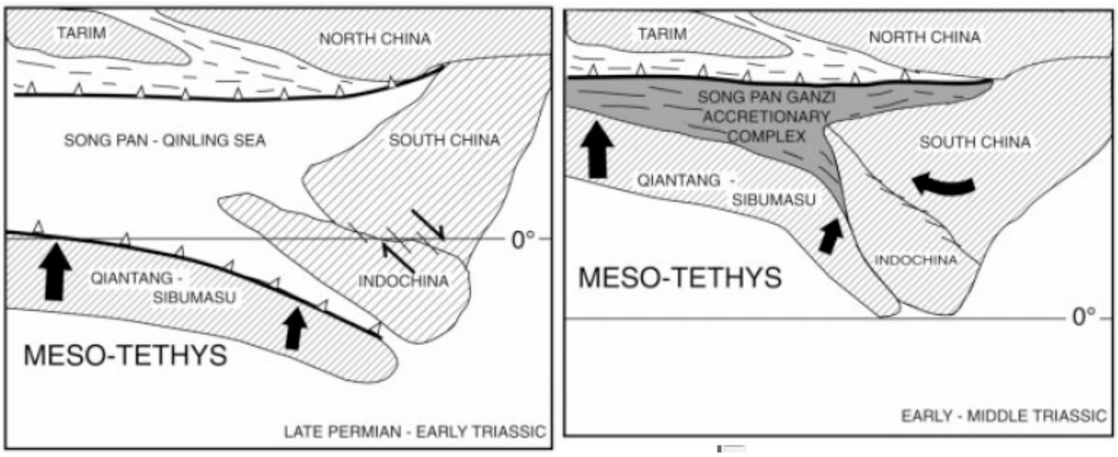


Figure 2.5: Palaeogeographic model for collision between Qiantang-Sibumasu and Indochina–South China. This caused rotation of South China–Indochina leading to closure of the Song Pan Sea (Palaeotethys) and final accretion between North and South China. (Carter et al., 2001).

The Triassic Truong Son belt that extends from northeastern Laos to central Vietnam, is one of the most important tectonic features of the Indochina terrane, It is a northwest- southeast trending structure and spreads from the northern Song Ma Suture, considered by many as the boundary between the Indochina and South China terranes (Lepvrier et al., 2007; Roger et al., 2014), to the southern Tam Ky–Phuoc Son Suture, which marks the boundary with the Kontum terrane (Lepvrier et al., 1997). Structural, kinematic and geochronological data collected in Vietnam, have significantly constrained geodynamic reconstructions. Lepvrier (2007) suggested that the main phase of Truong Son ductile deformation and high-temperature metamorphism took place between 250–240 Ma, and this tectonothermal event was interpreted as the result of a oblique collision of Indochina with Sibumasu (Carter et al., 2001). Two metamorphic massifs in the northern part of central Vietnam, at Bu Khang and Dai Loc recorded a U-Pb age of 244-246 Ma. Most of the intensive and extensive magmatism in the Truong Son belt appeared during the Late Permian and Middle Triassic, e.g. U–Pb ages (276–202 Ma) of granitoid rocks from Dien Bien and Chieng Khuong complexes in the northern Truong Son belt (Liu et al., 2012) and U–Pb age of 260 ± 4 Ma for Tien Phuoc granite (Ben Giang-Que Son complex) in the southern Truong Son belt (Hoa et al., 2008).

The Kontum Massif, in central Vietnam is dominated by metamorphic and magmatic rocks. Roger *et al*., (2007) suggested that the Kontum Massif had to be pre-Indosinian, since radiometric ages ranged between 450–475 Ma, corresponding to an Ordovician magmatic and metamorphic episode. But this study did not discuss the impact of the thermotectonic Triassic event. Some of the radiometric data from this area fall in the range of 240–250 Ma, contemporaneous to the event in the Truong Son Belt (Maluski et al., 2005). In the granulite Kannack Complex, yielded the oldest U–Pb monazite ages of 465–470 Ma (Roger et al., 2007) in the eastern Song Bien River. By contrast, the granulite rocks cropping out in the Song Ba valley yielded concordant Triassic ages. U–Pb monazite ages of 247 Ma have also been recorded in this area (Roger et al., 2007) as well as a zircon U-Pb age of 258 +/-7 Ma (Carter et al., 2001). This suggests Triassic deformation extended beyond just the Truong Son Belt.

During the Late Cretaceous eastern Indochina was an active continental margin evidenced by widespread occurrence of arc related magmatic rocks (Hall, 2012; Metcalfe, 2006). This involved the subduction of the Palaeo-Pacific oceanic crust beneath southern China, Vietnam and southern Borneo (Hall et al., 2009, Hall, 2012). At the same time, southwest Borneo and the north Palawan terrane and other small continental fragments were separated from Indochina and South China to open the proto-South China Sea (Metcalfe, 2006). Chen et al., (2008) studied the geochemistry of magmatic rocks across the southeast China and southeast Indochina margins and considered the granitoid rocks to be mainly A-type.

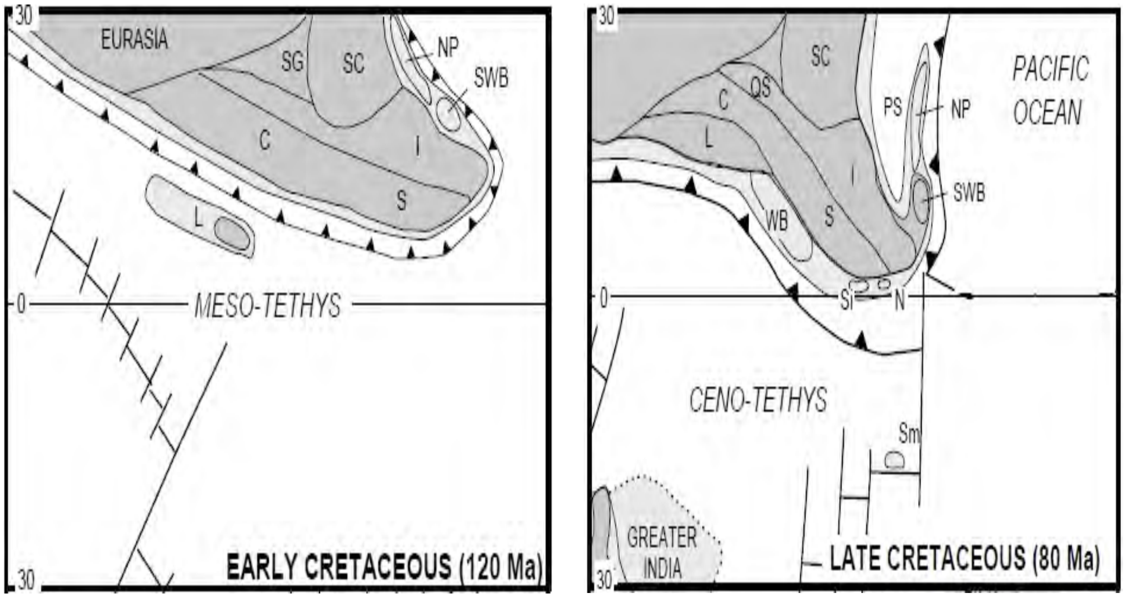


Figure 2.6: Palaeogeographic reconstruction for Indochina and adjacent regions in the Cretaceous. SG: Songpan Ganzi accretionary complex, SWB; South West Borneo, NP; North Palawan and other small continental fragments now forming part of the Philippines basement, SC: South China, I: Indochina, PS: Proto- South China Sea, N; Natuna, S: Sibumasu, L: Lhasa (Metcalfe, 2006).

2.6. India collision and extrusion

In the Early Cretaceous India-Seychelles-Madagascar separated from Australia-Antarctica and in the Late Cretaceous India-Seychelles drifted away from Madagascar and migrated rapidly northwards eventually colliding with Asia. Indian-Eurasian collision during the Palaeocene-early Eocene, which intensified from about 50-55 Ma (Najman et al., 2010) led to significant continental deformation throughout Asia. Tapponnier et al., (1982) suggested that collision related deformation also affected the Indochina terrane in the Oligocene by causing it to extrude south-eastward for at least 500 km along the Red River shear zone, which extends from near eastern Tibet into the Gulf of Tonkin. This tectonic motion and clockwise rotation of the Indochina Terrane was interpreted to be responsible for the opening of the South China Sea. However, others argue that opening of the South China Sea was independent of extrusion and was driven mainly by extensional forces from back-arc spreading induced by slab roll back either from subduction of the proto-South China Sea under Sabah/Borneo (Taylor, 1983; Holloway, 1982; Hall, 2002, 2009) or more regional extension related to subduction and retreat of the Pacific plate along the western Pacific margin (Shi and Li, 2012) (see Fig. 2,7).

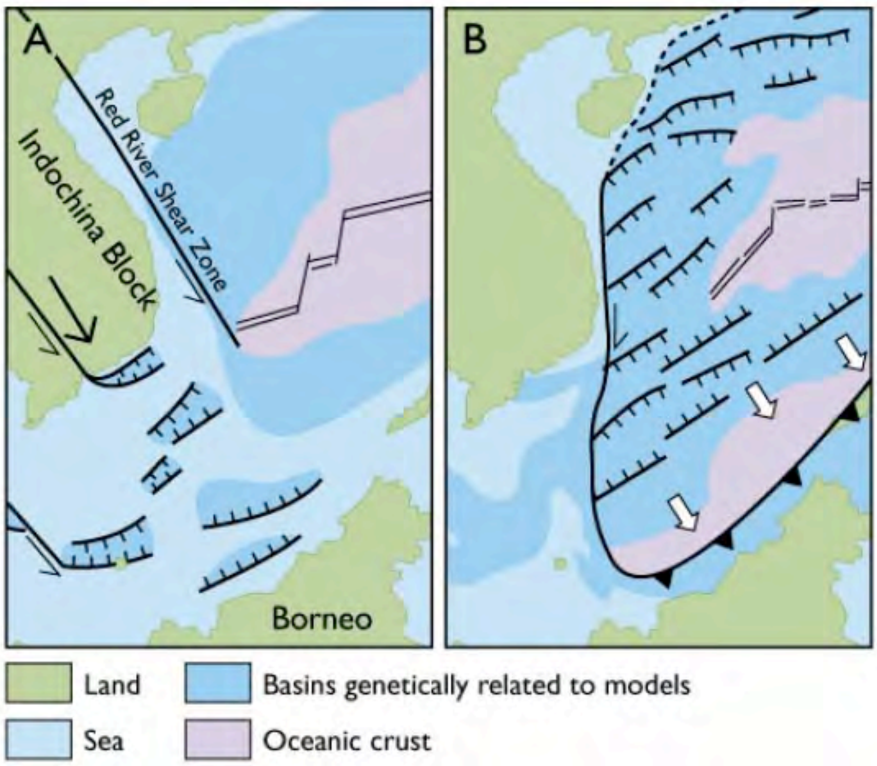


Figure 2.7: The two main classes of model put forward to explain the extension and opening of the South China Sea: A: Rifting and sea-floor spreading are due to a left-lateral pull-apart mechanism (Tapponier et al., 1982; Taylor, 1983). B: Trench retreat, back arc basin as a result of the subduction of old oceanic lithosphere beneath Borneo (Fyhn et al., 2009).

2.7. Rifting and opening of the South China Sea

The South China Sea, located to the east of Vietnam, west of Philippines, north of Borneo and South Mainland China (Fig. 2.7) is one of the largest sedimentary basins in eastern Asia.

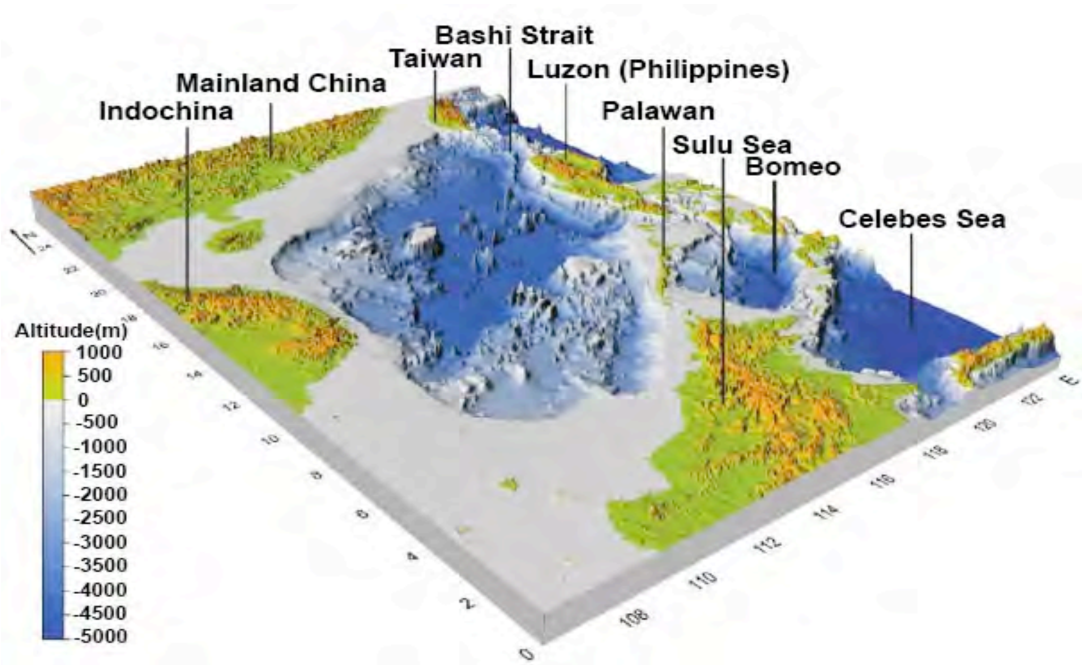


Figure 2.8: 3D Diagram to show the main geomorphologic features of the South China Sea. (Wang et al., 2009)

Prior to sea-floor spreading, the South China Sea region experienced extension. The main cause of this was the subduction of the Palaeo-Pacific lithosphere under the Asian continental margin, broadly along what is now the present-day eastern part of the South China Sea margin. This began in the Late Mesozoic, recorded by the formation of a magmatic arc. Along the western margin as in South Vietnam arc rocks include granite plutons of the Dinh Quan complex dated by zircon U-Pb geochronology as 115±1.2Ma and the Deo Ca complex at 118 ±1.4 Ma (Shellnutt et al., 2013). The youngest known zircon U–Pb arc age is ~73 Ma for the Long granite in Hainan (Xiao-Yan et al., 2014). The South China margin records a southeastwards trend in magmatic ages consistent with migration of the arc with trench retreat (rollback).

During this time, at about 90 Ma, the Luconia-Dangerous Ground block moved to the southeast margin of Asia and became a part of the South Asia margin (Hall, 2012). This tectonic motion has been linked to the opening of the Proto-South China Sea in either a back-arc setting on the East Asian margin or slab-pull induced microcontinent detachment from subduction along Northern Borneo (Doust et al., 2007). Zahirovic et al., (2014) proposed that the opening of the proto-South China Sea with the back-arc rifting took place about 65 Ma and accounted for the start of opening of the Gulf of Beibu in the Maastrichian (72 to 66 Ma) (Clift et al., 2001).

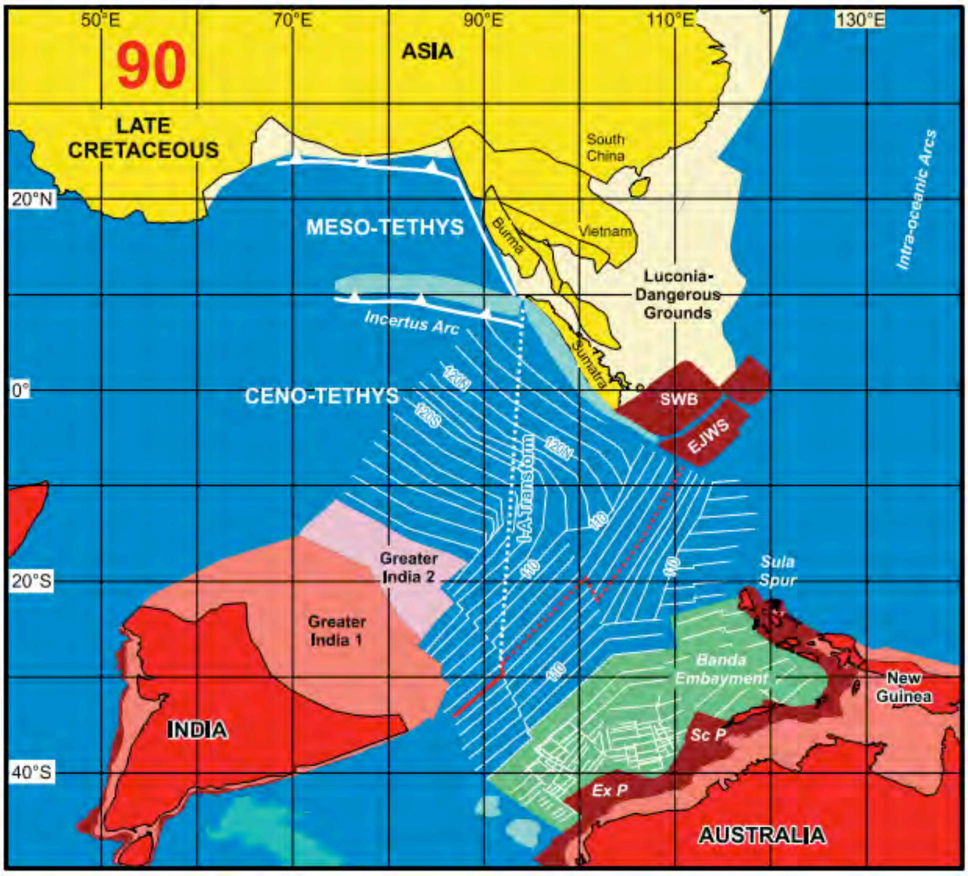


Figure 2.9: Reconstruction at 90 Ma when the Luconia-Dangerous Grounds block docked with the Asian margin (Hall, 2012).

It has been suggested that a large part of the proto - South China Sea may have been subducted under or uplifted as island arcs formed to the south in Borneo/Sabah and Palawan (Hall, 2002; Hutchinson, 2004), where remnants of the proto-South China Sea oceanic crust may be present (Hutchison, 2005). Others have suggested that the original South China Sea Basin was much larger before its subduction along the Manila Trench (Sibuet et al., 2002). For these reasons the early history of extension is not well defined and this has meant that authors have depicted subduction schematically, or assumed it for reconstructions older than 45 Ma (e.g. Hall, 1996, Hall, 2002 and Lee and Lawver, 1995).

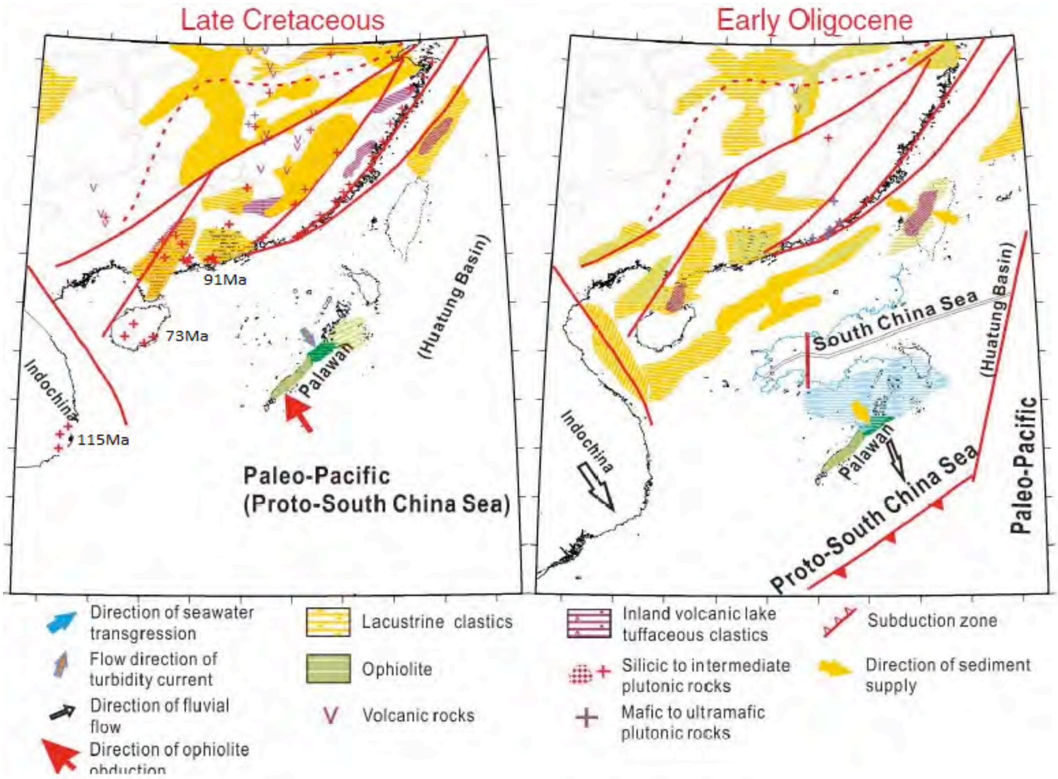


Figure 2.10: Opening of the South China Sea induced by regional extension related to subduction and retreat of the Pacific plate (Taylor, 1983).

Pre-spreading extension of the South China continental lithosphere produced more or less E-W oriented normal faults. With ocean spreading the orientation of new faults moved to NE-SW reflecting the progression of spreading to the southwest (Savva et al., 2014). The onset of spreading in the central part of the South China Sea started at 32 Ma and after a ridge jump at 25 Ma spreading also began in the southwestern sub-basin until 15 Ma when spreading ended in the entire basin due to blockage of the subduction zone along the eastern and southern boundary of the South China Sea by collision with a continental fragment such as the northern part of Palawan or a part of the Dangerous Grounds (Barckhausen et al., 2014).

2.8. Marine Basins

Important hydrocarbon bearing marine basins formed during the Cenozoic from the interplay between forces associated with the collision of India and Eurasia, regional Palaeogene rifting and subsequent Late Palaeogene through Early Neogene sea-floor spreading in the South China Sea. There are two important basins offshore central and southern Vietnam relevant to understanding the history of onshore uplift:

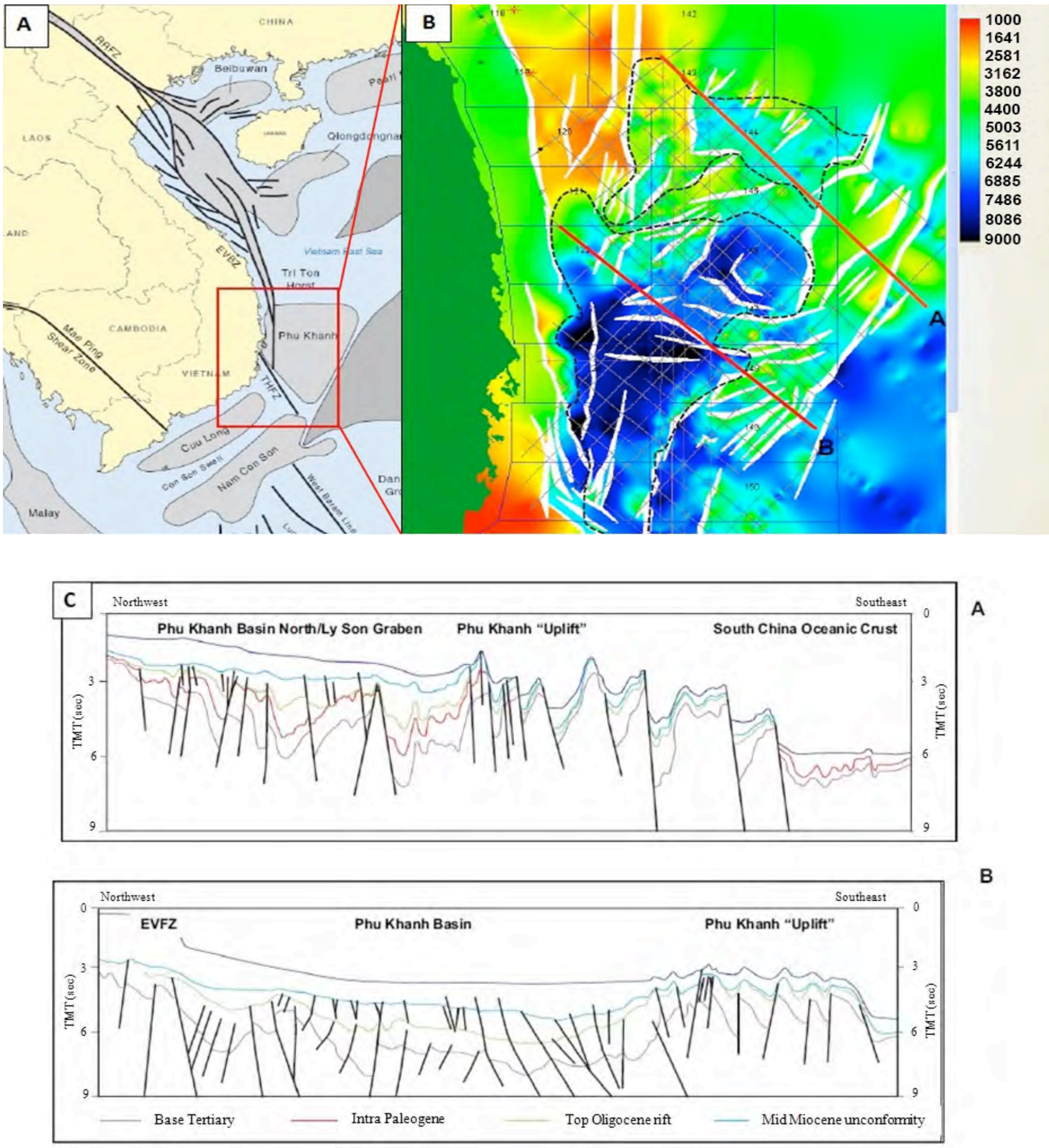


Figure 2.11: A) Tectonic setting of Phu Khanh Basin; B) Broad configuration of the Phu Khanh Basin and its relationship to the regional tectonic elements (white lines are faults). Lines A and B in Figure B are the two seismic cross-sections shown in Figure C (Kjell, 2011).

2.8.1. Phu Khanh Basin: This is a deep-water basin, which is situated at the base of continental slope off central Vietnam and is separated from the mainland by the SE extension of the Ailao Shan–Red River Fault (Fig. 2.11A). The basin history records two major rifting events:

Syn-Rift I in the Palaeogene was accompanied by deposition of clastic and lacustrine sediments

Syn-Rift II, is associated with the opening of the South China Sea and involved mainly marine sedimentation

Overlying these are the post-rift (sag phase) sediments, which include upper Miocene-Pliocene turbidite fans. These have been interpreted as the product of high rates of onshore erosion.

2.8.2. Cuu Long Basin: This basin is located offshore southeast Vietnam on the continental shelf and has an area of approximately 50,000 km^2 and is a major oil production province in Vietnam. Lignite and subbituminous coal were also found in the oil and gas exploration boreholes in the Oligocene-Miocene formations (Tran, 2000).

The Cuu Long Basin was formed by rifting during the Late Eocene - Early Oligocene (Nguyen and Le, 2003). The basin contains up to 8 km of mainly clastic sediments deposited between the Eocene to Quaternary (Phan et al., 2003). A narrow valley developed during the first (syn-rift) phase of extension and in the axial zone of the basin rapid subsidence took place in the late Oligocene. In the Early Miocene a new phase of seafloor spreading occurred accompanied by a period of sea level rise. This caused a marine transgression in all of the basins along the western edge of the South China Sea leading to the formation of carbonate and coral–reefs. Later post rift subsidence formed a broader shallow sag basin with clastic sedimentation.

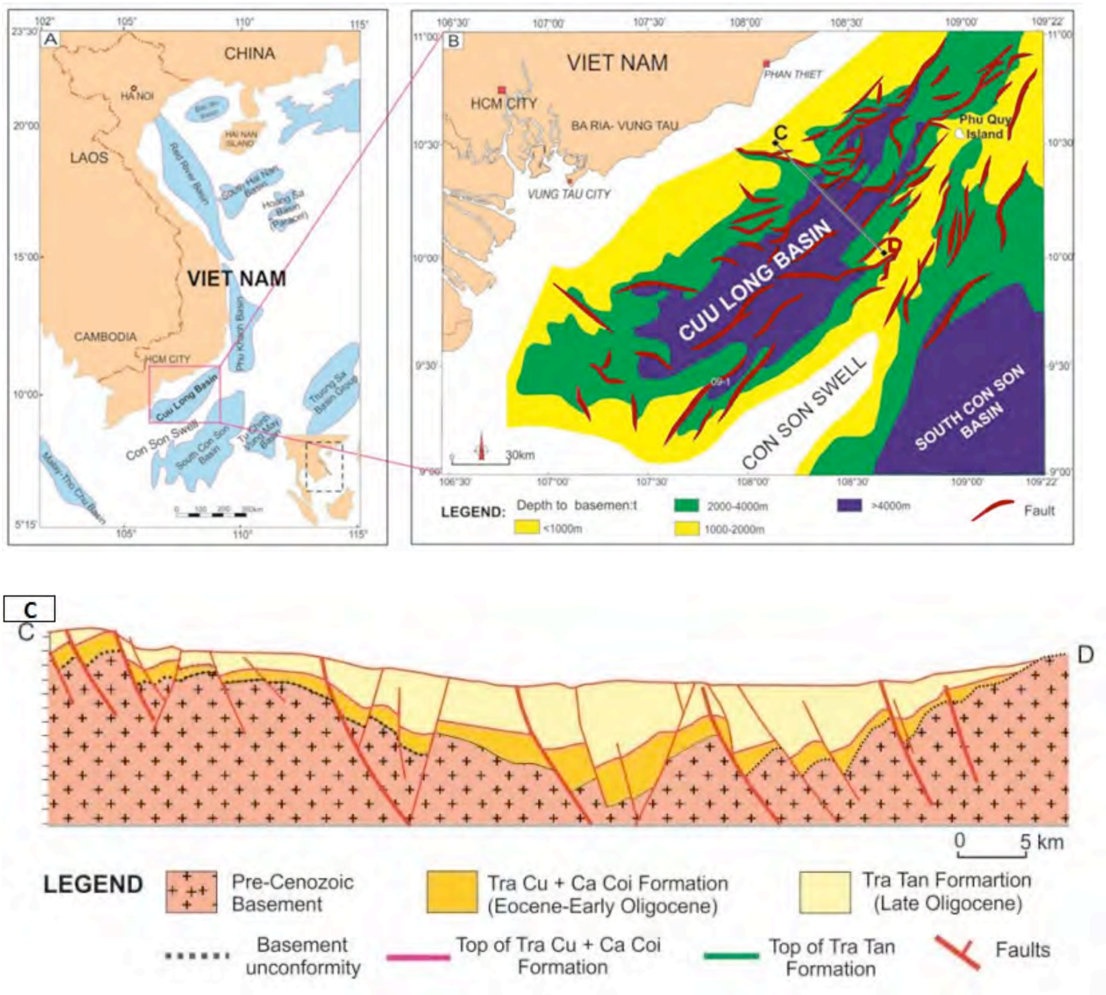


Figure 2.12: A) Location of the Cuu Long Basin; B) Configuration of the Cuu Long Basin and its relationship with other regional tectonic elements. Line C-D in Figure B is the cross-section described in Figures C (Lee & Lawver, 1995).

2.9. Geology of the study area

The study area spans the interior to coastal margins of central and southern Vietnam (see Fig. 1.3). The basement geology in the study area ranges in age from the Archean to the present day. Vietnamese geologists traditionally describe the geology as belonging to one of six mega-periods, each of which has a distinct development stage (Tran et al., 2011). This geological review describes the main features of each period. This scheme may change in the future as more of the rocks are subjected to high precision geochronology and petrological study.

2.9.1. Meso- Neoarchean

Information on the formation of this stage is limited and the evidence for Archean rocks in the Hoang Lien Son Metamorphic belt (North Vietnam) includes Precambrian gneisses, migmatite, amphibolite, two mica-garnet schist, and jaspilite that belong to the lower part of the Suoi Chieng Complex (Nguyen et al., 1978, 2004). Plagiogranite has been recognised in the Ca Vinh Complex (Izokh et al., 2005) and is part of a trondhjemite -tonalite- granodiorite gneiss sequence that has produced a bulk rock Nd age of 3400-3100 Ma and a U-Pb zircon age of 2834- 2535 Ma (Lan et al., 2001).

2.9.2. Palaeoproterozoic- Middle Neoproterozoic

Thermo-tectonic activities during the latest Mesoproterozoic-Middle Neoproterozoic stage are indicated by zircon U-Pb ages between 1480-1350 and 900-600 Ma from orthogneiss of the Kontum Metamorphic Terrane (Tran et al., 2003; Nguyen et al., 2001), including the Palaeoproterozoic Kan Nack and Mesoproterozoic Ngoc Linh Formation. The Kan Nack granulite complex (Nguyen et al., 1979) has a very complicated geological structure, and has been overprinted by several metamorphic and deformational phases during its very long history. These younger events have erased many of the primitive structural features and make it difficult to reconstruct correctly the original stratigraphic sequence which include the mafic granulite and pelite-felsic granulite groups. The Ngoc Linh Complex (Nguyen, et al., 1979) occurs in upper parts of the Dak Mi and Re rivers in the north and northeast region of Kontum province and is composed of metamorphic rocks of amphibolite facies consisting mainly of biotite gneiss, amphibole gneiss, crystalline schist and amphibolite.

2.9.3. Late Neoproterozoic-Silurian

Rocks assigned to this mega-period are related to the break-up of the Rodinia supercontinent (860-570 Ma) and the creation of Gondwana (600-530 Ma). The mega-period can be subdivided into three stages:

2.9.3.1. Late Neoproterozoic-Early Cambrian stage

A sequence of terrigenous sediments and tholeiitic basalts in the north-west of Vietnam are relicts of proto-Tethyan oceanic crust accreted to the Ma River Island Arc (according to the present position). On the Kontum Metamorphic Terrane's northern margin, the Kham Duc-Nui Vu Complex, includes terrigenous sedimentary rocks, andesite and Ti-high basalts that once formed a continental margin arc (Nguyen, et al., 2001). In this region, the Chu Lai complex has a component of granitogneiss and migmatite of crustal origin. A zircon U-Pb age of 511 Ma (Bui et al., 2010) shows the Kham Đuc-Nui Vu Complex was emplaced during a collision event in the Late Neoproterozoic-Early Palaeozoic related to the Gondwana supercontinent formation.

2.9.3.2. Middle Cambrian-Early Ordovician stage

In the basins in Viet Bac there are terrigenous-carbonate beds of the Lung Cu Group containing trilobites and brachiopods diagnostic of shallow shelf facies, identical to the cover of the Yangtze Carbonate Platform. There are also Ti-rich basalts and manganese-bearing siliceous shale and ophiolite assemblage in Ha Giang province, andesite in North East Lao Cai (Tran et al., 1995), together with 470 Ma (TIMS) plagiogranite of the Bach Xa Complex of intracontinental or marginal sea type. On the other hand, in the west of Son La-Thanh Hoa, Cambrian sediments are interbedded with N-MORB tholeiitic basalt (Ngo, 1999) and along with the Song Ma Ophiolite Assemblage are similar to MORB accreted to a subduction zone (Tran et al., 1977, Le et al., 1985). They have been interpreted as an Early Palaeozoic island arc accretionary terrane (Findlay, 1999). However, up to present time the age remains a problem, although there is evidence of Neoproterozoic-Early Palaeozoic activity and some Permian-Triassic ages. In the Vietnam-Laotian basin, Middle Cambrian-Lower Ordovician strata rest unconformably upon the Kham Duc-Nui Vu Complex (NP-E1) in Mo Rai, Northwest Kontum (Than et al., 2004) with the basal conglomerate interbeded with coarse sandstone over 150 m in thickness, passing upward into schist interbeded with bimodal volcanic rocks, that are possibly Late Pan-African orogenic products of the Nam-Ngai Belt. Toward the north of the Tam Ky-Hiep Đuc Belt, the ophiolite assemblage of the harzburgite-ophiolite type (HOT) is diagnostic of a back-arc setting (Izokh et al., 2005) and might be the marginal sea relics of Prototethys thrust over the Kontum Metamorphic Terrane.

2.9.3.3. Middle Ordovician-Silurian

During this stage orogenic processes were widespread in Vietnam and South China as Palaeotethys narrowed. Formation of terrigenous-carbonate basins containing Late Silurian brachiopods of shallow-sea continental shelf facies in the Vietnam-Laotian, West Bac Bo, East Bac Bo and South China basins is very similar to deposits in Eastern Australia (Tong et al., 2001).

In the Kontum Metamorphic Terrane, granulite in the Bien River Valley has a monazite age of 470-465 Ma (TIMS) (Roger et al., 2007) and granite-granodiorite of the Tra Bong Complexes 451–444 Ma (Carter et al., 2008), while gneisses of the Kham Đuc-Nui Vu Complex formed near the peak temperature rims of 447-452 Ma (Usuki et al., 2009). Tra Bong granitoids are widespread along the PoKo shear zone in the western margin of the Kontum terrane (Nguyen et al., 1979). The Dai Loc granite-gneiss complex is widely distributed in the north of the Kontum terrane, which were covered by Devonian sedimentary rocks, as well as penetrated by the Ban Chieng or Ba Na granite that caused post-magmatic alteration. The Dai Loc granitoid massif is composed of a intrusive and a vein phase with the central facies comprising biotite granitogneiss, two-mica granitic-gneiss and migmatitic granite, while the marginal facies consists of two mica granitogneiss and leucogranitogneiss, vein rocks consist of aplite, aplitic granite and pegmatite (Huynh et al., 1979), Zircon

U-Pb age of 418-407 Ma (Carter et al., 2001) exposures of about hundreds of square kilometers in the Da Nang-Se Kong Orogenic Belt. The igneous rocks have compositions characteristic of an active continental margin.

2.9.4. Devonian – Middle Permian

The Devonian-Middle Permian tectonic evolution reflects separation of the South China, Indochina, East Malaya and West Malaya terranes from Gondwana and drift from the southern hemisphere towards the equator (Metcalfe, 2006).

During the Early Devonian transgressive stage terrigenous clastic sedimentation passed gradually into 1500-2000 m thick carbonate-cherty formations that contain corals, fish and foraminifera (Tong et al., 2005). In the study region, the Devonian Cu Brei Formation of Early Devonian age was only recently discovered (Tran, 2003), and is exposed in a small area on the southeastern margin of the mountainous Cu Brei area of Sa Thay district in Kontum Province. The only radiometric dates are based on whole rock K-Ar ages 384±17 and 418+/-12 Ma, corresponding to the Late Silurian-Early Devonian. Fossils of corals and stromatoporoids support an Early Devonian age.

On this stage homogeneous limestone containing microfossils with a thickness up to 800-1000 m was deposited across most of the Indochina-South China region (Liem, 1985). These sequences are quite common in north Vietnam and Laos but in the study region it includes only the Dac Lin Formation of Late Carboniferous- Early Permian age and its component is terrigenous sediments interbedded with intermediate volcanics distributed mainly on the territory of Dak Lak province. (Nguyen et al., 1982)

2.9.5. Late Permian- middle Jurassic

2.9.5.1. Late Permian-Middle Triassic stage

The Indosinian event, caused by the collision between the Indochina and Sibumasu Composite Terranes commenced in the Permian and extended into the Triassic (Metcalfe, 2011), forming the Truong Son Orogenic Belt (Lepvrier *et al.*, 2008). Associated S-type granitoid batholiths have zircon U-Pb ages between 260-245 Ma (Bui et al., 2010; Tran et al., 2008). Related to this event are high-grade metamorphic rocks as well anatectic granites seen in the Dac To Kan zone (Tran et al., 2003, 2007).

In the Middle-Late Triassic stage, the Song Bung-An Khe intracontinental rift system were filled with coarse clastic sediments and a felsic volcano-plutonic association of foreland basin type, containing shallow marine fossils. These rift systems cover older structures in Central Indochina (Nguyen et al., 2001; Tran, 1995) and even in South-West Vietnam, situated on the attenuated crust (Le, et al., 1996).

2.9.5.2. Late Triassic-Middle Jurassic stage

The Early-Middle Jurassic shallow shelf sedimentary basin containing ammonoids and bivalves occurred in South Vietnam (Vu et al., 1989) also extend to Borneo, Indonesia, where fauna shows that there was once a connection between the Palaeopacific and Mesotethys. Continental red beds formed in the late Triassic and pass upwards into coal-bearing sedimentary rooks in the Nong Son Basin north of the Kontum region. The Middle Jurassic was under a compressional tectonic regime related to the latest phase of the Indosinian event. This changed into an intraplate extensional setting during the Late Jurassic-Cretaceous along the margin of East Vietnam-Southeast China.

2.9.6. Late Jurassic- Cenozoic

In this period, the Indochina and Sibumasu Terranes suffered the collisional impact of the Pacific Plate in the east and Tethys-Indian Plate in the west (Metcalfe, 2006; Barber et al., 2005). Important stages took place during the Late Jurassic-Cretaceous, Palaeocene-Miocene and Pliocene-Quaternary.

2.9.6.1. Late Jurassic-Cretaceous

In this stage, in addition to coarse-clastic continental sedimentation, the study region was also an active continental margin reflected by the occurrence of widespread calc-alkaline volcano-plutonic rocks composed of two series largely distributed in South and South central regions of Vietnam:

1) Đeo Bao Loc-Nha Trang series, including andesite-dacite-rhyodacite and diorite-granodiorite-granite of the Dinh Quan- Deo Ca Complex. Formation ages: K-Ar and Ar- Ar ages of granitic rock ranges from 80 to 118 Ma (Nguyen, 2001) and U-Pb zircon ages range from 88±1.5 to 109±7.0 Ma (Thuy et al., 2004) and 115.4±1.2 – 118.2±1.4 Ma (Shellnutt et al., 2013).

2) Don Duong Series, including dacite-rhyolite and biotite granite, leucogranite of the Ankroet Complex (Huynh et al., 1991). This formed the active continental margin of the Da Lat Zone. The magmas originated from a contaminated mantle source and mixed crust with zircon U-Pb ages of 93.4±2.0 to 96.1±1.1 Ma (Thuy et al., 2004) and 86.8±1.6 Ma (Shellnutt et al., 2013.) The series is regarded as of Late Jurassic age as it is unconformably overlain by Lower Cretaceous coarse-clastic continental sedimentary rocks containing the fresh-water bivalve *Cyotrigonioides* sp. (Nguyen, 2002). These red beds contain evaporites in some places and rest unconformably upon older rocks; they are interpreted as being deposited in a back-arc setting.

2.9.5.2. Palaeocene-Quaternary

This stage began with erosion creating a peneplain across much of Indochina, followed by the formation of Tertiary sedimentary basins, sea-floor spreading of the East Sea (South China Sea) and large-scale left-lateral strike-slip movements along major Northwest-Southeast faults. (Tran et al., 2011). Following sea-floor spreading in the East Sea, basalts erupted in diffuse fashion in South Indochina during the Late Cenozoic, especially in the Central Highland forming basaltic lava flows in the Plei Ku, Krong Buc, Dac Nong-Bu Dang Van Hoa Plateau areas, as well as on the Vietnamese continental shelf, and on near shore islands such as Phu Quy, Ly Son, Con Co islands. (Tran et al., 2011).

Plei Ku Plateau basaltic cover in Gia Lai and Kontum province has an area of about 7000km^2 and Krong Buc Plateau basaltic cover in the Dac Lac province with an area of about 6500 km^2 has many features similar to those in the Plei Ku plateau. The maximal thickness of about 500 m in the centre and decreases gradually towards the margin. In the plateau centre, there are nine recognised volcanic phases. Between these phases, there are stages of quiescence causing the weathering to some basalt members, whose thickness and weathering level differ from each other. Recent studies have identified six major eruptive cycles. Isotopic ages (K/Ar and Ar-Ar) of basalts are gave Pliocene-Pleistocene ages of: 1.9-1.75 Ma, 2.1-2.6 Ma; 3.4-3.5 Ma; 3.9-4.8 Ma; 5.3-6.4 Ma; 6.8-7.4 Ma (Bui et al., 2008).

2.10. Structural trends

Vietnam and adjacent areas have a history of faulting and multiple episodes of tectonic activity from the Precambrian to the present-day. Major fault zones have strongly influenced the regional tectonic framework and there is a close relationship between long-lived structures and episodic events. Most of the major fault zones were shaped by the major tectonic events such as the Indosinian orogeny in Permo-Triassic (NW-SE) and later on in the Cenozoic Indian-Eurasian collision and rifting and opening of the South China Sea (N-S and E-W trends) (Tran, 1995) (Fig. 2.13).

Many of the Indosinian faults appear to have been re-activated in the Cenozoic. A good example is the Song Hong Fault Zone (Faults 7,12 and 13 in Fig 2.13), usually called the Red River shear zone or Ailaoshan- Red River shear zone, which stretches more than 1000 km from east Tibet to the Gulf of Tonkin. Strain from the collision between India and Asia caused left-lateral strike-slip movement (extrusion) of Indochina relative to the South China block. The fault has an orientation similar to other Indosinian structures and so Cenozoic movement was helped by an existing crustal weakness. This fault appears to link up with Fault 49 (Fig. 2.13) extending in the N-S direction between longitudes 109^{o}-110^{o}E along the East Vietnam continental slope. The displacement of Fault 49 along the East Vietnam Scarp reached 190 km between 26-29 Ma and 20 Ma, by the time that sea floor spreading began in the South China Sea (Briais et al., 1993, Hutchison et al., 2001), which helped to form the Phu Khanh Basin (section 2.8.1 above).

In south Vietnam, in the study area, most of the faults show evidence of activity in the Cenozoic such as the Song Ba Fault Zone (Fault 31) which is oriented NW-SE and separated the Kontum Terrrane into two parts: the south-western part moved southeastward and the northeastern part moved northwestward. The Tuy Hoa-Bien Hoa fault zone (Fault 34) extends for 400 km in a NE-SW direction. The fault zone underwent two phases of slip movement: the first, normal sinistral strike-slip motion, occurred at the northeastern end (Tuy Hoa) in the Early Cenozoic and the second, normal sinistral strike-slip phase occurred at the southwestern end in the late Cenozoic. At the same time parallel faults (Faults 31,51,52,56) also moved probably linked to the extension and rifting associated with the early stages of South China Sea opening (Fig. 2.13) (Nguyen, 2001).

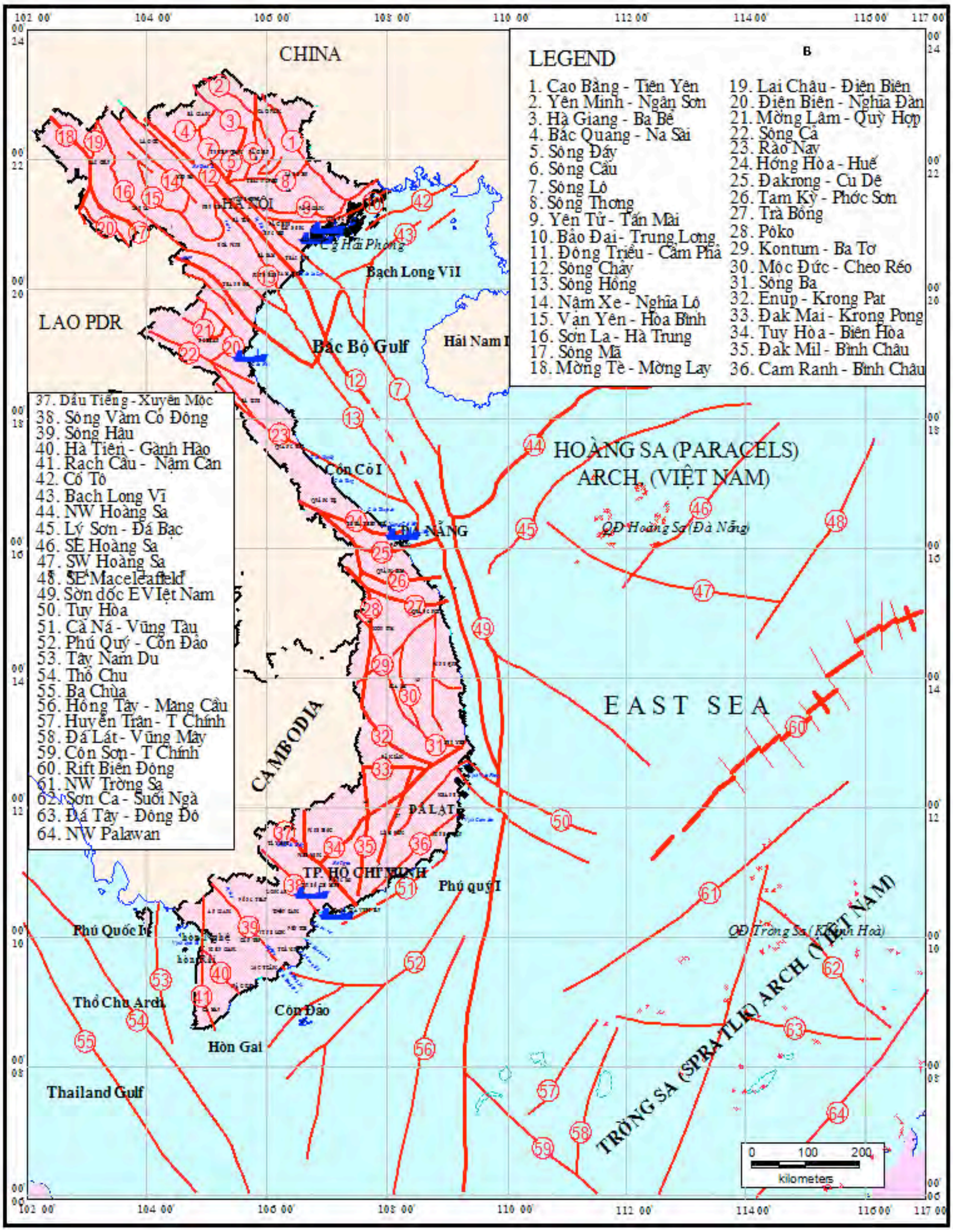


Figure 2.13: Location of major fault zones in Vietnam (Tran et al., 2011).

2.11. Summary

Geological events in the study area range from the Archean to the present-day but the most important events related to Gondwana assembly, rifting, drift and later collision with the Asian margin after which in the Late Mesozoic the study area (South Trung Bo and Central Highlands) became an active continental margin that resulted in widespread intrusion of the granites that are now exposed at the surface. During the Eocene to Miocene extension and opening of the South China Sea reactivated existing or created new structures and local uplifts as well as forming marine basins on the thinned extended continental margin. During the Late Cenozoic local basalts erupted possibly linked to a local hotspot.

3

METHODOLOGY AND APPROACH

3.1. Introduction

In chapter 1 I outlined the main aims and objectives of this thesis, which are based on obtaining heavy mineral, petrology and thermochronononological and geochronological data. In this chapter I explain the basic principles for each of these methods and detail the individual methodologies.

3.2. Sample separation

The purpose of separation is to extract concentrates of zircon for U-Pb geochronology and apatite for fission track (FT) and (U-Th)/He thermochronology analyses. Rock samples (about 3-5 kg) collected from field trips were crushed to a medium sand grain size and then rinsed in water to remove the fine dust. The remaining grains were then placed in an oven at 50 - 70^{o}C for drying. Grains were then sieved to remove the coarser fraction with sizes > 500 μm.

After sieving grains were put into a separating funnel containing Bromoform (density: 2.85) to separate the sample into two groups or fractions: a float group including quartz and feldspar and a sinking (more dense) group which contains the heavy minerals. The sinks were passed through a magnetic separator to separate non-magnetic minerals (which include zircon and apatite) from magnetic minerals (typically magnetitie, garnet, micas). Magnetic separator settings were a 12^{o} cross slope and a 15^{o} down slope. Grains were passed through the magnetic separator 3 times. The first time at a low field strength of 0.3 amps. The non-magnetic fraction was then passed through the separator for a second time at 0.5 amps, and repeated for a final pass at 1.0 amps. At each state I checked to make sure that no zircon or apatite was lost into the magnetic fraction. The non-magnetic fraction containing mainly zircon and apatite grains was then put into another heavy liquid known as Diiodomethane (density: 3.35) to separate apatite, which floats, from zircons that sink. Samples were washed with acetone and then dried under a heat lamp. Figure 3.1 summarises the main stages in the separation process.

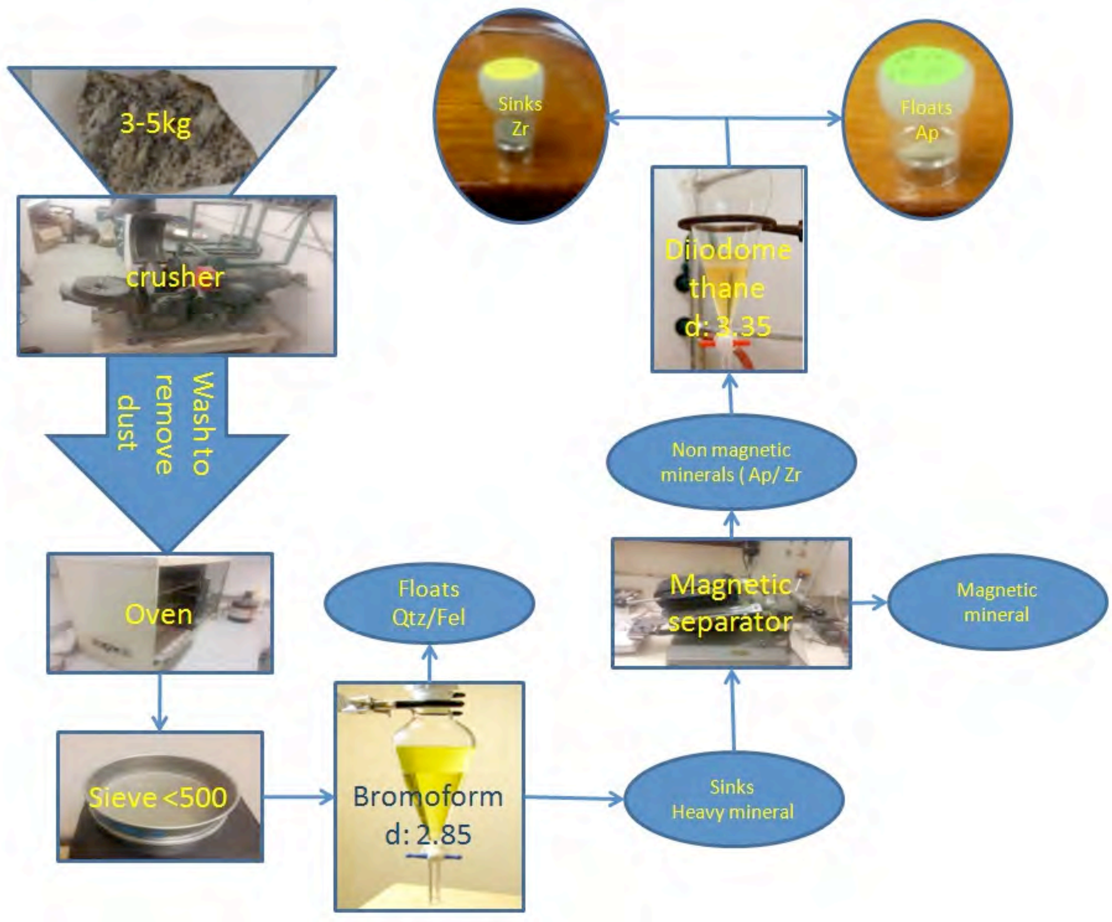


Figure 3.1: Flow chart of the heavy mineral separation process.

3.3. Sample mounting and polishing

Both apatite fission track analysis and zircon U-Pb geochronology require polished grain mounts. Apatite and zircon grains were mounted on glass slides using an epoxy resin made from a mixture of resin AY103 and hardener HY156 in 5:1 ratio. After thoroughly mixing, it was tested on a blank glass slide for hardness by keeping it on a hot plate at ~80ºC about 10 minutes. The samples were then mounted ready for polishing. Glass slides were marked with their respective sample numbers using a diamond pen and cleaned with acetone (apatite slides were labelled on the reverse side to the resin).

When the resin and glass slides were ready 2–3 drops of resin were added to a glass slide placed on the hotplate. Next a pinch of zircon or apatite as dropped onto the resin and mixed in using a needle tip so that the grains were evenly distributed to form a single layer on the glass slide. Subsequently, the glass slides were left on the hot–plate at 70º – 80º C for ~10 min, until the resin was hardened. Warming not only sped up the hardening but also degassed any air bubbles trapped in the resin.

Once cured and hardened the zircon and apatite grain mounts were polished in two stages: 1) a rough polish by hand on coarse 180 and 500 grit size carborundom papers to remove the araldite cover and slightly exposed the grains and, 2) by using a polishing machine with a 3μm alumina powder to produce a flat and smooth surface of the exposed zircon grains. The glass slides were run on polishing machine for 10–15 minutes at a speed of 100 rpm and intermittently examined under a microscope. If the surface was not smooth it was polished again to achieve a smooth surface. After polishing, the zircon mounts were analysed for U-Pb isotopic ratios using a LA–ICP–MS.

The apatite slides were given a final polish using 0.3μm alumina powder to remove fine polishing scratches. After this stage, apatite slides are ready to for etching to expose the fission tracks.

3.4. Closure temperatures

The concept of thermochronology relates the measured age of a mineral to a thermal history. It includes comparing the radiometric dates of two or more minerals with different closure temperatures. The closure temperature is when the crystal structure of a mineral has formed and cooled sufficiently to prevent diffusion of parent or daughter isotopes. At this point the mineral begins to display measurable radioactive decay and the clock starts running. A radiometric age can then be interpreted as recording the time elapsed since the mineral became closed to thermal diffusion. In a famous paper Dodson (1973) described a model that set out a quantitative definition of a minerals closure temperature but this only applies for a uniform cooling rate. Since different minerals have a different closure temperature, dating different minerals within the same rock can give information about the thermal history of the rock and be used to test for uniform cooling.

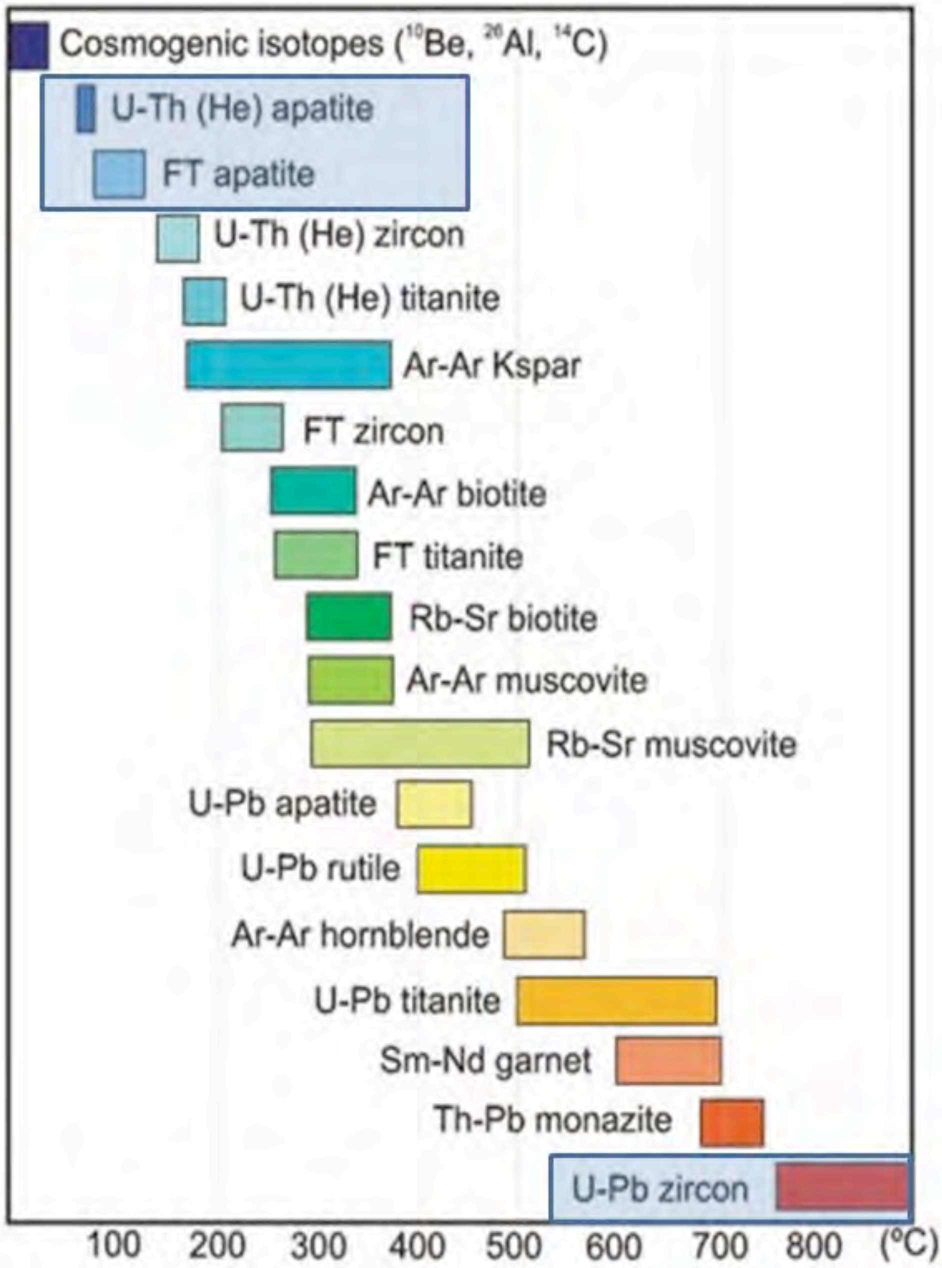


Figure 3.2: Thermochronometers and their effective closure temperatures (adapted from Gehrels et al., 2002). The three methods used in this study are highlighted in blue.

Closure temperatures span a range of Palaeo-temperatures from 40°C for (U-Th)/He dating of apatite up to 900 °C for U-Pb dating of zircon (Reiners et al., 2005). In this study I will use three of the most widely chronometers based on: Zircon (U-Pb), Apatite (U-Th)/He and Apatite Fission Track dating. The advantage of using apatite and zircon is that these minerals are common to a wide range of rock types.

3.5. Zircon U-Pb dating

A core objective of this work is a source to sink study to find out where the heavy mineral rich coastal sands come from. To do this I will use detrital zircon U-Pb geochronology to fingerprint the sand sources. The age distributions of the coastal sands can be compared to the age structure of different source areas based on zircon data from river drainages. Zircon is a U and Pb-rich heavy mineral highly resistant to both chemical and mechanical weathering, and is relatively abundant in many rock types, making it a useful mineral for dating rock formation and cooling to below ~750°C (Hodges, 2003). Because it has a high closure temperature, the U-Pb age is rarely reset by metamorphic events, allowing the mineral to be used as a robust provenance indicator although it is important to be aware that reworking via sedimentary deposits can be an issue when matching detrital grain and bedrock ages (Campbell, 2005). The method is based on the decay of isotope of uranium to stable lead.

For the U-Pb system, the elapsed time *t* since host mineral closure is calculated using equations:

$$({}^{206}Pb/{}^{238}U)_m = e^{\lambda 1t} - 1 \qquad \text{(Eq. 3.1)}$$

$$({}^{207}Pb/{}^{235}U)_m = e^{\lambda 2\,t} - 1 \qquad \text{(Eq. 3.2)}$$

where "m" (measure) = the isotopic ratio; λ_1 and λ_2 are the decay constants of ^{238}U and ^{235}U.

Given that in nature the ratio $^{238}U/^{235}U$ is a constant 137.88 the lead isotopes can also be used to determine a zircon age;

$$({}^{207}Pb/{}^{206}Pb)_m = ({}^{238}U/{}^{235}U)^{-1} \times [(e^{\lambda_2 t} - 1) / (e^{\lambda_1 t} - 1)] \qquad \text{(Eq. 3.3)}$$

If the U-Pb closed system in zircon is not destroyed then the equations above will give the same age values. These can also be displayed on concordia diagrams that plot Pb/U ratios to show the covariance of the isotopic ratios with time. Since ^{235}U decays faster than ^{238}U these plots produce curved paths. Concordia plots provide a useful way to visually assess the quality of measured data and determine if a zircon has been open to any diffusion. A measured age that is the result of significant diffusion will plot either above the Concordia line if it has experienced uranium loss or below the line (more common) if it has seen some lead loss (Figure 3.3).

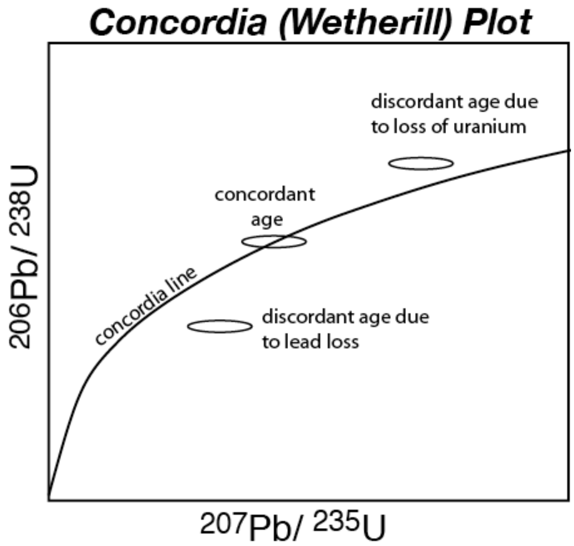


Figure 3.3: A concordia plot showing the main types of measured age. The ellipses represent the uncertainties on measured ratios. The plot is also sometimes called the Wetherill plot after the person who invented it.

3.5.1. Zircon U-Pb analysis by LA–ICP–MS

U-Pb analyses were carried out using a New Wave 193 nm UV excimenr laser ablation system connected to a Agilent 7700 quadrupole inductively coupled plasma mass spectrometer (LA-ICPMS) based in the London Geochronology Center. The laser parameters used were; 10-12 Hz repetition rate, 2.5 J/cm^2 energy density, and 25-35 μm spot size, adjusted to the zircon grain size. The spot aspect ratio (diameter/depth) aimed to ensure that the pit depth was not bigger than the pit diameter in order to minimize related isotope fractionation effects related to the ablation process. Because zircon is so resistant to resetting in some geological settings new zircon can grow on top of older zircons. This can result in an older inherited core that has an age unrelated to the most recent zircon growth event. I therefore tried where possible to place the laser spot as close as possible to the outer parts of the zircons. In some cases I could see the older cores in the reflected images on the laser control screen (see chapter 5).

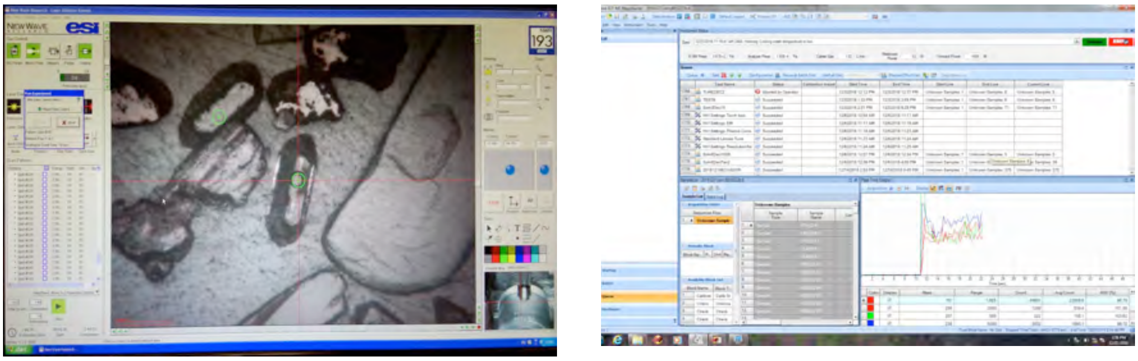


Figure 3.4: Computer screen controlling Laser Ablation (left) and ICP-MS (right) with Glitter 4.0 calculating the fractionation correction and results of $^{207}Pb/^{206}Pb$ and $^{206}Pb/^{238}U$ ratios.

Laser-ablated material was carried by He mixed with Ar gas to limit fractionation effects and introduced to the plasma source of the ICP–MS unit for ionization. Sample ionization took place in the hot Ar–plasma cell at a temperature of 8000 – 10000 K. The ions were then passed through a system of electrostatic lenses to filter off unwanted masses and then entered the quadrupole mass analyser where the ions were separated based on mass/charge (m/z) ratio and detected by an electron multiplier detector system comprising of many dynodes. The detector operated in pulse mode (P) for low sample concentrations and analog mode (A) for high sample concentrations. To ensure that the two different types of detector measured the same it was necessary to recalibrate the PA detectors every 2-3 weeks. This was done by ablating the standard glass and using the automated tuning software of the ICPMS system

During the analytical sessions the ICPMS experiences some electronic drift and there is a fractionation affect. Both need to be corrected for and this was done by repeated measurements of a zircon of known age. The basis principle is that the zircon age standard has well defined isotope ratios determined by accurate and precise thermal ionisation mass spectrometry (TIMS) and these values are compared against the ratios measured on the LA-ICPMS. Any difference is due to a combination of mass fractionation and electronic drift and this can be used to correct the sample (unknown) data. The measured $^{207}Pb/^{206}Pb$, $^{206}Pb/^{238}U$, $^{207}Pb/^{235}U$ ratios were corrected using the Plesovice age standard (reference age 337.13 ± 0.37 Ma, Slama et al., 2008). Concentration (in ppm) was determined relative to the NIST glass standard 612 assuming SiO_2 = 32.77% (stoichiometric in zircon). The fractionation correction and results of $^{207}Pb/^{206}Pb$ and $^{206}Pb/^{238}U$ ratios were calculated using GLITTER 4.0 (Jackson, 2004) (Fig. 3.3). This software allows the user to select the most stable part of the ablation signal for example it can help to avoid mixing two different growth zones with different ages (Fig. 3.4). Temora (Black et al., 2003) and 91500 (Wiedenbeck et al., 2004) zircon were used as secondary age standards to test the tuning and corrections. To remove bad data due to mixing of zircon growth zones or lead loss the data were filtered using standard discordance tests with a 15% cut off. The $^{206}Pb/^{238}U$ ratio is used to determine ages where < 1000 Ma and the $^{207}Pb/^{206}Pb$ ratio for older grains. The weighted mean U-Pb ages and Concordia plots were processed by using ISOPLOT R (Vermeesch, 2018).

3.6 Apatite Thermochronometry

Apatite thermochronometry based on the low temperature fission track (closure temperature approximately 100°C) and (U-Th)/He dating (closure temperature approximately 600°C) is used to the project aim of defining the Cenozoic erosion history of central and southern Vietnam. The basic principles and methodologies are outlined in the following sections.

3.6.1. Fission Track Analysis

Similar to other isotopic dating methods age determination consists of measuring the relative abundances of the decay (daughter) product, and parent isotope. A population of fission tracks, the decay product, observed in a uranium-bearing mineral grain is the product of natural spontaneous fission of the isotopes ^{238}U, ^{235}U and ^{232}Th present within the host mineral. The method is based on counting the number of spontaneous fission tracks (daughter) on an internal surface of a mineral grain and then determining the uranium concentration for the same counting area by neutron activation method that involves irradiating the sample in a nuclear reactor. Neutrons in the reactor collide with uranium atoms to induce fission. The newly induced fission tracks are recorded in mica detectors placed against the sample. The density of tracks in the mica detector is a function of the neutron fluence (φ), exposure time and sample uranium concentration. Research reactors are used as these have positions around the core that produce a well-thermalized neutron flux. This is necessary to avoid inducing fission in thorium since this has a long decay constant and so produces no spontaneous fission tracks. By using a well-thermalized reactor it is possible to induce fission in only ^{235}U. The constant ratio between the 235 and 238 isotopes of natural uranium can then be used to determine how U much uranium is present in a sample. The age equation is;

$$t = \frac{1}{\lambda_d} ln\left[1 + \frac{\lambda_d \varphi \sigma I \rho_s g}{\lambda_f \rho_i}\right] \quad \text{Eq. 3.4}$$

Where;

λ_d = total decay constant for all uranium isotopes [(1.55125±1.25)*$10^{-10}y^{-1}$]

φ = neutron fluence [n/cm2]

σ = thermal neutron capture cross section of ^{235}U [580.2*$10^{-24}cm^2$]

I = Natural isotope ratio $^{235}U/^{238}U$ [7.2527*10^{-3}]

ρ_s = spontaneous track density of sample

g = geometry correction factor [0.5 for the external detector method]

λ_f = decay constant for spontaneous fission of ^{238}U [(most recent experiments suggest a value near to 8.51 ± 0.18)×10^{-17} yr^{-1}]

ρ_i = induced track density on external mica detector surface.

Two problems remain with age equation (Eq. 3.4.) Both λ_f and φ have been hard to measure. λ_f, the decay by spontaneous fission should have a constant value but this has been experimentally difficult to measure. To determine the neutron fluence (φ) within a well-thermalized reactor is also very difficult (Hurford and

Green, 1983), partly because of variations in neutron fluence. This problem was solved by including a piece of dosimeter glass of known homogeneous uranium content together with another mica detector placed against it in the sample irradiation. By counting the average track density on the dosimeter mica detector the average variation in induced track density, i.e. the neutron flux can be determined indirectly by the induced track density in the mica detector, called ρ_d.

Dosimeters give a solution to the neutron fluence issue but it was also noticed that different analysts get different track counts for the same sample. Similar to the zircon U-Pb method these problems can be solved by using mineral standards of known age. Use of age standards can help to test and correct for variable differences between analysts. The age standard based correction factor for fission track is known as the ζ-factor. It was defined by Hurford and Green in 1983. Zeta (ζ) plus ρ_d replace λ_f, s and φ in the age equation and for a standard of known age ζ can be calculated using the equation:

$$\zeta = \frac{\left[e^{\lambda_d t^{std}} - 1\right]}{\lambda_d \left[\frac{\rho_s}{\rho_i} g\right]_{std} \rho_d} \qquad \text{Eq. 3.5}$$

Where t^{std} is the known age of the standard sample

Using zeta the age equation is now:

$$t = \frac{1}{\lambda_d} ln \left[1 + \lambda_d \zeta \frac{\rho_s}{\rho_i} g \rho_d\right] \qquad \text{Eq. 3.6}$$

Due to my limited time in the UK I did not have enough time to derive my own zeta calibration and so the fission track analyses in this study were made by my supervisor who has a ζ-factor based on CN5 dosimeter of 338 ± 5.

Fission tracks are formed by the parent nuclide (i.e., 238 U) decaying into two daughter nuclides of equal mass and a large amount of energy (c. 170 MeV). The particles strongly repel each other due to a positive charge and rapidly pass through the crystal lattice of the host mineral creating a trail of damage

The fission track system is not like other radiometric methods because closure is not affected by isotopic diffusion. Instead closure takes place by a crystallographic repair process that causes fission track shortening known as annealing. Based on laboratory experiments and geological data it has been shown that partial fission track annealing occurs over the temperature range ~120-50 °C (the temperature interval often referred to as the partial annealing zone or PAZ) when the exposure to heating lasts > 1 Myr (Laslett et al., 1987). Above 120°C (precise value depends on apatite composition) all fission tracks self-repair and disappear (zero age). Only when temperature fall again well below 120°C are newly formed tracks preserved. Below about 60°C the amount of annealing is so low that tracks remain around 15 -16 microns. Because track annealing has an Arrhenius relationship with temperature and time it is possible to get the same level of track annealing or resetting at higher temperatures for shorter durations of time and so closure temperature depends on cooling rate. This principle also applies to the apatite (U-Th)/He system (Fig. 3.5).

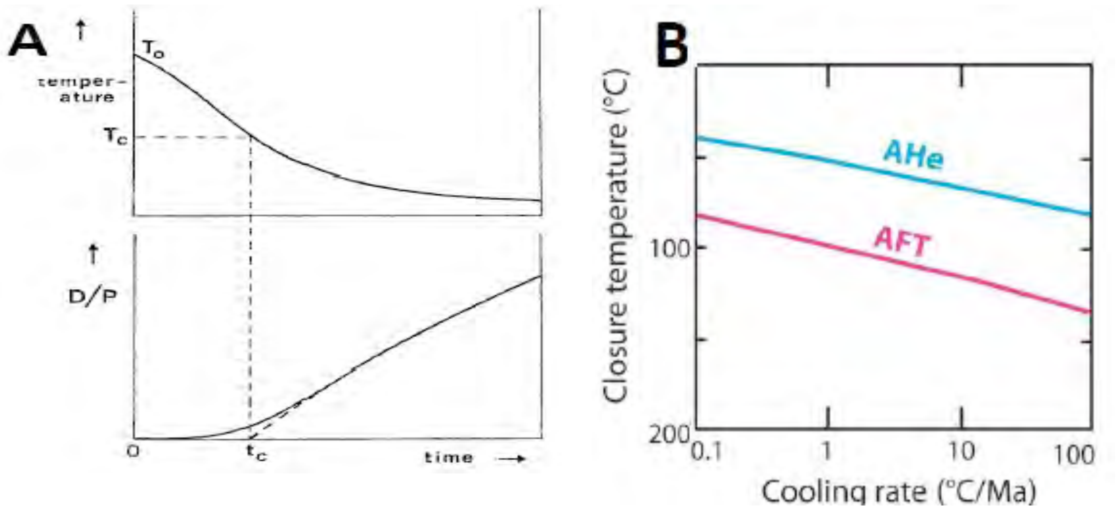


Figure 3.5: A: Illustration of the closure temperature concept (T_c) in relation to the daughter/parent (D/P) ratio B: Closure temperatures in relation to cooling rate for U-Th/He and AFT methods used in this study (Reiners and Brandon, 2006).

The concept of the PAZ is important as it helps tell us about what a measured FT age means. For example a sample that cools rapidly through the PAZ will produce a narrow range of long track lengths (mean length of 14-15 μm). This is because tracks have not been exposed to much heating. As the length of a track controls the probability of interesting the counting surface it follows that the measured age relates to the mean track length of a sample. For a long mean track length, which reflects minor annealing the measured age will approximate to the time of closure. In contrast, slow cooling will produce greater track length variation, and the fission track age will be intermediate between the times of PAZ entry and exit and unrelated to the time of closure. The track length distribution of a sample is therefore the result of a sample's thermal history. As a consequence all fission track analyses comprise two parts, the track density measurement (age) and track length measurement (cooling history).

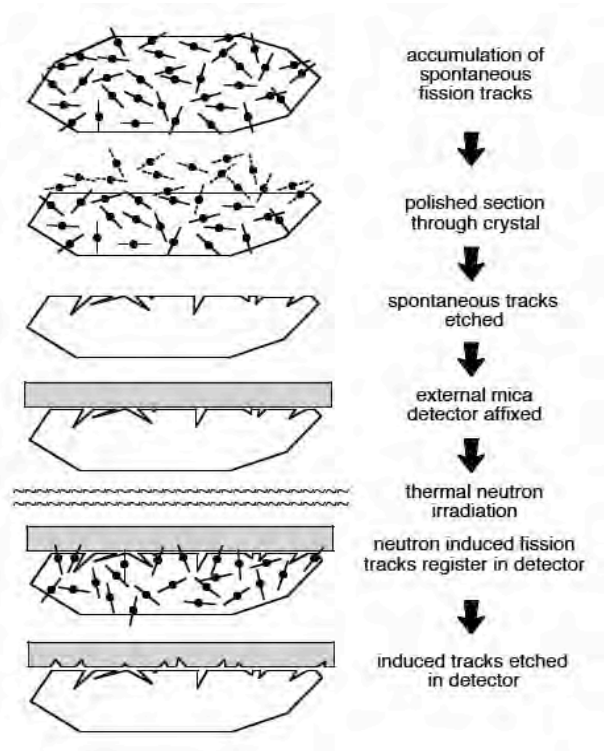


Figure 3.6: Cartoon illustrating the stages used in the external detector method (Hurford & Carter 1991)

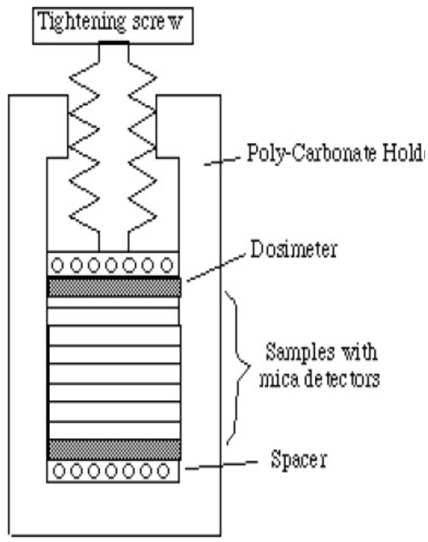


Figure 3. 7: A typical stack of samples packaged for thermal neutron irradiation

For age determination the external detector method (EDM) is the most widely used approach (Fig 3.6) (Hurford & Green 1983). The spontaneous tracks are counted in an etched apatite grain mount. The etchant used was 5N HNO_3 for

20 seconds at 20°C. The induced tracks in the external mica detector are exposed after irradiation by etching 48% Hf at 20°C for 25 minutes.

To prepare polished and etched grain mounts for irradiation the mounts were reduced to approximately 12 mm x 16 mm by scoring with a diamond pen and breaking glass by pressing slide on a wooden stick. One corner is cut for alignment purposes (see figure 3.8 below) A sheet of uranium free muscovite mica with a thickness of 50-100 µm, acting as a detector, is then placed on top of the sample and stacked in a nylon sample holder with glass dosimeters placed top and bottom (to detect any gradient within the irradiation) (Fig. 3.7). The glass dosimeter CN5 (uranium content 12ppm) was used. Samples were irradiated in the FRM11 reactor at Garching, University of Munich.

Track counting:

Sample and mica detector mounts are glued onto a prepared microscope slide for counting using clear nail varnish. Previously prepared slides are made from cut slides and coverslips so that the mica and apatites are on the same plane for counting. The cut corners of the mica detector and grain mount are placed opposite each other, so that they form a mirror image (Fig. 3.8).

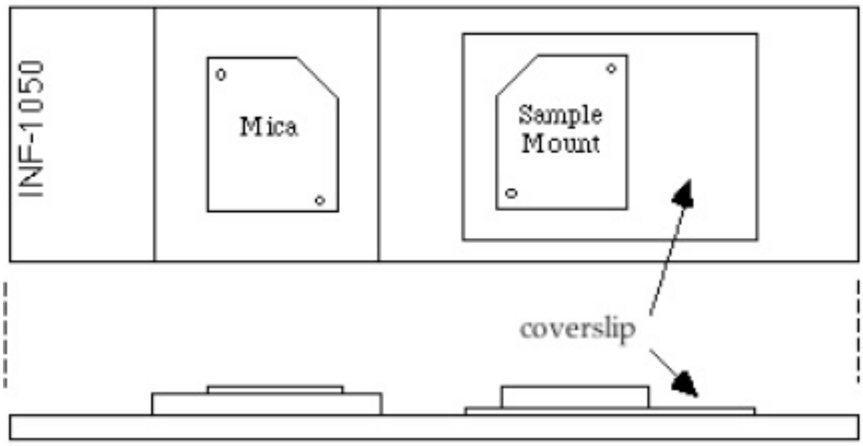


Figure 3.8: Apatite mount and mica detector prepared for counting

The number of grains selected for counting depends on the type of sample: 20 grains is generally enough for bedrock, however to study provenance studies > 50-100 grains may be required. Similarly, for very young (and/or low track density) samples 50-100 grains may be needed to get sufficient spontaneous tracks since the counting statistic affect both accuracy and precision. Grains selected for counting should be cut in a c-axis parallel because it has the lowest etched bulk rate (surface dissolution) similar to the mica detector, ensuring a geometry factor ('g' in Eq. 3.4) of 0.5. Furthermore a homogeneous track distribution of all grains and prints had to be considered. Inhomogeneous distributions can be caused by zonation, inclusions or fractures in the grain, which cause bias and uncertainty when choosing an area for counting. Such areas were avoided if found.

Track counting and length track measurement was carried out on a Zeiss Axioplan microscope linked to a computer controlled stage and drawing tablet for length measurement. The software, FTStage version 4.04 (Fig. 3.9), drives the alignment process, stores the locations of grains marked for counting and is used to, measure track lengths. Counting and track length measurement is done using a 100 times dry objective under a total magnification of 1250x.

Figure 3.9: The Zeiss Axioplan microscope and stage system used in this study.

Horizontal confined tracks are used for track length measurement. The software records the length and angle to the c-axis as there is a natural anisotropy between etched length and angle to c-axis that needs to be corrected for.

Tracks oriented perpendicular to the c-axis are wider and more visible compared to long thin tracks parallel to the c-axis. The etched internal (confined) tracks are visible because the etchant has found its way into the crystal via a cleavage crack to reveal a track in cleavage, or a track in track. In addition the size of the etch pit parallel to the c-axis were also measured as this gives an indication of the apatite composition which affects the track annealing temperatures (Barbarand et al., 2003).

The aim of track length measurement is to obtain sufficient track lengths so that both age and length data can be inputted into a thermal history modeling program to extract the cooling history of the sample (define time and rate of cooling). The cooling history can then be used to determine the rock erosion history. The numerical models used for thermal history modeling such as HeFty (Kecham, 2005) or QTQt (Gallagher, 2012) require the input of statistically meaningful datasets, which means ideally 75-100 track length measurements. However, this is not always possible, especially in samples that have low spontaneous track densities dues to young age or low uranium contents. To overcome this and to help constrain the lower temperature part of a thermal history (around 50-70°C) where FT data loose resolution researchers now routinely include apatite (U-Th)/He data. I followed this approach, especially as many of my samples had low spontaneous track densities.

3.6.2 Apatite U-Th/He dating

Apatite U-Th/He dating utilizes the radioactive decays of ^{238}U, ^{235}U and ^{232}Th that release 8, 7 and 6 α-particles (^{4}He) on their paths to the stable isotopes ^{206}Pb and ^{207}Pb. In addition, ^{4}He is also produced by the radioactive decays of ^{147}Sm and ^{143}Nd but as the decay constants for these isotopes is small compared to ^{238}U (6.54x10-12y^{-1} compared to 1.55x10-10y^{-1} for ^{238}U) their contribution are generally < 1% and thus may be ignored. As a noble gas helium can easily diffuse out of its host mineral lattice when exposed to elevated temperatures. The closure temperature for helium is lower than apatite fission track and is between 70-80°C the value depending on grain size and cooling rate. At temperatures >~70°C, helium rapidly diffused from apatite grain and < 40°C helium diffusion rate approaches zero. In the temperature interval from 40 to 70°C helium atoms are retained in the apatite grain (Fig. 3.5B). In general the amount of helium in an apatite will be a function of time and U/Th concentration as described by equation 3.7.

$$^{4}\mathrm{He} = 8\ ^{238}\mathrm{U}(e^{\lambda_{238} t} - 1) + 7\ ^{238}\mathrm{U} / 137.88(e^{\lambda_{235} t} - 1) + 6\ ^{232}\mathrm{Th}\,(e^{\lambda_{232} t} - 1) \qquad \text{Eq. 3.7}$$

Where: λ_{238}, λ_{235} and λ_{232} are the specific decay constants of ^{238}U, ^{235}U and ^{232}Th, t is the time since cooling below T_c and the amount of ^{235}U is calculated using the ratio of ^{238}U/^{235}U = 137.88 of naturally occurring uranium.

A helium age for an apatite requires measuring amount of helium (daughter) in apatite and its uranium and thorium contents (parent). However a complicating factor is that a correction also needs to be applied related to the grain size and shape. This is because the radiogenic ^{4}He are alpha particles produced by α-decay. This involves an energy release that causes recoil of the ^{4}He away from the parent nucleus. The distance the ^{4}He atom recoils varies with each decay series due to the differing energies released. In apatite radiogenic ^{4}He from ^{238}U-series decay has an average stopping distance of 19.7μm. α-particles created by the ^{235}U- and ^{232}Th-decay series have mean stopping distances of 22.8 μm and 22.4 μm respectively. This means that helium atoms will be expelled anywhere within a theoretical sphere, with the centre being the parent nucleus. As the radius of the sphere is the mean stopping distance any U or Th atoms within ~ 20 microns of the edge of an apatite crystal will expel some of the helium towards the outside of the apatite grain with the amount of helium lost increasing towards the grain edges (Fig. 3.10). This produces a gradient of decreasing helium around the edges of an apatite grain and a mismatch between the distribution of parent and daughter. Failure to take this into account will result in a significant underestimation of the calculated age. To avoid this a correction is made that takes into account the surface geometry of the analysed apatite grain. There are several correction methods (known as the FT correction) in the literature but in their simplest form they assume a spherical grain. Farley et al., (1996) outlined the basic correction equation as

FT = 1 – 0.75 (s/r) + 0.0625 (s/r)3 Eq. 3.8

Where s is the mean stopping distance and r is the radius of the spherical grain.

The Ft correction as it is known is applied to the uncorrected age using; corrected age = measured age / Ft. From Eq. 3.8 is was realized that grains with a width < 70 µm have a very large correction that increases with decreasing width. However for grains 70µm wide the correction is 25% falling to c. 5% for grains with widths > 250 µm. It is therefore better to measure helium ages on larger grains. The recoil correction is also best applied to complete euhedral grains.

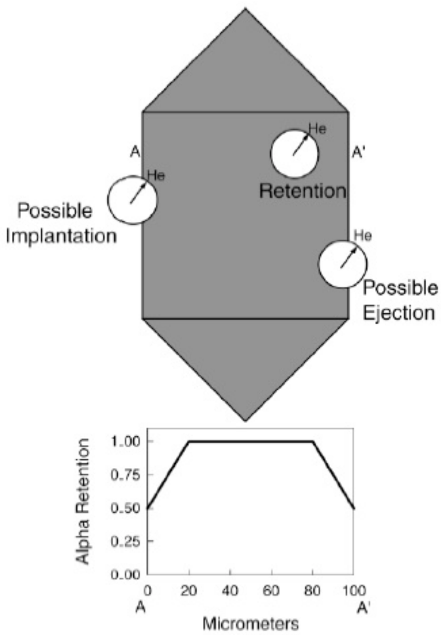


Figure 3.10: Schematic of He- ejection, retention and possible implantation based on the position of the recoil sphere (Farley, 2002)

Sample analysis has three stages; 1) hand picking of suitable apatites and measurement of grain dimensions; 2) helium measurement and 3) U/Th measurement. I describe these stages in more detail below.

Inclusion and crack free euhedral apatite grains were hand- picked under a binocular microscope. Suitable grains had a minimum diameter of 60-90 µm and length of 70 -250 µm. For each sample 8-10 grains were selected and then the diameter (X) and length (Y) dimension of each were measured on the zeiss

Axioplan microscope using the digitising tablet and Fission Track software FTStage4.04. The higher magnification of this microscope allows a further check for inclusions. These must be avoided to avoid the effects of He-implantation from mineral inclusions such as zircon that have higher U-Th concentrations. Any implanted helium would also be considered ‘parentless’ because such inclusions do not dissolve along with the apatite in preparation for the U/Th analysis by solution ICP-MS. The best 3 to 5 grains are then chose for loading into a platinum tube. (Fig. 3.11, 3.12, 3.13) shows this process.

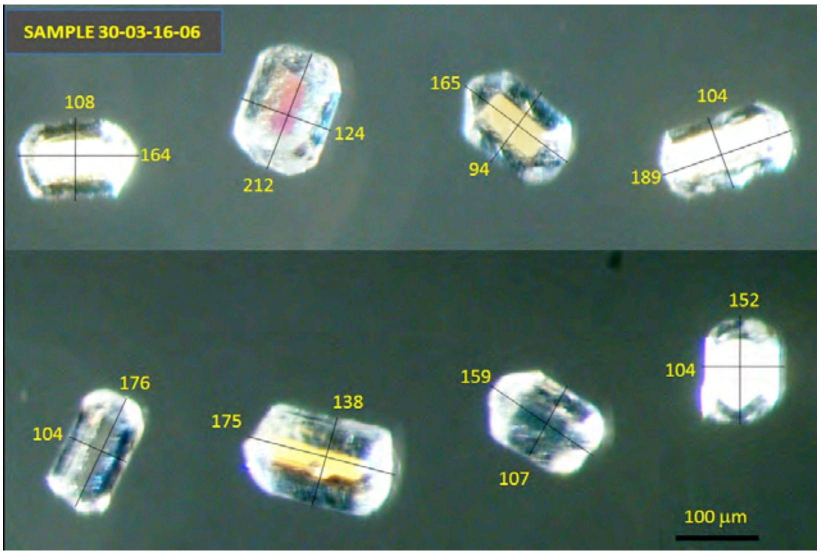


Figure 3.11: Apatite grains of sample 30-03-16-06

Figure 3.12: A) Rows of platinum tubes pressed into parafilm ready to be loaded with apatite grains. B) close up of a tube which is 0.8 mm in diameter

Each platinum tube containing apatite grain is then dropped into a numbered hole in a copper planchet which is then loaded into a laser chamber with a sapphire window where it is left to pump down for > 24hrs.

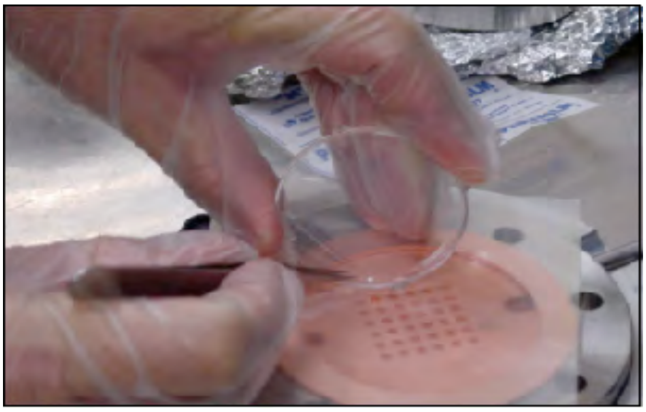


Figure 3.13: Loading the platinum tubes into the copper planchet ready for outgassing

The helium extraction line is a fully automated system that measures gas produced from heating by a Laservall 808nm diode laser. The laser is used to couple with the platinum tubes to create a microfurnace that heats the apatite inside to a temperature ≥ 950°C for 2-3 minutes. This releases all of the helium inside the apatite that escapes into the vacuum line. As the gas is released from the sample it is cleaned up by a getter running at 400° C, to remove contaminants leaving only noble gases. At the same time a pure 3He spike is added into the line ready for measurement on a Pfeiffer Prisma 200 Quadrupole Mass Spectrometer. Figure 3.14 shows the extraction line.

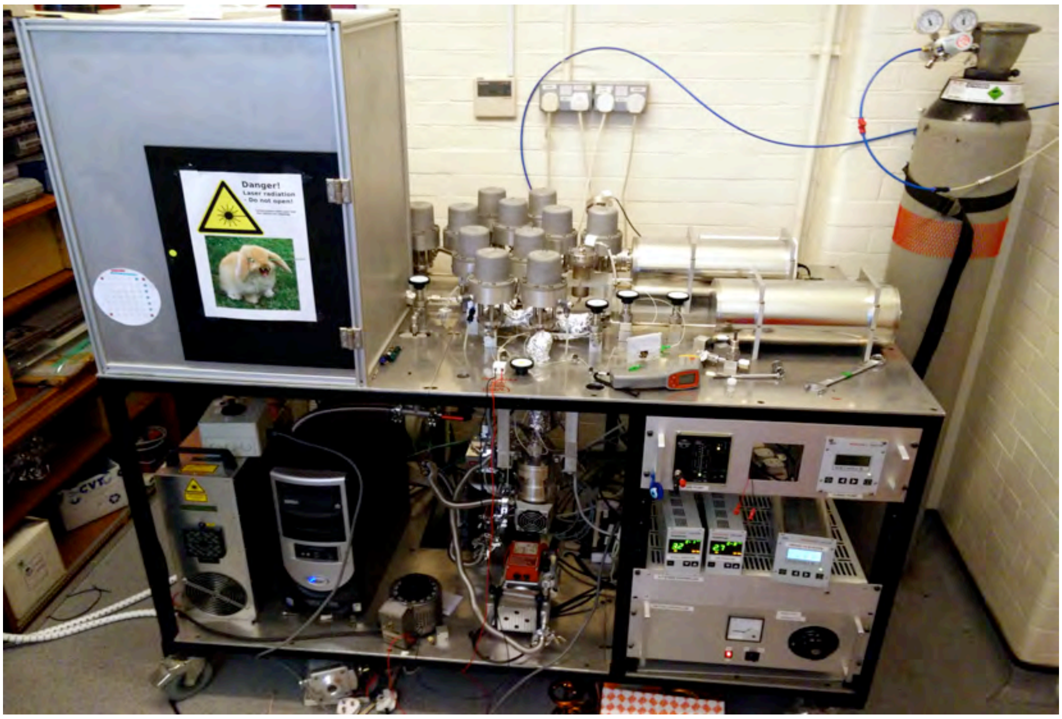


Figure 3.14: The Bbk-UCL helium extraction line. The laser cell is located in the box on the left.

Following the helium measurement, samples were removed and placed in small PTFE vials. Each vial + platinum packet is weighed. Then 50 µl of spike of uranium and thorium isotopes (^{235}U and ^{230}Th) in 30% HNO_3 is added, the vial reweighed, so that the mass of spike added can be calculated. The vials are then left standing for 1-2 days at room temperature to dissolve the apatites (the platinum is unaffected). After this the vials are filled up with 1.5 ml of milliQ water ready to be analyzed by the ICPMS. At typical solution run included vials water and spike blanks. Following ICPMS analyses the blank corrected count data were entered into an excel spreadsheet, together with the sample helium contents in ncc to calculate He ages and errors. Grain dimensions are also included to allow calculation of the Ft corrected ages. Data quality and accuracy was assessed using replicates of the Durango apatite age standard included in each analytical session. This standard has a reference age of 31.44±0.18 Ma (2σ) (McDowell et al., 2005).

3.7 Sandstone bulk mineral analysis

To understand the composition of the heavy mineral sands to help identify source areas I used a QEMSCAN® platform (owned by Rocktype limited and temporarily based in UCL). This is an automated scanning electron microscope system, initially design to support mineral- processing line in the mining industry (Pirrie & Rollinson, 2011). The Qemscan system can operate four modules (1) particle mineral analysis, (2) bulk mineral analysis, (3) trace mineral search, and (4) field image scan. During analysis, X-ray spectra are collected at a user-defined pixel spacing and the measured spectra is automatically compared with a database of known spectra and a mineral or a name is registered. Depending on a range of factors, including the grain size and the user-defined pixel spacing (between 0.2 and 25 µm), approximately 1000 grains, each 1-10 µm, can be measured per hour using a 1µm pixel space (Pirrie et al., 2004).

For this study polished slides of the sand samples were carbon coated and scanned at a resolution of 10 µm. The acquired EDS spectra of each measured spot were then interpreted automatically by reference to a database of mineral compositions to yield robust compositional information. Samples were kindly run by Dr Martin Rittner (London Geochronology Centre). Some samples were repeated a month later to test reprodicibility. These gave very similar results.

4

PROVENANCE, ROUTING AND WEATHERING HISTORY OF HEAVY MINERALS FROM COASTAL PLACER DEPOSITS OF SOUTHERN VIETNAM

4.1. Introduction

Beach and dune placer deposits occur along the 3260 km coastline of Vietnam, as well as offshore in water depths up to 30 m or more, are economically important sources of ilmenite, rutile and zircon (Fig. 4.1). The heavy mineral rich sands are mainly found in beach dunes, beach ridge, washover and backshore deposits associated with Holocene to Pleistocene sea-level changes. Onshore deposits occur as bands, typically 1-4 m thick that extend 1-3 km inland from the coast, and are up to 10 km in length. Most of the high-value deposits are found south of latitude 16°N particularly in the central SE Vietnam provinces Ninh Thuan and Binh Thuan (Fig. 4.1), to the northeast of Ho Chi Minh City. Surveys made in 2011 by the Department of Geology and Mineral Resources of Vietnam estimated that there are at least 650 million tons of ore reserves along the coastal margins between northeastern Vietnam and Vung Tau in the south. Sand ilmenite content typically varies from 10 to 100 kg/m^3 although some locations have concentrations well above this. Rutile contents are usually less than 1 kg/m^3, although in some places it can reach up to 3-4 kg/m^3 (e.g., coastal areas north of Da Nang). Zircon abundances also vary; the highest average content (up to 12 kg/m^3) can be found in the coastal sections of Ham Tan in Binh Thuan Province (Fig. 4.1). Mineral grain sizes are typically in the range of 0.16-0.25 mm. Understanding the origin of these minerals and the processes by which they became concentrated is the primary motivation of this study.

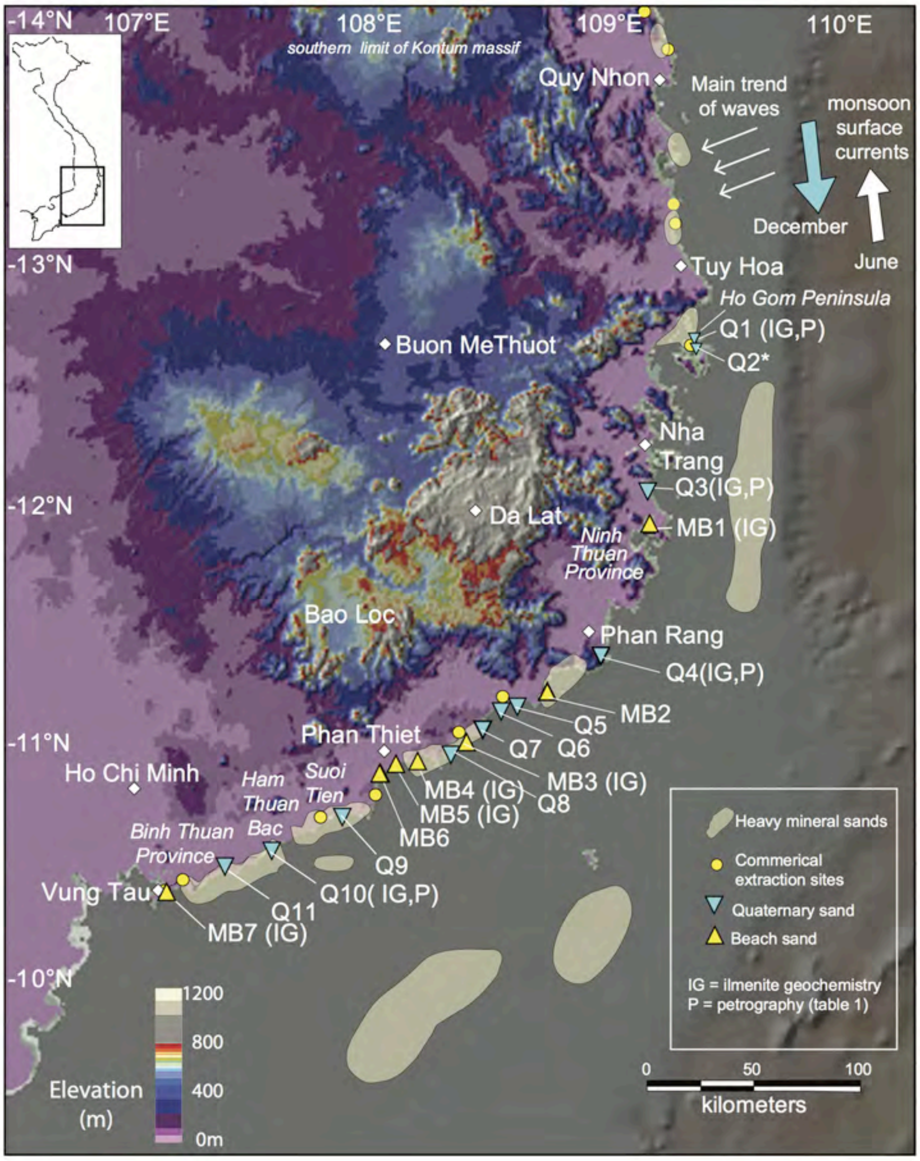


Figure 4.1: Locations of placer and beach sands samples and main commercial extraction sites in southern Vietnam. Samples with illmenite composition data, and mineralogical data reported in Table 1, are also indicated.

Ilmenite is an important source of titanium oxide. Fresh unaltered ilmenite has TiO_2 wt% values up to the stoichmetric value of 52.6 wt%. Chemical weathering and alteration, especially in oxidising and/or acidic environments, can change ilmenite chemistry by reducing Fe and Mn, increasing Ti and adding Al, Si, Th, P, V and Cr (Pownceby, 2010). The distribution and proportions of the different types of altered grains in the heavy mineral sands influences their commercial value as a source of Ti, and therefore it is important to understand the distribution and proportions of the different types of altered grains in the deposits which requires identifying where the alteration occurred and defining grain transport history.

Coastal sands along the southeast-central coastline of Vietnam typically comprise an outer and inner sand barrier. The former consists of loose white sand that sometimes form tombolos (e.g., Ho Gom Peninsula). The inner sand barrier located up to 20 km inland consists of light yellow to reddish yellow sands that include dunes found at elevations over 100 m above sea level, such as in the area north of Vung Tau or Ham Thuan Bac district (Fig. 4.1). Whether these sands are locally derived is unclear. The aim of this study is to better understand the environmental processes that led to the alteration and concentration of the heavy minerals and to define where the sand came from. It is known that the sands are closely linked to sea-level oscillations during the Quaternary, especially Holocene glacioeustatic changes between 8 and 5 ka (Stattegger et al., 2013). Falling sea level causes remobilisation of coastal sands deposited during highstands and increases bedrock erosion inland. Larger volumes of sediment would have been more intensely weathered during glacial periods (Wan et al., 2017) and the subaerial exposure of unconsolidated shelf sediments during associated lowstands would have affected ilmenite chemistry by causing enrichment in TiO_2. Wave action and longshore drift would also have contributed to the winnowing process, sorting grains according to size and density, hence it is entirely possible that sand grains are far removed from their original source areas.

4.2. Regional geology and geomorphology

The source and volume of beach sands depend on wind, wave and tide regimes as well as local erosion and fluvial transport rates. Detailed study of a river catchment in northern coastal Vietnam has indicated that greatest erosion reflected by river bedload and chemistry occurs within the mountainous regions where precipitation rates are highest, and that both weathering and erosion rates are linked to monsoon intensity (Jonell et al., 2017). Transport of sediment to the coast is dominated by discharge from the Mekong River in the south and by the Song Ma and Song Hong (Red River) in the north. Between these large rivers, that have their headwaters in Tibet and southwest China, the central areas of Vietnam are more locally drained by relatively small river catchments (Fig. 4.2) that have their headwaters in the nearby steep mountain ranges of the central highlands. Despite their small size, these rivers have been important sources of sediment to the coast and shelf as there is a relatively short distance between the wet highlands and the coastal plain, evidenced by high Quaternary sedimentation rates (from 0.5 to 1.2 m/ka) on the local continental shelf (Schimanski and Stattegger, 2005).

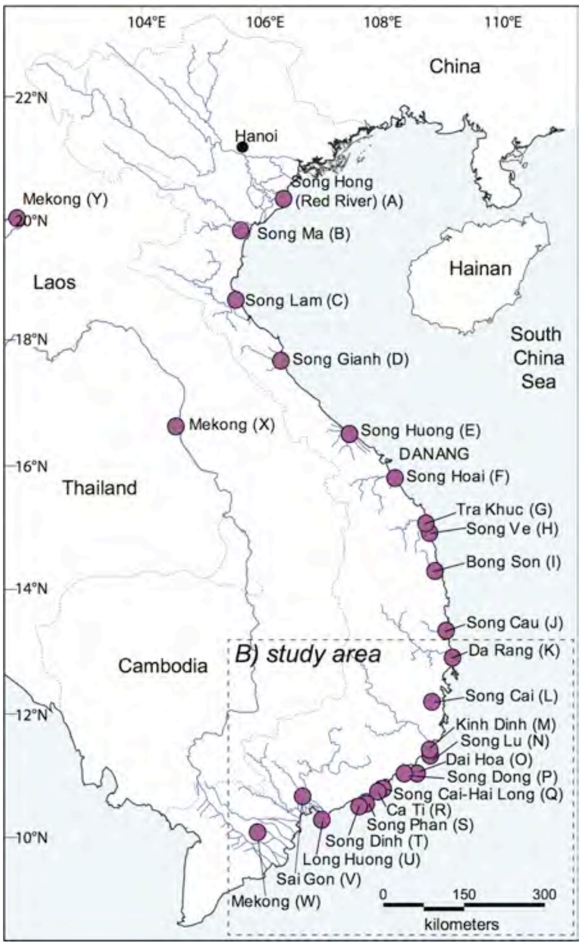


Figure 4.2: Locations of river sand samples collected from each of the main river outlets along the coast of Vietnam. Sample prefixes are given in brackets.

The trend of the coastline and shelf areas of Central Vietnam tend to follow the NNW- and NW-striking faults formed during the Triassic or earlier. Ordovician to Permo-Triassic granulite and amphibolite facies metamorphic rocks of the elevated Kontum Massif (Fig 4.1), which broadly lies between latitudes 14°N and 15°N, form the northern margin of the study area. Whilst zircon U-Pb geochronology has recorded Proterozoic ages between 1480-1350 and 900-600 Ma for local orthogneiss (Nguyen, et al., 2001; Tran, et al., 2003), charnokites, biotite-sillimanite-cordierite-garnet gneiss, schists, amphibolites, and granitoids originally mapped as Archean and Proterozoic have since been dated as Silurian and Triassic (Indosinian) (Carter et al., 2001; Nam et al., 2001; Hiet et al., 2015, 2016). These rock types are not seen south of latitude 13°N where Mesozoic granitoids dominate. West of Nha Trang are upper Carboniferous-lower Permian rocks of the Dac Lin Formation. These comprise terrigenous sediments interbedded with intermediate volcanic rocks, mainly andesitic basalts and tuffs. During the Triassic, closure of Tethys and final welding between Indochina and South China blocks caused significant deformation across much of northern Vietnam. This event is known as the Indosinian orogeny. Stratigraphy and radiometric ages of magmatic and metamorphic rocks support a Middle Triassic age for final closure of the Palaeotethys ocean (Faure et al., 2014). The study area was relatively unaffected by deformation related to this event. Triassic rocks are mainly confined to the northern part of the study area where the Mang Yang Formation includes rhyolites and tuffs associated with intracontinental rifts (Tran et al., 2011). Jurassic rocks are more widespread and occur as andesites, dacite and tuffaceous sandstones (Deo Bao Loc Formation). They are especially widespread in the western area between latitudes 13°30’N and 12°N. By contrast, the eastern region is dominated by Cretaceous magmatic rocks related to a former active continental margin. The widespread occurrence of arc-related magmatic rocks across the study area, including granitoids and rhyolites, is linked to subduction of the Palaeo-Pacific oceanic crust beneath southern China, Vietnam and southern Borneo (Shellnut et al., 2013; Hall and Breitfeld, 2017).

Within the study area there are three main suites of Cretaceous magmatic rocks. The Dinhquan and Deoca Complexes are found along the South Vietnamese coast. Petrological characteristics of the Dinhquan Complex comprise hornblende-biotite diorites, granodiorites and minor granites. The

Deoca complex consists of granodiorite, hornblende-biotite granite (phase I), biotite-hornblende granite, granosyenite and biotite syenite (phase II), and granite porphyry, granular aplite and pegmatite (dike phase). U-Pb zircon ages range from 88±1.5 – 109±7.0 Ma (Thuy et al., 2004) to 115.4±1.2 – 118.2±1.4 Ma (Shellnutt et al., 2013). The Ankroet Complex is smaller than the Dinhquan and Deoca complexes and is located further inland, at higher elevations. Rock types include medium to coarse-grained porphyroid biotite granite. Published zircon U-Pb ages are 93.4±2.0 – 96.1±1.1 Ma (Thuy et al., 2004) and 86.8±1.6 Ma (Shellnutt et al., 2013). Geochemical work by Shellnut et al. (2013) show the upper Lower Cretaceous granitic batholiths are I-type (partial melting of dehydrated middle/lower crust) and the Upper Cretaceous (i.e., ~90 Ma) granitic rocks have compositions similar to A-type (differentiated mafic parental magmas) associated with an extensional tectonic regime, most probably trench retreat caused by slab rollback. Rocks of Ankroet Complex are associated with this extensional setting.

Cenozoic fluvial-shallow marine clastic sedimentary rocks in the study area are the Oligo-Miocene Di Linh Formation, the lower Pliocene to Pleistocene Song Luy Formation, and the upper Pliocene to Pleistocene Ba Mieu Formation. Study of detrital zircon U-Pb ages from these units recorded abundant Cretaceous ages, as well as Permian–Triassic and Ordovician–Silurian sources. The youngest unit also records a significant increase in Precambrian zircons (Hennig et al., 2018). Also found across the study area are widespread late Cenozoic basaltic lava flows up to several hundred metres thick (Hoang and Flower, 1998). Alkali basaltic magmatism began in the middle Miocene and has a geochemistry that fits with sources of recycled eclogitic oceanic crust from the Hainan plume (An et al., 2017). Eruptions and lava flows often appear to have exploited local fault zones re-activated by South China Sea opening.

Patterns of sediment accumulation and concentration of heavy mineral sands along the coastal shelf and margins appear to track past sea-level changes. Direct evidence to support this can be found in optically stimulated luminescence (OSL) dating studies of stratigraphically oldest barrier sands exposed at Suoi Tien (10°57’16”N - 108°15’30”E) and Hon Gom (12°41.64’N - 109°45.27’E) (Fig. 1) (Quang-Minh et al., 2010) that include layers enriched in ilmenite and zircon. These gave deposition ages ranging from 8.3±0.6 to 6.2±0.3 ka, contemporaneous with the local postglacial maximum sea level highstand. Much older red shallow marine sands at Suoi Tien were dated to 101±16 ka whilst white sand at the bottom of the sequence could be as old as 276±17 ka and correspond to an earlier sea-level highstand. Detailed reconstructions of mid to late Holocene sea-level for Southeast Vietnam can be found in Stattegger et al. (2013).

Although sea-level fluctuations are important, the concentration of heavy minerals likely involved a combination of factors that included sediment transport history along the shelf and coastline (influenced by sediment supply) and hydrodynamic conditions. The latter is dominated by the East Asian monsoon system that blows from the northeast in winter and southwest in the summer. The northeast monsoon has most impact on northern Vietnam and the southwest monsoon on central and southern regions (Pham, 2003). Although seasonal reversal of the monsoon system also switches longshore currents from southerly to northerly, the long-term trend of sediment transport can also be affected by local coastal geomorphology. This makes it difficult to predict long-term trends in coastal sediment transport, as demonstrated by modeling studies of longshore transport to define impacts of sea-level changes associated with climate change (Dastgheib et al., 2016).

4.3. Methods and Approach

The study area covers the section of Vietnamese coastline where most heavy mineral sands are found, which is between 15°N and 10°N (Fig. 4.1). Since placer deposits represent biased sand composition we used a multi-method approach and defined the geochronological, geochemical and mineralogical signatures of representative placer deposits to locate sand source areas and define the extent of alteration and transport. Results are then compared against data collected from each of the main rivers along the Vietnamese coastline including two samples (X and Y) from the upper Mekong within (Laos (Fig. 4.2). This approach will enable a model of locally derived *vs* longshore transport derived to be tested.

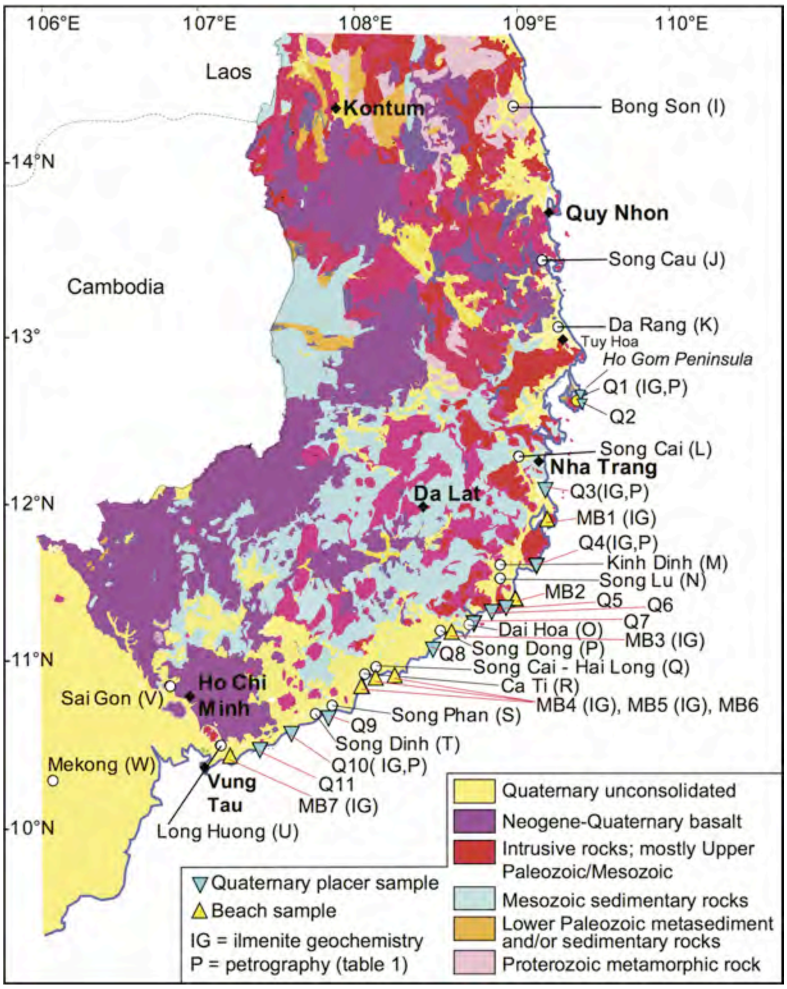


Figure 4.3: Map of study area geology showing locations of sand samples.

Sampling of placer deposits included nearby contemporary beach sands as these might preserve geographic links to source areas compared to older sands that are likely to have seen more extensive reworking and mixing, although reworking of older sediments would negate this assumption. Recognizing that during transport selective entrainment based on variations in grain density produces a compositional bias (Garzanti et al., 2009) we sampled sands with a typical grain size range between 65-500 µm. River sands were collected as close to river mouths as possible from active channel beds and point bars where heavy minerals tend to be concentrated. Beach sands were sampled (Fig. 4.3) in areas documented as rich in heavy minerals and taken from dark sand layers in the upper shoreface following removal of the lighter coloured top few centimeters. Also included are sand samples from onshore shallow boreholes drilled in prospective mining areas. In all cases efforts were made to avoid areas subject to obvious anthropogenic disturbance. In total 25 river and 18 onshore placer sand samples (typically between 1 to 2 kg) were collected.

Quantification of mineral types and abundances was made using automated energy-dispersive X-ray spectroscopy (SEM-EDS) coupled with expert software analysis on a QEMSCAN® platform which allows micron-scale mapping and mineral identification of samples (Pirrie and Rollinson, 2011). Polished grain mounts of untreated sands were scanned at a resolution of 10 µm yielding c. 5000 to 12000 grain counts per slide. The acquired EDS spectra were interpreted automatically by reference to a database of mineral compositions.

Detrital zircon U-Pb geochronology is used to help define ilmenite provenance since both Ilmenite and zircon are normally found in similar source rock types and would be expected to behave similarly during transport as they have similar specific gravities (4.5-4.7). Detrital zircon geochronology is widely used in provenance studies due to stability of the mineral and U-Pb system (e.g., Jonell et al., 2017; Singh et al., 2017). Detrital zircon grains were separated by standard heavy liquid techniques. Grains for dating were selected randomly from polished grain mounts and analyzed by laser ablation inductively coupled plasma mass spectrometry at the London Geochronology Centre based in University College London using a New Wave 193 nm laser ablation system coupled to an Agilent 7700 quadrupole-based ICP-MS. Typical ablation parameters used 25 µm spots with a 10 Hz repetition rate and an energy fluence of ca. 2:5 J/cm^2. Instrumental mass bias and depth-dependent inter-element fractionation of Pb, Th and U were corrected for using Plesovice as an external zircon standard (Sláma et al., 2008). Time-resolved signals that record evolving isotopic ratios with depth in each crystal were processed using Glitter 4.4 data reduction software. This removed spurious signals caused by inclusions, mixing of growth zones or fractures. Calculated $^{206}Pb/^{238}U$ ages were used for grains younger than 1000 Ma, and the $^{207}Pb/^{206}Pb$ age for older grains. Grains with a complex growth history or disturbed isotopic ratios, with > +5/-15% discordance, were rejected.

To characterize garnet and ilmenite chemistry and to test for ilmenite alteration by weathering grains (circa 100 per sample) from representative river and placer sands were selected for electron microprobe analysis. A JEOL JXA-8100 Electron Probe Microanalyzer Scanning Electron Microprobe fitted with an Oxford Instruments X-act PentaFET Precision detector was used to carry out the geochemical analyses on polished grain mounts. Qemscan mineral maps helped with grain identification.

4.4. Results and interpretation

4.4.1. Petrology

Table 4.1 summarises mineral abundances of representative rivers and Quaternary sands. Despite the wide presence of basaltic rocks olivines are rarely found in river sands and none were detected in the Qemscan analyses of untreated sand (Table 4.1). Pyroxenes are present in river sands but are missing from the coastal placer sands suggesting that there has been loss due to weathering. Minerals diagnostic of heavy to medium grade metamorphic rocks are common. Similar abundances of high-grade metamorphic minerals siliminite, kyanite and andalusite are present in both river and beach sands, although they are more abundant in the area between latitudes 14-16°N where outcrops of high-grade Proterozoic metamorphic rocks are more widespread. Amphiboles are especially common in the river sands between 12 and 16°N but abundances systematically decrease to the south (Fig. 4.4). By contrast, amphiboles are sparse in the contemporary beach sands (Table 4.1) suggesting either removal by weathering and physical abrasion, helped by its cleavage (Garzanti et al., 2015), or density sorting during transport (Garzanti et al., 2009).

Sample	F	G	H	I	J	K	L	Q1	Q2	Q3	Q4	Q10	MB7
Number of grains	7956	4826	3595	7077	7157	7055	11709	3857	1586	4627	10426	4553	7151
Grain type (% of all grains)	%	%	%	%	%	%	%	%	%	%	%	%	%
Quartz	79.2	61.6	68.4	64.8	51.6	54.1	41.5	95.3	94.6	96.6	67.0	90.2	90.5
Plagioclase Feldspars	3.7	4.8	5.2	4.8	11.8	6.4	20.1	0.1	0.1	0.1	0.81	0.2	0.5
Alkali Feldspars	6.1	7.2	7.6	9.6	17.8	14.0	19.1	1.1	1.9	0.1	14.1	1.4	1.4
Biotite	0.1	0.6	0.7	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Muscovite	0.9	2.0	3.0	4.7	1.6	2.3	2.1	0.1	0.1	0.0	0.7	0.1	0.1
Chlorite	0.4	0.8	1.0	0.7	0.2	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Smectite	0.66	1.1	0.9	1.0	1.3	1.9	1.9	0.1	0.1	0.1	2.3	0.2	0.4
Illite	1.0	1.6	1.8	2.0	3.0	3.6	3.4	0.1	0.2	0.0	2.9	0.3	0.4
Kaolinite/Dickite	0.9	1.4	1.8	1.9	1.3	7.5	3.8	0.6	0.7	0.3	5.5	1.0	1.4
Other Clays	1.7	1.5	2.1	1.9	2.0	4.4	2.9	1.3	1.6	0.8	3.6	2.3	3.0
Garnet	0.9	1.8	0.8	0.4	1.0	0.3	0.2	0.1	0.0	0.0	0.0	0.1	0.1
Apatite	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Amphibole	2.1	7.0	2.1	2.3	1.1	0.6	0.6	0.0	0.0	0.0	0.1	0.1	0.1
Rutile/Anatase	0.0	0.3	0.2	0.5	0.3	0.2	0.2	0.1	0.1	0.2	0.2	0.6	0.1
Tourmaline	0.3	1.6	1.3	1.4	0.3	1.7	1.6	0.1	0.1	0.2	0.5	0.3	0.2
Zircon	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0
Siderite-Magnesite	0.0	0.2	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ilmenite	0.0	0.7	0.1	1.6	1.2	0.2	0.1	0.3	0.3	0.8	0.6	1.8	1.1
Sillim/Ky/Andalusite	0.0	0.1	0.4	0.2	0.1	0.0	0.1	0.2	0.1	0.1	0.1	0.0	0.1
CPX	0.2	1.6	0.2	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Titanite	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unclassified other	1.8	2.7	1.9	1.7	2.2	1.9	1.5	0.5	0.1	0.7	1.5	1.1	0.6

Table 4.1. QEMSCAN mineral percentages (by volume) for untreated river and Quaternary beach sands from central and southern Vietnam.

Sorting is unlikely given that the ultrastable high-grade metamorphic minerals, siliminite and kyanite, which are only slightly denser than amphibole, are present in both river and beach sands (typically 0.1 to 0.4% of grains, Table 4.1). Aside from loss by weathering and abrasion it is also possible that the absence of amphiboles reflects minimal south-directed longshore transport, i.e., rivers sands are not dispersed very far along the coast. The latter seems more likely as the denser minerals garnet, rutile, ilmenite and zircon that do not breakdown as easily as amphibole during transport, also show decreasing abundances between northern and southern rivers and that levels in the beach sands always have a lower content than river sands. By contrast, levels of feldspars increase southwards in river samples but remain low in most heavy mineral sand samples. This provides clear evidence that some density separation is taking place in the marine environment.

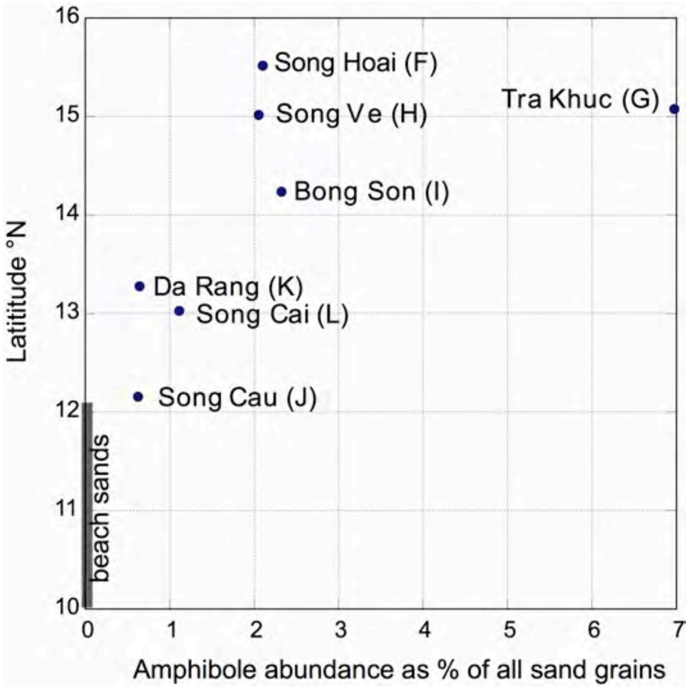


Figure 4.4: Abundance of amphiboles in river sands from central Vietnam as a fraction of total grains scanned on the Qemscan slide.

4.4.2. Garnet and ilmenite geochemistry

As garnet is present in both river and coastal sands I explored the usefulness of this mineral for defining local sand provenance. Chemical analyses by EPMA was used to calculate the common garnet end-members (almandine, andradite/schorlomite, grossular, pyrope, spessartine and uvarovite) of representative samples following the procedures outlined in Suggate and Hall, (2013). Due to difficulties obtaining good quality datasets (many measurement gave low EPMA totals) and identifying garnet on the polished thin sections only two samples each produced > 75 good quality grain analyses. These two river samples were from central Vietnam (north of 16 degrees) and are shown in figure 4.5. Sample F has more amphibolite derived garnets (red circles in the middle) suggesting a more basic source, while sample K has quite a lot of skarn (siliceous rock produced by the metamorphic alteration of limestone or dolomite) and calc-silicate derived garnets. Whilst garnet data confirm metamorphic and granitoid sources that fit with the local geology in the double ternary garnet plot there is often a large overlap area. Given the difficulties this work was not carried any further so that I could focus on ilmenite chemistry.

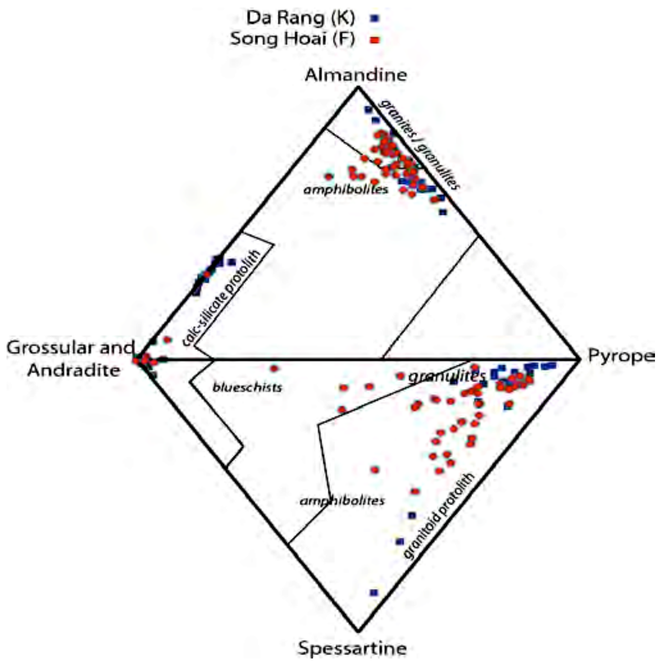


Figure 4.5: Example of detrital garnet compositional data from river sands samples F and K from central Vietnam. Both have small catchments that drain z metamorphic and granite rich terrain.

Results of a subset of samples selected for ilmenite microprobe analyses (Fig. 4.6) show that although some fresh unaltered ilmenite grains are present most ilmenites have been altered and this increased grain titanium contents to above stoichiometric levels (i.e., > 52.6 wt%). Figure 4.6A, of river sands, shows that there are some regional differences whereby the proportion of altered grains increases to the south. This implies that rivers in the north of the study area deliver fresher ilmenite to the coast and offshore. Figure 4.6B compares ilmenite from Holocene sands (Quang-Minh et al., 2010) along the coast. These data also show a trend of increased levels of weathering to the south. Comparison between river sands and nearby Holocene sands (Fig 4.6C) show dissimilar distributions supporting alteration after river deposition. Figure 4.6D compares modern beach sands along the coast and again the greatest amount of alteration is seen in the south.

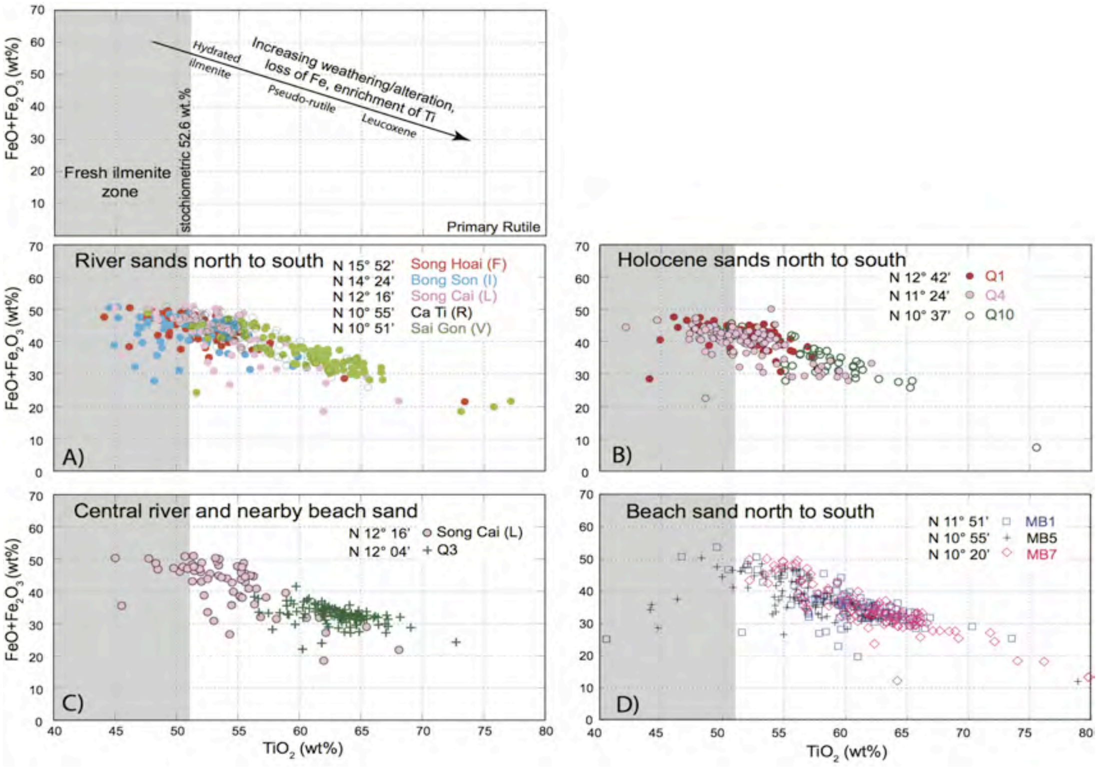


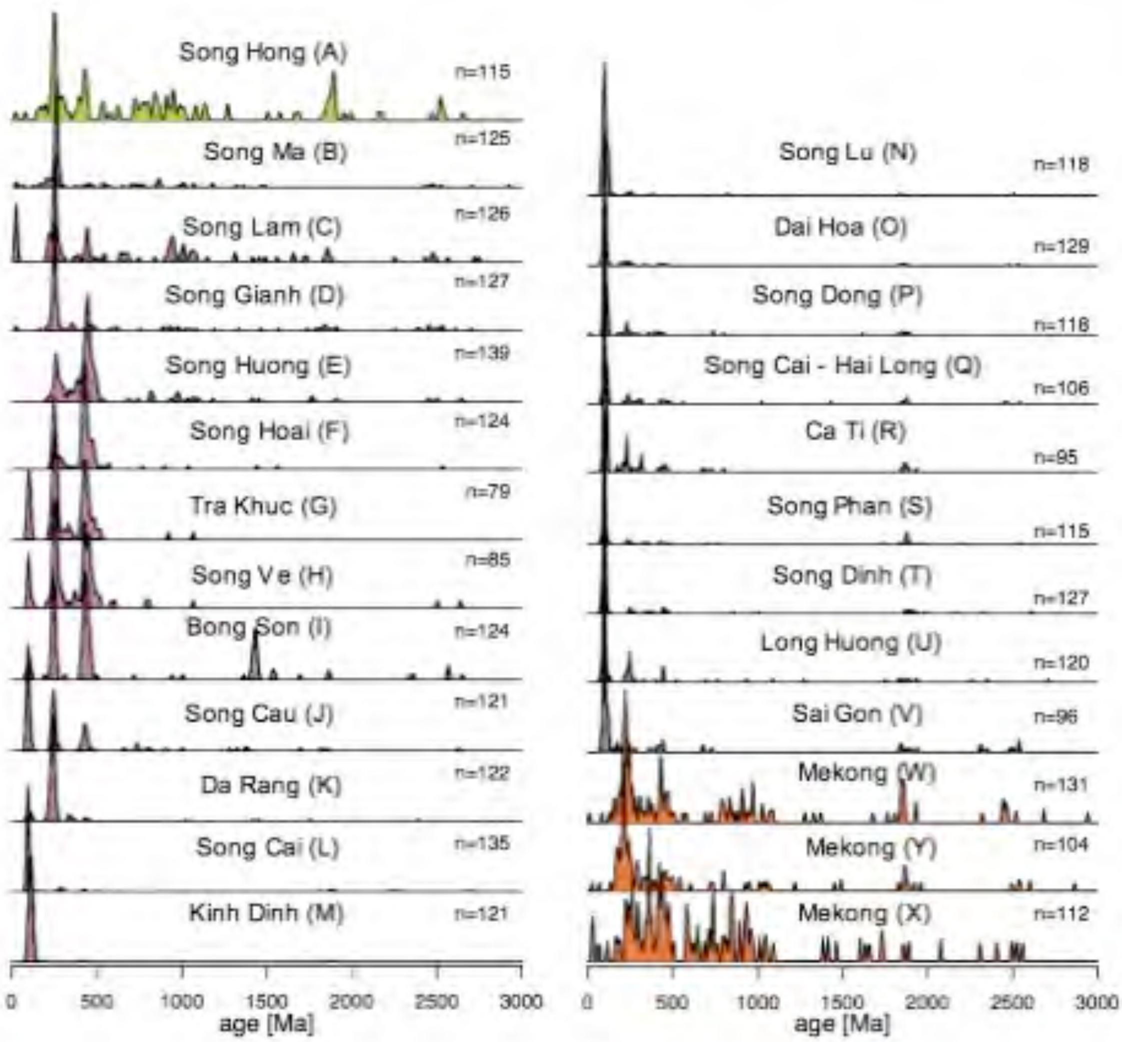
Figure 4.6: Ti and Fe contents of ilmenite grains from river and coastal sand samples.

4.3. Detrital zircon U-Pb river sand results

Data from each of the main river outlets along the coast of Vietnam provide a simple way of capturing signatures of the local geology against which coastal sand data may be compared (full analytical results are provided in the supplementary section). A summary of age distributions of individual river samples (Fig. 4.7), displayed as Kernel density (KDE) plots (Vermeesch, 2012), show rivers from northern and central Vietnam drain older rocks than rivers in southern Vietnam (Fig. 4.3). Both the Song Hong (Red River) and Mekong have age distributions dominated by a wide range of Proterozoic ages that reflect source rocks in the catchments beyond Vietnam, e.g. Mekong samples X and Y from Laos (Fig. 4.2). The proportion of 400-500 Ma zircons is seen to increase southwards at the expense of Proterozoic grains (Fig. 4.7). South of 14°N, river (sample L onwards) zircon age distributions are dominated by either Permo-Triassic, Cretaceous or Ordovician-Silurian peaks (Fig. 4.7). The Permo-Triassic ages are likely to be volcanic rather than granitic as the main rocks types in the study area are rhyolites and tuffs belonging to the Mang Yang

Formation although Triassic granulites are known in the Kontum area (Carter et al., 2001). The majority of age spectra contained a few Proterozoic ages, some of which are clearly related to inherited cores (see chapter 5). This observation is consistent with Shellnut et al. (2013) who noted magma mixing with older basement was required to explain the composition and inherited ages of the Cretaceous granites.

As visual comparison of KDE plots is subjective the data were also plotted as Multidimensional Scaling (MDS) maps (Vermeesch, 2013). The MDS approach, based on Kolmogorov–Smirnov statistics, group samples with similar age spectra, and pull apart samples with different spectra.



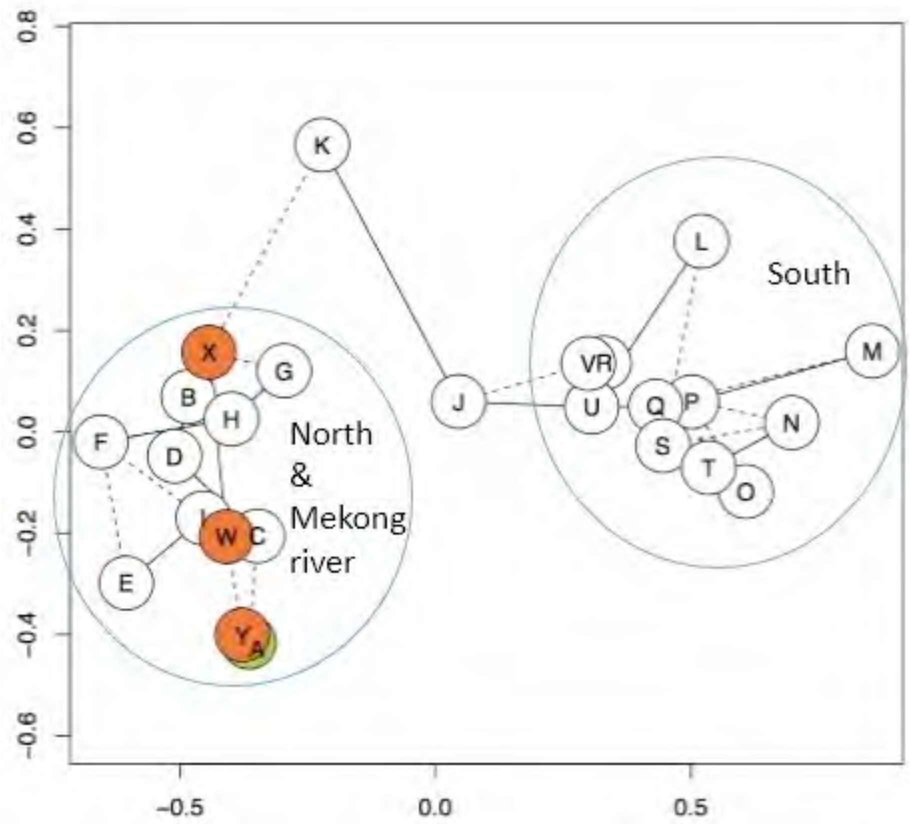


Figure 4.7: Kernel density and Multidimensional Scaling plots of the detrital zircon U-Pb results from the river samples shown in Figure 4.2.

The MDS map (Fig. 4.7) clearly shows two groups of samples. The left group comprises rivers from northern Vietnam plus the Mekong that have abundant Proterozoic ages. The right-hand group comprises river samples from central and southern Vietnam, which are dominated by Permo-Triassic and Cretaceous age peaks. These two groups reflect changes in regional geology whereby northern Vietnam is dominated by Proterozoic and Palaeozoic metamorphic basement, compared to the south where Mesozoic granitoids and Cenozoic basalts dominate. A transition between these groups occurs around the Kontum massif, which marks the northern limit of the main study area. The catchment of river K (Da Rang) spans this junction and therefore plots between the two main clusters. Based on these results it will be possible to identify if any of the heavy mineral sands originated from northern Vietnam.

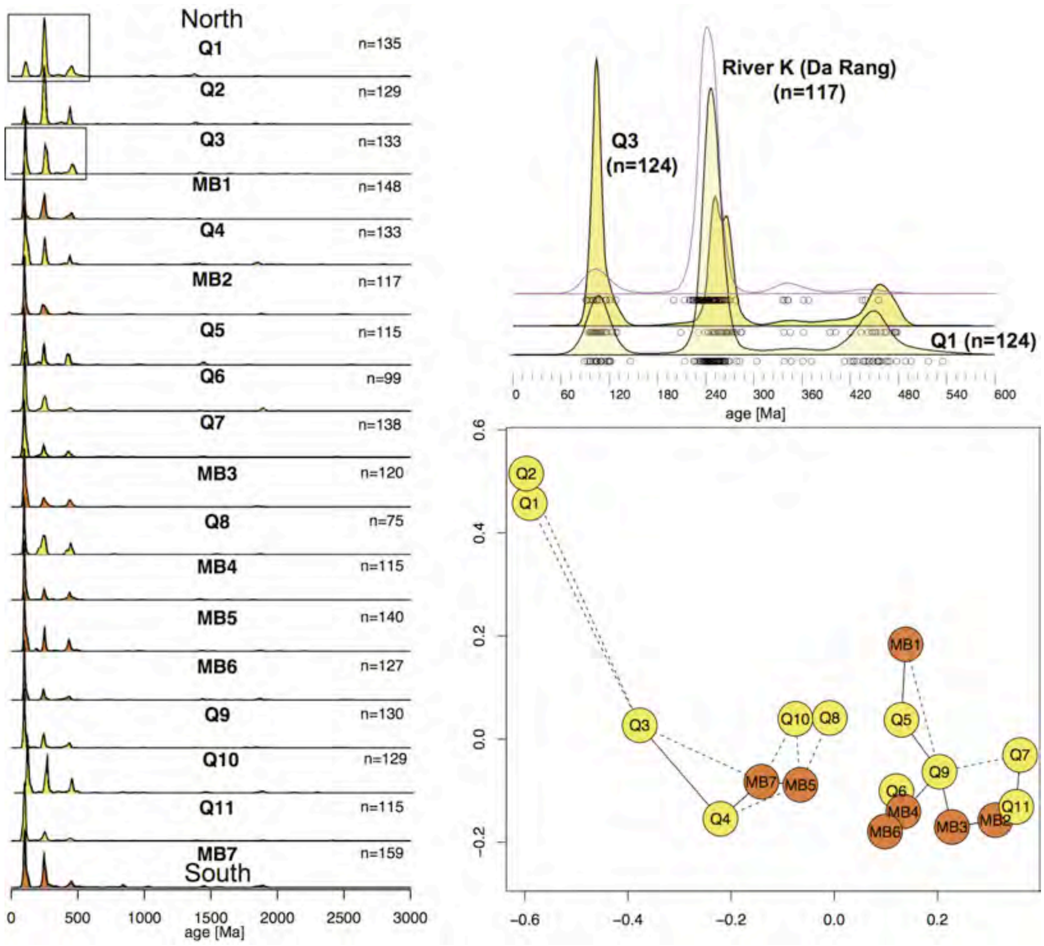


Figure 4.8: Kernel density and Multidimensional Scaling plots of detrital zircon U-Pb results from coastal sands. Prefix Q indicates a Quaternary sand and MB modern beach sands. KDE plots show the extent of similarity between River K and the Quaternary sands.

4.4. Detrital zircon U-Pb coastal sand results

KDE plots of detrital zircon ages from coastal Quaternary (Q) and modern beach (MB) sands (Fig. 4.8) show prominent age groups spanning 90-120 Ma and 220-250 Ma plus a minor group at 400-500 Ma. The age distributions are remarkably similar across the whole study area, differing only in the proportions of zircons within each age group. The accompanying MDS plot suggests samples Q1 and Q2, from north of Nha Trang (Fig. 4.1) are different from the rest but this is simply due to fewer Cretaceous ages compared to the other samples, despite being located less than 50 km from the Cretaceous Deo Ca Magmatic Complex.

The Da Rang (river K) is local to samples Q1 and Q2 and shows a similar age distribution (Fig. 4.8) although there are fewer Cretaceous and Ordovician-Silurian zircons. South of the Da Rang, all other rivers, apart from the Mekong, are dominated by Cretaceous zircons. Figure 4.9 is an MDS plot of concentrations of heavy minerals with a density > 3.2 comparing rivers in central Vietnam with nearby Quaternary sands. Whilst there is no systematic trend for locations from north to south the plot makes clear that Quaternary sands are different from local rivers sources.

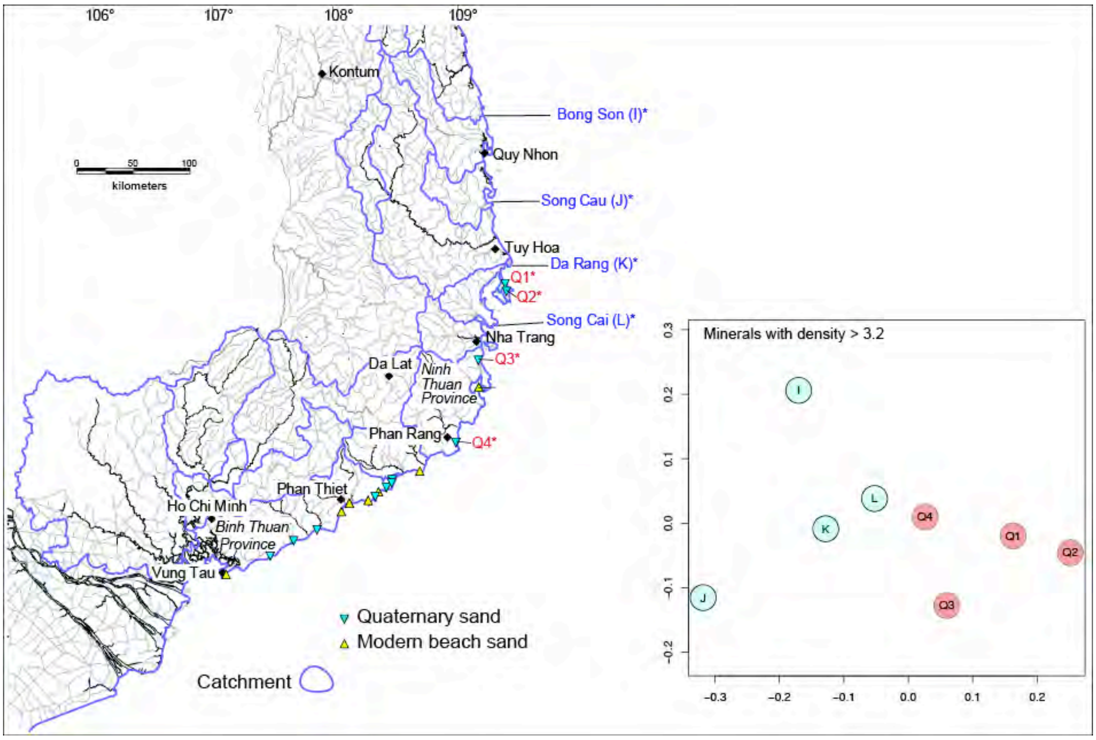


Figure 4.9: MDS plot of heavy mineral (densities > 3.2) concentrations of sands comparing rivers in central Vietnam (blue circles) with nearby Quaternary sands (red circles).

4.5. Discussion

Heavy mineral sand mineralogy data support derivation from a mixture of magmatic and high-grade metamorphic lithologies. Many sands contain trace amounts of the high-grade metamorphic minerals sillimanite and kyanite (present in both river and coastal sands) but olivine and pyroxenes are missing despite the widespread occurrence of Neogene basalts throughout southern Vietnam (see Table 4.1). Likely sources of sillimanites are outcrops of biotite-sillimanite-cordierite-garnet gneiss in the Kontum district. This is supported by the higher amounts of sillimanite in rivers G and H (Fig. 4.2) that drain this area. However, sillimanite is also present farther south in the Song Cai (L in Fig. 4.2) and in Holocene heavy mineral sands near Phan Rang (Q4 in Fig. 4.1), a region dominated by Cretaceous granites. Rocks west of Nha Trang have been mapped as Proterozoic amphibole gneiss and schists so it is conceivable that sillimanite rocks may also exist in this area.

Feldspar contents in river sands, which are typically between 10 and 40%, have been reduced to <2% in most heavy mineral sands indicating considerable density separation (and/or weathering) within the marine environment. Whilst hydraulic sorting and weathering effects mean that none of these observations enable specific source areas to be identified, several common trends have been recognized amongst the petrological, geochemical and geochronological datasets that reflect the sediment routing system. Amphibole abundances decrease from north to south and ilmenite TiO_2 content increases southwards.

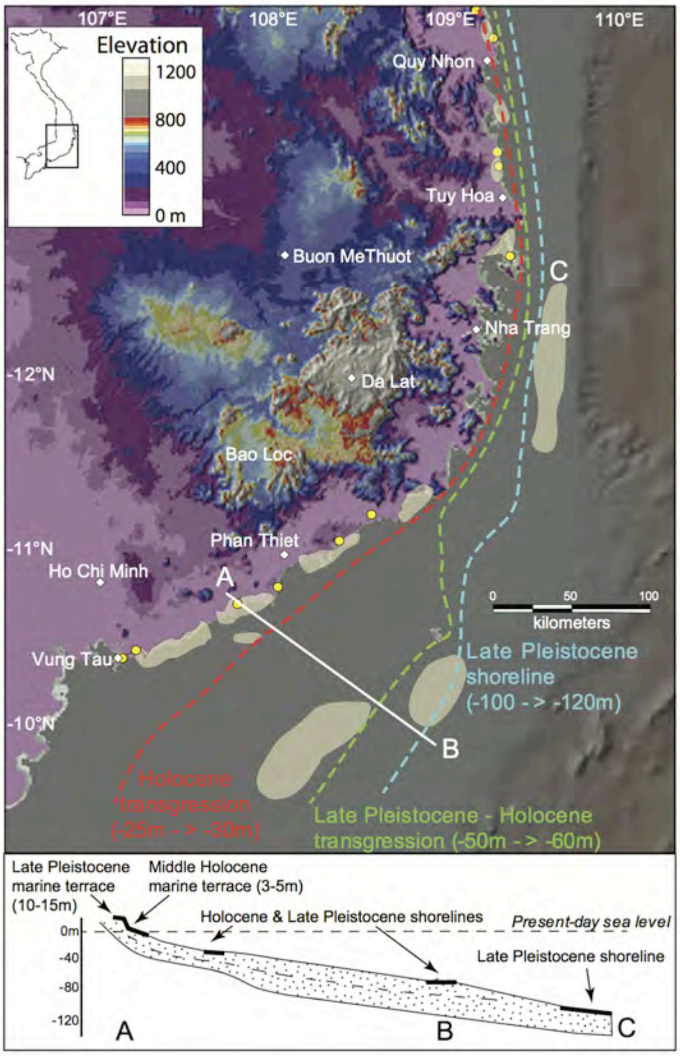


Figure 4.10: Relationship between late Pleistocene to Holocene sealevel change, shorelines and locations of the heavy mineral sands. The lower plot shows the link between OSL dated sands and Holocene sea level based on data from Quang-Minh et al. (2010) and Stattegger et al. (2013).

Relatively fresh ilmenite is delivered to the oceans by rivers in central Vietnam (e.g., Song Cau) compared to rivers in the south (e.g., Sai Gon), where alteration due to weathering is more developed (Fig. 4.6A). However, ilmenite TiO_2 content in river sands do not match local heavy mineral deposits (Fig. 4.6C). Collectively, this evidence shows most of the alteration must have taken place after deposition by rivers. One possibility is that the wider coastal plains found in the south are more conducive to intermediate storage (and weathering) before remobilisation and final deposition (Fig. 4.10).

Southward widening of the SE Vietnam Shelf area has not only increased the distance between sediment sources to the middle and outer shelf but also created a wide plain that would have been exposed to weathering during the late Pleistocene and Holocene highstands. With rising sealevel some of this sand would have been remobilised and transported inland, especially during the Holocene highstand between 6-7 ka. Sand was subsequently reworked by wave activity and redeposited during interstadial and interglacial transgressions. The narrow continental shelf farther north and the proximity of the mountainous terrain to the coast limit the amount of surface area exposed weathering in the northern and central coastal areas.

Studies of modern and late Pleistocene to Holocene stratigraphy of the shelf areas of central and southern Vietnam (Dung et al., 2013, 2014; Stattegger et al., 2013; Tan et al., 2014) have identified at least five major seismic units and three bounding surfaces that can be linked to known sealevel adjustments including relict beach-ridge deposits at water depths of about ~130 m below present that are associated with the last glacial lowstand. More importantly, in relation to understanding the processes by which sands became weathered and enriched in heavy minerals, studies Bui et al. (2013; 2014) have noted an absence of falling stage systems tract deposits. This can be explained as the result of inner and middle shelf deposits being subjected to erosion and reworking during successive sealevel falls following highstands and reworking again during the following transgression. Repeating cycles of reworking would also have been influenced by strong monsoon driven bottom currents evidenced by numerous NE–SW oriented sand waves that today are found at modern water depths of 20-40 m (Bui et al., 2013). Figure 4.9 shows former coastlines associated with past lowstands and their relationship to onshore and offshore placer sands (Quang-Minh et al., 2010; Stattegger et al., 2013).

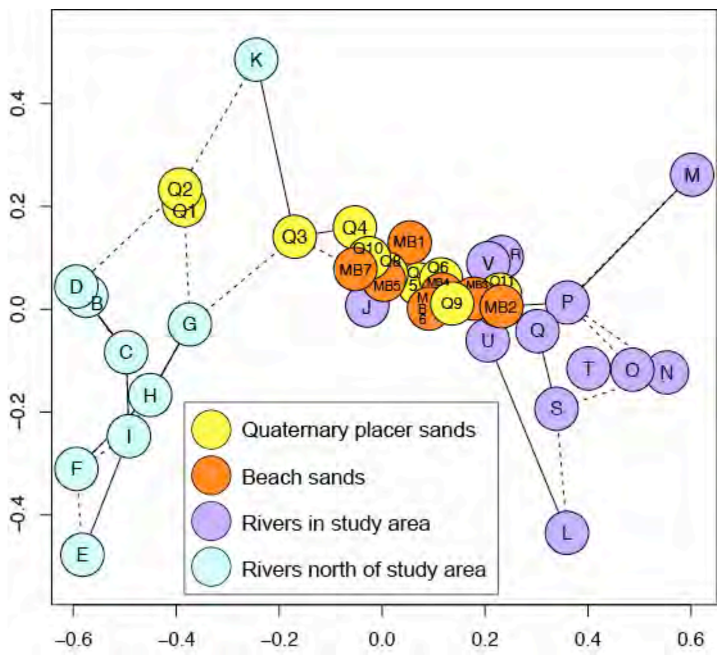


Figure 4.11: Multidimensional Scaling plot combining all detrital zircon samples apart from the Mekong and Red rivers that have been excluded due to their markedly different age spectra that rule out these rivers as sand sources.

Detrital zircon data help to define where placer sands came from. Results from rivers along the coast of Vietnam show clear differences in zircon age distributions between northern Vietnam and central to southern Vietnam that directly reflect changes in the local geology (Fig. 4.7). As the emphasis was on detecting the range of ages present rather than the abundance of zircon there is no need to take zircon fertility of the parent rocks into account. Differences between river and placer zircon age distributions (Fig. 4.11) rule out sources from northern and central Vietnam, which are dominated by older rocks. Exceptions are Mekong river samples that yielded significant numbers of Precambrian zircon ages. Similar old ages are also found in the late Pliocene to early Pleistocene Ba Mieu Formation (proto-Mekong) found east of Ho Chi Minh City (Hennig et al., 2018). Much of this formation has been eroded away and therefore if these rocks (and Palaeo-Mekong deposits in general) were an important source there should be significant numbers of Precambrian zircon ages present in the coastal sands. That this is not the case shows that Mekong river sands (modern or ancient) could not have been the main source of the placer sands. Geochronological and geochemical characteristic of placer and contemporary sands support a local origin defined by river catchments that are dominated by Cretaceous magmatism associated with an active continental margin, i.e., the Da Lat zone and areas to the south. Apart from Quaternary samples Q1 and Q2 that contain a larger proportion of ages between 220-250 Ma and 400-500 Ma, there is no significant difference between modern and older sand deposits (Fig. 4.7). This is likely due to mixing associated with changes in sealevel. Lack of Precambrian grains in the coastal placer deposits and beach sands rule out significant longshore transport from the north or reworking of Palaeo-Mekong sands in the south.

4.6. Conclusions

Placer sands along the coastal margins of central and southern Vietnam have been enriched in heavy minerals by cycles of deposition, weathering and erosion, and reburial associated with interstadial and interglacial sealevel changes. Weathering took place during lowstands. Geochemical and geochronological data show sands were derived from river catchments that contain outcrops of Cretaceous magmatic rocks. Results do not support significant longshore transport from northern Vietnam or from the Mekong delta in the south. Had there been significant transport from the north, placer sands would contain large numbers of zircons with Proterozoic and Palaeozoic ages that typify the geology of these areas, including the large catchment area of the Red River that extends into South China. Mekong sources can be ruled out for similar reasons. Ilmenite sources were observed in all of the main river outlets along the southern to central Vietnamese coastline although fresh unaltered grains were mainly found in the central region. A progressive enrichment of ilmenite TiO_2 content was observed from north to south due to more intense weathering related to a widening of the shelf area. This would have increased surface area exposure of unconsolidated shelf sediments to weathering during glacial sea-level lowstands and remobilisation and mixing during subsequent transgressions.

5

CRETACEOUS MAGMATISM

5.1. Introduction

A conclusion of chapter 4 was that the clastic sediment sources for the heavy mineral deposits came from mainly local sources that are rich in Mesozoic granites. Such rocks are common along southern Vietnam and are considered to be the product of a magmatic arc associated with subduction of Palaeo-Pacific oceanic crust beneath South China and Indochina (Hall et al., 2009, Hall, 2012). But in the study region there is not much published isotopic age data. The purpose of this chapter is to provide better understanding of the timing and duration of magmatic activities and thus source areas of the heavy mineral deposits by making new zircon U-Pb analyses on granites from across the study area.

5.2. Geological setting

The continental margin of south to central Vietnam belongs to the Indochina Terrane, and is surrounded by the Kontum Massif to the north, Central Highlands to the west and the South China Sea to the southeast. The region is dominated by Mesozoic sedimentary rocks and igneous and basaltic rocks (Fig 5.1). Precambrian basement is not exposed although seismic data (Khoan, et al., 1984) suggest that it is composed of granulites and gneisses. Palaeozoic rocks are mostly absent in part due to the region being an emerged continent at that time (Hutchison, 1989). The few outcrops are found in the north to northwest in the Dak-Lin area where Upper Palaeozoic sedimentary rocks (Carboniferous to Permian) are exposed. These rocks have compositions consistent with intermediate calc-alkaline volcanoes and carbonate rocks are also present (Nguyen, 2001). Hence it is considered to have had a similar geological evolution to the Kontum Massif (Nam et al., 2001).

Most of the study area is covered by Mesozoic to Cenozoic sedimentary rocks. The Mesozoic formations include widespread Lower to Middle Jurassic shallow marine sedimentary rocks. The Upper Jurassic–Cretaceous sequence includes the Deo Bao Loc, Nha Trang and Don Duong formations that formed in a continental environment. These are composed of volcano-sedimentary beds of mainly intermediate, felsic and alkaline composition (Nguyen, 1977). Formations are slightly folded and a weak contact metamorphism is seen in the aureoles of late Mesozoic plutons. Contemporaneous and widespread volcanic rocks are interpreted as subduction-related products (Nguyen et al., 2004) linked to widespread granite plutons.

Mesozoic granitoid bodies in study area are mostly located along the coastline to south of the Kontum Massif. Early petrological, mineralogical and textural studies by Vietnamese geologists subdivided these granitoids into three plutonic complexes, called Deoca, Dinhquan and Ankroet complex (Bao et al., 1980) and this scheme was used on the geological map of Vietnam at 1:500.000 scale.

The Dinhquan and Deoca Complexes is located northeast - southwest of Kontum and is found along the South Vietnamese coast. Petrological characteristics of the Dinhquan Complex comprises hornblende-biotite diorites, granodiorites and minor granites. The Deoca Complex consists of granodiorite, hornblende-biotite granite (phase I), biotite-hornblende granite, granosyenite and biotite syenite (phase II). granite porphyry. granular aplite and pegmatite (dike phase). Sedimentary rocks of the La Nga Formation form smear-slate and were crosscut by granitoids of the Ankroet Complex and these were covered by young volcanic rocks of the Don Duong Formation (K_2). K-Ar and Ar-Ar ages of granitic rock from the Dinhquan and Deoca complex ranges from 80 to 118 Ma (Nguyen, 2001) and U-Pb zircon ages range from 88±1.5 to 109±7.0 Ma (Thuy et al., 2004) and 115.4±1.2 – 118.2±1.4 Ma (Shellnutt et al., 2013).

The Ankroet Complex is smaller than the Dinhquan and Deoca Complexes and is located further inland, at higher elevations. Its characteristics include: medium to coarse-grained porphyroid biotite granite, light-grey in colour with a low hornblende content. K-Ar isotopic age ranges of granitic rock from 81.0±1.0 to

99.0 ±1.0 Ma and Rb-Sr are of 94.0-97.0±1.0 Ma (Phan, 2001) and zircon U-Pb ages of 93.4±2.0 to 96.1±1.1 Ma (Thuy et al., 2004) and 86.8±1.6 Ma (Shellnutt et al., 2013). Figure 5.1 summarises published granite ages in my study area.

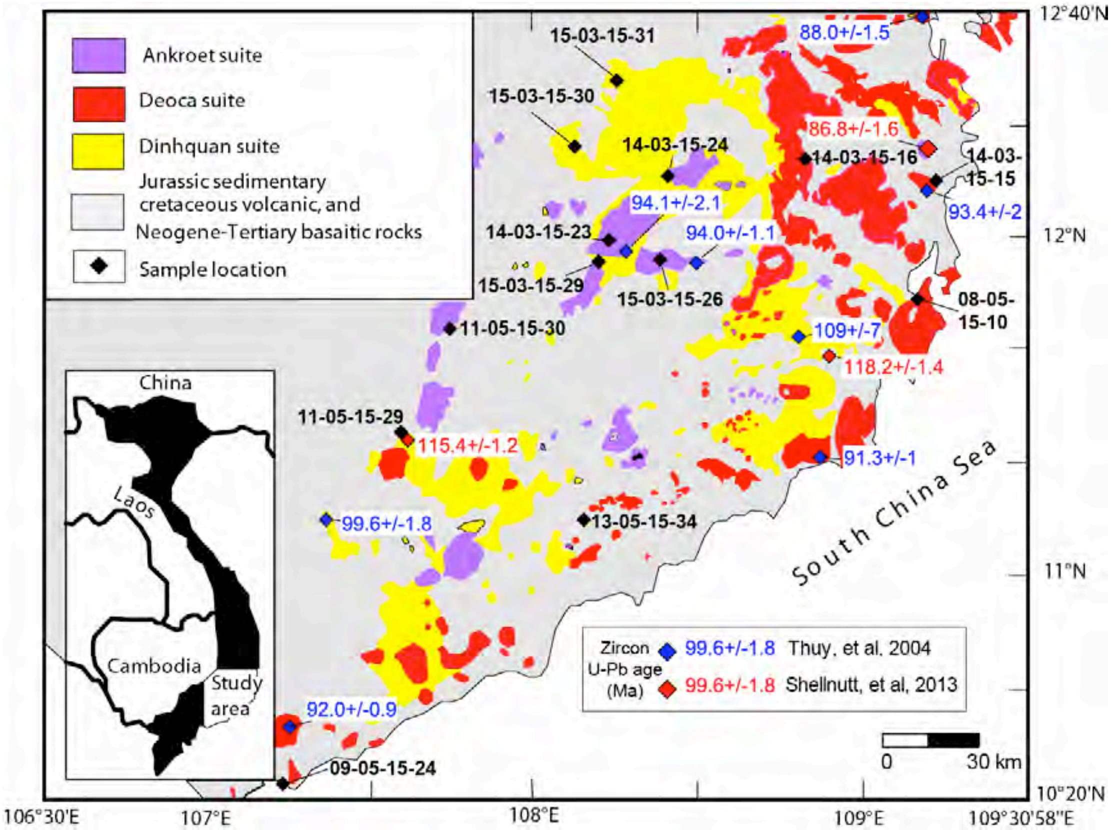


Figure 5.1: Simplified geological map of Southern Vietnam showing the distribution of sample location and published zircon U-Pb ages.

The Cretaceous magmatism is associated with an Andean type margin (Charvet et al., 1994) with Meso-Tethyan lithosphere being subduction below the margins of South China and Indochina. Geochemical work by Shellnut et al. (2013) show the middle Cretaceous granitic batholiths are I-type (partial melting of dehydrated middle/lower crust) and the Upper Cretaceous (i.e. ~90 Ma) granitic rocks have compositions similar to A-type (differentiated mafic parental magmas) associated with an extensional tectonic regime, most probably trench retreat caused by slab rollback. Ankroet rocks are associated with this extensional setting. The cartoon in figure 5.2 shows the plate setting at this time.

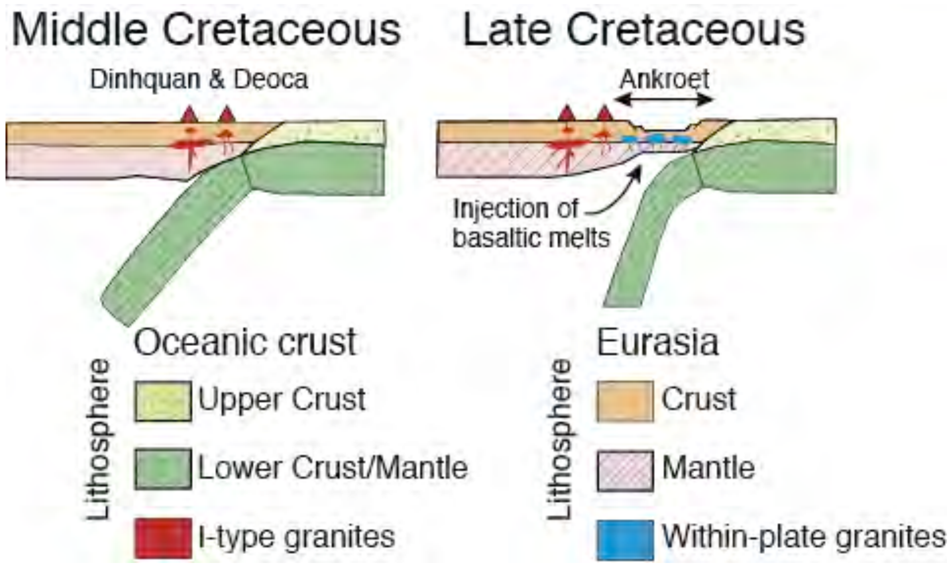


Figure 5.2: Plate setting that explains the origin of the main types of granite bodies in Southern Vietnam (from Shellnutt et al., 2013).

During the late Cenozoic widespread volcanism both on the Vietnamese mainland and coastal islands, produced extensive basaltic lava flows, of variable thickness and composition. Basaltic activity in South Vietnam begun in the Middle Miocene and is closely related to South China Sea opening and tectonic reactivation of the continental margin. Local fault zones were re-activated and this facilitated eruption of lavas (Bui, 2010).

5.3. Samples

This study collected 67 granite samples from which 15 were selected for zircon U-Pb geochronology based on location and existing data. Each 3-5 kg sample was crushed to a medium sand grain size and then rinsed in water to remove the fine dust. The remaining grains were then placed in an oven at 50–70 ^{o}C for drying. Grains were then sieved to remove the coarser fraction > 500 µm. After that detrital zircon grains were separated by standard heavy liquid techniques and mounted on glass slides in epoxy resin. The slides were then polished to expose intermal surfaces to enable Cathodoluminescence (CL) imaging and analysis by laser ablation inductively coupled plasma mass spectrometry (LA-

ICPMS). Analyses used the same approach and machine settings as the sand samples analysed for Chapter 4. Raw data are shown in appendix B. Each sample slide analyzed 25 to 30 spots. Cathodoluminescence images of zircons were taken using a JEOL JXA-8100 Electron Probe Microanalyzer Scanning Electron Microprobe fitted with an Oxford Instruments X-act PentaFET based in the Department of Earth Sciences at Birkbeck College.

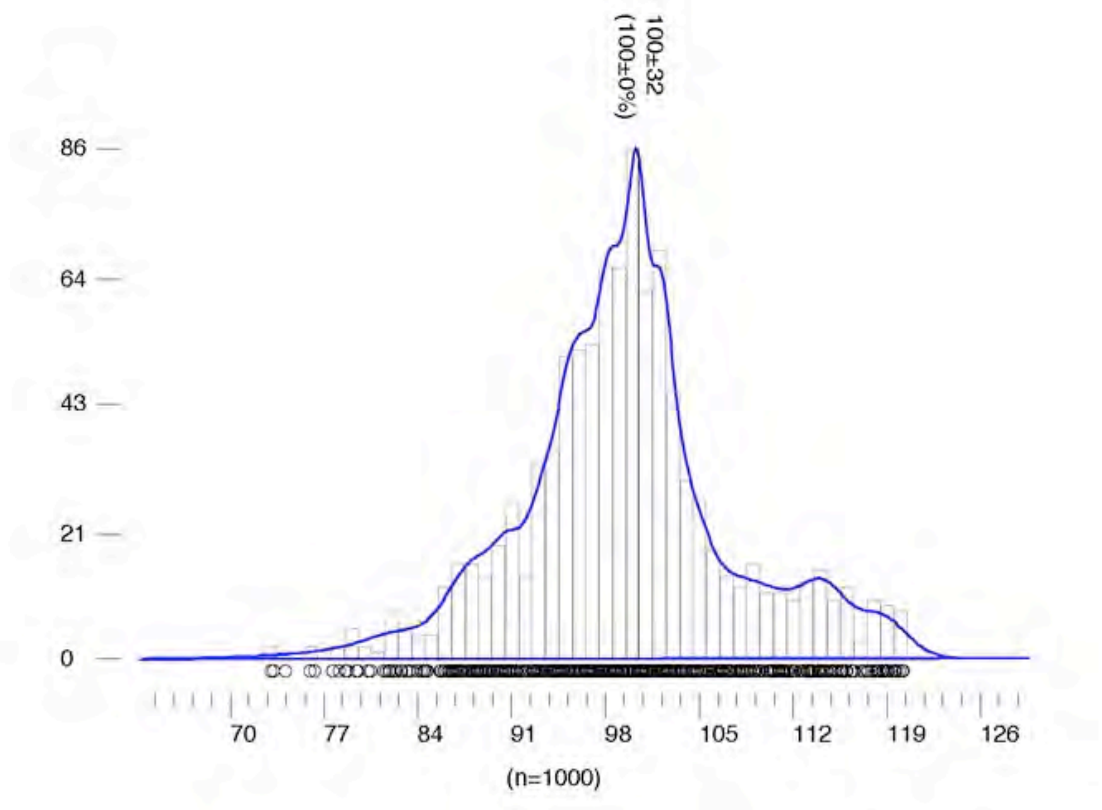


Figure 5.3: KDE plot showing all Cretaceous aged zircons present in river sands. This distribution represents the time span for Cretaceous magmatism in Southern Vietnam. Cretaceous zircon age distributions for each river are shown in Figure 5.4.

5.4. Results and Interpretation

To get an idea of the timing of Cretaceous magmatism across southern Vietnam and when magmatism was most active it is useful to examine the distribution of Cretaceous zircons present in the river sands from Chapter 4.

This shows that zircon grains are widely distributed throughout the Cretaceous period (Fig. 5.3) from 85-120 Ma but the most common ages, and presumably the main period of magmatism dates to 100 ± 10 Ma. The KDE plots in Figure. 5.4 show the distribution of Cretaceous zircon ages for each of the sampled river mouths. Comparing the age range of these zircons to U-Pb age results of granite from previously work by Thuy et al., (2004) and Shellnutt et al., (2013) suggests that most zircon in sands from river mouths come from local granites and therefore the ages reflect the local geology. This can be tested by dating the selected sampled rocks from defined river catchments.

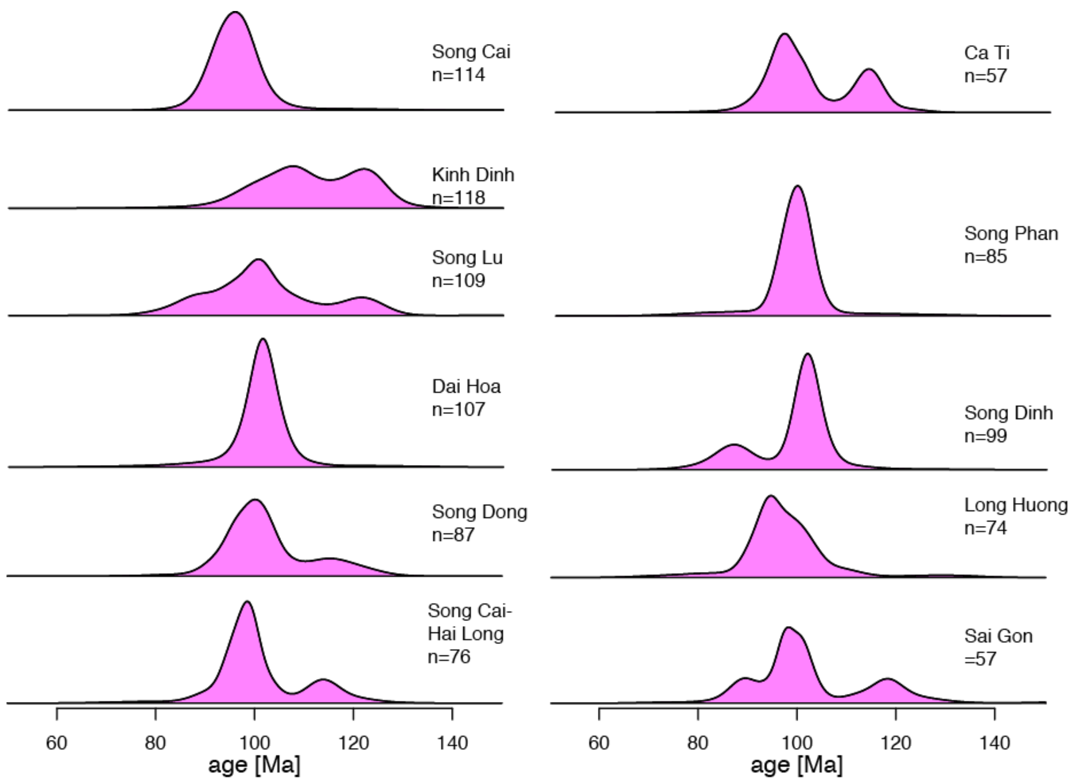


Figure 5.4: KDE plots of Cretaceous zircons present in sands from river mouths along the coast of Southern Vietnam (see Chapter 4 for further details, river locations are shown in figures 4.3, 5.5 and 5.6.).

The granite zircon results are generally of good quality and near to concordant although some samples show higher than desirable MSWD values after removal of any inherited ages (Table 5.1). No common lead correction has been applied. Figure 5.5 shows some representative concordia plots.

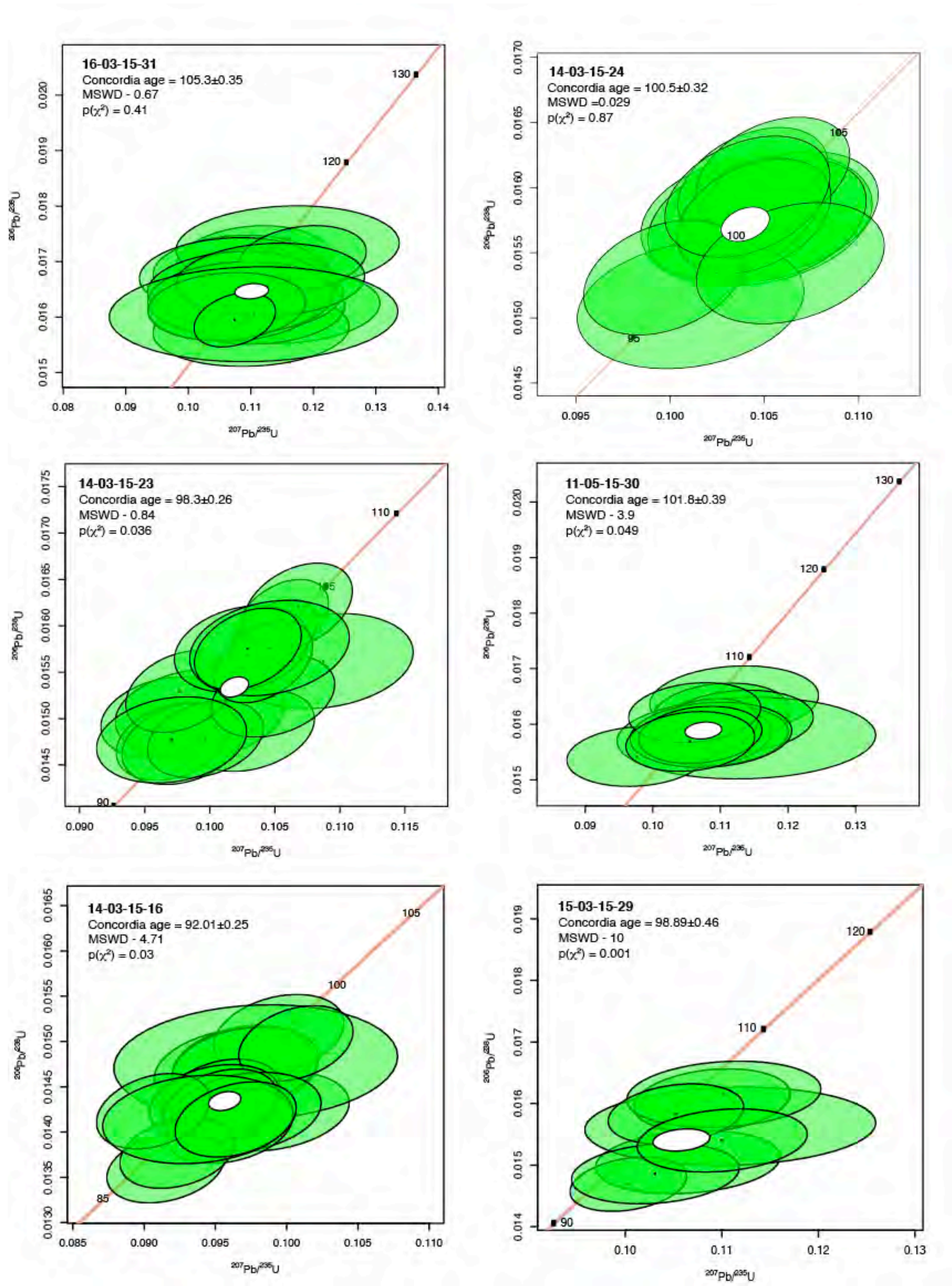


Figure 5.5: Representative concordia plots for granite samples showing the range of MSWD values. Further details in table 5.1.

Table 5.1 gives details of zircon results for granite samples not including any inherited ages. Raw data are provided in the Appendix B. The range of ages is narrow (from 92 up to 113 Ma) and compares well with main age range found in river sands and existing published data. Figure 5.6 shows locations of these ages on the geological map. No trends are seen although older ages tend to be located inland, away from the coast.

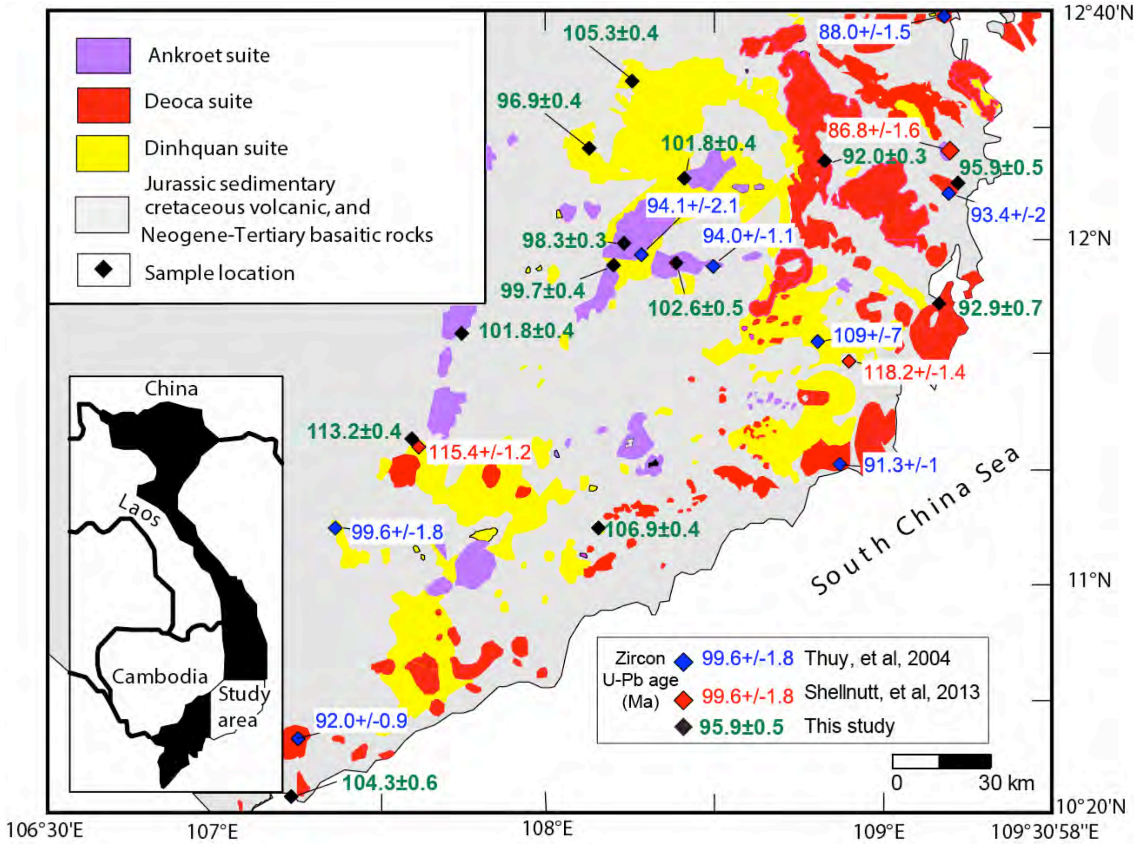


Figure 5.6: Geological map to show location of samples dated for this study as well as published data.

To test the relationship between river sands, heavy mineral sands and age of local granites I looked at some river catchments. Figure 5.7 shows the local geology of the Song Cai catchment and the location of two previously dated granites and two sampled rocks. The river sand sample is dominated by zircons with ages between 88 -104 Ma plus four grains with ages c. 115 Ma. A similar age range is found in the modern beach sands (13-05-15-37) and dated granite samples (14-03-15-15 & 16 and published data). Figure 5.8 shows another example from the Song Cai-Hai Long catchment. All of the evidence supports local sources for the heavy mineral rich beach sands.

Sample	Unit	U-Pb Age	MSWD	Latitude	Longitude
14-03-15-15	Deoca	95.97±0.52	1.9	N12 10 05.1	E109 11 30.9
14-03-15-16	Deoca	92.01±0.25	4.7	N12 13 52.1	E108 47 33.3
07-05-15-06a	Deoca	107.5±0.42	2	N13 03 37.0	E109 17 23.1
07-05-15-06b	Deoca	113.4±0.42	10	N13 03 37.0	E109 17 23.1
08-05-15-10	Deoca	92.88±0.66	0.68	N11 49 14.8	E109 08 43.0
09-05-15-24	Deoca	104.3±0.56	4	N10 22 51.6	E107 15 09.8
13-05-15-34	Deoca	106.9±0.44	11	N11 09 46.2	E108 08 50.2
14-03-15-23	Ankroet	98.3±0.26	0.84	N11 59 21.0	E108 12 06.0
14-03-15-24	Ankroet	101.8±0.39	3.9	N12 10 34.2	E108 22 44.3
15-03-15-26	Ankroet	102.6±0.51	1.9	N11 55 53.5	E108 21 33.9
11-05-15-30	Ankroet	101.8±0.39	3.9	N11 43 19.5	E107 43 32.3
15-03-15-29	Ankroet	98.89±0.47	10	N11 55 29.8	E108 10 24.4
15-03-15-30	Dinhquan	96.85±0.43	1.1	N12 15 44.7	E108 05 30.0
15-03-15-31	Dinhquan	105.3±0.35	0.67	N12 27 27.6	E108 12 59.2
11-05-15-29	Dinhquan	113.2±0.37	0.29	N11 24 59.7	E107 35 08.7

Table 5.1. Summary of representative granite zircon U-Pb ages measured in this study.

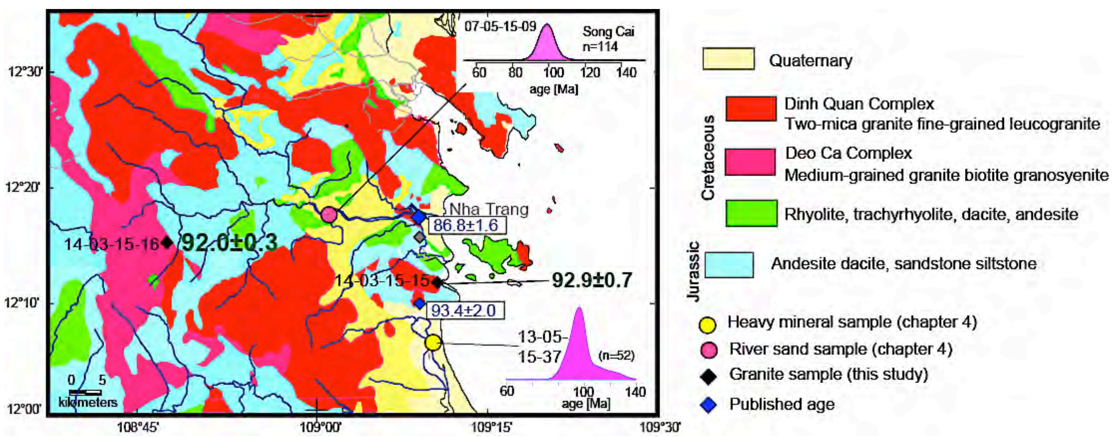


Figure 5.7: Geological map of the catchment area of the river Cai – Nha Trang (sample 07-05-15-09) collected near to the river mouth. Two granite bedrocks samples (14-03-15-15 and 16) were collected for analysis at proximal and distal tributaries of the main river.

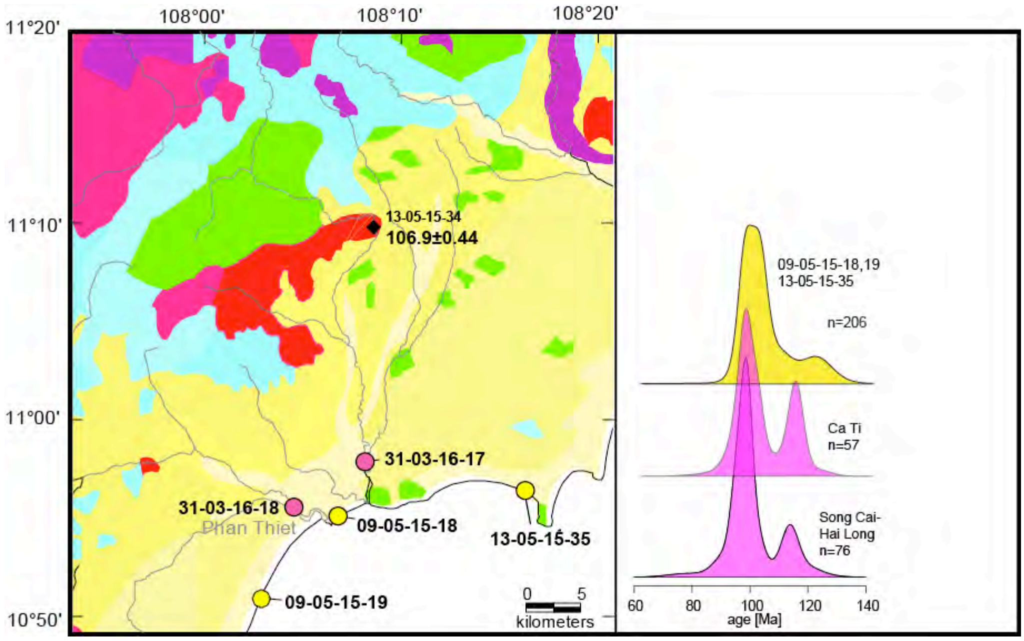


Figure 5.8: Geological map of the catchment area of Song Cai- Hai Long (Phan Thiet) (sample 31-03-16-17) collected near to the river mouth. A bedrock sample (13-05-15-34) collected from one of the upper tributaries provides a representative sample of the local granite age (106.9±0.4 Ma).

5.5. Discussion

There are two main published studies on the granites of South Vietnam (Thuy et al., 2004; Shellnutt et al., 2013). Both suggest Cretaceous magmatism across the study region was active between 87-118 Ma but together they only report ages from 13 granite samples (by U-Pb method). My work significantly increased coverage by doubling the number of granite ages and by using the river sands to sample Cretaceous magmatic rocks across a much larger area. The river sands record magmatic ages between 75-120 Ma although most ages fall between 85-105 Ma with greatest abundance around 100 Ma. Therefore magmatism in the region was most active around 100 Ma and had ended by 75 Ma.

Shellnutt et al. (2013) noted that Sr–Nd isotope trends required a portion of the parental magma for the Deoca and Dinhquan granite plutons to have been come from melted basement rocks of the Indochina Block. However, as no inherited grains were found during CL imaging and insitu analysis Shellnutt et al. (2013) could not confirm that mixing between mafic melts and partial melts derived from crustal rocks had taken place. This led authors to propose that the mixing required by their Sr-Nd data was associated with subducted material (basalt + sediment) instead of mixing with assimilated basement. Analyses of granite samples for this thesis found some inherited grains in granites of Deoca and Dinhquan Complexes and therefore these relict zircons may help to answer the question about the source of mixing. Table 5.2 summarises the range of ages found.

Sample	**Pluton/Suite**	**U-Pb Age**	**(Ma)**
07-05-15-06a	Deoca	255±7	961±22
07-05-15-06b	Deoca	253±7 252±6 248±6 235±6 240±7 239±7 263±7 252±7 245±6	2335±54 489±11 335±8 823±20
08-05-15-10	Deoca	249±3	
13-05-15-34	Deoca	254±7	
11-05-15-30	Ankroet		391±9 383±10
15-03-15-29	Dinhquan	228±6	1841±70
15-03-15-30	Dinhquan	234±6 211±6	1868±49
11-05-15-29	Dinhquan		1872±57

Table 5.2. Summary of zircon inherited ages found in samples from the Deoca and Dinhquan plutons.

Figure 5.9 shows examples of zircon CL images and the location of laser spots and ages. Zircons show oscillatory zoning patterns typical of magmatic grains. Core regions tend to be dark. Whilst the analytical strategy was to target grain rims to get youngest ages some grains contain relict zircons and show both zoned and unzoned cores. The most common inherited ages are Triassic followed by Proterozoic and Carboniferous to Ordovician ages (Table 5.2). These ages match basement rocks in the Kontum region to the north of the study area (e.g. Kontum zircon data of Carter et al. (2001) and Nam et al. (2001)). Similar basement rocks would be expected below the sedimentary cover of my study area. Shellnut proposed that granite compositions of South Vietnam were the product of either mixing with subducted material (basalt + sediment) or melted basement rock. The inherited core ages found in this study are consistent with basement melting.

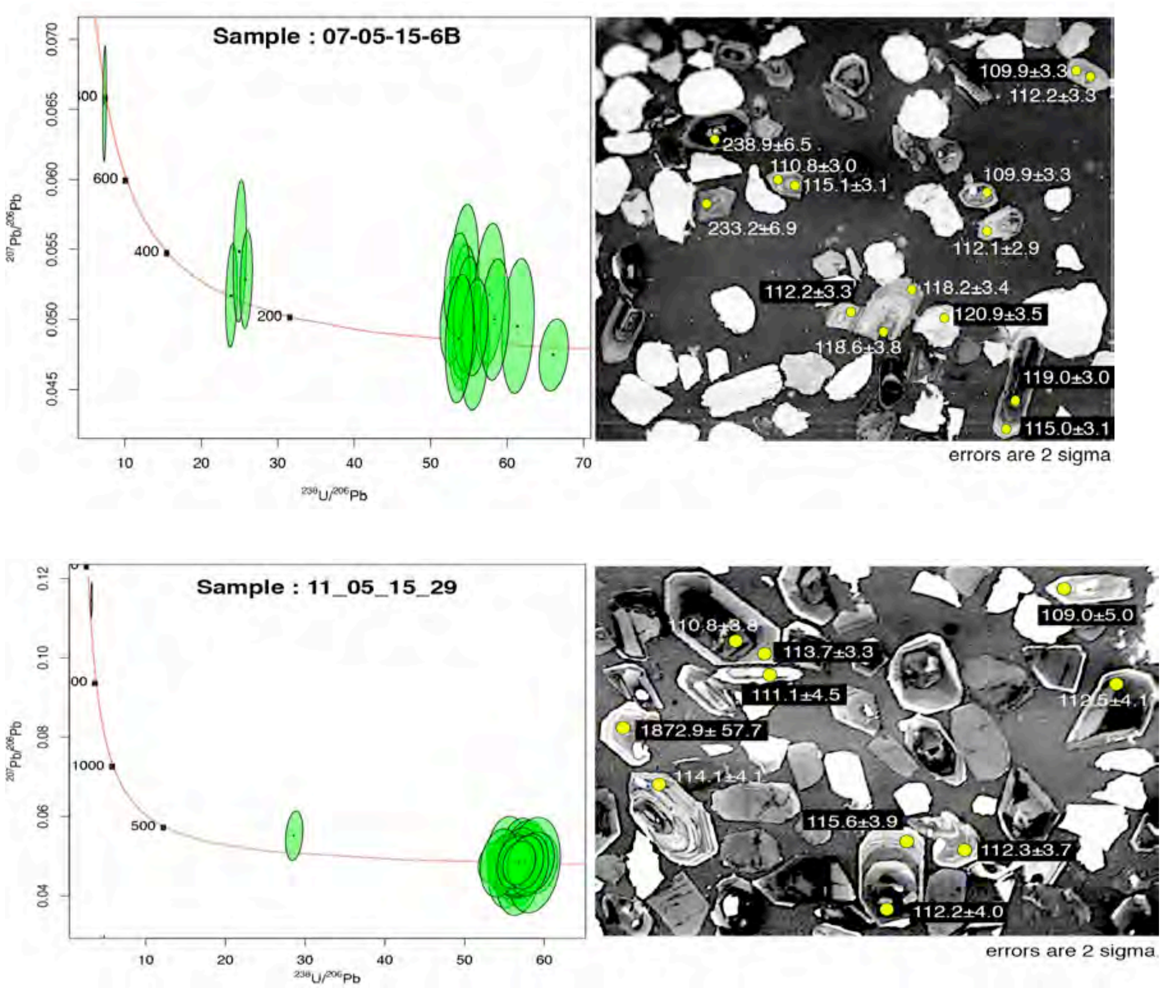


Figure 5.9: CL images of some zircons from samples 07-05-15-6B and 11-05-15-29 that include grains with inherited cores.

5.6. Summary

Comparison between bedrock granite ages and associated river sands relating to my study area confirm that there are lots of magmatic ages between 85-105 Ma with most ages falling around 100 Ma. This is the same age range found in coastal and beach sands (Chapter 4) showing that Cretaceous granites were the main source of these sands. The youngest Cretaceous ages are younger than ages reported in the literature and suggest magmatism continued longer than has been recognised. More work is needed on the geochemistry and intrusion history to fully understand the nature and history of this ancient active margin.

6

CENOZOIC EROSION HISTORY OF CENTRAL AND SOUTHERN VIETNAM: THERMOCHRONOMETRY RESULTS

6.1. Introduction

This chapter presents apatite thermochronometry results from bedrock samples collected in southern Vietnam with the main objective of determining if and how rifting and opening of the South China Sea affected Vietnam margin. The main goal is to review the apatite fission track and (U-Th)/He data and identify the main trends and features of the two datasets. These will then be discussed in chapter 7 with the aim of identifying regional trends in erosion through time and to compare the onshore erosion history with offshore sandstone stratigraphy to see if there is a direct connection.

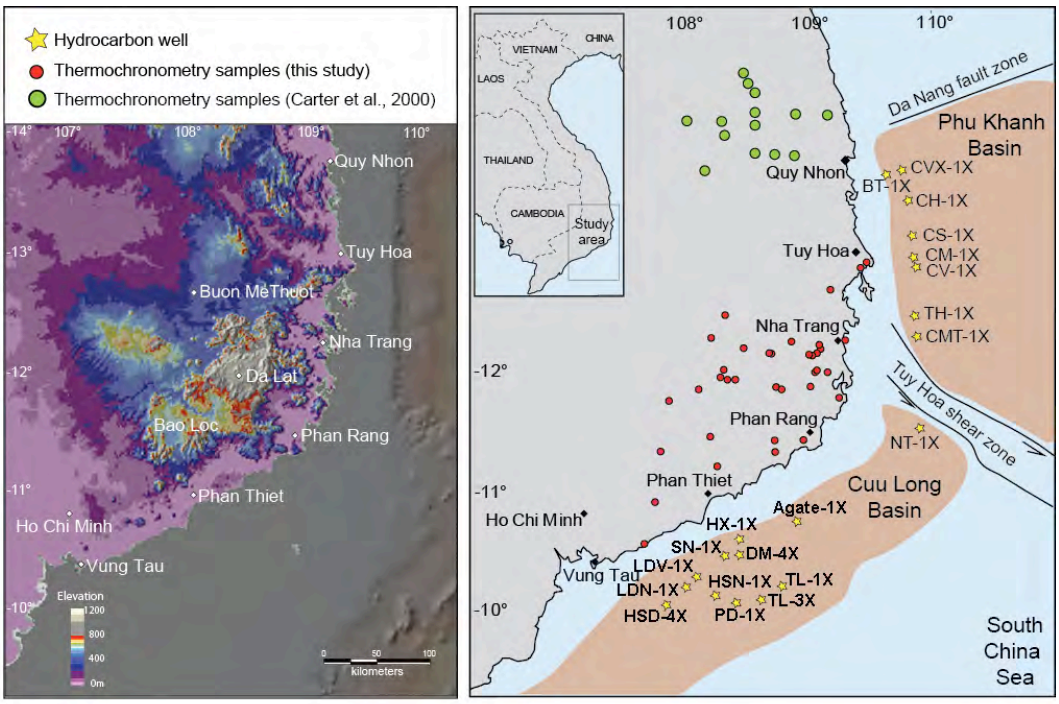


Figure 6.1: Topography of study area with samples, locations of previous work and relationship to offshore sedimentary basins.

6.2. Approach

Bedrock samples for apatite thermochronometry were collected from coast to interior transects across the study area (Fig. 6.1). Studies of rift and passive margin erosion patterns based on apatite fission track data (Gallagher and Brown, 1997) have shown that the amount of erosion is greatest along the coastal areas and decreases inland. This is mainly due to isostatic unloading: As a rift escarpment migrates inland, rock uplift rates remain high close to the margin leading to higher exhumation rates and younger ages. Variations in erosion caused by local geomorphic conditions and geology such as reactivation of inherited faults can add noise to this main trend.

Where suitable samples were also collected over the local relief, from the same rock type to represent a vertical section of exhumed crust. Vertical profiles are useful for identifying when any change in rock uplift and exhumation took place (e.g. Fitzgerald et al., 1995). Figure 6.2 shows the location of sampled rocks. Each sampled weighted between 2-5 kg and mainly granites as early sampling found that Mesozoic sedimentary rocks contained little if any apatite. In total 67 samples were collected (Fig. 6.2) on several visits to the study area between 2015 and 2017, but only 47 of these produced enough good quality apatite suitable for AFT analysis. A subset of these samples were also analysed by the AHe method to help define the lower temperature (~ 60-70°C) part of each samples cooling history. Details on the analytical methods used can be found in Chapter 3.

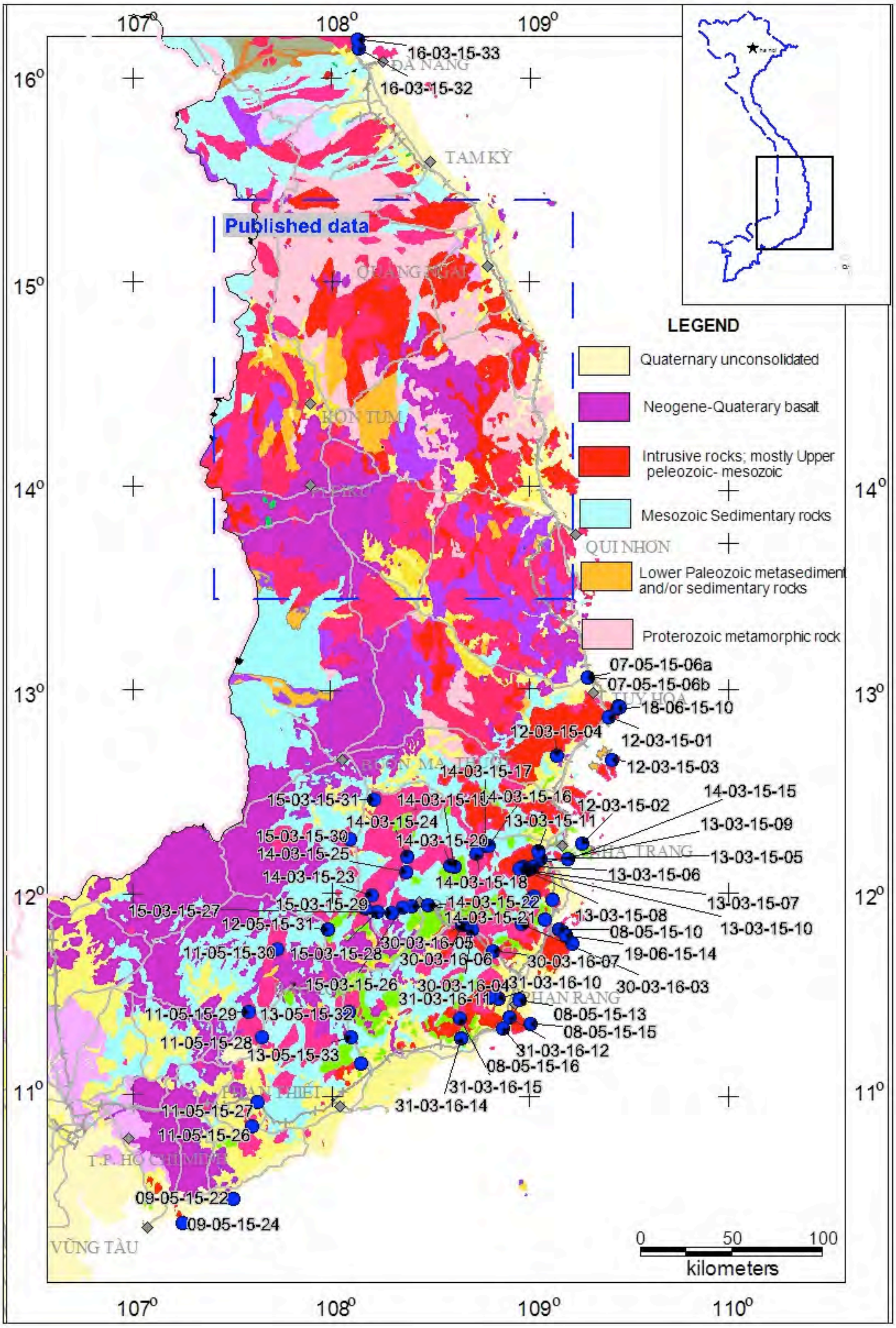


Figure 6.2: Locations of rocks collected for apatite thermochronometry.

6.3. Results

6.3.1. Apatite fission track

Table 6.1 summarises the apatite fission track results. Raw count data are given in the Appendix. Only four samples produced enough (> 50) horizontal confined track lengths for modeling (samples 15-03-15-27; 15-03-15-30; 15-03-15-31 and11-05-15-28). The lack of track length data in most samples was due to young age and low spontaneous track densities. The measured track length data gave mean lengths between 13.80µm and 14.23 µm, typical of samples that experienced rapid cooling through the fission track partial annealing zone. These measured ages record the time of cooling.

Sample	**Elev. (m.a. s.l.)**	**No. grains**	**Pd (Nd)**	**Ps (Ns)**	**Pi (Ni)**	**$P\chi^2$ %**	**% age disper-sion**	**Central Age (Ma) ±1 s**	**Mean track length (s.d) µm**	**No. lengths (DPAR in µm)**
12-03-15-01	111	20	1.813 (5025)	0.229 (149)	2.416 (1565)	13.7	22.1	**29.0±3.0**	14.39±0.04 (0.06)	2 (2.59)
12-03-15-02	69	20	1.813 (5025)	0.136 (121)	1.028 (961)	38.9	5.2	**38.5±3.8**		0 (1.85)
12-03-15-04	60	20	1.813 (5025)	0.115 (116)	0.977 (1014)	78.6	0.0	**35.0±3.5**		0 (1.71)
13-03-15-05	53	20	1.300 (3604)	0.358 (203)	2.349 (1427)	20.8	15.9	**31.6±2.7**		0 (2.20)
13-03-15-06	141	20	1.813 (5025)	0.314 (178)	2.792 (1611)	39.5	7.1	**33.8±2.8**	14.31±0.53 (1.19)	5 (1.99)
13-03-15-08	836	17	1.813 (5025)	0.490 (206)	2.490 (1055)	15.7	14.5	**60.2±5.2**	14.58±0.42 (0.94)	5 (2.89)
13-03-15-09	1187	20	1.300 (3604)	0.386 (187)	1.900 (1006)	17.9	17.7	**40.8±3.7**		0 (2.20)
13-03-15-10	1474	20	1.813 (5025)	0.466 (237)	2.387 (1241)	47.7	4.2	**58.3±4.3**	12.51±1.23 (1.73)	2 (1.74)
13-03-15-11	44	20	1.300 (3604)	0.209 (120)	1.905 (1152)	8.7	24.9	**23.4±2.7**		0 (2.41)
13-03-15-12	40	20	1.258 (3486)	0.662 (311)	3.583 (1734)	11.0	11.4	**38.3±2.6**	14.56±0.36 (1.19)	11 (3.50)
13-03-15-13	314	16	1.300 (3604)	0.229 (96)	1.345 (571)	59.7	1.2	**36.8±4.1**	16.06±1.03 (2.30)	5 (2.59)
13-03-15-14	598	11	1.813 (5025)	0.337 (95)	2.640 (841)	0.0	70.4	**37.6±9.4**		0 (1.93)
14-03-15-16	245	18	1.300 (3604)	0.091 (51)	0.911 (501)	99.2	0.0	**22.3±3.3**		0 (2.15)
14-03-15-19	1638	16	1.300 (3604)	0.377 (121)	1.694 (604)	7.1	29.5	**43.7±5.5**	14.28±1.25 (2.50)	4 (3.16)
14-03-15-20	1524	20	1.300 (3604)	0.387 (191)	2.901 (1370)	11.1	22.8	**32.4±3.2**		0 (2.55)
14-03-15-23	1489	19	1.813 (5025)	0.257 (124)	2.098 (1034)	66.6	0.3	**36.6±3.5**	14.46±1.18 (2.04)	3 (2.21)
14-03-15-24	1369	20	1.300 (3604)	0.255 (175)	1.355 (905)	42.8	4.2	**42.3±3.6**		0 (3.82)
15-03-15-27	1201	20	1.813 (5025)	1.556 678)	6.160 (2880)	0.0	27.1	**70.4±5.4**	13.80±0.15 (1.42)	93 (2.27)
15-03-15-28	980	10	1.300 (3604)	0.408 (92)	2.157 (517)	95.1	2.7	**39.0±2.7**		0 (2.61)
15-03-15-29	1226	20	1.300 (3604)	0.185 (127)	0.987 (701)	89.3	0.0	**39.7±3.9**		0 (3.08)
15-03-15-30	565	20	1.813	0.389	2.847	12.5	11.3	**45.8±3.9**	13.89±0.30	52

Sample	Elev. (m.a. s.l.)	No. grains	Pd (Nd)	Ps (Ns)	Pi (Ni)	$P\chi^2$ %	% age disper-sion	Central Age (Ma) ±1 s	Mean track length (s.d) µm	No. lengths (DPAR in µm)
			(5025)	(185)	(1241)				(2.17)	(2.27)
15-03-15-31	532	20	1.258 (3486)	0.633 (568)	3.300 (2942)	3.11	15.2	**41.6±2.5**	14.11±0.19 (1.91)	104 (3.50)
16-03-15-32	80	20	1.813 (5025)	0.722 (533)	8.112 (6149)	32.7	7.0	**26.6±1.3**	14.81±0.29 (1.49)	26 (2.27)
16-03-15-33	457	18	1.300 (3604)	0.574 (314)	7.916 (4365)	13.52	13.9	**15.9±1.1**	15.08±0.27 (1.25)	21 (2.08)
08-05-15-12	141	20	1.813 (5025)	0.404 (156)	2.676 (1081)	5.7	29.3	**42.3±4.8**		0 (1.99)
09-05-15-22	9	20	1.258 (3486)	0.279 (155)	1.374 (759)	18.8	17.3	**43.4±4.4**		0 (2.72)
11-05-15-26	93	20	1.246 (3455)	0.274 (153)	1.543 (874)	83.9	0.0	**36.8±3.3**		0 (3.24)
11-05-15-28	229	20	1.813 (5025)	0.671 (545)	4.222 (3419)	86.9	0.0	**48.7±2.3**	14.23±0.15 (1.33)	83 (2.14)
11-05-15-30	1016	20	1.246 (3455)	0.344 (170)	1.258 (632)	33.6	18.0	**58.4±5.8**	14.43±0.93 (1.61)	3 (3.52)
12-05-15-31	752	20	1.813 (5025)	0.393 (245)	2.353 (1516)	14.1	18.4	**49.3±4.1**	14.18±0.44 (1.60)	13 (2.20)
13-05-15-32	1019	14	1.258 (3486)	0.430 (123)	2.027 (597)	18.8	22.5	**43.3±5.2**		0 (3.50)
13-05-15-34	66	22	1.300 (3604)	0.368 (203)	3.064 (1702)	85.6	0.0	**26.2±2.0**	15.63±0.37 (1.10)	9 (2.85)
18-06-15-10	11	20	1.813 (5025)	0.139 (132)	1.145 (1110)	99.8	0.0	**36.3±3.4**		0 (1.94)
18-06-15-11	28	20	1.813 (5025)	0.110 (105)	1.382 (1328)	76.7	1.4	**24.2±2.5**		0 (1.53)
18-06-15-12	72	20	1.813 (5025)	0.171 (151)	1.487 (1355)	53.8	4.0	**34.1±3.0**		0 (1.53
30-03-16-03	186	20	1.300 (3604)	0.232 (94)	1.828 (782)	77.5	0.2	**26.4±2.9**		0 (3.16)
30-03-16-04	158	20	1.258 (3486)	0.300 (149	1.295 (652)	80.7	0.1	**48.4±4.5**	14.36±0.34 (1.59)	22 (2.43)
30-03-16-06	866	20	1.300 (3604)	0.292 (163)	2.113 (1220)	97.0	0.0	**29.3±2.5**	14.87±0.25 (0.90)	13 (3.17)
31-03-16-12	35	20	1.300 (3604)	0.219 (107)	2.02 (1033)	83.3	0.2	**22.7±2.3**		0 (2.77)
31-03-16-14	72	20	1.300 (3604)	0.613 (223)	2.820 (1029)	29.9	7.8	**47.5±3.7**	14.88±0.37 (1.16)	10 (2.64)
31-03-16-15	174	13	1.258 (3486)	0.196 (72)	1.028 (426)	22.9	26.8	**37.2±5.6**		0 (3.13)

Table 6.1. Apatite fission track analytical data

(i). Track densities are ($x10^6$ tr cm^{-2}) numbers of tracks counted (N) shown in brackets;
(ii). analyses by external detector method using 0.5 for the $4\pi/2\pi$ geometry correction factor;
(iii). ages calculated using dosimeter glass CN-5; (apatite). Analyst Carter ζ_{CN5} =338±5; calibrated by multiple analyses of IUGS apatite and zircon age standards (see Hurford 1990);
(iv). $P\chi^2$ is probability for obtaining χ^2 value for n degrees of freedom;
(v). Central age is a modal age, weighted for different precisions of individual crystals (Galbraith 1992).

Sample grain age data is mainly good enough (around 20 single grain ages measured in each sample) to have confidence of capturing the true age distribution. Only one sample (13-03-15-14) showed a lot of overdispersion (70%) but this only had 11 grain ages due to poor quality of apatites so this is the likely reason for over dispersion. The rest of samples have grain ages that fit with a single age population. Apatite composition was monitored using track etch pit size (DPAR) as an indicator. DPAR values range from 1.71 to 3.82 μm. Figure 6.3 shows a plot of DPAR and AFT central age. There is no clear trend that would suggest a compositional control on AFT age. This is probably because cooling through the partial annealing zone was fast.

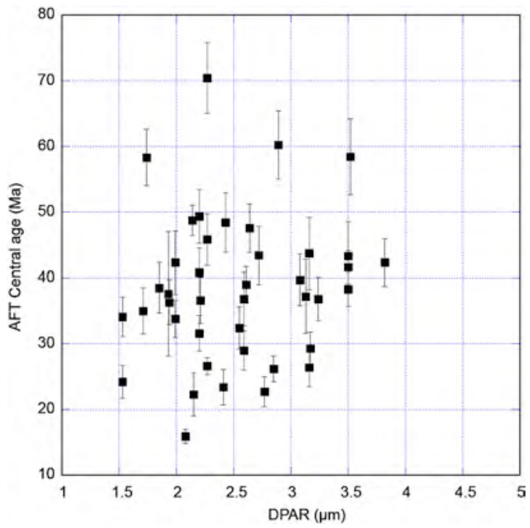


Figure 6.3: Plot to compare track etch pit size (a proxy for composition) and AFT central age. The plot shows not systematic relationship.

Figure 6.4 shows AFT central ages plotted against elevation. It makes it clear that most of the ages are between 25-50 Ma. There is no systematic relationship between sample age and elevation although most ages cluster between 25-50 Ma. Figure 6.5 shows age plotted against latitude. This also shows not trend between age and sample location.

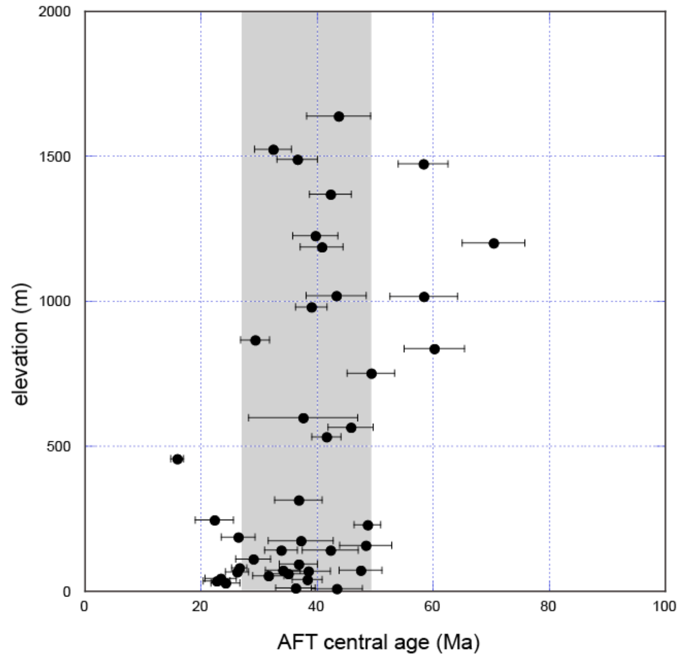


Figure 6.4: Plot to compare AFT central age with elevation. The grey shading represents the standard deviation (11 Myrs) of the mean age (38 Myrs).

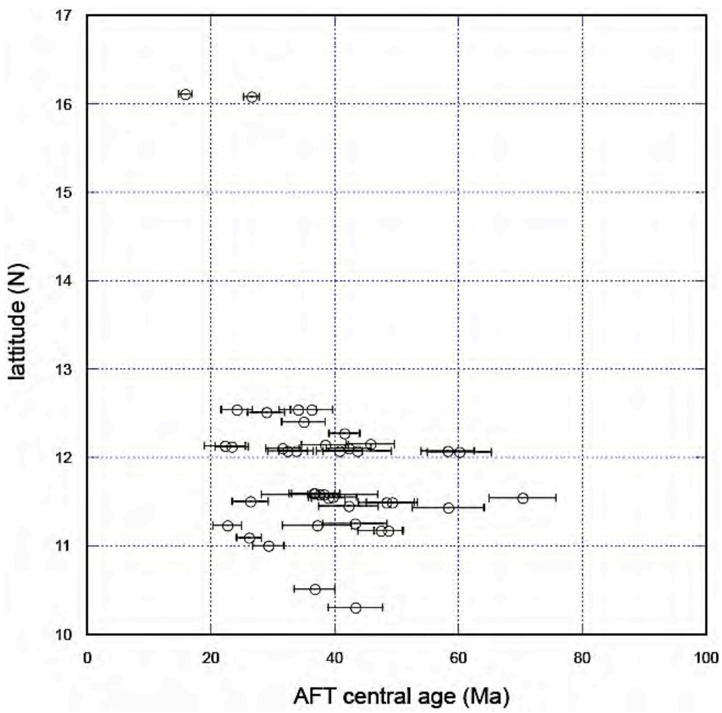


Figure 6. 5: Plot to compare AFT central age with lattitude. No trend is seen.

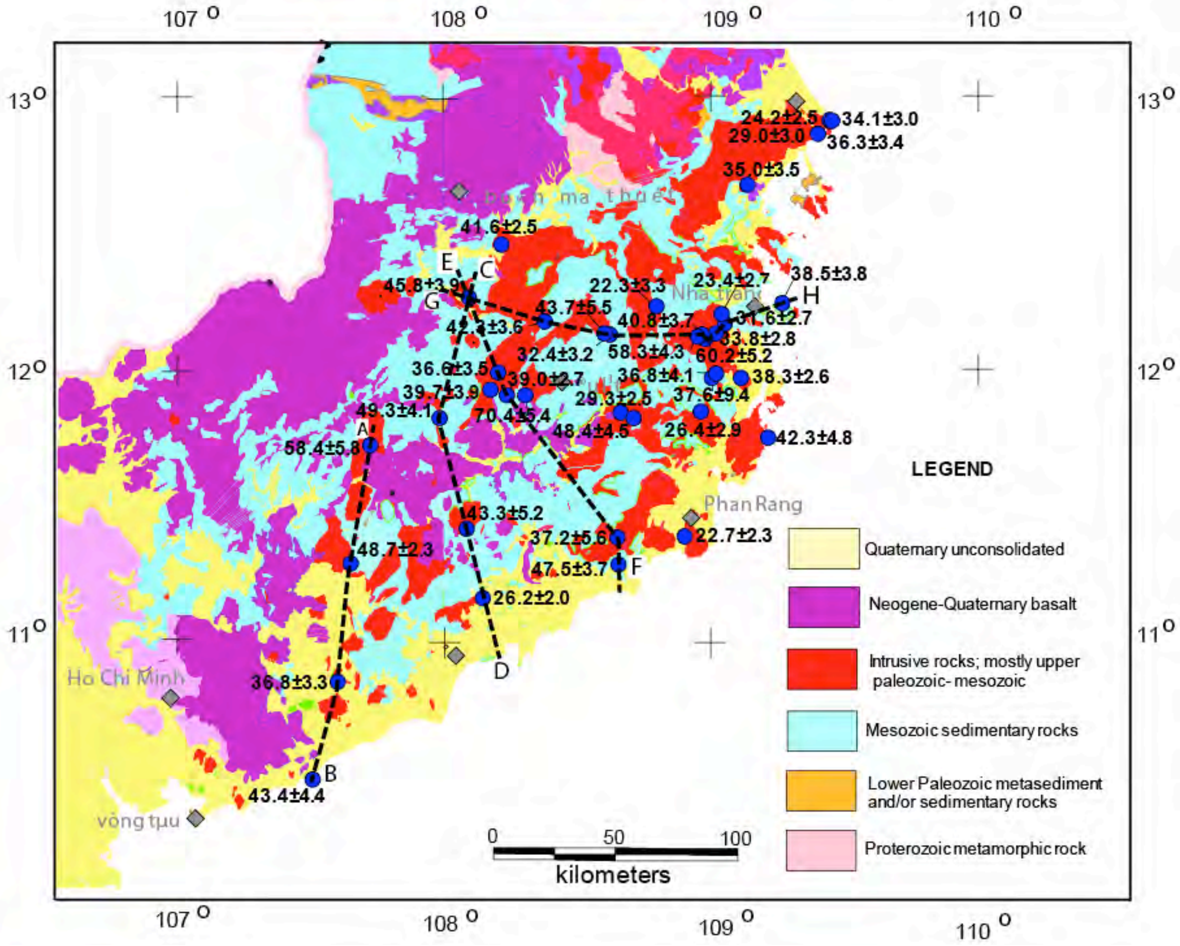


Figure 6.6: Shows the regional geology and apatite FT ages and lines of cross-section shown in figure 6.7.

To help visualize the distribution of AFT ages with elevation and location a series of topographic sections are shown in figure 6.7. The location of each line is shown with age data on the regional geological map in figure 6.6.

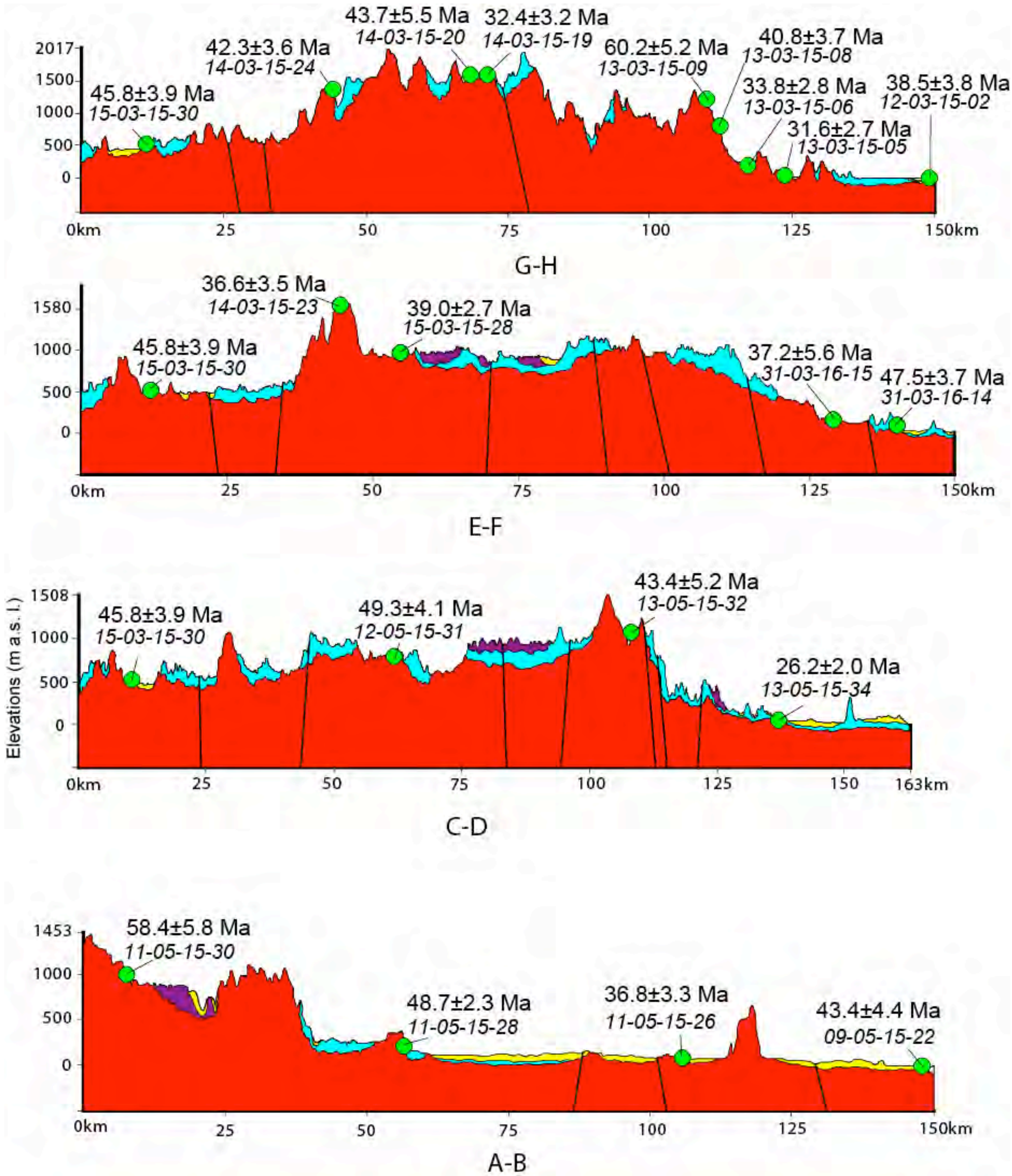


Figure 6.7: Topographic sections across the study area showing apatite FT ages and sample number. The location of each line is shown in figure 6.6.

6.3.2. Apatite (U-Th)/He

Table 6.2 show apatite (U-Th)/He results which I will refer to as AHe ages. In total 21 samples were analysed using between 3 and 6 replicates for each sample. All were from granites. Table 6.2 only reports replicate age data for grains that had no issues with outgassing or that were not apatites (it was not always easy to recognize apatite). The main outgassing issue was high helium on re-extracts that indicated zircon inclusions. The standard deviation as a percent of the mean age was used to identify the more reliable data. I used a 25% dispersion as a cutoff as this is widely used by the helium community although this is an arbitrary decision and mean ages may not be meaningful if age variation is big. Only uncorrected ages are shown since this is what will be used in thermal history modeling.

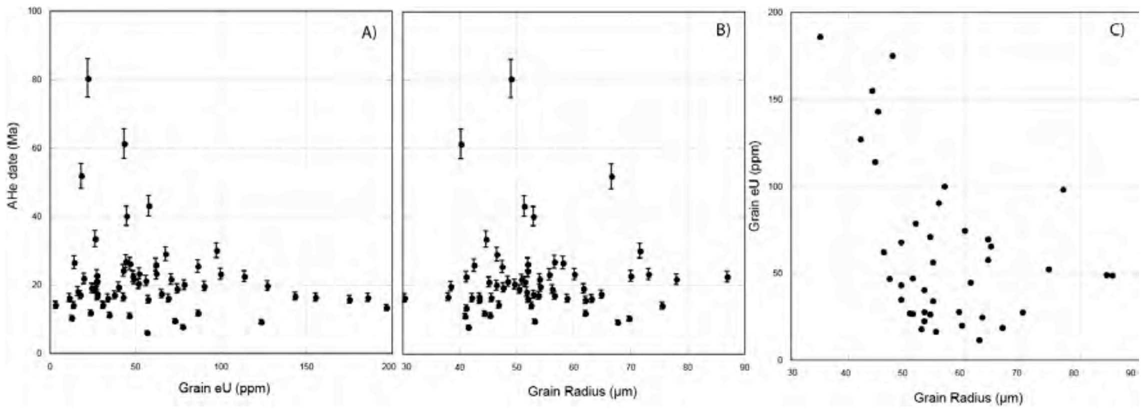


Figure 6.8: Plots comparing grain date with effective uranium content and grain radius.

Figure 6.8 plots all AHe ages against effective uranium (eU) values and grain radius based on a spherical geometry. If ages correlate with either of these then rock cooling rates would be low since He diffusion out of the apatite crystals would be slower for grains with a larger radius. Grains with the highest levels of radiation damage should also have a higher closure temperature (Flower et al., 2009) and therefore if cooling was slow should have older age. No clear trend is seen in plots and so radiation damage has not influenced grain age. Interestigly, grains with highest eU show least age dispersion. A possible reason is that there is more helium to measure and so ages are more reliable however when grain radius is compared with eU (Fig. 6.8C) it becomes clear that this is a grain size effect related to small radii (low helium).

Sample No.	4He (ncc)	Mass (mg)	U (ppm)	Th (ppm)	Sm (ppm)	Th/U ratio	Grain Length (μm)	Grain width (μm)	FT corr	Raw Age (Ma)	eU	Mean Age (Ma)	Std %
18-6-15-11	0.1678	0.0027	13.8	53.4	276.2	3.9	143	88	0.67	**18.8**	26.3		
18-6-15-11	0.2247	0.0031	14.2	57.4	287.0	4.0	170	86	0.67	**21.0**	27.7		
18-6-15-11	0.5860	0.0076	13.6	59.4	269.3	4.4	212	120	0.76	**22.7**	27.6	**22.3**	15%
18-6-15-11	0.5557	0.0038	25.0	83.6	410.3	3.3	146	102	0.70	**26.8**	44.6		
18-6-15-12	0.2150	0.0022	20.7	83.4	401.4	4.0	122	86	0.65	**19.3**	40.3		
18-6-15-12	0.4082	0.0013	61.3	281	968.9	4.6	130	64	0.56	**19.7**	127	**19.5**	4%
15-03-15-29	0.2001	0.0018	17.6	38.1	375.5	2.2	109	82	0.62	**33.4**	26.6		
15-03-15-29	0.3419	0.0017	38.4	101	504.1	2.6	135	72	0.60	**25.8**	62.1	**29.4**	13%
15-03-15-29	0.5557	0.0023	41.0	114	642.4	2.8	152	78	0.64	**29.0**	67.8		
15-03-15-31	0.6417	0.0037	56.2	78.1	145.3	1.4	151	100	0.70	**18.8**	74.5		
15-03-15-31	0.5786	0.0019	115	172	378.8	1.5	162	68	0.60	**16.4**	155		
15-03-15-31	0.7575	0.0056	50.1	82.1	160.0	1.6	192	108	0.73	**16.1**	69.4	**16.8**	8%
15-03-15-31	0.5665	0.0051	42.3	64.7	122.3	1.5	177	108	0.73	**15.7**	57.5		
13-05-15-33	0.5989	0.0018	105	299	370.6	2.8	128	75	0.61	**15.7**	175		
13-05-15-33	0.7777	0.0036	71.9	78.7	318.3	1.1	175	91	0.69	**19.6**	90.4	**19.4**	19%
13-05-15-33	1.1257	0.0040	81.8	77.2	383.0	0.9	186	93	0.70	**23.1**	99.9		
13-05-15-34	0.3372	0.0023	38.1	77.5	120.4	2.0	118	89	0.65	**21.1**	56.3		
13-05-15-34	0.4029	0.0021	50.4	120	190.2	2.4	123	83	0.64	**20.0**	78.6	**21.0**	4%
13-03-13-07	0.1726	0.0032	12.7	30.7	210.2	2.4	133	99	0.69	**21.8**	19.9		
13-03-13-07	0.3279	0.0011	79.6	272	1133	3.4	92	70	0.56	**16.6**	143	**18.2**	16%
13-03-13-07	0.2467	0.0007	109	328	1063	3.0	107	50	0.45	**16.3**	186		
13-03-15-13	0.0963	0.0020	18.2	70.6	229.3	3.9	135	78	0.63	**11.1**	34.8		
13-03-15-13	0.0893	0.0014	28.2	78.5	342.9	2.8	105	74	0.59	**10.9**	46.6	**9.9**	19%
11-5-15-29	0.1808	0.0021	25.2	76.0	258.8	3.0	138	78	0.63	**16.4**	43.0		
11-5-15-29	0.2956	0.0052	14.8	41.8	96.1	2.8	185	106	0.73	**19.0**	24.6	**17.7**	10%
11-05-15-28	1.2290	0.0083	32.0	86.3	142.4	2.7	201	129	0.77	**23.2**	52.3		
11-05-15-28	1.8846	0.0141	30.4	78.1	127.9	2.6	250	151	0.81	**22.4**	48.7	**21.0**	15%
11-05-15-28	0.8626	0.0062	41.0	104	147.0	2.5	210	109	0.74	**17.4**	65.4		
14-03-15-16	0.0984	0.0043	6.6	21.1	104.3	3.2	156	105	0.71	**16.2**	11.5		
14-03-15-16	0.1563	0.0042	10.5	31.2	191.1	3.0	233	85	0.69	**17.0**	17.8	**17.1**	6%
14-03-15-16	0.1098	0.0030	8.9	31.6	220.2	3.5	149	90	0.68	**18.1**	16.4		
11-05-15-26	0.2079	0.0031	21.3	54.1	227.1	2.5	157	89	0.68	**16.1**	34.0		
11-05-15-26	0.1792	0.0030	16.1	49.7	225.4	3.1	127	98	0.68	**17.3**	27.8	**18.4**	16%
11-05-15-26	0.5368	0.0028	43.6	117	629.0	2.7	148	88	0.67	**21.6**	71.0		
18-6-15-10	0.2668	0.0021	44.5	180	516.8	4.1	166	72	0.62	**11.7**			
18-6-15-10	0.3744	0.0029	24.5	117	374.9	4.8	173	82	0.66	**20.3**	overdispersed		41%
18-6-15-10	0.7626	0.0034	25.8	81.5	247.0	3.2	179	88	0.68	**40.1**			
13-05-15-32	0.8386	0.0047	42.8	83.3	450.5	1.9	176	104	0.72	**23.2**			
13-05-15-32	0.1946	0.0036	25.6	23.5	365.0	0.9	200	85	0.68	**14.1**	overdispersed		32%
13-05-15-32	0.8030	0.0030	59.4	116	439.0	2.0	219	74	0.65	**25.4**			
13-05-15-32	0.5644	0.0018	151	194	1251	1.3	163	66	0.59	**13.3**			
12-03-15-04	0.1265	0.0077	7.1	24.8	160.9	3.5	227	117	0.76	**10.3**			
12-03-15-04	0.2119	0.0045	7.5	29.0	131.5	3.9	194	97	0.71	**26.5**			
12-03-15-04	0.2092	0.0087	7.8	25.9	201.0	3.3	174	142	0.78	**14.0**	overdispersed		41%
12-03-15-04	0.3544	0.0045	26.3	49.6	201.9	1.9	213	92	0.70	**17.0**			
13-03-15-11	0.1688	0.0049	13.1	45.4	214.7	3.5	151	114	0.73	**11.8**			
13-03-15-11	0.0937	0.0017	19.4	35.4	218.9	1.8	102	81	0.61	**16.6**	overdispersed		
13-03-15-11	0.4888	0.0016	70.3	185	897.7	2.6	128	70	0.59	**22.4**			31%
09-05-15-22	0.7906	0.0066	7.9	45.0	354.8	5.7	209	113	0.75	**51.8**	18.5		
09-05-15-22	0.5647	0.0025	11.2	47.6	392.6	4.2	137	86	0.66	**80.3**	22.4	**64.4**	23%
09-05-15-22	0.4765	0.0014	21.2	95.3	863.6	4.5	121	69	0.58	**61.2**	114		
16-03-15-33	1.2485	0.0095	47.9	5.8	167.7	0.1	173	149	0.78	**21.7**	49	**25.9**	23%
16-03-15-33	2.6665	0.0074	96.2	6.0	195.7	0.1	167	134	0.77	**30.0**	98		
11-05-15-30	0.0158	0.0026	1.5	8.5	1.4	5.8	189	75	0.64	**14.3**			
13-03-15-15	0.4183	0.0033	27.7	65.4	266.8	2.4	179	86	0.68	**24.1**	overdispersed		40%
13-03-15-15	0.9363	0.0030	39.2	80.0	361.0	2.0	162	87	0.67	**43.1**			
14-03-15-24	0.5631	0.0037	31.1	68.1	288.7	2.2	224	82	0.68	**26.1**	47	**23.5**	16%
14-03-15-24	0.1348	0.0019	18.1	39.7	164.1	2.2	118	81	0.63	**20.9**	27		

Table 6.2. Summary of apatite (U-Th)/He analyses

6.3.3. Combined AFT and AHe datasets

Figure 6.9 plots the AFT and AHe data for all samples. The reason for making this plot is that if cooling rates were very fast, dates for the two chronometers overlap. Although many samples seem to lie within a narrow age range across the elevation only a few pairs of AFT and AHe ages overlap. This is true for both raw and corrected ages. For raw ages the data scatter is significant as weighted mean values show MSWD's between 9.8 (AFT) and 22.0 (AHe). The AHe data include overdispersed samples with replicate ages older than AFT ages but with low eU (e.g. sample 09-05-15-22). If sample replicates that show more than 25% dispersion are removed and the remaining data plotted the MSWD reduces from 22.0 (n=57) down to 9.5 (n=37) but this does not change much the weighted mean age which go from 17.2±0.2 to 18.5±0.5 Ma. For corrected AHe ages the difference with AFT age is reduced but in several cases replicates are much older than the AFT age. This is likely caused by overcorrection (or bad measurement or other unknown factor) rather than radiation damage for the reasons discussed above.

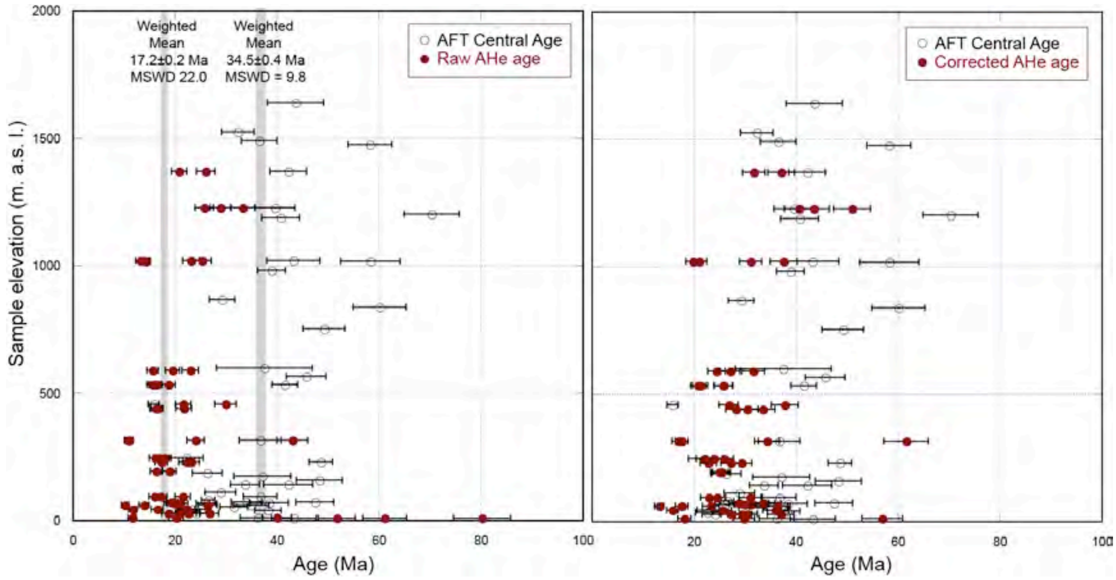


Figure 6.9: Plot of AFT and all (unfiltered) raw and corrected AHe ages against sample elevation.

Conclusion from plots in Figure 6.9 is that cooling through the AFT partial annealing zone (~110-60°C) and AHe closure (~ 60-50°C) was not very fast. There is a time difference between ages recorded by each method and this gap appears to get slightly wider with increasing elevation, although not for all samples. The best elevation trend is seen west of Nha Trang where a group of granite samples were collected from nearly 1500 m of relief over a distance of ten kilometres. The apatite fission track ages range from 31.6±2.7 to 58.3±4.3 Ma from elevations of 53 m to 1474 m. This means it took 26 Myrs to exhume 1400 m of crust, e.g. an exhumation rate of 54 m/Myr (0.05 mm/yr). A single AHe age from a sample at an elevation of 439 m has an uncorrected mean age of 18 Ma, which is similar to other samples (Fig. 6.9).

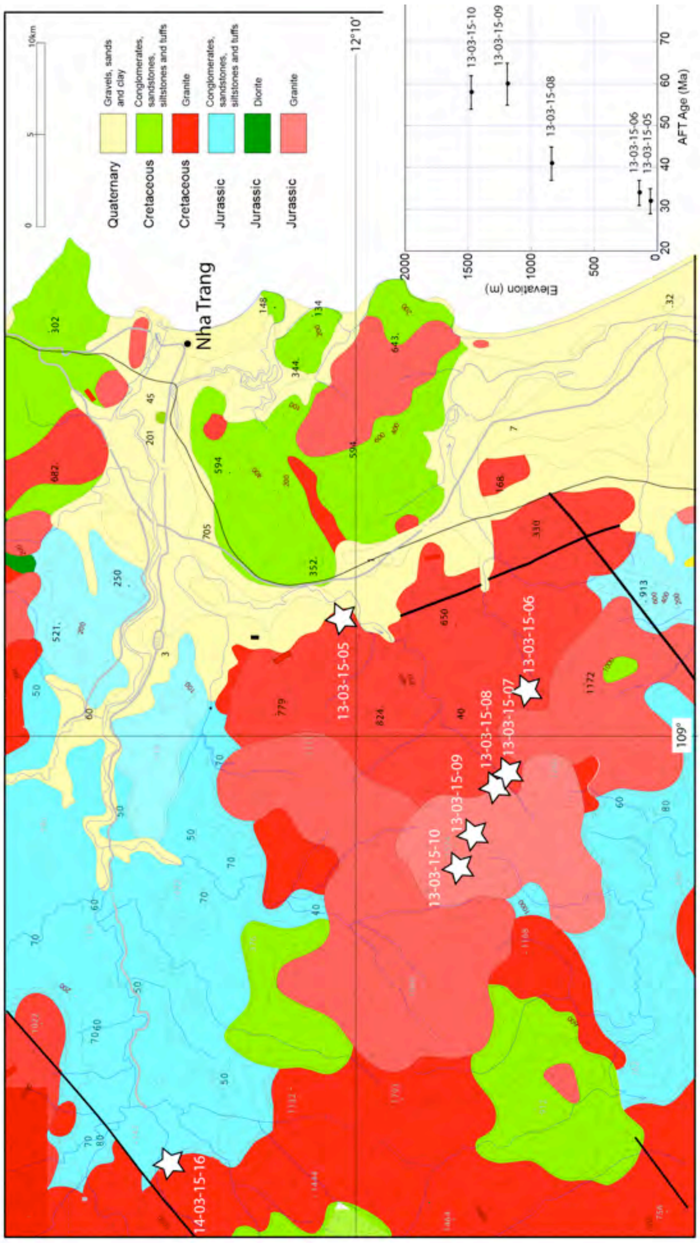


Figure 6.10: Location of samples from an elevation profile near Nha Trang.

Inland (see figure 6.7, line G-H) rocks from 100-200m higher than the elevation profile give younger ages (32-44 Ma compared to 60 Ma). This age difference is not large but is enough to show that depths of erosion away from the coastal area was not uniform and that local faults probably accommodated variable amounts of rock uplift. At the regional scale these differences are not that important. Most AFT ages record similar timing and rate of exhumation showing that the region was exhumed relatively uniformly throughout the Cenozoic.

6.3.4. Thermal history models.

Samples that have both AFT ages and AHe ages can be modeled to obtain constraint on rock sample (granite) thermal history and used to estimate how long it took for the granite rock samples to cool from around 110-100°C (base of FT partial annealing zone) through 60-50°C (helium closure) to surface temperatures. Sampled granites are Triassic or Early Cretaceous in age (see Chapter 5) so these rocks cooled from their intrusion temperatures before the Cenozoic. This means that cooling recorded by the AFT and AHe data is caused by rock uplift and exhumation, by erosion.

Sample	Elevation	Av Corr Age	±2 s	AFT Age	±2
18-6-15-11	28	31.1	2.2	24.2	2.5
13-05-15-34	66	30.5	2.1	26.2	2
18-6-15-12	72	31.3	2.2	34.1	3
11-05-15-26	93	26.3	1.8	36.8	3.3
11-05-15-28	229	55.5	3.9	48.7	2.3
14-03-15-16	245	24.0	1.7	22.3	3.3
13-03-15-13	314	15.7	1.1	36.8	4.1
16-03-15-33	457	32.4	2.3	15.9	1.1
15-03-15-31	532	23.5	1.6	41.6	2.5
15-03-15-29	1226	45.1	3.2	39.7	3.9
14-03-15-24	1369	34.5	2.4	42.3	3.6

Table 6.3: Samples with both AFT and AHe data that were used for modeling. No data in track length column refers to numbers of track length measurements < 50 which are considered unsuitable for modeling.

For the modeling I used the QTQt software of Gallagher (2012). This is based on a Bayesian transdimensional approach to data inversion to extract thermal histories. Model outputs are accepted thermal history models that give a mean thermal history model weighted by the posterior probability of each individual thermal history with 95% credible intervals that provide a measure of uncertainty. For the helium data I used all replicates.

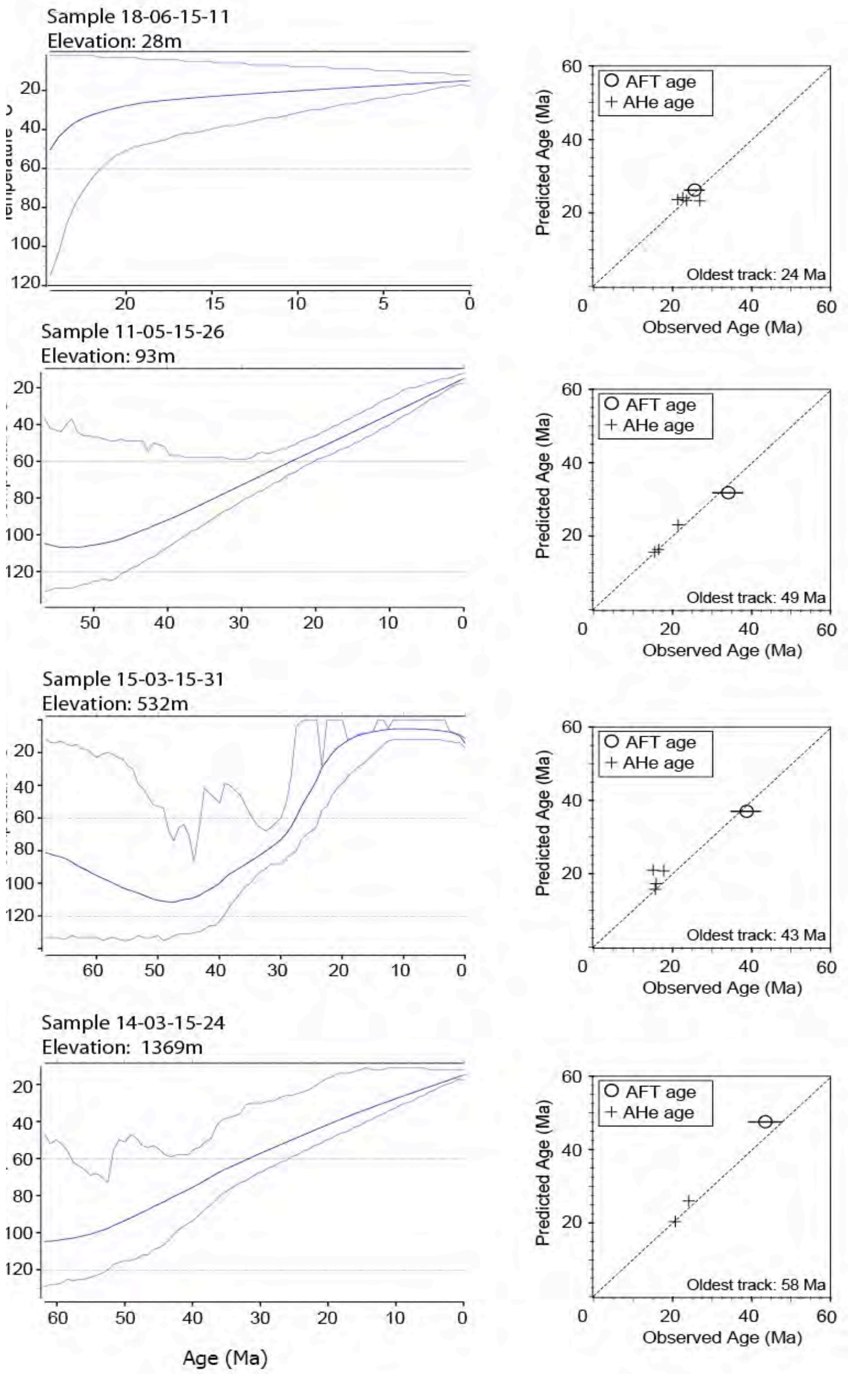


Figure 6.11: Representative thermal history models

Figure 6.11 show thermal history predictions of representative samples that cover the full elevation range. These models confirm that samples at the lower elevations, with youngest ages experienced fastest cooling and that samples at highest elevations cooled more slowly. The oldest fission tracks predicted by models give an indication of how far back in time the fission track data can see. These models confirm the qualitative predictions made in section 6.3.3 but it is hard to tell if there is any systematic relationship between the cooling rate and sample location. This will be explored further in the next chapter.

6.4. Summary

This chapter has introduced the apatite thermochronometry results. I have shown that cooling rates between the AFT and AHe closure temperatures (AFT partial annealing zone and AHe partial retention zone) were generally fastest closest to the coast where the youngest ages are found. Inland and at higher elevations cooling rates are slower but there are local differences. A simple interpretation is that this relates to the deepest erosion being near to the coast, which is the area where rivers will more rapidly respond to rock uplift and base level change caused by rifting in the South China Sea. The older ages further inland would be due to less erosion and this suggests rivers have not been affected by rifting or have not fully adjusted. In next chapter I examine the geographical distribution of cooling rates and erosion and compare these to local geology. I will also look for any links between onshore changes in erosion rate sedimentation in the offshore basins.

7

CENOZOIC EROSION HISTORY OF CENTRAL AND SOUTHERN VIETNAM

7.1. Introduction

In chapter 6 I looked at apatite thermochronometry results from South Vietnam to identify any data trends. I did not find any but found cooling rates were fast near the coast, which is also where the youngest apatite ages are mainly found. Inland and at higher elevations cooling rates were slower but there were local differences as some areas inland also appeared to suggest faster cooling. The goal of this chapter is to look at the results in a regional way to see if there is any connection to rifting and opening of the South China Sea and if periods of faster cooling and erosion match sand deposition in the offshore sedimentary basins, specifically, the Phu Khanh Basin to the north of the study area and the Cuu Long Basin in southern part of study area (Figure 7.1).

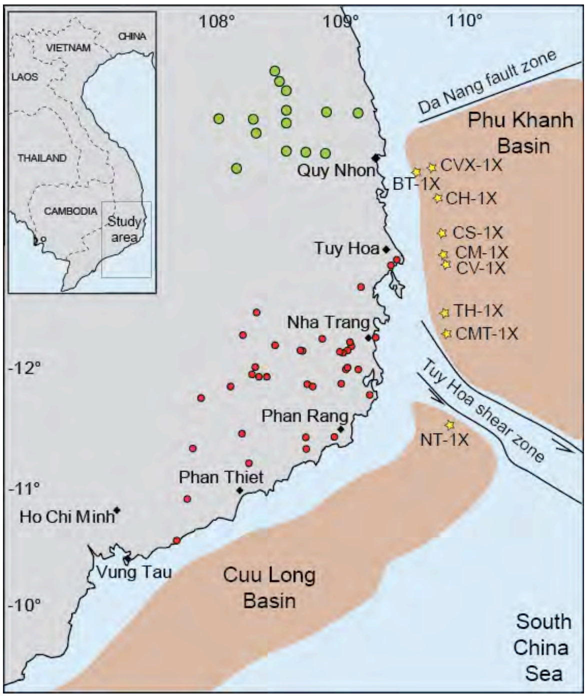


Figure 7.1: Location of onshore samples (red dots this study, green dots Carter et al., 2000) and offshore basins. Yellow stars are well locations.

Most of the hydrocarbon reservoirs in the offshore basins are found in Oligocene to Miocene siliciclastic rocks. These sandstones and siltstones were deposited by rivers flowing from the uplifted part of the Vietnam continental margin to the west or deposited by alluvial fans on local fault blocks. It is not clear how much of this erosion and sediment production was affected by regional tectonics associated with rifting process and seafloor spreading, or was related to background weathering and erosion. Important questions are;

1. Was erosion rate the same through time and across the study area?
2. Did the main syn-rift phase of rifting led to an increase in onshore erosion rates?
3. Was erosion affected by ocean spreading history?

First I review the stratigraphy of the Cenozoic geology of the study area and then the Cuu Long and Phu Khanh Basins which are located offshore adjacent to the study area. Sedimentation in the offshore basins should provide a record of changes in erosion history of the study area. The main trends will then be compared with regional models of the apatite thermochronometry data.

7.2. Stratigraphy onshore Cenozoic sedimentary rocks

The geology of the study area is dominated by Mesozoic igneous rocks however there are some small outcrops of Cenozoic sedimentary rocks that can be used to learn about what was happening to the study area at the time they were deposited. The main units in my study area are upper Oligocene to Miocene Di Linh Formation exposed in Lam Dong province and the upper Miocene to Pliocene Song Luy Formation exposed near the coast of Binh Thuan Province between Phan Thiet and Hon Rom.

Di Linh Formation

This formation can be found as small discontinuous outcrops between Dinh Van and Bao Loc (Tran, et al. 1998). The unit contains poorly sorted mud-rich sandstones to siltstones interbedded with claystones and bentonite layers with local basalts. There is a clear volcaniclastic component with evidence of channels that show a fluvial origin.

Song Luy Formation

Small outcrops show grey to yellow poorly sorted sandstones with grain sizes ranging from mud to coarse sand. Cross and trough bedding can be seen with some bioturbation. Depositional environments are consistent with river channels.

As these are local deposits and not very thick they show that the region was not subsiding. The provenance of these fluvial rocks were recently studied by Hennig et al. (2018) who found a significant change in provenance between the Oligo-Miocene Di Linh Formation and the lower Pliocene to Pleistocene Song Luy Formation. In their interpretation they linked these changes to a Miocene unconformity that reflected changes in river pathways connected to the development of the proto–Mekong River. An interesting question is what caused the rivers to change direction.

7.3. Stratigraphy of the marine basins

Detail on the regional geology and an overview of rifting can be found in chapter 2. This section expands on the clastic stratigraphy of the offshore basins, as these will be compared against the apatite exhumation histories to see if there is any co-relationship.

7.3.1. Cuu Long Basin

The Cuu Long Basin (Figure 7.1) is located along the coast between Vung Tau and Binh Thuan. It is considered as a typical closed sediment basin however, the basin tends to open to the northeast, in the present East Sea. According to Geological and oil resources of Vietnam, Vietnam Oil and Gas Group, (2007) drilling has shown that the basement of the Cuu Long Basin is composed of both pre-Cenozoic and Cenozoic sedimentary rocks. Sediment fill reaches a maximum thickness of 7-8 km in the center of the basin. Characteristics of each stratigraphic unit is described below, from old to young.

Palaeogene

Eocene – Ha Coi Formation (E_2cc)

This unit is characterized by coarse sediments: pebbles, sandstone, interbedded with thin layers of siltstone and illite-chlorite-sericite clay (Nguyen, 1982). Sediments are reddish-brown, violet-green in colour typical of continental-type molasse. Pollen spores, *Klukisporires, Triporopollenites, Trudopollis* are dry plant species commonly found in Eocene. The thickness of this unit can reach up to 600 m

Lower Oligocene – Tra Cu Formation (E_3^1tc)

Sediment of Tra Cu Formation (Nguyen, 1982) is mainly mudstone, siltstone and sandstone, with thin coals and carbonates consistent with deposition by rivers and lakes. Some places have volcanic rocks, mainly composed of tuffs and basalt, and subvolcanic porphyritic dolerites and gabbro-dolerite. According to their characteristics at the rock face, this formation is divided into two parts: upper and lower. The upper part is mostly fine grains and the bottom part is coarse grains. This formation has high potential for oil storage and production. The thickness of the formation ranges from 345 m to 845 m (according to drilling data) (Table 7.1) but on the half-graben seismic lines where there has been no drilling the Tra Cu Formation is thicker between 1500 m to 2000 m (Figure 6.3).

No	Drill hole	Depth below seafloor (m) from	to (m)	Interval (m)
1	HSD-4X	3387	3727	340
2	LDN-1X	2903	3253	350
3	LDV-1X	3385	3757	372
4	SN-1X	2380	3225	845
5	DM-4X	2740	3449	709

Table 7.1: Thickness distribution of Tra Cu Formation from well data

For a detailed view on the change of space and material composition and sedimentary facies in the Lower Oligocene (Tra Cu Formation) the HSD-4X Well (Figure 7.1) was described by Dong (2011) as follow;

Tra Cu Formation is found at depths from 3387 to 3727 m (Drill hole HSD-4X) with the thickness of 340 m. The main component consists of clastic sediment interbedded with basalts. These formations are distributed in a regular manner according to sedimentary rhythms (local terminology), reflecting cyclicity. Based on the sediment characteristics, this formation is divided into three subsets: lower, middle and upper and the inner one consisting of sedimentary rhythms with characteristic and composition features

Lower layer: This layer is located at a depth of 3727 to 3553 m, mainly characterized by basalt interbedded with sandstone, siltstone and claystone. This layer is subdivided into three rhythms with the following characteristics:

Rhythm 1: Depth from 3727-3695 m with a thickness of 32 m, including basalt at the bottom and sandstone above. The basalt thickness is 19 m. Sediment thickness is 13 m, made up of zeolitized sandstones, gray white, coarse to medium grain size, compacted and strongly cemented.

Rhythm 2: At a depth of 3695-3625m with a thickness of 70 m. There are six layers: basalt at the bottom, middle layer is thick sandstone and upper layer is sandstone interbedded with thin claystone.

Rhythm 3: At a depth of 3625-3553 m with a thickness of 70 m. In this rhythm, basalt flows account for 80% of the mass, from 3625 to 3560 m with a thickness of 65m, creating a thick layer, covered comformably by thin sandstones,.

Middle layer

The Middle layer has a thickness of 103m, ranging from 3553 to 3450 m in depth and was divided into seven rhythms:

Rhythm 1: Found at a depth of 3553-3540 m and has a thickness of 13m. There are only clastic sediments in this rhythm. The results of the lithological analysis show that at a depth of 3550 m is arkose sedimentary rock: fine-grained sandstones with medium to fine, angular to semi-angular grains. At a depth of 3543.5 m are greywackes with medium to fine grains size, including quartz, K-feldspar, plagioclase, mica and granitic material.

Rhythm 2: At a depth of 3540-3516 m with a thickness of 24 m, starting with a basalt layer, covered uncomfortably by arkose sandstone layer (10m in thickness). At the end of this rhythm is an 8 m-thick siltstone. Lithological composition includes mica, organic material, iron oxide and thin clay layer parallel to the surface.

Rhythm 3: At a depth of 3516-3503 m with a 13 m thickness, starting with basalt flows, and ending with thin bedded siltstones.

Rhythm 4: At a depth of 3503-3483 m with a thickness of 20 m, starting with an basalt flows and ending with a thinly bedded sandstone.. The sandstones are arkose, fine-grained with medium to fine, angular to semi-angular grains.

Rhythm 5: At a depth of 3483-3472 m with a thickness of 11 m. The rhythm begins with basalt and ends with a massive fine-grained arksose sandstone layer. Bedding is not clear.

Rhythm 6: Has a depth of 3472-3462 m with a thickness of 10 m. Basalt flows account for 80% of the rhythm thickness and the remaining are massive arkose sandstones.

Rhythm 7: Has a depth of 3462-3450 m, thickness of 12 m, starting with basalts then sandstones in the middle ending with siltstones in the top layer.

Upper layer

This layer has a thickness of 63 m spanning depths between 3450 to 3387 m. It has been divided into three rhythms:

Rhythm 1: Has a depth of 3450-3437 m with a 13 m thickness comprising only sedimentary rocks dominantly fine-grained, arkose with angular to semi-angular grains.

Rhythm 2: Is found at depths between 3437-3417m and a thickness of 20 m. This rhythm consists of a 4 m thick layer of basalt, the upper part being mainly sedimentary rocks with a thickness of 16 m. A blue-black siltstone on the top of rhythm is a zeolitized clay, composed of small amounts of quartz, K-feldspar, plagioclase, mica replaced by zeolite and chlorite.

Rhythm 3: Has a depth of 3417-3387 m and a thickness of 30 m including three sets, the bottom one is basalt, then thick bedded sandstones in the middle, and thin bedding sandstones at the top.

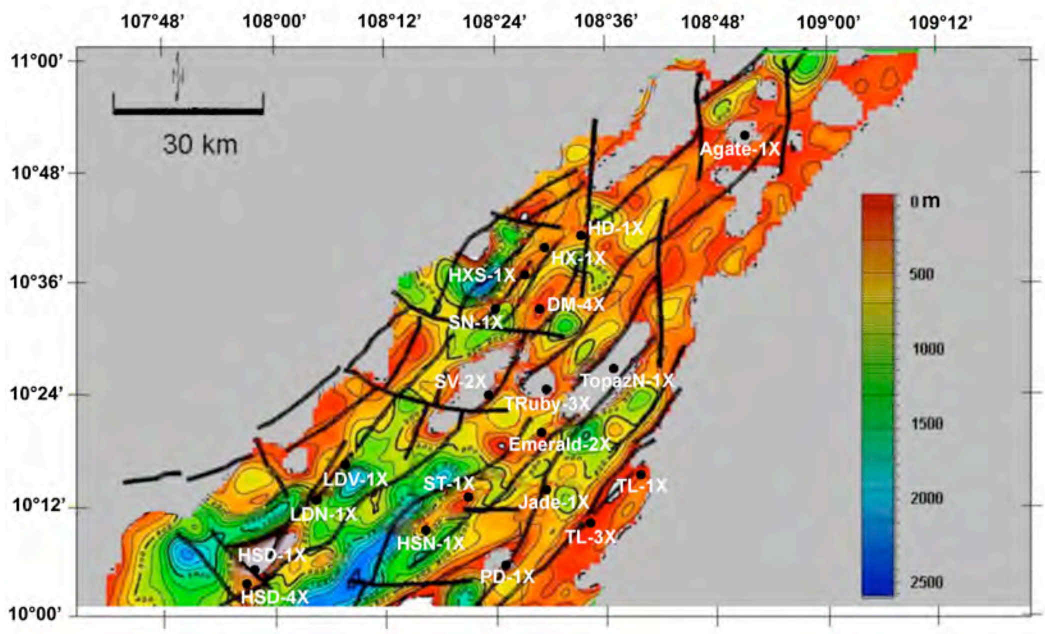


Figure 7.2: Isopach map of Tra Cu Formation in northeast of Cuu Long Basin (Hoang, 2011).

Upper Oligocene – Tra Tan Formation **(E_3^3*tt*)**

Rocks of this formation are sometimes seen to be unconformable over the Tra Cu Formation. The section can be divided into three distinct lithological parts (Ngo et al., 1980). The upper part consists mainly of brown clay - dark brown, very little red clay, sandstone and siltstone. The sand / clay ratio is about 35/65-50/50. The middle part consists mainly of dark brown clay, sandstone and siltstone. The sand/clay ratio is about 40/60 (about 50/50 is common), sometimes interbedded with thin limestone and coal. The lower part consists mainly of fine to coarse sandstone, conglomerate, dark brown clay and dark brown siltstone. The sandy / clay ratio varies from 20/80 to 50/50. The formation has a high organic content and of good quality, especially in the middle of Tra Tan. Environment of deposition is mainly by a river delta and coastal lakes. Pollen spores include stratigraphically significant and age restricted taxa such as *Florschuetzia Trilobata* normally associated with a mangrove environment (Chung et al., 2015).

Tra Tan Formation is widespread and continuous throughout the basin, present on both half graben and horsts so they no longer distinguish between tectonic zones such as the formation of Tra Cu Formation and Ca Coi Formation. The supply of materials is from the mainland so the material composition and depositional environment of the Tra Tan Formation is distinguished by the relative position between the central and the margin of the basin. Thus, the sediments of the Tra Tan Formation are characterized by gradual changes in the sedimentary environment throughout the basin

The thickness of the formation in wells varies from 450 m to nearly 1000 m. The thickness of the stratigraphy is usually thin across semi-horsts and thick to very thick (can exceed 1500 m) in the center of the half grabens (Fig 7.4).

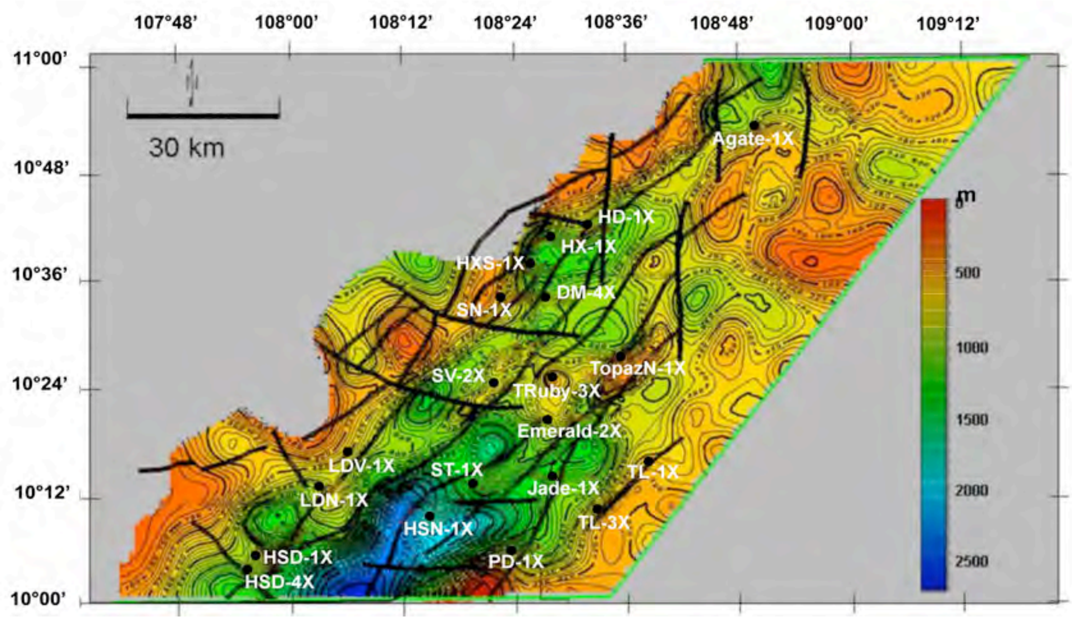


Figure 7.3: Isopach map of Tra Tan Formation in the northeast of Cuu Long Basin (Hoang, 2011).

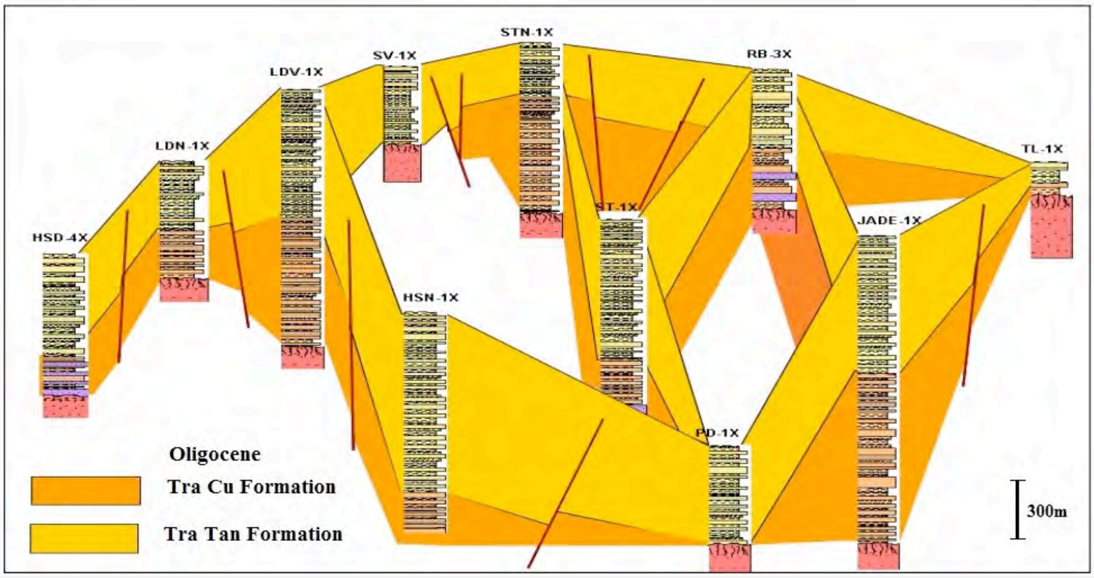


Figure 7.4: Fence diagram showing the spatial relationship between the Tra Cu and Tra Tan formations in the northeastern part of the Cuu Long Basin. (Hoang, 2011).

Neogene

Lower Miocene - Bach Ho Formation (N_1^1bh)

The Bach Ho Formation (Ngo et al., 1980) has been divided into two parts: The upper part is mainly grey clay and greyish green interbeds of sandstone and siltstone. The lower part is mostly sandstone, siltstone (accounting for 60% of the formation), interbedded with grey, yellow, red clay layers. These sediments were deposited in an alluvial plain to coastal plain setting in the lower part, gradually moving to a coastal plain-shallow sea in the upper part. The clay layer contains the benthic foram Rotaliana and thus unit is a great seal layer for the whole basin, varying in thickness from 50 m to 150 m. Pollen spores include *Florschuetzia levipoli (angiosperms) and Magnastriatites (ferns)*

Middle Miocene – Con Son formation (N_1^2cs)

Con Son Formation was established at well 15B-1X at depth 158—2248 m. Comprises sandstone (coarse to medium grainsize) and siltstones (up to 75 - 80%) with alternating layers of grey clay with thicknesses between 5 and 15 m, sometimes with thin coals. The thickness varies from 250 to 900 m.

Sedimentary enviroments are fluvial in the west and marsh-coastal plain in the east to northeast (Le et al., 1985).

Upper Miocene – Dong Nai Formation (N_1^3đn)

The Dong Nai Formation was described at well 15G-1X (Figure 7.1) (depth 650-1330m). Mainly medium grain sands alternating with silt and thinning layers of grey or multi-coloured clay, sometimes with thin carbonate or coal seams. The sedimentary environment is swamp-coastal plain in the western part of the basin and shallow coastal-shallow plain in the eastern and northern parts of the basin (San et al., 1980). Thicknesses vary from 500 to 700 m

Pliocene-Quaternary – Bien Dong Formation (N_2-Qbđ)

The Bien Dong Formation was established by Le et al. (1985) and is made up of mostly medium to fine grained sands with thin layers of mud, light grey clay. Carbonate rocks can be found throughout the basin with a relatively stable thickness in the range of 400 to 700 m. Abundant marine fossils and glauconite indicates a shallow coastal environment. Common fossils include foraminifera *Pseudorotalia*, *Globorotalia* as well as bryozoa, molusca, coral, algae and pollen spores such as *Dacrydium* and *Polocarpus imbricatus*.

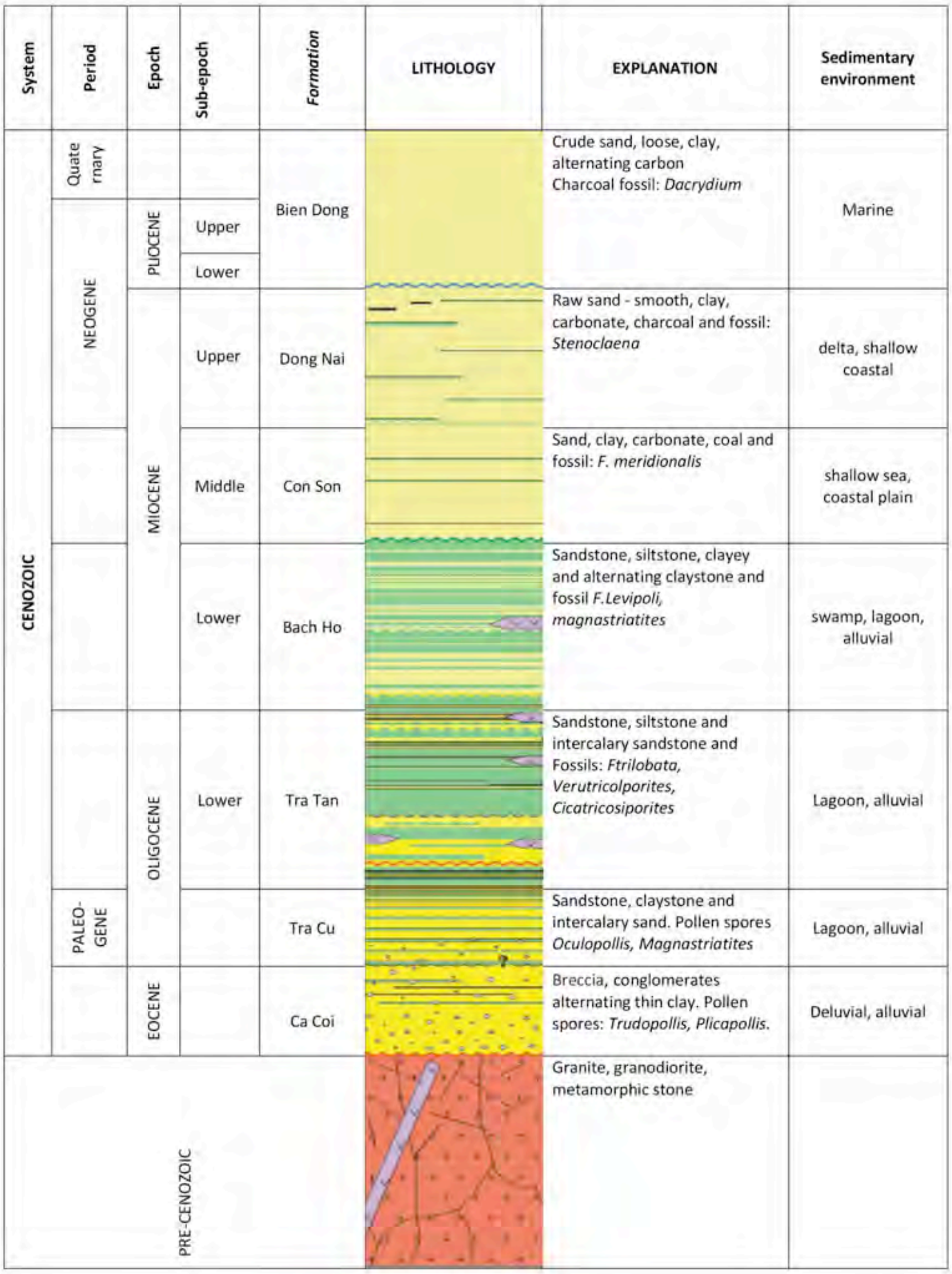


Figure 7.5: Stratigraphy of the Cuu Long Basin, (Tran, 2000)

Summary

Sand and silt represents a significant component of sediments deposited in this offshore basin since Eocene. The proportion of sand to clay shows a clear increase in the Miocene, especially in the fluvial sediments of the Con Son Formation indicating increased erosion in the sand source areas at that time.

7.3.2. Phu Khanh Basin

The Phu Khanh Basin is located along the coast of central Vietnam. The stratigraphy (Fig 7.7) is based mainly on interpretation of seismic reflection lines and borehole data and by comparison with sediments deposited in the Song Hong, Cuu Long and Nam Con Son basins. This mean the location of stratigraphic boundaries varies between authors. In the Geological and Oil resources of Vietnam (2005) scheme, Tran Ngoc Toan and Nguyen Hong Minh have relied on seismic data.

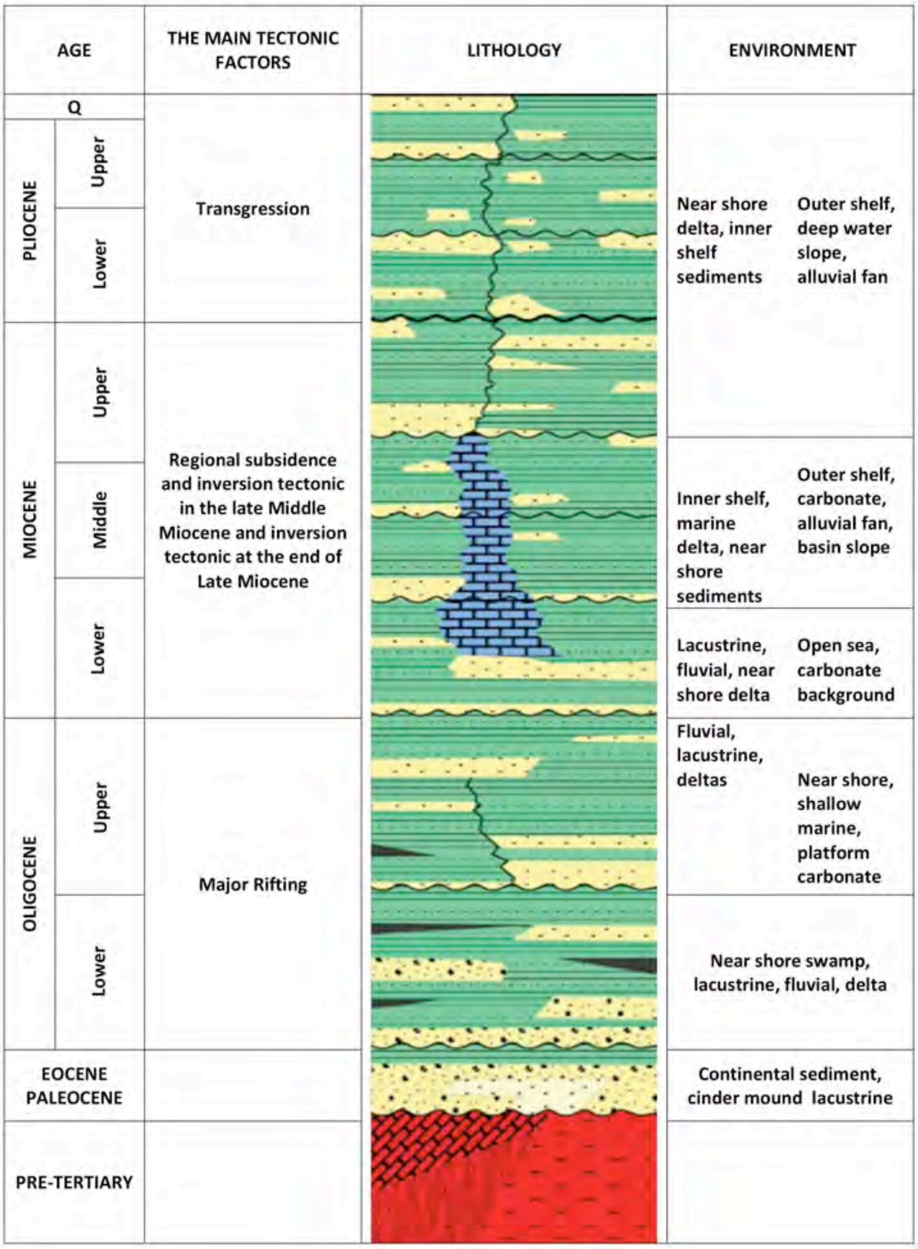


Figure 7.6: Stratigraphic framework of Phu Khanh Basin (Tran, 2000).

Cenozoic sedimentation shows thicknesses varying from 500 m along the western basin edge up to 7,000 - 8,000 m in a deep depression along the eastern margin of the basin. Basement is formed of magmatic and metamorphic rocks of varying age and composition. Cretaceous granite rocks are weathered and fractured in the Phan Rang shelf, Tuy Hoa shear zone and Da Nang shelf. Basin stratigraphic units are briefly reviewed below:

Palaeocene - Eocene?

Presumed Palaeocene - Eocene sedimentary rocks, found in graben and half grabens are coarse-grained sands with conglomerates at the base. On seismic data they are seen as low-continuity waveforms with medium to high amplitude.

Oligocene

Oligocene sediments were deposited unconformably on Eocene strata. They are finer-grained sands and clay, sometimes interbedded with thin coals. On seismic sections the sediment is classified as a low-continuity waveform. There are tangled reflections and high amplitudes. Sediment thickness varies from a few hundred meters at the edge to thousands at the center of the basin. Rock types are mainly reef and lagoonal carbonates with occasional black clay coal layers rich in organic matter (Fig. 7.8).

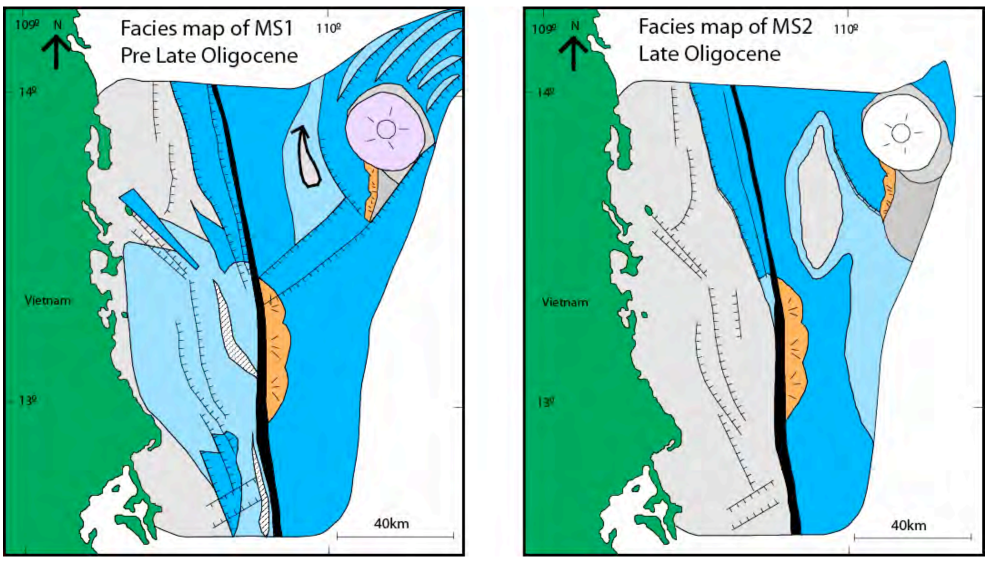


Figure 7.7: Cartoon to show the carbonate dominated Oligocene depositional environments in Phu Khanh Basin (after Fyhn et al., 2009). Legend in Figure 7.9

Miocene

Miocene sediments are mainly terrigenous deposits with deltas and alternating marine and shallow marine deposits. In the eastern part of Da Nang, Phan Rang reef limestone developed. It can be divided into lower Miocene sediments, middle and upper, each with seismic characteristics.

The lower Miocene sediments were deposited unconformably on Oligocene rocks. On seismic sections show by near parallel to parallel, low to high amplitude, medium continuity, and inclined types. In the north, there is a delta or alluvial fan, with high amplitude reflections indicative of carbonate formations. Mainly, lower Miocene formations are dominated by terrigenous deposits. The lower Miocene clay layer, clay-coal layer has lagoon, swamp lake facies and is the main oil source rock in the Phu Khanh basin (Fig. 7.9). The sediment thickness can reach over 2000 m.

Middle Miocene sediments are identified and linked on seismic documents with the characteristics of parallel or near parallel reflections, amplitude from low to high that show onlap on the coast and downlap in deeper water. In general, on the western and northern shelf of the Phu Khanh basin, the middle Miocene sediments are mainly composed of coarse- medium grained clastic deposits that are close to the mainland source areas. In the southern part of the basin, sedimentary deposits of Oligocene and Lower Miocene lagoons are buried beneath sandstone, siltstone, carbonate sediments of the Middle Miocene.

In the Miocene, it is common to find gravity deposits associated with alluvial fans along the back slope of the basin. These could be reservoirs capable of accumulating oil and gas. A carbonate shelf can be seen along the eastern edge (Fig. 7.9). There is some evidence for subaerial erosion with coral breccia, perhaps linked to deposition along a frontal reef.

Upper Miocene sediments are identified by seismic reflectances that are usually parallel to slightly divergent, low to medium amplitudes, show good continuity in the western part of the basin, and which have an ‘S’ shape towards slopes facing the sea.

Total thickness of Miocene sediments in the Phu Khanh basin reached up to

3000 m. The upper parts were deposited in a delta or beach or coastal environment, while to the west of the basin sedimentation is mainly non-marine parts of the delta dominated by fluvial deposits.

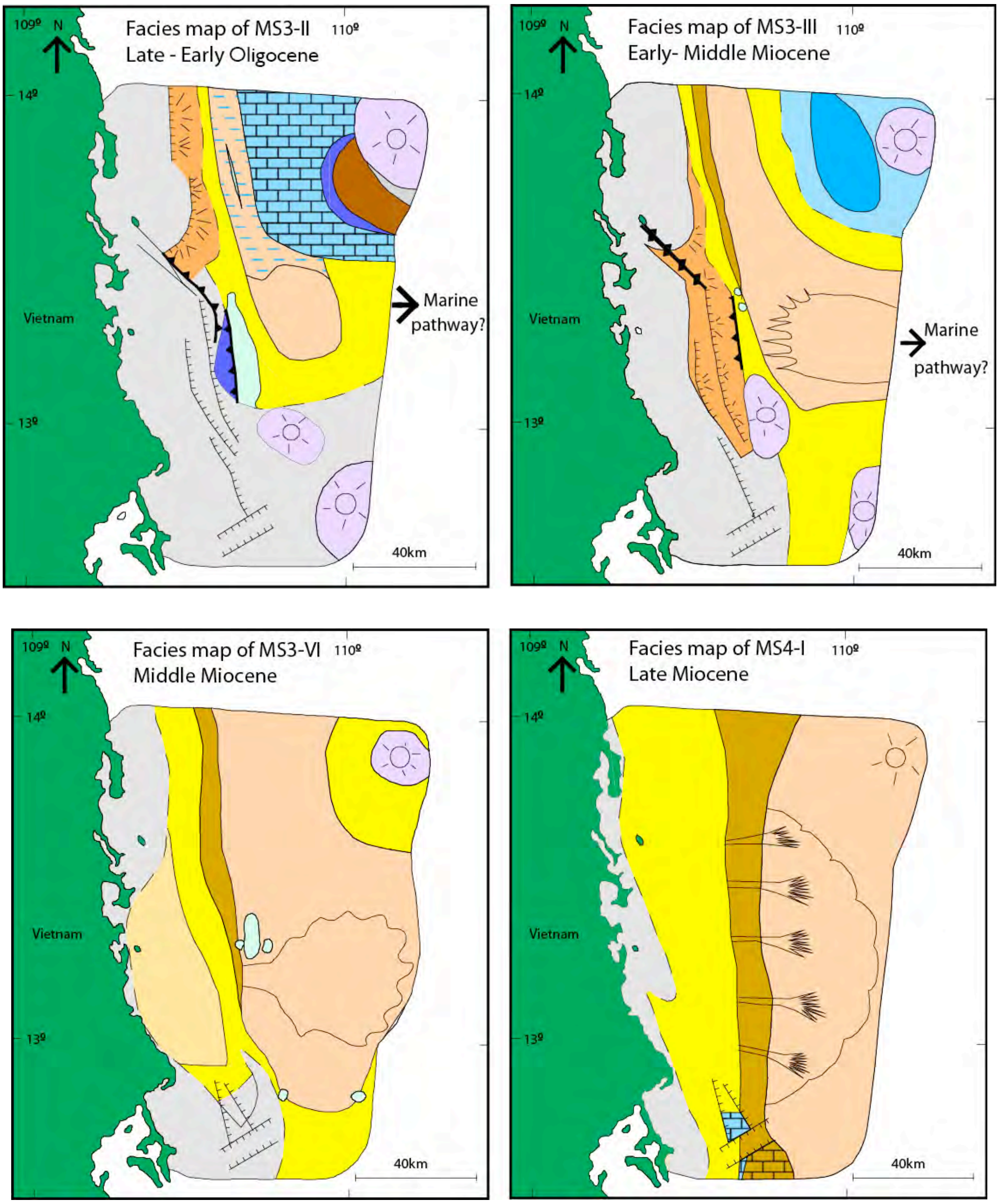


Figure 7.8: Cartoon to show the change in depositional environment in Phu Khanh Basin from early to late Miocene (from Fyhn et al., 2009). Legend in Figure 7.9.

Pliocene - Quaternary

Pliocene- Quaternary sediments are the sand, silt, shelf clay and deep-sea sediments associated with the formation of the entire continental shelf of the East Sea. On seismic sections, it is easy to identify and relate them to the Pliocene-Quaternary layer in the region. In the east there are usually thick sediment wedge-shaped, while the western part shows parallel reflections, good continuity, average amplitude, and low frequency, related to sediment shelf face from inside to offshore.

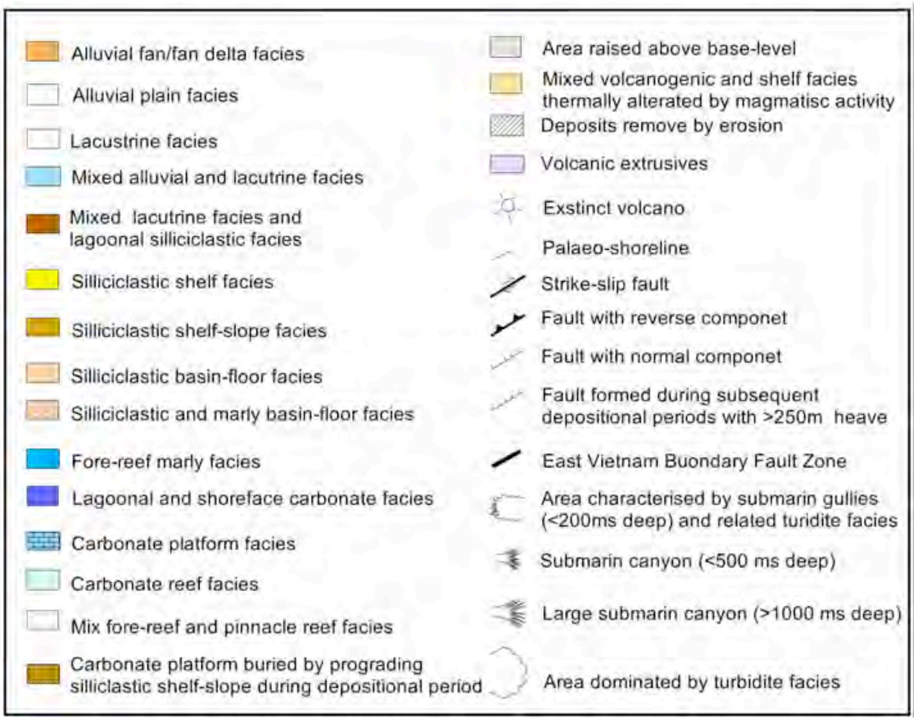


Figure 7.9: Legend for cartoon of facies maps (Fyhn et al., 2009).

Summary

The main feature of the Phu Khanh Basin stratigraphy is the change in sedimentation from lagoonal reefal carbonate dominated sedimentation in the Oligocene to siliciclastic dominated shoreface facies in the Miocene, mainly from the middle to late Miocene. This is clearly shown in the facies maps above and from comparison of well stratigraphy in figure 7.11.

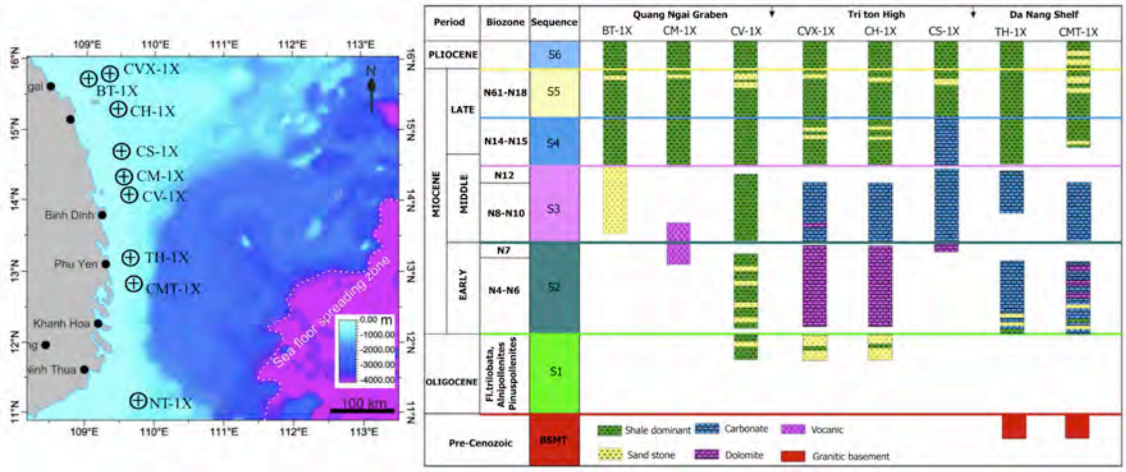


Figure 7.10: Comparison of well stratigraphy in the Phu Khanh Basin. Note the arrival of sands in the middle Miocene in well BT-1X (Nguyen, 2007).

7.4. Stratigraphy and rifting

Both Cuu Long and Phu Khanh basins show an increase in the proportion of sand, which also tends to be coarser, in the Miocene. Oligocene sediments tend to be clay rich and finer grained. The main increase in sand seen in wells close to the present-day coastline took place in the middle Miocene (figures 7.9 and 7.11). Do these changes have any link to rifting in the East Sea (South China Sea)?

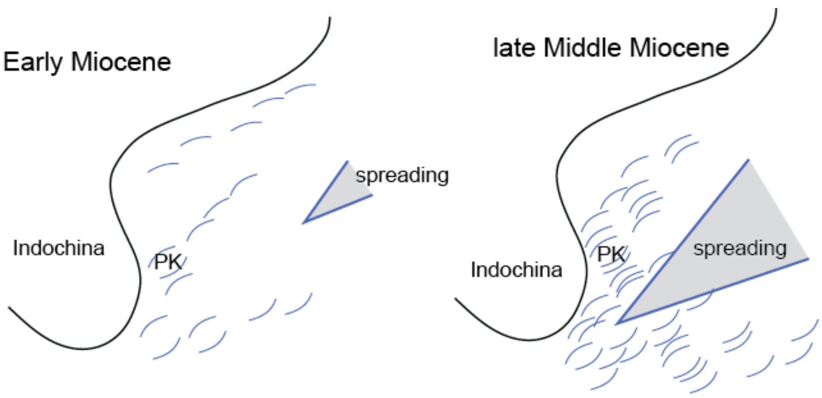


Figure 7.11: Cartoon to show the relationship between spreading and extension along southern Indochina. PK shows location of the Phu Khanh Basin.

Continental breakup that led to formation of the oceanic South China Sea basin can be traced back to the latest Cretaceous in the northeastern part of the basin caused by slab-pull from southeastward subduction of the proto-South China Sea along the North Borneo Trough. Over the next 30-40 Myrs extension propagated in a southern and western direction. Full oceanic spreading began well after extension dating to 32 Ma in the central part of the basin and 25-20 Ma (Fig 7.12 and 7.13) in the southwestern sub-basin (Barckhausen et al., 2014).

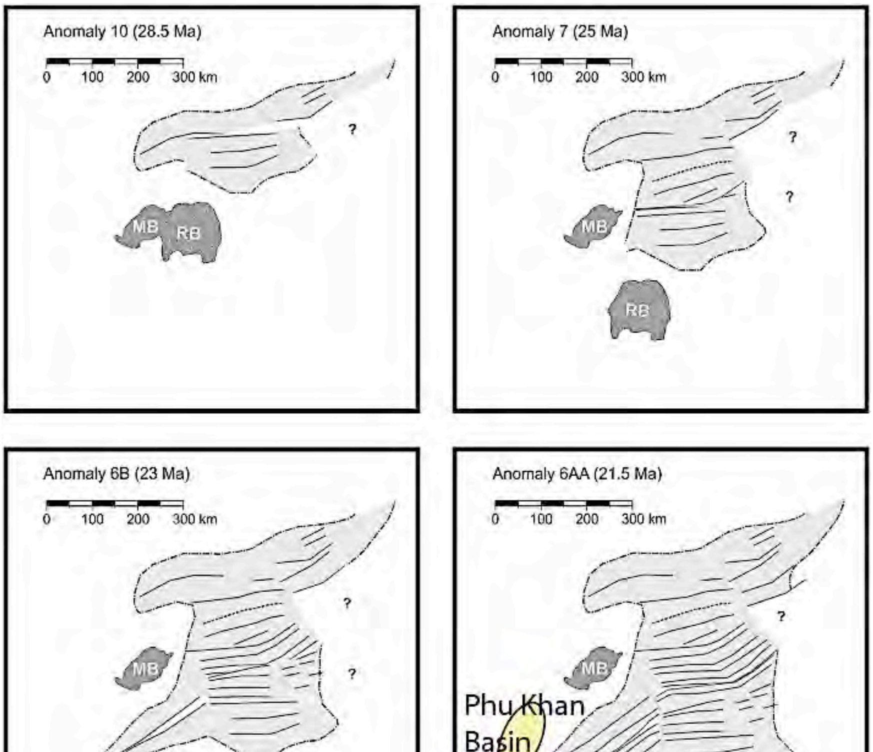


Figure 7.12: Reconstruction of spreading history of the South China Sea based on magnetic anomaly data showing the location of the Phu Khanh Basin (from Barckhausen et al., 2014).

Comparison between the offshore sedimentation and rifting show some similarity in timing of changes. This is shown by figure 7.14 where the most important feature is coincidence between unconformities in the offshore basins and change in orientation of rifting from north to south to northwest-southeast.

This change, that led to spreading in the southwestern sub-basin, took place around 23 Ma and is an important and widely known event that took place soon after a spreading ridge jump from the north to southwestern part of the South China Sea (Barckhausen et al., 2014).

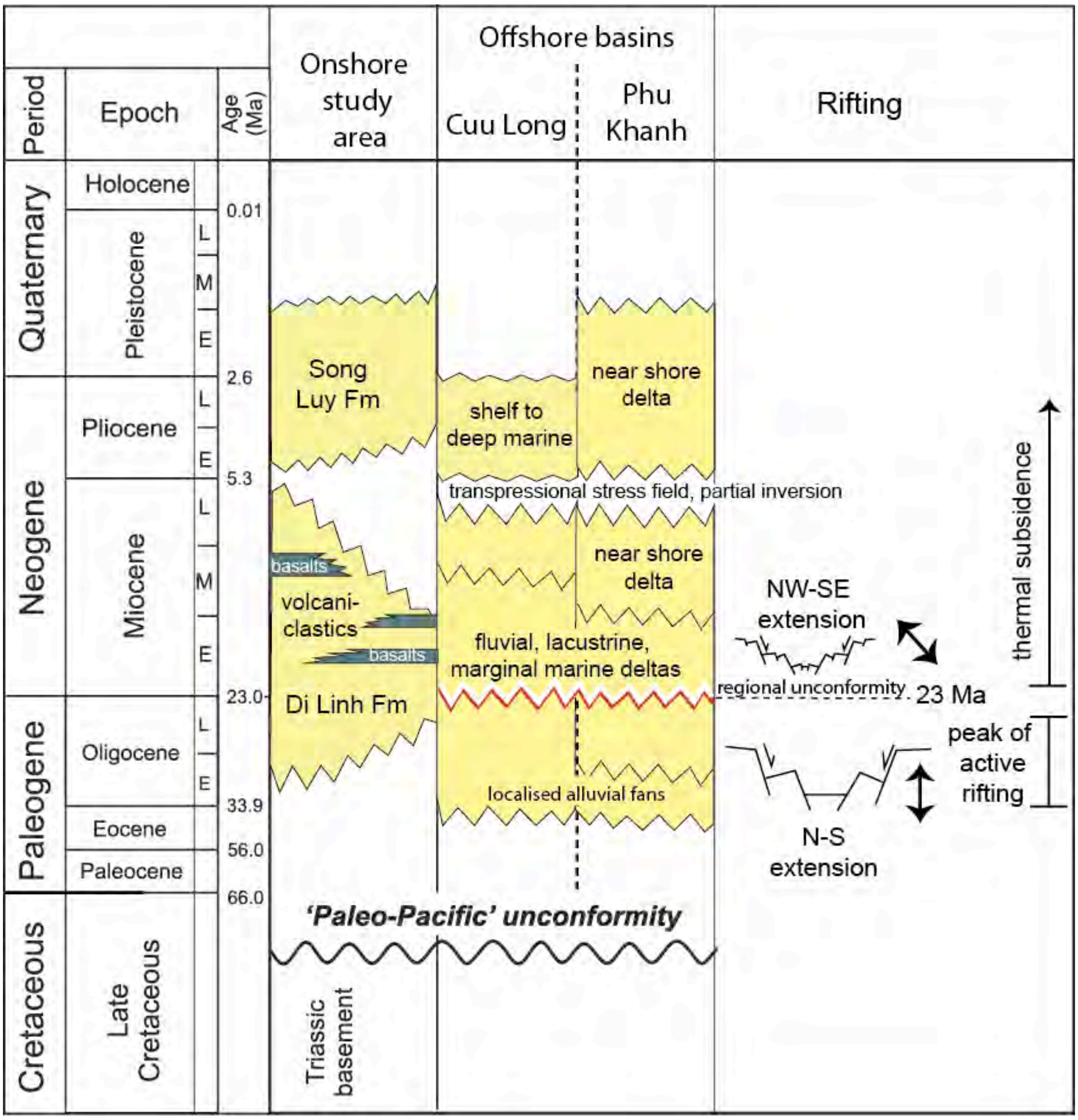


Figure 7.13: Summary of regional basin stratigraphy and changes in rifting orientation (adapted from Hennig et al., 2014; Savva et al., 2014).

Recent modeling work has stressed the significance of the 23 Ma event (Le Pourhiet et al., 2018). Using three-dimensional numerical simulations it was shown that the west-to-east topographic gradient (load) across Indochina helped to prevent continental break-up until the direction of stretching changed 23 million years ago. In figure 7.14, taken from Pourhiet et al., (2018), we can see that the orientation of spreading rotates anticlockwise as it moves west, which is not the normal scissor like pattern shown by many rifts around the world. From 32 Ma until 23 Ma only the east sub-basin was affected by ocean spreading (blue shading on figure 7.14a and b). Then a 15° change in the direction of spreading took place, shown by the yellow shading on figure 17.15a and b (blue lines show the orientation of magnetic anomalies). Before this change rifting took place on structures oriented perpendicular to Indochina, which meant that the topographic load of Indochina acted as a compressive resisting force to propagation spreading further west. This is why figure 7.15b stage 1 involves slow rifting (note that in the northern South China Sea recent work by Larsen et al., (2018) has shown that rifting in the late Eocene to Oligocene was short (< 10 Myrs) and rapid). To overcome this resistance spreading rotated 15 degrees towards the south, oblique to Indochina, which allowed spreading to move southwest and at a faster rate (steps 2 and 3 on figure 7.14b). The unconformities in the Phu Khanh basin reflect this change in stress field that would also have affected basin subsidence.

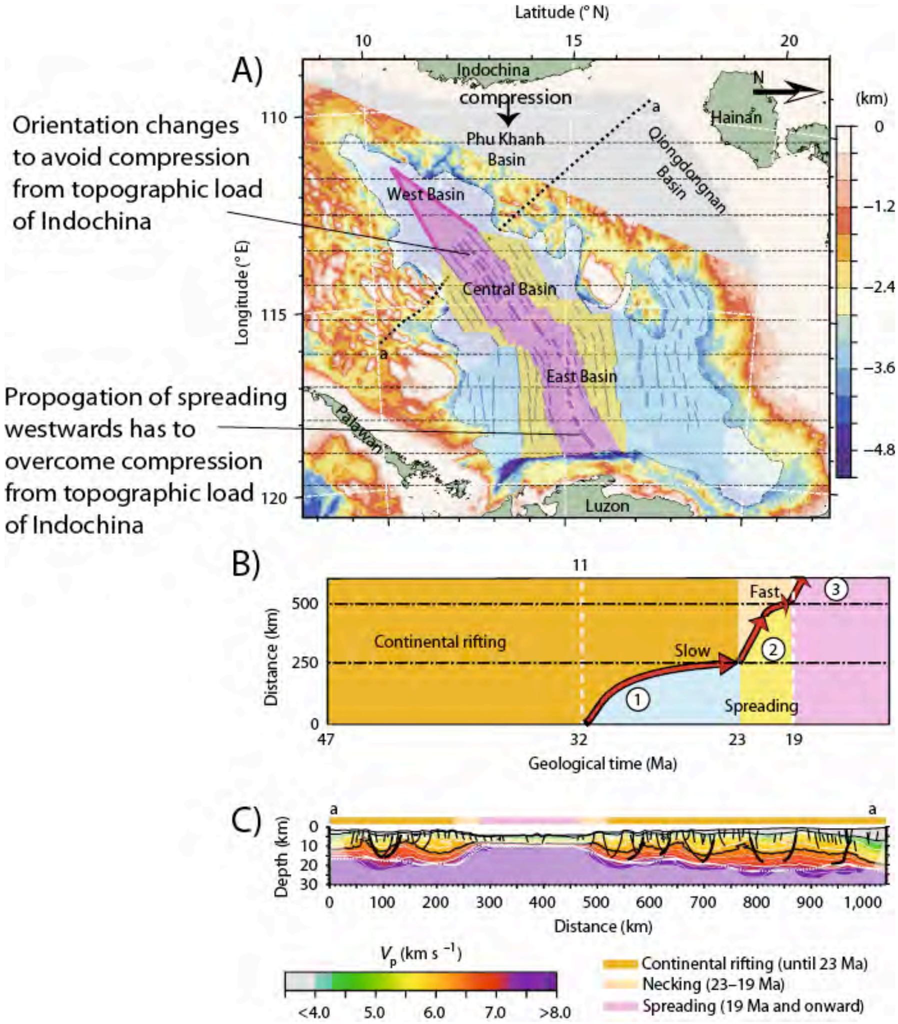
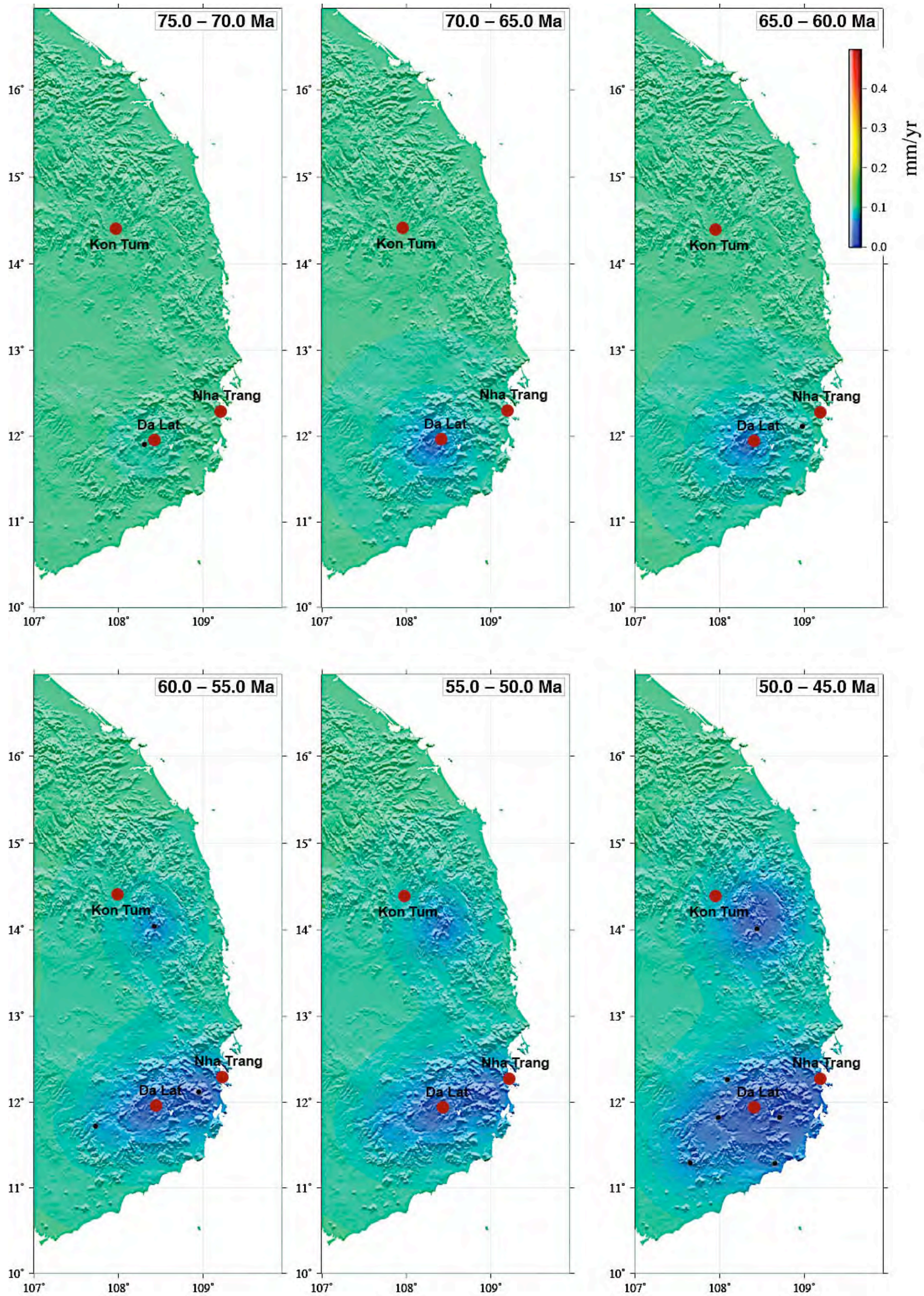


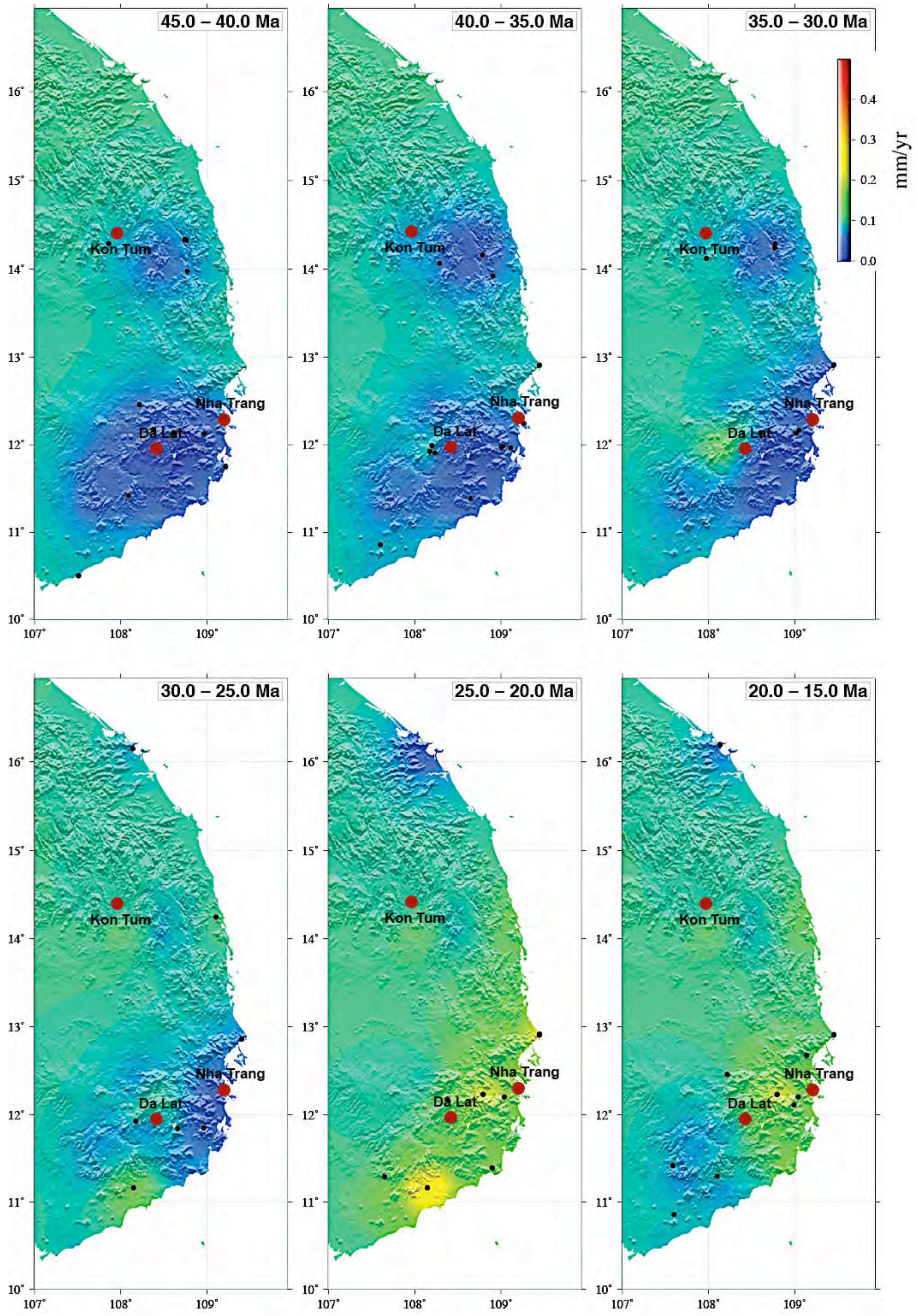
Figure 7.14: Cartoon to explain spreading history of the South China Sea (modified from Pourhiet et al., 2018).

7.5. Regional exhumation history

To see if and how the apatite data relate to rifting my dataset set needs to be looked at in a regional way. The thermal histories shown in chapter 6, based on QtqT modeling only show thermal history of single samples. This makes it difficult to identify spatial and temporal trends. One way to examine the data is to make a contour map of ages but this oversimplifies the results and makes it hard to show the different rates of cooling between the AFT and AHe systems. To avoid this problem I used the linear inverse method written by Matt Fox who kindly ran my data through his code (Fox et al., 2013). This method has the advantage that it takes into account any evolving thermal field below complex topography. It does this by converting the 4D thermal field into transient 1D thermal models that are consistent with exhumation rates and temperature perturbations caused by topography. Results are used to show regional trends in the data. They do not attempt to determine a unique solution to this inverse problem.

The models need to make interpolations between ages or time-averaged exhumation rates and are based on a correlation length scale parameter of 40 km. A thermal model is used that results in present day geothermal gradient of up to 28°C/km for the most rapidly exhuming areas (an initial steady state geothermal gradient of 22°C/km and corresponding basal heat flow lower boundary condition at 100 km depth, an upper boundary condition at 0 km fixed surface temperature of ~15°C at ~500 m.a.s.l. Exhumation rate in a specific time interval is constrained by the data that fall within that specific time interval but also exhumation rates in other time intervals. The following cartoons show 5 Myr timeslices that start in the Upper Cretaceous, which is the furthest back in recorded by some of the AFT data. The cartoons shown on the following pages are for 5 Myr timeslices, starting in the late Cretaceous.


75.0 – 70.0 Ma
70.0 – 65.0 Ma
65.0 – 60.0 Ma
60.0 – 55.0 Ma
55.0 – 50.0 Ma
50.0 – 45.0 Ma
Kon Tum
Da Lat
Nha Trang
mm/yr
0.0
0.1
0.2
0.3
0.4
10°
11°
12°
13°
14°
15°
16°
107°
108°
109°



45.0 – 40.0 Ma
40.0 – 35.0 Ma
35.0 – 30.0 Ma
30.0 – 25.0 Ma
25.0 – 20.0 Ma
20.0 – 15.0 Ma
Kon Tum
Nha Trang
Da Lat
mm/yr
0.0
0.1
0.2
0.3
0.4
107°
108°
109°
10°
11°
12°
13°
14°
15°
16°

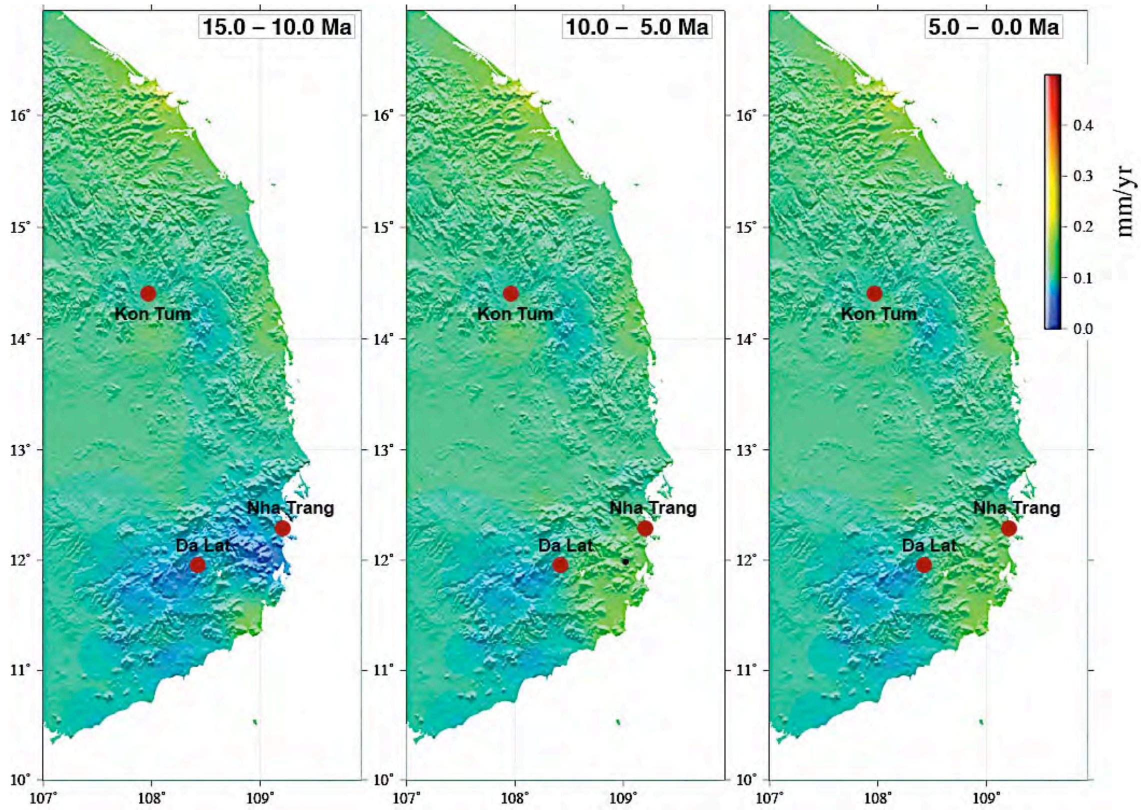


Figure 7.15: Results of inversions to infer variations in regional exhumation rates in space and time.

The main features shown by the inversion cartoons can be summarized as follows;

70-60 Ma: The area that first records exhumation relates to the oldest AFT ages (58-70 Ma), which are found at modern elevations between 836 m up to 1474 m approximately 100km inland, South West of Nha Trang. Rates are low (< 100 m/Myr)

60-25 Ma: Exhumation rates remain low but the area has expanded to include most of the study area as well as the Kontum Massif.

25-15 Ma: A distinct increase in exhumation rate from 100 m up to 300 m/Myr is seen across the study area over this time interval. By 15 Ma the area to the south has returned to background rates of < 100 m/Myr, shown by the blue shading in Figure 7.15.

7.6. Discussion

At the large scale the apatite thermochronometry data show uniform exhumation rates through time and space. As data record exhumation in the study area as far back as the Late Cretaceous this shows that in some areas the total amount of erosion since that time has been low and relatively slow. For the oldest AFT ages (samples 15-03-15-27, 13-03-15-08 and 13-03-15-10) this would be around 3 km over 70 Myrs equivalent to an erosion rate of 0.04-0.06 mm/yr (40-60 m/Myr) for geothermal gradients in the range of 25-35°C/km. The elevation profile of granite samples collected from west of Nha Trang (Fig 6.10) recorded an exhumation rate of 0.05 mm/yr. These rates are similar to modern to long-term erosion rates recorded in the Song Gianh drainage of northern Vietnam (Jonell et al., 2017). However, thermal history models and differences in lag time between AFT and AHe ages (Fig. 6.9) show cooling and erosion rates were not constant and this is confirmed by the exhumation maps that show between 25 Ma and 15 Ma there was increase in exhumation to between 0.2 and 0.3 mm/yr (200-300 m/Myr). This overlaps with the time interval between mean AFT and AHe ages shown on the age plots against elevation in Figure 6.9. This recent cooling is mainly recorded by AHe data as most samples were at shallow crust levels near or below base of fission track partial annealing zone (around 60°C) so the FT system was not sensitive to change in exhumation rate.

The South China Sea is a wide continental rift and has the largest area of submerged continental crust in the world. Southern Vietnam represents an exposed part of the Indochina section of the passive margin, which in the region of the study area extends offshore for over 400 km before oceanic lithosphere is reached (Fig. 7.15). We do not know exactly when rifting began in the section of the margin offshore the study area but the Phu Khanh and Cuu Long basins record active extension and subsidence from the Late Eocene through the development of small grabens eroded by alluvial fans (Fig. 7.15). Most of the active rifting appears to have ended by 23 Ma and this is recorded in the marine basins by uplift and a regional unconformity at the Oligocene/Miocene boundary. The thermochronometry data and exhumation maps from this study suggest active rifting and subsidence did not much influence study area, as there is no evidence for big changes in exhumation rate during the Eocene and Oligocene. This might be because extension was distributed across a wide margin. Worldwide passive margins typically show trends in apatite exhumation data with youngest ages and deepest erosion near low elevation coastal plains and ages increasing inland due to less material eroded from the elevated hinterland (Gallagher and Brown, 1997). This trend is not seen across the study area and maybe is due to large width of extended continental margin.

The three maps in figure 7.15 show between 25 and15 Ma exhumation rates changed from < 0.1 mm/yr to up to 0.3 mm/yr. This change is mainly recorded by the AHe data. It is noticeable that in the marine basins Oligocene sediments tend to be clay rich and fine grained but in the Miocene clastic sedimentation was coarser grained and thicker, especially in oil wells drilled close to the present-day coastline. The volume of sandy sediment in the Miocene was enough to feed gravity flows along submarine canyons oriented perpendicular to the coastline and produce turbidites (Fig. 7.9 and 7.10). This fits with increased erosion onshore and explains the increase in exhumation recorded by the apatite data.

For exhumation rates to increase there would need to be a base level or climate change to allow rivers to erode faster. Global sea level change can be ruled out, as it did not change much in the early Miocene. Intensification of the East Asian monsoon appears to have taken place at this time (Clift et al., 2014) but if this were the cause of accelerated erosion it would be regional in extent and there would already have to be some relief to allow increases in river incision rate. The maps in figure 7.15 do not show a regional uniform increase in rock uplift and so climate change is discounted, although it may have had a second order effect. Active rifting had also ended by this time, which leaves margin uplift as the most likely explanation.

As discussed in section 7.4 the timing of the regional unconformity at 23 Ma overlaps with a change in regional stress field that allowed ocean spreading to migrate westwards. Before 23 Ma, the topographic load of Indochina was oriented perpendicular to spreading in South China Sea and this added stress slowed down the west migration of spreading that took place between 28 and

23 Ma. This resistance could have caused uplift of the study area. Within the marine basins there is also some evidence for a transpressional Middle Miocene stress field that caused local block inversion. This may be related to ocean spreading moving westwards at an oblique angle to Indochina (compared with perpendicular before 23 Ma) but it is hard to believe that the this stress on its own was enough to uplift the onshore study area.

Another possibility to consider is that uplift was related to arrival of the Hainan mantle plume. This was a mechanism proposed by Carter et al. (2000) to account for late Miocene acceleration in exhumation across the Kontum Plateau and increase in sedimentation in the Phu Khanh Basin. However, although basaltic volcanism is widespread across southern Vietnam magmatism dates to between 13.8 Ma and 4.1 Ma, which is well after spreading ended in the East Sea (An et al., 2016). This mechanism is more likely to explain the more recent late Miocene inversion seen in the marine basins (Fig. 7.14).

With regard to the two classes of model put forward to explain extension in the South China Sea (chapter 2, Fig. 2.7) I do not see how the timing and changes in deformation in the offshore basins fit with the left-lateral pull apart mechanism first put forward by Tapponier et al., (1982). Whilst kinematic indicators and the structural style of the Yingehai-Song Hong Basin fit with Paleogene rifting in the Song Hong Basin being due to left lateral movement along the Red River Fault zone (Fhyn et al., 2018) the associated transtensional regime only lasted until the end of the Oligocene when a regional inversion marked a regional change in tectonic stress regime. The offshore basins in my study area are located far from the red River fault and in the case of the Cuu Long Basin have an orientation incompatible with a transtensional origin associated with motion on the Red River Fault. There is also evidence that basin extension began early in the Eocene before known movement on the Red River Fault (Morely, 2013) although dating of oldest basin sediments is far from reliable. However, there is a common element between the north and south basins, which is the 23 Ma inversion event. The evidence put forward by Pourhiet et al., (2018) associated with a change in spreading direction suggests that this the most likely cause and because this is regional in nature it best fits model two (Fig. 2.7) whereby extension and rifting is linked to opening of the South China Sea driven by subduction of a proto south China Sea in a region just north of Borneo.

7.7 Summary

My apatite thermochronometry work has identified a period of increased exhumation between 25-15 Ma that affected Southern Vietnam. This timing coincides with re-organisation in regional stress related to a change in ocean spreading direction as it moved into the East Sea, and this probably caused the increased exhumation but exactly how is beyond the aims of this study.

8

CONCLUSIONS AND FURTHER WORK

8.1. Introduction

This thesis had two main aims. The first was to determine the source of ilmenite placer deposits found in Pleistocene to Quaternary sands enriched in heavy minerals that can be found all along the coastal region of southern Vietnam, and to define the process(es) that caused enrichment. The second aim was to learn about the Cenozoic erosion history of central and southern Vietnam and to see if opening of the South China Sea (especially rifting in the East Sea) controlled or contributed to the regional onshore erosion. Both aims were met. Main conclusions from my work are given in the sections below.

8.2. Origin of coastal placer deposits of southern Vietnam

Geochemical and geochronological data presented in Chapter 4 showed that Placer sands along the coastal margins of central and southern Vietnam came from river catchments that contain outcrops of Cretaceous magmatic rocks. Using detrital zircon geochronology it was possible to show that most of the sands came from these rocks and that significant longshore transport from either northern Vietnam or from the Mekong delta in the south did not take place. If either of these areas were sources the sands would contain large numbers of zircons with Proterozoic and Palaeozoic ages that typify the geology of these river catchment areas but the placer sands do not show this.

The geochemical data and petrological data showed Ilmenite was present in all of the main river outlets along the southern to central Vietnamese coastline but fresh unaltered grains were mainly in central region. Ilmenites showed increasing TiO_2 content from north to south and this was due to increased exposure to weathering during glacial sea-level lowstands. Increased enrichment in heavy minerals can therefore be related to cycles of deposition, weathering and erosion, and reburial associated with interstadial and interglacial sealevel changes weathering. This was caused by a widening of the shelf area to the south that would have increased the surface area of unconsolidated shelf sediments that were exposed to weathering. This discovery has solved an old problem in Vietnamese geology.

8.3. Cretaceous magmatism

Chapter 5 examined the distribution of Cretaceous magmatism along Southern to Central Vietnam using the detrital zircon ages from modern river sands to capture the range of ages. This was done because very little is known about the age and extent of magmatism. There are only two published studies and these report ages from only 13 granite samples. These ages suggested Cretaceous magmatism across the study region was active between 87-118 Ma. Using the river data to sample a wide area and many intrusions the crop out in the river catchments I found that ages ranged from 75-120 Ma although most ages fall between 85-105 Ma with greatest abundance around 100 Ma. Based on these results I can say that magmatism in the region was most active around 100 Ma and had ended by 75 Ma, which is nearly ten million years younger was known before. Based on the inherited ages I was also able to confirm that granite compositions of south Vietnam were the product of melted basement rock which rules out an alternative hypothesis that suggested mixing with subducted material (basalt + sediment). The inherited ages in Table 5.2 are broadly similar to the range of ages that characterise Cathaysia (Shu et al., 2011, record main age peaks at 1.9-1.8 Ga, 860-800 Ma and 450-400 Ma) suggesting the basement was once part of this block.

8.4. Cenozoic erosion history of central and southern Vietnam

AFT and AHe data presented in Chapter 6 showed that cooling rates and associated depths of erosion were sometimes highest closest to the coast where youngest ages were found and lower inland where older ages were found but this pattern was not seen everywhere. Data from an elevation profile of granite samples collected from west of Nha Trang recorded an exhumation rate of 0.05 mm/yr which is similar to modern to long-term erosion rates recorded in the Song Gianh drainage of northern Vietnam (Jonell et al., 2017). This might suggest that erosion rates remained constant for most of the Cenozoic, but when the dataset were modeled at the large-scale (chapter 7) results show uniform exhumation rates through time and space apart from a period of increased exhumation between 25-15 Ma that affected most of South Vietnam. This timing is significant as active rifting appears to have ended by 23 Ma and it is recorded in local marine basins by basin inversion and a regional unconformity at the Oligocene/Miocene boundary. This is mainly recorded by the AHe data, which is more sensitive to smaller magnitude change in exhumation. In the marine basins Oligocene sediments tend to be clay rich and fine grained but in the Miocene clastic sedimentation was coarser grained and thicker, especially in oil wells drilled close to the present-day coastline which supports uplift and increased erosion at that time. The cause of this change is not clear. Recent work by others has shown that the regional unconformity at 23 Ma overlaps with a change in regional stress field that allowed ocean spreading in the South China Sea to migrate westwards so this is a possible candidate to explain the change in rock uplift rate across southern Vietnam in the Miocene.

It is conceivable that regional changes in river drainage contributed to increased sedimentation seen in the offshore basins, expcially changes relating to the Mekong River. Recent work has argued that this river did not exist in its modern extent before 17 Ma (Niet et al., 2018) i.e. slightly later than the key changes in sedimentation seen in the offshore basins. However, it is interesting to note that these authors highlight the enhanced monsoonal precipitation in the middle Miocene as a driver for enhanced erosion. Hennig et al., (2018) report evidence, largely based on heavy mineral and detrital zircon data, that the Mekong was a local river sourced from within Indochina until circa 8 Ma, which is too late to explain basin wide increases in sedimentation. Based on current understanding I do not consider drainage re-organisation can explain the increases in sand sedimentation discussed in this study.

8.5. Further work

Work in Chapter 4 was able to identify ilmenite sources regions and regional trends in weathering that can explain heavy mineral enrichment but the actual rock types that sourced the ilmenites have not been well established so further work is needed to pinpoint which types of rocks produced ilmenite in the first place. In addition no allowances were made to test for variations in zircon fertility, which may have caused some signals to appear more important. Likewise, hydraulic sorting effects were not evaluated. The Source Rock Density index of Garzanti and Andò (2007) can be used to detect and correct for hydraulic-controlled concentration of denser minerals in order to help identify the parent rock types. This work would require more detailed sampling of the individual river catchments for both petrology and geochronology.

Chapter 5 established the age range of Cretaceous magmatism is wider than previously thought. River samples show which catchments contain younger and older Cretaceous magmatism so these catchment areas should be targeted to find the associated rocks. There is need to study their geochemistry to understand the origin and setting that produced the widespread magmatism.

In Chapter 6 and 7 I found links between regional tectonics, onshore erosion and sedimentation in the offshore basins. The timing of change in exhumation rate is well defined but the cause is not so this needs further work. This can involve study of river networks to learn about how they adjusted to a change in rock uplift rate, which may help understand what drove the uplift.

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APPENDIX A

i) SAMPLE LOCATION DETAILS 3
River samples 3
Heavy mineral sands 4
Bedrock samples for thermochronometry 5
ii) RAW DATA FOR CHAPTER 4 7
a) Garnet EPMA Results 7
Sample 06-05-15-01 7
Sample 07-05-15-05 9
Sample 07-05-15-07 11
Sample 09-05-15-21 11
Sample 13-05-15-36 11
b) Ilmenite EMPA results 12
Sample 03-04-16-22 12
Sample 06-05-15-01 14
Sample 07-05-15-05 16
Sample 07-05-15-07 18
Sample 07-05-15-09 20
Sample 08-05-15-11 22
Sample 08-05-15-14 25
Sample 09-05-15-18 27
Sample 09-05-15-21 29
Sample 13-05-15-36 31
Sample 13-05-15-37 34
Sample 29-05-15-25 36
Sample 31-03-16-18 39
c) Qemscan results (mineral volume %) 41
d) River Zircon U-Pb Data 43
River A 43
River B 45
River C 47
River D 49
River E 51
River F 53
River G 56

River H 57
River I 58
River J 61
River K 63
River L 65
River M 67
River N 69
River O 71
River P 73
River Q 75
River R 78
River S 79
River T 81
River U 83
River V 85
River W 87
River X 89
River Y 91
d) Placer and coastal sands 93
Sample MB1 93
Sample MB2 96
Sample MB3 98
Sample MB4 100
Sample MB5 102
Sample MB6 104
Sample MB7 107
Sample Q1 109
SampleQ3 114
Sample Q4 116
Sample Q5 118
Sample Q6 120
Sample Q7 122
Sample Q8 124
Sample Q9 126
Sample Q10 128
Sample Q11 130
iii) GRANITE AGES FOR CHAPTER 5 133

i) SAMPLE LOCATION DETAILS

River samples

Prefix	Sample	River name	Latitude	Longitude
A	26-06-17-07	Song Hong	N20 17 19.06	E106 33 2.75
B	14-11-16-03	Song Ma	N19 47 22.87	E105 49 34.72
C	13-02-17-05	Song Lam	N18 40 29.97	E105 43 42.46
D	26-06-17-08	Song Gianh	N17 42 51.84	E106 26 40.34
E	12-03-17-04	Song Huong	N16 34 8.99	E107 37 29.98
F	06-05-15-01	Song Hoai	N15 52 35.4	E108 23 30.8
G	06-05-15-02	Tra Khuc	N15 08 05.9	E108 48 03.2
H	06-05-15-03	Song Ve	N15 02 27.0	E108 51 10.2
I	06-05-15-04	Bong Son	N14 24 41.4	E109 00 25.9
J	14-05-15-38	Song Cau	N13 28 06.3	E109 11 35.8
K	07-05-15-05	Da Rang	N13 03 37.0	E109 17 23.1
L	07-05-15-09	Song Cai	N12 16 05.3	E109 02 10.8
M	30-03-16-08	Kinh Dinh	N11 36 12.7	E108 55 40.0
N	31-03-16-09	Song Lu	N11 31 11.7	E108 55 19.2
O	31-03-16-13	Dai Hoa	N11 14 22.6	E108 43 37.3
P	31-03-16-16	Song Dong	N11 11 51.6	E108 32 42.7
Q	31-03-16-17	Song Cai- Hai Long	N10 58 20.7	E108 08 30.0
R	31-03-16-18	Ca Ti	N10 55 56.0	E108 04 34.5
S	01-04-16-19	Song Phan	N10 44 26.7	E107 52 28.1
T	01-04-16-20	Song Dinh	N10 41 12.9	E107 45 45.4
U	01-04-16-21	Long Huong	N10 29 40.8	E107 09 55.1
V	03-04-16-22	Sai Gon	N10 51 42.8	E106 51 01.7
W	26-06-17-06	Song Me Kong	N10 16 55.27	E106 6 51.63
X	14-11-16-02	Song Me Kong (S. LaoS)	N16 41 28.35	E104 46 7.87
Y	14-11-16-01	Song Me Kong (N. LaoS)	N19 58 16	E102 14 35

Heavy mineral sands

Prefix	Sample	Latitude	Longitude	High stand distance to coast (m)	Height a.s.l. (m)
MB1	08-05-15-11	N11 51 51.7	E109 11 08.8	Modern beach	13
MB2	08-05-15-17	N11 10 56.9	E108 41 50.9	Modern beach	15
MB3	13-05-15-36	N11 00 58.8	E108 21 20.9	Modern beach	11
MB4	13-05-15-35	N10 56 41.6	E108 16 14.0	Modern beach	12
MB5	09-05-15-18	N10 55 26.2	E108 06 54.2	Modern beach	7
MB6	09-05-15-19	N10 51 23.3	E108 02 56.0	Modern beach	10
MB7	09-05-15-25	N10 20 38.5	E107 05 48.2	Modern beach	1
Q1	07-05-15-07	N12 42 10.4	E109 23 58.2	262	23
Q2	07-05-15-08	N12 38 21.4	E109 24 40.6	194	30
Q3	13-05-15-37	N12 04 54.1	E109 10 51.7	1701	21
Q4	08-05-15-14	N11 24 54.8	E108 59 46.6	1210	48
Q5	Hong Thang KT.1364	N11 06 46.9	E108 28 10.8	2636	Mine borehole
Q6	Hong Thang KT.237	N11 05 18.0	E108 27 46.9	2263	Mine borehole
Q7	Hon Hong KT.252	N11 03 01.0	E108 25 15.1	1163	Mine borehole
Q8	Hon Rom LK17	N10 58 31.8	E108 19 49.6	1288	42
Q9	09-05-15-20	N10 42 21.7	E107 50 51.8	62	15
Q10	09-05-15-21	N10 37 07.8	E107 39 23.5	1310	42
Q11	09-05-15-23	N10 29 34.9	E107 27 38.2	283	21

Bedrock samples for thermochronometry

Sample	Lithology	Latitude	Longitude	Elevation (m)
12-03-15-01	granite	N12 51 47.7	E109 23 51.7	111
12-03-15-02	granite	N12 14 37.0	E109 15 47.4	69
12-03-15-03	granite	N12 39 03.5	E109 24 54.5	14
12-03-15-04	granite	N12 40 35.4	E109 08 13.6	60
13-03-15-05	granite	N12 10 04.1	E109 02 59.2	53
13-03-15-06	granite	N12 07 52.2	E109 00 57.8	141
13-03-15-07	granite	N12 06 45.1	E108 59 22.4	439
13-03-15-08	granite	N12 06 50.3	E108 58 38.0	836
13-03-15-09	granite	N12 07 37.5	E108 57 51.1	1187
13-03-15-10	granite	N12 07 12.5	E108 56 52.7	1474
13-03-15-11	granite	N12 12 08.4	E109 02 21.6	44
13-03-15-12	granite	N11 58 05.6	E109 06 41.6	40
13-03-15-13	granite	N11 59 03.1	E109 01 06.4	314
13-03-15-14	granite	N11 58 12.0	E109 00 04.8	598
14-03-15-15	granite	N12 10 05.1	E109 11 30.9	3
14-03-15-16	granite	N12 13 52.1	E108 47 33.3	245
14-03-15-17	granite	N12 14 02.7	E108 46 22.9	615
14-03-15-18	granite	N12 11 41.0	E108 43 54.0	1098
14-03-15-19	granite	N12 07 43.3	E108 37 12.6	1638
14-03-15-20	granite	N12 07 59.4	E108 35 56.9	1524
14-03-15-21	granite	N11 56 29.9	E108 29 09.9	1608
14-03-15-22	granite	N11 56 10.6	E108 24 22.9	1586
14-03-15-23	granite	N11 59 21.0	E108 12 06.0	1489
14-03-15-24	granite	N12 10 34.2	E108 22 44.3	1369
14-03-15-25	granite	N12 06 09.7	E108 22 39.1	1788
15-03-15-26	granite	N11 55 53.5	E108 21 33.9	1250
15-03-15-27	granite	N11 54 14.5	E108 18 19.8	1201
15-03-15-28	granite	N11 54 26.6	E108 14 04.5	980
15-03-15-29	granite	N11 55 29.8	E108 10 24.4	1226
15-03-15-30	granite	N12 15 44.7	E108 05 30.0	565
15-03-15-31	granite	N12 27 27.6	E108 12 59.2	532
16-03-15-32	granite	N16 08 38.6	E108 08 09.7	80
16-03-15-33	granite	N16 11 23.8	E108 07 52.0	457
07-05-15-06a	mafic	N13 03 37.0	E109 17 23.1	9
07-05-15-06b	mafic	N13 03 37.0	E109 17 23.1	9
08-05-15-10	granite	N11 49 14.8	E109 08 43.0	10
08-05-15-12	granite	N11 45 07.6	E109 12 49.5	141
08-05-15-13	granite	N11 28 36.0	E108 56 55.9	69
08-05-15-15	granite	N11 21 31.0	E109 00 04.8	67
08-05-15-16	granite	N11 20 01.1	E108 51 42.5	22
09-05-15-22	granite	N10 30 03.6	E107 30 27.2	9

Sample	Lithology	Latitude	Longitude	Elevation (m)
09-05-15-24	granite	N10 22 51.6	E107 15 09.8	20
11-05-15-26	granite	N10 51 27.2	E107 36 03.3	93
11-05-15-27	granite	N10 58 25.0	E107 37 36.6	148
11-05-15-28	granite	N11 17 27.4	E107 39 01.0	229
11-05-15-29	granite	N11 24 59.7	E107 35 08.7	193
11-05-15-30	granite	N11 43 19.5	E107 43 32.3	1016
12-05-15-31	granite	N11 49 14.8	E107 58 54.0	752
13-05-15-32	granite	N11 25 02.7	E108 05 08.3	1019
13-05-15-33	granite	N11 17 41.2	E108 06 00.2	589
13-05-15-34	granite	N11 09 46.2	E108 08 50.2	66
18-06-15-10	granite	N12 54 33.1	E109 26 33.9	22
18-06-15-11	granite	N12 54 55.3	E109 26 41.8	28
18-06-15-12	granite	N12 54 44.1	E109 27 02.7	72
19-06-15-13	granite	N11 48 42.1	E109 09 53.0	88
19-06-15-14	granite	N11 47 45.9	E109 10 40.1	35
30-03-16-02	granite	N11 52 16.6	E109 04 31.9	57
30-03-16-03	granite	N11 50 50.9	E108 57 37.5	186
30-03-16-04	granite	N11 49 17.3	E108 42 31.0	158
30-03-16-06	granite	N11 50 28.0	E108 39 31.8	866
31-03-16-11	granite	N11 29 19.5	E108 47 48.8	81
31-03-16-12	granite	N11 23 24.4	E108 53 53.8	35
31-03-16-14	granite	N11 17 06.5	E108 39 11.0	72
31-03-16-15	granite	N11 23 02.4	E108 38 49.9	174

ii) RAW DATA FOR CHAPTER 4

a) Garnet EPMA Results

Sample 06-05-15-01

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.04	0.06	24.27	36.61	0.03	22.94	0.11	0.09	0.65	10.58	95.4
0.02	0.08	26.02	37.39	-0.04	23.79	0.23	0.15	0.04	7.92	95.6
0.04	0.02	24.69	38.33	0.03	23.54	-0.02	-0.12	0.08	10.58	97.17
0.07	-0.02	25.26	38.31	0.01	23.67	0.04	0.06	0.12	9.78	97.3
0	0.04	26.89	38.26	-0.08	23.5	0.28	0.06	0.2	8.32	97.46
-0.01	0.07	25.02	38.44	0.01	22.3	0.19	-0.09	1.71	10.06	97.69
0.01	0.06	22.56	38.04	0.06	23.05	-0.08	-0.08	0.15	14.01	97.78
0.04	0.11	22.9	38.08	0.04	23.99	0.21	0.17	0.25	12.3	98.09
-0.04	-0.08	24.01	38.49	0.02	23.56	0.01	-0.22	0.2	12.25	98.21
0.06	0.06	23.31	38.66	0.13	23.35	0.21	0.09	0.28	12.47	98.59
-0.02	0.08	23.27	38.68	-0.01	23.18	0.12	0.02	0.76	12.54	98.63
0.02	-0.03	24.98	38.68	0.03	23.66	-0.02	-0.11	0.4	11.2	98.82
0.02	0	24.05	38.56	0.11	24.14	0.1	0.1	0.08	12.03	99.19
-0.04	0.01	28.19	39.5	0.03	24.29	0.14	0.03	-0.05	7.25	99.34
0.1	5.18	21.23	38.1	0.06	1.44	0.24	-0.05	2.49	30.57	99.35
0.08	-0.04	23.22	38.72	0.11	23.75	0.46	0.26	0.46	12.36	99.39
-0.06	5.48	21.33	38.08	0.05	2.38	-0.05	-0.07	1.74	30.7	99.59
0.04	-0.01	23.67	39.19	0.05	24.06	0.07	0.14	0.09	12.32	99.64
-0.01	0.1	12.93	62.01	-0.01	15.06	0.1	-0.03	0.24	9.32	99.71
-0.03	-0.1	23.28	38.87	0.05	24.03	0.04	0.29	0.15	13.2	99.78
0.24	-0.01	26.65	39.88	0	24.44	0.07	-0.07	0.12	8.52	99.83
-0.01	-0.02	22.38	38.22	0.1	24.07	0.19	0.09	0.06	14.78	99.86
0.04	5.24	21.8	38.33	0.01	4.83	-0.11	-0.06	0.97	28.89	99.94
-0.01	-0.03	22.35	38.99	0.07	24.52	-0.01	-0.24	0.15	14.26	100.06
0.05	0.08	20.8	39.07	-0.09	23.55	0.21	0.12	0.13	16.25	100.16
0.04	3.43	21.22	38.79	0.02	11.92	0.2	-0.18	3.21	21.57	100.23
0.04	4.42	21.29	38.53	0.04	1.3	-0.15	-0.16	1.86	33.09	100.26
0.03	3.17	21.21	37.59	0.01	3.41	-0.05	-0.11	6.72	28.28	100.26
0.01	3.69	21.08	37.64	-0.01	1.61	0.05	0.05	2.78	33.38	100.29
0.03	-0.01	23.82	39.09	0.06	24.11	0.18	0.89	0.17	12.05	100.38
0.02	0.07	25.66	39.79	-0.08	24.45	-0.01	0.02	0.13	10.6	100.63
-0.01	0.1	27.65	39.71	0.01	25.2	-0.12	-0.02	0.2	8.03	100.74
-0.04	0.06	28.2	40.45	0.09	24.84	0.03	0.11	0.19	7.03	100.96
-0.03	4.67	21.52	37.52	0.02	3.06	0.05	0.07	4.76	29.45	101.1
0.01	0.06	25.39	39.94	0	24.43	-0.08	-0.03	0.28	11.13	101.12
0.01	4.44	21.53	37.97	-0.04	1.89	0.12	0.08	1.25	33.98	101.22
0.02	7.6	22.09	38.95	0.02	2	0.16	0.06	1.64	28.71	101.25
0.07	-0.01	25.68	39.95	-0.01	24.77	0.09	0.02	0.25	10.66	101.46
-0.01	3.28	21.55	38.45	0.06	3.11	0.05	-0.08	1.2	33.97	101.59
0.01	0.06	26.92	39.66	0.03	24.11	0.2	0.23	0.32	10.22	101.76
0.07	0.88	20.41	39.84	0.05	33.18	0.62	0.06	0.45	6.2	101.77
-0.03	3.95	21.48	38.76	-0.12	6.55	-0.08	-0.17	6.47	25.04	101.85

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.06	5.63	22.13	38.72	-0.07	2.75	0.07	0.15	4.84	27.73	101.88
-0.07	4.27	21.7	38.32	0.01	1.96	-0.07	-0.1	5.3	30.57	101.9
0.12	3.67	21.52	38.63	-0.08	2.74	0.04	-0.18	2.09	33.39	101.94
-0.04	6.34	22.03	38.71	-0.02	1.83	0.03	0.04	4.03	29.07	102.03
0.06	3.4	21.52	37.95	-0.08	0.66	0.11	0.02	3.19	35.33	102.14
-0.03	3.31	22	37.82	0.03	1.11	0.09	0.11	4.25	33.51	102.19
-0.06	7	22.1	39.23	0.02	1.24	0.03	0.07	1.32	31.26	102.21
-0.01	4.08	21.77	38.28	0.1	1.62	0.07	0.14	2.64	33.53	102.22
-0.05	5.19	22.19	38.65	-0.05	1.19	0	-0.1	1.24	34	102.25
-0.06	3.91	22.16	38.11	0.01	1.14	-0.06	0.01	1.64	35.4	102.26
0.13	3.26	21.69	38.22	0.06	2.73	-0.02	-0.03	1.99	34.36	102.38
-0.01	4.15	21.54	38.72	0.02	2.11	0.17	0.05	4.1	31.54	102.39
-0.04	7.24	22.16	39.16	-0.04	1.3	0.03	0.22	0.96	31.43	102.41
0.01	5.81	22.19	39.28	-0.07	1.15	-0.02	0.05	1.41	32.62	102.42
-0.02	4.05	21.12	38.34	0.02	6.58	1.13	-0.13	2.96	28.42	102.47
0.07	3.94	21.82	37.8	0.02	1.78	0.3	-0.03	3.49	33.31	102.49
-0.1	3.98	22.28	37.94	-0.08	1.31	-0.16	0.04	2.14	35.14	102.5
0	3.33	21.67	38.13	0.02	1.61	0.04	0	1.4	36.31	102.51
0.09	4.77	21.9	38.6	0.07	1.83	0.06	0.13	3.12	31.94	102.53
-0.06	7.11	22.25	39.24	-0.02	1.37	0.04	0.01	1.53	31.13	102.59
0.06	3.06	21.66	38.07	0.1	1.19	0.17	0.04	4.63	33.62	102.59
-0.04	4.06	21.48	38.22	0.03	1.6	0.18	0.14	4.69	32.23	102.6
0	8.1	22.57	39.21	0.08	1.39	0.17	0.02	3.07	28.02	102.62
0.03	5.45	21.68	38.75	0.01	6.61	0.01	0.11	1.96	28.07	102.68
0.03	3.39	20.94	38.38	0.02	1.39	0.1	-0.04	2.9	35.7	102.82
0.05	9.77	22.7	40.06	-0.03	1.54	0.18	0.09	1.49	27	102.86
-0.02	2.53	21.88	38.59	-0.03	8.25	0.13	0.08	0.52	30.95	102.87
0.04	5.69	22.43	39.02	0.01	1.97	-0.03	-0.01	1.36	32.41	102.88
0.05	1.76	21.3	38.55	0.02	7.71	0.14	0	3.05	30.36	102.96
0.09	4.32	21.44	38.53	0.01	1.04	0.11	0.1	3.94	33.39	102.98
-0.11	5.58	22.01	39.31	-0.01	3.84	0.19	-0.18	2.35	30.06	103.04
0.01	7.99	22.19	39.79	0.06	2.76	0.08	0.12	2.42	27.78	103.2
0.01	3.37	21.52	38.69	0.02	5.55	0.12	-0.16	2.91	31.22	103.25
-0.01	6.65	22.31	39.93	0.02	1.03	-0.16	0.2	1.09	32.43	103.49
-0.01	3.42	22	38.75	0	1.82	0.12	0.12	4.07	33.22	103.51
-0.01	7.18	22.28	39.64	0.03	1.61	-0.19	0	1.08	31.9	103.51
0.07	0.45	19.55	40.45	0.01	36.82	0.67	0.05	0.15	5.37	103.6
-0.02	2.27	21.85	38.83	-0.15	9.51	-0.11	0.24	4.19	27.13	103.72
0.1	3.43	22.14	38.07	0.05	0.97	0.15	-0.01	3.53	35.41	103.85
0.07	4.5	21.92	39.65	-0.06	3.46	-0.09	0.05	2.32	32.04	103.85
-0.03	3.21	21.47	39.26	0.09	2.92	0.17	-0.01	1.41	35.51	104
0.02	3.54	21.74	38.71	-0.04	1.68	0.02	0.03	7.84	30.49	104.03
-0.07	7.73	22.81	40.62	-0.01	1.36	-0.09	-0.22	1.05	30.95	104.14
0.07	3.35	21.51	39.33	0.01	5.79	0.16	-0.09	0.91	33.27	104.31
0	6.52	22.43	39.62	0.06	0.98	0.25	-0.01	1.3	33.2	104.33
-0.06	6.49	22.63	39.91	-0.01	1.36	-0.02	0.24	1.12	32.68	104.34
-0.06	3.84	22.23	39.41	-0.02	6.68	-0.03	-0.06	1.72	30.79	104.5

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.05	5.17	22.62	39.88	0.03	1.61	-0.03	0.03	1.84	33.33	104.53
0.03	4.37	22.46	39.46	0	5.61	0.16	-0.26	1.6	31.11	104.54
0.06	7.87	22.58	40.44	0.05	2.09	-0.06	0.13	1.57	29.88	104.62
-0.05	5.32	22.44	40.01	0.07	3.28	0.03	0.19	2.3	31.07	104.67
-0.06	7.77	23.16	40.43	0.02	3.31	0.4	-0.22	0.49	29.59	104.89
0.09	2.83	21.89	38.43	0.06	1.82	0.23	0.11	9.31	30.23	104.98
0.01	6.72	22.64	39.57	-0.04	2.7	0.24	-0.14	6.74	26.58	105.02
0.06	2.86	21.03	42.65	0.03	8.99	0.09	0.16	3.1	26.06	105.02
0.02	6.82	22.89	40.17	-0.03	1.32	0.14	-0.06	0.85	33.41	105.53
-0.04	6.49	22.52	39.92	0.07	2.02	-0.11	-0.02	7.59	27.16	105.6
-0.05	6.63	22.15	39.83	-0.05	1.67	0.14	0	5.51	29.77	105.6

Sample 07-05-15-05

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.04	-0.14	22.16	37.05	0.08	22.86	0.27	0.1	0.25	13.34	96.01
0.09	-0.09	23.1	36.97	-0.05	23.27	0.17	0.12	0.27	12.39	96.23
-0.02	-0.04	18.68	37.7	-0.02	23.06	0.23	-0.01	-0.08	17.05	96.54
-0.06	0.01	21.96	37.4	0	23.29	0.18	-0.29	0.05	14.08	96.62
0.03	-0.05	22.12	37.18	0.02	23.6	0.36	0.14	-0.09	13.36	96.67
-0.02	-0.06	22.91	37.62	0.03	22.79	0.04	0.04	0.98	12.44	96.75
-0.01	0.03	21.72	37.8	0.04	23	0.07	-0.18	0.28	14.07	96.83
0.02	0.06	23.44	38.09	0.08	23.7	0.32	-0.05	0.15	11.06	96.87
0.02	-0.01	22.57	38.09	-0.08	23.33	0.32	0.21	0.17	12.34	96.95
0.03	-0.08	22.58	37.96	-0.01	23.39	0.05	0.07	0.24	12.74	96.96
-0.06	-0.01	23.14	38.19	-0.01	23	0.28	0.56	-0.12	12.01	96.97
0.01	0	24.77	38.56	0.06	23.73	-0.09	-0.09	0.26	9.84	97.06
0.03	0.07	23.26	38.1	-0.02	23.58	0.1	0.02	0.24	11.78	97.16
0.79	4.81	19.58	35.82	0.06	3.14	0.04	-0.05	1	32.01	97.19
0.08	0.13	23.67	37.74	-0.1	22.37	0.28	0.37	0.26	12.46	97.26
0.07	0.06	22.44	37.8	0.01	23.54	0	0.08	0.14	13.22	97.36
0	0.08	21.85	37.91	0.01	23.66	-0.18	-0.03	0.19	13.93	97.41
0	0.16	22.09	38.27	0	23.41	0.09	-0.01	0.24	13.27	97.52
0.03	-0.17	22.29	38.23	-0.06	23.57	-0.04	0.17	0.25	13.33	97.6
0.01	-0.01	22.86	38.4	0.09	23.56	0	0.05	0.45	12.26	97.68
0	0.26	20.59	38.46	-0.02	22.89	0.2	-0.01	0.3	15.05	97.71
0.06	0.01	24.02	37.81	-0.05	23.25	0.32	0.13	0.43	11.75	97.73
0.04	0.02	24.05	38.28	0	22.5	0.16	-0.16	0.91	11.99	97.79
-0.05	-0.01	23.43	37.98	-0.01	23.96	0.19	-0.09	0.05	12.44	97.89
0.03	-0.01	22.34	38.5	0.03	23.9	0.04	-0.3	-0.02	13.46	97.98
-0.05	-0.02	24.22	38.35	0.01	23.96	-0.09	0.08	0.18	11.36	98.01
0	-0.03	22.3	38.27	0.03	23.29	0.49	0.11	0.27	13.51	98.23
-0.02	0.03	22.01	38.54	0	23.92	0.57	0.11	0.29	12.79	98.24
-0.01	-0.05	25.15	37.97	0.09	23.42	0.31	0.16	0.32	10.93	98.29
-0.01	0.04	22.7	37.84	0.07	23.55	0.57	0.12	0.14	13.28	98.3
0	0.07	22.07	38.31	0.01	23.94	-0.13	-0.07	0.25	13.88	98.33
-0.08	0.01	24.21	38.63	0.08	23.66	0.21	-0.02	0.18	11.47	98.35

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.02	0.01	22.08	38.64	0.04	23.48	-0.14	-0.04	0.1	14.21	98.35
-0.05	-0.01	26.94	37.87	-0.13	23.63	-0.03	0.04	1.05	9.08	98.39
0.04	0.27	22.89	38.94	0.02	22.72	0.36	0.06	0.35	12.77	98.41
-0.06	0.03	22.85	38.28	-0.01	23.67	0.16	0.04	0.47	13.01	98.44
-0.03	-0.01	23.76	38.4	-0.03	23.91	0.64	0.11	0.09	11.63	98.47
-0.06	0.29	25.22	39.01	0.08	24.33	0.05	-0.34	0.22	9.83	98.64
0.08	6.68	21.43	38.3	-0.06	2.76	0.04	-0.29	0.78	28.99	98.7
0.07	-0.04	23.52	38.15	0.09	23.89	0.52	0.05	0.09	12.41	98.74
0	-0.02	19.88	38.58	0.08	23.09	0.21	-0.09	0.55	16.53	98.81
-0.02	0.02	24.86	38.62	0.03	23.79	0.09	0.18	0.06	11.19	98.83
0.02	0.06	25.86	38.66	0.04	24.32	0.18	0.1	0.07	9.67	98.98
-0.07	0.04	23.97	38.33	0.01	24.42	0.2	0.01	0.12	11.96	98.99
0	0.1	25.61	38.73	0.06	23.93	0.23	-0.03	-0.01	10.38	98.99
0.02	0.08	22.74	38.21	0.06	23.43	0.22	0.08	0.21	13.96	99.02
0.01	0.02	18.85	38.32	0.06	23.22	0.59	-0.06	0.27	17.8	99.07
-0.04	0.13	24.66	39.09	0.01	23.76	0.09	0.26	0.3	10.86	99.11
0.08	0.05	21.98	38.45	0.01	23.75	0.3	0.01	-0.01	14.53	99.14
-0.02	0.14	24.76	38.93	0.11	23.3	0.19	0.02	0.1	11.72	99.23
0.04	0	23.07	38.7	0.02	23.84	0.29	0.31	0.18	12.9	99.36
0.02	-0.07	21.61	38.98	-0.04	23.2	0.04	0.05	0.13	15.45	99.37
0.11	0	23.53	38.43	-0.12	23.73	0.02	0.21	0.29	13.22	99.43
0.03	0.26	23.43	38.68	-0.02	24.1	0.05	0.01	0.33	12.7	99.58
0	0.11	26.59	39.04	0.04	23.89	-0.13	-0.03	0.62	9.57	99.71
0	8.75	21.76	38.54	-0.05	1.26	0.06	-0.02	0.96	28.48	99.74
-0.03	0.08	23.07	39.55	0.09	23.78	0.31	-0.11	0.25	13.08	100.08
-0.03	0.07	21.85	39.19	-0.12	24.01	0.28	-0.14	0.29	14.72	100.13
0.01	0.07	22.67	39.01	0.01	23.58	0.71	-0.03	0.26	14.02	100.29
0.02	6.72	22.03	38.52	0.05	1.61	-0.08	-0.16	1.27	30.31	100.3
-0.03	0.01	24.2	39.77	0.01	23.41	-0.08	-0.11	0.29	12.85	100.32
-0.02	0.07	25.25	39.52	0.03	24.54	0.01	-0.02	0.38	10.69	100.45
0.02	0	18.02	39.6	0.1	36.86	-0.06	-0.02	0.03	5.98	100.53
-0.07	4.08	21.45	37.9	0.03	1.49	0.14	0.19	1.66	33.74	100.6
0.05	0.02	25.09	38.69	0.1	23.85	0.47	0.06	0.75	11.67	100.75
-0.04	8.09	22.26	38.98	0.01	1.37	0.07	0.03	0.53	29.59	100.89
-0.01	0.05	22.91	39.3	-0.02	23.84	0.13	0	0.27	14.57	101.03
0.08	-0.06	22.78	37.02	0.14	21.81	5.4	0.14	0.29	13.52	101.13
0.03	7.46	22.14	38.91	0.05	2.53	0.24	-0.16	0.83	29.43	101.45
-0.03	4.56	22.14	37.86	-0.13	1.83	0.2	0.1	1.02	33.9	101.46
0.02	10.13	22.6	39.74	-0.03	1.08	-0.01	0.19	0.41	27.51	101.64
0.05	5.77	22.23	38.35	0.06	1.41	0.04	-0.05	1.21	32.61	101.68
-0.02	7.24	22.31	39.51	0.02	1.31	0.03	0.1	1.12	30.07	101.7
-0.07	9.14	22.27	39.43	0.01	1.39	0.07	0.15	0.5	29.12	102
0.08	4.98	21.8	38.77	0.01	1.57	0.03	0.09	0.74	34.26	102.35
-0.03	11.19	22.83	40.63	-0.06	1.69	0.12	0.01	0.62	25.62	102.61
0.11	7.82	22.69	39.6	0.03	2.34	0.1	0	0.56	29.67	102.91
0.08	3.92	21.97	38.42	0.07	0.88	0.21	0.11	1.61	35.71	102.98
0.08	1.95	21.66	38	0	0.85	-0.03	0.03	9.02	31.81	103.37

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0	0.09	21.42	40.98	0	33.8	0.22	0.07	2.53	4.37	103.5
0	8.57	22.77	40.4	0.09	1.88	0.21	-0.09	1.68	28.27	103.79
0.02	6.1	22.13	38.78	0.11	1.33	0.16	0.15	1.5	33.61	103.89
0.17	5.52	22.34	39	0.01	2.82	-0.07	-0.06	1.23	33.02	103.99
0.14	1.01	21.08	37.37	-0.03	0.73	0.1	0.17	15.04	28.41	104.01
0.02	7.14	22.15	39.52	-0.1	1.23	0.01	0.22	0.78	33.19	104.14
0.06	8.57	22.85	40.22	0.01	1.98	0.03	0.08	0.86	29.55	104.2
0.07	4.19	22.23	38.6	-0.07	1.76	0.03	0.04	12.95	24.71	104.52
0.08	6.56	22.99	39.74	0	1.3	0.21	-0.03	0.52	33.79	105.16

Sample 07-05-15-07

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.03	0.03	26.14	39.15	0.03	23.96	-0.03	0.08	0.4	9.71	99.52
0.1	0	21.93	37.62	-0.01	23.15	0.44	0.15	0.05	12.94	96.36
-0.05	0.04	20.37	37.24	0.04	23.14	0.28	0.04	0.36	14.37	95.84
-0.06	-0.08	23.04	38.29	-0.1	23.5	0.32	0.18	0.36	12.63	98.09
0	0.02	24.37	38.23	-0.13	23.73	0.15	0.04	0.4	11.55	98.37
0.01	0.06	22.09	37.53	-0.02	23.2	-0.02	-0.07	-0.07	12.99	95.69
0.03	0.09	0.09	38.64	0.01	23.43	0.17	-0.06	0.4	10.91	98.4
0.01	0	23.4	38.02	-0.02	23.09	0.27	0.05	0.5	12.36	97.69
0.03	-0.03	21.59	37.94	0.03	23.32	0.4	-0.02	0.19	14.16	97.6
0.05	0.04	21.23	38.01	-0.01	23.72	0.26	0.02	0.15	14.04	97.49

Sample 09-05-15-21

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.06	0.04	23.48	36.41	0.04	22.21	0.59	-0.01	1.58	10.64	95.03
-0.08	0.01	19.1	36.98	-0.05	23.31	0.03	0.09	0.22	16.57	96.19
0.23	0.16	25.48	39.24	0.2	19.51	0.14	0.08	1.21	10.43	96.68
-0.01	0.03	23.77	37.9	-0.02	23.12	0.45	0.22	0.11	11.22	96.8
0.22	0.12	22.86	37.99	0.06	23.28	0.13	0.09	0.04	12.62	97.42
-0.06	-0.12	26.55	38.4	0	23.9	0.36	0.22	0.5	8.56	98.31
-0.01	0.07	24.87	38.96	-0.07	23.86	0.17	0.02	0.45	10.21	98.52
-0.04	0.11	24.75	38.43	0.05	24.04	-0.11	-0.08	0.11	11.39	98.66
0	0.34	18.89	38.11	-0.03	23.49	0.28	0.03	0.22	17.52	98.84
0.04	0	25.4	39.26	0.04	24.19	0.28	0.18	0.04	10.49	99.9
0.01	0.02	27.83	39.7	0.05	24.31	0.27	-0.15	0.18	8.12	100.33
-0.01	-0.01	27.25	39.79	0.03	24.38	0.16	0.26	-0.1	8.96	100.7
0.01	0.05	26.05	39.08	0.09	23.2	0.25	0.09	1.13	10.95	100.89
0.33	0.22	22.56	37.99	-0.17	25.62	0.1	0.03	0.71	16.75	104.12
0.18	0.26	23.9	38.02	-0.02	26.31	0.26	-0.13	0.39	15.29	104.47

Sample 13-05-15-36

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.06	-0.05	24.76	38.59	0.05	23.84	0.3	0.03	0.54	10.95	99.08
0.08	0.31	22.14	38.14	0.11	22.99	0.32	-0.19	0.17	13.28	97.34
-0.07	0.85	18.9	36.09	0.17	20.66	0.24	0.13	0.1	18.41	95.47
0.09	1.12	22.41	38.55	0.16	22.1	0.11	-0.3	0.24	13.81	98.29

0.01	5.15	21.56	38.17	-0.06	1.33	0.14	0.08	1.27	32.18	99.83

b) Ilmenite EMPA results

Sample 03-04-16-22

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.01	0.2	0.09	0.01	-0.06	0.17	53.1	0.08	2.16	45.37	101.13
0.1	0.25	0.1	0.01	0.04	0.12	51.09	0.23	2.63	46.66	101.24
0.06	0.17	0	0.1	0.09	-0.04	47.66	0.13	4.02	50.03	102.19
0.06	0.13	0.37	0.1	0.04	0.15	52.47	0.02	1.55	43.04	97.93
0.04	0.07	0.14	0.01	0.07	0.13	58.11	0.22	4	35.63	98.4
0.03	0.18	-0.02	0.14	0.14	-0.08	52.39	0.21	4.25	43.15	100.4
0.09	0.09	0.14	0.04	0	-0.04	54.19	0.16	7.16	41.07	102.89
-0.07	0.16	0.04	0.18	0.09	0.09	55.21	-0.16	4.51	38.34	98.39
0.1	0.13	0.14	0.21	0.01	0.18	54.62	0.08	2.98	42.09	100.52
0.1	0.01	0.09	0.13	0.04	0.14	55.32	0.18	1.96	37.59	95.57
-0.06	0.15	1.4	0.24	0.08	0.1	62.43	0.91	0.98	31.07	97.3
0.18	0.13	0.11	0.06	-0.02	0.08	53.58	-0.04	2.4	44.09	100.58
0.17	0.11	0.17	0.16	-0.03	0.12	53.27	0.22	3.53	38.56	96.26
-0.04	-0.04	0.11	0.1	0.05	0.13	40.95	-0.07	3.93	35.29	80.4
-0.03	0.07	0.14	-0.18	0	0.13	51.43	0.36	2.33	41.72	95.98
-0.05	0.18	-0.06	0.14	0.09	0.02	54.99	0.13	3.5	44.97	103.91
0	0.16	0.1	0.12	-0.05	-0.01	53.75	0.12	3.36	41.32	98.86
0.12	-0.06	0.08	0.05	0	-0.03	54.17	0.43	4.76	43.51	103.02
-0.06	0.01	0.04	0.19	0.02	0.02	54.16	-0.02	2.49	46.64	103.48
0.04	0.11	0.15	0.09	0	0.18	58.87	0.35	3.56	34.69	98.05
0.08	0.02	0	0.1	0.03	-0.01	54.36	0.33	5.48	42.66	103.04
0.12	0.01	0.08	0	-0.04	0.04	55.21	0.2	5.49	43.01	104.12
0.03	0.53	11.41	0.07	0.06	0.02	51.01	0.31	1.21	41.51	106.16
-0.03	0.17	0.07	-0.08	0.01	-0.06	52.54	0.09	5.06	44.08	101.84
0.05	0.09	0.02	0.11	-0.07	0.11	55.54	0.08	4.19	42.13	102.25
0.07	0.07	0.07	-0.05	0	0.05	55.26	0	4.09	42.62	102.17
0.02	0.22	0.14	0.21	-0.01	0.06	55.9	0.16	1.56	40.9	99.17
0.02	0.09	-0.02	0.15	0.06	-0.01	54.42	0.12	2.89	46.87	104.58
-0.05	0.14	0.05	0.05	-0.03	0.01	53.67	0.23	1.41	49.23	104.7
0.08	0.19	0.11	0.15	-0.1	0.16	56.8	0.15	3.49	38.9	99.94
0.21	-0.02	0.22	0.23	0.06	0	53.93	0.11	2.06	46.61	103.41
-0.06	0.11	-0.02	0.03	-0.06	-0.02	55.11	0.1	1.01	48.28	104.49
0.01	0.13	0.27	0.32	-0.01	0.14	58.38	0.27	2.41	38.91	100.82
0.14	-0.04	0.21	0.01	0	0.05	53.27	0.04	2.2	49.29	105.18
0.02	0.17	0.09	-0.02	-0.11	0.03	55.01	0.01	4	42.16	101.34
-0.08	-0.11	0.17	-0.04	-0.04	0.07	49.14	0.1	2.34	51.07	102.63
0	0.05	0.19	0.06	0.01	0.09	60.64	0.35	2.19	34.36	97.93
0.04	0.12	0.2	0.06	0.02	0.01	56.4	0.17	4.11	44.07	105.19
0	0.21	0.09	-0.08	-0.12	0.03	52.3	0.12	1.91	48.17	102.62
0.1	0.07	0.04	0.1	-0.01	0	56.03	0.14	2.25	38.79	97.5
0.06	0.14	1.09	0.36	-0.05	0.15	62.6	0.21	1.84	29.02	95.42

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.04	0.07	2.71	0.28	0.01	0.26	53.93	0.26	3.23	41.53	102.32
0.01	0.05	0.33	0.22	0.05	0.11	63.86	0.08	3.5	34.91	103.13
0.1	0.59	-0.05	-0.07	0.03	0.14	58.11	0.03	1.1	43.59	103.56
0.02	0.05	-0.06	0.04	-0.01	0.04	54.4	0.03	4.07	46.64	105.22
0.07	0.18	0.14	0.24	0.06	0.02	56.85	0.03	2.92	39.46	99.97
0.08	0.14	0.11	0.25	0.03	0.18	59.76	0.07	3.01	35.54	99.19
0.03	0.23	0.19	0.12	0.05	0	53.8	0.19	1.96	41.08	97.65
0.18	0.05	0.07	0.12	0	0.07	54.42	0.13	3.58	41.45	100.08
0.01	0.19	-0.04	0.06	0.06	-0.04	54.69	0.08	2.97	44.12	102.1
0.15	0.1	0.08	0.15	0.05	0.13	55.2	0.01	1.91	37.65	95.43
0.05	0.23	0.1	0.23	0.05	0.21	58.28	0.07	3.53	35.17	97.93
0.08	0.21	0.06	0.01	0.09	0.05	52.61	0.28	3.35	43.35	100.09
-0.12	0.43	-0.03	0.02	0.02	0.08	51.09	0.14	1.66	45.05	98.34
-0.06	0.17	0.45	0.44	0.02	0.28	61.35	0.27	2.29	33.49	98.69
0.04	0.02	0.04	0.03	-0.09	0.1	53.53	0.08	6.63	42.28	102.65
0.19	0.13	0.07	0.08	0.05	0.04	52.07	0.2	2.08	47.82	102.74
0.02	0.17	0.02	0.05	-0.05	-0.01	50.75	0.21	3.85	47.79	102.81
-0.02	0.1	-0.02	0.15	-0.05	-0.02	56.39	-0.26	2.32	37.71	96.3
0.03	0.24	-0.08	0	-0.03	-0.04	52.12	0.44	2.92	47.13	102.73
0.13	0.06	0.16	0.07	0.01	0.03	54.77	0.08	3.87	40.39	99.57
0.1	0.15	0.03	0.03	-0.04	0.01	53.36	0.21	4.14	43.96	101.95
0.03	0.36	0.18	-0.08	0.02	0.12	55.19	0.28	2.87	41.34	100.32
0.07	0.13	0.07	-0.01	0.03	0.16	50.45	0	2.33	49.61	102.84
0.04	0.17	0.04	0.14	0.05	0.09	54.96	0.32	2.94	41.05	99.79
0.17	-0.09	0.11	-0.01	0.07	0.03	50.2	0.03	5.57	46.87	102.95
0.04	0.19	0.23	0.17	0.04	0.07	60.59	0.33	2.7	31.92	96.29
0.04	0.27	0.26	0	-0.04	0.1	50.72	0.05	3.32	48.46	103.16
0.02	0.2	-0.02	-0.07	-0.04	-0.03	53.48	0.11	3.45	44.9	101.99
0	1.06	0.25	-0.21	0.05	0.12	56.45	0.26	0.9	44.09	102.96
0.04	0.1	0.13	0.12	0.07	-0.03	53.72	0.17	4.43	40.25	99
-0.02	0.22	0.54	0.2	0.12	0.07	63.7	0.47	3.92	32.39	101.62
0.18	0.14	0.67	0.5	0	0.38	65.57	0.29	2.75	25.82	96.29
0.03	0.19	0.76	0.08	-0.03	0.22	57.21	0.43	3.42	36.5	98.8
0.04	0.13	-0.03	0.11	0.04	0	52.09	0	2.17	45.96	100.52
0.03	0.01	0.17	0.21	-0.05	-0.01	64.57	-0.09	1.99	34.43	101.26
0.05	0.26	-0.12	0.2	0.13	0.02	51.28	0	1.69	48.58	102.08
0.04	0.05	0.01	-0.11	0.05	0.09	54.06	0.11	2.42	46.85	103.57
0.12	0.28	0.12	0.17	0.05	0.18	57.7	0.14	1.09	37.87	97.71
-0.04	0.13	0.04	0.1	0.01	-0.01	50.92	-0.03	2.77	49.22	103.11
0.03	1.28	-0.08	0.08	0.01	-0.06	52.42	0.32	0.74	48.71	103.47
0.04	0.05	-0.01	0.02	-0.03	-0.06	51.48	0.14	4.04	48.05	103.72
-0.02	0.25	0.22	-0.03	0.02	0.09	55.56	-0.03	1.86	48.44	106.36
0.04	0.11	0.06	0.1	-0.04	-0.05	56.16	-0.13	1.52	47.62	105.38
-0.04	0.27	0.07	0.15	0.04	0.01	55.82	0.08	3.04	42.51	101.95
0.06	-0.05	0.14	0.07	0.04	-0.01	55.39	0.07	1.14	45.55	102.41
0.11	0.21	0.23	0.1	0.06	0.04	60.04	0.04	1.17	40.31	102.3
-0.05	0.47	0.08	0.18	0.06	0.04	58.81	0.23	1.35	41.34	102.51

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.03	0.08	0.04	-0.04	-0.03	0.04	51.5	-0.01	1.79	49.7	103.03
0.13	-0.05	-0.03	0.07	-0.03	0.08	52.95	-0.14	5.29	45.62	103.9
0.03	0.16	0.12	0.07	0.09	-0.08	49.51	-0.19	4.86	47.4	101.96
0.08	0.23	-0.01	0.05	0.07	0.06	51.5	0.09	3.35	46.6	102.01
-0.06	0.09	0.03	0.09	-0.11	-0.01	51.29	0.07	6.02	45.11	102.54
0.12	0.16	-0.1	-0.05	0	0.05	54.94	0	4.02	44.62	103.75
0.2	0.06	0.07	-0.01	-0.02	-0.04	52.91	0.23	10.49	40.68	104.58
0.09	0.31	0.22	0.04	0.07	-0.03	52.24	0.31	2.34	48.39	103.97
0.05	0.18	0.02	0.02	-0.06	0.15	54.59	0.23	2.67	45.88	103.73
0.02	0.02	0.15	0.23	0.03	0.06	60.63	0.18	1.34	35.55	98.23
-0.01	0.12	0.18	0.19	0.02	0.1	58.04	0	1.82	42.53	102.98
0.15	0.05	3.47	2.61	0.01	0.81	66.6	0.04	2.17	19.03	94.95
0.08	0.05	0.13	0.21	0.05	0.33	58.94	-0.11	3.86	32.58	96.13
0.08	-0.01	0.5	0.13	0	0.05	53.81	0.2	2.46	45.14	102.38

Sample 06-05-15-01

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.06	0.01	0.03	0.13	-0.01	0.02	50.33	0.19	12.35	37.71	100.83
0.07	0	0.16	0.02	-0.03	0.02	51.58	-0.08	2.99	44.92	99.64
0.06	0.09	0.23	0.05	-0.04	0.15	51.91	0.05	2.26	44.46	99.23
-0.06	0.13	0.01	0.22	0.1	0.3	49.38	-0.03	2.66	43.14	95.84
-0.1	0.06	0.04	0.25	-0.02	0.14	42.92	-0.1	3.73	44.25	91.17
-0.04	0.14	0.1	0.16	-0.1	0.12	45.84	-0.26	1.8	37.81	85.57
0.05	0.12	5.89	0.19	-0.03	0.22	40.49	0.05	1.34	32.2	80.5
-0.01	-0.11	0.06	0.09	-0.05	0.2	46.77	-0.06	2.82	39.15	88.87
0.03	0.09	0.16	0.07	-0.01	0.16	47.67	-0.05	2.32	39.27	89.71
0.06	0.02	0.33	0.02	0.02	0.09	47.86	-0.08	2.06	39.99	90.36
-0.06	0.18	0.13	-0.02	0.04	0.05	47.77	0.13	2.4	42.12	92.75
-0.03	-0.09	0.44	0.28	-0.06	0.12	46.12	-0.03	12.33	38.48	97.56
0.01	0.18	0.16	0.3	0.03	0.02	48.85	-0.03	2.84	40.36	92.69
0.1	0.1	0.21	0.06	0.03	0.15	50.74	0	2.45	44.03	97.87
0.02	0.19	0.47	0.19	-0.05	0.2	44.09	0.07	2.72	47.71	95.61
-0.14	0.1	0.18	-0.03	0.04	0	51.27	0.36	1.81	43.84	97.43
0.09	0.08	0.55	0.23	-0.01	0.07	49.37	-0.02	4.13	41.91	96.4
0.01	-0.07	0.34	0.1	0.02	0.12	51.87	0.03	2.7	43.39	98.5
0.09	0.25	0.01	0.16	-0.03	0.05	54.08	0.1	1.31	45.81	101.82
0.06	0.05	0.15	0.14	-0.08	0.1	54.2	-0.15	5.43	39.76	99.67
-0.02	0.12	0.14	0.09	0.08	-0.02	46.17	0.24	1.75	50.56	99.1
0.13	0.14	0.07	0.22	0.13	0.2	54.13	0	2.49	44.59	102.09
0.09	0.01	0.36	0.14	0.06	0.22	49.22	0.33	0.93	48.64	100
0.04	0.03	0.31	0.19	0.03	0.15	48.57	-0.29	4.26	46.73	100
0.03	0.06	0	0.19	-0.07	0.12	50.84	-0.02	2.9	46.96	101.02
-0.07	0.03	0.14	0.13	0.03	0.15	48.93	-0.07	2.04	47.91	99.21
0.07	0.17	0.12	0.13	-0.03	0.05	51.71	-0.02	4.22	42.11	98.53
0	0.01	0.19	-0.02	0.11	0.12	47.58	-0.05	3.46	47.2	98.59
-0.06	0.01	0.02	-0.14	-0.02	0.13	52.83	-0.1	1.55	44.85	99.07
0.04	0.08	0.34	0.19	0.03	0.06	52.33	0.01	4.99	38.13	96.21

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.06	0.02	0.04	0.08	-0.01	0.09	51.76	0.04	7.14	40.84	99.93
-0.04	0.08	-0.04	0.09	-0.09	0.07	52.57	-0.05	3.11	42.21	97.91
0.07	0.21	-0.04	0.02	0	0.08	52.4	-0.01	2.02	44.2	98.94
0	0.04	0.07	0.03	0.01	-0.04	47.41	0.03	0.57	47.52	95.63
0	0.21	0.25	0.23	-0.04	0.19	53.64	-0.14	4.65	38.67	97.66
0.16	0.07	0.44	0.21	0.05	0.07	51.98	-0.05	1.88	44.98	99.79
-0.02	-0.01	0.26	0.07	-0.03	0.07	51.6	-0.11	1.36	44.11	97.3
0.1	0.13	0.32	0.07	0.01	0.06	51.54	0.01	0.78	45.37	98.39
0.07	0.01	0.3	0.22	0.13	0.23	57.48	0.14	0.42	38.46	97.46
0.07	0.07	0.25	0.21	-0.08	0.16	51.11	0.14	6.4	40.65	98.98
0.09	0.11	0.15	0.03	-0.02	0.03	50.34	0.15	0.97	48.91	100.76
0.07	0.12	0.19	0.07	-0.09	0.02	51.45	0.14	0.84	48.48	101.3
-0.1	0.06	0.09	0.04	0.04	-0.01	52.68	0.04	3.36	44.01	100.22
0.02	0.03	1.01	27.5	0.06	25.55	45.01	0.16	0	1.01	100.33
0.11	0.08	0.12	-0.06	0.01	0.12	53.58	-0.03	3.74	42.25	99.91
-0.06	0.16	-0.06	0.12	0.04	0.02	49.26	0.12	1.25	46.9	97.76
0.1	0.07	-0.03	-0.02	-0.04	-0.01	52.62	0.16	12.98	35.17	101.01
0.04	0.08	0.58	0.56	0.05	0.97	55.13	-0.15	3.04	29.59	89.89
-0.01	0.17	0.23	0.08	0.01	0	49.44	-0.05	1.99	42.44	94.28
0.04	0.04	0.29	0.16	0.03	0.07	49.32	0.13	2.71	44.61	97.39
0.05	0.1	0.04	0.01	0.02	0.03	52.81	-0.22	1.4	44.81	99.04
0.17	0.03	0.32	0.18	0.09	-0.04	52.26	0.2	1.01	46.76	100.98
0.04	0.09	0.18	0.2	-0.01	0.17	56.62	0.03	0.51	37.5	95.32
0.05	0.17	0.22	-0.02	-0.1	0.16	53.28	0.27	2.83	44.15	101.02
0.07	-0.02	0.45	0.03	-0.03	0.13	51.83	-0.03	2.96	43.09	98.48
-0.03	0.04	0.17	0.07	-0.1	0	47.96	-0.05	1.74	49.59	99.38
0.03	0.16	0.28	0.22	-0.06	0.2	50.22	0.01	1.26	46.13	98.45
0.07	0.12	0.33	0.19	-0.05	0.1	73.44	-0.1	0.99	21.62	96.7
0.02	0.15	0.17	0.12	-0.01	0.02	51.04	0.06	2.35	46.56	100.48
0.06	-0.02	0.22	-0.02	-0.01	0.25	53.38	0.17	1.86	43.17	99.05
0.05	0.11	0.08	0	-0.05	0.05	52.56	0.01	1.83	43.69	98.33
0.02	0.09	0.1	0.13	-0.02	0.06	51.34	-0.04	2.67	44.9	99.24
0.02	-0.1	-0.01	0.1	-0.06	0.09	53.31	0.05	1.92	44.98	100.31
-0.08	0.12	0.25	0.13	-0.05	0.11	52.92	0.21	4.14	41.87	99.62
0.09	0.09	0.02	0.21	0.03	0.14	49.93	0.24	0.28	45.28	96.3
0.02	0.19	0.55	0.55	0	0.36	63.64	-0.04	3.7	28.62	97.58
0.05	0	0.12	0.06	-0.04	0.02	53.18	-0.05	1.63	48	102.98
0.12	-0.01	0.18	0.12	0.08	-0.04	54.41	-0.13	3.97	45.35	104.04
-0.01	0	0.1	0.05	-0.01	0.03	50.22	0.15	6.02	46.38	102.93
0.04	0.16	0.04	-0.01	0.06	-0.06	53.36	0.16	2.96	44.89	101.6
0.07	0.06	0.12	-0.1	0.08	-0.1	54.68	-0.1	4.68	40.53	99.94
0.26	-0.11	0.06	0.3	0.01	0.18	54.47	0.2	4.47	42.14	101.98
-0.03	0.06	0.01	-0.04	0.03	-0.06	50.41	-0.09	3.18	47.36	100.83
-0.15	0.14	-0.03	-0.08	0.02	0.04	47.88	0.49	1.16	49.66	99.14
-0.02	0.07	0.1	-0.01	-0.04	-0.01	53.22	0.03	0.9	46.36	100.61
-0.04	0.09	-0.01	0.15	0	0	53.58	0.05	2.18	43.92	99.93
0.01	0.17	1.43	1.4	0	0.1	48.45	-0.03	2.94	42.07	96.55

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.06	0.03	0.5	0.18	0.01	-0.04	47.41	0.17	3.86	39.59	91.77
-0.04	0.02	0.27	0.14	0.06	0.04	53.57	-0.06	1.57	45.58	101.15
-0.05	-0.04	0.35	0.07	0.01	0.06	54.25	0	4.11	42.03	100.8
-0.05	-0.05	0.01	0.04	0	0.09	51.59	-0.07	2	46.16	99.71
-0.09	-0.06	0.17	0.09	0.01	0.03	49.28	-0.03	1.88	49.65	100.94
-0.1	0.17	0.04	0.02	-0.01	-0.04	53.77	0.03	6.93	41.21	102.03
-0.03	0.01	0.45	0.24	-0.03	0.33	56.15	-0.15	5.51	37.49	99.99
0.07	0.15	0.03	0.06	0.06	-0.09	48.42	-0.01	3.37	48.58	100.62
-0.11	0.14	0.04	0.25	0.04	0.04	55	0.05	2.92	42.98	101.34
0.13	0.07	-0.05	0.03	-0.06	-0.06	52.64	-0.13	3.47	44.36	100.4
0.06	0.15	-0.09	0.02	-0.01	0.07	50.68	0.02	2.35	49.16	102.42
-0.03	-0.03	0.03	0.02	-0.06	-0.07	51.86	-0.03	2.77	46.65	101.11
-0.08	0.12	0.31	0.29	-0.04	0.01	47.92	-0.03	2.82	47.24	98.57
-0.02	0.03	0.39	0.63	0.01	0.28	53.26	0.08	3.07	40.38	98.1
-0.02	0.01	0.01	-0.16	0.03	-0.01	54.14	0.01	3.77	44.05	101.84
0.02	0.2	-0.06	0.05	0	-0.05	53.02	-0.18	1.37	44.59	98.96
-0.03	-0.02	0.08	0.06	-0.02	-0.11	48.79	-0.16	1.62	48.8	99.03
0	0.01	-0.05	-0.05	-0.02	-0.08	48.27	0.08	3.57	47.42	99.16
0.09	-0.03	-0.01	0.01	0.02	0.04	57.6	0.27	0.17	39.61	97.78
0.08	0.22	0.3	-0.04	0.09	0.12	57.7	0.11	2.07	33.51	94.16
0.01	0.06	0.11	0.12	-0.16	0.09	50.66	0.11	1.09	49.93	102.02
0.05	0	-0.01	-0.07	-0.07	-0.01	50.57	-0.05	1.68	48.89	100.98
0.08	0.02	0.01	0.01	-0.01	0.07	53.72	-0.11	4.31	45.39	103.49

Sample 07-05-15-05

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.03	-0.01	0.16	0.06	-0.01	0.04	51.11	-0.1	2.12	44.77	98.17
-0.04	0.03	0.04	0.14	-0.04	0.03	46.88	0.06	4.8	44.87	96.76
-0.06	0.08	0.01	0.16	0.04	0.05	52.85	0.27	3.03	41.89	98.32
0.12	-0.14	0.05	-0.03	0.06	-0.03	52.45	0.21	6.75	39.45	98.88
0.11	0	0.24	0.08	0.02	0.05	48.66	-0.07	8.13	40.09	97.31
-0.05	0.11	0.03	-0.1	0.08	-0.02	51	0.2	1.55	45.18	97.99
0.17	-0.05	0.05	-0.02	0.02	-0.03	48.24	0.04	1.8	48.06	98.27
0.02	-0.02	0.04	0.12	0.01	0.15	52.18	0.13	2.76	43.55	98.94
-0.02	0.07	0.1	0.02	-0.02	-0.09	51.51	-0.39	2.04	43.79	97.01
-0.06	0.11	0.02	-0.03	0.03	0.13	46.99	0.1	2.5	47.62	97.4
-0.01	0	0.03	0.06	0.01	-0.06	48.92	0.03	3.83	44.07	96.87
0.08	0.04	0.31	0.06	-0.01	0.19	44.91	-0.15	12.88	38.97	97.28
0.03	0.32	0.35	0.18	-0.01	0.02	50.69	-0.02	0.54	31.87	83.97
0.23	-0.06	0.01	0.05	0	0.05	50.2	-0.11	16.33	31.2	97.91
0.03	0.08	-0.06	-0.04	-0.03	0.09	48.39	-0.02	13.94	35.8	98.2
0.05	0.15	-0.02	0.06	-0.01	-0.08	50.9	-0.07	1.78	46.94	99.69
-0.04	0	-0.01	0.02	0.03	-0.02	52.87	0.13	2.54	44.97	100.49
0.12	-0.04	-0.04	0.14	0.01	-0.06	48.8	-0.14	10.64	38.15	97.57
-0.1	0.18	-0.01	0.21	0.02	0.11	52.14	-0.04	1.17	45.72	99.39
0.03	0.17	0.09	0.1	-0.02	0.07	54.8	0.17	0.97	35.84	92.23
0.08	0.07	0.09	0.15	0.09	0.05	59.87	0.03	2.44	35.27	98.14

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.05	-0.18	-0.06	-0.01	-0.02	-0.04	54.1	0.18	2.95	42.07	99.05
-0.04	0.24	0.02	0.11	0.01	-0.05	48.71	0.13	1.71	47.16	97.99
0.15	0.05	2.53	0.85	0.02	0.18	51.47	0.2	5.72	30.9	92.05
0.14	0.17	0.09	-0.13	0.11	0.1	53.17	0.15	1.53	45.1	100.44
-0.03	0.11	0.04	0.03	0.03	-0.02	52.35	0.04	3.07	43.78	99.4
-0.02	0.09	0.06	-0.03	-0.13	0.07	53.41	0.03	2.38	43.99	99.86
0.07	-0.01	0.01	0.04	0	0.06	45.21	-0.19	4.57	47.43	97.2
0.18	0.15	0.26	0.14	0.06	0.07	51.23	-0.19	2.68	42.61	97.19
0	0.18	0.06	0.14	-0.03	-0.11	54.41	0.15	2.53	42.48	99.81
0.02	0.15	0.05	-0.04	0.02	-0.11	51.78	0.16	1.9	44.51	98.44
0.06	0.13	0.2	0.1	-0.03	0.05	47.12	-0.05	6.12	44.36	98.06
0	0.06	0.06	-0.07	0.03	-0.09	47.64	0.01	4.95	45.63	98.23
-0.09	0.16	0	-0.02	-0.02	0.06	53.55	-0.08	0.94	45.49	99.97
0.03	0.61	0.14	-0.05	-0.01	-0.08	55.86	0.19	1.42	42.07	100.18
-0.15	0.26	0	0.25	0.02	0.1	54.91	-0.15	2.3	45.79	103.33
0.01	0.12	-0.09	-0.05	0.08	0.16	49	0.04	6.17	45.91	101.34
0.12	-0.08	0.1	0.09	-0.1	0.02	54.14	-0.13	6.3	41.59	102.05
0	0.05	0.04	-0.12	0.03	0.08	48.24	0.36	4.06	47.41	100.17
0.03	-0.06	1.68	2.29	0.53	0.06	59.45	0.06	4.25	32.38	100.64
-0.01	0.1	0.03	-0.03	0	0.04	51.05	-0.07	2.19	47.14	100.46
0.03	0.01	0	0.2	0.09	0	48.15	-0.04	25.86	27.91	102.21
0.15	-0.05	0.1	0.12	0.07	-0.06	50.48	0.01	4.4	45.53	100.74
0.02	0.12	0.9	0.83	0.18	-0.01	54.16	0	6.13	36.34	98.65
-0.01	0.22	-0.02	0.14	-0.03	0.07	51.73	-0.1	1.24	44.89	98.13
-0.04	0.03	0.01	0.14	-0.02	0.01	51.74	-0.08	1.77	46.22	99.8
-0.01	1.05	0.1	-0.01	-0.05	0.09	50.97	0.07	0.31	46.8	99.33
0.03	0.22	-0.03	0.22	0.04	0.03	53.06	0.08	2.07	45.98	101.68
-0.19	0.08	0.02	0.04	0.01	0.01	52.38	0.03	3.56	43.86	99.82
0.03	0.07	0.04	0.07	0.01	0.03	51.58	-0.28	3.42	44.99	99.96
0.05	0.1	0.01	0.05	0.11	0	53.86	0.05	2.86	43.67	100.77
-0.02	0.01	0.22	0.22	-0.06	0.1	50.9	0.1	2.01	46.24	99.71
-0.06	-0.02	0.12	0.1	0.02	-0.04	47.63	-0.06	4.58	46.28	98.56
0.17	0.03	0.06	-0.04	0	-0.1	54.25	0.01	1.8	43.28	99.45
-0.03	0.1	0.02	0.08	0	0.06	52.61	-0.08	5.62	41.07	99.45
0.11	-0.14	0.09	1.39	0.03	1.4	53.46	0.02	7.93	36.66	100.95
-0.09	0.16	-0.13	0.02	0.01	0.01	52.89	0.45	0.96	44.14	98.42
0.03	0.06	0.16	0.15	-0.05	0.07	46.59	0.17	19.71	32.24	99.13
0.13	0.24	0.43	0.61	0.07	0.06	57.94	0.14	0.84	33.91	94.36
-0.03	0.1	0.04	0.17	-0.12	0	46.8	-0.09	7.47	42.51	96.86
-0.04	0.1	0.01	0.05	0.01	0.04	51.92	0.08	2.31	44.67	99.15
0	0.14	0.09	0.17	-0.08	0.07	53.73	-0.13	4.24	42.99	101.22
0	0.09	0.13	0.19	-0.03	0.02	44.51	-0.22	1.67	50.6	96.95
-0.01	-0.01	-0.17	0.07	0.13	0.07	53.2	-0.02	0.84	46.71	100.82
0.04	0.06	-0.03	-0.1	-0.02	0.07	50.95	-0.1	1.35	48.73	100.95
-0.05	0.29	0.07	0.07	0.07	-0.05	53.73	0.07	2.03	45.26	101.48
-0.03	0.22	-0.02	0.1	0.08	0	54.14	-0.15	6.12	41.39	101.85
-0.04	0.09	-0.12	0.11	-0.01	-0.03	54.53	0.27	1.29	45.63	101.72

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.08	-0.09	0.06	-0.03	-0.03	-0.05	54.27	0.01	6.36	42.24	102.83
-0.05	0.12	0.09	0.2	-0.03	0.01	53.8	0.15	2.98	44.43	101.7
-0.01	0.02	0.15	0	-0.04	0.05	51.62	0.17	2.41	46.99	101.37
-0.14	0.23	0.08	0.04	0.01	0.15	45.18	0.2	1.52	50.73	98
0.01	0.03	-0.11	0.3	0.04	0.11	54.83	0.26	1.48	44.05	101.01
0.08	0.06	1.87	1.25	0.08	0.14	50.97	-0.06	4.04	40.46	98.89
-0.02	0.27	0.11	0.03	-0.02	0.05	53.42	-0.09	0.64	47.08	101.47
0.02	0.1	0.09	-0.03	0.15	0.16	50.02	0.2	0.86	47.76	99.32
0.21	0.12	0.07	0.08	0.05	0.12	55.57	-0.01	2.96	36.09	95.27
0	0.01	0.06	0.06	0.1	0.03	47.2	0.04	12.56	39.77	99.84
0.02	0.13	0.15	-0.08	-0.1	0.06	50.71	-0.07	1.25	45.59	97.68
-0.07	0.08	0.08	-0.01	0.02	-0.01	51.86	-0.08	1.59	45.14	98.6
-0.08	0.13	-0.05	0.11	-0.03	-0.01	51.37	0.05	1.08	45.89	98.46
0.11	0	0.17	0.1	0.03	-0.08	50.28	-0.11	6.49	41.37	98.35
0	0.23	0.03	0.09	-0.01	0.02	51.76	-0.07	2.42	43.27	97.73
0.03	0.18	0.02	-0.1	-0.04	0.09	54.04	0.19	1.53	44.76	100.69
0.15	-0.05	0.12	0.02	0.03	0.06	53.91	0.24	3.31	41.29	99.09
-0.03	0.08	0.05	-0.09	-0.13	-0.11	52.42	-0.08	2.42	45.1	99.63
0.05	0.07	0.08	0.02	0.08	0.04	50.28	0.09	0.72	47.56	98.99
0.08	0.07	0.15	0.05	0.04	0.03	54.58	-0.25	2.97	45.22	102.93
0.17	0.09	-0.02	0.06	0.04	-0.05	54.74	0.28	1.77	44.95	102.05
0.01	0.09	-0.01	0.07	-0.03	0	53.45	0.12	1.2	48.14	103.05
0.01	0.01	0.05	0.13	0.09	0.07	52.37	-0.06	9.56	40.73	102.97
0.05	0.2	0.16	0.03	-0.05	-0.01	54.03	0.27	1.75	47	103.44
0.01	0.08	-0.03	-0.02	0.1	-0.06	49.41	0.22	3.12	48.6	101.41
0.27	0.06	-0.04	0	-0.04	0.12	55.97	-0.1	11.49	31.4	99.13
0.01	0.04	0.17	-0.01	0.06	0.17	57.28	-0.01	1.94	37.93	97.6
-0.05	-0.04	0.08	0.13	-0.05	0.05	48.36	0.31	3.34	47.53	99.66
0.07	0.03	-0.08	0	-0.08	0.03	52.68	-0.01	3.53	43.02	99.18
-0.04	-0.01	0.07	0.07	-0.03	0.05	55.26	0.22	0.68	38.14	94.41
0.1	0.03	0	-0.03	0	0.01	49.46	0.07	1.63	45.11	96.38
0.01	0.2	0.03	0.06	0	0.15	56.72	0.15	0.91	30.82	89.04
0.09	0.01	0.34	0.26	0.06	0.03	56.13	0.12	6.41	28.34	91.81
-0.08	0.01	0.03	0.05	0.04	0.03	52.09	0.15	1.45	45.02	98.78
0.09	0.03	0.01	0.09	0.03	-0.07	51.83	0.2	3.41	42.7	98.32

Sample 07-05-15-07

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.13	0.14	-0.09	0.12	0.02	0.05	52.39	0.1	1.8	44.61	99.28
0.1	0.13	0.01	0.01	-0.06	0.02	48.82	0.05	4.23	45.3	98.61
-0.02	0.19	0.01	-0.03	0.02	0.1	52.14	0	0.82	45.2	98.43
-0.12	0.03	0.08	0.03	0	0.09	54.47	-0.11	1.44	41.61	97.51
0.12	-0.12	0.11	-0.01	0.1	0.07	52.56	0.13	2.06	43.8	98.82
0.05	0.06	-0.02	0.04	-0.13	-0.04	52.65	0.16	3.35	42.02	98.13
0.07	0.12	0.03	-0.05	0.02	0.09	48.11	0.13	3.75	45.15	97.42
-0.06	0.04	-0.05	0.14	0.11	-0.01	48.87	0.03	8.15	38.88	96.09
0.08	0.15	0.05	0.02	0.05	0.02	48.13	0.24	1.04	47.47	97.24

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.02	0.02	0.32	0.15	-0.08	0.01	56.03	0.07	1.77	34.48	92.8
-0.05	0.18	0.03	0.08	-0.02	0.19	53.17	0.32	3.19	37.17	94.27
-0.02	0.12	0.16	0.13	0.05	-0.08	52.88	-0.06	4.68	38.91	96.76
-0.08	0.32	0.64	0.16	0.04	0.26	53.57	0.12	4.79	31.64	91.47
-0.13	0.07	0.32	0.07	0.05	0.06	53.12	-0.09	2.74	34.13	90.35
-0.05	0.18	0.03	-0.08	0	0.12	52.33	0	3.78	38.94	95.26
0	0.09	-0.03	0.05	0.04	0.1	52.04	-0.35	3.2	43.61	98.76
0.09	0.18	0.16	0.06	0.04	0.11	45.55	0	3.54	44.83	94.55
0.03	0.02	0.16	0.13	-0.01	0.23	56.64	0.13	2.16	31.72	91.22
0.01	-0.07	0.79	0.17	-0.03	0.17	52.17	0.23	2.54	40.77	96.75
0.01	0.04	0.13	0.16	0.02	0.07	52.96	-0.07	2.83	37.92	94.06
0.01	0.03	0.09	0.13	0.09	0.06	51.03	0.02	2.28	42.14	95.86
0.05	0.2	0.1	-0.03	0.05	0	50.52	0.09	0.59	43.91	95.47
-0.05	0.1	0.21	-0.04	-0.04	0.22	52.83	-0.25	6.78	33.13	92.9
0.03	0.06	0.14	0.02	0	0.08	52.34	0.03	2.94	36.08	91.72
0	0.03	-0.02	0.19	-0.01	0.12	51.42	-0.07	2.68	43.87	98.21
0.02	-0.16	0.43	-0.01	-0.06	0.07	47.17	0.12	3.38	40.09	91.05
0.05	0.13	0.11	0.03	-0.08	0.09	44.03	0.06	24.23	28.48	97.12
0.04	0.27	0.32	0.11	0	0.11	53.22	0.19	1.18	39.42	94.86
0.03	0.09	-0.14	0.06	0.06	0.08	52.67	-0.21	3.68	42.67	98.99
0.01	0.04	0.01	0.06	-0.02	0.18	48.01	-0.1	6.55	43.52	98.25
-0.02	0.1	0	-0.08	-0.09	0.05	52.42	0.06	2.1	43.7	98.24
-0.05	0	0.15	0.07	0.05	0.15	53.04	-0.07	3.79	41.95	99.08
0.1	0.14	0.39	0.11	-0.02	0.03	52.51	0.04	0.74	40.13	94.15
-0.02	0.04	0.28	-0.01	0.08	0.04	54.8	-0.18	2.53	34.7	92.25
0.07	0.1	0.14	-0.01	-0.06	0.09	58.15	0.07	3.52	31.93	94
0.01	-0.06	1.92	1.94	0.01	0.13	54.33	0.06	2.92	33.87	95.13
0.02	0.1	0.15	-0.04	-0.01	0.02	55.49	-0.03	2.97	40.84	99.51
0.04	0.19	-0.02	0.12	0.09	0.08	56.89	0.03	1.98	38.47	97.87
0.11	0.11	0.13	0.24	0.01	-0.02	54.18	0.15	0.99	42.99	98.91
0.07	0.09	0.26	0.04	-0.07	0.2	50.59	-0.22	11.89	38	100.85
0.07	0.01	0.21	0.11	-0.03	0.2	51.23	0.01	1.76	41.96	95.52
0.02	0.01	1.2	1.16	0.06	0.01	54.7	0.11	7.29	30.75	95.32
0	-0.06	0.09	0.14	0.01	0.08	53.81	0.03	2.62	43.06	99.79
0.01	-0.01	0.09	0.13	-0.04	0.2	31.84	-0.08	3.8	57.65	93.6
0.07	0.1	0.04	-0.04	0.03	0.15	52.44	0.07	3.36	43.25	99.48
0.09	0.08	0.11	0.15	-0.06	0.06	57.25	0	2.29	35.48	95.43
0.03	-0.02	0.14	-0.1	0	0.14	53.5	0.02	3.31	43.21	100.22
0.15	0.09	0.31	0.21	0.02	0.08	53.29	0.06	5.98	37.07	97.27
-0.04	0.13	0.03	0.04	-0.08	-0.05	52.64	0.18	4.43	43.3	100.58
0.01	0.1	-0.05	-0.02	0.09	0.06	50.33	-0.19	2.39	45.05	97.77
-0.06	0.13	0.22	0.01	0.05	0.01	54.67	0.16	2.41	40.26	97.86
0.1	0.02	1.53	0.17	0.12	0.21	53.71	0.15	2.46	37.2	95.66
-0.06	0.06	0.09	0.05	0	0.02	49.25	0.13	5.68	43.91	99.13
-0.03	0.15	0.38	0.02	0.02	0.04	55.71	0.23	1.71	36.98	95.2
-0.02	0.01	0.11	0.11	-0.09	0	54.82	0.01	2.6	39.01	96.58
0.07	-0.02	0.59	0.18	0.04	0.11	50.93	0.25	2.25	42.38	96.79

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.07	-0.09	-0.01	-0.08	0.04	0.02	52.16	0.08	2.92	44.37	99.48
0.01	0.11	0.01	0.08	-0.07	0.04	54.17	0.15	1.22	45.26	100.97
-0.09	0.04	0.1	0.06	0.01	0.17	52.7	0.11	3.2	42.67	98.98
0.04	0.1	0.04	0.04	0.07	-0.05	48.77	-0.01	1.78	45.55	96.32
0.07	0.03	0.01	0.13	0.02	-0.03	53.34	-0.16	2.02	45.49	100.93
0.38	-0.02	0	0.16	-0.04	0.03	53.29	-0.02	6.21	39.18	99.19
0.02	-0.02	0.08	0.04	0	0.07	52.13	-0.11	3.64	42.55	98.38
0.04	0.22	0.12	-0.16	-0.02	0.09	54.14	0.21	1.06	41.91	97.61
0.03	0.22	0.04	-0.06	0.11	-0.08	52.45	0.07	0.64	44.48	97.9
-0.09	0.19	0.09	0.29	0.01	0.11	49.28	0	3.03	46.56	99.46
-0.1	0.02	0.22	-0.07	0	0.1	49.35	-0.04	6.09	43.48	99.04
0.11	0.05	0.02	0	-0.02	0.05	52.68	0.11	1.19	44.64	98.82
0.03	0.03	0.04	0.03	0.06	0.04	50.69	0.06	2.8	44.76	98.53
0.01	0.25	-0.06	0.04	0.01	0	52.93	0.14	1.18	43.64	98.13
0.14	0.11	0.1	0.23	-0.06	0.2	56.99	0.06	3.1	34.1	94.98
0.04	0.1	0.07	-0.03	0.04	-0.01	51.16	0.13	1.66	43.25	96.4
0.11	0.06	0.33	0.23	0.03	0.05	57.07	0.03	2.87	32.83	93.61
0.09	-0.08	0.02	0.05	0.05	-0.03	51.57	0.1	2.53	43.77	98.08
0.05	0.1	0.21	0.03	0.04	0.02	52.21	-0.06	5.25	40.64	98.49
0.01	0.02	0.1	-0.02	0.04	0.11	51.31	0.09	0.19	43.85	95.7
-0.02	-0.01	-0.04	0.08	-0.01	-0.02	47.06	0.23	5.3	46.67	99.25
0.03	0.14	0.19	0.12	0.03	0.04	57.21	0.11	0.91	31.87	90.65
0.05	0.06	0.03	0.04	-0.02	0.15	52	0.02	2.13	43.55	98.03
0.01	0.05	0.11	0.15	0.04	0.09	47.65	-0.03	5.59	44.27	97.91
0.02	0.03	0.14	0.04	-0.01	0.15	55.49	0.16	2.35	37.29	95.68
-0.09	0.08	-0.04	0.02	0.04	0.13	52.37	0.07	2.63	43.85	99.07
0.03	-0.07	0.01	-0.01	-0.07	0.08	53.08	-0.01	5	41.59	99.64
0.37	0.09	0.19	0.18	0.04	0.02	51.09	0.19	1.46	42.59	96.2
-0.05	0.15	-0.04	0	0.04	-0.04	51.4	-0.09	2.48	43.31	97.17
0.07	0.09	0.13	-0.06	0	0.05	50.95	-0.01	1.25	44.83	97.31
0.07	-0.11	0.11	0.06	0.09	0.15	53.76	0.19	1.59	40.95	96.87
-0.02	0.09	0.13	0.08	-0.01	0	52.89	-0.02	7.7	39.59	100.43
0.06	0.06	0	0.38	-0.03	0.15	46.36	-0.08	5.33	40.91	93.16
-0.06	0.13	-0.08	0.06	0	0.13	51.74	0.06	1.92	43.27	97.15
0	-0.05	0.07	-0.07	0	0.12	52.71	0	1.19	42.61	96.58
0.03	0.24	0.15	0	0.1	0.14	44.89	-0.02	9.35	40.63	95.51
0.07	0.07	0.12	0	-0.04	0.14	51.9	-0.09	4.87	41.21	98.25
0.09	-0.04	0.01	0.16	0.1	0.1	46	0.05	1.12	47.67	95.26
-0.02	0.12	0.15	0.05	-0.07	0.13	53.23	-0.07	1.61	43.69	98.81
-0.03	0.1	-0.08	0.01	-0.02	0.04	46.34	0.2	7.36	44.49	98.41

Sample 07-05-15-09

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.02	0.13	0.09	-0.08	0.02	0.01	50.26	-0.02	3.87	46.22	100.48
0.1	-0.02	0.11	0.07	0.03	-0.08	50.52	0.23	2.43	47.69	101.08
-0.07	0.03	0.08	0.08	-0.01	0.13	52	0.11	5.45	43.08	100.88
0.01	0.17	-0.02	0.19	-0.04	0.05	52.55	0.08	3.94	43.68	100.61

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.01	0.08	0.12	0.09	-0.09	-0.03	53.41	-0.11	4.92	44.97	103.36
0.07	0.06	0.74	0.49	0.03	0.24	52.52	0.08	8.96	33.6	96.81
-0.02	0.1	-0.04	0.05	0.06	0.03	52.04	0.26	0.92	48.96	102.35
0.06	0.32	0.04	0.23	0.05	0.01	56.48	0.31	1.55	40.89	99.94
0.1	0.13	0.08	0.26	-0.14	0.14	59.12	0.17	6.73	47.15	113.75
0.18	0.66	0.38	0.9	0.16	0.02	59.05	0.05	1.45	51.86	114.71
-0.1	0.15	0.01	0.16	0.01	0.03	50.73	0.49	0.98	47.14	99.61
0.04	1.52	0.47	0.9	0.04	-0.02	49.76	0.44	3.99	47.26	104.41
0.01	0.09	0.3	0.41	-0.07	0.19	57.28	0.07	8.92	38.18	105.37
-0.09	0.11	0.22	0.05	0.01	0.02	48.46	0.15	-0.01	46.89	95.82
0.12	0.09	1.68	11.36	0.05	0.56	61.94	0.12	3.08	18.62	97.61
0.06	0.28	1.42	0.98	-0.02	0.82	68.08	0.3	3.72	21.91	97.56
0.09	0.53	0.08	0.14	0.01	0.38	48.3	0.15	4.79	48.81	103.27
0.04	0.05	-0.06	0.01	-0.01	0.11	53.03	-0.02	22.58	30.95	106.69
0.02	0.05	0.25	-0.1	0.12	0.16	55.44	-0.25	2.19	48.83	106.71
-0.05	0.25	0.02	0	0.06	0.15	51.37	0.36	1.34	51.07	104.58
0.09	0.18	0.14	0.07	-0.1	0.03	52.71	0.14	4.99	45.56	103.8
0.08	0.07	0.06	0.03	0.06	0.09	55.13	0.09	10.71	38.59	104.9
0	0.19	0.04	0.3	0.03	0.11	54.32	0.13	19.63	26.76	101.5
0.01	0.09	0.03	0.06	-0.01	0.09	53.41	0.13	1.49	48.16	103.45
-0.09	0.15	0.21	0.15	-0.04	0.04	50.67	0.16	1.35	50.92	103.52
-0.04	0.05	0.01	-0.04	0.1	0.07	56.25	-0.07	4.1	45.02	105.44
0.09	0.06	0.07	0.35	-0.02	0.16	61.98	0.27	4.42	34.59	101.98
-0.04	0.1	-0.12	0.06	-0.03	0.04	55.21	0	2.45	47.87	105.55
0.02	-0.09	0.36	0.06	0.04	-0.02	53.15	0.2	1.56	50.43	105.69
-0.1	0.17	-0.03	0.05	0.03	-0.02	55.57	0.22	5.79	43.02	104.7
-0.03	0.03	0.41	0.08	-0.06	0.35	51.29	-0.04	6.86	43.17	102.07
0.1	-0.06	0.21	0.07	-0.04	0.05	55.51	0.1	4.95	44.51	105.41
0.05	0.13	0.57	0.15	0.02	0.21	65.44	0.21	7.54	28.98	103.29
0.06	0.09	1.81	1.56	0.05	0.45	62.14	-0.06	4.8	27.22	98.11
0.09	0.02	0.07	0.15	0.02	0.01	51.29	-0.03	1.69	48.47	101.78
0.03	0.41	1.43	2.85	0.34	0.47	52.23	-0.01	6.65	38.81	103.2
0.06	-0.1	-0.03	0.09	0.09	0.15	54.52	0.2	6.34	42.74	104.05
0.05	0.1	0.03	0.1	0.02	0.03	53.26	-0.01	2.07	49.36	105.02
0.04	0.12	0.08	0.22	-0.05	0.12	51.39	0.18	5.18	46.27	103.55
0.2	-0.04	0.07	0.13	-0.05	0.11	54.47	0.25	12.13	35.78	103.06
0.04	0.08	0.19	0.36	-0.04	0.07	58.87	0	2.53	39.61	101.7
0.06	-0.09	0.2	0.03	-0.05	0.24	53.45	-0.04	1.24	50.13	105.16
0.11	0.09	-0.03	0.09	-0.01	-0.03	54.62	0.2	8.13	39.93	103.1
-0.05	0.11	0.02	0.06	0.11	0.05	55.86	0.04	5.49	40.94	102.63
0.02	0.1	0.09	0.05	0.07	0.04	45.5	0.08	4.15	36.53	86.62
0.11	0.13	0.1	0.03	0.04	0.07	51.95	-0.15	3.24	46	101.53
0	0.1	0.3	-0.06	0.02	0.06	51.42	0.08	4.26	47.58	103.76
0.01	0.11	0.08	0	0.03	-0.05	47.72	0.31	3.69	50.23	102.12
0.1	0.2	0.11	0.04	0.05	0.01	55.6	0.09	5.34	45.15	106.69
0.05	-0.08	0.57	0.38	-0.02	10.15	45.53	0.09	4.95	35.6	97.21
0.11	-0.17	0.01	0.12	0.09	-0.02	52.65	0.1	8.06	43.55	104.51

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.21	0.03	0.06	0.04	-0.1	0.04	55.62	0.03	2.88	45.52	104.34
0.01	-0.06	0.1	0.12	-0.03	-0.1	53.65	0.47	5.4	44.43	104
0.02	0.13	0.12	0.06	0.1	0.08	45.01	0.14	1.95	50.44	98.05
0.03	-0.08	0.23	0.21	0.02	0.21	55.24	-0.08	5.31	43.75	104.84
0.14	0.1	-0.08	0	-0.11	0.07	54.94	-0.02	1.05	47.85	103.93
0.06	0.07	0.75	0.64	0.03	0.35	58.12	0.16	6.84	31.5	98.52
0.33	0.05	1.97	1.55	0.09	0.34	56.83	-0.05	3.37	32.09	96.55
-0.05	0.01	0.74	0.46	0.05	0.19	60.57	0.11	8.06	31.87	102.01
0.06	0.12	0.28	0.21	-0.07	0.06	54.1	0.11	4.5	44.09	103.47
-0.05	0.12	-0.05	-0.02	-0.04	0.11	56.24	0.19	5.18	44.71	106.4
0.11	0.58	0.6	0.51	0.07	0.14	61.61	0.06	4.16	31.89	99.72
0.19	0.24	0.47	0.53	-0.04	0.4	62.22	0.1	4.94	33.58	102.63
0.1	0.01	0.13	0.03	-0.1	0	41.58	0.23	3.05	34.95	79.99
-0.05	0.09	-0.07	0.15	0.04	0.19	51.77	-0.04	3.99	46.77	102.83
0.24	0.12	3.69	3.87	0.55	0.11	55.8	0.01	2.1	27.49	93.98
0.07	0.12	0.11	0.03	-0.02	0.2	55.48	0.02	4.63	43.86	104.49
0.04	0.01	0	-0.06	-0.13	0.02	51.44	-0.06	6.32	46.42	104.01
0.06	0.19	0.86	0.44	0.14	0.25	55.3	-0.1	6.17	38.1	101.41
0.1	0.14	-0.04	0.07	-0.01	-0.02	55.25	0.22	3.84	45.9	105.45
-0.17	0.13	0.03	0.09	-0.14	0.02	56.03	-0.13	5.09	44.98	105.93
0.14	0.15	0.13	-0.07	0.08	0.07	50.88	0.06	5.6	47.07	104.09
0.05	0.06	-0.03	0.07	0.04	0.08	56.34	-0.08	11.62	36.03	104.18

Sample 08-05-15-11

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.1	0.18	0.32	0.21	0.01	0.21	64.2	0.06	1.96	32.37	99.62
0.05	0.28	0.27	0.31	0.04	0.33	59.4	0.16	3.53	35.72	100.09
0.02	0.44	0.11	0.13	0.11	0.17	58.42	0.3	5.02	38.4	103.13
-0.03	-0.02	0.39	0.17	-0.12	0	52.77	-0.04	4.91	46.71	104.73
0.06	0.15	0.49	0.26	0.04	0.25	59.5	-0.08	1.65	36.66	98.98
0.12	0.13	0.45	0.24	-0.07	0.28	61.89	-0.08	3.78	31.72	98.44
-0.02	0.07	0.57	0.15	-0.06	0.35	58.16	0	3.51	38.67	101.39
0.03	0.11	0.38	0.25	0.05	0.14	64.17	0.06	2.62	36.38	104.18
0.15	0.21	0.33	0.17	0.12	0.34	57.62	0.1	3.78	39.35	102.18
0.08	0.21	0.3	0.22	0.05	0.09	66.82	0.06	1.15	31.88	100.85
0.05	0.2	0.33	0.21	0.09	0.23	60.35	-0.11	3.76	36.78	101.88
0.07	0.19	0.16	0.12	0.03	0.29	62.43	0	2.76	35.81	101.86
-0.02	0.16	0.37	0.12	0.07	0.08	63.5	0.29	1.7	35.39	101.66
0.02	4.47	0.27	0.14	0.1	0.11	52.04	0.26	0.85	46.65	104.91
0.15	0.08	0.45	0.22	-0.03	0.2	64.61	0.03	3.6	30.95	100.29
0.15	-0.03	0.66	0.26	-0.03	0.19	60.1	-0.2	4.55	29.27	94.94
-0.02	0.71	0.43	0.18	0.06	0.4	59.97	0.07	2.19	36.27	100.26
0.08	-0.07	0.11	0.23	0.02	0.06	56.64	0.11	2.56	42.03	101.76
-0.04	0.25	0.55	0.21	0.06	0.18	64.51	0.35	0.79	32.12	98.98
0.1	0	0.26	0.18	0.09	0.28	59	-0.21	2.29	37.68	99.67
0.03	0.16	0.34	0.21	0.08	0.19	65.57	-0.12	2.7	33.5	102.68
-0.01	0.11	0.29	0.39	-0.09	0.14	57.22	0.14	1.84	37.4	97.41

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.13	0.2	0.24	0.2	0.11	0.11	50.41	0.17	4.62	46.83	103.03
0.07	0.11	0.08	-0.09	-0.02	0.02	53.23	0.15	1.93	42.91	98.4
0.04	0.08	0.26	0.21	-0.01	0.02	62.74	0.3	2.81	34.93	101.38
0.02	0.11	0.08	0.18	0.04	0.17	61.51	0.01	7.03	33.92	103.07
0.06	0.17	0.28	0.3	-0.04	0.2	65.11	0.05	4.52	29.3	99.95
0.06	0.19	0.21	0.17	0.1	0.08	61.18	0	3.33	33.3	98.61
0.08	0.06	0.25	0.15	0.03	0.07	59.66	0.11	2.62	36.36	99.4
-0.03	0.3	0.13	0.29	0.05	0.24	59.09	-0.04	1.93	36.72	98.68
0.01	0.32	0.08	-0.02	0.03	0.13	63.15	-0.05	3.11	33.17	99.92
0.03	0.12	0.35	-0.01	-0.08	0.08	56.26	-0.06	3.39	38.12	98.18
0.07	0.22	0.23	0.03	0.08	-0.02	56.57	-0.36	5.25	38.04	100.11
-0.08	0.12	0.05	0.17	-0.05	-0.08	61.67	0.04	1.98	36.68	100.51
-0.01	0.19	0.13	0.05	-0.03	0.02	55.75	0	3.91	41.85	101.88
0.01	0.12	0.39	0.27	-0.04	0.1	63.25	0.03	1.19	33.62	98.94
0.07	0.18	0.15	0.22	-0.07	0.17	62.31	-0.01	2.77	34.31	100.12
0.07	0.02	0.22	0.07	-0.06	0.12	60.24	-0.08	1.93	39.85	102.37
-0.05	0.26	0.03	0.14	0	0.14	58.16	-0.06	2.62	45.53	106.78
-0.03	0.25	0.22	0.25	-0.09	0.11	59.18	0.16	1.77	40.1	101.93
0.12	0.28	0.66	0.07	-0.02	0.09	61.15	0.05	2.07	37.96	102.42
0.02	0.09	0.1	0.15	0.05	0	59.56	0.22	1.77	44.27	106.22
0.05	0.21	0.25	0.1	-0.04	-0.02	63.18	0.08	2.56	33.42	99.8
0.16	-0.01	0.05	0.17	-0.04	0.12	59.28	0.16	3.38	43.01	106.28
0.11	0.17	0.4	0.05	0.12	0.09	54.92	0.2	3.43	45.01	104.49
0.05	0.12	0.14	0.06	-0.02	-0.01	61.06	0.24	4.3	33.82	99.76
0.14	0.18	0.16	0.22	0.06	0.14	62.21	0.25	0.91	35.61	99.87
0.06	0.07	0.2	0.12	-0.03	0	61.35	0.04	4.02	35.13	100.97
0.07	0.01	0.63	0.1	-0.08	0.06	60.11	-0.07	3.52	35.57	99.93
-0.01	0.02	0.37	0.17	-0.05	0.09	65.44	0.25	4.66	30.68	101.62
0.02	0.15	0.1	0.1	-0.02	0.02	60.04	-0.09	3.92	38.56	102.8
-0.04	0.21	0.14	0.16	-0.06	0.12	65.42	0.03	2.28	31.51	99.77
0.03	0.22	0.52	0.14	-0.05	0.02	62.66	-0.1	5.28	32.12	100.84
0.04	0	0.09	0.23	-0.08	0.01	59.35	-0.25	17.86	23.05	100.29
-0.08	0.06	1.12	2.69	0.04	0.26	51.51	0.25	0.9	27.33	84.08
0.04	0.1	0.09	0.17	0.08	0.23	59.34	0.07	9.14	36.08	105.33
0.06	0.1	0.12	0.24	-0.01	0.07	60.89	-0.07	2.5	35.86	99.76
-0.05	0.34	0.25	0.02	0.03	0.17	61.98	0.17	0.33	36.37	99.62
-0.04	0.1	0.26	0.04	-0.04	0.06	60.93	0.2	18.65	19.75	99.93
0.08	0.16	0.34	0.09	0.07	0.07	59.59	-0.12	4.71	35.53	100.51
-0.03	0.08	0.16	0.25	0.05	0.23	62.01	0.11	4.98	32.24	100.06
0.08	0.06	0.32	0.19	0.09	-0.02	63.66	0.1	1.73	33.04	99.25
0.08	0.11	0.11	0.24	0.01	0.04	58.34	-0.08	13.89	27.51	100.24
0.1	0.07	0.02	0.22	-0.06	-0.01	56.96	-0.22	11.97	32.04	101.1
0.16	0.01	0.16	-0.01	-0.07	0.09	60.04	-0.19	3.75	37.18	101.11
-0.04	0.18	0.39	0.56	-0.07	0.2	55.51	-0.1	3.99	35.84	96.46
0.15	-0.01	0.08	-0.01	0.08	0.01	56.06	-0.19	7.5	37.18	100.84
0.11	0.15	0.25	0.1	-0.09	0	61.65	0.06	4.97	31.58	98.78
0.12	0.19	0.4	0.52	-0.05	0.16	66.04	-0.25	2.25	31.95	101.31

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.1	0.19	0.65	0.32	-0.04	0.25	65.67	-0.02	1.17	28.51	96.6
0.03	0.1	0.35	0.1	-0.02	0.12	62.68	0.13	1.96	31.65	97.11
0.07	0.07	0.23	0.16	0.07	0.29	57.75	0.19	5.39	34.15	98.37
0.08	0.14	0.43	0	0.01	0.18	59.58	0.27	8.9	28.25	97.84
0.06	0.07	0.28	0.15	0.03	0.18	59.46	0	5.46	31.88	97.58
0.02	0.22	0.45	0.51	0.14	0.23	56.88	-0.09	8.78	33.46	100.59
0.02	0.2	0.28	0.29	-0.02	0.1	59.85	0.07	4.29	33.06	98.15
0.15	0.29	3.61	4.06	0.34	0.27	40.49	0.02	4.47	25.21	78.92
0.08	0.08	0.51	0.23	0.06	0.23	56.46	0	5.46	35.88	99.01
0.03	0.1	0.2	0.16	0.06	0.21	62.2	0.14	2.04	35.1	100.24
-0.03	0.09	0.3	0.13	-0.02	0.18	63.51	0.32	3.04	31.93	99.45
-0.09	0.1	0.18	0.38	0	0.11	56.94	0.01	6.04	32.97	96.63
0.06	-0.14	0.07	0.05	0.01	0.12	55.89	-0.05	1.7	45.84	103.55
0.07	-0.04	0.25	0.13	0.13	0.14	57.47	0.29	2.56	37.85	98.86
0.07	0.64	0.47	0.1	-0.06	0.12	57.84	0.1	0.81	37.53	97.62
0.15	0.17	0.25	0.31	0.02	0.29	61.2	0.09	3.69	31.64	97.8
-0.02	0.18	0.23	0.36	0.03	0.12	59.76	0.11	2.93	33.88	97.59
0.1	0.09	0.2	0.02	0.05	0.14	51.93	-0.03	2.61	48.25	103.36
0.12	0.21	0.27	0.18	-0.01	0.02	62.73	0.03	3.86	33.51	100.92
0.09	0.21	0.39	0.1	-0.04	0.1	60.64	0.2	2.7	35.32	99.72
0.01	0.09	0.2	0.33	0.04	0.17	63.28	0.16	4.48	30.42	99.16
-0.02	0.21	0.28	0.22	0.08	0.1	64.67	0.08	3.32	31.33	100.29
0.13	0.24	0.48	0.35	0.09	0.07	63.67	0.02	1.72	34.96	101.72
0.13	0.03	0.2	0.02	0	0.01	61.8	-0.11	3.79	35.4	101.27
-0.02	0	0.08	0.07	0.03	0.03	60.22	-0.1	2.54	38.47	101.33
0	0.14	0.12	0.22	-0.06	0.08	58.13	-0.07	1.81	38.19	98.57
0.1	0.18	0.09	0.06	-0.05	0.11	52.68	-0.21	2.78	50.64	106.38
0.01	0.09	0.8	0.26	0.05	0.26	70.24	-0.02	2.39	29.1	103.16
-0.04	0.08	0.13	0.35	0.04	0.04	62.29	-0.18	3.56	30.51	96.8
-0.02	0.13	0.4	-0.05	-0.03	0.13	64.08	0.16	2.63	31.95	99.38
0.01	0.86	0.26	0.13	0	0.07	58.56	0.08	0.88	40.41	101.26
0.01	0.19	0.24	0.01	0.1	0.07	59.24	-0.11	2.9	42.4	105.05
0.04	0.1	0.1	0.15	0.01	0.07	57.81	-0.02	16.85	27.02	102.13
0.03	0	0.18	0.13	0.07	0.25	86.18	0.4	2.16	15.6	105
0	0.29	0.5	0.44	0.06	0.19	73.47	0.19	0.77	25.42	101.34
0	0.06	0.25	0.08	-0.03	0.03	65.22	0.05	3.24	33.58	102.49
0.03	0.13	0.62	0.23	-0.07	0.28	46.61	-0.1	3.29	50.78	101.8
-0.02	0.05	0.1	0.08	0.02	0.04	57.66	-0.06	5.97	37.55	101.4
0	0.04	0.31	0.1	0.02	0.2	59.85	0.14	2.54	39.24	102.45
-0.09	0.23	0.34	0.25	0.07	0.15	64.17	0.34	1.9	32.86	100.22
0.13	-0.09	0.15	-0.04	0.1	0.13	49.47	0	2.05	53.72	105.59
0.14	0.05	0.14	0.19	0.06	0.06	59.54	0.08	3.95	37.05	101.26
0.01	0.1	0.45	-0.01	-0.06	0.14	64.61	0.04	2.13	34.01	101.42
-0.03	0.18	0.19	0.04	0.03	0.04	56.29	-0.09	0.61	45.51	102.77
-0.01	0.27	1.03	0.4	0.06	0.2	66.41	-0.04	3.98	28.58	100.88

Sample 08-05-15-14

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.02	-0.03	-0.09	-0.03	0.08	-0.06	57.23	0.17	3.87	54.82	115.94
0.03	0.05	0.14	0.12	0.03	0.04	62.78	0.5	0.44	35.61	99.73
-0.02	0.16	0.08	0.06	0.04	0.12	56.86	-0.05	3.73	41.87	102.83
0.09	0.16	-0.1	0.17	0.03	0.08	47.95	0.17	3.35	51.37	103.28
0.08	0.03	0.05	-0.02	-0.01	-0.02	54.61	0.22	1.14	48.07	104.15
-0.03	0.01	0	0.12	0.05	0.08	52.76	-0.09	3.26	48.2	104.35
-0.01	0.01	0.19	0.3	0.09	0	58.65	-0.15	4.62	33.98	97.69
0.02	0.1	0.19	-0.06	-0.09	-0.03	52.4	-0.41	12.63	40.67	105.42
0.01	0.07	0.58	0.58	-0.03	0.12	62.62	0.19	1.09	33.66	98.89
-0.05	-0.04	0.64	0.59	-0.03	0.17	54.65	0.28	5.12	36.75	98.09
0	0.06	0.2	0.18	-0.04	0.09	54.27	0.1	1.12	48.69	104.66
0.02	0.11	0	0.01	0.01	0.16	55.07	0.15	3.13	46.45	105.11
-0.06	0.2	-0.03	0	0.01	-0.03	54.52	0.14	3.99	47.52	106.25
0.07	-0.11	0.11	0.09	0.06	0.11	56.09	0.11	5.59	45.38	107.5
0.13	0.12	0.02	0.04	0	-0.09	54.26	0.09	0.91	48.53	104
0.12	0.09	0	-0.03	0.01	0	56.01	0.05	5.43	45.16	106.84
0.12	-0.08	0.05	0.04	0.05	-0.05	53.88	0.01	5.12	46.14	105.27
-0.04	0.02	0.12	0.36	-0.12	0.07	51.89	0.29	24.2	27.25	104.05
0	0.49	0.06	-0.13	0.02	-0.02	51.13	0.1	1.09	51.11	103.84
0.06	-0.01	0.1	0.2	0.07	0.07	56.58	-0.18	6.94	35.1	98.93
0.15	-0.07	0.09	0.04	0.1	0.2	54.92	0.04	2.69	45.44	103.59
-0.01	0.02	0.02	-0.02	0.01	-0.04	52.1	-0.05	2.53	48.53	103.08
0.03	0.39	-0.06	0.09	0.07	0	50.69	0.2	5.4	46.81	103.61
0.06	-0.21	0.2	0.15	-0.05	0.02	52.77	0.22	5.16	45.66	103.97
-0.08	0.08	0.09	-0.01	0.03	-0.08	53.21	0.04	4.56	46.68	104.51
-0.03	5.54	1.62	0.08	-0.01	0.09	45.4	0.04	0.1	49.12	101.95
0.06	0.32	0.18	-0.04	0.01	0.06	58.28	0.09	0.86	39.27	99.1
0.01	0.2	-0.02	0.11	0.02	0.14	51.52	0.08	3.17	47.84	103.07
-0.04	0.06	0.17	0.2	0.01	0.11	56.49	0.26	1.85	40.26	99.38
0.07	-0.04	0.26	0.19	-0.02	-0.04	61.36	0.04	2.14	34.56	98.51
0.1	0.28	-0.08	0.14	-0.01	-0.02	55.26	-0.02	0.62	47.7	103.96
0.04	0.09	0.06	-0.01	0.01	0.09	51.76	0.13	2.89	49.1	104.17
0.05	0.11	-0.04	0.05	-0.05	0.06	51.87	0.02	10.85	41.58	104.5
-0.03	0.25	0.33	0.36	-0.02	0.1	63.5	-0.04	2.35	32.55	99.36
-0.03	0.18	-0.04	0	-0.02	0.16	56.21	0.17	3.07	47.04	106.74
0.15	0	0	0.11	0.03	0.05	56.35	0.08	5.51	45.19	107.47
-0.11	0.02	-0.02	0.02	0.08	0.01	54.33	0.23	3.79	46.32	104.66
0.2	0.05	0.05	-0.06	0.03	0.05	52.77	0.14	5.77	46.9	105.9
0	0.05	-0.01	0.07	0.12	0.14	53.93	-0.12	3.68	46.58	104.45
0.08	0.04	0.08	0.03	0.09	0.03	54.49	0.41	1.06	47.57	103.88
0.07	0.12	0.1	-0.07	-0.05	-0.09	52.44	0.16	5.21	46.08	103.98
-0.06	0.13	-0.01	0.11	-0.02	-0.07	56.15	0	1.43	49.17	106.84
0.04	0.23	0.01	-0.05	0.02	0.07	57.83	0.09	2.9	43.43	104.58
0.08	0.08	0.05	0.19	0.1	0.04	56.61	0.03	1.47	46.74	105.39
0	0.01	-0.23	-0.04	0.04	-0.06	55.01	0.18	5.83	44.48	105.2
0	0.14	0.12	-0.01	0.01	0.13	55.74	0.1	2.74	44.09	103.06

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.06	0.01	0.02	0	-0.08	0	51.51	-0.22	5.27	45.24	101.82
-0.12	-0.02	0.03	0.15	0.03	0	50.77	0.12	2.65	50.14	103.75
0.01	0.11	0.12	0.03	0.04	0.01	57.11	-0.03	5.06	45.51	107.96
0.09	0.15	-0.14	0.06	0.02	0.18	56.58	0.02	5.53	44.02	106.5
0.09	0.25	0.13	-0.05	-0.02	-0.02	57.56	0.07	0.96	49.98	108.94
0.08	0.08	0.11	0.13	-0.08	0.08	52.28	-0.04	5.25	48.45	106.35
0.06	0.48	0.02	0.08	0.03	0	62.04	0.19	0.17	38.71	101.76
0.09	0.12	0.16	0.06	-0.14	0.14	54.19	-0.18	6.9	41.1	102.45
-0.03	0.12	-0.12	0.04	-0.03	0.11	53.36	0.26	4.52	47.28	105.52
-0.01	0.09	0.13	-0.02	0.04	0.1	53.86	0.17	4.84	45.15	104.34
-0.04	-0.02	0.08	-0.1	0.01	0.12	52.58	0	1.83	49.52	103.98
0.13	0.02	-0.02	0.12	0.11	0.11	50.97	0.16	1.69	48.7	101.97
0.08	0.06	0.36	0.16	0.02	0.11	52.55	0.04	3.76	45.62	102.76
0.04	0.1	0.16	-0.04	0.12	0.28	60.66	0.14	0.89	37.76	100.12
0.12	0.07	0.08	0.02	-0.03	0.05	54.1	-0.15	7.32	40.51	102.1
0.1	0.13	0.31	0.15	0.02	0.05	57.69	0.29	1.42	37.66	97.83
0.12	0.11	0.04	-0.06	-0.05	0.08	52.97	0.2	4.58	46.48	104.46
0.16	0.04	0.22	0.2	0.03	0.09	58.95	0.14	6.68	33.72	100.23
-0.03	0.09	0.56	0.03	0.14	0.02	63.28	-0.1	2.53	34.09	100.61
0.08	-0.07	0.06	0.14	-0.05	-0.05	55.04	-0.04	5.91	44.15	105.19
0.02	0.19	0.43	0.06	-0.11	0.08	59.94	0.11	1.32	34.02	96.06
0.1	0.06	0.15	0.01	-0.07	0.04	54.72	0.14	3.52	44.92	103.58
0.09	0.12	0.07	-0.02	-0.09	0	55.22	0.29	5.56	41.12	102.36
0.12	0.11	-0.1	-0.05	0	0.09	52.34	-0.12	4.12	47.26	103.76
0.07	0.12	0.18	0.14	-0.01	0.12	53.04	-0.1	4	45.02	102.58
-0.04	0.16	-0.01	0.01	0	-0.06	55.24	0.02	5.97	43.79	105.08
0.17	0.14	-0.04	0.03	0.1	0	51.42	0.3	5.62	45.49	103.23
-0.05	-0.05	-0.01	0.12	-0.03	0.12	54.6	0.31	1.2	47.47	103.67
0.08	0.15	0.21	0.34	-0.05	0.03	61.05	0.2	1.13	35.78	98.92
-0.06	-0.07	0	-0.06	0.02	-0.06	54.23	0.06	2.45	46.65	103.17
-0.07	0.04	0.15	0.14	0.02	-0.01	56.27	0.16	6.16	36.83	99.71
0	0.17	-0.05	0.11	0.03	0.01	52.94	-0.31	3.81	48.32	105.02
0.13	0.08	0	0.19	-0.13	0.04	52.92	0.34	6.76	43.55	103.88
-0.03	0.14	0.3	0.06	0	0.06	61.33	0.01	1.37	37.06	100.32
0.09	-0.02	-0.05	0.05	-0.09	0.03	56.72	-0.06	4.9	44.24	105.79
0.14	0.17	-0.1	0.2	-0.02	-0.02	57.22	0.11	3.64	46.7	108.05
0.02	0.06	0.12	0.09	-0.01	0	57.63	-0.03	5.67	45.48	109.03
-0.02	0.18	0.23	0.15	-0.02	0.05	58.35	0.13	4.15	43.67	106.86
0.13	0.3	-0.04	0.15	0.03	0	65.4	-0.13	3.61	37.92	107.36
0.04	0.19	-0.15	0.13	-0.07	0.1	53.95	0.18	6.12	47.66	108.15
0.11	0	-0.01	0.01	0	-0.05	52.2	0.27	2.9	49.19	104.62
0.08	0.43	-0.02	0.05	0.05	0.06	56.55	0.26	1.27	48.09	106.81
0.02	0.15	0.02	-0.24	0.01	0.06	51.09	0.21	3.45	51.95	106.74
0.03	-0.02	0.16	-0.01	0.04	0.12	57.59	0.02	3.09	43.04	104.06
0.08	0.14	0.12	-0.06	-0.04	0.11	51.87	-0.17	6	48.35	106.42
0.04	0.07	-0.01	-0.04	-0.06	0.01	53.07	0.12	5.09	46.15	104.46
-0.07	0.05	0.08	0.15	0.01	0	54.38	0.24	2.71	47.15	104.7

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.07	-0.1	0.15	0.17	0.1	0.23	53.26	0.29	6.54	44.34	104.92
0.05	0.11	-0.06	0.04	0.11	0.12	55.86	-0.01	8.31	41.66	106.18
-0.02	0.31	-0.05	-0.08	0.04	0.1	55.56	0.12	5.28	43.76	105.03
0	-0.01	0.04	0.12	-0.01	-0.02	53.09	0.04	5.53	45.96	104.74
0.13	0.18	0.24	-0.01	-0.05	0.11	50.5	-0.07	7.45	45.02	103.49
0	0.07	0.27	0.16	-0.05	0.03	61.15	-0.23	3.02	33.76	98.18
-0.03	0.09	0.1	0	0.03	0.09	55.29	0.1	5.28	44.66	105.6
0.07	0.09	0	0.06	-0.01	0.02	53.2	0.09	2.44	46.92	102.89
-0.08	0.03	-0.03	0.12	0.01	0.08	54.15	-0.08	7.45	41.57	103.23
0	0.05	-0.01	-0.05	-0.14	0.12	56.63	-0.19	2.55	46.86	105.82
-0.02	0.13	-0.1	0.08	-0.01	0.14	53.59	0.07	7.05	44.33	105.27
0.09	0.2	-0.09	0.07	-0.11	-0.01	53.75	0.1	4.12	46.8	104.92
0.03	0.15	-0.14	0.06	0.01	-0.06	55.45	0.09	0.6	48.02	104.21
-0.01	0.6	0.03	0.08	-0.02	-0.09	55.86	0.04	5.48	45.95	107.91

Sample 09-05-15-18

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.03	0.2	0.09	0.17	0.01	0.01	57.5	0.33	3.66	35.2	97.2
0.02	-0.04	-0.09	0.16	0.02	0.17	51.6	0.29	4.29	47.46	103.88
0.1	0	0.2	0.13	-0.07	0.12	46.25	0.29	2.97	37.58	87.57
-0.04	0.13	0.33	0.3	-0.01	0.05	57.63	0.13	5.56	35.94	100.03
0.26	0.05	0.21	0.33	0	0.26	59.94	-0.02	1.57	33.84	96.43
0.05	0.23	0.15	0.34	0.01	0.13	58.07	0.21	2.28	35.95	97.41
0	0.05	-0.17	0.15	-0.06	0.02	52.01	0.13	3.98	48.57	104.68
0.01	-0.05	0.34	0.16	-0.04	0.24	59.06	0.3	0.79	36.48	97.3
0	0.03	0.07	0	-0.02	0.07	56.77	-0.08	2.01	44.88	103.73
0.01	0.18	0.08	0.16	0.07	0.05	56.94	-0.04	2.89	45.38	105.71
0.02	0.09	-0.01	-0.09	-0.03	-0.01	53.12	0.09	3.97	48.49	105.64
-0.04	0.23	0.16	0.04	0.03	0.1	54.54	-0.13	2.04	47.62	104.59
0.15	-0.08	0.14	0.12	0.01	0.09	56.22	0.23	0.99	47	104.85
0.02	0.06	0.21	0.17	-0.09	0.09	60.53	0.16	3.12	36.1	100.38
0.05	0.01	0.14	0.02	0.08	0	54.21	0.12	9.43	35.65	99.7
0.05	1.44	8.97	12.32	2.46	0.26	44.66	-0.28	3.76	28.64	102.29
-0.11	0	0.02	0.01	0.04	0.08	55	-0.05	0.61	47.18	102.78
-0.06	0.16	0.05	0.04	-0.04	0.03	56.19	0.09	5.18	42.41	104.05
0.01	0.13	0.1	0	0.09	-0.1	55	0.06	1.36	46.76	103.41
0.09	0.16	3.39	3.96	0.76	0.15	78.86	0.14	4.26	12.07	103.85
-0.11	0.14	0.36	0.16	0.01	0.21	61.03	0.06	2.22	35.68	99.75
-0.03	0.06	0.09	-0.06	-0.05	0.1	56.95	0.1	4.69	43.48	105.33
0.09	0.07	0.86	0.32	-0.06	0.26	61.29	-0.04	3.82	32.22	98.83
0.13	-0.11	0.11	0.1	0.04	0.13	52.5	-0.15	8.33	44.81	105.89
0.07	0.01	0.29	0.13	0.03	0.09	57.26	0.19	6.22	35.64	99.93
-0.02	0.01	0.26	0.24	0.09	0.1	61.95	0.69	3.53	32.24	99.1
0.02	0.12	-0.04	0.09	0	-0.04	57.12	0.02	2.13	44.07	103.47
0.05	0.04	0.32	0.69	-0.01	0.02	55.73	0.51	3.8	38.21	99.36
0.02	-0.01	0.09	0.02	0.05	0.11	54.53	-0.07	2.21	44.01	100.94
0.08	0.03	0.28	0.59	0.02	0.04	62.04	0.03	5.45	31.35	99.91

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.18	0.16	6.63	0.71	0.02	0.26	61.96	0.05	3.98	32.35	106.31
0.02	0.13	0.25	-0.1	-0.01	0.06	54.91	0.32	18.75	26.59	100.92
0.03	0.01	0.43	0.28	0.08	0.03	59.09	0.02	6.95	30.31	97.22
0.01	0.19	0.41	0.1	0.03	0.04	56.15	0.39	2.99	36.99	97.31
0.06	0.12	0.35	0.11	0.07	0.09	56.68	-0.04	3.69	37.23	98.35
0.15	0.12	0.19	0.23	-0.12	0.12	58.16	0.25	2.94	36.45	98.49
0.14	0.17	0.33	0.29	0.03	0.09	58.71	0.1	1.9	36.19	97.96
-0.01	0.07	0.46	0.65	0.04	0	55.89	-0.06	3.24	43.06	103.33
0.01	0.06	-0.03	0	0	0.02	48.2	0.08	3.26	50.37	101.97
0.02	0.09	0.63	0.2	0.02	0.4	62.11	-0.16	3.1	31.93	98.32
-0.09	0.16	0.33	0.32	0.04	0.18	63.73	-0.12	1.84	29.87	96.26
0.06	0.09	0.12	0.16	-0.09	0.06	58.43	-0.14	4.03	39.36	102.07
0.4	0.26	0.34	0.34	0.1	0.07	60.74	0.16	1.19	35.25	98.85
0.01	0.04	0.5	0.21	0	0.09	62.1	0.09	2.17	35.96	101.18
0.09	0	0	0.06	0.01	-0.05	50.8	0.17	10.25	41.26	102.59
0.12	0.2	0.46	0.19	-0.04	0.06	62.6	0	1.61	31.83	97.04
-0.09	0.03	0.13	0.02	0.02	0.01	54.2	0.08	3.77	44.7	102.86
0.04	0.07	0.02	0.22	0.06	0.07	53.18	-0.08	3.73	45.93	103.24
-0.02	0.14	0.45	0.06	-0.06	0.19	56.61	0.01	3.43	39.57	100.38
0.05	0.05	0.22	0.12	0.02	0.02	61.89	0.07	3.43	31.95	97.8
0.03	-0.02	0.26	0.14	-0.02	-0.02	58.73	0.12	2.54	38.41	100.16
0.08	0.01	0.18	0.34	0.09	0.06	54.29	-0.2	3.38	41.8	100.03
0.1	0.27	0.37	0.1	-0.02	0.19	54.52	0	7.91	37.31	100.76
0.09	0.13	0.42	4.16	0.01	0.07	55.42	-0.03	4.97	38.19	103.43
0.03	0.13	0.25	0.15	-0.12	0.15	57.51	0.07	1.46	38.51	98.15
0.08	0.15	0.01	0.34	-0.01	0	55.58	0.23	5.21	43.15	104.74
0.21	0.19	0.03	0.01	0.12	-0.04	55.61	0.29	1.83	47.23	105.47
0.04	0.08	0.08	0.15	0.04	-0.12	55.9	-0.09	3.12	46.32	105.53
0.08	0.07	0.12	-0.02	-0.04	0.02	51.4	0.21	5.71	46.28	103.84
0.11	-0.01	0.39	0.08	-0.03	0.01	61.23	-0.24	5.26	30.89	97.69
0	0.16	0.19	0.35	-0.07	0.23	56.78	0.08	3.98	34.56	96.25
0.12	0.24	1.56	0.29	0.1	0.34	54.75	-0.23	6.98	38.52	102.67
0.02	0.03	0	0.08	0.01	0.17	53.16	-0.21	2.61	45.25	101.12
-0.01	0.17	0.29	0.14	0.03	0.03	61.73	0.14	4.08	31.87	98.47
-0.08	0.08	0.21	0.28	0.05	0.05	61.57	-0.17	3.16	31.72	96.88
-0.01	0.21	0.03	0.19	-0.03	-0.06	53.48	-0.34	4.72	44.5	102.7
0.04	0.02	2.18	2.22	-0.02	0.09	54.26	0.02	4.47	33.67	96.95
0.1	0.35	0.09	0.1	0	0.04	53.93	0.09	0.84	46.37	101.91
0.09	0.31	1.44	2.4	0.28	0.19	55.15	0.03	5.79	34.98	100.64
0.05	0.06	0.26	0.21	-0.03	0.16	63.64	0.05	1.42	31.78	97.59
0	0.14	0.12	0.02	0.02	0.21	60.1	-0.04	6.33	31.38	98.28
0.02	0.04	0.06	0.05	-0.01	0.16	54.75	0.1	3.82	45.11	104.09
0.97	-0.04	-0.02	6.62	0.05	0.68	44.05	-0.04	5.8	34.28	92.36
-0.07	0.15	0.43	0.29	0.08	0.12	60.27	0.01	2.17	32.58	96.04
0.09	0.32	0.09	0.08	-0.03	-0.01	56.25	0.01	1.48	44.55	102.83
0.09	0.11	0.34	0.25	0.03	0.03	57.7	0.1	7.74	32.84	99.22
0.06	0.09	0.25	0.09	-0.04	0.17	54.01	-0.21	2.19	32.97	89.57

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.11	0	0.51	0.21	0.02	0.01	57.64	0.08	2.77	38.36	99.72
0.09	0.07	0.86	1.03	0.05	0.05	60.66	0.21	1.9	34.23	99.15
-0.1	0.09	0.36	0.13	-0.09	0.02	60.45	0.16	1.89	36.76	99.65
0.15	-0.01	0.17	0.07	-0.05	0.08	58.24	0.31	3.65	37.92	100.53
0.47	-0.02	0.13	0.07	-0.07	0.01	56.32	0.01	6.73	39.27	102.91
0.12	0.11	-0.01	0.1	0.02	0.05	55.82	0.11	13.43	37.71	107.44
-0.05	0.04	0.22	-0.15	0.04	0.06	51.44	0.05	4.49	46.27	102.4
0.01	0.05	0.7	0.78	0.14	0.24	58.41	-0.03	3.45	32.21	95.95
0.21	-0.03	0.04	-0.04	0.05	-0.01	51.99	-0.13	8.44	41.21	101.74
0.11	0.08	0.25	0.1	0.04	0.11	55.9	0.38	3.02	40.56	100.56
0.05	0	0.05	0.14	-0.02	0.05	54.15	-0.11	5.93	38.27	98.5
0.11	0.54	0.09	0.24	0.1	0.12	61.54	0.01	1.16	34.17	98.07
-0.01	0	-0.02	-0.01	0.03	-0.02	54.71	0.02	1.84	45.96	102.5
-0.01	0.13	-0.01	0.07	0.03	0.02	49.91	-0.26	4.99	44.52	99.38
0.11	0.06	0.28	0.07	0.01	0.16	44.15	0	3.43	35.88	84.15
0	0.11	-0.01	-0.01	0	-0.06	54.65	0.2	6.49	42.99	104.36
0.05	0.13	0.55	0.56	-0.04	0.16	54.79	0.2	3.19	40.15	99.74
-0.04	0	0.38	0.16	0.01	-0.05	56.89	-0.28	2.09	41.19	100.34
-0.04	0.14	0.62	0.22	-0.06	0.15	62.79	-0.32	3.43	31.52	98.44
-0.05	0.05	2.95	3.39	0.3	0.14	60.08	0.28	2.83	28.27	98.25
0.11	0.13	-0.06	0.09	-0.09	-0.05	49.48	0.21	4.66	47.61	102.09
-0.04	0.13	0.28	0.23	0	0.04	57.99	0.13	4.43	31.8	95
-0.06	0.14	0.26	0.09	0.04	0.09	56.17	0.22	0.87	43.75	101.56
0.01	0.22	-0.06	0.03	-0.04	0.11	50.75	0.01	4.33	46.61	101.96
0.07	-0.03	-0.04	0.01	-0.02	-0.01	55.72	0.04	0.73	46.37	102.86

Sample 09-05-15-21

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.05	0.27	0.53	0.08	0.03	0.08	56.89	0.08	2.3	33.92	94.25
0.01	0.08	0.01	-0.05	-0.1	0.06	51.56	0.04	3.07	44.78	99.45
-0.01	0.12	0.31	0.06	0.01	0.04	58.51	-0.17	3.49	31.89	94.25
-0.06	0.02	0.23	0.09	0.06	0.01	57.53	0.08	4.2	30.98	93.14
0.09	0.16	-0.05	-0.1	0.03	-0.03	48.94	-0.05	4.99	44.32	98.3
-0.05	0	0.01	0.12	-0.07	0.06	50.03	0.04	6.76	41.98	98.89
-0.05	0.11	0.4	0.12	-0.03	0.07	55.28	0.07	2.87	34.23	93.07
0.01	0.1	0.37	0.05	0.02	0.1	61.37	0.19	2.14	31.33	95.68
-0.05	-0.08	0.3	0.12	-0.01	0.23	57.72	0.22	3.48	31.83	93.76
0.02	0.06	-0.01	0.1	0.01	0.07	50.71	0.23	2.16	45.68	99.02
0.04	0.23	0.66	0.05	-0.03	0.02	59.4	0.03	4.1	31.01	95.52
-0.02	0.05	0.62	0.08	0.03	0.13	57.25	0.24	1.84	35.21	95.44
0.07	0.12	4.8	8.3	1.47	0.05	75.53	-0.02	0.76	7.43	98.49
-0.01	0.03	0.22	0.14	-0.03	0.01	55.1	-0.12	12.15	27.91	95.41
-0.01	0.12	0.25	0.13	0	0.14	57.92	-0.04	2.15	36.02	96.68
-0.05	0.2	0.29	0.1	-0.05	0.06	55.47	0.2	2.92	34.6	93.74
0.02	0.05	0.06	0.01	-0.03	0.04	55.85	-0.09	1.82	41.67	99.39
0.09	0.14	0.24	0.07	0.04	0.07	59.59	0.08	2.18	35.08	97.58
-0.02	0.1	0.25	-0.02	-0.09	0.07	56.28	0.12	3.03	36	95.72

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.01	-0.01	0.61	0.09	-0.03	-0.01	65.41	0.06	1.66	27.86	95.63
0.06	0.03	0.47	0.11	0.04	0.13	57.17	0.03	4.75	31.14	93.94
0.03	0.2	0.34	0.1	0	0.12	56.3	0.05	2.55	36.31	96.01
-0.01	0.11	0.38	0.1	-0.09	0.13	57.58	0.14	2.11	33.38	93.84
0.15	-0.05	0.36	0.34	0.05	0.22	57.1	0.02	1.73	35.01	94.94
0.09	0.09	0.27	0.04	0.02	0.11	55.88	0.14	3.61	31.64	91.91
-0.01	0.31	0.24	0.11	0	-0.01	58.54	0.34	2.88	32.32	94.71
0.06	0.21	0.59	0.37	0.02	-0.02	57.75	-0.16	1.62	31.59	92.04
-0.02	0.07	0.28	-0.04	-0.03	0.19	54.68	-0.01	2.2	37.03	94.34
0.12	-0.14	0.27	0.03	0.01	0.06	57.12	-0.11	14.65	20.93	92.94
-0.03	0.07	0.66	0.13	0.04	0.05	60.6	-0.14	1.4	31.63	94.42
0.05	0.15	0.2	0.23	-0.02	0.21	58.46	-0.02	2.9	32.71	94.86
0.05	0.06	0.37	0.11	0.03	0.07	58.45	-0.05	3.52	32.41	95
0.07	0.03	0.34	0.23	0.05	0.14	53.09	0.09	1.27	40.22	95.53
0.12	0.04	0.45	0.62	-0.01	0.21	55.65	0.08	5.92	32.59	95.69
-0.06	0.07	0.33	0.02	0.01	0.14	56.16	0.07	3.3	34.72	94.76
0.05	0.19	0.61	0.06	0.03	-0.17	60.62	-0.24	5.43	32.53	99.12
0.26	0.01	0.11	0.1	-0.04	-0.02	51.01	-0.1	8.41	42.05	101.8
0.18	-0.04	0.2	0.09	-0.03	0.14	58.45	0.21	2.84	37.2	99.24
-0.08	-0.05	0.5	0.09	-0.09	0.07	59.79	0.1	1.58	32.03	93.93
0.02	0.3	0.19	0.06	-0.05	0.14	57.82	0.12	2.35	37.1	98.05
0.01	0.15	0.62	0	0.04	0.05	60.53	0.19	2.05	31.11	94.75
0.06	0.02	0.39	0.02	0.02	0.1	59.34	0.01	2.35	31.81	94.14
0.02	0.16	0.3	-0.01	0.03	0.13	60.8	-0.08	5.72	28.76	95.84
0.09	0.01	0.24	0.12	0.04	0.06	57.24	0	2.83	32.12	92.75
-0.09	0.05	0.27	0.03	0.02	0.03	57.89	0.11	3.83	31.11	93.25
0.22	0.13	0.75	0.15	-0.11	0.07	60.76	-0.02	4.23	30.13	96.31
-0.01	0.25	0.44	0.14	0.01	0.13	61.17	-0.16	0.84	33.08	95.9
0.06	0	0.46	0.16	0.1	0.24	57.55	-0.04	6.21	30.64	95.38
-0.04	0.24	1.22	1.17	0.04	0.18	57.75	0.36	4.52	31.61	97.04
0.05	-0.07	0.37	0.2	0.01	0.05	64.29	0.16	4.32	27.53	96.92
0.23	-0.17	0.27	0.14	-0.04	0.06	55.03	-0.11	9.4	31.05	95.84
-0.03	0.11	0.16	0.03	-0.06	0.11	55.61	0	2.91	33.39	92.24
-0.04	0.09	0.26	0.02	-0.03	0.02	58.22	-0.12	7.03	27.04	92.49
0.06	0.16	0.32	0.16	0.06	0.1	57.76	0.04	2.05	33.26	93.96
0	0.33	0.32	0	-0.06	0.13	55.71	-0.11	1.21	35.16	92.69
0.05	0	0.22	-0.02	-0.04	0.14	52.71	0.27	3.91	43.37	100.6
0.05	0.01	0.06	-0.08	0.09	0.16	50.69	-0.05	4.56	44.3	99.8
-0.1	-0.12	0.38	0.11	-0.01	0.01	58.71	0.18	2.5	35.02	96.68
-0.05	0.11	0.9	0.72	-0.12	0.11	61.05	0.31	3.51	28.22	94.76
0.11	0.08	0.44	0.15	-0.05	0.03	58.52	-0.14	3.83	31.83	94.79
-0.04	0.46	0.21	0.17	-0.04	0.14	60.33	-0.02	2.49	30.14	93.85
0	0.06	0.21	0.13	0.08	0.17	59.91	-0.01	1.21	32.65	94.41
0.01	8.82	0.15	0.11	0.02	0.06	58.3	-0.01	2.3	30.95	100.72
0.01	0.14	0.08	-0.02	-0.07	0.1	49.51	-0.1	3.37	44.04	97.07
0.05	0.25	-0.07	0.02	0.05	0.06	54.63	-0.03	3.65	40.01	98.63
0.03	-0.1	-0.03	0.11	-0.03	0.08	50.77	-0.14	5.96	41.54	98.18

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.05	0.02	0.23	0.2	-0.05	0.04	54.4	-0.12	3.61	34.66	92.95
0.04	0.07	0.35	0.15	0.05	0.06	60.06	-0.09	5.18	27.84	93.7
-0.07	0.22	0.26	0.05	0.11	0.07	50.26	-0.19	1.12	43.25	95.07
0.07	-0.02	0.28	0.04	-0.01	0.04	56.95	-0.12	2.83	33.7	93.78
0.21	0.06	0.44	-0.06	-0.05	0.16	56.98	0.07	7.21	29.12	94.13
0	0.05	0.13	0.17	0.02	0.05	57.43	0.08	2.05	37.86	97.84
0.12	0.11	0.22	0.15	0.06	0.19	55.15	-0.05	7.93	29.53	93.4
0.03	0.17	0.12	0.38	-0.03	0.12	53.38	-0.16	5.34	39.66	99.03
0.01	0.23	0.02	0.08	0.06	-0.02	50.54	0.15	6.5	42.12	99.7
-0.13	0.68	0.22	0.07	-0.04	0.03	53.94	0.02	3.1	35.18	93.06
0.06	0.26	0.21	-0.02	0.04	0.05	55.8	0.05	2.37	35.37	94.19
0.03	0.03	0.21	0.14	0.05	0.08	57.09	0.19	3.43	35.43	96.67
-0.05	-0.06	0.24	0.13	-0.02	0.13	57.36	-0.11	2.46	35.21	95.28
0.04	0.2	1.73	2.27	0.03	0.29	59.09	0.14	2.37	27.41	93.56
0.09	0.24	0.31	0.04	0.01	0.27	56.87	0.35	0.92	37.67	96.77
0.2	0.04	0.14	0.07	0	0.06	51.42	0.07	3.2	41.28	96.49
0.11	0.22	1.13	0.15	-0.01	0.17	54.29	-0.04	2.98	34.2	93.19
0.04	0.1	0.53	0.15	0.03	0.08	60.87	0.35	0.38	33.97	96.5
-0.03	0.15	0.45	-0.01	-0.07	0.07	61.14	-0.18	3.51	29.09	94.13
-0.05	0.19	0.32	0.19	0.01	0.13	55.04	0.26	6.15	33.1	95.33
0.13	0.05	0.27	0.15	0.07	0.08	50.65	-0.01	10.71	36.83	98.93
0	0.27	0.23	0.1	-0.03	0.16	58.8	0.12	2.23	34.13	95.99
-0.09	0	0.3	0.07	-0.05	0.25	52.27	-0.01	3.33	40.08	96.15
-0.03	0.09	0.69	0.56	-0.05	0.1	56.34	-0.2	4.96	31.39	93.86
0.09	-0.06	0.77	0.11	0.09	0.2	65.25	0.04	3.52	25.83	95.83
0.08	-0.04	0.12	0.07	-0.07	0.12	51.08	-0.21	4.17	43.18	98.5
0	0.04	0.31	0.18	-0.03	0.09	58.88	-0.09	6.64	27.62	93.65
-0.04	0.1	0.2	0.1	0.09	0.05	60.61	0.52	1.99	32.14	95.75
-0.06	0.17	-0.01	0.01	0.03	0.04	55.59	0.24	2.22	42	100.22
0.12	0.03	1.34	0.14	-0.06	0.1	65.55	-0.04	0.27	26.69	94.15
0.05	0.17	0.76	0.15	0.02	0.09	62.69	-0.13	3.18	28.45	95.45
0.04	0.17	0.13	0.08	0	0.07	50.58	0.12	4.82	44.23	100.23
0.05	0.05	0.34	0.1	0.02	0.11	55.6	0.09	4.58	33.14	94.08
0.06	-0.06	0.38	-0.02	-0.01	0.12	60.43	0.01	2.09	30.88	93.89
0.14	0.17	0.16	0.32	-0.03	0.04	59.35	-0.05	3.38	30.99	94.48
0.02	0.17	0.26	0.07	-0.02	-0.03	55.33	0.11	2.26	36.13	94.3
0.01	-0.05	0.09	0.01	0.01	0.1	97.82	-0.17	0.11	0.74	98.68
0.04	0.02	0.1	0	0.07	0.12	59.43	0.11	1.79	33.5	95.17
-0.01	0.07	0.12	0.01	-0.05	0.05	54.21	0.09	5.4	32.78	92.66

Sample 13-05-15-36

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.1	-0.01	-0.01	0.09	-0.08	0.06	49.47	-0.11	12.55	38.13	100.19
0.16	0.02	-0.07	0.08	0.04	0.03	50.54	0.04	3.83	43.98	98.64
0.07	0.03	0.07	0.11	-0.03	0.03	55.31	0.19	0.52	39.24	95.55
0.12	0.05	0.2	0.05	0.11	0.07	59.94	0.09	2.74	32.1	95.46

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.06	0.07	-0.03	0.02	0.02	-0.05	51.28	-0.08	13.07	35.02	99.39
-0.02	0.02	0.04	-0.05	0	-0.03	51.5	-0.02	2.56	47.07	101.07
0.06	-0.18	0.19	0.08	0.01	0	49.85	0.51	7.36	42.8	100.67
0	0.01	0.38	0.49	0	0.16	57.93	0.07	0.36	32.72	92.12
0.13	0.31	0.34	0	0.06	0.1	62.39	0.04	0.58	32.64	96.59
0.17	0.11	0.17	0.07	0.03	0.09	57	0.28	2.41	36.32	96.65
0.05	0	0.02	-0.08	0.07	-0.04	52.18	-0.04	18.18	32.34	102.68
0.12	0.22	0.18	0.11	-0.02	0.02	57.17	0.09	1.63	38.25	97.77
0.09	-0.07	-0.01	0.05	-0.06	-0.01	53.22	-0.09	24.02	23.2	100.35
0.11	0.14	-0.04	0.18	0.04	0.16	54.43	0.11	7.4	41.11	103.65
-0.02	0.05	-0.11	0.05	0.05	-0.03	55.71	-0.1	2.24	44.46	102.3
0.14	0.22	0.4	0.38	-0.03	0.08	54.07	-0.04	8.03	39.11	102.36
-0.02	0.13	-0.06	-0.04	-0.01	0.09	52.9	0.05	7.57	40.63	101.24
0.7	-0.12	0.05	0.21	-0.04	0.13	53.26	-0.1	11.13	32.49	97.71
-0.02	0.2	0.01	0.23	0.02	0.03	56.2	0.37	2.66	36.2	95.9
-0.01	0.2	0.68	0.56	-0.01	0.12	62.28	-0.18	1.4	28.49	93.52
0.16	0.08	0.06	0.19	-0.06	0.04	51.92	0.1	6.18	37.55	96.21
0.12	0.09	-0.07	0.06	0	-0.08	53.15	-0.05	2.57	42.5	98.3
0.13	0.12	0.6	1.62	0.08	0.18	86.43	0.21	0.69	7.88	97.93
-0.03	0.01	0.31	0.24	0.03	0.05	55.62	-0.25	5.61	32.14	93.72
0.02	-0.14	0.16	0.09	0	0.05	50.97	-0.28	5.32	35.71	91.89
0.16	0.05	0.12	0.09	0	0.12	57.54	0.24	4.13	31.74	94.19
0.03	0.09	0.25	0.15	0	0.23	58.18	-0.01	1.39	31.69	92.01
0.26	-0.01	0.1	0.14	0.02	0.09	54.24	-0.01	5.63	33.52	93.98
0.02	-0.1	0.11	-0.02	0.11	-0.1	50.9	0.05	5.93	42.22	99.13
0.09	0.01	0.04	-0.02	0.08	0.09	55.65	-0.08	0.31	42.14	98.32
0.14	0.13	0	0.08	0.03	0.15	51.58	0.11	7.94	40.46	100.61
0.06	0.21	0.05	0.05	0.03	0.01	48.19	0.21	5.88	43.43	98.13
0.1	0.08	0.05	0.12	0.03	0.04	54.02	-0.05	6.41	33.61	94.4
0.08	0.11	0.06	0.18	-0.04	0.01	57.14	0.17	2.63	36.33	96.67
0.02	0.03	0	0.13	0.01	0.12	49.76	0.07	1.52	47.56	99.22
0.24	0.08	0.21	0.09	0.09	0.09	56.17	-0.12	5.12	35.43	97.39
0.01	0.21	-0.01	-0.1	-0.02	0.11	48.87	-0.15	5.5	44.8	99.23
0.17	0.13	0.21	0.2	-0.02	0.13	61.96	-0.17	1.14	27.7	91.45
0.19	0.17	0.29	0.25	0.12	0.17	55.85	-0.13	2.9	34.36	94.18
0.02	0.21	-0.01	0.03	0.02	-0.02	48.73	-0.07	2.09	45.46	96.46
0.05	0.06	-0.02	0.2	-0.01	-0.06	53.82	0.09	4.07	41.56	99.77
0.06	-0.04	-0.08	0.07	-0.02	0.03	55.56	0.03	2.49	40.1	98.21
-0.05	0.06	0.02	0.2	0.08	0.06	58.91	0.1	1.27	31.45	92.1
0.01	-0.01	0.02	0.12	0.03	0.04	54.04	-0.09	1.72	41.96	97.83
0.01	0.25	0.24	0.12	-0.13	0.12	54.36	0.03	3.12	34.58	92.68
0.17	0.04	-0.02	0.01	-0.03	0.06	58.94	-0.28	3.57	30.65	93.12
0.1	0.02	0.22	0.3	0.02	0.02	59.54	0.18	1.08	30.59	92.07
0.05	0.14	-0.01	0.17	-0.01	0.03	50.2	0.06	3.77	45.42	99.83
0.06	0.12	-0.06	0.05	0.07	0.12	53.91	-0.05	3.55	44.06	101.82
0	0.34	0.34	0.44	0.07	0.17	58.5	0.18	4.33	29.37	93.74
0.05	0.04	0.07	0.15	-0.03	0.06	50.06	-0.07	7.02	42.22	99.57

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.08	0.22	0.16	-0.01	0.04	-0.12	55.34	0.14	6.94	37.74	100.55
0.13	0.05	0.13	0.21	0.06	-0.05	53.88	0.11	8.57	29.28	92.37
0.03	0.04	0.17	-0.03	0.02	0.12	53.66	0.06	2.52	43.33	99.94
0.07	0.11	0.1	0.11	-0.12	0.2	60.06	0.01	2.92	31.15	94.62
0.01	0.18	0.38	0.55	0.05	-0.05	56.91	0.11	3.93	31.78	93.85
-0.05	0.26	0.01	0.21	0.06	-0.02	51.83	0.07	11.09	36.78	100.26
0.02	0.41	2.23	3.45	0.32	0.12	62.76	0.03	3.85	23.42	96.6
0.16	0.15	0.85	0.49	0.06	0.23	59.93	0.14	4.22	28.8	95.03
0.05	0.11	0.05	-0.05	-0.04	-0.05	52.09	-0.05	3.77	44.11	99.97
0.15	0.09	0.23	-0.06	0	-0.07	53.23	0.22	6.88	40.12	100.79
0.02	0.3	0.23	0.18	-0.01	-0.01	54.99	-0.01	4.69	37.71	98.08
0.03	0.03	0.13	0.1	0.02	0.11	54.37	0.15	3.76	35.75	94.44
0.05	0.16	-0.1	0.04	0.07	-0.07	53.61	0.19	3.07	41.5	98.52
0.11	0.07	0.04	0.03	0.03	0.09	53.26	-0.1	4.92	35.48	93.93
0.04	0.16	0.3	0.04	0.04	0.03	53.37	0.05	2.3	38.2	94.54
0.1	0.15	-0.03	0.18	0.01	0.08	52.34	-0.06	5.48	41.34	99.6
-0.01	0.27	0.02	-0.06	0.01	0.1	50.33	-0.08	2.15	45.52	98.25
0.14	-0.03	0.55	1.09	0.04	0.14	85.89	0.1	2.63	7.52	98.06
0.04	0.05	0.06	0.06	0.02	-0.04	51	0.04	4.45	46.47	102.15
0.05	0.07	0.06	-0.07	0	0	59.34	0.24	4.84	34.24	98.78
0.15	0.13	0.28	0.13	-0.01	0.12	58.29	-0.01	3.51	33.84	96.44
0.12	0.14	0.03	0.05	0.04	0.03	55.5	-0.12	2.89	40.34	99.03
0.14	0.21	0.21	0.11	-0.01	0.13	53.6	0.08	6.39	36.01	96.86
-0.02	0.49	0.4	0.13	-0.01	0.14	57.81	0.01	1.08	37.46	97.49
0.09	0.02	0.08	0.15	0.03	0.08	54.21	-0.23	2.31	44.81	101.55
-0.06	0.08	-0.01	0.23	0.04	0.02	60.16	0.11	1.42	34	95.99
-0.03	0.13	-0.07	0.08	-0.06	0.04	48.1	-0.12	21.35	31.97	101.4
0	0.07	0.12	0.04	0.06	-0.03	55.14	0.17	4.75	37.45	97.76
0.07	0.14	0.24	0.12	-0.05	0.12	62.02	0.03	2.28	30.15	95.14
0.01	0.12	0.03	0.11	-0.02	0	53.37	0.17	2.58	43.98	100.34
0.13	0.27	0.2	-0.07	-0.01	0.14	51.7	-0.11	1.65	43.37	97.27
0.12	0.13	1.47	0.08	0.11	0.07	50.66	0.12	4.64	40.48	97.88
0.13	0.11	0.07	0.27	0.09	0.03	58.4	-0.2	1.17	34.76	94.82
0.22	0.02	0	0.11	0	0.02	52.89	0.18	9.63	38.29	101.36
0.07	0.11	0.2	0.09	0.03	0.08	52.71	0.15	4.16	39.57	97.19
0.13	0.06	0.04	-0.05	0.01	0	54.12	0.25	3.94	40.11	98.61
-0.01	0.08	-0.13	0.08	0.02	0.03	52.52	-0.22	3.75	42.02	98.13
-0.01	0.28	0.62	0.45	-0.04	0.33	61.56	0.38	1.29	28.71	93.57
0.04	0.32	0.19	0.11	0.04	0.04	53.76	0.22	1.34	35.15	91.21
0.07	0.18	0.13	0.07	0	0.09	54.36	-0.08	3.44	32.63	90.89
0.05	0.06	-0.07	0.01	-0.07	0.04	48.77	-0.21	9.15	40.05	97.79
0.17	0.01	-0.03	0.22	0.04	0.03	48.7	0.05	4.83	44.21	98.23
0.21	-0.07	0.19	-0.08	0.04	0.04	55.75	0.19	3.5	33.94	93.7
0.09	0.13	0	0	-0.01	-0.06	55.52	0.07	4.03	32.72	92.48
0.84	0.17	0.16	0.35	0.04	0.07	50.72	0.07	6.7	34.59	93.71
-0.07	0.06	0.11	-0.09	-0.03	0.04	47.58	0.03	4.34	45.07	97.04
0.06	-0.02	-0.02	-0.1	0.09	0.07	55.19	0.13	2.94	38.44	96.79

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.12	0.04	0	0.01	-0.07	0.03	47.55	-0.05	9.42	42.61	99.68
-0.05	0.07	-0.03	0.13	0.03	-0.1	53.03	-0.04	2.69	42.96	98.69
0.16	0.13	0.16	-0.02	0.05	0.03	50.12	-0.12	1.86	42.44	94.8
0.24	0.08	0.21	0.11	-0.05	0.01	59.52	0.02	2.59	30.69	93.4
0	0.06	0.09	-0.04	-0.03	0.03	52.36	0.04	2.87	44.58	99.95
0.15	-0.04	0.25	0.21	0.13	0.07	54.9	-0.03	3.24	34.19	93.08
0.17	0.12	0.34	0.17	0.05	0.22	59.78	0.11	1.33	30.66	92.93
0.01	0	-0.08	0.14	-0.05	0.12	53.35	0.12	4.72	41.97	100.31

Sample 13-05-15-37

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.01	0.01	0.35	0.12	0.02	0.24	57.87	0.07	2.59	32.11	93.39
-0.03	0.07	0.17	0.04	-0.05	0.04	59.86	0.16	1.45	32.52	94.21
0.03	-0.02	0.15	0.11	0.08	0.11	56.79	0.14	5.53	33.47	96.39
0.01	-0.01	0.23	0.17	0.02	0.04	57.9	-0.11	9.86	28.11	96.23
0.12	-0.01	0.38	0.06	0.03	0.1	60.39	-0.13	4.26	31.73	96.94
0.01	-0.02	0.32	0.23	0.01	0.22	62.59	0.09	0.66	33.31	97.42
0.04	0.03	0.18	0	0.03	-0.01	62.92	0.03	1.7	32.11	97.03
-0.01	0.17	0.3	0.04	0.03	0.07	63.91	-0.27	3.06	30.43	97.74
-0.07	0.11	0.14	-0.05	0.04	0.06	60.89	0.19	2.72	34.63	98.66
0.02	0.08	0.32	0.13	-0.09	0.07	60.34	0.12	17.23	21.97	100.18
0.13	-0.1	0.37	0.06	0.09	0.05	65	0.12	1.99	30.7	98.41
-0.02	-0.06	0.36	0.02	-0.01	0.06	64.32	0.2	1.69	32.78	99.34
0.03	0.11	0.28	-0.01	0.02	0.16	63.83	-0.11	1.88	32.85	99.03
0.04	-0.03	0.35	0.08	-0.07	0.26	59.73	-0.15	8.61	29.71	98.53
0.07	0.04	0.42	-0.02	-0.09	0.07	63.53	-0.12	1.61	32.83	98.32
0.08	0.03	0.14	-0.03	0.02	0	62.49	-0.1	2.09	35.28	99.99
0.01	0.13	0.4	0.19	-0.01	0.15	66.53	-0.01	1.94	29.56	98.9
-0.02	0.07	0.16	0.17	-0.05	0.11	61.34	0.25	0.72	36.34	99.08
-0.01	-0.05	0.28	0.05	-0.06	-0.04	63.79	-0.13	2.15	34.27	100.25
-0.02	0.08	0.36	-0.02	0.02	-0.04	62.98	0.01	0.65	34.67	98.7
0	-0.04	0.3	0.11	-0.11	0.14	66.12	0.08	1.62	31.7	99.9
0	0.01	0.16	0.09	-0.03	0.06	59.04	0.09	5.26	37.05	101.72
-0.04	0.06	0.31	-0.01	-0.07	0.07	64.95	-0.02	6.56	27.41	99.22
0.04	0.39	0.57	-0.05	0.04	0.16	66.47	0.08	1.1	31.84	100.63
0.1	-0.04	0.31	0.08	0	0.02	65.55	-0.12	2.57	31.34	99.82
0.06	0.11	0.01	0.09	0.03	0.09	60.36	-0.1	5.77	34.86	101.27
-0.02	0.08	0.35	0.07	0.05	0.08	62.02	0.16	4.14	34.27	101.2
0.1	0.16	0.5	-0.02	-0.01	0.05	65.21	-0.07	2.16	32.04	100.13
0.03	0.09	0.32	-0.08	0.13	-0.02	62.94	0.02	1.61	34.4	99.44
-0.01	0.01	0.31	0.16	-0.1	0.11	62.75	-0.36	2.94	34.62	100.45
-0.04	0.11	0.16	-0.02	-0.12	-0.04	63.54	-0.08	4.31	30.34	98.15
-0.05	0.16	0.42	-0.01	0.02	0.02	64.71	-0.14	2.41	32.15	99.7
-0.11	0.2	0.37	0.08	0.05	0.11	62.71	0.17	4.05	32.35	99.98
0	0.06	0.26	-0.01	0.01	0.12	64.64	-0.05	3.24	32.05	100.33
0.06	-0.09	0.31	0.13	0	0.08	61.4	0.21	1.04	35.81	98.94
-0.07	0.06	0.21	0.12	-0.05	-0.03	62.07	0.04	3.28	33.65	99.28

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
-0.04	0.18	0.31	0.15	0.06	-0.03	64.14	-0.04	2.37	31.44	98.54
0	0.09	0.55	0.2	-0.03	0.13	67.08	0.1	1.28	29.88	99.27
0.05	-0.11	0.18	0.08	0	0.09	62.32	-0.07	5.19	29.81	97.55
0.08	0.13	0.35	0.56	-0.05	0.11	63.48	-0.05	2.88	31.07	98.55
0.01	-0.03	0.42	0.1	0.01	0.12	59.11	-0.13	6.32	32.82	98.77
0.05	0.2	0.1	0.19	-0.04	0.09	63.07	-0.18	3.39	33.94	100.8
0	0	0.64	0.04	0.01	-0.05	64.21	0.1	4.72	28.8	98.47
0	0.2	0.36	-0.06	0.03	0.12	61.95	0.01	3.31	33.06	98.97
-0.07	0.18	0.51	0.14	0.05	-0.1	68.29	0.03	0.78	31.92	101.73
0.1	0.18	0.69	0.04	0.05	0.06	64.69	-0.05	2.79	29.51	98.07
0.04	0.13	0.25	0.18	0.06	0.09	61.37	0	2.51	33.63	98.27
-0.05	0.04	0.17	0.01	0	0.05	59.61	-0.01	1.8	36.03	97.65
-0.06	0.05	0.34	0	-0.06	0.04	61.56	0.27	2.78	34.44	99.36
-0.03	-0.07	0.26	-0.07	0.01	0.07	64.65	-0.1	2.35	32.48	99.55
0.03	-0.02	0.36	0.09	0	0.2	61.91	-0.1	13.27	23.88	99.62
0.02	0.22	0.46	-0.08	-0.1	-0.05	63.64	0.18	5.26	32.19	101.73
-0.1	-0.08	0.23	-0.01	0.04	0.02	67.19	0.22	1.5	32.5	101.52
-0.04	0.1	0.2	0.21	-0.11	0.13	65.15	0.31	2.01	32.19	100.15
0.14	-0.01	0.2	0.07	-0.07	0.09	56.73	-0.02	5.67	37.64	100.42
0.13	0.03	0.3	0.11	0.02	0.12	64.16	0.08	3.84	32.02	100.83
-0.01	-0.02	0.38	0.04	0.04	0.12	64.31	-0.11	1.85	33.19	99.79
-0.01	0.06	0.36	-0.03	0.01	0.16	64.9	-0.14	2	34	101.3
-0.04	0.26	0.06	0.02	-0.03	0.01	60.93	0.1	3.69	40.58	105.57
0.02	0.09	0.26	0.07	0.02	0.04	66.26	-0.13	1.33	32.26	100.23
0.03	0.01	0.17	0.17	-0.1	-0.01	64.17	-0.09	1.53	35.64	101.53
0.06	0.14	0.42	0.1	0.06	0.14	64.2	0.63	2.46	32.43	100.66
-0.02	4.29	0.98	-0.06	0.09	-0.04	59.86	0.11	0.69	33.65	99.53
0.04	0.29	0.11	0.04	0.09	-0.04	62.15	0.1	2.05	36.03	100.87
0.18	-0.01	0.26	0.18	-0.09	0.14	65.56	-0.04	1.56	33.63	101.37
0.06	0.06	0.2	0.14	0.08	0.07	63.26	-0.04	9.53	28.52	101.89
0.02	0.17	0.34	0.05	0.02	0.11	63.71	0.02	2.14	31.29	97.87
0.05	0.32	0.25	-0.05	-0.01	0.08	62.32	-0.02	0.94	34.81	98.7
0.02	0.07	0.38	0.04	-0.02	0.14	60.54	-0.13	4.16	32.96	98.15
-0.11	0	0.08	0.14	0.06	-0.07	56.42	-0.01	3.22	38.25	98
0.05	0	0.44	-0.06	-0.08	0.13	61.91	0.07	4.05	32.74	99.24
0.08	0.07	0.21	0.04	-0.08	0.01	58.49	0.24	6.9	33.31	99.26
0.09	0.07	0.14	0.02	0.03	0.06	63.38	-0.05	2.1	31.71	97.55
-0.03	0.08	0.51	0.05	0.02	-0.01	65.14	0.03	2.39	31.11	99.29
0.03	0.02	1.03	0.01	-0.01	0.1	62.19	0	3.16	31.05	97.57
-0.04	0.09	0.16	0.08	0	0.09	62.13	-0.25	4.76	32.1	99.12
-0.1	0.11	0.34	-0.04	0.05	0.15	64.26	-0.04	6.79	27.02	98.54
-0.02	0.34	0.24	0.01	0.04	0.22	62.55	0.09	2.49	34.44	100.4
-0.01	0.07	0.36	0.09	-0.01	-0.02	65.08	-0.12	1.21	32.15	98.81
0.04	0.09	0.14	0.05	0.03	0.01	63.43	0.09	1.98	32.61	98.47
-0.05	0.18	0	0	0.04	0.14	61.93	0.11	1.1	33.98	97.45
-0.1	-0.02	0.26	0.02	-0.02	0.02	63.63	-0.07	2.87	33.42	100.02
-0.06	0.1	0.35	0.07	0	0	63.37	0.1	2.19	33.93	100.03

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.09	0.06	-0.02	0.13	0.04	0.16	59.83	0.23	1.63	41.5	103.62
0.01	0.05	0.21	0.07	-0.03	-0.03	64.8	0.09	1.63	32.75	99.55
0	0.04	0.28	0.22	0.03	0.12	63.75	0.18	7.26	27.29	99.19
0.05	0.33	0.35	0.19	-0.07	0.12	65.34	-0.01	1.85	31.26	99.41
0	0.16	0.76	0.21	0.05	0.17	72.85	0.06	0.57	24.19	99.03
0.01	0.15	0.13	-0.03	0.15	0.08	60.71	-0.14	4.53	37.17	102.75
0.04	-0.02	0.48	0.06	0.08	0.07	62.48	-0.11	9.08	28.86	101
0.05	-0.01	0.25	0.04	0.02	0.12	59.39	0.15	3.36	37.1	100.47
-0.11	0.05	0.32	-0.19	0.03	0.01	64.99	0.04	2.24	32.42	99.81
0.06	0.15	0.94	-0.01	-0.11	0.2	64.57	-0.27	4.6	31.14	101.27
-0.01	0.11	0.23	0.09	0.05	0.08	60.45	0.1	1.71	36.71	99.52
0.08	0.18	0.25	0.06	0.06	0.1	61.62	0.05	1.63	35.82	99.84
-0.06	-0.02	0.17	0.03	0	-0.03	60.86	0.16	2.78	37.72	101.6
0	0.1	0.59	0	-0.06	0.13	67.3	-0.15	2.73	29.1	99.75
-0.04	0.05	0.41	0.05	-0.03	0.09	59.07	-0.12	4.51	35.48	99.46
0.05	0.02	0.13	-0.05	0	0.01	63.34	0.07	1.45	32.04	97.05
0.06	0.09	0.24	0.12	0.01	0.04	63.15	0.05	2.25	33.82	99.84
-0.06	0	0.53	0.1	-0.06	0.12	67.3	0.17	0.74	31.29	100.13
-0.04	0.11	0.25	-0.04	0	0.15	65.59	0.2	3.65	32.45	102.33
0.03	0.05	0.3	-0.03	0.03	0.14	69.14	-0.05	1.66	28.69	99.95
-0.1	0.13	0.09	0.09	-0.09	0.1	61.9	0.31	1.3	36.81	100.55
-0.07	0.23	0.42	-0.04	0.03	0.09	59.26	-0.12	5.96	32.7	98.45
-0.06	0.07	4.53	0.09	0.04	0.08	67.13	-0.07	1.66	27.12	100.6
0.07	0.13	0.42	0.02	-0.03	-0.05	64.75	0.16	2.1	29.53	97.11
-0.07	0.02	0.07	0.21	0.02	0.08	64.82	-0.05	2.99	32.72	100.82
0.08	0.02	0.44	0.02	-0.01	0.1	64.7	-0.13	0.97	32.43	98.62
0.01	-0.03	0.05	0.08	0.03	-0.01	57.57	0.03	10.68	33.19	101.6

Sample 29-05-15-25

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.04	0.22	0.25	0.05	-0.05	0.09	64.17	-0.32	5.5	29.29	99.24
-0.12	0.17	-0.18	0.11	0.04	0	56.02	0.32	1.1	49.55	107.01
-0.01	0.16	0.15	0.06	-0.05	-0.03	57.26	0.13	2.61	42.3	102.57
-0.1	0.1	0.32	0.09	0.08	0.07	61.26	0.05	3.09	36.6	101.56
-0.06	0.02	-0.08	0.09	0.01	0.05	54.87	0.25	3.7	47.42	106.26
0.1	0.12	0.36	0.07	0.03	0.26	63.89	0.17	1.5	32.09	98.58
0.15	0.07	0.48	0.12	0.1	0.16	60.9	0.04	2.99	35.04	100.05
-0.08	0.09	0.08	0.14	-0.08	0.05	56.7	-0.14	7.16	34.97	98.9
0.04	0.12	0.28	0.08	0.03	0.06	61.76	0.02	5.32	32.88	100.58
-0.03	0.18	1.37	0.48	0.03	0.3	61.8	0.11	1.67	28.69	94.6
0.08	0.21	1.77	1.1	-0.09	0.99	79.73	0.24	0.17	13.38	97.57
-0.04	0.12	0.66	0.35	-0.09	0.09	64.81	0.12	2.62	31.77	100.42
0.02	0.3	1.03	0.73	-0.03	0.44	72.07	0.05	0.43	24.44	99.48
0.04	0.07	-0.01	0.08	0.04	0.02	52.12	0.02	2.9	49.88	105.16
0.01	0.17	0.24	0.26	-0.05	0.2	64.15	0.03	21.97	12.26	99.25
0.16	0.5	0.58	0.42	0.05	0.43	63.8	0.18	3.27	30.06	99.45
0.08	0.09	0.25	0.11	-0.03	0.1	65.27	-0.11	1.06	31.53	98.35

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.14	0.02	0.4	0.1	0.05	0.2	65.68	-0.19	3.72	29.55	99.67
0.23	0.07	0.81	0.41	0.01	0.14	66.03	0.29	4.74	25.84	98.59
-0.06	0.18	0.07	0.16	0.01	-0.07	57.73	0.05	3.13	39.31	100.53
-0.01	0.2	-0.01	0.22	0.04	0.1	62.02	-0.01	2.5	34.66	99.72
0.02	0.08	0.13	0.12	0.04	0.2	63.24	0.03	5.42	30.5	99.78
0.11	0.2	0.1	0.22	0.04	0.05	63.3	0.13	2.91	32.91	99.95
0.04	0.11	0.13	0.21	0.12	0.23	62.14	0.18	1.98	33.21	98.34
-0.01	0.02	0.17	0.06	-0.05	0.18	60.3	0.05	1.99	34.91	97.62
0.02	-0.02	0.17	-0.12	-0.07	-0.02	55.54	0.27	1.54	47.95	105.24
-0.02	0.25	0.28	0.08	-0.02	0.13	58.6	-0.06	3.09	35.48	97.79
-0.1	0.12	0.34	0.24	-0.02	0.11	63.21	0.15	1.74	33	98.79
0.07	0.04	0.07	-0.02	0.04	0.12	59.27	0.21	1.73	42.75	104.28
0.02	0.07	0.18	0.27	-0.01	0.04	65.32	0.06	2.6	29.91	98.47
-0.09	0.09	0.18	0.03	-0.07	0.1	66.14	0.03	2.92	30.26	99.59
-0.02	0.29	0.84	0.23	0.07	0.11	64.62	0.1	1.53	28.88	96.65
0.13	0.14	-0.07	-0.05	-0.09	-0.05	53.54	0.13	1.6	50.08	105.35
0.01	0.22	0.06	0.14	0.02	-0.02	53.36	-0.04	6.98	45.24	105.96
0.01	0.3	1.13	0.61	0	0.35	81.48	0.19	2.22	15.49	101.78
0.07	0.19	0.61	0.19	-0.01	0.13	65.8	0.2	1.62	33.31	102.11
0.04	0.11	0.21	0.31	0.14	0.42	65.15	-0.15	2.76	31.33	100.32
-0.05	0.42	0.29	0.34	0.06	0.14	65.74	0.29	4.15	31.37	102.74
0.08	-0.06	-0.01	0.05	-0.05	0.1	53.63	0.09	4.02	42.52	100.35
0.11	0.12	0.17	0.26	0.01	0.02	61.88	0.25	4.89	33.34	101.05
0.19	-0.1	0.28	0.22	-0.05	0.11	61.78	0.24	5.6	33.02	101.3
0.11	0.03	0.06	0.21	0.01	0.13	62.64	0.09	3.04	33.68	100
0.02	0.01	0.2	0.22	-0.01	0.19	62.71	0.07	1.69	34.34	99.44
0.12	0.09	5.95	8.54	1.19	0.25	87.97	0.01	-0.01	1.14	105.26
0.02	0.05	0.11	0.12	0.02	0.09	63.9	0.17	5.11	31.5	101.08
0.03	0.24	0.4	0.11	0.08	0.07	62.57	-0.05	2.03	35.91	101.39
-0.06	-0.13	0.21	0.08	-0.03	0.03	56.64	0.2	5.07	36.84	98.85
0	-0.02	0.12	0.15	0.01	0.09	59.79	-0.23	3.94	35.27	99.12
0.08	0.12	0.43	0.62	-0.01	0.07	60.93	-0.08	9.19	30.75	102.1
-0.02	0.16	0.1	0.12	0.09	0.06	58.51	0.04	4.5	40.11	103.68
0.01	0.09	0.13	0.15	-0.05	0.02	63.27	0.03	2.22	32.15	98.02
-0.12	0.01	0.08	0.2	0.09	0.06	52.13	-0.2	9.51	43.42	105.18
0.07	0.08	-0.02	0.19	0.06	0.04	62.15	0.34	1.09	32.81	96.83
0	0.09	0.29	0.01	0.03	0.16	58.52	0.1	3.42	40.92	103.54
-0.07	0.18	0.16	0.03	0.06	-0.01	64.07	0.08	2.41	34.46	101.36
0.16	-0.1	0	0.12	0.11	0.02	54.84	0.05	1.97	49.35	106.52
0.03	0.11	-0.03	0.01	-0.01	0.08	54.87	0.02	1.26	49.27	105.61
0.15	0	0.06	0.06	-0.03	0.05	56.33	-0.09	2.23	43.38	102.13
0.14	0.05	0.08	0.17	-0.01	0.13	56.76	-0.12	10.06	34.43	101.69
-0.05	0.08	0.22	0.29	-0.11	0.12	62.56	0.42	2.65	32.99	99.17
0	0.06	0.13	0.17	0.11	0.06	64.53	0.13	4.29	33.6	103.09
-0.02	0.1	0.37	0.06	-0.04	0.16	59.75	0.13	2.44	38.59	101.55
0.04	0.08	-0.03	0.02	0.01	0.06	54.27	0.13	5.8	46.83	107.2
0.06	0.01	0.41	0.15	-0.02	0.11	63.21	-0.06	1.13	37.08	102.08

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.01	0.08	0.07	0.09	-0.02	0.21	62.68	-0.05	2.16	36.58	101.81
0.11	0.33	1.26	0.63	0.06	0.27	69.13	0.11	3.52	25.47	100.89
0.09	-0.02	0.35	0.14	0.01	0.1	60.38	-0.01	6.04	31.53	98.62
0.05	0.16	0.26	0.09	0.03	0.12	62	0.21	4.92	32.52	100.37
0.09	0.18	0.35	0.22	-0.04	0.28	66.18	-0.17	1.59	33.3	101.99
0.1	0.08	0.08	-0.01	0.11	-0.04	62.41	-0.16	6.99	34.47	104.03
-0.01	0.14	0.85	0.34	0.04	0.15	65.94	0.22	2.57	30.58	100.81
0.05	0.05	0.05	-0.06	-0.04	0.07	55.88	0.12	2.19	48.49	106.78
0.04	0.06	0.07	0.08	-0.06	-0.01	56.29	0.18	7.5	42.99	107.14
0.09	0.15	0.15	0.12	0.07	0.18	60.07	0.17	3.16	37.51	101.68
0.13	0.23	0.6	0.19	-0.04	0.38	71.73	0.34	2.28	27.16	103.01
0.06	0.12	0.21	0.22	-0.02	0.18	63.62	0.19	1.25	35.58	101.41
0	0.11	0.08	0.11	-0.1	0.07	63.87	0.01	1.96	32.5	98.6
0.07	0.16	1.08	0.23	0.02	0.21	66.55	0.5	3.7	30.21	102.74
0.18	0.2	0.51	0.21	-0.03	0.32	68.87	0.02	3.45	27.66	101.41
0.08	0.01	0.19	0.26	0.07	0.05	61.15	0.1	4.18	34.94	101.03
-0.06	0.16	0.11	0.19	0.01	0.22	60.4	0.2	6.16	34.13	101.52
0	0.42	1.36	1.55	0.07	0.81	76.11	0.04	1.04	18.21	99.63
0.14	0.05	0.5	0.12	-0.01	0.13	64.03	0.09	1.74	32.02	98.8
0.1	0.11	0.16	0.04	0.01	0.22	65.72	0.22	2.52	31.16	100.26
0.08	0.19	0.57	0.99	0.1	0.27	67.05	0.05	2.31	27.73	99.34
0.08	0.04	0.28	0.18	0.03	0.08	60.53	0.03	2.31	37.74	101.3
-0.02	0.22	0.32	0.15	-0.01	0.13	56.37	0.15	5.78	37.76	100.86
-0.06	0.21	0.62	0.3	0.05	0.15	64.63	0.61	3.41	32.41	102.32
0.04	0.14	0.14	0.13	0.02	0.27	63.08	-0.1	4.42	29.76	97.89
-0.03	0.18	0.4	0.18	-0.06	0.05	60.61	0.18	2.71	36.43	100.65
0	0.21	0.15	0.25	-0.03	0.16	65.86	-0.26	1.36	32.77	100.48
-0.03	0.06	0.29	0.21	0.08	0	62.29	-0.1	13.68	23.73	100.21
-0.05	0.03	0.02	-0.07	-0.02	0.09	56.82	-0.01	2.67	47.11	106.61
0.03	0.06	0.36	0.08	0.05	0.12	64.52	0.04	1.45	32.93	99.64
0.06	0.01	0.08	-0.04	0.06	0.19	59.28	0.02	4.8	36.94	101.4
0.03	0.04	0.28	0.15	0.13	0.06	59.59	-0.1	7.55	32.45	100.18
0.05	0.03	0.24	0.35	-0.05	0.27	67.61	0.1	0.54	27.77	96.92
0.08	0.12	0.07	-0.01	0.11	0.25	56.13	0.35	4.72	39.46	101.28
0.09	0.28	1.15	0.58	-0.02	0.43	73.94	0.14	0.36	18.47	95.43
0.09	0.19	0.9	0.15	0.02	0.15	63.96	0.53	1.9	31.04	98.93
0.15	0.06	0.27	0.7	0.08	0.03	98.11	0.03	2.05	3.65	105.11
0.04	0.08	0.26	0.12	0.04	-0.01	64.23	0.1	5.67	29.17	99.71
0.11	0.32	0.25	0.28	0.01	0.05	65.57	-0.08	4.67	29.52	100.7
0.02	0.15	0.76	0.61	-0.02	0.17	68.37	0.25	1.42	27.63	99.37
0	0.19	0.39	0.07	-0.03	0.17	65.63	0.2	1.97	33.08	101.67
0.02	0.16	0.28	0.2	-0.06	0.24	65.23	0.02	1.53	29.23	96.87
0.02	0.09	0.36	0.21	-0.08	0.2	60.76	-0.15	3.51	32.34	97.29
-0.01	1.92	0.01	-0.01	-0.06	0.07	57.09	0.49	0.87	45.38	105.75
0.03	0.05	0.21	0	0.03	0.09	60.95	-0.16	1.86	39.99	103.05
0.07	0.03	-0.01	0.17	-0.03	-0.07	54.13	0.08	3.23	48.01	105.61

Sample 31-03-16-18

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.01	0.2	0.09	0.01	-0.06	0.17	53.1	0.08	2.16	45.37	101.13
0.1	0.25	0.1	0.01	0.04	0.12	51.09	0.23	2.63	46.66	101.24
0.06	0.17	0	0.1	0.09	-0.04	47.66	0.13	4.02	50.03	102.19
0.06	0.13	0.37	0.1	0.04	0.15	52.47	0.02	1.55	43.04	97.93
0.04	0.07	0.14	0.01	0.07	0.13	58.11	0.22	4	35.63	98.4
0.03	0.18	-0.02	0.14	0.14	-0.08	52.39	0.21	4.25	43.15	100.4
0.09	0.09	0.14	0.04	0	-0.04	54.19	0.16	7.16	41.07	102.89
-0.07	0.16	0.04	0.18	0.09	0.09	55.21	-0.16	4.51	38.34	98.39
0.1	0.13	0.14	0.21	0.01	0.18	54.62	0.08	2.98	42.09	100.52
0.1	0.01	0.09	0.13	0.04	0.14	55.32	0.18	1.96	37.59	95.57
-0.06	0.15	1.4	0.24	0.08	0.1	62.43	0.91	0.98	31.07	97.3
0.18	0.13	0.11	0.06	-0.02	0.08	53.58	-0.04	2.4	44.09	100.58
0.17	0.11	0.17	0.16	-0.03	0.12	53.27	0.22	3.53	38.56	96.26
-0.04	-0.04	0.11	0.1	0.05	0.13	40.95	-0.07	3.93	35.29	80.4
-0.03	0.07	0.14	-0.18	0	0.13	51.43	0.36	2.33	41.72	95.98
-0.05	0.18	-0.06	0.14	0.09	0.02	54.99	0.13	3.5	44.97	103.91
0	0.16	0.1	0.12	-0.05	-0.01	53.75	0.12	3.36	41.32	98.86
0.12	-0.06	0.08	0.05	0	-0.03	54.17	0.43	4.76	43.51	103.02
-0.06	0.01	0.04	0.19	0.02	0.02	54.16	-0.02	2.49	46.64	103.48
0.04	0.11	0.15	0.09	0	0.18	58.87	0.35	3.56	34.69	98.05
0.08	0.02	0	0.1	0.03	-0.01	54.36	0.33	5.48	42.66	103.04
0.12	0.01	0.08	0	-0.04	0.04	55.21	0.2	5.49	43.01	104.12
0.03	0.53	11.41	0.07	0.06	0.02	51.01	0.31	1.21	41.51	106.16
-0.03	0.17	0.07	-0.08	0.01	-0.06	52.54	0.09	5.06	44.08	101.84
0.05	0.09	0.02	0.11	-0.07	0.11	55.54	0.08	4.19	42.13	102.25
0.07	0.07	0.07	-0.05	0	0.05	55.26	0	4.09	42.62	102.17
0.02	0.22	0.14	0.21	-0.01	0.06	55.9	0.16	1.56	40.9	99.17
0.02	0.09	-0.02	0.15	0.06	-0.01	54.42	0.12	2.89	46.87	104.58
-0.05	0.14	0.05	0.05	-0.03	0.01	53.67	0.23	1.41	49.23	104.7
0.08	0.19	0.11	0.15	-0.1	0.16	56.8	0.15	3.49	38.9	99.94
0.21	-0.02	0.22	0.23	0.06	0	53.93	0.11	2.06	46.61	103.41
-0.06	0.11	-0.02	0.03	-0.06	-0.02	55.11	0.1	1.01	48.28	104.49
0.01	0.13	0.27	0.32	-0.01	0.14	58.38	0.27	2.41	38.91	100.82
0.14	-0.04	0.21	0.01	0	0.05	53.27	0.04	2.2	49.29	105.18
0.02	0.17	0.09	-0.02	-0.11	0.03	55.01	0.01	4	42.16	101.34
-0.08	-0.11	0.17	-0.04	-0.04	0.07	49.14	0.1	2.34	51.07	102.63
0	0.05	0.19	0.06	0.01	0.09	60.64	0.35	2.19	34.36	97.93
0.04	0.12	0.2	0.06	0.02	0.01	56.4	0.17	4.11	44.07	105.19
0	0.21	0.09	-0.08	-0.12	0.03	52.3	0.12	1.91	48.17	102.62
0.1	0.07	0.04	0.1	-0.01	0	56.03	0.14	2.25	38.79	97.5
0.06	0.14	1.09	0.36	-0.05	0.15	62.6	0.21	1.84	29.02	95.42
0.04	0.07	2.71	0.28	0.01	0.26	53.93	0.26	3.23	41.53	102.32
0.01	0.05	0.33	0.22	0.05	0.11	63.86	0.08	3.5	34.91	103.13
0.1	0.59	-0.05	-0.07	0.03	0.14	58.11	0.03	1.1	43.59	103.56
0.02	0.05	-0.06	0.04	-0.01	0.04	54.4	0.03	4.07	46.64	105.22
0.07	0.18	0.14	0.24	0.06	0.02	56.85	0.03	2.92	39.46	99.97

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.08	0.14	0.11	0.25	0.03	0.18	59.76	0.07	3.01	35.54	99.19
0.03	0.23	0.19	0.12	0.05	0	53.8	0.19	1.96	41.08	97.65
0.18	0.05	0.07	0.12	0	0.07	54.42	0.13	3.58	41.45	100.08
0.01	0.19	-0.04	0.06	0.06	-0.04	54.69	0.08	2.97	44.12	102.1
0.15	0.1	0.08	0.15	0.05	0.13	55.2	0.01	1.91	37.65	95.43
0.05	0.23	0.1	0.23	0.05	0.21	58.28	0.07	3.53	35.17	97.93
0.08	0.21	0.06	0.01	0.09	0.05	52.61	0.28	3.35	43.35	100.09
-0.12	0.43	-0.03	0.02	0.02	0.08	51.09	0.14	1.66	45.05	98.34
-0.06	0.17	0.45	0.44	0.02	0.28	61.35	0.27	2.29	33.49	98.69
0.04	0.02	0.04	0.03	-0.09	0.1	53.53	0.08	6.63	42.28	102.65
0.19	0.13	0.07	0.08	0.05	0.04	52.07	0.2	2.08	47.82	102.74
0.02	0.17	0.02	0.05	-0.05	-0.01	50.75	0.21	3.85	47.79	102.81
-0.02	0.1	-0.02	0.15	-0.05	-0.02	56.39	-0.26	2.32	37.71	96.3
0.03	0.24	-0.08	0	-0.03	-0.04	52.12	0.44	2.92	47.13	102.73
0.13	0.06	0.16	0.07	0.01	0.03	54.77	0.08	3.87	40.39	99.57
0.1	0.15	0.03	0.03	-0.04	0.01	53.36	0.21	4.14	43.96	101.95
0.03	0.36	0.18	-0.08	0.02	0.12	55.19	0.28	2.87	41.34	100.32
0.07	0.13	0.07	-0.01	0.03	0.16	50.45	0	2.33	49.61	102.84
0.04	0.17	0.04	0.14	0.05	0.09	54.96	0.32	2.94	41.05	99.79
0.17	-0.09	0.11	-0.01	0.07	0.03	50.2	0.03	5.57	46.87	102.95
0.04	0.19	0.23	0.17	0.04	0.07	60.59	0.33	2.7	31.92	96.29
0.04	0.27	0.26	0	-0.04	0.1	50.72	0.05	3.32	48.46	103.16
0.02	0.2	-0.02	-0.07	-0.04	-0.03	53.48	0.11	3.45	44.9	101.99
0	1.06	0.25	-0.21	0.05	0.12	56.45	0.26	0.9	44.09	102.96
0.04	0.1	0.13	0.12	0.07	-0.03	53.72	0.17	4.43	40.25	99
-0.02	0.22	0.54	0.2	0.12	0.07	63.7	0.47	3.92	32.39	101.62
0.18	0.14	0.67	0.5	0	0.38	65.57	0.29	2.75	25.82	96.29
0.03	0.19	0.76	0.08	-0.03	0.22	57.21	0.43	3.42	36.5	98.8
0.04	0.13	-0.03	0.11	0.04	0	52.09	0	2.17	45.96	100.52
0.03	0.01	0.17	0.21	-0.05	-0.01	64.57	-0.09	1.99	34.43	101.26
0.05	0.26	-0.12	0.2	0.13	0.02	51.28	0	1.69	48.58	102.08
0.04	0.05	0.01	-0.11	0.05	0.09	54.06	0.11	2.42	46.85	103.57
0.12	0.28	0.12	0.17	0.05	0.18	57.7	0.14	1.09	37.87	97.71
-0.04	0.13	0.04	0.1	0.01	-0.01	50.92	-0.03	2.77	49.22	103.11
0.03	1.28	-0.08	0.08	0.01	-0.06	52.42	0.32	0.74	48.71	103.47
0.04	0.05	-0.01	0.02	-0.03	-0.06	51.48	0.14	4.04	48.05	103.72
-0.02	0.25	0.22	-0.03	0.02	0.09	55.56	-0.03	1.86	48.44	106.36
0.04	0.11	0.06	0.1	-0.04	-0.05	56.16	-0.13	1.52	47.62	105.38
-0.04	0.27	0.07	0.15	0.04	0.01	55.82	0.08	3.04	42.51	101.95
0.06	-0.05	0.14	0.07	0.04	-0.01	55.39	0.07	1.14	45.55	102.41
0.11	0.21	0.23	0.1	0.06	0.04	60.04	0.04	1.17	40.31	102.3
-0.05	0.47	0.08	0.18	0.06	0.04	58.81	0.23	1.35	41.34	102.51
-0.03	0.08	0.04	-0.04	-0.03	0.04	51.5	-0.01	1.79	49.7	103.03
0.13	-0.05	-0.03	0.07	-0.03	0.08	52.95	-0.14	5.29	45.62	103.9
0.03	0.16	0.12	0.07	0.09	-0.08	49.51	-0.19	4.86	47.4	101.96
0.08	0.23	-0.01	0.05	0.07	0.06	51.5	0.09	3.35	46.6	102.01
-0.06	0.09	0.03	0.09	-0.11	-0.01	51.29	0.07	6.02	45.11	102.54

Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	Cr_2O_3	MnO	FeO+ Fe_2O_3	Total
0.12	0.16	-0.1	-0.05	0	0.05	54.94	0	4.02	44.62	103.75
0.2	0.06	0.07	-0.01	-0.02	-0.04	52.91	0.23	10.49	40.68	104.58
0.09	0.31	0.22	0.04	0.07	-0.03	52.24	0.31	2.34	48.39	103.97
0.05	0.18	0.02	0.02	-0.06	0.15	54.59	0.23	2.67	45.88	103.73
0.02	0.02	0.15	0.23	0.03	0.06	60.63	0.18	1.34	35.55	98.23
-0.01	0.12	0.18	0.19	0.02	0.1	58.04	0	1.82	42.53	102.98
0.15	0.05	3.47	2.61	0.01	0.81	66.6	0.04	2.17	19.03	94.95
0.08	0.05	0.13	0.21	0.05	0.33	58.94	-0.11	3.86	32.58	96.13
0.08	-0.01	0.5	0.13	0	0.05	53.81	0.2	2.46	45.14	102.38

c) Qemscan results (mineral volume %)

Sample	Cua Dai	Tra Khuc	Song Ve	**Bong Son**	Da Rang	**hm**	**hm**	Song Cai	**hm**	**hm**	**HM**	**hm**	**hm**	**Song cau**
River	F	G	H	**I**	K			L						**J**
Sample number	**06-05-15-01**	**06-05-15-02**	**06-05-15-03**	**06-05-15-04**	**07-05-15-05**	**07-05-15-07**	**07-05-15-08**	**07-05-15-09**	**08-05-15-14**	**09-05-15-21**	**09-05-15-25**	**13-05-15-36**	**13-05-15-37**	**13-05-15-38**
Number of Particles	7956	4826	3595	7077	7355	3857	1586	11709	10426	4553	7151	6540	4627	7157
Quartz	1.27	55.40	68.06	66.64	40.02	92.46	94.02	50.51	69.24	92.61	88.63	0.91	95.20	46.10
Plagioclase Feldspars	0.29	4.90	4.71	5.57	13.85	0.09	0.05	6.70	0.62	0.10	0.19	0.04	0.01	16.63
Alkali Feldspars	0.10	6.37	8.44	10.12	20.27	2.40	2.11	15.94	13.35	0.93	0.90	0.02	0.03	20.57
Biotite	0.04	0.43	0.52	0.10	0.12	0.01	0.01	0.18	0.03	0.01	0.02	0.03	0.00	0.05
Muscovite	0.23	2.91	3.06	3.73	2.06	0.05	0.02	1.96	0.67	0.09	0.09	0.15	0.00	1.65
Chlorite	0.60	0.82	0.59	0.40	0.26	0.00	0.01	0.40	0.02	0.01	0.01	0.05	0.00	0.31
Smectite	0.45	0.59	0.51	0.43	1.24	0.07	0.03	1.42	1.13	0.10	0.13	0.05	0.04	0.82
Illite	0.12	1.10	1.24	1.14	2.74	0.16	0.08	3.30	1.90	0.17	0.16	0.06	0.01	2.31
Kaolinite/Dickite	0.09	1.09	1.02	1.15	1.22	0.38	0.18	8.06	3.25	0.37	0.53	0.35	0.28	2.11
Other Clays	0.26	0.90	0.78	0.78	1.14	0.94	0.65	3.61	2.06	0.95	1.09	0.06	0.76	1.40
Glauconite	0.01	0.01	0.01	0.02	0.17	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.01
Garnet	26.25	3.31	1.27	0.30	0.84	0.02	0.00	0.24	0.02	0.01	0.07	0.14	0.00	0.24
Apatite	0.28	0.18	0.01	0.01	0.03	0.00	0.00	0.02	0.00	0.00	0.00	0.12	0.00	0.01
Spinel	0.71	0.03	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00
Amphibole	10.53	8.16	2.53	2.26	1.89	0.01	0.01	0.65	0.06	0.10	0.05	0.11	0.00	0.57
Rutile/Anatase	1.77	0.53	0.21	0.19	0.47	0.12	0.01	0.13	0.13	0.24	0.21	5.33	0.02	0.12
Tourmaline	1.34	0.93	1.00	0.55	0.45	0.08	0.18	1.11	0.18	0.22	0.21	3.26	0.00	0.51
Zircon	0.17	0.04	0.01	0.01	0.00	0.03	0.01	0.01	0.04	0.08	0.02	0.47	0.03	0.02
Calcite/Aragonite	0.00	0.17	0.07	0.06	1.77	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.18
Dolomite	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Siderite-Magnesite	0.11	0.10	0.13	0.17	0.03	0.00	0.00	0.05	0.01	0.00	0.00	0.12	0.00	0.08
Pyrite/Marcasite	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ilmenite	37.78	1.42	0.26	0.54	1.40	0.12	0.09	0.09	0.61	0.82	0.16	80.25	0.08	0.04
Sillimanite/Kyanite/Andalusite	0.04	0.11	0.33	0.23	0.04	0.11	0.00	0.02	0.02	0.08	0.06	0.07	0.06	0.04
Olivine	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Magnetite	0.14	0.11	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Fe Oxide	2.47	1.38	0.11	0.05	0.18	0.00	0.00	0.02	0.08	0.01	0.00	0.30	0.00	0.03
Epidote	0.41	0.10	0.02	0.00	0.04	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.00	0.00
OPX	0.39	0.93	0.45	0.20	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
CPX	1.11	2.15	0.45	0.06	0.24	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.07
Titanite	0.58	0.57	0.01	0.03	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05

Staurolite	0.36	0.05	0.02	0.02	0.04	0.00	0.00	0.04	0.00	0.00	0.01	0.34	0.00	0.01
Others	4.70	0.84	0.26	0.14	0.20	0.00	0.00	0.21	0.02	0.01	0.01	0.61	0.00	0.08
Pores and unknown	7.34	4.37	3.90	5.10	8.92	2.92	2.54	5.25	6.54	3.05	7.39	6.82	3.47	5.97

d) River Zircon U-Pb Data

River A

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G2	908	986	1.20468	0.02467	0.13197	0.0016	0.06623	0.00134	0.5	1.8	799.1	18.3
G3	324	232	0.31368	0.00789	0.04347	0.00054	0.05235	0.00131	1.0	8.8	274.3	6.7
G7	605	583	1.89259	0.0435	0.18283	0.00231	0.0751	0.00172	-0.4	-1.0	1082.4	25.2
G8	231	102	5.31666	0.07645	0.33808	0.00394	0.1141	0.00155	-0.3	-0.6	1865.7	48.7
G9	97	74	0.27668	0.00567	0.03592	0.00043	0.05588	0.00113	9.0	49.2	227.5	5.4
G10	892	330	6.30171	0.10163	0.37301	0.00449	0.12257	0.00191	-1.2	-2.5	1994	54.7
G12	134	88	1.61597	0.02887	0.1649	0.00196	0.0711	0.00124	-0.8	-2.5	984	21.7
G14	320	155	5.41066	0.0793	0.34462	0.00404	0.11391	0.00158	-1.2	-2.5	1862.7	49.8
G15	1421	409	0.28429	0.0083	0.03883	0.0005	0.05312	0.00156	3.5	26.4	245.6	6.2
G16	139	27	0.27016	0.00928	0.03861	0.00052	0.05077	0.00176	-0.6	-6.1	244.2	6.4
G18	1136	1894	1.20859	0.03318	0.1273	0.00168	0.06888	0.0019	4.2	13.7	772.4	19.2
G19	461	110	0.51401	0.01019	0.06701	0.0008	0.05565	0.00108	0.7	4.6	418.1	9.7
G21	1943	1088	0.72911	0.02492	0.08718	0.00121	0.06068	0.0021	3.2	14.2	538.8	14.4
G22	277	308	10.74863	0.14943	0.4682	0.00549	0.16656	0.00218	1.0	1.9	2523.4	43.5
G23	532	262	10.05818	0.14862	0.43966	0.00525	0.16598	0.00234	3.9	6.7	2517.5	46.9
G26	368	383	5.09148	0.09163	0.32927	0.00406	0.11219	0.00198	0.0	0.0	1835.1	63.2
G27	961	217	0.41326	0.00697	0.05354	0.00062	0.056	0.00091	4.5	25.6	336.2	7.6
G30	211	180	0.54334	0.01444	0.06912	0.00088	0.05703	0.00152	2.3	12.4	430.9	10.6
G31	1355	1013	1.24643	0.0223	0.13216	0.00157	0.06842	0.00119	2.7	9.2	800.2	17.9
G32	2	0	5.42844	0.08568	0.33916	0.00405	0.11612	0.00176	0.4	0.8	1897.4	54.1
G34	205	53	1.35743	0.02063	0.13967	0.00162	0.07051	0.00102	3.3	10.7	842.8	18.3
G35	370	44	0.53598	0.0101	0.0702	0.00083	0.05539	0.00102	-0.4	-2.2	437.4	10.0
G36	300	235	0.53997	0.01307	0.07061	0.00087	0.05548	0.00134	-0.3	-1.9	439.8	10.5
G38	42	31	1.07194	0.01594	0.11758	0.00136	0.06615	0.00093	3.2	11.6	716.6	15.7
G40	1035	258	0.28246	0.00809	0.0403	0.00051	0.05086	0.00146	-0.8	-8.7	254.7	6.4
G42	118	117	0.2818	0.00979	0.03856	0.00052	0.05302	0.00186	3.4	26.0	243.9	6.5
G43	2016	731	1.6483	0.03013	0.1585	0.0019	0.07545	0.00135	4.3	12.2	948.5	21.1
G44	715	353	5.29084	0.06963	0.33395	0.00383	0.11495	0.0014	0.5	1.1	1879	43.6
G45	3337	182	0.48449	0.00841	0.06303	0.00074	0.05577	0.00094	1.8	11.0	394	8.9
G47	343	172	1.59199	0.02586	0.15833	0.00186	0.07295	0.00114	2.1	6.4	947.5	20.7
G48	435	220	0.22013	0.00346	0.03092	0.00036	0.05166	0.00078	2.9	27.4	196.3	4.5
G49	458	10	5.08225	0.06936	0.32016	0.0037	0.11517	0.00147	2.4	4.9	1882.5	45.6
G50	1458	604	0.25111	0.00486	0.03566	0.00042	0.05108	0.00097	0.7	7.6	225.9	5.3
G51	956	406	5.09427	0.07939	0.32591	0.00387	0.11341	0.0017	0.9	2.0	1854.7	53.6
G52	1372	1201	1.87925	0.03298	0.18168	0.00216	0.07505	0.00128	-0.2	-0.6	1076.2	23.6
G53	413	169	1.3796	0.02244	0.14322	0.00168	0.06989	0.00109	2.0	6.7	862.8	18.9
G54	461	257	1.70938	0.03312	0.165	0.002	0.07516	0.00143	2.8	8.2	984.5	22.1
G55	1373	685	5.41516	0.07566	0.33978	0.00394	0.11563	0.00152	0.1	0.2	1889.7	46.9
G56	1950	460	1.16951	0.02013	0.12105	0.00143	0.07009	0.00117	6.8	20.9	736.6	16.4
G57	535	300	0.29272	0.02479	0.04298	0.00093	0.04941	0.00427	-3.9	-62.3	271.3	11.5
G59	502	423	0.27532	0.01935	0.03854	0.00074	0.05183	0.00372	1.3	12.2	243.8	9.2
G61	521	438	0.38132	0.02072	0.05021	0.00085	0.0551	0.00305	3.9	24.1	315.8	10.4
G62	327	276	2.01043	0.03337	0.18834	0.00222	0.07744	0.00124	0.6	1.8	1132.6	63.2
G63	890	528	4.20504	0.06047	0.29451	0.00342	0.10359	0.00141	0.7	1.5	1689.4	49.7
G64	1817	488	5.06669	0.07222	0.31732	0.0037	0.11584	0.00156	3.0	6.1	1893	48.0
G66	2586	916	1.72251	0.02789	0.17055	0.002	0.07327	0.00114	0.2	0.6	1015.2	22.0
G67	548	498	0.34928	0.01298	0.0465	0.00065	0.0545	0.00205	3.8	25.2	293	8.0
G68	4662	1086	1.37283	0.02023	0.13792	0.00159	0.07222	0.00101	5.3	16.0	832.9	18.1
G69	1264	182	5.23408	0.06955	0.32862	0.00377	0.11556	0.00143	1.4	3.0	1888.6	44.1
G70	1741	1017	0.29365	0.01186	0.04067	0.00058	0.05238	0.00214	1.7	14.9	257	7.2
G72	271	252	0.53818	0.0148	0.07004	0.0009	0.05575	0.00154	0.2	1.2	436.4	10.8
G73	345	492	5.22126	0.17057	0.32609	0.00523	0.11617	0.00387	2.0	4.1	1898.1	117.6
G74	676	605	1.14914	0.02615	0.12687	0.00158	0.06571	0.00149	0.9	3.4	770	18.0
G75	389	293	1.27363	0.02119	0.13855	0.00162	0.06669	0.00107	-0.3	-1.0	836.4	18.4
G76	440	511	0.29375	0.01136	0.03901	0.00056	0.05463	0.00214	6.0	37.9	246.7	6.9
G77	589	161	0.34841	0.01043	0.04773	0.00062	0.05296	0.00159	1.0	8.2	300.5	7.6
G78	92	84	0.56271	0.01756	0.07156	0.00095	0.05705	0.0018	1.8	9.6	445.5	11.4

G79	3605	574	0.02266	0.00078	0.00346	0.00005	0.04753	0.00165	2.2	70.4	22.3	0.6
G80	128	109	2.4319	0.04682	0.21276	0.0026	0.08293	0.00157	0.7	1.9	1267.6	72.9
G81	11	4	0.28401	0.00993	0.03955	0.00054	0.0521	0.00184	1.5	13.7	250.1	6.6
G82	158	127	0.30121	0.00879	0.04149	0.00053	0.05267	0.00154	2.0	16.6	262.1	6.6
G83	476	209	1.45328	0.03069	0.15146	0.00186	0.06962	0.00145	0.2	0.9	909.1	20.8
G84	443	172	0.28666	0.00961	0.04007	0.00054	0.0519	0.00176	1.0	9.9	253.3	6.6
G85	386	122	11.16459	0.1503	0.48164	0.00559	0.16818	0.00211	0.1	0.2	2539.6	41.8
G87	1254	870	0.18185	0.0067	0.02581	0.00035	0.05112	0.00191	3.3	33.3	164.3	4.5
G88	505	330	0.28231	0.01791	0.03915	0.00071	0.05232	0.00339	2.0	17.3	247.5	8.8
G89	263	1907	0.16278	0.00328	0.02335	0.00028	0.05057	0.001	2.9	32.7	148.8	3.5
G90	3818	1597	2.31415	0.03932	0.20229	0.00241	0.083	0.00137	2.4	6.4	1269.2	63.5
G91	1407	1034	2.13144	0.0331	0.19843	0.00232	0.07793	0.00116	-0.7	-1.9	1145.2	58.4
G92	242	322	0.35332	0.01285	0.04887	0.00067	0.05246	0.00193	-0.1	-0.8	307.6	8.3
G93	69028	53218	5.76962	0.0814	0.3491	0.00406	0.11991	0.00159	0.6	1.3	1954.9	47.0
G95	327	225	0.68334	0.01774	0.08446	0.00107	0.0587	0.00152	1.2	6.0	522.7	12.7
G96	24	19	1.10025	0.01694	0.11801	0.00137	0.06764	0.00099	4.8	16.2	719.1	15.8
G98	242	73	1.1974	0.01992	0.12427	0.00146	0.06991	0.00112	5.9	18.4	755.1	16.7
G99	680	350	0.32984	0.01449	0.04573	0.00068	0.05233	0.00233	0.4	3.8	288.3	8.4
G100	317	205	0.289	0.011	0.04065	0.00057	0.05158	0.00199	0.4	3.6	256.9	7.0
G101	405	744	0.94691	0.01647	0.10213	0.0012	0.06727	0.00114	7.9	25.9	626.9	14.1
G102	235	45	5.16065	0.07315	0.32231	0.00375	0.11617	0.00155	2.5	5.1	1898	47.7
G105	4701	1913	1.25642	0.04121	0.14269	0.00198	0.06389	0.00212	-3.9	-16.5	859.8	22.4
G107	201	121	10.3057	0.1391	0.46314	0.00538	0.16144	0.00203	0.4	0.7	2470.8	42.2
G108	345	238	7.30575	0.09893	0.39429	0.00456	0.13443	0.0017	0.3	0.6	2156.6	43.8
G109	604	408	0.5197	0.01199	0.06691	0.00082	0.05635	0.00129	1.8	10.3	417.5	9.9
G111	235	202	3.27083	0.0516	0.25284	0.00298	0.09386	0.00142	1.4	3.5	1505.2	56.7
G112	374	970	1.1774	0.03215	0.12983	0.00169	0.06579	0.00181	0.4	1.6	786.9	19.3
G114	318	81	1.54698	0.03669	0.15839	0.00201	0.07086	0.00168	0.2	0.6	947.8	22.3
G116	1330	597	0.28618	0.00636	0.03997	0.00048	0.05195	0.00114	1.2	10.8	252.6	6.0
G117	463	188	1.572	0.04039	0.15966	0.00207	0.07143	0.00184	0.5	1.5	954.9	23.0
G118	130	105	12.59096	0.16199	0.50685	0.00581	0.18023	0.00214	0.2	0.4	2655	39.0
G119	3269	265	1.37193	0.02515	0.14013	0.00167	0.07103	0.00127	3.7	11.8	845.4	18.9
G120	635	334	0.18576	0.0067	0.02731	0.00037	0.04935	0.0018	-0.4	-5.5	173.7	4.6
G121	532	229	0.94204	0.02542	0.10091	0.00132	0.06773	0.00184	8.8	28.0	619.7	15.4
G122	241	95	0.23093	0.00376	0.03098	0.00036	0.05408	0.00085	7.3	47.5	196.7	4.5
G123	364	206	10.96333	0.15572	0.47844	0.00565	0.16625	0.00223	0.0	0.0	2520.3	44.7
G126	8	6	0.53112	0.01351	0.06927	0.00087	0.05562	0.00141	0.2	1.2	431.8	10.5
G127	291	309	0.52043	0.02245	0.0682	0.00102	0.05536	0.00243	0.0	0.3	425.3	12.3
G129	1060	1158	2.12274	0.03731	0.19941	0.00238	0.07723	0.00132	-1.4	-4.0	1127.2	67.4
G130	7	7	0.4887	0.01008	0.06369	0.00076	0.05567	0.00113	1.5	9.3	398	9.3
G131	1439	724	1.44552	0.03408	0.15121	0.00191	0.06936	0.00163	0.0	0.2	907.7	21.4
G132	180	49	0.51478	0.01014	0.06774	0.00081	0.05514	0.00107	-0.2	-1.1	422.5	9.7
G133	397	18	1.48092	0.02082	0.15138	0.00174	0.07098	0.00094	1.5	5.0	908.7	19.5
G134	905	119	1.09264	0.01725	0.11952	0.00139	0.06633	0.001	3.0	10.9	727.8	16.0
G135	414	214	0.27994	0.01258	0.03737	0.00057	0.05435	0.00248	6.0	38.7	236.5	7.1
G136	4288	2711	1.67862	0.03189	0.1686	0.00203	0.07223	0.00135	-0.4	-1.2	1004.4	22.4
G137	2728	728	0.76661	0.01952	0.08628	0.0011	0.06447	0.00164	8.3	29.5	533.5	13.0
G138	200	175	0.26034	0.01102	0.03786	0.00055	0.04988	0.00214	-2.0	-26.4	239.6	6.8
G139	33	31	3.64286	0.07276	0.27136	0.0034	0.0974	0.00192	0.7	1.7	1574.9	73.1
G140	315	145	0.28884	0.00958	0.03992	0.00053	0.0525	0.00176	2.1	17.8	252.3	6.6
G141	426	138	1.5615	0.02648	0.15527	0.00183	0.07296	0.0012	2.7	8.2	930.4	20.5
G143	487	165	4.05107	0.0628	0.28721	0.00339	0.10233	0.00152	1.0	2.4	1666.9	54.4
G144	1275	251	0.08285	0.00346	0.01214	0.00017	0.04953	0.00209	3.9	55.0	77.8	2.2
G145	313	33	0.47865	0.00817	0.06289	0.00073	0.05522	0.00091	1.0	6.6	393.2	8.9
G146	139	61	0.84983	0.01879	0.09361	0.00115	0.06587	0.00145	8.3	28.1	576.8	13.6
G147	155	13	0.44581	0.00726	0.05957	0.00069	0.0543	0.00085	0.3	2.7	373	8.4
G148	146	115	0.28634	0.01039	0.03962	0.00054	0.05243	0.00192	2.1	17.7	250.5	6.8
G149	152	59	7.5623	0.1106	0.40371	0.00476	0.1359	0.00189	-0.3	-0.5	2175.6	47.9

River B

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	1202	328	1.36425	0.02125	0.14388	0.00173	0.0688	0.001	0.8	2.9	866.5	19.5
G2	131	188	10.01688	0.15939	0.45441	0.00571	0.15994	0.0024	0.9	1.6	2455.1	50.3
G3	385	423	11.21208	0.15448	0.5037	0.00606	0.16151	0.00201	-3.4	-6.4	2471.5	41.8
G4	811	143	0.28514	0.00722	0.04017	0.00051	0.0515	0.00129	0.3	3.6	253.9	6.4
G5	518	291	0.28522	0.00826	0.04076	0.00054	0.05078	0.00147	-1.0	-11.6	257.5	6.6
G6	485	132	0.29586	0.00876	0.04138	0.00055	0.05188	0.00153	0.7	6.7	261.4	6.8
G7	728	71	0.13627	0.00492	0.01945	0.00027	0.05083	0.00185	4.4	46.8	124.2	3.4
G8	4346	647	0.02095	0.00077	0.00322	0.00004	0.04723	0.00174	1.9	65.7	20.7	0.6
G9	119	60	0.19466	0.02128	0.02687	0.00072	0.05256	0.00587	5.7	44.9	170.9	9.1
G10	527	127	0.27616	0.01037	0.03978	0.00057	0.05037	0.00191	-1.6	-18.6	251.5	7.0
G11	447	151	0.32287	0.00948	0.04304	0.00057	0.05443	0.0016	4.6	30.1	271.6	7.1
G12	316	775	0.69319	0.01758	0.08553	0.00111	0.0588	0.00148	1.1	5.5	529.1	13.2
G13	2787	2749	0.20218	0.00379	0.02802	0.00034	0.05235	0.00094	4.9	40.8	178.2	4.3
G14	2980	2999	0.23303	0.00513	0.03147	0.00039	0.05373	0.00116	6.5	44.5	199.7	4.9
G15	456	186	1.19281	0.02247	0.12709	0.00157	0.0681	0.00124	3.4	11.5	771.2	18.0
G16	284	69	0.2885	0.01115	0.04103	0.00059	0.05102	0.00199	-0.7	-7.3	259.2	7.3
G17	479	139	0.29258	0.00885	0.04096	0.00055	0.05182	0.00157	0.7	6.8	258.8	6.8
G18	950	326	0.29527	0.00679	0.041	0.00052	0.05225	0.00118	1.4	12.6	259.0	6.4
G19	1447	5	0.06722	0.00318	0.01036	0.00016	0.04709	0.00226	-0.5	-24.3	66.4	2.0
G20	428	141	0.30061	0.01461	0.04231	0.00067	0.05156	0.00254	-0.1	-0.5	267.1	8.3
G21	350	105	0.31015	0.02035	0.0423	0.0008	0.0532	0.00356	2.7	20.8	267.1	9.9
G22	228	79	0.29567	0.01644	0.03868	0.00067	0.05546	0.00314	7.5	43.2	244.6	8.3
G23	96	70	10.17616	0.16991	0.46882	0.00598	0.15749	0.0025	-1.1	-2.0	2428.9	53.4
G24	239	138	2.17947	0.04222	0.19986	0.00251	0.07912	0.00148	0.0	0.1	1175.3	73.4
G25	395	124	0.29046	0.00962	0.04108	0.00056	0.0513	0.0017	-0.2	-2.0	259.5	6.9
G26	259	143	0.29088	0.01288	0.04006	0.00061	0.05268	0.00236	2.4	19.6	253.2	7.6
G27	769	441	0.27438	0.00705	0.03845	0.00049	0.05178	0.00132	1.2	11.8	243.2	6.1
G28	549	178	0.29111	0.0083	0.0408	0.00054	0.05177	0.00147	0.6	6.4	257.8	6.6
G29	313	448	2.24924	0.0398	0.20575	0.00254	0.07932	0.00134	-0.8	-2.2	1180.1	66.1
G30	941	448	1.39376	0.02293	0.14136	0.00171	0.07154	0.00111	4.0	12.4	852.3	19.4
G31	578	207	0.29095	0.00826	0.03978	0.00052	0.05306	0.0015	3.1	24.1	251.5	6.5
G32	436	114	0.28945	0.00929	0.04048	0.00055	0.05188	0.00167	0.9	8.7	255.8	6.8
G33	212	131	3.33173	0.05926	0.26044	0.00325	0.09282	0.00158	-0.2	-0.5	1484.1	64.1
G34	1178	456	0.31574	0.01101	0.04172	0.00059	0.05491	0.00193	5.7	35.5	263.5	7.3
G35	292	72	0.30784	0.0153	0.0427	0.00069	0.05231	0.00264	1.1	9.8	269.5	8.5
G36	1492	932	0.25175	0.00542	0.03621	0.00045	0.05045	0.00106	-0.6	-6.3	229.3	5.6
G37	27	35	0.26624	0.05438	0.03553	0.00157	0.05438	0.01133	6.5	41.8	225.0	19.5
G38	371	83	0.2921	0.01004	0.04023	0.00056	0.05269	0.00182	2.4	19.4	254.2	6.9
G39	276	330	0.71854	0.01947	0.08801	0.00116	0.05924	0.0016	1.1	5.6	543.8	13.7
G40	344	287	1.34262	0.0267	0.14399	0.0018	0.06765	0.00131	-0.3	-1.1	867.2	20.3
G41	386	129	0.28774	0.00984	0.04018	0.00055	0.05196	0.00179	1.1	10.5	253.9	6.9
G42	623	122	1.88576	0.03333	0.1687	0.00208	0.08111	0.00137	7.1	17.9	1005.0	23.0
G43	529	308	0.76173	0.01575	0.09258	0.00115	0.0597	0.0012	0.7	3.8	570.8	13.6
G44	217	112	2.76159	0.05111	0.23523	0.00294	0.08518	0.00152	-1.2	-3.2	1319.6	68.5
G45	500	917	1.83781	0.03072	0.18003	0.00219	0.07407	0.00117	-0.8	-2.3	1067.2	23.9
G46	457	125	0.28592	0.00909	0.03965	0.00054	0.05232	0.00167	1.8	16.2	250.7	6.7
G47	419	115	0.28796	0.0095	0.04117	0.00056	0.05075	0.00168	-1.2	-13.3	260.1	6.9
G48	375	401	0.69735	0.01702	0.08635	0.00111	0.0586	0.00141	0.6	3.3	533.9	13.2
G49	444	147	0.29445	0.00942	0.04106	0.00056	0.05203	0.00167	1.0	9.5	259.4	6.9
G50	794	152	0.29032	0.00733	0.04146	0.00053	0.0508	0.00127	-1.2	-12.9	261.9	6.5
G51	7715	1487	0.22786	0.00362	0.0321	0.00038	0.0515	0.00076	2.3	22.6	203.7	4.8
G52	470	557	0.03268	0.0032	0.00472	0.00011	0.05025	0.00502	7.9	85.3	30.3	1.4
G53	287	142	1.15189	0.0313	0.11932	0.00161	0.07005	0.0019	7.1	21.8	726.6	18.5
G54	641	321	0.29477	0.00813	0.04087	0.00053	0.05233	0.00144	1.6	13.9	258.2	6.6
G55	729	189	0.28974	0.00741	0.04061	0.00052	0.05176	0.00131	0.7	6.7	256.6	6.4
G56	542	184	0.28883	0.00825	0.04138	0.00054	0.05065	0.00144	-1.5	-16.3	261.4	6.7
G57	395	360	1.10026	0.02313	0.1154	0.00146	0.06918	0.00142	7.0	22.1	704.1	16.8
G58	329	369	0.54569	0.01467	0.07263	0.00095	0.05451	0.00146	-2.2	-15.2	452.0	11.4
G59	258	102	18.15928	0.24646	0.62164	0.0075	0.21196	0.00259	-3.8	-6.7	2920.6	39.3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G60	644	258	0.28744	0.00787	0.04142	0.00054	0.05036	0.00137	-1.9	-23.7	261.6	6.6
G61	567	196	0.29327	0.0085	0.04047	0.00053	0.05257	0.00152	2.1	17.6	255.8	6.6
G62	322	111	0.28115	0.01058	0.04044	0.00057	0.05044	0.00191	-1.6	-18.6	255.6	7.1
G63	165	125	12.27698	0.18227	0.48041	0.00594	0.18542	0.00255	3.8	6.4	2702.0	45.1
G64	711	639	0.29094	0.00794	0.04207	0.00054	0.05018	0.00136	-2.4	-30.8	265.7	6.7
G65	404	132	0.29968	0.00997	0.04241	0.00058	0.05127	0.00171	-0.6	-5.9	267.8	7.2
G66	300	91	0.28814	0.01145	0.04117	0.00059	0.05079	0.00204	-1.2	-12.5	260.1	7.4
G67	1029	442	0.28546	0.00703	0.04054	0.00052	0.05109	0.00124	-0.5	-4.6	256.2	6.4
G68	611	187	0.98557	0.01796	0.1152	0.00141	0.06208	0.00108	-0.9	-3.9	702.9	16.3
G69	330	196	2.90576	0.05109	0.24247	0.003	0.08695	0.00146	-1.2	-2.9	1359.4	64.1
G70	1355	273	0.28087	0.00582	0.03937	0.00049	0.05176	0.00104	1.0	9.5	248.9	6.0
G71	420	157	0.28902	0.00947	0.04144	0.00056	0.0506	0.00166	-1.5	-17.6	261.8	7.0
G72	602	333	0.32125	0.00983	0.04339	0.00058	0.05372	0.00165	3.3	23.8	273.8	7.2
G73	639	193	0.29234	0.00781	0.04137	0.00053	0.05127	0.00136	-0.3	-3.4	261.3	6.6
G74	575	187	0.29207	0.00861	0.04151	0.00055	0.05105	0.0015	-0.8	-7.9	262.2	6.8
G75	1132	350	1.60678	0.02436	0.16378	0.00196	0.07118	0.001	-0.5	-1.6	977.8	21.8
G76	3007	36	0.47387	0.00909	0.05968	0.00073	0.05761	0.00107	5.4	27.4	373.7	8.9
G77	714	114	1.15472	0.02102	0.12134	0.00149	0.06905	0.00121	5.6	18.0	738.3	17.1
G78	280	213	0.28914	0.01148	0.04106	0.00059	0.0511	0.00205	-0.6	-5.7	259.4	7.4
G79	216	191	10.60817	0.15262	0.46253	0.00564	0.16641	0.0022	1.6	2.8	2521.9	44.0
G80	1282	511	0.29527	0.00613	0.04104	0.00051	0.0522	0.00105	1.3	11.8	259.3	6.3
G81	385	126	0.32678	0.01407	0.04468	0.00068	0.05307	0.00231	1.9	15.0	281.8	8.3
G82	247	37	0.17407	0.01167	0.02505	0.00047	0.05042	0.00344	2.1	25.5	159.5	5.9
G83	523	161	0.2674	0.0121	0.03749	0.00058	0.05175	0.00237	1.4	13.5	237.3	7.2
G84	3770	1467	0.22889	0.00385	0.03249	0.00039	0.05112	0.00081	1.6	16.3	206.1	4.9
G85	322	120	0.28619	0.01058	0.04057	0.00057	0.05118	0.00191	-0.3	-3.0	256.4	7.1
G86	108	79	1.0812	0.03611	0.12514	0.00178	0.06269	0.00211	-2.1	-9.0	760.1	20.4
G87	406	378	0.31695	0.01579	0.0437	0.00071	0.05263	0.00266	1.4	11.9	275.7	8.7
G88	405	104	0.29247	0.0096	0.04082	0.00056	0.05198	0.00171	1.0	9.4	257.9	6.9
G89	331	87	0.2915	0.01052	0.04105	0.00058	0.05152	0.00187	0.1	1.8	259.4	7.1
G90	346	137	0.34727	0.01159	0.04818	0.00066	0.0523	0.00175	-0.2	-1.6	303.3	8.1
G91	708	157	0.29314	0.00768	0.04152	0.00053	0.05123	0.00133	-0.5	-4.5	262.3	6.6
G92	335	78	0.29907	0.01312	0.03997	0.00061	0.05429	0.00241	5.1	34.0	252.7	7.6
G93	640	74	1.78043	0.03368	0.18006	0.00224	0.07174	0.00131	-2.7	-9.1	1067.3	24.4
G94	1761	629	0.245	0.00488	0.03472	0.00043	0.05121	0.00099	1.1	12.0	220.0	5.3
G95	1165	468	0.53936	0.01214	0.06914	0.00087	0.0566	0.00125	1.6	9.3	431.0	10.5
G96	923	240	0.29926	0.00693	0.04206	0.00053	0.05163	0.00117	0.1	1.3	265.6	6.5
G97	410	137	0.29354	0.00958	0.04165	0.00057	0.05114	0.00167	-0.7	-6.6	263.1	7.0
G98	330	108	3.41379	0.05422	0.26981	0.00329	0.0918	0.00137	-2.1	-5.2	1463.2	56.3
G99	405	119	0.29988	0.01185	0.04138	0.0006	0.05258	0.0021	1.9	15.9	261.4	7.5
G100	291	110	0.29054	0.01103	0.04122	0.00059	0.05114	0.00196	-0.5	-5.4	260.4	7.3
G101	559	182	0.34285	0.01415	0.04425	0.00067	0.05622	0.00235	7.2	39.4	279.1	8.2
G102	523	161	0.28556	0.0086	0.04007	0.00053	0.05171	0.00156	0.7	7.1	253.3	6.6
G103	357	97	0.28088	0.01007	0.04104	0.00057	0.04966	0.00179	-3.0	-44.7	259.3	7.1
G104	1969	1189	0.22974	0.00449	0.03276	0.0004	0.05089	0.00096	1.1	11.9	207.8	5.0
G105	733	401	1.31432	0.02135	0.14337	0.00173	0.06652	0.00101	-1.4	-5.0	863.7	19.5
G106	427	60	0.57027	0.014	0.07275	0.00093	0.05688	0.00138	1.2	6.9	452.7	11.2
G107	350	94	0.28854	0.00994	0.04161	0.00057	0.05031	0.00174	-2.1	-25.6	262.8	7.1
G108	276	143	0.27413	0.01268	0.0382	0.00059	0.05207	0.00244	1.8	16.2	241.7	7.4
G109	49533	17274	0.03222	0.00043	0.00476	0.00006	0.04906	0.00059	5.2	79.7	30.6	0.7
G110	431	31	1.43263	0.02801	0.14286	0.00178	0.07276	0.00138	4.9	14.5	860.8	20.1
G111	642	143	0.49691	0.01084	0.06663	0.00083	0.05411	0.00115	-1.5	-10.7	415.8	10.1
G112	342	200	0.29838	0.01029	0.04201	0.00058	0.05154	0.00179	-0.1	-0.1	265.3	7.2
G113	577	196	0.28249	0.00792	0.0409	0.00053	0.05011	0.0014	-2.2	-29.1	258.4	6.6
G114	493	209	0.29634	0.00888	0.04169	0.00055	0.05158	0.00154	0.1	1.3	263.3	6.9
G115	745	39	0.31388	0.00923	0.04288	0.00057	0.05311	0.00156	2.4	18.8	270.7	7.0
G116	373	108	0.28469	0.01069	0.04097	0.00058	0.05042	0.00191	-1.7	-20.8	258.8	7.2
G117	426	190	0.30948	0.01102	0.0433	0.00061	0.05186	0.00186	0.2	2.2	273.2	7.5
G118	325	183	0.30984	0.01212	0.04249	0.00062	0.05291	0.00209	2.2	17.5	268.2	7.6
G119	2209	390	0.22973	0.00543	0.03124	0.00039	0.05336	0.00124	5.9	42.4	198.3	4.9
G120	606	490	23.93196	0.32823	0.61417	0.0075	0.28273	0.00351	5.8	8.6	3378.1	38.5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G121	714	152	0.92169	0.0164	0.10591	0.00129	0.06315	0.00107	2.2	9.0	648.9	15.1
G122	116	387	10.87716	0.17149	0.48575	0.00609	0.16247	0.00241	-1.6	-2.8	2481.6	49.5
G123	249	195	1.67518	0.03387	0.1685	0.00212	0.07214	0.00142	-0.5	-1.4	1003.8	23.4
G124	432	275	0.58799	0.01694	0.07572	0.00101	0.05634	0.00162	-0.2	-1.2	470.5	12.1
G125	94	96	1.30427	0.04264	0.13992	0.002	0.06763	0.00223	0.4	1.5	844.2	22.6
G126	1093	825	1.83566	0.02842	0.17046	0.00205	0.07813	0.00113	4.3	11.8	1014.7	22.6

River C

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	308	224	0.54805	0.01315	0.07059	0.00087	0.05633	0.00135	0.9	5.4	439.7	10.5
G2	1856	247	0.23185	0.00412	0.03249	0.00038	0.05178	0.0009	2.7	25.3	206.1	4.7
G3	2896	926	0.02123	0.00077	0.00327	0.00004	0.04706	0.00173	0.9	59.4	21.1	0.6
G4	163	63	0.93347	0.02333	0.10923	0.00137	0.06201	0.00155	0.2	0.9	668.3	15.9
G5	1117	656	0.02789	0.00152	0.00395	0.00006	0.05122	0.00284	9.8	89.9	25.4	0.8
G7	282	94	0.28376	0.00944	0.03895	0.00052	0.05286	0.00177	3.0	23.6	246.3	6.4
G8	780	380	0.98634	0.01769	0.11308	0.00133	0.06329	0.00111	0.9	3.8	690.6	15.4
G10	354	112	0.29071	0.01064	0.03968	0.00055	0.05316	0.00197	3.3	25.3	250.8	6.8
G11	2606	545	12.44163	0.16016	0.47389	0.00537	0.1905	0.00226	5.5	9.0	2746.5	38.8
G12	436	155	5.26887	0.07393	0.33578	0.00386	0.11385	0.0015	-0.1	-0.2	1861.8	47.3
G13	1207	627	0.28197	0.00616	0.03764	0.00045	0.05435	0.00118	5.9	38.2	238.2	5.6
G14	992	852	9.05422	0.11845	0.41663	0.00474	0.15768	0.00191	4.4	7.6	2431.0	40.8
G15	193	194	7.9604	0.11943	0.4067	0.00479	0.14202	0.00204	1.2	2.3	2252.0	49.1
G16	343	213	1.81302	0.03079	0.17545	0.00206	0.07498	0.00123	0.8	2.4	1042.1	22.6
G17	2197	911	0.02426	0.00099	0.00362	0.00005	0.04859	0.002	4.3	81.8	23.3	0.6
G18	354	175	0.2861	0.00866	0.03964	0.00051	0.05237	0.00159	2.0	17.0	250.6	6.3
G19	659	567	0.70071	0.01258	0.08096	0.00095	0.0628	0.0011	7.4	28.4	501.9	11.3
G21	781	334	0.27592	0.00624	0.03819	0.00046	0.05242	0.00118	2.4	20.4	241.6	5.7
G22	400	114	0.28104	0.00825	0.03911	0.0005	0.05214	0.00154	1.7	15.2	247.3	6.2
G23	313	171	0.28617	0.00987	0.0392	0.00053	0.05297	0.00185	3.1	24.3	247.9	6.5
G24	228	201	0.54845	0.0153	0.07143	0.00091	0.05571	0.00156	-0.2	-1.0	444.8	10.9
G25	856	54	1.96323	0.02821	0.18865	0.00216	0.07551	0.00102	-1.0	-3.0	1082.1	54.0
G26	2592	144	0.24383	0.00408	0.03411	0.00039	0.05187	0.00084	2.5	22.6	216.2	4.9
G27	1260	1294	0.26439	0.00516	0.03633	0.00043	0.05281	0.00101	3.6	28.2	230.0	5.3
G28	385	133	0.28789	0.00981	0.04075	0.00054	0.05126	0.00176	-0.2	-2.1	257.5	6.7
G29	745	40	2.91007	0.04321	0.23086	0.00267	0.09146	0.00129	3.4	8.0	1456.1	53.2
G30	103	178	2.94931	0.06036	0.23888	0.00297	0.08959	0.00182	1.0	2.5	1416.6	76.5
G31	595	442	0.02745	0.00233	0.00442	0.00008	0.04509	0.00389	-3.2	-2830	28.4	1.1
G32	526	330	2.58533	0.03819	0.22114	0.00255	0.08483	0.00119	0.7	1.8	1311.5	54.1
G34	677	368	3.85536	0.05525	0.27535	0.00317	0.10159	0.00138	2.3	5.2	1653.5	49.8
G35	959	196	0.27703	0.0059	0.03829	0.00046	0.05249	0.0011	2.5	21.1	242.2	5.7
G36	288	37	0.96909	0.03031	0.10687	0.00145	0.06579	0.00208	5.1	18.2	654.6	16.9
G37	375	127	0.28935	0.0087	0.03912	0.00051	0.05366	0.00162	4.3	30.7	247.4	6.3
G39	102	199	10.35074	0.16116	0.46409	0.00558	0.16183	0.00242	0.4	0.7	2474.9	50.1
G40	1907	502	0.24067	0.0048	0.03388	0.0004	0.05154	0.00101	2.0	18.9	214.8	5.0
G41	392	736	10.68302	0.14426	0.47365	0.00544	0.16365	0.00206	-0.1	-0.2	2493.8	42.2
G42	270	80	4.76951	0.07184	0.30782	0.0036	0.11242	0.00162	2.9	5.9	1839.0	51.6
G43	547	242	0.54243	0.01119	0.07112	0.00085	0.05534	0.00113	-0.7	-4.0	442.9	10.2
G44	153	87	1.529	0.03419	0.15655	0.00194	0.07087	0.00158	0.5	1.7	937.6	21.6
G46	394	289	0.43163	0.01086	0.05813	0.00072	0.05387	0.00135	0.0	0.4	364.3	8.8
G47	349	118	4.28125	0.06285	0.29505	0.00342	0.10528	0.00147	1.4	3.1	1719.3	50.8
G48	760	440	1.71632	0.02892	0.17011	0.002	0.07321	0.00119	0.2	0.7	1012.7	22.0
G50	891	503	0.70527	0.01183	0.08736	0.00101	0.05858	0.00095	0.4	2.1	539.9	12.0
G51	462	210	0.30628	0.00806	0.04273	0.00053	0.05201	0.00137	0.6	5.7	269.7	6.6
G52	130	193	4.49013	0.07698	0.30679	0.00369	0.10619	0.00177	0.2	0.6	1735.1	60.6
G53	145	209	1.57371	0.03537	0.1619	0.00201	0.07053	0.00158	-0.8	-2.5	967.3	22.3
G54	401	430	0.53965	0.01228	0.06993	0.00085	0.056	0.00127	0.6	3.6	435.7	10.3
G55	287	309	2.29182	0.04901	0.2131	0.00265	0.07803	0.00166	-2.9	-8.5	1147.7	83.2
G56	482	363	13.90177	0.18363	0.53751	0.00614	0.18766	0.0023	-1.1	-1.9	2721.8	40.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G57	898	243	0.29701	0.00635	0.04111	0.00049	0.05242	0.00111	1.7	14.5	259.7	6.1
G58	683	250	0.29057	0.00685	0.04087	0.0005	0.05158	0.00121	0.3	3.3	258.2	6.2
G59	2098	918	0.5687	0.00856	0.07018	0.0008	0.0588	0.00084	4.6	21.9	437.2	9.7
G60	1677	244	0.24473	0.00456	0.03385	0.0004	0.05246	0.00095	3.6	29.8	214.6	4.9
G62	336	141	1.49933	0.02672	0.15562	0.00184	0.06991	0.00121	-0.2	-0.7	932.4	20.5
G63	146	82	0.28789	0.01345	0.04205	0.00063	0.04967	0.00235	-3.2	-47.7	265.5	7.8
G65	367	265	1.82669	0.03041	0.17954	0.0021	0.07382	0.00119	-0.9	-2.7	1064.5	23.0
G66	519	257	0.03097	0.00244	0.00485	0.00009	0.04636	0.00371	-0.6	-93.8	31.2	1.2
G67	671	438	4.08981	0.05649	0.29115	0.00333	0.10192	0.00132	0.3	0.7	1659.4	47.6
G68	332	83	5.14383	0.07734	0.32436	0.00379	0.11506	0.00165	1.8	3.7	1880.9	51.3
G69	71	29	1.58045	0.04648	0.16636	0.00223	0.06893	0.00204	-3.0	-10.6	992.0	24.7
G70	400	109	0.28161	0.00851	0.03988	0.00051	0.05124	0.00156	-0.1	-0.2	252.1	6.4
G71	847	788	0.29608	0.00645	0.04027	0.00048	0.05334	0.00115	3.5	25.9	254.5	6.0
G72	687	69	0.27828	0.00669	0.03983	0.00049	0.05069	0.00121	-1.0	-11.0	251.8	6.0
G73	740	906	0.31347	0.00707	0.04261	0.00052	0.05337	0.00119	2.9	21.9	269.0	6.4
G74	925	435	0.28545	0.00617	0.03986	0.00048	0.05196	0.00111	1.2	11.1	252.0	5.9
G75	522	326	0.03041	0.00256	0.00435	0.00009	0.05073	0.00435	8.6	87.7	28.0	1.1
G77	121	152	1.8323	0.04217	0.17702	0.00223	0.0751	0.00172	0.6	1.9	1050.7	24.4
G78	4222	780	0.49958	0.00817	0.06152	0.00071	0.05892	0.00093	6.9	31.8	384.9	8.7
G79	2015	552	0.02465	0.00106	0.00362	0.00005	0.04941	0.00216	6.0	86.1	23.3	0.7
G80	581	268	0.29993	0.00745	0.0414	0.00051	0.05257	0.0013	1.8	15.7	261.5	6.3
G81	685	438	0.33123	0.00742	0.04516	0.00055	0.05321	0.00118	2.0	15.7	284.8	6.7
G82	1258	640	1.35065	0.01947	0.13924	0.00159	0.07038	0.00096	3.3	10.6	840.3	18.0
G84	634	397	2.409	0.03993	0.20604	0.00243	0.08483	0.00136	3.1	7.9	1311.7	61.7
G88	632	535	0.28662	0.00706	0.03971	0.00049	0.05237	0.00129	1.9	16.7	251.1	6.0
G89	425	220	10.90112	0.14678	0.46323	0.00532	0.17075	0.00215	2.5	4.3	2565.0	41.7
G90	1367	419	0.49222	0.0083	0.06339	0.00074	0.05634	0.00092	2.6	14.8	396.2	8.9
G91	198	75	1.17733	0.02707	0.12282	0.00153	0.06955	0.00159	5.8	18.4	746.8	17.5
G92	2185	788	0.02181	0.00099	0.00329	0.00005	0.0481	0.0022	3.3	79.7	21.2	0.6
G93	104	100	0.62751	0.02833	0.0761	0.00118	0.05983	0.00275	4.6	20.9	472.8	14.1
G94	4996	683	0.02243	0.00067	0.00334	0.00004	0.04877	0.00147	4.7	84.3	21.5	0.5
G95	238	271	0.71408	0.01838	0.08873	0.00111	0.05839	0.0015	-0.1	-0.6	548.0	13.2
G96	1265	106	1.58249	0.02734	0.15713	0.00185	0.07307	0.00123	2.4	7.4	940.8	20.6
G97	624	140	1.68139	0.02956	0.17001	0.00201	0.07176	0.00123	-1.0	-3.4	1012.1	22.1
G98	685	376	0.55938	0.01106	0.07136	0.00085	0.05688	0.00111	1.5	8.6	444.3	10.2
G99	385	104	0.86806	0.01795	0.10356	0.00125	0.06082	0.00124	-0.1	-0.4	635.3	14.6
G100	920	256	0.28832	0.00639	0.0397	0.00048	0.0527	0.00116	2.5	20.5	251.0	5.9
G101	197	100	1.54137	0.03303	0.15434	0.0019	0.07246	0.00154	2.4	7.4	925.2	21.2
G102	352	118	0.2869	0.00916	0.03992	0.00052	0.05215	0.00168	1.5	13.5	252.3	6.5
G104	2149	1944	0.24515	0.00437	0.03451	0.0004	0.05154	0.00089	1.8	17.4	218.7	5.0
G105	478	133	1.52232	0.02538	0.15833	0.00185	0.06976	0.00112	-0.9	-2.8	947.5	20.6
G107	433	376	0.02956	0.00272	0.00434	0.00009	0.04942	0.00462	6.1	83.4	27.9	1.2
G108	468	99	0.33753	0.00879	0.046	0.00057	0.05324	0.00139	1.9	14.5	289.9	7.1
G109	359	296	1.6215	0.02824	0.1592	0.00188	0.0739	0.00125	2.8	8.3	952.3	20.9
G110	728	426	0.36594	0.00775	0.04931	0.00059	0.05384	0.00113	2.0	14.8	310.3	7.3
G111	243	144	3.12552	0.05939	0.24359	0.00298	0.0931	0.00174	2.4	5.7	1489.9	70.0
G112	417	300	0.02559	0.00263	0.00429	0.00009	0.04331	0.00451	-6.9	-2750	27.6	1.2
G113	250	216	0.51615	0.01456	0.06779	0.00087	0.05525	0.00156	0.0	-0.2	422.8	10.5
G115	547	258	5.51317	0.07586	0.35235	0.00404	0.11353	0.00146	-2.2	-4.8	1856.7	46.3
G117	373	125	0.28527	0.00891	0.03954	0.00051	0.05235	0.00165	1.9	16.9	250.0	6.4
G118	19186	128	0.24425	0.00328	0.03398	0.00039	0.05215	0.00065	3.0	26.2	215.4	4.8
G119	389	323	0.03061	0.00301	0.00449	0.0001	0.04952	0.00495	6.3	83.3	28.8	1.3
G120	415	221	3.63141	0.05401	0.27256	0.00316	0.09667	0.00137	0.2	0.5	1560.9	52.6
G122	649	530	0.30437	0.01004	0.04166	0.00055	0.05302	0.00176	2.5	20.2	263.1	6.9
G123	680	101	5.06754	0.06922	0.32406	0.00371	0.11347	0.00145	1.2	2.5	1855.6	45.9
G124	246	371	1.49891	0.02947	0.15008	0.00181	0.07247	0.0014	3.2	9.8	901.4	20.3
G125	1192	356	0.02761	0.00149	0.00423	0.00007	0.04739	0.0026	1.8	60.2	27.2	0.8
G126	513	227	1.87965	0.02933	0.18228	0.00211	0.07482	0.00112	-0.5	-1.5	1079.4	23.1
G128	430	158	1.53663	0.02584	0.15303	0.00179	0.07286	0.00119	3.0	9.1	917.9	20.1
G129	607	46	9.86566	0.1311	0.4426	0.00506	0.16174	0.002	2.5	4.5	2473.9	41.4
G130	516	241	0.27528	0.00751	0.04032	0.0005	0.04954	0.00135	-3.1	-46.9	254.8	6.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G131	826	622	0.28136	0.0063	0.03881	0.00047	0.0526	0.00117	2.5	21.2	245.5	5.8
G132	617	1017	2.10163	0.03166	0.1792	0.00207	0.08509	0.00122	8.2	19.4	1062.6	22.7
G134	322	155	0.28158	0.00914	0.03993	0.00053	0.05117	0.00167	-0.2	-1.6	252.4	6.5
G135	684	102	1.53447	0.02636	0.15439	0.00182	0.07211	0.0012	2.0	6.4	925.5	20.3
G137	478	164	0.94708	0.01735	0.11078	0.00131	0.06203	0.00111	-0.1	-0.3	677.3	15.2
G139	696	150	1.69102	0.02564	0.16839	0.00194	0.07286	0.00105	0.2	0.7	1003.3	21.4
G140	1902	713	0.58537	0.00891	0.07226	0.00083	0.05878	0.00085	4.0	19.5	449.8	10.0
G141	2515	300	0.58908	0.00865	0.07185	0.00082	0.05949	0.00083	5.1	23.6	447.3	9.9
G142	384	105	1.68451	0.0286	0.1691	0.00199	0.07228	0.00119	-0.4	-1.3	1007.2	21.9
G143	300	127	0.30438	0.01181	0.0416	0.00059	0.05309	0.00209	2.7	20.9	262.8	7.2
G144	22011	71	0.89745	0.08386	0.10438	0.00228	0.06239	0.00592	1.6	6.9	640.0	26.7
G145	388	362	0.62722	0.01405	0.07313	0.00089	0.06223	0.00139	8.7	33.3	455.0	10.7
G146	446	276	0.32099	0.00862	0.0451	0.00056	0.05165	0.00139	-0.6	-5.4	284.3	7.0
G147	165	166	1.50772	0.03368	0.15882	0.00197	0.06888	0.00153	-1.8	-6.1	950.2	21.9
G148	907	428	1.57198	0.02324	0.15878	0.00183	0.07183	0.00101	1.0	3.2	950.0	20.3
G150	1024	440	0.26601	0.00569	0.03755	0.00045	0.0514	0.00109	0.8	8.2	237.6	5.6

River D

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	958	247	0.28559	0.01041	0.03946	0.00054	0.05251	0.00194	2.2	18.9	249.5	6.7
G2	116	29	0.27918	0.00922	0.04028	0.00053	0.05029	0.00167	-1.8	-22.3	254.6	6.6
G3	583	112	0.29119	0.01069	0.03943	0.00055	0.05358	0.00199	4.1	29.4	249.3	6.8
G4	546	389	11.03205	0.14383	0.48824	0.00562	0.16393	0.00198	-1.5	-2.7	2496.7	40.3
G5	490	286	0.27543	0.0099	0.03982	0.00054	0.05019	0.00182	-1.9	-23.5	251.7	6.7
G6	232	120	10.04508	0.13487	0.47558	0.00551	0.15324	0.00192	-2.8	-5.3	2382.4	42.3
G7	3614	2626	0.2662	0.01273	0.03858	0.00059	0.05006	0.00243	-1.8	-23.3	244	7.3
G8	192	82	0.2926	0.01159	0.04068	0.00058	0.05218	0.00209	1.4	12.4	257.1	7.2
G9	6294	3892	0.54516	0.01143	0.07128	0.00086	0.05549	0.00115	-0.5	-2.8	443.9	10.3
G10	245	62	0.28485	0.00933	0.03984	0.00053	0.05188	0.00171	1.1	10.1	251.8	6.6
G11	348	275	13.51354	0.17256	0.5287	0.00605	0.18544	0.00218	-0.7	-1.3	2702.2	38.5
G12	120	61	0.2901	0.01152	0.04011	0.00057	0.05247	0.00211	2.0	17.1	253.5	7.1
G13	2268	1097	1.73513	0.03369	0.17133	0.00208	0.07348	0.0014	0.2	0.7	1019.5	22.9
G14	312	813	10.87241	0.18164	0.47325	0.00591	0.16668	0.00271	0.6	1.1	2524.6	54.1
G15	838	476	9.93576	0.13574	0.45013	0.00524	0.16014	0.00205	1.4	2.5	2457.2	42.9
G16	169	34	0.52081	0.01473	0.06808	0.00088	0.0555	0.00158	0.3	1.7	424.6	10.6
G17	826	181	0.6107	0.01062	0.07739	0.00091	0.05725	0.00096	0.7	4.0	480.5	10.9
G18	1475	422	0.43613	0.00692	0.0571	0.00066	0.05542	0.00084	2.7	16.5	358	8.1
G19	895	45	0.23544	0.0041	0.0327	0.00038	0.05224	0.00088	3.5	30.0	207.4	4.8
G20	381	112	1.61654	0.02853	0.15376	0.00183	0.07628	0.00131	5.9	16.4	922	20.5
G21	283	205	1.61672	0.0268	0.15455	0.00182	0.0759	0.00122	5.4	15.2	926.4	20.3
G22	708	172	0.0239	0.00104	0.00349	0.00005	0.04964	0.00219	6.7	87.4	22.5	0.7
G23	390	156	0.27404	0.01439	0.03967	0.00064	0.05012	0.00268	-2.0	-25.0	250.8	7.9
G24	209	115	0.26617	0.01967	0.03587	0.00073	0.05384	0.00407	5.5	37.7	227.2	9.1
G25	375	332	2.19971	0.03563	0.2002	0.00236	0.07972	0.00124	0.4	1.1	1190	60.9
G26	983	243	0.28596	0.01061	0.03926	0.00055	0.05284	0.00199	2.9	22.9	248.3	6.8
G27	686	322	0.25732	0.01185	0.03893	0.00058	0.04796	0.00224	-5.6	-156	246.2	7.2
G28	276	94	0.2675	0.00977	0.03672	0.00051	0.05285	0.00195	3.5	27.9	232.5	6.3
G29	760	218	0.29203	0.01009	0.0408	0.00055	0.05193	0.00181	0.9	8.7	257.8	6.8
G30	1453	397	0.31187	0.0141	0.04078	0.00062	0.05548	0.00255	6.9	40.3	257.7	7.7
G31	334	30	0.60815	0.0159	0.07572	0.00096	0.05827	0.00153	2.5	12.7	470.5	11.5
G32	1924	648	9.90934	0.12862	0.45139	0.00518	0.15927	0.00191	1.0	1.9	2448	40.3
G33	294	92	0.27661	0.00928	0.04001	0.00053	0.05016	0.0017	-1.9	-25.1	252.9	6.6
G34	416	3	0.65419	0.01105	0.0799	0.00093	0.0594	0.00097	3.1	14.8	495.5	11.2
G35	568	491	0.45454	0.01555	0.06001	0.00082	0.05495	0.0019	1.3	8.4	375.7	9.9
G36	316	235	12.39232	0.16736	0.51318	0.00597	0.1752	0.00221	-1.3	-2.4	2608	41.7
G37	405	155	0.35641	0.01555	0.04477	0.00068	0.05776	0.00256	9.6	45.8	282.3	8.4
G38	325	155	0.28688	0.00852	0.0409	0.00053	0.05089	0.00152	-0.9	-9.5	258.4	6.5
G39	543	309	0.18347	0.01207	0.02637	0.00048	0.05047	0.00339	1.9	22.6	167.8	6.1
G40	348	268	1.38816	0.03112	0.14667	0.00183	0.06866	0.00153	0.2	0.7	882.3	20.5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G41	386	155	0.27653	0.01001	0.03944	0.00054	0.05087	0.00186	-0.6	-6.2	249.4	6.7
G42	218	14	0.32017	0.00843	0.04102	0.00052	0.05663	0.00149	8.8	45.6	259.2	6.4
G43	420	153	0.28376	0.00888	0.03964	0.00052	0.05194	0.00164	1.2	11.4	250.6	6.4
G44	654	793	1.60572	0.03041	0.16415	0.00197	0.07097	0.00132	-0.8	-2.4	979.8	21.9
G45	405	284	9.88183	0.1694	0.427	0.00538	0.1679	0.00282	5.7	9.6	2536.8	55.7
G46	735	1214	0.88752	0.03945	0.09808	0.00157	0.06565	0.00298	6.9	24.2	603.1	18.4
G47	316	93	0.2825	0.00977	0.04184	0.00056	0.04899	0.00171	-4.4	-79.4	264.2	6.9
G48	281	128	0.28866	0.00986	0.04136	0.00055	0.05064	0.00175	-1.4	-16.3	261.2	6.9
G49	78	66	0.56553	0.02832	0.07217	0.00116	0.05685	0.0029	1.3	7.4	449.2	14.0
G50	325	164	0.27923	0.01167	0.03999	0.00058	0.05066	0.00215	-1.1	-12.2	252.8	7.1
G51	360	111	0.83368	0.02164	0.09257	0.00119	0.06534	0.0017	7.9	27.3	570.7	14.0
G52	330	137	4.6109	0.06426	0.29735	0.00344	0.1125	0.00147	4.3	8.8	1840.2	47.0
G53	1098	115	0.44579	0.0088	0.05625	0.00067	0.0575	0.00112	6.1	30.9	352.8	8.2
G54	3377	1704	0.29743	0.01215	0.04058	0.00059	0.05318	0.0022	3.1	23.8	256.4	7.3
G55	4058	2086	0.28382	0.01319	0.04097	0.00062	0.05026	0.00237	-2.0	-25.0	258.8	7.7
G56	416	237	0.25533	0.01161	0.03867	0.00057	0.0479	0.00221	-5.6	-162	244.6	7.1
G57	515	122	0.27843	0.01073	0.04034	0.00056	0.05008	0.00195	-2.2	-28.2	254.9	7.0
G58	3723	2300	5.22783	0.0821	0.33978	0.00404	0.11163	0.00168	-1.5	-3.3	1826.1	54.2
G59	235	50	1.61478	0.02487	0.16286	0.00189	0.07194	0.00106	0.3	1.2	972.6	21.0
G60	210	125	1.93545	0.03674	0.18323	0.00222	0.07664	0.00143	0.8	2.4	1084.6	24.2
G61	426	150	0.2794	0.0097	0.03992	0.00054	0.05079	0.00178	-0.8	-9.2	252.3	6.7
G62	359	499	3.08286	0.07528	0.24353	0.00323	0.09184	0.00225	1.7	4.0	1464.1	92.0
G63	449	173	0.37461	0.01291	0.04921	0.00067	0.05523	0.00192	4.4	26.5	309.6	8.2
G64	255	141	0.29115	0.01398	0.0407	0.00063	0.0519	0.00253	0.9	8.4	257.2	7.8
G65	521	606	1.77939	0.03481	0.17652	0.00214	0.07313	0.00141	-1.0	-3.0	1048	23.5
G66	347	150	0.54071	0.01122	0.07122	0.00086	0.05508	0.00113	-1.0	-6.7	443.5	10.3
G67	349	281	0.24257	0.00398	0.03253	0.00038	0.0541	0.00085	6.8	45.0	206.4	4.7
G68	626	246	0.28258	0.01091	0.03945	0.00056	0.05197	0.00203	1.3	12.2	249.4	6.9
G69	658	313	0.26525	0.01144	0.03848	0.00056	0.05002	0.00219	-1.8	-24.4	243.4	6.9
G70	388	137	0.96582	0.02089	0.10176	0.00125	0.06886	0.00148	9.9	30.2	624.7	14.7
G71	2184	2022	1.51025	0.02435	0.15755	0.00184	0.06955	0.00108	-0.9	-3.1	943.2	20.5
G72	220	231	0.02906	0.01161	0.0045	0.00033	0.04686	0.01902	0.7	31.2	28.9	4.2
G73	283	89	0.27972	0.01253	0.03894	0.00058	0.05212	0.00237	1.7	15.2	246.3	7.2
G74	622	70	4.31512	0.06916	0.29433	0.00351	0.10637	0.00164	2.0	4.3	1738.1	55.9
G75	487	515	0.38777	0.01852	0.05496	0.00084	0.05119	0.00248	-3.5	-38.3	344.9	10.3
G76	324	86	0.28014	0.00868	0.03912	0.00051	0.05195	0.00162	1.4	12.7	247.4	6.3
G77	208	124	0.28677	0.01033	0.03941	0.00054	0.05279	0.00192	2.7	22.1	249.2	6.7
G78	327	297	0.27471	0.01622	0.0399	0.00067	0.04995	0.003	-2.3	-30.9	252.2	8.3
G79	1757	497	0.27145	0.01295	0.03737	0.00058	0.05269	0.00256	3.1	25.1	236.5	7.2
G80	435	848	0.25535	0.00881	0.03686	0.0005	0.05027	0.00175	-1.0	-12.5	233.3	6.2
G81	303	164	1.43118	0.0212	0.14805	0.00171	0.07014	0.00098	1.3	4.5	890	19.2
G82	218	146	0.31351	0.01223	0.04351	0.00062	0.05228	0.00207	0.9	7.8	274.5	7.6
G83	133	78	0.29288	0.01001	0.03856	0.00052	0.0551	0.0019	6.9	41.4	243.9	6.5
G84	434	364	0.26987	0.00574	0.0385	0.00046	0.05086	0.00107	-0.4	-3.9	243.5	5.7
G85	371	195	4.84881	0.0768	0.31236	0.00372	0.11262	0.00172	2.3	4.9	1842.2	54.7
G86	88	9	0.84006	0.01497	0.0995	0.00117	0.06126	0.00106	1.3	5.7	611.5	13.8
G87	252	128	0.27344	0.01308	0.0388	0.00059	0.05114	0.00248	0.0	0.6	245.4	7.4
G88	334	176	8.7806	0.12744	0.4115	0.00487	0.15481	0.00213	4.2	7.4	2399.8	46.5
G89	537	242	0.28699	0.00893	0.0403	0.00053	0.05167	0.00162	0.6	6.0	254.7	6.5
G90	1130	978	0.2682	0.00793	0.03918	0.0005	0.04966	0.00148	-2.6	-38.3	247.8	6.2
G91	251	40	0.2933	0.01167	0.0414	0.00059	0.0514	0.00207	-0.1	-1.1	261.5	7.3
G92	251	69	0.28146	0.00691	0.04	0.00049	0.05106	0.00125	-0.4	-3.9	252.8	6.1
G93	301	182	0.26651	0.00534	0.03807	0.00045	0.05079	0.001	-0.4	-4.2	240.9	5.6
G94	294	56	0.28062	0.00946	0.03907	0.00052	0.05211	0.00177	1.6	14.8	247.1	6.5
G95	40	24	0.27909	0.01167	0.03802	0.00055	0.05326	0.00226	3.9	29.2	240.5	6.9
G96	226	43	0.26986	0.00879	0.03612	0.00048	0.0542	0.00178	6.0	39.6	228.8	6.0
G97	772	254	0.55245	0.01365	0.0715	0.00089	0.05606	0.00138	0.3	2.0	445.2	10.7
G98	258	268	10.28821	0.19379	0.46602	0.00609	0.16017	0.00298	-0.2	-0.3	2457.5	62.2
G99	352	459	17.09265	0.29338	0.54242	0.0071	0.22863	0.00385	5.2	8.2	3042.5	53.4
G100	157	103	4.46579	0.07434	0.29266	0.00353	0.11071	0.00179	4.2	8.6	1811.1	58.1
G101	102	0	5.81453	0.26757	0.36034	0.00736	0.11707	0.00554	-1.8	-3.8	1912	165.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G102	269	249	11.01866	0.16092	0.47962	0.00571	0.16668	0.00231	0.0	0.0	2524.6	46.2
G103	512	171	0.27447	0.0098	0.03904	0.00053	0.05101	0.00184	-0.2	-2.4	246.9	6.6
G104	248	247	0.29839	0.00966	0.04205	0.00056	0.05148	0.00168	-0.2	-1.1	265.5	6.9
G105	256	83	0.2898	0.00629	0.0418	0.0005	0.0503	0.00108	-2.1	-26.4	264	6.2
G106	693	535	2.4838	0.0482	0.20991	0.00258	0.08585	0.00164	3.2	8.0	1334.8	73.2
G107	4491	5478	0.29565	0.01936	0.04022	0.00074	0.05333	0.00356	3.5	25.9	254.2	9.1
G108	0	0	0.2818	0.00936	0.03976	0.00053	0.05142	0.00172	0.3	3.2	251.4	6.6
G109	274	217	1.09706	0.03651	0.12489	0.00173	0.06373	0.00214	-0.9	-3.5	758.6	19.9
G110	241	51	5.26319	0.07189	0.33283	0.00384	0.11473	0.00146	0.6	1.3	1875.6	45.7
G111	1174	714	5.2056	0.074	0.3339	0.00388	0.11311	0.00152	-0.2	-0.4	1850	48.1
G112	801	203	0.43059	0.00933	0.05697	0.00069	0.05484	0.00118	1.8	11.9	357.2	8.4
G113	602	577	0.59285	0.01474	0.07578	0.00095	0.05676	0.00141	0.4	2.2	470.9	11.3
G114	144	51	0.32098	0.01841	0.0428	0.00074	0.05441	0.00318	4.6	30.4	270.2	9.2
G115	366	104	0.27616	0.01032	0.0389	0.00054	0.0515	0.00195	0.7	6.6	246	6.7
G116	814	850	5.36167	0.07785	0.33307	0.0039	0.11679	0.00161	1.4	2.9	1907.7	49.0
G117	129	62	0.26879	0.01311	0.03675	0.00058	0.05307	0.00263	3.9	29.8	232.7	7.2
G118	449	221	0.28227	0.01287	0.04005	0.0006	0.05113	0.00237	-0.3	-2.7	253.2	7.4
G119	976	367	7.33232	0.09786	0.37341	0.00431	0.14246	0.00177	5.3	9.4	2257.4	42.5
G120	319	375	0.27991	0.0063	0.03982	0.00048	0.051	0.00114	-0.4	-4.5	251.7	6.0
G121	2180	584	0.27777	0.00867	0.03877	0.00051	0.05199	0.00163	1.5	13.9	245.2	6.3
G122	17601	5798	0.27644	0.00876	0.03857	0.00051	0.052	0.00166	1.6	14.6	243.9	6.3
G123	124	44	0.28566	0.00977	0.03881	0.00052	0.05341	0.00185	4.0	29.1	245.4	6.5
G124	362	239	3.70349	0.06707	0.27678	0.00338	0.09708	0.00172	-0.2	-0.4	1568.8	65.7
G125	367	162	0.2915	0.01065	0.04032	0.00056	0.05246	0.00194	1.9	16.5	254.8	6.9
G126	1071	221	4.78864	0.0697	0.31789	0.00371	0.10929	0.00151	0.2	0.5	1787.6	49.9
G127	742	724	0.32039	0.01147	0.04315	0.00059	0.05387	0.00195	3.6	25.4	272.4	7.3
G128	1	0	0.27678	0.00782	0.03921	0.0005	0.05121	0.00145	0.1	1.0	247.9	6.2

River E

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	565	363	3.08453	0.04438	0.25041	0.00292	0.08937	0.00121	-0.8	-2.0	1412.0	51.1
G2	707	118	0.53258	0.0109	0.06917	0.00083	0.05586	0.00112	0.5	3.4	431.2	10.0
G3	458	206	0.59276	0.01327	0.07619	0.00093	0.05644	0.00125	-0.1	-0.9	473.3	11.2
G4	829	1042	0.27399	0.00849	0.03956	0.00052	0.05024	0.00156	-1.7	-21.2	250.1	6.4
G5	263	277	0.52938	0.01544	0.07018	0.00091	0.05473	0.0016	-1.3	-9.0	437.2	11.0
G6	409	304	0.53163	0.01308	0.06926	0.00086	0.05569	0.00136	0.3	1.8	431.7	10.4
G7	114	88	0.56717	0.02424	0.07176	0.00107	0.05734	0.00249	2.1	11.3	446.8	12.9
G8	581	220	0.29858	0.00811	0.04206	0.00053	0.0515	0.0014	-0.1	-0.9	265.6	6.6
G9	193	170	0.55334	0.01813	0.07159	0.00097	0.05608	0.00185	0.3	2.0	445.7	11.6
G10	554	260	0.54495	0.01197	0.07064	0.00086	0.05597	0.00121	0.4	2.4	440.0	10.4
G11	5048	174	0.53104	0.0076	0.06655	0.00077	0.05789	0.00077	4.1	21.0	415.3	9.3
G12	989	186	1.3789	0.02189	0.13409	0.00157	0.0746	0.00113	8.5	23.3	811.2	17.9
G13	530	270	0.56752	0.01241	0.0722	0.00088	0.05703	0.00123	1.6	8.7	449.4	10.6
G14	274	175	0.39308	0.0131	0.0536	0.00072	0.05321	0.00179	0.0	0.3	336.6	8.8
G15	239	151	0.30269	0.01552	0.04302	0.00069	0.05105	0.00266	-1.1	-11.7	271.5	8.5
G16	447	122	0.55299	0.01665	0.07306	0.00096	0.05491	0.00166	-1.7	-11.3	454.6	11.5
G17	151	40	0.59402	0.02127	0.07752	0.00108	0.0556	0.00201	-1.6	-10.4	481.3	12.9
G18	2270	5394	0.48905	0.00754	0.06165	0.00072	0.05755	0.00084	4.8	24.7	385.7	8.7
G19	372	88	0.5815	0.01445	0.0734	0.00092	0.05747	0.00142	1.9	10.4	456.6	11.1
G20	800	613	0.62114	0.0116	0.07825	0.00093	0.05759	0.00105	1.0	5.5	485.7	11.1
G21	1573	21	0.48376	0.00813	0.06253	0.00073	0.05612	0.00091	2.5	14.4	391.0	8.9
G22	296	276	0.62293	0.01663	0.07993	0.00102	0.05654	0.00151	-0.8	-4.8	495.7	12.2
G23	354	211	0.53869	0.01396	0.07112	0.0009	0.05495	0.00142	-1.2	-8.0	442.9	10.8
G24	64	22	0.93903	0.04097	0.11173	0.00173	0.06098	0.0027	-1.5	-7.0	682.8	20.1
G25	313	167	0.30898	0.01086	0.04485	0.00061	0.04998	0.00177	-3.4	-45.9	282.9	7.5
G26	1034	201	1.88226	0.02649	0.18206	0.00211	0.075	0.00098	-0.3	-0.9	1078.2	23.0
G27	216	164	0.56681	0.0178	0.07218	0.00096	0.05697	0.0018	1.5	8.3	449.3	11.6
G28	747	355	0.30363	0.00746	0.04222	0.00052	0.05217	0.00128	1.0	9.0	266.6	6.5
G29	1935	601	0.59916	0.0092	0.07349	0.00085	0.05915	0.00086	4.3	20.2	457.1	10.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G30	664	263	0.60525	0.0122	0.07722	0.00093	0.05686	0.00112	0.2	1.3	479.5	11.1
G31	359	790	0.29508	0.00999	0.04113	0.00055	0.05205	0.00178	1.0	9.6	259.8	6.9
G32	1845	259	0.26331	0.00502	0.03696	0.00044	0.05168	0.00096	1.4	13.8	234.0	5.5
G33	198	114	1.27904	0.03039	0.13481	0.00171	0.06883	0.00163	2.6	8.8	815.2	19.4
G34	434	198	1.29806	0.02608	0.13735	0.00167	0.06856	0.00135	1.8	6.3	829.7	19.0
G35	623	252	0.30363	0.00797	0.04227	0.00053	0.05212	0.00137	0.9	8.1	266.9	6.6
G36	915	624	1.31914	0.0204	0.13618	0.00159	0.07028	0.00103	3.8	12.1	823.0	18.0
G37	2466	2089	0.48513	0.0075	0.06265	0.00073	0.05618	0.00082	2.5	14.6	391.7	8.8
G38	460	200	0.51193	0.01428	0.06553	0.00084	0.05668	0.00158	2.6	14.5	409.1	10.2
G39	129	121	0.55179	0.02276	0.0726	0.00107	0.05514	0.00231	-1.2	-8.2	451.8	12.8
G40	566	232	0.60138	0.01273	0.07578	0.00092	0.05757	0.0012	1.5	8.2	470.9	11.0
G41	238	170	0.34207	0.01491	0.04663	0.0007	0.05322	0.00235	1.7	13.2	293.8	8.6
G42	945	675	0.64288	0.01273	0.08061	0.00097	0.05786	0.00112	0.9	4.6	499.8	11.6
G43	336	202	0.29546	0.01037	0.04133	0.00056	0.05186	0.00184	0.7	6.5	261.1	7.0
G44	2250	197	0.24921	0.00449	0.03528	0.00042	0.05125	0.00089	1.1	11.3	223.5	5.2
G45	303	154	0.3498	0.01188	0.04821	0.00065	0.05264	0.0018	0.4	3.1	303.5	8.0
G46	152	91	0.59456	0.02161	0.0791	0.0011	0.05453	0.002	-3.5	-24.9	490.8	13.2
G47	410	253	0.63324	0.01487	0.08115	0.001	0.05661	0.00132	-1.0	-5.8	503.0	12.0
G48	302	159	0.54408	0.01499	0.06954	0.00089	0.05676	0.00157	1.8	10.0	433.4	10.8
G49	372	259	0.53748	0.01365	0.06934	0.00087	0.05624	0.00142	1.1	6.3	432.1	10.5
G50	148	80	0.503	0.01976	0.06774	0.00097	0.05387	0.00214	-2.1	-15.6	422.5	11.7
G51	398	316	0.5422	0.01361	0.07015	0.00088	0.05607	0.0014	0.6	3.9	437.1	10.6
G52	109	221	10.40159	0.16283	0.4725	0.00578	0.15971	0.00239	-0.9	-1.7	2452.6	50.3
G53	192	179	4.93703	0.08017	0.33272	0.004	0.10765	0.00168	-2.3	-5.2	1760.1	56.4
G54	117	84	0.57739	0.02462	0.07276	0.0011	0.05757	0.00249	2.2	11.8	452.8	13.2
G55	332	288	0.4407	0.0161	0.05571	0.00079	0.05739	0.00212	6.1	30.9	349.5	9.6
G56	362	191	2.01155	0.03457	0.18586	0.00222	0.07852	0.0013	1.9	5.3	1098.9	24.1
G57	567	238	0.57167	0.01278	0.07314	0.0009	0.0567	0.00125	0.9	5.0	455.1	10.8
G58	266	132	0.31574	0.0122	0.04532	0.00064	0.05054	0.00198	-2.5	-29.9	285.7	7.8
G59	236	239	1.08722	0.02632	0.12121	0.00153	0.06507	0.00157	1.3	5.0	737.5	17.6
G60	298	184	1.66775	0.03235	0.16523	0.00201	0.07323	0.00139	1.1	3.4	985.8	22.2
G61	364	347	0.56079	0.01403	0.07439	0.00093	0.05469	0.00136	-2.3	-15.6	462.6	11.2
G62	1729	558	0.47984	0.00791	0.06225	0.00073	0.05592	0.00088	2.2	13.3	389.3	8.8
G63	627	293	5.6474	0.07571	0.35011	0.00405	0.11703	0.00145	-0.6	-1.2	1911.3	44.1
G64	1488	103	1.62529	0.02421	0.1633	0.0019	0.0722	0.00101	0.5	1.7	975.1	21.1
G65	110	115	0.57219	0.0269	0.07234	0.00114	0.05739	0.00274	2.0	11.0	450.2	13.7
G66	1311	41	0.2967	0.01017	0.04188	0.00057	0.05139	0.00178	-0.3	-2.3	264.5	7.0
G67	148	88	0.51389	0.02035	0.06798	0.00098	0.05484	0.0022	-0.7	-4.5	424.0	11.8
G68	276	70	0.2929	0.01147	0.03986	0.00056	0.05331	0.00211	3.5	26.3	252.0	7.0
G69	130	96	0.54988	0.02231	0.07127	0.00104	0.05597	0.0023	0.2	1.6	443.8	12.5
G70	134	79	0.5505	0.02207	0.07402	0.00107	0.05395	0.00219	-3.3	-24.8	460.4	12.8
G71	472	224	0.55178	0.01288	0.07226	0.00089	0.0554	0.00128	-0.8	-5.0	449.7	10.7
G72	79	88	0.31973	0.02202	0.04097	0.00079	0.05662	0.00398	8.8	45.7	258.8	9.7
G73	794	652	1.8197	0.02701	0.17871	0.00208	0.07387	0.00103	-0.7	-2.1	1059.9	22.8
G74	350	146	0.35602	0.01121	0.04895	0.00065	0.05277	0.00167	0.4	3.4	308.0	7.9
G75	508	296	0.56238	0.0128	0.07299	0.0009	0.0559	0.00126	-0.2	-1.3	454.1	10.8
G76	355	317	1.55098	0.0285	0.16007	0.00192	0.0703	0.00126	-0.6	-2.1	957.1	21.4
G77	430	214	0.64507	0.01532	0.07615	0.00095	0.06146	0.00145	6.8	27.8	473.1	11.4
G78	239	115	0.58722	0.01768	0.07404	0.00098	0.05754	0.00174	1.9	10.1	460.4	11.7
G79	494	212	4.70723	0.06547	0.31495	0.00366	0.10843	0.00141	0.2	0.5	1773.2	47.0
G80	317	221	0.50878	0.01429	0.0672	0.00086	0.05493	0.00155	-0.4	-2.5	419.3	10.4
G81	168	115	0.57377	0.02023	0.07171	0.001	0.05805	0.00207	3.1	16.0	446.4	12.0
G82	112	64	0.62002	0.02589	0.07822	0.00117	0.05751	0.00244	0.9	4.9	485.5	13.9
G83	446	212	1.63831	0.02769	0.16295	0.00193	0.07294	0.00119	1.2	3.9	973.2	21.4
G84	3789	2345	0.42198	0.00724	0.05484	0.00064	0.05582	0.00092	3.9	22.6	344.2	7.9
G85	616	441	0.57894	0.01219	0.07483	0.00091	0.05613	0.00116	-0.3	-1.8	465.2	10.9
G86	298	171	0.4753	0.01398	0.06448	0.00084	0.05348	0.00158	-2.0	-15.4	402.8	10.2
G87	234	175	0.58306	0.01806	0.07446	0.00099	0.05681	0.00177	0.7	4.2	463.0	11.9
G88	1116	774	0.60829	0.01052	0.07433	0.00088	0.05937	0.00099	4.4	20.4	462.2	10.5
G89	174	179	0.54978	0.03112	0.07095	0.00124	0.05622	0.00324	0.7	4.0	441.9	14.9
G90	3598	936	0.46742	0.00677	0.0586	0.00068	0.05787	0.00079	6.1	30.0	367.1	8.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G91	774	367	0.31354	0.0078	0.04157	0.00052	0.05471	0.00136	5.4	34.4	262.6	6.4
G92	2239	574	0.53767	0.00822	0.06792	0.00079	0.05743	0.00083	3.1	16.5	423.6	9.5
G93	161	140	0.53961	0.02027	0.0706	0.001	0.05545	0.00211	-0.4	-2.2	439.8	12.0
G94	150	63	1.76126	0.04142	0.17381	0.00222	0.07351	0.00172	-0.2	-0.5	1033.1	24.4
G95	761	342	0.55764	0.0111	0.07319	0.00088	0.05528	0.00108	-1.2	-7.6	455.3	10.5
G96	274	79	0.64473	0.018	0.07663	0.001	0.06104	0.00171	6.1	25.7	476.0	11.9
G97	612	252	0.51679	0.01256	0.06606	0.00082	0.05676	0.00137	2.6	14.3	412.4	10.0
G98	789	872	0.62435	0.01194	0.08011	0.00096	0.05654	0.00105	-0.8	-5.0	496.8	11.4
G99	1646	1125	0.54525	0.00898	0.06999	0.00082	0.05652	0.00089	1.3	7.6	436.1	9.9
G100	260	145	0.28745	0.01172	0.04087	0.00059	0.05103	0.00211	-0.6	-6.6	258.2	7.2
G101	183	138	0.34327	0.01565	0.04594	0.0007	0.05421	0.00251	3.5	23.7	289.5	8.6
G102	344	108	0.39627	0.01237	0.05376	0.00071	0.05348	0.00168	0.4	3.3	337.6	8.7
G103	494	359	2.36919	0.0414	0.21632	0.00259	0.07946	0.00134	-2.3	-6.7	1183.5	66.2
G104	503	179	0.73077	0.01559	0.08585	0.00105	0.06176	0.0013	4.9	20.3	530.9	12.5
G105	498	666	0.53307	0.01258	0.07002	0.00087	0.05523	0.00129	-0.6	-3.5	436.3	10.4
G106	2308	915	0.45912	0.00727	0.05971	0.00069	0.05578	0.00084	2.6	15.7	373.9	8.5
G107	701	591	0.63579	0.01276	0.08169	0.00098	0.05647	0.00111	-1.3	-7.7	506.2	11.7
G108	174	99	0.5752	0.02051	0.07276	0.00102	0.05735	0.00207	1.9	10.3	452.8	12.2
G109	1316	254	0.52621	0.00927	0.06797	0.0008	0.05617	0.00096	1.3	7.6	423.9	9.7
G110	745	391	0.54327	0.0112	0.06961	0.00084	0.05662	0.00115	1.6	8.9	433.8	10.1
G111	1341	856	0.53784	0.00932	0.06972	0.00082	0.05597	0.00094	0.6	3.6	434.5	9.9
G112	113	69	0.57442	0.03332	0.07245	0.00129	0.05752	0.0034	2.2	11.8	450.9	15.5
G113	556	219	3.07557	0.04512	0.24449	0.00286	0.09126	0.00126	1.2	2.9	1452.0	52.2
G114	245	182	0.2716	0.01186	0.03856	0.00057	0.0511	0.00226	0.0	0.7	243.9	7.0
G115	266	133	0.53414	0.01653	0.07166	0.00095	0.05408	0.00168	-2.6	-19.3	446.2	11.4
G116	447	239	0.47016	0.0122	0.06179	0.00078	0.0552	0.00143	1.2	8.0	386.5	9.5
G117	423	207	0.51902	0.01324	0.06694	0.00084	0.05625	0.00143	1.6	9.5	417.7	10.2
G118	98	464	0.62959	0.02899	0.079	0.00123	0.05782	0.00271	1.1	6.2	490.2	14.7
G119	482	116	12.25795	0.15929	0.49686	0.00576	0.17899	0.00213	0.9	1.6	2643.5	39.3
G120	214	100	0.44208	0.01619	0.05837	0.00082	0.05494	0.00204	1.6	10.8	365.7	9.9
G121	593	449	11.07769	0.14289	0.48957	0.00565	0.16416	0.00194	-1.5	-2.8	2499.0	39.4
G122	287	253	0.5596	0.01629	0.07124	0.00093	0.05699	0.00167	1.7	9.5	443.6	11.2
G123	224	201	0.55512	0.01792	0.07194	0.00097	0.05598	0.00182	0.1	0.8	447.8	11.6
G124	498	198	0.29508	0.01148	0.03961	0.00057	0.05404	0.00213	4.9	32.8	250.4	7.0
G125	240	340	0.58872	0.01798	0.0764	0.00101	0.0559	0.00172	-0.9	-5.9	474.6	12.1
G126	195	5	0.34703	0.02151	0.04813	0.00086	0.05231	0.00331	-0.2	-1.3	303.0	10.6
G127	558	275	1.554	0.02612	0.15535	0.00184	0.07257	0.00117	2.3	7.1	930.9	20.5
G128	838	338	0.53834	0.01057	0.06974	0.00083	0.056	0.00108	0.6	3.8	434.6	10.1
G129	145	84	0.53653	0.02128	0.07153	0.00103	0.05442	0.00219	-2.1	-14.6	445.3	12.4
G130	48	13	0.38668	0.03395	0.04948	0.0011	0.0567	0.00508	6.6	35.0	311.3	13.5
G131	2761	1065	0.31443	0.00807	0.04305	0.00054	0.05299	0.00136	2.2	17.3	271.7	6.7
G132	3689	326	0.23469	0.00387	0.03265	0.00038	0.05214	0.00082	3.4	29.0	207.1	4.8
G133	5352	1350	0.49807	0.00738	0.0609	0.0007	0.05933	0.00083	7.7	34.2	381.1	8.6
G134	1407	470	0.51672	0.00893	0.06652	0.00078	0.05636	0.00094	1.9	10.9	415.1	9.5
G135	303	197	0.32315	0.01176	0.04431	0.00061	0.05291	0.00195	1.7	14.0	279.5	7.5
G136	736	198	0.28161	0.00723	0.03972	0.0005	0.05144	0.00132	0.3	3.6	251.1	6.1
G137	103	74	0.54215	0.02496	0.06871	0.00107	0.05724	0.00268	2.7	14.4	428.4	12.9
G138	36	4	0.29344	0.03918	0.04128	0.00124	0.05158	0.00702	0.2	2.3	260.7	15.3
G139	131	105	0.54955	0.02302	0.07039	0.00105	0.05664	0.00241	1.4	8.0	438.5	12.6

River F

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	289	179	0.52108	0.01728	0.06981	0.00095	0.05416	0.00181	-2.1	-15.3	435.0	11.5
G2	919	625	0.28444	0.00755	0.03872	0.00049	0.0533	0.00142	3.8	28.2	244.9	6.1
G3	152	141	0.51311	0.02249	0.06781	0.00104	0.0549	0.00244	-0.6	-3.7	422.9	12.5
G4	297	219	0.52297	0.01745	0.068	0.00093	0.0558	0.00188	0.7	4.5	424.1	11.3
G5	554	742	0.70076	0.01668	0.08576	0.00108	0.05928	0.0014	1.7	8.2	530.4	12.8
G6	418	275	0.31546	0.01108	0.04255	0.00059	0.05378	0.00191	3.6	25.8	268.6	7.3
G8	274	151	0.60305	0.01994	0.07696	0.00106	0.05685	0.0019	0.3	1.4	478.0	12.6

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G9	964	281	0.27398	0.00747	0.03816	0.00049	0.05208	0.00142	1.9	16.5	241.4	6.1
G10	658	198	0.58946	0.01411	0.07662	0.00096	0.05581	0.00133	-1.1	-7.0	475.9	11.5
G11	3220	194	0.555	0.00967	0.06699	0.0008	0.06011	0.00101	7.2	31.2	418.0	9.6
G12	1063	249	0.63104	0.01305	0.08132	0.00099	0.0563	0.00115	-1.4	-8.7	504.0	11.8
G13	263	207	0.46217	0.01725	0.05815	0.00083	0.05767	0.00218	5.9	29.5	364.3	10.2
G14	326	223	0.25016	0.01095	0.03543	0.00053	0.05123	0.00228	1.0	10.6	224.4	6.6
G15	412	87	1.43891	0.03125	0.14977	0.00187	0.06971	0.0015	0.6	2.2	899.7	20.9
G16	501	68	0.53497	0.01509	0.069	0.0009	0.05625	0.00159	1.2	6.8	430.1	10.9
G17	638	1049	0.27388	0.00911	0.03867	0.00052	0.05139	0.00172	0.5	5.3	244.6	6.5
G19	297	444	0.50106	0.01779	0.06663	0.00093	0.05456	0.00196	-0.8	-5.5	415.8	11.2
G20	5737	1623	0.28278	0.00509	0.04067	0.00048	0.05045	0.00088	-1.6	-19.1	257.0	6.0
G21	1325	280	0.75446	0.01471	0.09169	0.00111	0.0597	0.00114	0.9	4.7	565.5	13.1
G23	105	64	0.55474	0.02982	0.06752	0.00116	0.05961	0.00327	6.4	28.5	421.2	14.0
G24	139	138	0.25358	0.01885	0.03741	0.00073	0.04918	0.00372	-3.1	-51.6	236.8	9.0
G25	452	122	1.81756	0.03773	0.17454	0.00216	0.07555	0.00155	1.4	4.3	1037.1	23.7
G26	169	125	0.50683	0.02321	0.06788	0.00105	0.05417	0.00252	-1.7	-12.0	423.4	12.7
G27	236	99	0.2596	0.01462	0.03931	0.00065	0.04791	0.00274	-5.8	- 165	248.6	8.1
G28	147	92	0.50987	0.0252	0.06682	0.00108	0.05536	0.00278	0.3	2.3	417.0	13.1
G29	956	1086	0.28911	0.0081	0.04061	0.00052	0.05166	0.00145	0.5	5.0	256.6	6.5
G30	2973	324	0.28943	0.00591	0.04039	0.00049	0.05199	0.00104	1.1	10.5	255.2	6.1
G31	440	220	0.53502	0.01589	0.06953	0.00092	0.05583	0.00167	0.4	2.7	433.3	11.1
G33	564	313	0.7533	0.01831	0.09205	0.00116	0.05938	0.00144	0.4	2.3	567.6	13.7
G34	1482	290	0.46353	0.0102	0.06743	0.00082	0.04987	0.00108	-8.1	- 122	420.6	9.9
G35	233	34	0.35347	0.01602	0.04743	0.00073	0.05407	0.00249	2.9	20.1	298.7	9.0
G36	452	306	0.51727	0.01519	0.0678	0.00089	0.05535	0.00163	0.1	0.8	422.9	10.8
G37	356	689	0.27542	0.0116	0.03856	0.00057	0.05182	0.00221	1.3	12.1	243.9	7.1
G38	146	91	0.52522	0.02539	0.06804	0.00109	0.05601	0.00275	1.0	6.2	424.3	13.1
G39	238	116	0.56003	0.02109	0.07488	0.00107	0.05427	0.00207	-3.0	-21.9	465.5	12.8
G40	1390	176	0.62487	0.01278	0.07723	0.00094	0.0587	0.00118	2.8	13.7	479.6	11.2
G41	773	491	2.92031	0.05222	0.23329	0.00281	0.09082	0.00158	2.6	6.3	1442.7	65.4
G42	365	296	0.50322	0.0162	0.06779	0.00091	0.05386	0.00175	-2.1	-15.8	422.8	11.0
G43	2130	6115	0.27205	0.00606	0.03946	0.00048	0.05002	0.0011	-2.1	-27.5	249.5	6.0
G44	164	93	0.33257	0.01869	0.04461	0.00076	0.05409	0.0031	3.6	24.9	281.4	9.4
G45	484	393	0.51258	0.01511	0.06731	0.00089	0.05525	0.00164	0.1	0.5	419.9	10.7
G48	581	295	0.52327	0.01451	0.06745	0.00087	0.05628	0.00156	1.5	9.1	420.8	10.6
G49	110	85	0.29228	0.02137	0.03971	0.00079	0.05341	0.00398	3.7	27.5	251.0	9.7
G50	362	192	10.58127	0.18576	0.45798	0.00556	0.16763	0.00285	2.3	4.1	2534.1	56.5
G51	607	406	0.52845	0.0142	0.06843	0.00088	0.05602	0.00151	1.0	5.8	426.7	10.6
G52	989	1015	0.3428	0.00908	0.04794	0.00061	0.05188	0.00137	-0.9	-7.9	301.9	7.5
G53	1919	809	0.58902	0.01181	0.0749	0.00091	0.05706	0.00112	1.0	5.6	465.6	10.9
G54	447	290	0.52277	0.01614	0.06586	0.00088	0.05759	0.00179	3.9	20.0	411.1	10.7
G55	251	47	0.27529	0.0142	0.03925	0.00063	0.05089	0.00267	-0.5	-5.3	248.2	7.8
G56	876	591	0.5288	0.01296	0.06925	0.00087	0.0554	0.00135	-0.1	-0.8	431.6	10.5
G57	145	139	0.52595	0.02778	0.06663	0.00112	0.05727	0.00308	3.2	17.1	415.8	13.6
G59	459	237	0.29707	0.0123	0.04108	0.0006	0.05247	0.0022	1.8	15.2	259.5	7.5
G60	598	374	0.29045	0.01093	0.03888	0.00055	0.05419	0.00206	5.3	35.1	245.9	6.8
G61	273	202	1.14353	0.03437	0.12603	0.00171	0.06583	0.00199	1.2	4.5	765.2	19.6
G62	1814	1402	0.57963	0.01235	0.07387	0.0009	0.05693	0.0012	1.0	5.9	459.4	10.8
G63	634	168	0.58634	0.01658	0.07732	0.00101	0.05502	0.00156	-2.4	-16.2	480.1	12.0
G64	340	256	0.31026	0.01357	0.04334	0.00065	0.05193	0.00231	0.3	3.2	273.5	8.0
G65	332	123	0.40213	0.01625	0.05376	0.00079	0.05427	0.00222	1.7	11.6	337.6	9.6
G66	2271	931	0.53925	0.01104	0.07033	0.00085	0.05563	0.00112	0.0	-0.2	438.1	10.3
G67	665	336	0.52619	0.01439	0.06763	0.00087	0.05645	0.00155	1.8	10.1	421.8	10.5
G68	649	419	0.52357	0.01502	0.06796	0.00089	0.0559	0.00161	0.9	5.4	423.8	10.7
G69	265	286	0.28037	0.0142	0.04001	0.00064	0.05084	0.00262	-0.8	-8.4	252.9	7.9
G70	419	311	0.26222	0.01235	0.03759	0.00058	0.05062	0.00242	-0.5	-6.4	237.8	7.2
G71	382	201	0.56823	0.01895	0.07077	0.00097	0.05825	0.00196	3.7	18.1	440.8	11.7
G72	1100	636	0.52171	0.01293	0.06764	0.00085	0.05596	0.00138	1.0	6.3	421.9	10.3
G73	164	150	0.53943	0.02655	0.07072	0.00114	0.05534	0.00277	-0.6	-3.5	440.5	13.7
G74	3103	2555	0.2849	0.00643	0.04019	0.00049	0.05143	0.00115	0.2	2.4	254.0	6.1
G75	185	126	0.25734	0.0163	0.03885	0.00069	0.04805	0.0031	-5.4	- 141	245.7	8.5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G76	1039	431	0.6265	0.01503	0.07317	0.00092	0.06212	0.00148	8.5	32.9	455.2	11.0
G78	692	732	0.52404	0.01448	0.06918	0.00089	0.05496	0.00152	-0.8	-5.0	431.2	10.8
G79	1226	585	0.56966	0.01333	0.0745	0.00093	0.05548	0.00129	-1.2	-7.4	463.2	11.1
G80	614	494	0.59691	0.01662	0.07554	0.00098	0.05733	0.0016	1.3	6.8	469.4	11.8
G81	275	221	0.57025	0.02159	0.0734	0.00105	0.05637	0.00216	0.4	2.0	456.6	12.7
G82	1439	160	0.27634	0.00739	0.0388	0.00049	0.05167	0.00138	0.9	9.4	245.4	6.1
G86	738	214	0.54131	0.01476	0.0711	0.00091	0.05524	0.00151	-0.8	-5.0	442.8	11.0
G87	943	886	0.60547	0.01511	0.07785	0.00098	0.05642	0.0014	-0.5	-3.2	483.3	11.7
G88	1286	669	0.61284	0.01423	0.07856	0.00098	0.0566	0.0013	-0.5	-2.6	487.5	11.7
G89	224	223	0.50342	0.02159	0.06998	0.00105	0.05219	0.00227	-5.1	-48.5	436.1	12.6
G90	135	121	0.55152	0.02816	0.07231	0.00119	0.05534	0.00288	-0.9	-5.7	450.0	14.3
G91	443	413	0.28709	0.01165	0.0397	0.00058	0.05247	0.00216	2.1	18.0	251.0	7.2
G92	986	542	0.53096	0.01356	0.06879	0.00087	0.056	0.00143	0.8	5.1	428.9	10.5
G93	631	645	0.50275	0.01471	0.06697	0.00088	0.05446	0.0016	-1.0	-7.1	417.9	10.6
G94	224	247	0.50641	0.02135	0.06793	0.00101	0.05409	0.00231	-1.8	-13.1	423.7	12.2
G95	250	186	0.56647	0.02198	0.07071	0.00103	0.05813	0.00229	3.5	17.5	440.4	12.4
G96	409	414	0.52049	0.0173	0.06529	0.00089	0.05784	0.00194	4.4	22.1	407.7	10.8
G97	115	37	0.33752	0.02321	0.04579	0.00088	0.05347	0.00375	2.3	17.2	288.7	10.8
G98	711	358	0.49992	0.01447	0.06652	0.00087	0.05453	0.00158	-0.9	-5.7	415.2	10.5
G99	350	254	0.59969	0.02022	0.07619	0.00105	0.05711	0.00194	0.8	4.4	473.3	12.6
G100	195	148	0.54931	0.02439	0.06982	0.00107	0.05708	0.00258	2.2	12.0	435.1	12.9
G101	4706	3011	0.56218	0.01181	0.07369	0.0009	0.05535	0.00114	-1.2	-7.6	458.4	10.8
G103	583	201	0.36577	0.0129	0.0493	0.00068	0.05383	0.00192	2.0	14.7	310.2	8.4
G104	278	184	0.50348	0.0202	0.06614	0.00097	0.05523	0.00225	0.3	2.1	412.8	11.7
G105	365	331	0.50273	0.01854	0.06687	0.00094	0.05455	0.00204	-0.9	-6.0	417.3	11.4
G106	264	199	0.26062	0.0149	0.03835	0.00065	0.04931	0.00287	-3.1	-49.2	242.6	8.0
G107	1252	590	0.55215	0.01401	0.07155	0.0009	0.05599	0.00142	0.2	1.3	445.5	10.9
G109	535	324	0.53249	0.01688	0.06967	0.00094	0.05546	0.00177	-0.1	-0.9	434.1	11.3
G110	1488	195	0.55484	0.01375	0.07124	0.0009	0.0565	0.0014	1.0	5.9	443.6	10.8
G111	537	244	0.51706	0.01637	0.06854	0.00092	0.05473	0.00174	-1.0	-6.5	427.4	11.1
G112	316	257	0.32551	0.01501	0.0448	0.00069	0.05272	0.00247	1.3	10.8	282.5	8.5
G113	1118	522	0.55392	0.01462	0.07059	0.0009	0.05693	0.0015	1.8	9.9	439.7	10.8
G117	398	393	0.48818	0.01807	0.06535	0.00092	0.05419	0.00203	-1.1	-7.7	408.1	11.2
G119	333	139	0.51348	0.01915	0.06648	0.00095	0.05604	0.00212	1.4	8.5	414.9	11.4
G120	63	47	0.65641	0.04791	0.07738	0.00163	0.06155	0.00459	6.6	27.0	480.5	19.5
G121	742	251	0.54407	0.01604	0.0712	0.00093	0.05544	0.00164	-0.5	-3.2	443.4	11.2
G122	354	265	0.51537	0.01935	0.06623	0.00094	0.05646	0.00215	2.1	12.0	413.4	11.4
G123	1189	779	0.517	0.01391	0.06901	0.00088	0.05435	0.00146	-1.7	-11.6	430.2	10.6
G125	183	179	0.2836	0.01813	0.03868	0.00071	0.05319	0.00347	3.6	27.4	244.6	8.8
G126	532	651	0.26099	0.01095	0.03833	0.00056	0.0494	0.0021	-2.9	-45.4	242.5	6.9
G127	787	131	0.53956	0.01624	0.0706	0.00093	0.05545	0.00168	-0.4	-2.3	439.8	11.2
G128	646	1003	0.27041	0.01116	0.03862	0.00056	0.05081	0.00213	-0.5	-5.3	244.2	7.0
G129	758	450	0.51404	0.01552	0.06663	0.00088	0.05597	0.0017	1.3	7.8	415.8	10.6
G130	782	506	0.2852	0.01006	0.04017	0.00055	0.05151	0.00184	0.4	3.8	253.9	6.8
G131	1353	837	0.52947	0.01415	0.06917	0.00088	0.05554	0.00148	0.1	0.6	431.1	10.6
G134	152	113	0.53102	0.03017	0.06738	0.00118	0.05717	0.00331	2.9	15.5	420.4	14.2
G135	256	131	0.54259	0.0241	0.07064	0.00108	0.05573	0.00251	0.0	0.3	440.0	13.0
G136	394	319	0.26283	0.01237	0.03725	0.00057	0.05119	0.00245	0.5	5.5	235.8	7.1
G137	452	165	0.52623	0.01854	0.06696	0.00093	0.05702	0.00203	2.8	15.0	417.8	11.3
G139	151	112	0.57244	0.02987	0.07053	0.00119	0.05888	0.00313	4.6	21.9	439.4	14.3
G141	195	162	0.50252	0.02427	0.06456	0.00103	0.05647	0.00278	2.5	14.2	403.3	12.5
G145	1193	124	3.6842	0.0874	0.27581	0.00345	0.09691	0.00229	-0.1	-0.3	1565.6	87.2
G147	2786	1676	0.53993	0.01367	0.07002	0.00088	0.05595	0.00141	0.5	3.0	436.3	10.6
G148	177	154	0.55358	0.02696	0.07026	0.00113	0.05716	0.00283	2.2	12.0	437.7	13.6
G149	505	410	0.60552	0.02	0.0791	0.00107	0.05554	0.00185	-2.1	-13.2	490.8	12.8
G150	3783	388	0.27236	0.00723	0.03894	0.00049	0.05075	0.00135	-0.6	-7.3	246.2	6.1

River G

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G4	101.8	64.5	0.37298	0.01934	0.04751	0.00076	0.05696	0.00301	7.6	38.9	299.2	9.4
G9	1969.7	37.3	0.29637	0.00611	0.04194	0.00048	0.05127	0.00105	-0.5	-4.6	264.8	6.0
G12	189.0	159.2	0.54368	0.01698	0.07055	0.00091	0.05591	0.00177	0.3	2.0	439.5	10.9
G13	771.1	2665.2	0.30216	0.00922	0.0424	0.00054	0.0517	0.0016	0.1	1.7	267.7	6.6
G17	144.7	122.5	0.56815	0.03146	0.07325	0.00124	0.05628	0.00318	0.2	1.5	455.7	14.9
G18	5426.7	190531	0.25271	0.00507	0.03464	0.0004	0.05293	0.00106	4.2	32.6	219.5	5.0
G20	569.6	384.9	0.2583	0.00689	0.03683	0.00045	0.05088	0.00137	0.0	1.0	233.2	5.6
G27	485.7	447.1	0.5352	0.01364	0.07099	0.00086	0.0547	0.0014	-1.5	-10.5	442.1	10.4
G31	403.1	508.2	0.36578	0.00985	0.05028	0.00062	0.05279	0.00143	0.1	1.1	316.2	7.6
G32	1718.0	88.4	0.49336	0.00818	0.0646	0.00073	0.05541	0.0009	0.9	5.8	403.6	8.8
G33	218.7	242.8	0.5297	0.02005	0.06888	0.00096	0.0558	0.00215	0.5	3.3	429.4	11.5
G39	237.9	115.4	0.11851	0.01097	0.01785	0.0004	0.04818	0.00455	-0.3	-5.7	114.0	5.0
G40	914.5	496.5	0.53968	0.00995	0.07108	0.00081	0.05509	0.00101	-1.0	-6.4	442.6	9.7
G42	300.6	148.8	1.94849	0.03421	0.18872	0.00217	0.07491	0.0013	-1.5	-4.5	1066.1	69.0
G43	1306.3	400.8	0.58326	0.01001	0.07584	0.00086	0.0558	0.00094	-1.0	-6.1	471.2	10.3
G45	1105.4	226.5	0.28863	0.0089	0.04024	0.00051	0.05204	0.00162	1.3	11.4	254.3	6.3
G50	205.5	95.5	0.29067	0.01226	0.04049	0.00058	0.05208	0.00223	1.3	11.5	255.9	7.1
G57	50.2	106.0	0.29392	0.0267	0.0414	0.00089	0.05151	0.00476	0.0	0.9	261.5	11.0
G61	467.8	619.1	0.11984	0.0069	0.01646	0.00028	0.05283	0.00311	9.2	67.3	105.2	3.5
G63	261614.3	0.0	0.30003	0.01882	0.04225	0.00073	0.05153	0.00329	-0.1	-0.9	266.8	9.0
G67	555.7	260.7	0.30797	0.01191	0.04336	0.0006	0.05153	0.00202	-0.4	-3.4	273.6	7.4
G68	1289.8	377.4	0.28475	0.00566	0.03997	0.00046	0.0517	0.00102	0.7	7.1	252.6	5.7
G73	131.5	84.8	0.10487	0.01143	0.01585	0.00039	0.04801	0.00533	-0.1	-2.8	101.4	4.9
G74	382.6	514.9	0.11711	0.00552	0.01723	0.00025	0.04931	0.00236	2.2	32.3	110.1	3.2
G77	730.8	459.6	0.26526	0.00806	0.03948	0.00049	0.04875	0.00149	-4.3	-83.7	249.6	6.0
G78	584.8	393.0	0.12171	0.00452	0.01787	0.00024	0.04942	0.00186	2.1	32.0	114.2	3.0
G79	495.6	281.5	1.46763	0.02439	0.15336	0.00174	0.06944	0.00113	-0.3	-0.9	919.7	19.4
G82	1007.0	1322.3	0.12202	0.00437	0.01753	0.00023	0.0505	0.00183	4.4	48.6	112.0	2.9
G89	271.6	152.0	0.64639	0.0248	0.08205	0.00115	0.05716	0.00223	-0.4	-2.3	508.3	13.7
G91	174491	38.1	0.25907	0.05261	0.03751	0.00166	0.05012	0.01039	-1.5	-18.5	237.4	20.7
G113	113.6	39.1	0.31673	0.02435	0.04411	0.00089	0.0521	0.00409	0.4	3.9	278.3	11.0
G114	644.9	329.2	0.29362	0.00716	0.04126	0.00049	0.05163	0.00126	0.3	3.2	260.6	6.1
G118	103.7	179.4	0.2932	0.02568	0.04125	0.00091	0.05157	0.00461	0.2	2.2	260.6	11.3
G119	5303.8	2314.6	0.29296	0.00428	0.04104	0.00045	0.05179	0.00073	0.6	6.2	259.3	5.6
G122	619.8	136.9	0.26766	0.01079	0.03811	0.00053	0.05096	0.00209	-0.1	-0.8	241.1	6.6
G123	658.1	449.0	0.6061	0.01166	0.07776	0.00089	0.05656	0.00108	-0.3	-1.9	482.7	10.7
G130	1098.2	282.9	0.55166	0.00959	0.07231	0.00082	0.05535	0.00095	-0.9	-5.6	450.1	9.8
G132	9276.9	3703.9	0.09131	0.00202	0.01381	0.00016	0.04798	0.00106	0.3	8.8	88.4	2.0
G135	220.0	228.8	0.61195	0.01781	0.07772	0.00098	0.05713	0.00168	0.5	2.7	482.5	11.8
G146	401.7	275.7	0.56687	0.01337	0.07277	0.00087	0.05652	0.00134	0.7	4.1	452.8	10.4
G148	603.9	358.0	0.55905	0.01178	0.07193	0.00084	0.05639	0.00119	0.7	4.1	447.8	10.1
G149	389.2	245.0	0.10733	0.00973	0.01619	0.00036	0.0481	0.00445	0.0	0.8	103.5	4.5
G001	598.3	507.5	0.56728	0.01228	0.07401	0.00083	0.05561	0.00122	-0.9	-5.5	460.3	10.0
G003	1937.1	516.9	0.0988	0.00259	0.01496	0.00017	0.04792	0.00127	0.0	-1.4	95.7	2.2
G008	232.4	161.9	0.47759	0.02017	0.06416	0.00091	0.054	0.00233	-1.1	-8.1	400.9	11.0
G011	510.4	254.9	0.30105	0.01293	0.04222	0.00059	0.05173	0.00227	0.2	2.5	266.6	7.4
G012	462.1	168.9	0.38187	0.0117	0.05304	0.00065	0.05224	0.00163	-1.4	-12.6	333.1	8.0
G013	125.3	71.0	0.26537	0.01987	0.03694	0.00073	0.05211	0.00399	2.2	19.5	233.9	9.0
G015	483.9	175.5	0.59937	0.01463	0.07917	0.00092	0.05493	0.00136	-2.9	-20.0	491.1	11.0
G017	286.2	485.9	0.27401	0.01012	0.0389	0.00051	0.0511	0.00192	0.0	-0.2	246.0	6.3
G018	180.9	242.1	0.2712	0.01249	0.0378	0.00054	0.05205	0.00245	1.9	16.8	239.2	6.8
G019	156.8	41.1	0.29024	0.01585	0.04049	0.00064	0.05201	0.0029	1.1	10.5	255.8	7.9
G020	461.6	235.3	0.10053	0.00556	0.01519	0.00024	0.04802	0.00271	0.1	1.8	97.2	3.0
G022	1062.7	250.1	0.31014	0.01171	0.04185	0.00056	0.05377	0.00207	3.8	26.8	264.3	6.9
G024	137.6	82.9	0.52755	0.02083	0.06937	0.00095	0.05517	0.00222	-0.5	-3.1	432.3	11.4
G027	346.8	377.3	0.09299	0.00837	0.01401	0.0003	0.04815	0.00443	0.7	15.9	89.7	3.9
G026	797.5	197.1	0.09683	0.00452	0.01464	0.00021	0.04798	0.00229	0.1	3.7	93.7	2.7
G028	276.6	187.4	0.53504	0.0172	0.07092	0.00089	0.05473	0.00179	-1.5	-10.1	441.7	10.8
G029	127.1	64.4	0.38924	0.02713	0.05335	0.001	0.05293	0.00377	-0.4	-2.8	335.0	12.3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G030	211.9	113.3	0.30123	0.01225	0.0424	0.00058	0.05155	0.00214	-0.1	-0.9	267.7	7.1
G031	1142.0	263.9	0.27499	0.00627	0.03855	0.00044	0.05176	0.0012	1.2	11.2	243.8	5.4
G033	374.1	127.6	0.5004	0.0133	0.06624	0.00078	0.0548	0.00148	-0.4	-2.3	413.5	9.5
G034	172.7	91.9	0.49506	0.01876	0.06605	0.00088	0.05438	0.0021	-0.9	-6.6	412.3	10.7
G035	294.8	201.8	0.5108	0.01481	0.06862	0.00083	0.054	0.00159	-2.1	-15.3	427.9	10.0
G036	170.9	136.3	0.51167	0.01842	0.06805	0.00089	0.05455	0.002	-1.1	-7.7	424.4	10.8
G037	1056.7	488.0	0.27073	0.00749	0.0382	0.00045	0.05142	0.00145	0.7	6.9	241.7	5.6
G038	200.5	53.0	0.68205	0.03356	0.08438	0.00133	0.05864	0.00295	1.1	5.7	522.2	15.9
G039	3600.0	948.8	0.5202	0.00855	0.06807	0.00073	0.05545	0.00091	0.2	1.3	424.5	8.8
G040	120.3	99.5	0.5291	0.02247	0.06956	0.00099	0.05518	0.00239	-0.5	-3.3	433.5	11.9
G041	171.3	121.4	0.51421	0.01814	0.0682	0.00089	0.0547	0.00197	-0.9	-6.3	425.3	10.7
G042	477.6	260.8	0.09958	0.00529	0.01509	0.00023	0.04787	0.00259	-0.2	-5.2	96.6	2.9
G043	304.9	129.8	0.28964	0.00996	0.0409	0.00052	0.05138	0.0018	0.0	-0.2	258.4	6.4
G044	1237.2	77.8	0.25724	0.00562	0.03696	0.00041	0.05049	0.00112	-0.7	-7.5	234.0	5.2
G045	144.5	92.1	0.54913	0.03432	0.0703	0.00127	0.05667	0.00363	1.5	8.4	437.9	15.3
G046	533.2	116.8	0.41283	0.01031	0.05686	0.00066	0.05268	0.00134	-1.6	-13.2	356.5	8.0
G047	661.2	87.2	0.51242	0.01108	0.06807	0.00077	0.05461	0.0012	-1.0	-7.1	424.5	9.3
G048	1911.2	1119.3	0.52397	0.0091	0.06748	0.00073	0.05633	0.00098	1.6	9.4	420.9	8.8
G049	383.7	221.9	0.10835	0.00966	0.0163	0.00035	0.04822	0.00439	0.3	5.4	104.2	4.5
G050	220.6	100.5	0.49991	0.01973	0.06588	0.0009	0.05505	0.00222	0.1	0.7	411.3	10.9

River H

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	800	532	0.29713	0.00627	0.04175	0.00049	0.05163	0.00108	0.2	1.9	263.7	6.1
G4	94	80	0.29098	0.01722	0.04095	0.00069	0.05155	0.00311	0.2	2.6	258.7	8.5
G5	30164	-1	0.09565	0.01085	0.01446	0.00037	0.04797	0.00555	0.2	4.3	92.6	4.7
G6	1666	613	0.09965	0.00239	0.01523	0.00018	0.04746	0.00114	-0.9	-35.7	97.4	2.3
G7	251	190	0.52539	0.01381	0.06921	0.00086	0.05507	0.00146	-0.6	-4.0	431.4	10.3
G9	823	176	0.28233	0.00604	0.04006	0.00047	0.05113	0.00109	-0.3	-2.7	253.2	5.8
G10	7087	11	0.31022	0.12091	0.0436	0.00292	0.05161	0.02038	-0.3	-2.5	275.1	36.1
G12	1435	231	0.47535	0.00747	0.06303	0.00071	0.0547	0.00083	0.2	1.5	394.0	8.6
G13	352	355	0.26713	0.00798	0.03785	0.00048	0.05119	0.00154	0.4	3.9	239.5	6.0
G14	11755	1430	0.56409	0.00706	0.07237	0.0008	0.05654	0.00066	0.8	4.8	450.4	9.6
G15	936	497	0.10272	0.00305	0.01551	0.00019	0.04803	0.00144	0.1	1.6	99.2	2.5
G16	416	312	0.52177	0.01148	0.06798	0.00081	0.05568	0.00122	0.6	3.5	423.9	9.8
G17	813	312	0.52867	0.0093	0.06816	0.00078	0.05626	0.00097	1.4	8.0	425.1	9.4
G18	690	701	0.27793	0.00811	0.03879	0.00049	0.05198	0.00153	1.5	13.8	245.3	6.1
G19	533	345	0.54851	0.01065	0.07246	0.00084	0.05491	0.00105	-1.6	-10.4	451.0	10.1
G20	809	518	0.51792	0.00919	0.06805	0.00078	0.05521	0.00096	-0.1	-0.9	424.4	9.4
G22	531	194	0.52408	0.01044	0.06767	0.00079	0.05618	0.00111	1.4	8.0	422.1	9.6
G25	654	140	0.52818	0.00987	0.06896	0.0008	0.05556	0.00102	0.2	1.0	429.9	9.6
G27	420	164	0.27812	0.00766	0.03887	0.00048	0.0519	0.00144	1.4	12.6	245.8	6.0
G29	209	132	0.54924	0.01536	0.07204	0.00091	0.0553	0.00156	-0.9	-5.7	448.5	10.9
G30	239	194	0.53392	0.01461	0.06826	0.00086	0.05674	0.00156	2.1	11.5	425.6	10.3
G31	233	134	0.50962	0.01759	0.06723	0.00091	0.05499	0.00192	-0.3	-1.9	419.4	11.0
G32	201	123	0.22562	0.02628	0.03238	0.00091	0.05054	0.00602	0.6	6.6	205.4	11.3
G33	794	361	0.51789	0.00917	0.06778	0.00078	0.05543	0.00096	0.2	1.5	422.7	9.4
G35	552	136	0.53285	0.01369	0.06903	0.00085	0.056	0.00145	0.8	4.8	430.3	10.3
G36	276	138	0.10194	0.00829	0.01545	0.00032	0.04786	0.00397	-0.2	-8.2	98.8	4.0
G37	1018	706	0.27388	0.00544	0.03853	0.00045	0.05157	0.00101	0.9	8.5	243.7	5.6
G41	210	84	0.39099	0.01263	0.05318	0.00069	0.05333	0.00174	0.3	2.6	334.0	8.5
G42	400	298	0.42913	0.01032	0.05776	0.0007	0.05389	0.0013	0.2	1.2	362.0	8.5
G43	2636	268	0.27165	0.0042	0.03835	0.00043	0.05139	0.00077	0.6	6.1	242.6	5.4
G44	701	414	0.27441	0.00617	0.03835	0.00046	0.0519	0.00116	1.5	13.6	242.6	5.7
G47	500	429	0.11248	0.00583	0.01538	0.00025	0.05306	0.0028	10.0	70.3	98.4	3.1
G48	1211	535	0.55751	0.00877	0.07224	0.00082	0.05598	0.00085	0.1	0.4	449.6	9.8
G54	502	99	1.88462	0.02798	0.17992	0.00204	0.07598	0.00109	0.9	2.6	1066.5	22.3
G57	234	171	12.3615	0.16239	0.50274	0.0057	0.17836	0.00222	0.3	0.5	2637.7	41.1

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G61	13748	3	0.27112	0.04781	0.03801	0.00111	0.05175	0.00922	1.3	12.3	240.5	13.8
G63	175	258	0.3249	0.0205	0.04526	0.00081	0.05207	0.00335	0.1	1.0	285.4	10.1
G66	631	383	0.55629	0.01052	0.07199	0.00084	0.05606	0.00105	0.2	1.4	448.1	10.0
G70	999	219	0.5172	0.00864	0.0685	0.00078	0.05477	0.00089	-0.9	-6.0	427.1	9.4
G71	579	512	0.28585	0.01032	0.04029	0.00055	0.05147	0.00188	0.3	2.8	254.6	6.8
G75	175	193	0.10294	0.00803	0.0156	0.00031	0.04787	0.00381	-0.3	-9.0	99.8	3.9
G77	512	438	0.67432	0.01295	0.08401	0.00098	0.05822	0.00111	0.6	3.3	520.0	11.7
G81	781	959	0.29433	0.01086	0.04134	0.00056	0.05164	0.00193	0.3	3.1	261.2	7.0
G83	454	207	0.29997	0.00802	0.04145	0.00051	0.0525	0.00141	1.8	14.8	261.8	6.3
G85	181	75	0.80451	0.02094	0.09472	0.00119	0.06161	0.00161	2.7	11.7	583.4	14.0
G86	1993	341	0.83984	0.01165	0.09845	0.0011	0.06188	0.00082	2.3	9.6	605.3	12.9
G90	208	93	0.34177	0.01619	0.0472	0.00072	0.05252	0.00253	0.4	3.6	297.3	8.9
G91	899	640	0.28088	0.00606	0.03952	0.00047	0.05156	0.00111	0.6	6.1	249.8	5.8
G92	159	68	0.61128	0.02809	0.07838	0.00121	0.05658	0.00265	-0.4	-2.6	486.4	14.4
G93	295	240	0.12953	0.0081	0.01939	0.00034	0.04846	0.00309	-0.1	-1.7	123.8	4.2
G94	932	719	0.29918	0.00617	0.04218	0.00049	0.05145	0.00105	-0.2	-2.1	266.4	6.1
G95	85	51	0.50976	0.02325	0.06663	0.00101	0.0555	0.00258	0.6	3.8	415.8	12.2
G96	865	206	0.63202	0.01066	0.08049	0.00092	0.05696	0.00094	-0.3	-2.0	499.1	11.0
G97	327	516	0.29762	0.00915	0.04117	0.00053	0.05243	0.00163	1.7	14.6	260.1	6.5
G98	405	275	0.58079	0.01267	0.07457	0.00089	0.0565	0.00123	0.3	1.6	463.6	10.7
G99	470	332	0.10916	0.0059	0.01553	0.00025	0.05098	0.00281	5.8	58.6	99.4	3.2
G100	619	737	0.27867	0.0091	0.03918	0.00051	0.05159	0.0017	0.7	7.3	247.8	6.3
G101	401	301	0.57052	0.01283	0.0733	0.00088	0.05646	0.00127	0.5	2.9	456.0	10.5
G102	338	377	0.56754	0.01393	0.07394	0.0009	0.05568	0.00137	-0.8	-4.7	459.9	10.8
G103	934	1004	0.29586	0.00608	0.04204	0.00049	0.05105	0.00104	-0.9	-9.3	265.5	6.1
G104	552	30	0.6383	0.01316	0.08254	0.00097	0.0561	0.00115	-2.0	-12.2	511.3	11.6
G105	1012	467	1.17956	0.01708	0.13027	0.00147	0.06568	0.00091	0.2	0.9	789.4	16.7
G106	213	181	10.36376	0.14064	0.45708	0.00522	0.16447	0.00213	1.7	3.0	2502.2	43.3
G107	248	366	0.57421	0.01831	0.0758	0.00099	0.05495	0.00177	-2.2	-14.9	471.0	11.9
G108	651	331	0.54993	0.0104	0.07136	0.00083	0.0559	0.00104	0.1	0.8	444.3	10.0
G109	353	265	0.29196	0.00888	0.04162	0.00053	0.05089	0.00156	-1.0	-11.4	262.8	6.6
G112	601	141	0.34775	0.00797	0.04847	0.00058	0.05205	0.00119	-0.7	-6.2	305.1	7.1
G114	144	129	0.57313	0.02579	0.07378	0.00113	0.05635	0.00258	0.2	1.4	458.9	13.5
G118	272	210	0.10847	0.00626	0.01626	0.00026	0.0484	0.00284	0.6	12.4	104.0	3.3
G119	284	117	0.26468	0.00915	0.03827	0.00051	0.05016	0.00176	-1.5	-19.6	242.1	6.3
G120	967	847	0.28742	0.00585	0.04027	0.00047	0.05177	0.00104	0.8	7.5	254.5	5.8
G127	98	60	0.54961	0.02154	0.07103	0.001	0.05612	0.00223	0.5	3.2	442.4	12.1
G128	1069	1082	0.6087	0.0096	0.078	0.00088	0.05661	0.00087	-0.3	-1.8	484.2	10.6
G129	46294	26873	0.45555	0.00701	0.05912	0.00067	0.0559	0.00083	2.9	17.3	370.3	8.1
G130	42270	28647	0.46778	0.00768	0.0599	0.00068	0.05665	0.00091	3.9	21.4	375.0	8.3
G132	200	190	0.31697	0.02074	0.04468	0.00082	0.05146	0.00344	-0.8	-7.7	281.8	10.1
G133	219	121	0.58117	0.01909	0.07328	0.00098	0.05753	0.00192	2.0	10.9	455.9	11.8
G134	553	1126	0.30282	0.00744	0.04227	0.00051	0.05197	0.00128	0.6	6.0	266.9	6.3
G135	403	254	0.59378	0.01534	0.0767	0.00095	0.05616	0.00146	-0.7	-3.9	476.4	11.4
G141	319	240	0.57879	0.01414	0.07501	0.00091	0.05598	0.00137	-0.5	-3.4	466.2	11.0
G142	2524	84	0.28214	0.0045	0.04048	0.00046	0.05056	0.00078	-1.3	-15.9	255.8	5.7
G145	241	459	0.25627	0.02114	0.03579	0.00078	0.05195	0.00438	2.2	19.9	226.7	9.7
G147	433	509	0.29577	0.00802	0.04216	0.00052	0.05089	0.00139	-1.2	-12.8	266.2	6.4
G148	967	690	1.33805	0.02402	0.1333	0.00156	0.07281	0.00129	6.9	20.0	806.6	17.7
G150	329	177	0.51703	0.02159	0.06798	0.001	0.05517	0.00234	-0.2	-1.2	424.0	12.0

River I

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	3572	186	0.57928	0.00818	0.07473	0.00084	0.05625	0.00076	-0.1	-0.7	464.6	10.0
G2	974	515	2.89987	0.04018	0.23243	0.00261	0.09053	0.0012	2.6	6.2	1436.6	50.0
G4	717	348	0.27592	0.00639	0.03831	0.00046	0.05226	0.00121	2.1	18.4	242.3	5.7
G5	157	74	0.26666	0.01281	0.03808	0.00056	0.05081	0.00248	-0.4	-3.8	240.9	7.0
G7	1136	67	1.14952	0.0181	0.11796	0.00134	0.07071	0.00108	8.1	24.3	718.8	15.5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G8	410	32	0.58096	0.01293	0.07404	0.00088	0.05694	0.00126	1.0	5.8	460.4	10.6
G9	556	368	1.60343	0.02579	0.15742	0.0018	0.07391	0.00116	3.1	9.3	942.4	20.1
G10	300	438	0.21428	0.00836	0.03024	0.00042	0.05142	0.00203	2.7	26.1	192.0	5.2
G11	1117	426	0.53032	0.00917	0.06817	0.00078	0.05644	0.00096	1.6	9.4	425.1	9.4
G12	467	154	0.52446	0.01099	0.06757	0.0008	0.05631	0.00117	1.6	9.2	421.5	9.6
G13	299	328	0.12152	0.00654	0.01703	0.00027	0.05178	0.00283	7.0	60.6	108.8	3.4
G14	485	249	2.75276	0.04295	0.22917	0.00262	0.08716	0.00132	1.0	2.5	1364.0	57.8
G18	482	259	0.27746	0.00899	0.0389	0.00051	0.05176	0.0017	1.1	10.5	246.0	6.3
G19	432	680	0.26141	0.0079	0.03663	0.00047	0.05178	0.00158	1.7	15.8	231.9	5.8
G20	417	170	4.86263	0.07456	0.30984	0.00357	0.11387	0.00169	3.2	6.6	1862.1	53.3
G21	502	192	2.96294	0.04369	0.23815	0.0027	0.09027	0.00128	1.5	3.8	1431.2	53.7
G22	1377	358	2.91378	0.04179	0.23491	0.00265	0.09	0.00124	1.9	4.6	1425.5	52.1
G23	278	174	0.30016	0.01442	0.0404	0.00062	0.05391	0.00264	4.4	30.5	255.3	7.7
G24	824	431	0.27858	0.00664	0.03895	0.00047	0.0519	0.00124	1.3	12.4	246.3	5.8
G25	467	293	0.10082	0.00839	0.01522	0.00031	0.04806	0.00408	0.1	4.8	97.4	4.0
G26	1053	522	3.01508	0.04237	0.24317	0.00273	0.08997	0.00121	0.6	1.5	1424.7	50.8
G27	1390	341	0.55069	0.00878	0.07089	0.0008	0.05637	0.00087	0.9	5.3	441.5	9.7
G28	640	716	0.26947	0.00634	0.03801	0.00046	0.05145	0.00121	0.7	7.8	240.5	5.7
G29	640	347	3.05607	0.04411	0.24507	0.00277	0.09048	0.00125	0.6	1.6	1435.6	52.4
G30	1288	9	0.59345	0.00959	0.07525	0.00086	0.05722	0.0009	1.2	6.3	467.7	10.3
G31	304	668	0.26648	0.00874	0.03733	0.00049	0.0518	0.00172	1.5	14.5	236.3	6.0
G32	902	421	0.52804	0.00944	0.06785	0.00078	0.05647	0.00099	1.7	10.0	423.2	9.4
G33	2904	293	0.5338	0.00793	0.06907	0.00078	0.05608	0.0008	0.9	5.4	430.5	9.4
G34	298	322	0.52991	0.01567	0.06807	0.00087	0.05649	0.00169	1.7	9.8	424.5	10.5
G35	1450	762	0.45134	0.00886	0.06573	0.00076	0.04982	0.00096	-7.8	-119	410.4	9.2
G36	536	141	0.5129	0.01443	0.06468	0.00082	0.05753	0.00163	4.1	21.0	404.0	9.9
G37	955	198	8.24396	0.11705	0.39484	0.00448	0.1515	0.00206	5.3	9.2	2362.9	46.1
G40	1678	186	0.58378	0.00924	0.07438	0.00084	0.05695	0.00087	1.0	5.4	462.5	10.1
G41	405	541	0.10283	0.00471	0.01556	0.00022	0.04794	0.00223	-0.2	-4.7	99.6	2.8
G44	930	344	0.569	0.01116	0.07083	0.00083	0.05829	0.00113	3.7	18.3	441.2	10.0
G45	270	158	3.05083	0.05114	0.24388	0.00283	0.09077	0.00149	1.0	2.4	1441.6	61.9
G46	104	72	3.43165	0.06935	0.26183	0.00321	0.0951	0.00192	0.8	2.0	1530.0	74.9
G47	189	229	0.10828	0.01323	0.01571	0.00043	0.05	0.00623	3.9	48.5	100.5	5.5
G48	302	138	0.5685	0.01512	0.07207	0.0009	0.05723	0.00153	1.9	10.3	448.6	10.8
G49	1005	576	0.1017	0.0031	0.01539	0.00019	0.04796	0.00147	-0.1	-2.3	98.4	2.5
G50	219	92	0.67612	0.02355	0.08074	0.00111	0.06076	0.00215	4.8	20.6	500.5	13.2
G51	315	134	0.5267	0.01317	0.06848	0.00084	0.0558	0.0014	0.6	3.9	427.0	10.1
G52	662	417	2.79445	0.04268	0.22386	0.00255	0.09058	0.00134	4.0	9.4	1437.6	55.8
G53	640	299	0.53514	0.01065	0.06895	0.00081	0.05631	0.00111	1.3	7.4	429.8	9.7
G54	1504	330	0.53232	0.0088	0.06895	0.00079	0.05602	0.0009	0.8	5.0	429.8	9.5
G55	243	124	0.12297	0.00773	0.01854	0.00032	0.04812	0.00308	-0.5	-12.7	118.4	4.0
G56	834	49	0.55799	0.01046	0.07137	0.00083	0.05673	0.00105	1.3	7.5	444.4	10.0
G59	428	183	4.19475	0.0642	0.29281	0.00334	0.10394	0.00154	1.1	2.4	1695.7	54.1
G60	559	422	0.53771	0.01114	0.06803	0.0008	0.05735	0.00118	3.0	15.9	424.3	9.7
G61	797	476	3.04744	0.04556	0.24378	0.00276	0.0907	0.00131	0.9	2.4	1440.2	54.4
G62	3341	565	2.79558	0.04023	0.22647	0.00255	0.08957	0.00123	2.9	7.1	1416.2	52.2
G65	677	214	2.9437	0.0453	0.23989	0.00273	0.08903	0.00133	0.5	1.3	1404.9	56.4
G66	1666	1032	0.28866	0.00542	0.0405	0.00047	0.05172	0.00096	0.6	6.2	255.9	5.8
G67	679	333	0.28767	0.00873	0.04128	0.00053	0.05056	0.00155	-1.5	-18.0	260.7	6.5
G68	1175	425	0.2725	0.00581	0.03819	0.00045	0.05178	0.0011	1.3	12.3	241.6	5.6
G69	2313	165	0.56388	0.00909	0.07304	0.00083	0.05602	0.00088	-0.1	-0.4	454.4	10.0
G70	4141	149	0.57276	0.00872	0.07416	0.00084	0.05604	0.00082	-0.3	-1.7	461.2	10.0
G72	1183	303	0.5662	0.01118	0.07243	0.00085	0.05672	0.00111	1.1	6.1	450.8	10.2
G73	270	104	2.98653	0.0543	0.2414	0.00285	0.08976	0.00161	0.7	1.9	1420.4	67.7
G75	1255	948	3.37518	0.05047	0.25635	0.0029	0.09553	0.00138	1.9	4.4	1538.5	53.7
G76	479	93	0.53488	0.01246	0.0692	0.00083	0.05608	0.00131	0.9	5.3	431.3	10.1
G77	677	181	0.52058	0.01089	0.06752	0.0008	0.05594	0.00116	1.0	6.3	421.2	9.6
G79	1641	710	0.53729	0.00929	0.06924	0.00079	0.05631	0.00095	1.2	6.9	431.5	9.6
G80	843	31	0.55092	0.0127	0.07008	0.00084	0.05704	0.00131	2.0	11.3	436.7	10.2
G81	1536	799	0.30036	0.00631	0.0419	0.00049	0.05202	0.00108	0.8	7.5	264.6	6.1
G82	5359	55	0.59112	0.00904	0.07618	0.00086	0.0563	0.00083	-0.4	-2.1	473.3	10.3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G83	445	507	0.29651	0.01386	0.0398	0.00061	0.05405	0.00257	4.8	32.5	251.6	7.5
G85	1902	198	0.26237	0.00579	0.03595	0.00043	0.05295	0.00116	3.9	30.3	227.7	5.3
G86	1349	522	2.88975	0.04602	0.23102	0.00264	0.09076	0.0014	2.9	7.0	1441.4	58.3
G87	136	106	11.0719	0.22948	0.46939	0.00621	0.17114	0.00356	1.9	3.4	2568.8	68.7
G88	678	505	0.28447	0.01138	0.0395	0.00056	0.05225	0.00212	1.8	15.8	249.7	6.9
G89	652	396	3.0884	0.05076	0.24733	0.00284	0.0906	0.00145	0.4	0.9	1438.1	60.4
G90	739	305	12.73067	0.19201	0.51471	0.00584	0.17946	0.00261	-0.6	-1.1	2647.9	47.8
G91	857	319	0.54091	0.01082	0.07047	0.00082	0.05569	0.0011	0.0	0.2	439.0	9.9
G92	582	341	0.4995	0.01622	0.06599	0.00087	0.05492	0.0018	-0.1	-0.8	412.0	10.5
G94	261	133	0.31429	0.01472	0.04196	0.00064	0.05435	0.00259	4.8	31.3	264.9	7.9
G95	641	132	3.02764	0.04931	0.24338	0.00279	0.09026	0.00143	0.7	1.9	1430.9	59.8
G96	419	132	0.55298	0.01315	0.07145	0.00087	0.05615	0.00134	0.4	2.9	444.9	10.4
G97	249	54	0.38328	0.01656	0.04949	0.00075	0.05619	0.00248	5.8	32.2	311.4	9.2
G98	1129	419	1.93734	0.03178	0.16823	0.00192	0.08355	0.00133	9.1	21.8	1002.4	21.2
G99	759	105	10.54928	0.16627	0.44833	0.00514	0.17072	0.00261	4.0	6.9	2564.8	50.7
G100	148	211	5.14457	0.09848	0.32645	0.00395	0.11434	0.00217	1.2	2.6	1869.5	67.7
G101	366	123	0.54047	0.01501	0.07025	0.00088	0.05582	0.00156	0.3	1.7	437.6	10.6
G102	5346	1093	0.31683	0.00556	0.04155	0.00048	0.05533	0.00095	6.5	38.3	262.4	5.9
G103	756	394	0.28029	0.00724	0.03928	0.00048	0.05177	0.00134	1.0	9.7	248.4	6.0
G105	815	68	0.54296	0.01108	0.07081	0.00083	0.05563	0.00112	-0.2	-0.9	441.1	10.0
G106	2595	72	0.55465	0.00948	0.07231	0.00083	0.05565	0.00093	-0.5	-2.7	450.1	9.9
G107	1448	649	0.27345	0.00574	0.03903	0.00046	0.05084	0.00106	-0.6	-5.7	246.8	5.7
G108	284	76	0.52558	0.01519	0.06904	0.00088	0.05523	0.00161	-0.3	-2.1	430.4	10.6
G109	581	285	0.28196	0.00813	0.03929	0.00049	0.05207	0.00151	1.5	13.8	248.4	6.1
G111	1936	712	0.26041	0.00529	0.03719	0.00043	0.0508	0.00102	-0.2	-1.6	235.4	5.4
G112	5427	284	0.52943	0.00874	0.06853	0.00078	0.05606	0.0009	1.0	5.9	427.3	9.4
G113	170	96	0.10606	0.00901	0.01572	0.00032	0.04894	0.00423	1.8	30.6	100.6	4.1
G114	823	240	0.26183	0.00718	0.0374	0.00046	0.05079	0.0014	-0.3	-2.3	236.7	5.8
G115	581	388	3.30501	0.05622	0.24967	0.00288	0.09604	0.0016	3.2	7.2	1548.6	61.8
G116	151	135	0.50901	0.01895	0.06549	0.00091	0.05639	0.00213	2.2	12.5	408.9	11.0
G117	625	225	0.51668	0.01201	0.06809	0.00082	0.05506	0.00128	-0.4	-2.5	424.6	9.9
G118	983	167	0.25314	0.00616	0.03661	0.00044	0.05016	0.00122	-1.2	-14.5	231.8	5.5
G119	733	421	0.08565	0.00478	0.01254	0.0002	0.04955	0.00282	3.9	53.9	80.3	2.6
G120	105	20	0.5007	0.02457	0.06522	0.00102	0.0557	0.00278	1.2	7.5	407.3	12.3
G121	642	646	0.2626	0.00745	0.03709	0.00046	0.05137	0.00147	0.9	8.9	234.7	5.8
G122	774	213	0.51767	0.01151	0.0667	0.0008	0.05631	0.00125	1.8	10.2	416.3	9.6
G124	554	596	0.27879	0.00785	0.03971	0.0005	0.05094	0.00144	-0.5	-5.5	251.0	6.2
G125	3108	762	3.00481	0.04968	0.24262	0.00277	0.08986	0.00144	0.6	1.6	1422.4	60.7
G126	1371	145	0.53188	0.01044	0.07013	0.00082	0.05502	0.00107	-0.9	-5.8	437.0	9.9
G128	476	87	0.27	0.00852	0.03836	0.00049	0.05107	0.00163	0.0	0.5	242.7	6.1
G130	117	115	0.51702	0.02362	0.06841	0.00103	0.05484	0.00255	-0.8	-5.2	426.5	12.4
G131	269	164	11.39884	0.1982	0.48379	0.00565	0.17095	0.00291	0.5	0.9	2567.0	56.4
G133	369	106	2.78144	0.05447	0.2258	0.00268	0.08937	0.00173	2.9	7.1	1412.1	73.2
G134	537	545	0.26184	0.00764	0.0377	0.00047	0.05039	0.00148	-1.0	-12.1	238.6	5.9
G135	197	44	8.43186	0.1538	0.40857	0.00484	0.14973	0.00269	3.2	5.7	2342.9	60.8
G136	559	311	2.81673	0.05289	0.22748	0.00267	0.08984	0.00166	2.9	7.1	1422.0	69.8
G137	891	621	0.27857	0.00693	0.03981	0.00048	0.05077	0.00126	-0.8	-9.2	251.6	6.0
G138	1258	848	0.27693	0.00632	0.03993	0.00048	0.05032	0.00114	-1.7	-20.3	252.4	5.9
G139	330	61	0.55069	0.01544	0.07147	0.0009	0.05591	0.00158	0.1	0.7	445.0	10.8
G140	637	593	0.27387	0.00742	0.03864	0.00048	0.05143	0.0014	0.6	6.0	244.4	5.9
G141	1078	128	0.5356	0.0111	0.07049	0.00083	0.05513	0.00113	-0.8	-5.2	439.1	10.0
G142	614	341	3.13396	0.0572	0.2492	0.0029	0.09125	0.00164	0.5	1.2	1451.6	67.4
G143	485	595	0.54251	0.01336	0.07019	0.00086	0.05608	0.00138	0.6	3.9	437.3	10.3
G144	217	187	0.28099	0.01285	0.0403	0.00059	0.05059	0.00235	-1.3	-14.7	254.7	7.3
G145	371	189	0.27313	0.00911	0.03806	0.0005	0.05206	0.00176	1.8	16.4	240.8	6.2
G148	873	270	0.50732	0.01114	0.06797	0.00081	0.05415	0.00118	-1.7	-12.4	423.9	9.8
G149	129	102	0.54505	0.02355	0.07302	0.00107	0.05416	0.00238	-2.8	-20.4	454.3	12.9
G150	329	150	0.57838	0.01967	0.07334	0.00099	0.05722	0.00197	1.6	8.7	456.2	11.9

River J

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	5217	2291	0.09216	0.00227	0.01395	0.00017	0.04793	0.00117	0.2	5.7	89.3	2.2
G2	158	82	0.10586	0.00997	0.01606	0.00036	0.04784	0.00459	-0.5	-13.5	102.7	4.6
G3	644	194	0.48509	0.01155	0.06851	0.00084	0.05138	0.00121	-6.0	-65.7	427.2	10.2
G4	213	273	0.26965	0.01625	0.03676	0.00066	0.05323	0.00327	4.2	31.3	232.7	8.2
G5	372	129	0.29451	0.00882	0.04091	0.00054	0.05224	0.00157	1.4	12.6	258.5	6.6
G6	178	168	0.09728	0.00906	0.01481	0.00033	0.04765	0.00452	-0.5	-16.7	94.8	4.2
G8	927	109	1.42107	0.02088	0.151	0.00176	0.06829	0.00095	-1.0	-3.3	906.6	19.7
G9	400	66	5.02577	0.07097	0.3208	0.00376	0.11368	0.0015	1.7	3.5	1859.0	47.4
G11	215	114	0.29704	0.01132	0.04008	0.00057	0.05377	0.00208	4.2	29.9	253.4	7.0
G14	209	81	0.10228	0.00756	0.01553	0.0003	0.04778	0.0036	-0.5	-13.7	99.4	3.8
G15	955	294	1.70604	0.02451	0.16848	0.00196	0.07348	0.00099	0.7	2.3	1003.7	21.7
G16	363	91	1.07316	0.02037	0.12001	0.00145	0.06489	0.0012	1.3	5.2	730.6	16.7
G17	146	112	0.0909	0.01377	0.01366	0.00046	0.0483	0.00747	1.0	23.3	87.4	5.9
G18	1017	349	0.29123	0.00598	0.04076	0.00049	0.05185	0.00105	0.8	7.6	257.5	6.1
G19	447	312	0.08393	0.00521	0.01274	0.00022	0.0478	0.00302	0.2	7.9	81.6	2.8
G22	437	198	0.13326	0.00524	0.01921	0.00027	0.05034	0.002	3.6	41.9	122.6	3.4
G23	626	305	0.26253	0.00669	0.03821	0.00048	0.04986	0.00127	-2.1	-28.3	241.7	5.9
G24	339	152	0.09508	0.00721	0.0131	0.00027	0.05266	0.00408	9.9	73.3	83.9	3.4
G25	271	154	0.26877	0.00965	0.03841	0.00053	0.05077	0.00184	-0.5	-5.5	243.0	6.6
G26	390	173	0.52712	0.01235	0.06968	0.00087	0.05489	0.00128	-1.0	-6.5	434.2	10.4
G28	195	67	0.55971	0.01738	0.07183	0.00096	0.05654	0.00177	0.9	5.4	447.2	11.6
G31	450	171	0.53119	0.01181	0.07027	0.00086	0.05485	0.00121	-1.2	-7.8	437.8	10.4
G32	306	125	0.2723	0.00918	0.03865	0.00052	0.05112	0.00174	0.0	0.7	244.5	6.5
G33	967	232	0.2708	0.00584	0.03951	0.00048	0.04974	0.00106	-2.6	-36.7	249.8	5.9
G34	227	119	0.53581	0.01543	0.06838	0.00089	0.05686	0.00165	2.2	12.2	426.4	10.8
G35	458	215	0.09218	0.0044	0.01413	0.00021	0.04735	0.00229	-1.0	-36.1	90.4	2.7
G36	434	319	0.26272	0.00777	0.03637	0.00047	0.05242	0.00156	2.9	24.1	230.3	5.9
G37	867	399	0.27266	0.00616	0.03932	0.00048	0.05032	0.00113	-1.5	-18.4	248.6	6.0
G39	350	118	0.11213	0.00716	0.01592	0.00029	0.05111	0.00333	6.0	58.6	101.8	3.7
G40	157	109	0.28436	0.02144	0.04063	0.00082	0.05078	0.00391	-1.1	-11.3	256.8	10.2
G41	240	46	0.31046	0.01136	0.04431	0.00061	0.05084	0.00188	-1.8	-19.7	279.5	7.6
G42	502	323	0.10407	0.00518	0.01564	0.00024	0.04828	0.00244	0.4	11.4	100.1	3.1
G43	366	190	0.31061	0.01049	0.04375	0.00059	0.05151	0.00176	-0.5	-4.7	276.1	7.3
G44	626	539	0.27088	0.00676	0.03824	0.00048	0.0514	0.00128	0.6	6.5	241.9	5.9
G45	277	352	0.10491	0.00597	0.01466	0.00025	0.05192	0.00301	8.0	66.7	93.8	3.1
G46	169	134	0.28968	0.01291	0.03888	0.00059	0.05407	0.00245	5.0	34.2	245.9	7.3
G47	241	138	0.09801	0.00865	0.01477	0.00032	0.04816	0.00434	0.4	11.8	94.5	4.1
G48	755	761	0.09724	0.00485	0.01466	0.00023	0.04814	0.00244	0.4	11.5	93.8	2.9
G49	535	277	0.10978	0.00545	0.01645	0.00026	0.04842	0.00244	0.6	12.3	105.2	3.2
G50	464	474	0.0888	0.00635	0.01338	0.00026	0.04815	0.00351	0.8	19.7	85.7	3.3
G51	453	190	0.52928	0.01187	0.07129	0.00088	0.05388	0.0012	-2.8	-21.4	443.9	10.5
G52	255	97	0.09008	0.0078	0.01362	0.00029	0.04798	0.00423	0.5	10.1	87.2	3.7
G53	849	371	0.10518	0.00345	0.01569	0.00021	0.04866	0.00161	1.2	23.6	100.3	2.6
G54	633	237	2.93179	0.04141	0.24283	0.00283	0.08761	0.00116	-0.8	-2.0	1373.9	50.4
G55	768	496	0.26609	0.00617	0.03855	0.00047	0.05009	0.00115	-1.7	-22.3	243.8	5.9
G56	122	95	0.09095	0.0213	0.01375	0.00068	0.04801	0.01147	0.5	10.8	88.0	8.7
G57	250	227	0.09708	0.00619	0.01478	0.00025	0.04765	0.00309	-0.5	-16.9	94.6	3.2
G58	394	230	0.10765	0.00658	0.01627	0.00028	0.04802	0.00298	-0.2	-5.1	104.0	3.5
G59	289	246	0.09576	0.00572	0.01463	0.00024	0.04751	0.00288	-0.7	-26.0	93.6	3.1
G61	207	112	0.11404	0.0082	0.01579	0.00031	0.05242	0.00384	8.6	66.8	101.0	3.9
G63	180	245	0.2838	0.01233	0.03731	0.00056	0.0552	0.00244	7.5	43.8	236.1	7.0
G64	1407	802	0.09239	0.00336	0.0137	0.00019	0.04894	0.0018	2.3	39.6	87.7	2.4
G65	554	248	2.45113	0.03611	0.20829	0.00244	0.08539	0.00119	3.1	7.9	1324.4	53.6
G66	393	236	0.10308	0.00496	0.01551	0.00024	0.04822	0.00235	0.4	10.0	99.2	3.0
G67	536	411	0.50455	0.01095	0.06628	0.00081	0.05524	0.00118	0.3	1.9	413.7	9.8
G68	243	121	0.52622	0.01522	0.06918	0.0009	0.0552	0.0016	-0.4	-2.7	431.2	10.9
G69	285	198	0.52879	0.01415	0.0693	0.00089	0.05537	0.00148	-0.2	-1.1	431.9	10.7
G70	589	202	0.26021	0.00679	0.03824	0.00048	0.04937	0.00129	-2.9	-46.0	241.9	6.0
G71	239	158	0.52429	0.01518	0.068	0.00089	0.05595	0.00163	0.9	5.8	424.1	10.7

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G72	283	180	4.90437	0.07274	0.31955	0.00378	0.11137	0.00156	0.9	1.9	1821.8	50.5
G73	298	334	0.4933	0.01391	0.06525	0.00085	0.05486	0.00155	0.0	-0.2	407.4	10.2
G75	327	272	0.28175	0.00972	0.03789	0.00052	0.05396	0.00188	5.1	35.1	239.7	6.4
G76	1240	327	0.0994	0.00335	0.01504	0.0002	0.04795	0.00163	0.0	-0.7	96.2	2.6
G77	435	864	1.27901	0.02279	0.13438	0.00161	0.06907	0.0012	2.9	9.8	812.8	18.3
G80	255	188	0.29333	0.01107	0.04003	0.00056	0.05318	0.00203	3.2	24.8	253.0	7.0
G81	40	39	0.08832	0.02883	0.01343	0.00083	0.04772	0.01583	-0.1	-1.8	86.0	10.6
G83	95	68	4.04963	0.08122	0.28298	0.00361	0.10384	0.00206	2.4	5.2	1693.9	72.3
G84	401	275	0.11077	0.0063	0.01546	0.00026	0.05197	0.00301	7.9	65.2	98.9	3.3
G85	1009	434	0.09893	0.00323	0.01493	0.0002	0.04809	0.00158	0.3	7.9	95.5	2.5
G87	857	120	0.27856	0.00627	0.03999	0.00049	0.05055	0.00113	-1.3	-14.8	252.8	6.1
G88	971	256	0.1019	0.00366	0.01541	0.00021	0.04797	0.00174	-0.1	-2.0	98.6	2.7
G89	198	121	0.5337	0.01728	0.06891	0.00093	0.0562	0.00184	1.1	6.5	429.6	11.3
G90	1013	299	0.09972	0.00329	0.01489	0.0002	0.04859	0.00162	1.3	25.5	95.3	2.5
G91	473	609	0.08777	0.0069	0.01314	0.00027	0.04846	0.00389	1.4	30.9	84.2	3.4
G92	2234	513	0.28322	0.00484	0.03866	0.00046	0.05316	0.00088	3.6	27.2	244.5	5.7
G93	683	252	0.27747	0.00684	0.03926	0.00049	0.05129	0.00126	0.2	2.2	248.2	6.1
G94	157	58	0.11431	0.00944	0.0169	0.00034	0.04909	0.00413	1.8	29.0	108.0	4.4
G95	618	755	0.10383	0.00607	0.01562	0.00026	0.04822	0.00287	0.4	9.3	99.9	3.4
G96	371	446	0.09962	0.00725	0.01448	0.00028	0.04992	0.0037	4.0	51.5	92.7	3.6
G97	3018	882	0.27637	0.00453	0.03935	0.00046	0.05096	0.0008	-0.4	-4.1	248.8	5.7
G98	150	131	0.0931	0.01138	0.01409	0.00038	0.04793	0.00597	0.2	5.0	90.2	4.8
G99	277	201	11.99854	0.1915	0.49014	0.0061	0.17764	0.00273	1.3	2.3	2630.9	50.7
G100	12350	22984 95	0.52892	0.01015	0.06814	0.00082	0.05632	0.00106	1.4	8.5	425.0	9.9
G101	210	213	0.27322	0.01449	0.03704	0.00062	0.05353	0.00289	4.6	33.2	234.5	7.7
G102	1213	469	0.099	0.00305	0.01511	0.0002	0.04756	0.00147	-0.7	-25.9	96.6	2.5
G106	177	61	0.29236	0.01314	0.03928	0.0006	0.054	0.00247	4.8	33.0	248.4	7.4
G107	398	137	0.56608	0.01358	0.07115	0.00089	0.05773	0.00138	2.8	14.7	443.1	10.7
G109	301	210	0.26576	0.00967	0.03712	0.00052	0.05195	0.00191	1.8	17.0	235.0	6.4
G110	699	212	0.26466	0.00678	0.03689	0.00046	0.05206	0.00133	2.1	19.0	233.5	5.8
G111	222	270	0.10507	0.01006	0.01596	0.00037	0.04776	0.00466	-0.7	-18.0	102.1	4.7
G112	353	195	0.09739	0.0055	0.01462	0.00024	0.04833	0.00278	0.9	19.0	93.6	3.0
G113	895	516	0.09688	0.00343	0.01456	0.0002	0.04828	0.00172	0.8	17.4	93.2	2.5
G114	207	177	0.11446	0.00969	0.01699	0.00036	0.0489	0.00422	1.3	24.0	108.6	4.6
G115	373	173	1.17214	0.02275	0.13031	0.00158	0.06527	0.00124	-0.3	-0.8	789.6	18.1
G116	490	211	0.10304	0.00463	0.01528	0.00023	0.04895	0.00223	1.9	32.8	97.7	2.9
G117	168	91	1.03322	0.02706	0.12108	0.00157	0.06192	0.00162	-2.2	-9.7	736.8	18.0
G118	218	158	0.09404	0.00689	0.01426	0.00026	0.04786	0.00357	0.0	0.1	91.3	3.4
G119	660	182	0.10238	0.00452	0.01515	0.00022	0.04903	0.00219	2.2	35.1	96.9	2.8
G120	1158	389	0.10112	0.00348	0.01538	0.00021	0.0477	0.00165	-0.6	-17.7	98.4	2.6
G121	187	64	2.55236	0.04731	0.22206	0.00272	0.0834	0.00151	-0.4	-1.1	1278.5	70.0
G123	1632	608	0.4643	0.00929	0.06301	0.00076	0.05347	0.00105	-1.7	-13.0	393.9	9.2
G126	241	170	0.10715	0.00794	0.01603	0.00031	0.04849	0.00366	0.9	16.9	102.5	3.9
G127	737	239	0.51503	0.00992	0.06931	0.00083	0.05392	0.00102	-2.4	-17.6	432.0	10.0
G128	1211	112	0.2796	0.00554	0.0393	0.00047	0.05163	0.001	0.7	7.6	248.5	5.9
G129	301	237	0.10202	0.00717	0.01536	0.00029	0.04819	0.00345	0.3	9.3	98.3	3.6
G130	398	123	0.50484	0.01197	0.06682	0.00083	0.05482	0.00129	-0.5	-3.0	417.0	10.1
G132	487	398	0.13483	0.0066	0.01874	0.0003	0.05221	0.0026	7.3	59.4	119.7	3.7
G134	858	373	2.91002	0.04022	0.23949	0.00278	0.08817	0.00114	0.0	0.2	1386.2	48.9
G135	168	138	0.26714	0.01251	0.03667	0.00056	0.05287	0.00252	3.6	28.2	232.1	7.0
G137	760	348	0.26816	0.00752	0.03808	0.00049	0.0511	0.00144	0.1	1.7	240.9	6.1
G138	779	280	0.10825	0.00371	0.01597	0.00021	0.04919	0.0017	2.3	34.8	102.1	2.7
G140	507	312	0.09598	0.00663	0.01462	0.00027	0.04763	0.00335	-0.5	-17.0	93.6	3.5
G142	101	38	0.90098	0.02988	0.10777	0.0015	0.06067	0.00203	-1.1	-5.2	659.8	17.4
G143	716	345	0.27359	0.00657	0.03976	0.00049	0.04994	0.00119	-2.3	-30.9	251.3	6.1
G144	78	61	0.09063	0.01963	0.01348	0.00062	0.04878	0.01078	2.1	37.1	86.3	7.9
G145	764	634	0.1072	0.00371	0.01619	0.00022	0.04806	0.00168	-0.1	-1.5	103.5	2.8
G146	462	166	0.54996	0.01215	0.07223	0.00089	0.05525	0.00121	-1.0	-6.5	449.6	10.7
G147	388	81	0.27881	0.00969	0.04077	0.00055	0.04963	0.00174	-3.1	-45.0	257.6	6.9
G148	2471	1906	1.06581	0.01461	0.12115	0.0014	0.06384	0.00081	-0.1	-0.1	737.2	16.1
G149	84	53	0.61638	0.02699	0.07631	0.00117	0.05862	0.00261	2.9	14.3	474.0	14.1

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G150	549	296	0.25378	0.00805	0.03653	0.00048	0.05041	0.00161	-0.7	-8.1	231.3	6.0

River K

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G2	3196	2275	0.09508	0.00201	0.01434	0.00017	0.04813	0.00101	0.4	12.9	91.8	2.2
G4	359	131	0.25276	0.01415	0.03423	0.00057	0.05359	0.00306	5.4	38.6	217.0	7.2
G5	282	158	0.09616	0.00772	0.01568	0.00028	0.04449	0.00362	-7.1	-200	100.3	3.6
G7	482	120	0.27732	0.00976	0.03787	0.00052	0.05315	0.00189	3.7	28.5	239.6	6.4
G8	604	281	0.26215	0.01044	0.03492	0.00049	0.05448	0.0022	6.8	43.4	221.3	6.1
G9	877	48	0.2623	0.01149	0.03426	0.00052	0.05556	0.00248	8.9	50.0	217.2	6.4
G10	140	144	0.09671	0.02168	0.01494	0.00049	0.04697	0.01062	-2.0	-101.7	95.6	6.2
G11	429	494	0.2257	0.01481	0.03317	0.00058	0.04938	0.00329	-1.8	-26.9	210.4	7.2
G12	179	108	0.27928	0.01232	0.03763	0.00056	0.05386	0.00241	5.0	34.7	238.1	7.0
G13	652	555	0.29058	0.00711	0.03919	0.00049	0.05381	0.00131	4.5	31.7	247.8	6.0
G14	1482	258	0.5391	0.00954	0.06987	0.00082	0.05599	0.00096	0.6	3.6	435.4	9.9
G15	888	214	0.25843	0.00775	0.03625	0.00047	0.05173	0.00156	1.7	16.1	229.6	5.8
G16	1113	462	0.26008	0.00586	0.03669	0.00045	0.05144	0.00115	1.0	10.9	232.3	5.5
G18	387	282	0.25083	0.01058	0.03552	0.00052	0.05125	0.00219	1.0	10.7	225.0	6.4
G19	1053	39	0.24754	0.00563	0.03515	0.00043	0.0511	0.00115	0.9	9.3	222.7	5.3
G20	189	269	0.2354	0.0303	0.03471	0.00102	0.04922	0.00646	-2.5	-39.2	220.0	12.7
G21	100	114	0.27133	0.02759	0.0406	0.00098	0.0485	0.00503	-5.0	-107.2	256.5	12.1
G23	195	224	0.29923	0.0222	0.04131	0.00083	0.05257	0.00398	1.9	15.9	260.9	10.3
G24	285	219	0.25947	0.01362	0.03641	0.00059	0.05172	0.00276	1.6	15.6	230.5	7.3
G25	296	213	0.27487	0.0107	0.03999	0.00056	0.04988	0.00196	-2.5	-33.6	252.8	6.9
G27	2152	710	2.98059	0.04583	0.23718	0.00276	0.0912	0.00134	2.2	5.4	1450.6	55.3
G28	444	162	0.27034	0.00863	0.03774	0.0005	0.05198	0.00167	1.8	16.1	238.8	6.2
G29	443	308	0.27478	0.0092	0.03832	0.00051	0.05204	0.00176	1.7	15.6	242.4	6.4
G30	231	124	0.2774	0.01498	0.0378	0.00062	0.05326	0.00293	3.9	29.6	239.2	7.8
G31	589	269	0.08971	0.00448	0.01384	0.00021	0.04705	0.00238	-1.6	-72.4	88.6	2.6
G32	438	241	0.25815	0.0113	0.03653	0.00054	0.05129	0.00228	0.8	8.8	231.3	6.7
G33	140	200	0.26906	0.01594	0.0373	0.00064	0.05235	0.00316	2.5	21.5	236.1	8.0
G36	252	535	0.27997	0.01126	0.03827	0.00055	0.05309	0.00216	3.5	27.2	242.1	6.8
G37	352	136	0.28105	0.00915	0.03927	0.00052	0.05194	0.0017	1.3	12.1	248.3	6.5
G38	742	236	0.28589	0.00708	0.03994	0.00049	0.05195	0.00128	1.1	10.9	252.4	6.1
G39	313	194	0.26264	0.00948	0.03798	0.00052	0.05019	0.00183	-1.5	-18.0	240.3	6.4
G41	720	340	0.26204	0.0129	0.03647	0.00057	0.05214	0.00261	2.3	20.8	230.9	7.1
G42	199	150	0.26481	0.0119	0.03692	0.00055	0.05205	0.00237	2.1	18.7	233.7	6.9
G44	1024	260	0.30731	0.00695	0.0434	0.00053	0.05139	0.00115	-0.7	-6.0	273.9	6.5
G45	728	59	0.29334	0.00758	0.04096	0.00051	0.05197	0.00134	0.9	8.9	258.8	6.3
G46	279	276	0.27778	0.01092	0.03859	0.00055	0.05224	0.00208	2.0	17.6	244.1	6.8
G47	131	206	0.10022	0.01185	0.01593	0.0004	0.04567	0.00549	-4.8	-1018	101.9	5.0
G49	322	449	0.26022	0.01011	0.03665	0.00052	0.05153	0.00203	1.2	12.3	232.0	6.4
G50	736	71	0.38987	0.00904	0.05392	0.00066	0.05247	0.00121	-1.2	-10.7	338.5	8.1
G51	480	523	0.10263	0.00942	0.01513	0.00035	0.04922	0.00461	2.5	38.9	96.8	4.4
G52	106	127	0.27197	0.02182	0.04001	0.00082	0.04933	0.00403	-3.4	-54.6	252.9	10.1
G53	565	246	0.26855	0.00775	0.03919	0.0005	0.04972	0.00144	-2.5	-36.1	247.8	6.2
G55	299	152	0.27515	0.012	0.03766	0.00056	0.05302	0.00235	3.6	27.7	238.3	6.9
G56	602	618	0.25593	0.00875	0.0356	0.00048	0.05216	0.0018	2.6	22.9	225.5	6.0
G57	2045	1540	0.28928	0.00588	0.03783	0.00045	0.05549	0.00111	7.8	44.5	239.4	5.6
G58	189	121	0.29626	0.01324	0.04039	0.0006	0.05323	0.00242	3.2	24.6	255.3	7.5
G60	167	190	0.28084	0.01738	0.03772	0.00068	0.05403	0.00341	5.3	35.9	238.7	8.4
G64	287	225	0.25744	0.01123	0.03821	0.00056	0.04889	0.00216	-3.8	-69.5	241.7	7.0
G66	317	307	0.25853	0.00968	0.03724	0.00052	0.05037	0.00191	-0.9	-11.0	235.7	6.4
G67	120	167	0.13785	0.0144	0.01956	0.00047	0.05115	0.00544	5.0	49.6	124.8	6.0
G69	935	584	0.29068	0.00767	0.04018	0.00051	0.0525	0.00139	2.0	17.4	253.9	6.3
G70	394	144	0.26722	0.00888	0.03803	0.00051	0.05099	0.00171	0.0	-0.1	240.6	6.3
G71	351	654	0.27231	0.01143	0.03897	0.00057	0.05071	0.00216	-0.8	-8.4	246.5	7.0
G72	525	791	0.10745	0.0067	0.01637	0.00028	0.04763	0.00302	-1.1	-30.9	104.7	3.6

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G73	506	494	0.2639	0.00903	0.03642	0.00049	0.05259	0.00182	3.1	25.9	230.6	6.1
G74	310	407	0.12531	0.00747	0.01771	0.00031	0.05135	0.00312	5.9	55.9	113.2	3.9
G76	111	75	0.28486	0.01825	0.03831	0.0007	0.05396	0.00352	5.0	34.4	242.3	8.6
G77	24	36	0.26334	0.0442	0.037	0.00117	0.05164	0.00879	1.4	13.2	234.2	14.6
G78	120	101	0.26785	0.01758	0.03774	0.00068	0.05151	0.00344	0.9	9.4	238.8	8.5
G79	125	73	0.12089	0.01223	0.01837	0.00042	0.04775	0.00492	-1.3	-36.2	117.4	5.4
G80	709	800	0.27263	0.00853	0.0375	0.00049	0.05276	0.00166	3.2	25.4	237.3	6.1
G82	941	53	0.42194	0.01014	0.05713	0.00071	0.05359	0.00128	-0.2	-1.2	358.2	8.6
G83	319	368	0.27512	0.01167	0.03877	0.00057	0.0515	0.00221	0.7	6.8	245.2	7.0
G84	269	128	4.77071	0.09912	0.32304	0.00405	0.10717	0.0022	-1.4	-3.0	1751.9	74.1
G85	588	225	0.28453	0.01039	0.04073	0.00056	0.05069	0.00187	-1.2	-13.5	257.4	7.0
G86	644	211	0.42534	0.0118	0.05815	0.00074	0.05308	0.00148	-1.2	-9.8	364.4	9.1
G87	470	1019	0.21101	0.00869	0.03095	0.00044	0.04947	0.00207	-1.1	-15.3	196.5	5.6
G88	822	1308	0.27629	0.00872	0.03941	0.00052	0.05088	0.00162	-0.6	-6.0	249.2	6.4
G90	585	164	0.26952	0.00914	0.0387	0.00052	0.05054	0.00173	-1.0	-11.3	244.8	6.5
G91	90	97	0.27446	0.0183	0.03933	0.00071	0.05064	0.00343	-1.0	-10.9	248.7	8.8
G92	129	120	0.25647	0.01705	0.03916	0.0007	0.04753	0.00321	-6.4	- 230	247.6	8.7
G93	769	333	0.27417	0.00782	0.03919	0.0005	0.05077	0.00145	-0.7	-7.6	247.8	6.2
G94	511	241	0.27592	0.00938	0.03957	0.00053	0.05059	0.00173	-1.1	-12.5	250.2	6.6
G95	429	264	2.93874	0.06003	0.23806	0.00292	0.08958	0.0018	1.1	2.8	1416.5	75.9
G96	227	399	0.24809	0.01333	0.03676	0.00059	0.04898	0.00267	-3.3	-58.4	232.7	7.4
G97	325	348	0.27679	0.0106	0.03856	0.00054	0.05209	0.00202	1.7	15.7	243.9	6.7
G98	135	111	0.26612	0.01671	0.03874	0.00068	0.04985	0.00318	-2.2	-30.2	245.0	8.5
G99	71	71	0.26264	0.02452	0.03651	0.00082	0.05221	0.00496	2.5	21.5	231.1	10.1
G100	694	66	0.39265	0.01031	0.05294	0.00067	0.05383	0.00141	1.1	8.6	332.5	8.2
G101	787	397	0.26383	0.00781	0.03591	0.00047	0.05332	0.00159	4.6	33.6	227.4	5.8
G102	159	110	0.25651	0.01496	0.03627	0.00062	0.05132	0.00305	1.0	9.9	229.7	7.7
G103	830	638	0.25306	0.00689	0.03578	0.00045	0.05133	0.0014	1.1	11.3	226.6	5.7
G104	546	425	0.09213	0.00525	0.01367	0.00023	0.04891	0.00284	2.3	39.1	87.5	2.9
G107	192	219	0.2634	0.01329	0.03646	0.00058	0.05242	0.00269	2.8	24.0	230.9	7.2
G109	410	495	0.24386	0.0105	0.03489	0.00051	0.05071	0.00221	0.2	2.9	221.1	6.4
G110	705	843	0.26182	0.00757	0.03698	0.00048	0.05137	0.00149	0.9	9.1	234.1	5.9
G111	904	322	0.30682	0.00903	0.04172	0.00054	0.05336	0.00158	3.1	23.4	263.5	6.7
G112	561	55	0.5789	0.01621	0.07259	0.00094	0.05787	0.00162	2.7	13.9	451.7	11.3
G113	181	70	0.26396	0.01512	0.03716	0.00063	0.05154	0.003	1.1	11.3	235.2	7.8
G114	683	332	0.31356	0.009	0.04219	0.00054	0.05394	0.00155	3.9	27.7	266.4	6.7
G115	173	225	0.26297	0.01467	0.03689	0.00061	0.05173	0.00293	1.5	14.6	233.5	7.6
G117	682	163	0.29901	0.00984	0.03922	0.00053	0.05533	0.00184	7.1	41.7	248.0	6.6
G118	154	148	0.2708	0.01415	0.03854	0.00061	0.05099	0.00271	-0.2	-1.4	243.8	7.6
G119	426	179	0.27142	0.00956	0.03889	0.00053	0.05064	0.0018	-0.9	-9.4	245.9	6.6
G120	529	400	0.54447	0.01535	0.06924	0.0009	0.05706	0.00161	2.3	12.5	431.6	10.8
G121	679	1537	0.25818	0.00765	0.03741	0.00048	0.05008	0.00149	-1.5	-19.2	236.8	6.0
G122	47	72	9.08087	0.21767	0.42812	0.00583	0.15392	0.00369	2.1	3.9	2389.9	80.5
G123	390	604	0.25723	0.00924	0.03724	0.00051	0.05012	0.00182	-1.4	-17.6	235.7	6.3
G124	161	92	0.27519	0.01755	0.03719	0.00068	0.0537	0.00349	4.8	34.3	235.4	8.4
G125	194	54	1.94883	0.04828	0.17163	0.00221	0.08239	0.00204	7.5	18.6	1021.1	24.3
G126	335	198	0.27892	0.0105	0.03916	0.00055	0.05168	0.00197	0.9	8.7	247.6	6.8
G127	456	130	0.25114	0.0111	0.03634	0.00053	0.05015	0.00224	-1.1	-13.9	230.1	6.7
G128	985	135	0.25765	0.00894	0.03514	0.00048	0.0532	0.00186	4.5	34.0	222.7	6.0
G129	159	185	0.27483	0.01588	0.03706	0.00063	0.05382	0.00317	5.1	35.4	234.6	7.9
G130	302	222	0.11649	0.0067	0.0175	0.00029	0.0483	0.00282	0.1	1.9	111.8	3.6
G131	398	332	0.28006	0.00998	0.03929	0.00054	0.05172	0.00186	0.9	9.0	248.4	6.7
G133	641	576	0.27815	0.00861	0.03929	0.00052	0.05137	0.0016	0.3	3.5	248.4	6.4
G134	380	403	0.25885	0.00944	0.03685	0.00051	0.05097	0.00188	0.2	2.5	233.3	6.3
G135	621	223	0.28911	0.00897	0.04127	0.00054	0.05084	0.00158	-1.1	-11.6	260.7	6.7
G137	403	331	0.26393	0.00961	0.03786	0.00052	0.05058	0.00186	-0.8	-8.0	239.6	6.5
G138	175	41	0.39708	0.01657	0.05331	0.00078	0.05405	0.00229	1.4	10.2	334.8	9.6
G139	279	136	0.25659	0.01057	0.03695	0.00053	0.05038	0.0021	-0.9	-10.0	233.9	6.6
G140	644	248	0.27027	0.00809	0.03818	0.0005	0.05136	0.00154	0.5	6.0	241.6	6.2
G141	415	336	0.26954	0.00952	0.03913	0.00053	0.04998	0.00178	-2.1	-27.6	247.5	6.6
G142	561	353	0.26663	0.00845	0.03825	0.00051	0.05058	0.00161	-0.8	-9.2	242.0	6.3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G143	2513	319	0.29972	0.00732	0.04085	0.00051	0.05324	0.00129	3.1	23.9	258.1	6.3
G145	466	516	0.25674	0.01029	0.03584	0.00051	0.05198	0.00211	2.2	20.2	227.0	6.4
G146	790	115	0.28057	0.00811	0.04051	0.00052	0.05025	0.00145	-1.9	-23.9	256.0	6.5
G147	489	163	0.28537	0.00936	0.04024	0.00054	0.05146	0.0017	0.2	2.8	254.3	6.7
G148	651	396	0.27929	0.00855	0.03924	0.00051	0.05164	0.00159	0.8	8.0	248.1	6.4
G149	241	129	0.27666	0.01219	0.03932	0.00058	0.05106	0.00228	-0.2	-2.1	248.6	7.2
G150	743	77	0.39296	0.01076	0.05409	0.00069	0.05271	0.00144	-0.9	-7.3	339.6	8.4

River L

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	483	365	0.13147	0.00511	0.0185	0.00026	0.05155	0.00203	6.1	55.5	118.2	3.3
G4	994	306	0.29741	0.0062	0.04058	0.00049	0.05318	0.00109	3.1	23.8	256.4	6.0
G5	2060	762	0.09994	0.00233	0.01478	0.00018	0.04906	0.00113	2.2	37.2	94.6	2.3
G6	1345	761	0.09583	0.00268	0.01406	0.00018	0.04945	0.00138	3.2	46.8	90.0	2.3
G8	415	395	5.02352	0.07024	0.31369	0.00364	0.11618	0.00152	3.7	7.3	1898.2	46.8
G9	91	55	0.35757	0.01975	0.04784	0.0008	0.05423	0.00305	3.1	20.8	301.2	9.8
G10	1007	1459	0.10105	0.00444	0.01523	0.00022	0.04814	0.00214	0.3	8.1	97.4	2.8
G11	171	158	0.09679	0.00771	0.01403	0.00028	0.05006	0.00406	4.5	54.6	89.8	3.6
G12	1959	854	0.10182	0.0026	0.01499	0.00019	0.04928	0.00125	2.7	40.5	95.9	2.4
G13	133	173	0.08589	0.0115	0.01323	0.00039	0.04708	0.00642	-1.2	-59.5	84.7	5.0
G14	823	490	0.10555	0.00384	0.01483	0.0002	0.05164	0.0019	7.4	64.8	94.9	2.6
G16	2117	695	0.09846	0.00238	0.01462	0.00018	0.04886	0.00117	1.9	33.8	93.6	2.3
G17	19476	6696	0.09757	0.00138	0.01447	0.00017	0.04892	0.00065	2.1	35.8	92.6	2.1
G18	228	109	0.09747	0.00653	0.01509	0.00027	0.04687	0.00319	-2.2	-127	96.5	3.4
G19	589	358	0.09886	0.00408	0.01408	0.0002	0.05093	0.00213	6.2	62.1	90.1	2.6
G20	859	760	0.11908	0.00376	0.01858	0.00024	0.04648	0.00147	-3.8	-422	118.7	3.0
G21	2323	1653	0.09932	0.00223	0.01386	0.00017	0.05199	0.00116	8.5	68.9	88.7	2.1
G22	487	413	0.09962	0.00461	0.01547	0.00023	0.0467	0.00219	-2.6	-191	99.0	2.9
G23	1951	1175	0.09828	0.00246	0.01455	0.00018	0.04901	0.00122	2.3	37.3	93.1	2.3
G24	533	408	0.09866	0.00548	0.0145	0.00024	0.04937	0.00279	2.9	44.0	92.8	3.0
G25	1042	576	0.10091	0.00326	0.01488	0.0002	0.04921	0.0016	2.5	39.7	95.2	2.5
G26	510	76	5.29679	0.07267	0.33494	0.00388	0.11473	0.00147	0.3	0.7	1875.6	45.8
G27	729	474	0.0978	0.00367	0.01451	0.0002	0.04889	0.00186	1.9	34.9	92.9	2.5
G28	1303	744	0.10377	0.0029	0.01508	0.00019	0.04991	0.0014	3.9	49.4	96.5	2.4
G30	548	571	0.10489	0.00436	0.01447	0.00021	0.05258	0.00222	9.4	70.2	92.6	2.7
G31	754	600	0.35915	0.00892	0.04504	0.00056	0.05785	0.00144	9.7	45.8	284.0	7.0
G33	942	389	0.10541	0.0039	0.01575	0.00022	0.04854	0.00182	1.0	19.9	100.8	2.7
G34	330	204	0.10968	0.0061	0.01575	0.00026	0.05053	0.00286	5.0	54.1	100.7	3.3
G36	1002	425	0.11052	0.00358	0.01588	0.00021	0.05049	0.00165	4.7	53.3	101.6	2.7
G44	6214	4701	0.0974	0.00169	0.01418	0.00017	0.04982	0.00083	4.0	51.4	90.8	2.1
G45	224	123	8.03448	0.11693	0.415	0.0049	0.14045	0.00193	-0.1	-0.2	2232.8	47.3
G47	610	654	0.10328	0.00441	0.01474	0.00021	0.05084	0.0022	5.8	59.6	94.3	2.7
G48	2204	2150	0.10657	0.00246	0.01543	0.00019	0.05012	0.00115	4.2	50.8	98.7	2.4
G50	271	127	0.37181	0.01587	0.04678	0.0007	0.05766	0.0025	8.9	43.0	294.7	8.6
G53	101	66	12.47108	0.19082	0.49708	0.00605	0.18201	0.00267	1.5	2.6	2671.3	48.1
G57	290	362	0.10122	0.00606	0.01484	0.00025	0.04949	0.00301	3.1	44.4	95.0	3.2
G59	662	511	0.10401	0.00405	0.01523	0.00021	0.04953	0.00195	3.1	43.7	97.5	2.7
G60	2810	1203	0.09649	0.00212	0.01491	0.00018	0.04696	0.00102	-2.0	-103	95.4	2.3
G61	363	297	0.11838	0.00729	0.0162	0.00029	0.05303	0.00333	9.7	68.6	103.6	3.6
G62	1483	900	0.11409	0.00314	0.01679	0.00021	0.0493	0.00136	2.2	33.8	107.3	2.7
G63	4270	2987	0.0979	0.00193	0.0147	0.00017	0.04833	0.00093	0.7	18.3	94.1	2.2
G64	2339	1158	0.09624	0.00235	0.01459	0.00018	0.04784	0.00116	-0.1	-3.3	93.4	2.3
G65	403	340	0.11407	0.00557	0.01574	0.00024	0.05256	0.00261	8.9	67.5	100.7	3.1
G66	337	320	0.09836	0.00548	0.01447	0.00024	0.04933	0.0028	2.9	43.4	92.6	3.0
G70	6266	2834	0.09599	0.00172	0.01431	0.00017	0.04865	0.00085	1.6	30.0	91.6	2.1
G71	815	527	0.10463	0.00395	0.01549	0.00021	0.04899	0.00187	1.9	32.8	99.1	2.7
G72	1155	510	0.10634	0.00331	0.01577	0.0002	0.04892	0.00153	1.7	30.0	100.9	2.6
G73	847	385	0.11445	0.00391	0.01636	0.00022	0.05076	0.00175	5.2	54.5	104.6	2.8

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G74	1305	588	0.10317	0.00302	0.01532	0.0002	0.04887	0.00144	1.7	30.8	98.0	2.5
G75	342	287	0.11175	0.00621	0.01589	0.00026	0.05104	0.00289	5.9	58.1	101.6	3.3
G76	294	139	0.10618	0.00802	0.01458	0.00029	0.05282	0.00408	9.9	70.9	93.3	3.7
G77	491	610	0.0886	0.00578	0.01354	0.00024	0.04749	0.00315	-0.6	-18.6	86.7	3.1
G78	259	55	5.32155	0.08021	0.33504	0.00396	0.11523	0.00165	0.5	1.1	1883.5	51.3
G80	746	272	0.11014	0.00407	0.01544	0.00021	0.05177	0.00194	7.5	64.1	98.7	2.7
G81	367	126	4.91464	0.07071	0.32259	0.00377	0.11053	0.0015	0.1	0.3	1808.1	48.9
G83	428	317	0.10611	0.0051	0.01506	0.00023	0.05111	0.0025	6.2	60.7	96.4	2.9
G85	478	283	0.1023	0.00524	0.0145	0.00023	0.05118	0.00267	6.6	62.7	92.8	2.9
G87	1443	648	0.10555	0.00287	0.01521	0.00019	0.05035	0.00137	4.7	53.9	97.3	2.4
G88	1459	1360	0.11457	0.00339	0.01598	0.00021	0.052	0.00155	7.7	64.2	102.2	2.6
G91	334	284	0.66049	0.01592	0.08085	0.00101	0.05926	0.00142	2.7	13.1	501.2	12.0
G95	672	896	0.09383	0.00385	0.01401	0.0002	0.04857	0.00202	1.6	29.6	89.7	2.5
G96	314	145	0.16688	0.00745	0.02336	0.00035	0.05182	0.00235	5.2	46.3	148.9	4.4
G97	2199	866	0.09343	0.00225	0.01384	0.00017	0.04897	0.00117	2.4	39.6	88.6	2.2
G98	439	279	0.11225	0.00592	0.0154	0.00025	0.05287	0.00284	9.6	69.5	98.5	3.2
G99	1744	937	0.10435	0.00273	0.01484	0.00019	0.05103	0.00134	6.2	60.8	94.9	2.4
G100	999	600	0.10663	0.0035	0.0153	0.0002	0.05057	0.00167	5.1	55.7	97.9	2.6
G102	3876	3308	0.09793	0.00244	0.01449	0.00018	0.04903	0.00122	2.4	38.0	92.7	2.3
G104	2658	2169	0.09561	0.00221	0.01399	0.00017	0.04957	0.00114	3.5	48.8	89.6	2.2
G105	528	339	0.12364	0.0048	0.01823	0.00025	0.04919	0.00193	1.6	25.8	116.5	3.2
G107	240	196	0.10284	0.00873	0.01531	0.00032	0.04872	0.00421	1.4	27.1	98.0	4.1
G108	2234	1309	0.09849	0.00242	0.01474	0.00018	0.04846	0.00118	1.2	22.7	94.3	2.3
G109	1216	543	0.10301	0.00308	0.01558	0.0002	0.04798	0.00144	-0.1	-2.7	99.6	2.5
G111	510	373	0.10118	0.00466	0.01508	0.00022	0.04868	0.00228	1.5	27.3	96.5	2.8
G112	419	282	0.10665	0.00623	0.01521	0.00026	0.05087	0.00302	5.8	58.6	97.3	3.2
G114	1048	709	0.09531	0.0048	0.01351	0.00021	0.05117	0.00262	6.8	65.2	86.5	2.7
G115	2332	1507	0.09611	0.00228	0.01436	0.00018	0.04856	0.00114	1.4	27.6	91.9	2.2
G118	2845	823	0.09642	0.00217	0.01462	0.00018	0.04784	0.00107	-0.1	-3.8	93.6	2.2
G119	350	163	8.57804	0.11861	0.4297	0.00501	0.14483	0.00187	-0.4	-0.8	2285.7	44.2
G120	1299	925	0.1115	0.00324	0.01584	0.0002	0.05106	0.00149	5.9	58.4	101.3	2.6
G125	364	267	0.52955	0.01427	0.06801	0.00087	0.05649	0.00152	1.7	10.0	424.1	10.5
G126	31040	6529	0.09918	0.00137	0.01484	0.00017	0.04849	0.00063	1.1	22.8	95.0	2.2
G127	362	188	0.50924	0.0142	0.06672	0.00086	0.05537	0.00155	0.4	2.5	416.4	10.3
G128	631	233	0.10429	0.00456	0.01437	0.00021	0.05267	0.00234	9.6	70.8	91.9	2.7
G130	354	219	0.10393	0.00607	0.01563	0.00026	0.04823	0.00286	0.4	9.5	100.0	3.3
G131	966	527	0.09655	0.0038	0.01424	0.0002	0.04919	0.00196	2.7	42.0	91.1	2.5
G132	152	46	4.86268	0.10769	0.31006	0.00411	0.11378	0.00252	3.1	6.4	1860.6	78.9
G134	1232	1094	0.11127	0.00363	0.01626	0.00021	0.04965	0.00163	3.0	41.8	104.0	2.7
G135	928	498	0.09575	0.00367	0.01427	0.0002	0.04867	0.00189	1.5	30.6	91.4	2.5
G136	1806	1268	0.10163	0.00288	0.01542	0.00019	0.04782	0.00136	-0.3	-10.2	98.6	2.5
G137	1846	1128	0.09968	0.00274	0.01458	0.00018	0.04959	0.00137	3.4	46.9	93.3	2.3
G138	300	222	0.10843	0.00987	0.01512	0.00035	0.05203	0.00484	8.1	66.3	96.7	4.4
G140	446	357	0.09987	0.00574	0.0148	0.00024	0.04895	0.00286	2.1	34.8	94.7	3.1
G141	689	642	0.09929	0.00437	0.01508	0.00022	0.04778	0.00213	-0.4	-10.7	96.5	2.8
G143	377	305	0.10117	0.00578	0.01496	0.00025	0.04906	0.00285	2.3	36.5	95.7	3.1
G144	486	201	0.35297	0.00991	0.04634	0.0006	0.05527	0.00156	5.1	30.9	292.0	7.3
G145	287	163	7.20722	0.13881	0.37049	0.0048	0.14113	0.00269	5.2	9.3	2241.1	65.2
G146	1282	630	0.10401	0.00365	0.01514	0.0002	0.04985	0.00177	3.8	48.6	96.8	2.6
G148	956	537	0.10011	0.00364	0.01544	0.00021	0.04705	0.00173	-1.8	-91.3	98.7	2.6
G41	924	1089	0.09224	0.00317	0.01446	0.00019	0.04627	0.0016	-3.2	-678	92.6	2.4
G42	1974	1153	0.09537	0.00237	0.01412	0.00017	0.04899	0.00121	2.3	38.7	90.4	2.2
G43	559	228	0.11155	0.0044	0.01559	0.00022	0.0519	0.00207	7.7	64.5	99.7	2.8
G44	159	101	0.08419	0.00886	0.01388	0.00031	0.04401	0.0047	-7.5	-887	88.8	4.0
G45	388	282	0.10127	0.00539	0.01529	0.00024	0.04804	0.00259	0.1	3.4	97.8	3.1
G47	1076	657	0.10303	0.00312	0.01549	0.0002	0.04825	0.00147	0.5	11.0	99.1	2.5
G48	225	129	0.1004	0.01027	0.01428	0.00036	0.05099	0.00533	6.2	62.0	91.4	4.5
G49	1044	1170	0.10373	0.00317	0.01543	0.0002	0.04877	0.0015	1.5	28.0	98.7	2.5
G50	871	648	0.11056	0.00572	0.01613	0.00026	0.04974	0.00262	3.3	43.6	103.1	3.3
G51	2978	1488	0.09594	0.00206	0.01422	0.00017	0.04896	0.00103	2.2	37.6	91.0	2.2
G52	1313	690	0.10039	0.0029	0.01491	0.00019	0.04886	0.00142	1.8	32.4	95.4	2.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G53	1376	436	0.10196	0.0028	0.01526	0.00019	0.04847	0.00133	1.0	20.1	97.6	2.4
G54	782	746	0.10059	0.00356	0.01495	0.0002	0.04882	0.00174	1.8	31.3	95.6	2.6
G56	380	396	0.54183	0.01309	0.07006	0.00087	0.0561	0.00135	0.7	4.3	436.5	10.5
G57	391	216	0.10466	0.00646	0.01498	0.00026	0.0507	0.00319	5.5	57.9	95.8	3.3
G58	1691	644	0.099	0.00267	0.0149	0.00019	0.04821	0.0013	0.5	13.0	95.3	2.4
G59	1350	679	0.1043	0.0031	0.01533	0.0002	0.04936	0.00147	2.7	40.5	98.1	2.5
G60	497	334	0.19982	0.00732	0.02916	0.0004	0.04971	0.00184	-0.2	-2.0	185.3	5.0
G61	425	261	0.11444	0.00634	0.01581	0.00026	0.05252	0.00296	8.8	67.2	101.1	3.3
G62	614	175	0.09999	0.00572	0.01428	0.00024	0.0508	0.00296	5.9	60.6	91.4	3.1
G63	435	337	0.10583	0.00543	0.01462	0.00023	0.05251	0.00274	9.1	69.6	93.6	3.0
G64	819	581	0.10428	0.0038	0.01448	0.0002	0.05225	0.00193	8.6	68.7	92.7	2.5
G65	1332	1060	0.10307	0.0033	0.01532	0.0002	0.04881	0.00157	1.6	29.4	98.0	2.5
G66	493	273	0.10473	0.00525	0.01539	0.00024	0.04938	0.00251	2.7	40.7	98.4	3.0
G67	308	206	0.10069	0.00657	0.01542	0.00027	0.04737	0.00314	-1.2	-46.1	98.6	3.4
G68	449	280	0.32613	0.01015	0.04584	0.0006	0.05161	0.00162	-0.8	-7.7	288.9	7.4
G69	808	532	0.10224	0.0042	0.01515	0.00022	0.04897	0.00204	2.0	33.8	96.9	2.7
G70	667	594	0.10353	0.00538	0.01474	0.00024	0.05095	0.00269	6.0	60.5	94.3	3.0
G71	1094	628	0.10041	0.00446	0.01424	0.00021	0.05117	0.00231	6.7	63.3	91.1	2.7
G72	559	192	0.09574	0.00505	0.0152	0.00024	0.04571	0.00245	-4.5	-971	97.2	3.0
G73	211	147	0.09353	0.01203	0.01414	0.0004	0.048	0.00629	0.3	7.7	90.5	5.1
G74	289	284	0.10654	0.00813	0.01508	0.0003	0.05124	0.00398	6.5	61.7	96.5	3.8
G75	476	312	0.10214	0.00487	0.01499	0.00023	0.04943	0.00239	3.0	43.1	95.9	2.9
G76	19624	5539	0.10202	0.00155	0.01442	0.00017	0.05133	0.00074	6.8	63.9	92.3	2.1
G77	1024	230	0.10198	0.00333	0.01486	0.0002	0.04979	0.00164	3.7	48.7	95.1	2.5
G79	1241	609	0.10346	0.00309	0.01563	0.0002	0.04801	0.00144	0.0	-1.3	100.0	2.5
G80	321	251	13.84596	0.18878	0.53918	0.00628	0.1863	0.00237	-1.5	-2.6	2709.8	41.6

River M

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	694	362	0.10353	0.00361	0.01539	0.0002	0.04883	0.00172	1.6	29.5	98.4	2.6
G2	129	103	0.13123	0.00958	0.01945	0.00036	0.04896	0.00364	0.8	14.9	124.2	4.5
G3	162	107	0.1187	0.00835	0.01909	0.00033	0.04512	0.00322	-6.6	-1218.0	121.9	4.2
G4	273	242	0.12032	0.00606	0.01754	0.00027	0.04976	0.00255	2.9	39.1	112.1	3.4
G5	219	86	0.10322	0.00655	0.01615	0.00027	0.04637	0.00299	-3.5	-504.1	103.3	3.5
G6	185	159	0.11848	0.00724	0.01712	0.00029	0.05022	0.00313	3.9	46.7	109.4	3.7
G7	792	705	0.12819	0.00378	0.01859	0.00023	0.05003	0.00149	3.1	39.5	118.8	3.0
G8	472	391	0.13156	0.00481	0.01918	0.00026	0.04977	0.00184	2.4	33.5	122.5	3.3
G9	173	151	0.11375	0.00786	0.01661	0.0003	0.04969	0.00349	3.0	41.1	106.2	3.8
G10	1049	133	0.1221	0.00331	0.01854	0.00023	0.0478	0.0013	-1.2	-33.8	118.4	2.9
G11	636	221	0.13074	0.00417	0.01927	0.00025	0.04923	0.00159	1.4	22.4	123.1	3.1
G12	173	89	0.10515	0.00725	0.01608	0.00029	0.04744	0.00333	-1.4	-44.9	102.9	3.6
G13	481	485	0.11464	0.00471	0.01676	0.00024	0.04964	0.00207	2.9	40.0	107.1	3.0
G14	436	195	0.141	0.00521	0.01936	0.00026	0.05285	0.00198	8.3	61.7	123.6	3.3
G15	569	330	0.10406	0.00394	0.01597	0.00021	0.04728	0.00181	-1.7	-63.0	102.2	2.7
G16	496	392	0.12098	0.00465	0.01811	0.00025	0.04849	0.00189	0.3	6.1	115.7	3.1
G17	509	359	0.11523	0.0044	0.01738	0.00024	0.04812	0.00186	-0.4	-5.8	111.1	3.0
G18	620	261	0.10266	0.00376	0.01605	0.00021	0.04642	0.00172	-3.3	-431	102.6	2.7
G19	369	276	0.11425	0.00516	0.01706	0.00025	0.04859	0.00223	0.6	14.8	109.1	3.1
G20	827	298	0.09997	0.00324	0.0155	0.0002	0.0468	0.00153	-2.5	-153	99.2	2.5
G21	409	379	0.11412	0.00482	0.01671	0.00024	0.04955	0.00212	2.6	38.5	106.9	3.0
G22	814	457	0.12973	0.00387	0.01933	0.00024	0.0487	0.00146	0.4	7.6	123.4	3.1
G23	1207	114	0.10393	0.00284	0.01594	0.0002	0.04732	0.0013	-1.5	-57.0	101.9	2.5
G24	497	299	0.12945	0.00477	0.01881	0.00025	0.04994	0.00186	2.9	37.5	120.1	3.2
G25	47	25	0.53054	0.03227	0.06795	0.00119	0.05666	0.00351	2.0	11.3	423.8	14.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G26	148	69	0.12768	0.01041	0.01883	0.00038	0.04921	0.00409	1.5	24.0	120.2	4.8
G27	417	249	0.13388	0.00664	0.01895	0.00029	0.05126	0.00259	5.5	52.1	121.0	3.7
G28	1421	584	0.09149	0.00246	0.01364	0.00017	0.04868	0.00131	1.8	34.1	87.3	2.1
G29	583	406	0.1315	0.00439	0.01982	0.00026	0.04815	0.00162	-0.9	-18.8	126.5	3.3
G30	154	111	0.11947	0.00835	0.01659	0.00031	0.05227	0.00372	8.0	64.3	106.1	3.9
G31	222	133	0.11556	0.00671	0.0174	0.00028	0.04819	0.00285	-0.2	-2.6	111.2	3.6
G32	420	280	0.13344	0.00517	0.01964	0.00027	0.04931	0.00194	1.4	23.0	125.4	3.4
G33	740	284	0.10625	0.00352	0.01612	0.00021	0.04783	0.0016	-0.6	-14.7	103.1	2.6
G34	712	390	0.13102	0.00466	0.01962	0.00026	0.04846	0.00174	-0.2	-2.8	125.3	3.3
G35	466	352	0.1264	0.00478	0.01871	0.00025	0.04902	0.00188	1.2	19.7	119.5	3.2
G36	373	392	0.1187	0.00523	0.01816	0.00026	0.04744	0.00212	-1.8	-64.1	116.0	3.3
G37	197	102	0.11604	0.00771	0.01728	0.00031	0.04872	0.0033	0.9	17.8	110.5	3.9
G38	1206	784	0.12157	0.00307	0.01797	0.00022	0.04911	0.00124	1.5	24.9	114.8	2.8
G39	251	170	0.12038	0.00667	0.01814	0.00029	0.04815	0.00271	-0.4	-8.6	115.9	3.6
G40	627	431	0.12601	0.0042	0.0177	0.00023	0.05166	0.00174	6.5	58.1	113.1	2.9
G41	330	249	0.11021	0.00544	0.01629	0.00024	0.0491	0.00246	1.9	31.7	104.2	3.1
G42	448	283	0.20604	0.00644	0.02879	0.00037	0.05193	0.00164	3.9	35.1	183.0	4.6
G43	1743	901	0.10035	0.00278	0.01463	0.00018	0.04978	0.00139	3.7	49.4	93.6	2.3
G44	579	377	0.12681	0.00439	0.01913	0.00025	0.0481	0.00168	-0.8	-17.0	122.2	3.2
G45	643	373	0.13004	0.00418	0.01874	0.00024	0.05036	0.00164	3.7	43.5	119.7	3.1
G46	213	168	0.11477	0.00674	0.01665	0.00028	0.05002	0.00299	3.6	45.7	106.5	3.5
G47	908	334	0.10244	0.0034	0.01499	0.0002	0.04959	0.00167	3.2	45.5	95.9	2.5
G48	451	199	0.12828	0.00498	0.01951	0.00027	0.04771	0.00188	-1.6	-48.5	124.6	3.4
G49	559	276	0.12919	0.00455	0.01959	0.00026	0.04785	0.0017	-1.4	-37.9	125.1	3.3
G50	319	233	0.11867	0.00572	0.01791	0.00027	0.04808	0.00235	-0.4	-10.9	114.4	3.4
G51	219	196	0.11418	0.00665	0.01677	0.00028	0.0494	0.00293	2.4	35.7	107.2	3.5
G52	808	551	0.10445	0.00341	0.01574	0.0002	0.04816	0.00159	0.2	5.9	100.7	2.6
G53	213	225	0.11042	0.00833	0.01723	0.00033	0.04652	0.00357	-3.5	-351	110.1	4.1
G54	371	355	0.12375	0.00534	0.01698	0.00025	0.0529	0.00232	9.2	66.6	108.5	3.1
G55	371	165	0.13404	0.00571	0.01918	0.00027	0.05071	0.00219	4.2	46.2	122.5	3.5
G56	600	328	0.1286	0.00435	0.0194	0.00025	0.04809	0.00164	-0.9	-19.2	123.9	3.2
G57	262	319	0.11702	0.00621	0.0165	0.00026	0.05147	0.00278	6.5	59.7	105.5	3.3
G58	500	281	0.13274	0.00482	0.02041	0.00027	0.0472	0.00173	-2.8	-121	130.2	3.4
G59	352	195	0.12428	0.00553	0.01716	0.00025	0.05257	0.00238	8.4	64.6	109.7	3.2
G60	743	311	0.09787	0.00341	0.01489	0.0002	0.0477	0.00168	-0.5	-13.9	95.3	2.5
G61	350	194	0.12425	0.00564	0.01863	0.00027	0.04838	0.00223	-0.1	-0.8	119.0	3.4
G62	669	311	0.11044	0.00381	0.01642	0.00022	0.0488	0.0017	1.3	24.0	105.0	2.7
G63	125	84	0.10865	0.01064	0.01568	0.00036	0.05028	0.00502	4.4	51.7	100.3	4.6
G64	488	221	0.12045	0.00465	0.01734	0.00024	0.0504	0.00197	4.2	48.1	110.8	3.0
G65	110	52	0.1202	0.01037	0.01801	0.00036	0.04843	0.00425	0.2	4.5	115.1	4.6
G66	792	496	0.12366	0.0038	0.01873	0.00024	0.0479	0.00148	-1.0	-27.9	119.6	3.0
G67	385	259	0.11223	0.00501	0.01688	0.00024	0.04823	0.00219	0.1	2.6	107.9	3.1
G68	321	222	0.14472	0.01145	0.02047	0.00042	0.05131	0.00415	5.1	48.7	130.6	5.4
G69	641	368	0.1214	0.0041	0.01884	0.00024	0.04677	0.0016	-3.3	-224	120.3	3.1
G70	632	396	0.10039	0.00369	0.0148	0.0002	0.04921	0.00183	2.5	40.0	94.7	2.5
G71	263	136	0.11091	0.00605	0.01602	0.00026	0.05023	0.00279	4.2	50.2	102.5	3.3
G72	443	204	0.11775	0.00482	0.01707	0.00024	0.05007	0.00208	3.6	44.9	109.1	3.0
G73	188	124	0.1225	0.00765	0.019	0.00032	0.04679	0.00297	-3.3	-218	121.3	4.0
G74	189	94	0.11184	0.00841	0.01632	0.00031	0.04973	0.00381	3.1	42.8	104.4	3.9
G75	1193	504	0.12156	0.00315	0.01822	0.00022	0.04841	0.00126	0.1	2.3	116.4	2.8
G76	542	288	0.12468	0.00453	0.01849	0.00025	0.04894	0.0018	1.0	18.6	118.1	3.1
G77	333	196	0.12321	0.00579	0.01812	0.00027	0.04935	0.00236	2.0	29.8	115.7	3.4
G78	502	258	0.12344	0.00466	0.01885	0.00025	0.04752	0.00182	-1.8	-61.0	120.4	3.2
G79	581	391	0.1024	0.00398	0.01555	0.00021	0.04779	0.00188	-0.5	-13.1	99.5	2.7
G80	618	383	0.13064	0.00574	0.01776	0.00026	0.05339	0.00239	9.9	67.1	113.5	3.3
G81	933	517	0.10459	0.00328	0.01509	0.00019	0.05029	0.00159	4.6	53.7	96.6	2.5
G82	146	133	0.12868	0.00956	0.01967	0.00036	0.04747	0.00358	-2.1	-74.2	125.6	4.6
G83	384	233	0.1003	0.00497	0.01528	0.00023	0.04763	0.0024	-0.7	-22.4	97.8	2.9
G84	289	266	0.12389	0.00628	0.01917	0.00029	0.04689	0.00241	-3.1	-181	122.4	3.7
G85	635	357	0.10157	0.00389	0.01572	0.00021	0.04688	0.00182	-2.4	-135	100.6	2.7
G86	332	271	0.11866	0.00599	0.01789	0.00027	0.04812	0.00247	-0.3	-8.7	114.3	3.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G87	1062	461	0.10239	0.00305	0.01535	0.00019	0.04841	0.00145	0.8	17.8	98.2	2.5
G88	516	280	0.1268	0.00471	0.01953	0.00026	0.04712	0.00177	-2.8	-127	124.7	3.3
G89	238	104	0.11131	0.0065	0.01637	0.00027	0.04934	0.00293	2.4	36.1	104.7	3.4
G90	184	115	0.12455	0.00789	0.0181	0.00031	0.04992	0.00322	3.0	39.6	115.7	4.0
G91	195	116	0.13393	0.00812	0.01925	0.00032	0.05048	0.00312	3.8	43.4	122.9	4.1
G92	350	214	0.12863	0.00575	0.01979	0.00028	0.04716	0.00214	-2.7	-121	126.3	3.6
G93	622	380	0.10014	0.00375	0.01539	0.00021	0.04722	0.00179	-1.6	-64.2	98.5	2.6
G94	318	143	0.10755	0.00637	0.01678	0.00028	0.0465	0.0028	-3.4	-352	107.3	3.5
G95	893	318	0.10074	0.00319	0.01537	0.0002	0.04756	0.00152	-0.8	-27.8	98.3	2.5
G96	248	95	0.11393	0.00637	0.01701	0.00027	0.04859	0.00276	0.7	15.1	108.8	3.4
G97	1063	384	0.10619	0.00309	0.01533	0.00019	0.05026	0.00147	4.5	52.7	98.1	2.4
G98	451	209	0.12635	0.0051	0.0186	0.00026	0.0493	0.00202	1.7	26.8	118.8	3.3
G99	837	608	0.11776	0.0036	0.01796	0.00023	0.04758	0.00147	-1.5	-47.4	114.7	2.9
G100	781	287	0.10869	0.00377	0.0161	0.00021	0.04898	0.00172	1.7	29.9	103.0	2.7
G101	1666	741	0.09041	0.00229	0.0136	0.00016	0.04824	0.00123	0.9	21.7	87.1	2.1
G102	27	33	5.36043	0.1436	0.33891	0.00484	0.11478	0.00312	-0.1	-0.3	1876.4	96.5
G103	354	243	0.12876	0.00588	0.01908	0.00028	0.04898	0.00227	1.0	17.0	121.8	3.5
G104	221	127	0.11062	0.0067	0.01669	0.00028	0.0481	0.00297	-0.2	-2.6	106.7	3.5
G105	199	148	0.11438	0.00886	0.01645	0.00033	0.05047	0.00399	4.6	51.5	105.2	4.2
G106	123	84	0.10434	0.0093	0.01692	0.00034	0.04475	0.00405	-6.8	-1080	108.1	4.3
G107	203	98	0.12289	0.0075	0.01938	0.00032	0.04601	0.00285	-4.9	-1236	123.7	4.0
G108	331	192	0.1198	0.0056	0.01769	0.00026	0.04915	0.00233	1.7	27.1	113.0	3.3
G109	183	211	0.11787	0.00745	0.01736	0.0003	0.04928	0.00317	2.0	31.2	110.9	3.8
G110	1014	371	0.10092	0.00306	0.01478	0.00019	0.04954	0.00152	3.2	45.4	94.6	2.4
G111	189	163	0.11024	0.00818	0.01737	0.00032	0.04605	0.00348	-4.3	-1109	111.0	4.1
G112	156	98	0.10952	0.00816	0.01691	0.00031	0.04701	0.00356	-2.4	-119	108.1	4.0
G113	749	392	0.12931	0.00398	0.01943	0.00025	0.0483	0.0015	-0.4	-8.8	124.0	3.1
G114	540	300	0.11191	0.00429	0.01701	0.00023	0.04774	0.00185	-0.9	-27.0	108.7	2.9
G115	230	137	0.1128	0.00904	0.01601	0.00033	0.05113	0.00418	6.0	58.5	102.4	4.2
G116	130	101	0.10551	0.0096	0.01685	0.00035	0.04545	0.0042	-5.5	-1076	107.7	4.4
G117	374	200	0.13709	0.00577	0.02025	0.00029	0.04913	0.0021	0.9	16.0	129.2	3.6
G118	1235	665	0.09249	0.0027	0.01403	0.00018	0.04784	0.0014	0.0	0.4	89.8	2.2
G119	641	356	0.13025	0.00432	0.01958	0.00025	0.04826	0.00162	-0.6	-11.6	125.0	3.2
G120	824	452	0.10879	0.00353	0.01543	0.0002	0.05117	0.00168	6.3	60.2	98.7	2.5
G121	132	116	0.11756	0.00988	0.01681	0.00034	0.05076	0.00434	5.1	53.3	107.4	4.3

River N

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G2	412	469	0.11737	0.00504	0.01674	0.00024	0.05086	0.00222	5.3	54.4	107.0	3.1
G4	1164	393	0.09723	0.0028	0.01442	0.00018	0.04892	0.00142	2.1	35.9	92.3	2.3
G5	470	226	0.1424	0.00522	0.01945	0.00027	0.05312	0.00197	8.9	62.8	124.2	3.4
G6	1991	861	0.08411	0.00209	0.01277	0.00016	0.0478	0.00119	0.2	7.3	81.8	2.0
G7	501	253	0.10713	0.00434	0.01592	0.00022	0.04881	0.00201	1.5	26.6	101.8	2.8
G10	495	748	0.10971	0.00436	0.01594	0.00022	0.04992	0.00201	3.6	46.7	102.0	2.8
G11	1163	492	0.10089	0.00284	0.01471	0.00018	0.04975	0.00141	3.6	48.6	94.2	2.3
G13	244	128	0.26715	0.00971	0.03894	0.00053	0.04977	0.00183	-2.4	-33.4	246.2	6.5
G14	734	291	0.108	0.00365	0.01561	0.00021	0.05018	0.00172	4.2	50.9	99.9	2.6
G15	835	519	0.12484	0.00373	0.01849	0.00023	0.04898	0.00147	1.1	19.7	118.1	3.0
G16	1146	391	0.09454	0.00274	0.01398	0.00018	0.04907	0.00143	2.5	40.7	89.5	2.2
G17	1427	413	0.08719	0.00242	0.01346	0.00017	0.047	0.00131	-1.5	-77.0	86.2	2.1
G18	891	1256	0.08794	0.00293	0.01375	0.00018	0.04641	0.00156	-2.7	-363	88.0	2.3
G19	682	998	0.2529	0.00624	0.0358	0.00044	0.05126	0.00127	1.0	10.2	226.7	5.4
G20	201	97	0.12424	0.00719	0.0193	0.00031	0.04671	0.00275	-3.5	-261	123.2	4.0
G22	691	371	0.10134	0.00359	0.01572	0.00021	0.04677	0.00168	-2.5	-168	100.5	2.6
G23	581	336	0.09525	0.0038	0.01508	0.00021	0.04582	0.00185	-4.2	-960	96.5	2.6
G24	647	355	0.0971	0.00355	0.0139	0.00019	0.05067	0.00187	5.7	60.6	89.0	2.4
G25	149	97	0.11364	0.00838	0.01714	0.00032	0.04811	0.00361	-0.2	-4.7	109.5	4.0

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G26	354	245	0.12694	0.00561	0.01898	0.00027	0.04853	0.00217	0.1	3.2	121.2	3.4
G28	682	487	0.1328	0.00431	0.01912	0.00025	0.05039	0.00165	3.7	42.6	122.1	3.1
G29	622	392	0.09442	0.00364	0.01373	0.00019	0.0499	0.00195	4.2	53.9	87.9	2.4
G30	237	134	0.09779	0.00624	0.01423	0.00024	0.04986	0.00324	4.0	51.7	91.1	3.1
G31	921	399	0.10715	0.00335	0.01552	0.0002	0.05008	0.00158	4.1	50.0	99.3	2.5
G32	1072	528	0.09994	0.00303	0.01466	0.00019	0.04946	0.00151	3.1	44.7	93.8	2.4
G34	5316	4397	0.09014	0.00169	0.01275	0.00015	0.05131	0.00095	7.4	68.0	81.6	1.9
G35	367	61	0.28577	0.00867	0.04017	0.00051	0.05162	0.00158	0.5	5.4	253.9	6.4
G37	1085	787	0.09165	0.0028	0.01382	0.00018	0.0481	0.00148	0.6	15.1	88.5	2.2
G38	1273	2563	0.08038	0.00241	0.01138	0.00014	0.05124	0.00155	7.5	71.0	73.0	1.8
G39	304	118	0.10723	0.00552	0.01578	0.00024	0.04929	0.00258	2.4	37.5	101.0	3.1
G40	601	274	0.10475	0.00398	0.01584	0.00021	0.04798	0.00185	-0.1	-4.1	101.3	2.7
G42	255	209	0.12768	0.00661	0.01938	0.0003	0.04781	0.00252	-1.4	-39.3	123.7	3.8
G43	443	275	0.12345	0.00489	0.01881	0.00026	0.04761	0.00191	-1.6	-52.0	120.1	3.3
G44	434	276	0.10089	0.00445	0.01568	0.00022	0.04667	0.00209	-2.7	-212	100.3	2.8
G45	545	591	0.12017	0.00444	0.01746	0.00024	0.04993	0.00187	3.2	41.8	111.6	3.0
G46	84	49	10.69237	0.18511	0.4708	0.00569	0.16477	0.00281	0.4	0.7	2505.2	56.7
G47	287	129	0.11815	0.00599	0.01741	0.00027	0.04923	0.00254	1.9	30.0	111.3	3.4
G48	4163	3101	0.0989	0.00199	0.01458	0.00017	0.04919	0.00098	2.7	40.6	93.3	2.2
G49	603	292	0.10912	0.00406	0.01594	0.00022	0.04966	0.00187	3.1	43.1	102.0	2.7
G50	109	80	0.08801	0.00896	0.01321	0.0003	0.04832	0.005	1.2	26.4	84.6	3.8
G52	536	171	0.44047	0.01016	0.06028	0.00072	0.05301	0.00122	-1.8	-14.6	377.3	8.8
G53	753	385	0.10512	0.00358	0.01565	0.0002	0.04873	0.00168	1.4	25.7	100.1	2.6
G54	551	255	0.10162	0.00403	0.01569	0.00021	0.04698	0.00189	-2.1	-110	100.4	2.7
G56	730	304	0.12985	0.00417	0.01944	0.00025	0.04846	0.00157	-0.1	-2.0	124.1	3.2
G57	393	215	0.12902	0.00541	0.01886	0.00027	0.04964	0.00211	2.3	32.4	120.4	3.4
G58	530	342	0.11958	0.00455	0.01707	0.00023	0.05083	0.00196	5.1	53.2	109.1	3.0
G59	421	202	0.11911	0.00501	0.01772	0.00025	0.04877	0.00208	1.0	17.3	113.2	3.2
G60	294	106	0.30769	0.01024	0.04162	0.00055	0.05364	0.00181	3.7	26.1	262.8	6.8
G61	496	165	0.10632	0.00442	0.01532	0.00022	0.05035	0.00212	4.7	53.6	98.0	2.7
G62	1358	541	0.08977	0.00258	0.01353	0.00017	0.04814	0.0014	0.8	18.2	86.6	2.1
G63	459	393	0.10459	0.00452	0.01574	0.00022	0.04821	0.00211	0.3	8.0	100.7	2.8
G66	1412	43	1.36856	0.02241	0.13632	0.00155	0.07284	0.00116	6.3	18.4	823.8	17.6
G67	614	200	0.10019	0.00386	0.01511	0.00021	0.04811	0.00188	0.3	7.5	96.7	2.6
G69	223	130	0.10706	0.00654	0.01595	0.00027	0.04868	0.00303	1.3	23.0	102.0	3.4
G70	1974	647	0.08663	0.00221	0.01292	0.00016	0.04863	0.00124	1.9	36.3	82.8	2.0
G72	760	213	0.10154	0.00396	0.01461	0.0002	0.05042	0.00199	5.0	56.4	93.5	2.6
G73	1200	686	0.10864	0.00306	0.0149	0.00019	0.05288	0.0015	9.7	70.5	95.4	2.4
G74	833	444	0.11323	0.00359	0.01569	0.0002	0.05236	0.00168	8.6	66.7	100.3	2.6
G75	880	438	0.10975	0.00348	0.01661	0.00021	0.04794	0.00154	-0.5	-11.8	106.2	2.7
G76	251	150	0.11903	0.00652	0.01749	0.00028	0.04937	0.00275	2.1	32.4	111.8	3.5
G77	398	185	0.11079	0.005	0.01616	0.00023	0.04975	0.00228	3.3	43.6	103.3	3.0
G78	494	226	0.12742	0.00487	0.01899	0.00026	0.04869	0.00189	0.4	8.7	121.3	3.3
G79	932	216	0.10403	0.00331	0.01554	0.0002	0.04858	0.00156	1.1	22.0	99.4	2.5
G80	203	66	0.1221	0.00727	0.01805	0.0003	0.04909	0.00297	1.5	24.1	115.3	3.8
G81	706	323	0.10553	0.00376	0.01568	0.00021	0.04882	0.00176	1.6	27.9	100.3	2.6
G84	1679	580	0.09136	0.00251	0.01353	0.00017	0.04899	0.00136	2.5	41.1	86.6	2.1
G85	690	582	0.12977	0.00429	0.01954	0.00025	0.04817	0.00161	-0.7	-15.8	124.8	3.2
G86	629	314	0.1623	0.0051	0.02382	0.0003	0.04943	0.00157	0.6	9.8	151.8	3.8
G87	457	218	0.10368	0.0045	0.01542	0.00022	0.04879	0.00215	1.6	28.4	98.6	2.8
G88	746	356	0.11169	0.00384	0.01562	0.00021	0.05189	0.00181	7.6	64.4	99.9	2.6
G90	1826	861	0.10866	0.00273	0.01597	0.00019	0.04937	0.00125	2.5	38.3	102.1	2.4
G91	1854	626	0.0858	0.00236	0.01279	0.00016	0.04868	0.00135	2.1	38.2	81.9	2.0
G92	701	348	0.10191	0.00371	0.01521	0.0002	0.04862	0.0018	1.2	24.7	97.3	2.6
G93	276	133	0.11006	0.00595	0.0167	0.00026	0.04782	0.00263	-0.7	-19.9	106.8	3.3
G94	1326	482	0.09962	0.0029	0.01483	0.00019	0.04873	0.00143	1.6	29.5	94.9	2.4
G96	291	142	0.1335	0.00641	0.0196	0.00029	0.04941	0.00241	1.7	25.2	125.1	3.7
G99	1156	830	0.10857	0.00322	0.01643	0.00021	0.04793	0.00144	-0.4	-11.0	105.1	2.6
G100	172	133	0.11776	0.00806	0.01624	0.0003	0.05261	0.00367	8.9	66.7	103.8	3.8
G101	548	219	0.0958	0.00403	0.01505	0.00021	0.04617	0.00197	-3.5	-1381	96.3	2.7
G102	1885	481	0.09529	0.00257	0.01434	0.00018	0.04821	0.00131	0.7	16.2	91.8	2.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G103	1096	510	0.10121	0.00317	0.01472	0.00019	0.04988	0.00158	3.9	50.3	94.2	2.4
G104	314	258	0.09696	0.00546	0.01473	0.00023	0.04775	0.00274	-0.3	-9.4	94.3	3.0
G105	567	376	0.10253	0.00439	0.01576	0.00022	0.04721	0.00206	-1.7	-69.7	100.8	2.8
G106	1273	442	0.093	0.00284	0.0137	0.00017	0.04924	0.00152	3.0	45.0	87.7	2.2
G108	539	267	0.10378	0.00431	0.01512	0.00021	0.04978	0.0021	3.6	47.6	96.8	2.7
G109	523	185	0.12519	0.00486	0.01874	0.00026	0.04847	0.00191	0.1	2.0	119.7	3.2
G111	268	106	0.10643	0.00598	0.01602	0.00026	0.04819	0.00276	0.2	5.5	102.5	3.3
G112	562	269	0.12395	0.00471	0.01901	0.00026	0.04729	0.00182	-2.3	-90.9	121.4	3.2
G113	2079	1220	0.10132	0.00258	0.01488	0.00018	0.04939	0.00127	2.9	42.8	95.2	2.3
G114	331	372	0.11044	0.00675	0.01584	0.00027	0.05058	0.00315	5.0	54.3	101.3	3.4
G116	283	116	0.1013	0.00587	0.01608	0.00026	0.0457	0.00269	-4.8	-1028	102.9	3.2
G117	1069	479	0.09689	0.00325	0.01497	0.00019	0.04697	0.00159	-2.0	-102	95.8	2.5
G118	919	568	0.08869	0.00315	0.01298	0.00017	0.04957	0.00179	3.9	52.5	83.1	2.2
G119	287	135	0.1102	0.00595	0.01631	0.00026	0.04903	0.0027	1.7	30.0	104.3	3.3
G120	844	326	0.10472	0.00357	0.01563	0.0002	0.04862	0.00168	1.1	22.8	100.0	2.6
G121	535	243	0.11994	0.00478	0.01666	0.00023	0.05222	0.00212	8.0	63.9	106.5	2.9
G123	478	229	0.1051	0.00457	0.01674	0.00024	0.04555	0.00201	-5.1	-1069	107.0	3.0
G127	828	504	0.10607	0.00365	0.01521	0.0002	0.0506	0.00177	5.2	56.3	97.3	2.5
G128	575	218	0.10431	0.00414	0.01636	0.00022	0.04626	0.00186	-3.7	-850	104.6	2.8
G129	175	121	0.12041	0.00785	0.01651	0.00029	0.05291	0.00352	9.3	67.5	105.6	3.7
G130	803	186	0.12624	0.00404	0.01862	0.00024	0.04919	0.0016	1.5	24.3	118.9	3.0
G131	404	253	0.11961	0.0053	0.0181	0.00026	0.04795	0.00216	-0.8	-20.5	115.6	3.3
G132	393	103	0.10559	0.00502	0.01591	0.00023	0.04814	0.00233	0.1	4.1	101.8	3.0
G133	1758	1086	0.0922	0.00262	0.01372	0.00017	0.04875	0.0014	1.9	35.4	87.8	2.2
G134	560	418	0.09581	0.00408	0.0142	0.0002	0.04894	0.00212	2.2	37.3	90.9	2.5
G136	222	96	0.10445	0.00669	0.01555	0.00026	0.04874	0.00318	1.5	26.6	99.4	3.4
G137	478	236	0.12034	0.00492	0.01761	0.00024	0.04957	0.00206	2.5	35.6	112.6	3.1
G139	1015	358	0.09853	0.00324	0.01501	0.00019	0.04761	0.00159	-0.7	-21.3	96.1	2.4
G140	342	78	5.04658	0.10078	0.32514	0.00381	0.11261	0.00226	0.7	1.5	1841.9	71.7
G141	1129	125	0.12163	0.00362	0.01723	0.00022	0.05122	0.00155	5.8	56.1	110.1	2.7
G142	478	196	0.13484	0.00534	0.01898	0.00026	0.05154	0.00208	5.9	54.3	121.2	3.3
G143	161	106	0.11357	0.00804	0.01685	0.00031	0.04889	0.00353	1.4	24.4	107.7	3.9
G144	313	142	0.09848	0.00535	0.01519	0.00024	0.04704	0.0026	-1.9	-90.6	97.2	3.0
G145	349	129	0.10546	0.00531	0.01559	0.00024	0.04908	0.00252	2.1	34.1	99.7	3.0
G146	366	112	0.10429	0.00515	0.01646	0.00024	0.04596	0.00231	-4.4	-1052	105.3	3.1
G147	450	190	0.12695	0.00527	0.0192	0.00027	0.04796	0.00202	-1.0	-27.3	122.6	3.4
G149	1178	401	0.0954	0.00303	0.01359	0.00017	0.05091	0.00164	6.3	63.3	87.0	2.2
G150	1163	487	0.09515	0.00303	0.01403	0.00018	0.0492	0.00159	2.8	43.0	89.8	2.3

River O

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	639	249	0.10724	0.00401	0.01609	0.00022	0.04836	0.00183	0.5	12.1	102.9	2.8
G2	610	401	0.12952	0.0045	0.01925	0.00025	0.04882	0.00171	0.7	11.6	122.9	3.2
G3	622	242	0.11751	0.0054	0.0173	0.00026	0.04929	0.0023	2.0	31.6	110.6	3.3
G4	446	218	0.40412	0.00983	0.05418	0.00066	0.05412	0.00131	1.3	9.5	340.1	8.1
G5	412	258	0.11021	0.00503	0.01598	0.00024	0.05005	0.00232	3.9	48.3	102.2	3.0
G6	730	414	0.12344	0.00553	0.01701	0.00025	0.05265	0.0024	8.7	65.4	108.7	3.2
G7	1397	68	0.26043	0.00497	0.03606	0.00042	0.05241	0.00098	2.9	24.7	228.4	5.3
G8	547	209	0.10462	0.00579	0.0159	0.00026	0.04775	0.00269	-0.7	-18.1	101.7	3.3
G9	411	158	0.1093	0.00578	0.01572	0.00025	0.05045	0.00271	4.8	53.5	100.5	3.2
G10	502	338	0.20383	0.00634	0.02987	0.00038	0.04952	0.00155	-0.7	-9.8	189.7	4.8
G11	530	366	0.10859	0.0043	0.016	0.00022	0.04926	0.00197	2.3	36.1	102.3	2.8
G12	127	79	0.10325	0.01325	0.01501	0.00043	0.04993	0.00653	4.0	49.9	96.0	5.4
G13	566	280	0.10778	0.00421	0.01534	0.00021	0.05098	0.00202	5.9	59.1	98.1	2.7
G14	637	424	0.56162	0.0109	0.07196	0.00085	0.05663	0.00108	1.0	6.0	448.0	10.2
G15	347	30	10.11636	0.13483	0.45284	0.00521	0.1621	0.00203	1.6	2.8	2477.7	41.9
G16	729	360	0.10618	0.0038	0.01591	0.00021	0.04843	0.00175	0.8	15.5	101.7	2.7

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G17	609	435	0.30296	0.00743	0.04244	0.00052	0.0518	0.00127	0.3	3.2	267.9	6.4
G18	484	235	0.10553	0.0046	0.01642	0.00023	0.04663	0.00206	-3.0	-250	105.0	3.0
G19	561	365	0.10842	0.00424	0.01588	0.00022	0.04954	0.00196	2.9	41.5	101.6	2.8
G20	554	264	0.10544	0.0042	0.01578	0.00022	0.04848	0.00196	0.9	18.0	100.9	2.8
G21	1142	406	0.11376	0.0036	0.0165	0.00021	0.05003	0.00159	3.7	46.3	105.5	2.7
G22	1027	494	0.11087	0.00335	0.01667	0.00021	0.04825	0.00146	0.2	4.7	106.6	2.7
G23	221	114	0.13477	0.00792	0.01945	0.00032	0.05027	0.003	3.4	40.1	124.2	4.0
G24	758	415	0.2838	0.00659	0.03972	0.00048	0.05184	0.0012	1.0	9.8	251.1	5.9
G25	321	66	5.46515	0.07575	0.34713	0.00399	0.11424	0.0015	-1.3	-2.8	1867.9	46.9
G26	2175	584	0.09007	0.00236	0.01383	0.00017	0.04725	0.00124	-1.0	-43.7	88.5	2.2
G27	623	281	0.11202	0.00419	0.01693	0.00023	0.04802	0.00182	-0.4	-9.3	108.2	2.9
G28	539	256	0.10522	0.00447	0.01567	0.00022	0.04873	0.0021	1.4	25.6	100.2	2.8
G29	546	319	0.10351	0.00533	0.01578	0.00024	0.04759	0.00249	-0.9	-28.9	100.9	3.1
G30	751	448	0.10365	0.0037	0.01559	0.00021	0.04823	0.00174	0.4	10.0	99.7	2.6
G31	388	175	0.11067	0.00523	0.01616	0.00024	0.0497	0.00238	3.2	42.9	103.3	3.1
G32	727	400	0.11351	0.00391	0.01619	0.00022	0.05086	0.00177	5.4	55.8	103.6	2.7
G33	422	192	0.10462	0.00494	0.01589	0.00023	0.04777	0.00229	-0.6	-16.9	101.6	3.0
G34	215	146	0.10111	0.00659	0.01534	0.00027	0.04783	0.00317	-0.3	-9.2	98.1	3.4
G35	441	194	0.1107	0.00492	0.01644	0.00024	0.04886	0.0022	1.4	25.5	105.1	3.0
G36	867	356	0.10396	0.00345	0.01569	0.0002	0.04807	0.00161	0.0	2.2	100.4	2.6
G37	13075	689	0.08093	0.00127	0.01226	0.00014	0.04789	0.00072	0.5	15.4	78.6	1.8
G38	599	217	0.111	0.00597	0.01694	0.00027	0.04754	0.0026	-1.3	-43.1	108.3	3.4
G39	405	166	0.10365	0.00502	0.01592	0.00024	0.04725	0.00232	-1.7	-66.3	101.8	3.0
G40	549	457	0.10863	0.00447	0.01637	0.00023	0.04815	0.00201	0.0	1.6	104.7	2.9
G41	288	181	0.56207	0.01475	0.07417	0.00093	0.05499	0.00145	-1.8	-12.0	461.2	11.1
G42	1977	811	0.08577	0.0033	0.0119	0.00017	0.05231	0.00204	9.6	74.5	76.3	2.1
G43	414	159	0.10964	0.00511	0.01588	0.00023	0.05011	0.00237	4.0	49.3	101.5	3.0
G44	167	75	0.10833	0.00805	0.01596	0.0003	0.04925	0.00372	2.3	36.0	102.1	3.8
G45	143	72	0.10313	0.01098	0.01636	0.00039	0.04575	0.00495	-4.7	-1045	104.6	4.9
G46	452	243	0.11219	0.0048	0.0164	0.00024	0.04965	0.00215	3.1	41.4	104.8	3.0
G47	181	85	0.10558	0.00842	0.01539	0.00031	0.0498	0.00405	3.6	47.0	98.4	3.9
G48	366	169	5.05662	0.06966	0.32375	0.00372	0.11333	0.00147	1.2	2.5	1853.5	46.7
G49	846	430	0.10506	0.00347	0.0161	0.00021	0.04736	0.00158	-1.5	-54.5	102.9	2.7
G50	1174	992	0.23072	0.00539	0.032	0.00039	0.05232	0.00122	3.8	32.1	203.1	4.8
G51	790	718	0.10102	0.00412	0.01526	0.00021	0.04803	0.00198	0.1	3.3	97.6	2.7
G52	332	280	0.20665	0.00779	0.0298	0.00041	0.05031	0.00192	0.7	9.6	189.3	5.1
G53	4935	2015	0.09303	0.00179	0.01284	0.00015	0.05256	0.001	9.7	73.5	82.3	1.9
G54	437	248	0.10868	0.00492	0.01607	0.00023	0.04908	0.00225	1.9	32.2	102.8	3.0
G55	548	369	0.10136	0.00419	0.01535	0.00021	0.0479	0.00201	-0.2	-5.3	98.2	2.7
G56	279	460	0.09369	0.00681	0.01381	0.00026	0.04924	0.00364	2.8	44.5	88.4	3.3
G57	734	729	0.10791	0.00379	0.01565	0.00021	0.05003	0.00178	4.0	49.1	100.1	2.6
G58	1483	910	0.09385	0.00278	0.01416	0.00018	0.04809	0.00143	0.6	12.8	90.6	2.3
G59	633	293	0.10682	0.00401	0.01596	0.00022	0.04857	0.00184	1.0	19.6	102.1	2.7
G60	488	133	0.10438	0.00444	0.01541	0.00022	0.04917	0.00212	2.2	36.7	98.6	2.8
G61	884	385	0.09725	0.00335	0.01491	0.0002	0.04734	0.00165	-1.3	-44.3	95.4	2.5
G62	289	114	0.10356	0.0061	0.01577	0.00026	0.04765	0.00285	-0.8	-24.7	100.9	3.3
G63	442	200	0.11003	0.00482	0.0164	0.00023	0.04868	0.00216	1.0	20.7	104.9	3.0
G64	987	353	0.10152	0.00317	0.01528	0.0002	0.04823	0.00151	0.5	11.5	97.7	2.5
G65	509	206	0.10543	0.00431	0.01575	0.00022	0.04857	0.00201	1.0	20.6	100.8	2.8
G66	353	119	0.10319	0.00528	0.01572	0.00024	0.04764	0.00247	-0.8	-24.4	100.5	3.0
G67	523	271	0.10325	0.00433	0.01575	0.00022	0.04756	0.00202	-1.0	-31.6	100.8	2.8
G68	428	207	0.12134	0.00516	0.01902	0.00027	0.04629	0.00199	-4.3	-864	121.5	3.4
G69	497	256	0.10696	0.00434	0.0157	0.00022	0.04942	0.00203	2.8	40.2	100.4	2.8
G70	534	303	0.11134	0.00434	0.01578	0.00022	0.0512	0.00202	6.2	59.6	100.9	2.8
G71	334	315	0.09555	0.00527	0.01476	0.00023	0.04699	0.00263	-1.8	-95.9	94.4	2.9
G72	927	327	0.10322	0.00336	0.01578	0.0002	0.04746	0.00156	-1.2	-40.3	100.9	2.6
G73	401	155	0.10618	0.00517	0.01549	0.00023	0.04975	0.00246	3.4	46.0	99.1	2.9
G74	795	460	0.10687	0.00357	0.01556	0.0002	0.04985	0.00168	3.6	47.0	99.5	2.6
G75	619	257	0.10971	0.00417	0.01652	0.00022	0.04819	0.00185	0.1	2.9	105.6	2.8
G76	68	30	0.53909	0.02809	0.06848	0.00111	0.05713	0.00303	2.5	13.9	427.0	13.4
G77	601	268	0.10972	0.00418	0.01633	0.00022	0.04875	0.00188	1.2	23.1	104.4	2.8

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G78	378	146	0.10207	0.00509	0.0159	0.00024	0.04658	0.00236	-2.9	-265	101.7	3.0
G79	480	210	0.10608	0.00451	0.01572	0.00022	0.04897	0.00211	1.8	31.2	100.6	2.8
G80	247	136	4.59519	0.06828	0.29765	0.00347	0.11202	0.00159	4.1	8.3	1832.5	51.2
G81	843	355	0.10011	0.00329	0.01495	0.00019	0.0486	0.00161	1.3	25.5	95.7	2.5
G82	716	250	0.10514	0.00379	0.01563	0.00021	0.04882	0.00178	1.5	28.1	100.0	2.7
G83	911	433	0.09989	0.00326	0.01506	0.0002	0.04814	0.00158	0.4	9.3	96.3	2.5
G84	1478	487	0.2526	0.00475	0.03522	0.00041	0.05205	0.00096	2.5	22.4	223.1	5.1
G85	604	320	0.10483	0.00416	0.0153	0.00021	0.0497	0.002	3.4	46.0	97.9	2.7
G86	892	299	0.10292	0.00335	0.01567	0.0002	0.04765	0.00156	-0.8	-23.8	100.3	2.6
G87	758	227	0.09891	0.00355	0.01531	0.0002	0.04689	0.0017	-2.1	-126	97.9	2.6
G88	470	162	0.10289	0.00454	0.01551	0.00022	0.04813	0.00216	0.2	6.1	99.2	2.8
G89	1834	464	0.09781	0.00239	0.01411	0.00017	0.05031	0.00123	4.9	56.9	90.3	2.2
G90	814	587	0.10394	0.00348	0.01582	0.00021	0.04769	0.00161	-0.8	-22.2	101.2	2.6
G91	398	158	0.10942	0.00514	0.01594	0.00024	0.0498	0.00238	3.3	45.1	102.0	3.0
G92	185	109	0.26307	0.01173	0.03703	0.00054	0.05155	0.00233	1.2	11.7	234.4	6.7
G93	626	99	4.89522	0.06929	0.31481	0.00363	0.11283	0.00152	2.1	4.4	1845.5	48.2
G94	523	313	0.11287	0.00447	0.01646	0.00023	0.04977	0.002	3.2	42.9	105.2	2.9
G95	917	273	0.1081	0.00337	0.01653	0.00021	0.04747	0.00149	-1.4	-46.8	105.7	2.7
G96	427	165	0.10209	0.00486	0.01616	0.00024	0.04585	0.00221	-4.5	-1032	103.3	3.0
G97	311	142	0.11317	0.00585	0.0162	0.00025	0.05069	0.00266	5.1	54.3	103.6	3.2
G98	671	295	0.10203	0.00384	0.01567	0.00021	0.04724	0.0018	-1.7	-65.2	100.3	2.7
G99	617	217	0.11008	0.00423	0.01631	0.00022	0.04896	0.0019	1.6	28.6	104.3	2.8
G100	238	107	0.10002	0.00682	0.01593	0.00028	0.04555	0.00316	-5.0	-1018	101.9	3.5
G101	235	215	0.10476	0.00682	0.01464	0.00026	0.05194	0.00344	8.0	66.9	93.7	3.3
G102	525	206	0.10917	0.00475	0.01587	0.00023	0.0499	0.0022	3.6	46.7	101.5	2.9
G103	442	242	10.51227	0.13653	0.45637	0.00522	0.16714	0.00203	2.4	4.2	2529.2	40.4
G104	610	322	0.10195	0.00427	0.01551	0.00022	0.04769	0.00202	-0.6	-19.1	99.2	2.8
G105	539	268	0.54157	0.01969	0.06729	0.00094	0.0584	0.00215	4.7	23.0	419.8	11.4
G106	542	151	0.26759	0.00844	0.0356	0.00047	0.05455	0.00174	6.8	42.7	225.5	5.8
G107	417	201	0.103	0.00525	0.0153	0.00024	0.04884	0.00253	1.6	30.1	97.9	3.0
G108	2263	187	0.2234	0.00408	0.03192	0.00037	0.05078	0.00091	1.0	12.2	202.6	4.6
G109	700	345	0.10272	0.00401	0.01529	0.00021	0.04874	0.00193	1.5	27.8	97.8	2.7
G110	490	172	0.10717	0.00492	0.01608	0.00023	0.04837	0.00225	0.6	12.3	102.8	3.0
G111	530	208	0.10989	0.00474	0.01583	0.00023	0.05037	0.0022	4.5	52.2	101.3	2.9
G112	900	493	0.10796	0.00364	0.01538	0.0002	0.05094	0.00173	5.8	58.7	98.4	2.6
G113	814	353	0.11137	0.00392	0.01605	0.00021	0.05036	0.00179	4.5	51.5	102.6	2.7
G114	335	264	0.10784	0.00586	0.01579	0.00025	0.04956	0.00274	3.0	42.1	101.0	3.2
G115	811	351	0.10905	0.00384	0.01571	0.00021	0.05036	0.00179	4.6	52.5	100.5	2.7
G116	541	202	0.28376	0.00784	0.03984	0.0005	0.05168	0.00143	0.7	7.2	251.8	6.2
G117	273	177	0.10913	0.00662	0.01638	0.00027	0.04833	0.00298	0.4	9.2	104.8	3.5
G118	1693	627	0.09648	0.00255	0.01427	0.00018	0.04908	0.0013	2.4	39.7	91.3	2.2
G119	532	230	0.1045	0.00464	0.01582	0.00023	0.04792	0.00216	-0.3	-7.2	101.2	2.9
G120	366	280	0.1077	0.00559	0.01598	0.00025	0.04891	0.00258	1.7	28.9	102.2	3.1
G121	921	394	0.10635	0.00349	0.01618	0.00021	0.04769	0.00158	-0.9	-24.5	103.5	2.7
G122	353	165	0.10868	0.0059	0.01599	0.00025	0.04931	0.00272	2.4	37.0	102.3	3.2
G123	698	349	0.11337	0.00418	0.01593	0.00022	0.05163	0.00193	7.0	62.1	101.9	2.7
G124	654	361	0.10988	0.0042	0.01623	0.00022	0.04911	0.0019	2.0	32.3	103.8	2.8
G125	507	223	0.10678	0.00471	0.01617	0.00023	0.04791	0.00214	-0.4	-10.5	103.4	2.9
G126	851	406	0.11763	0.00386	0.01699	0.00022	0.05025	0.00166	4.0	47.5	108.6	2.8
G127	642	302	0.10043	0.00409	0.01566	0.00022	0.04652	0.00192	-3.0	-307	100.2	2.7
G128	490	205	0.11639	0.00503	0.01598	0.00023	0.05286	0.00232	9.4	68.3	102.2	2.9
G129	515	225	0.10876	0.00467	0.0157	0.00022	0.05026	0.00219	4.4	51.5	100.4	2.9

River P

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	792	712	0.27032	0.00644	0.03725	0.00047	0.05264	0.00124	3.1	24.8	235.8	5.8
G3	474	439	0.10238	0.00447	0.01427	0.00021	0.05205	0.0023	8.4	68.3	91.3	2.7
G6	1254	912	0.09429	0.0028	0.01454	0.00019	0.04706	0.00139	-1.6	-78.8	93.0	2.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G7	124	81	1.03772	0.02993	0.12072	0.00161	0.06237	0.0018	-1.6	-7.0	734.7	18.6
G8	137	74	0.09886	0.00891	0.01496	0.00031	0.04793	0.00438	0.0	-1.1	95.7	3.9
G9	622	427	0.1067	0.00411	0.01571	0.00022	0.04927	0.00191	2.4	37.4	100.5	2.8
G11	605	249	0.10274	0.00404	0.01509	0.00021	0.04938	0.00196	2.8	41.8	96.6	2.7
G12	1423	389	0.09624	0.00269	0.01424	0.00018	0.04904	0.00137	2.4	39.2	91.1	2.3
G13	694	374	0.10581	0.00386	0.01561	0.00022	0.04918	0.00181	2.3	36.2	99.8	2.7
G15	404	322	0.52301	0.0129	0.06475	0.00082	0.0586	0.00143	5.6	26.7	404.5	10.0
G16	174	76	0.10213	0.00784	0.01566	0.00029	0.04732	0.00369	-1.5	-54.9	100.2	3.7
G17	390	204	0.10938	0.00512	0.01532	0.00023	0.0518	0.00246	7.6	64.6	98.0	3.0
G19	553	442	0.10508	0.00436	0.01547	0.00022	0.04927	0.00207	2.5	38.4	99.0	2.8
G20	843	348	0.11589	0.00381	0.01602	0.00022	0.05248	0.00173	8.6	66.5	102.5	2.7
G22	432	328	0.25818	0.00795	0.03636	0.00048	0.05151	0.00159	1.3	12.7	230.2	6.0
G23	506	436	0.11323	0.00462	0.01572	0.00023	0.05224	0.00216	8.3	66.0	100.6	2.9
G24	208	298	0.12468	0.00772	0.01734	0.0003	0.05217	0.00329	7.7	62.2	110.8	3.8
G25	60	54	0.59257	0.03004	0.07181	0.00118	0.05987	0.00309	5.7	25.3	447.0	14.2
G26	36	21	0.50672	0.03837	0.06392	0.00128	0.05751	0.00443	4.2	21.8	399.4	15.5
G27	538	281	0.12954	0.00487	0.01841	0.00026	0.05106	0.00194	5.2	51.7	117.6	3.3
G28	412	168	0.10033	0.00479	0.0152	0.00023	0.04788	0.00231	-0.2	-5.2	97.3	2.9
G29	633	240	0.11256	0.00422	0.0161	0.00022	0.05072	0.00192	5.1	54.8	103.0	2.8
G30	722	417	0.09497	0.00356	0.01442	0.0002	0.04777	0.00181	-0.2	-6.1	92.3	2.5
G32	307	108	5.29931	0.08887	0.33621	0.00404	0.11435	0.00184	0.0	0.1	1869.6	57.4
G33	347	191	0.10768	0.00548	0.01708	0.00026	0.04574	0.00236	-4.9	-1091	109.2	3.3
G34	1015	586	0.09793	0.00318	0.01446	0.00019	0.04913	0.0016	2.5	39.8	92.6	2.4
G36	763	359	0.12683	0.00433	0.01765	0.00024	0.05213	0.0018	7.4	61.3	112.8	3.0
G37	201	142	0.11214	0.00762	0.01605	0.00029	0.05069	0.0035	5.2	54.8	102.6	3.7
G38	478	336	0.10671	0.00471	0.0156	0.00023	0.04963	0.00222	3.2	43.8	99.8	2.9
G39	352	227	0.11308	0.00586	0.01621	0.00026	0.05061	0.00266	4.9	53.5	103.7	3.2
G40	498	532	0.28124	0.0083	0.0386	0.0005	0.05285	0.00156	3.0	24.3	244.2	6.3
G41	573	239	0.2913	0.00782	0.03993	0.00051	0.05292	0.00142	2.9	22.4	252.4	6.3
G42	265	335	0.10518	0.00609	0.01507	0.00025	0.05063	0.00298	5.3	56.9	96.4	3.2
G43	1316	358	0.10204	0.00291	0.01499	0.00019	0.04937	0.00141	2.9	42.0	95.9	2.4
G44	317	148	0.10705	0.00566	0.01654	0.00026	0.04696	0.00252	-2.3	-125	105.7	3.3
G45	109	124	0.11537	0.01106	0.01745	0.00037	0.04796	0.00467	-0.5	-15.8	111.5	4.6
G46	503	419	0.12567	0.00499	0.01816	0.00026	0.05021	0.00202	3.6	43.4	116.0	3.2
G48	191	199	0.12983	0.00802	0.01836	0.00032	0.05131	0.00322	5.6	53.9	117.3	4.0
G49	564	320	0.10652	0.00422	0.01576	0.00022	0.04903	0.00196	2.0	32.5	100.8	2.8
G50	581	525	0.10724	0.00411	0.01575	0.00022	0.0494	0.00192	2.7	39.7	100.7	2.8
G52	409	169	0.11184	0.00506	0.01585	0.00024	0.05118	0.00235	6.2	59.3	101.4	3.0
G53	1271	517	0.102	0.00295	0.01479	0.00019	0.05004	0.00145	4.2	51.9	94.6	2.4
G54	121	64	0.09375	0.00924	0.01451	0.00031	0.04689	0.00469	-1.9	-114	92.8	3.9
G55	253	196	0.11132	0.00639	0.0157	0.00026	0.05145	0.003	6.8	61.5	100.4	3.3
G57	377	87	0.29813	0.00904	0.04209	0.00055	0.05138	0.00157	-0.3	-3.0	265.8	6.8
G58	1630	1610	0.23187	0.00497	0.03327	0.0004	0.05056	0.00107	0.3	4.5	211.0	5.0
G60	637	389	0.11485	0.00419	0.01604	0.00022	0.05193	0.00192	7.6	63.7	102.6	2.8
G61	343	127	0.10244	0.00528	0.01656	0.00025	0.04488	0.00234	-6.5	-1058	105.9	3.2
G62	195	177	0.10482	0.00713	0.016	0.00028	0.04751	0.00328	-1.2	-37.6	102.4	3.6
G64	59	45	0.01463	0.01019	0.00234	0.00016	0.04535	0.03175	-2.6	-1500	15.1	2.1
G65	300	99	5.41364	0.09556	0.34062	0.00407	0.1153	0.00198	-0.1	-0.3	1884.5	61.3
G67	168	166	0.10666	0.00805	0.01488	0.00028	0.05201	0.00399	8.1	66.7	95.2	3.6
G68	366	126	0.10757	0.00518	0.01515	0.00023	0.05152	0.00252	7.0	63.3	96.9	2.9
G69	95	125	0.52327	0.02282	0.06793	0.00102	0.05588	0.00248	0.8	5.3	423.7	12.3
G70	1410	457	0.09442	0.00273	0.01454	0.00019	0.04709	0.00136	-1.6	-73.7	93.1	2.4
G71	224	163	0.10729	0.00667	0.01545	0.00027	0.05039	0.00319	4.8	53.6	98.8	3.4
G72	575	237	0.26125	0.00732	0.03573	0.00046	0.05305	0.00149	4.2	31.6	226.3	5.7
G73	269	188	5.24318	0.09491	0.33605	0.00403	0.11319	0.002	-0.4	-0.9	1851.2	63.4
G74	556	336	0.11707	0.00452	0.01669	0.00023	0.05087	0.00199	5.3	54.6	106.7	3.0
G75	1015	410	0.10749	0.00335	0.01584	0.00021	0.04923	0.00154	2.4	36.1	101.3	2.6
G76	353	175	0.11087	0.00531	0.01608	0.00024	0.05002	0.00243	3.9	47.5	102.8	3.1
G78	179	105	0.11761	0.00818	0.01726	0.00031	0.04944	0.00349	2.4	34.6	110.3	3.9
G79	180	113	0.09982	0.0073	0.01476	0.00027	0.04905	0.00365	2.2	37.2	94.5	3.5
G80	202	118	0.13937	0.00796	0.01905	0.00032	0.05308	0.00309	9.0	63.4	121.6	4.0

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G81	571	396	0.11328	0.0044	0.01641	0.00023	0.05007	0.00197	3.9	47.1	104.9	2.9
G83	346	237	0.25361	0.00856	0.0359	0.00048	0.05125	0.00175	0.9	9.8	227.4	6.0
G84	84	119	0.24762	0.01664	0.03637	0.00064	0.04938	0.00337	-2.5	-38.7	230.3	8.0
G85	281	135	5.23441	0.09682	0.3361	0.00402	0.11298	0.00206	-0.5	-1.1	1847.9	65.1
G86	539	111	0.4608	0.01116	0.05932	0.00073	0.05635	0.00137	3.6	20.2	371.5	8.9
G87	520	529	0.11092	0.00449	0.01548	0.00022	0.05199	0.00213	7.9	65.2	99.0	2.8
G89	653	376	0.09644	0.00376	0.01504	0.00021	0.04653	0.00184	-2.8	-284	96.2	2.6
G90	146	92	0.11551	0.00868	0.01796	0.00033	0.04665	0.00356	-3.3	-266	114.8	4.2
G91	1089	307	0.0996	0.00312	0.0154	0.0002	0.04693	0.00148	-2.1	-116	98.5	2.5
G92	383	189	0.11663	0.00531	0.01622	0.00024	0.05216	0.00242	8.0	64.6	103.7	3.1
G93	575	148	0.10534	0.00412	0.01586	0.00022	0.04818	0.00191	0.3	6.3	101.4	2.8
G94	496	170	0.11045	0.00451	0.01585	0.00023	0.05055	0.0021	4.9	54.0	101.4	2.9
G95	343	173	0.11401	0.00541	0.01623	0.00025	0.05095	0.00246	5.6	56.5	103.8	3.1
G96	97	92	0.13291	0.01168	0.01808	0.00038	0.05332	0.00477	9.7	66.3	115.5	4.9
G98	202	155	0.3442	0.01284	0.04678	0.00065	0.05338	0.00202	1.9	14.6	294.7	8.0
G100	162	76	0.0979	0.0076	0.01493	0.00028	0.04759	0.00375	-0.7	-22.4	95.5	3.6
G101	114	46	0.10905	0.00992	0.01809	0.00036	0.04372	0.00404	-9.1	-1155	115.6	4.6
G102	508	239	0.11532	0.00467	0.0168	0.00024	0.04979	0.00205	3.2	41.9	107.4	3.0
G103	190	166	0.1074	0.00724	0.01503	0.00027	0.05185	0.00356	7.7	65.5	96.2	3.4
G104	392	329	0.11581	0.00522	0.01605	0.00024	0.05235	0.0024	8.5	65.9	102.6	3.0
G105	14	15	0.2532	0.05399	0.03614	0.00132	0.05082	0.01097	0.1	1.6	228.9	16.5
G106	177	126	1.2171	0.03176	0.13173	0.00168	0.06703	0.00176	1.3	4.9	797.7	19.1
G107	363	170	0.10804	0.00544	0.01611	0.00025	0.04866	0.00249	1.2	21.6	103.0	3.1
G108	357	184	0.10924	0.00546	0.01567	0.00024	0.05058	0.00257	5.1	54.8	100.2	3.1
G109	749	479	0.10962	0.00388	0.01629	0.00022	0.04881	0.00175	1.3	25.0	104.2	2.8
G110	247	258	0.09756	0.00647	0.01531	0.00026	0.04622	0.00312	-3.6	-965	98.0	3.3
G111	679	1002	0.09952	0.00392	0.01502	0.00021	0.04808	0.00192	0.2	6.9	96.1	2.6
G113	164	104	0.12551	0.0085	0.01788	0.00032	0.05093	0.00352	5.2	51.9	114.2	4.1
G114	159	105	0.13833	0.01291	0.01889	0.00041	0.05313	0.00505	9.1	63.9	120.6	5.2
G116	182	48	5.25164	0.10911	0.34156	0.00415	0.11155	0.00232	-1.8	-3.8	1824.7	74.6
G117	837	409	0.10675	0.00367	0.01614	0.00021	0.04798	0.00167	-0.2	-6.3	103.2	2.7
G121	1841	503	0.08884	0.00255	0.01321	0.00017	0.04881	0.00142	2.1	38.9	84.6	2.1
G122	168	91	0.14172	0.00894	0.01933	0.00034	0.05319	0.00343	9.1	63.4	123.4	4.3
G123	96	76	0.09982	0.01105	0.01421	0.00033	0.05097	0.00574	6.3	62.1	90.9	4.3
G124	720	472	0.13099	0.00451	0.01877	0.00025	0.05062	0.00177	4.3	46.4	119.9	3.2
G125	295	132	0.10351	0.00584	0.01541	0.00025	0.04872	0.0028	1.4	26.7	98.6	3.1
G126	320	93	0.2074	0.00841	0.02793	0.0004	0.05387	0.00223	7.8	51.4	177.6	5.0
G127	386	381	0.10134	0.00507	0.01534	0.00023	0.04794	0.00244	-0.1	-3.3	98.1	3.0
G130	349	182	1.08769	0.02613	0.12133	0.00149	0.06504	0.00158	1.2	4.8	738.2	17.1
G131	515	203	0.11754	0.0049	0.01665	0.00024	0.05123	0.00218	6.0	57.6	106.4	3.0
G132	237	173	0.21387	0.00955	0.03001	0.00044	0.05171	0.00235	3.3	30.1	190.6	5.5
G133	269	140	0.13018	0.00672	0.0192	0.0003	0.04918	0.00259	1.4	21.7	122.6	3.8
G135	497	252	0.11438	0.00486	0.01564	0.00023	0.05305	0.0023	9.9	69.7	100.1	2.9
G136	1639	1101	0.0888	0.00263	0.01341	0.00017	0.04803	0.00144	0.6	14.9	85.9	2.2
G137	256	218	3.91748	0.08535	0.28562	0.00346	0.09951	0.00219	-0.1	-0.3	1614.9	81.0
G138	453	81	5.1019	0.10655	0.31971	0.00382	0.11578	0.00244	2.7	5.5	1892.0	75.0
G139	833	340	0.10806	0.00385	0.01503	0.0002	0.05216	0.0019	8.3	67.1	96.2	2.6
G140	200	126	0.09456	0.00681	0.01549	0.00028	0.04429	0.00324	-7.5	-9900	99.1	3.5
G142	276	257	0.10619	0.00594	0.01549	0.00025	0.04975	0.00284	3.4	45.9	99.1	3.2
G143	367	270	0.42472	0.01272	0.05583	0.00072	0.05519	0.00168	2.6	16.6	350.2	8.8
G146	265	341	0.52164	0.0163	0.06972	0.00091	0.05429	0.00173	-1.9	-13.5	434.4	10.9
G147	433	181	0.10366	0.00477	0.01507	0.00022	0.04992	0.00234	3.9	49.6	96.4	2.8
G148	230	158	0.12239	0.00706	0.01907	0.00031	0.04656	0.00274	-3.8	-359	121.8	3.9
G150	201	231	0.11996	0.00751	0.01789	0.0003	0.04865	0.00311	0.6	12.7	114.3	3.8

River Q

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	433	140	0.57392	0.01279	0.07181	0.00086	0.05804	0.00129	3.0	15.8	447.1	10.3
G2	103	95	10.0653	0.16558	0.43448	0.00516	0.16825	0.00272	4.9	8.4	2540.3	53.6

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G3	248	155	0.12894	0.00692	0.01887	0.00029	0.04962	0.00271	2.2	32.0	120.5	3.7
G4	626	301	0.10396	0.00388	0.01551	0.00021	0.04867	0.00184	1.2	24.9	99.2	2.6
G5	1949	828	0.07974	0.00211	0.01212	0.00015	0.04779	0.00127	0.4	11.8	77.6	1.9
G10	448	232	0.11507	0.00476	0.0163	0.00023	0.05126	0.00216	6.0	58.7	104.3	2.9
G11	264	149	0.0908	0.00548	0.01487	0.00024	0.04435	0.00272	-7.2	-951	95.2	3.0
G12	560	148	0.35607	0.00847	0.04897	0.00059	0.05281	0.00126	0.4	3.8	308.2	7.2
G13	258	129	0.10324	0.00588	0.01543	0.00025	0.0486	0.00282	1.1	23.2	98.7	3.2
G15	153	120	0.27717	0.01273	0.0377	0.00056	0.05338	0.00249	4.1	30.9	238.6	7.0
G16	236	134	0.10332	0.00685	0.01496	0.00026	0.05015	0.00339	4.3	52.6	95.7	3.3
G17	598	210	0.13143	0.00455	0.01928	0.00025	0.0495	0.00174	1.9	28.2	123.1	3.2
G19	306	181	0.53992	0.01389	0.07001	0.00086	0.05601	0.00145	0.5	3.5	436.2	10.3
G21	635	277	0.53223	0.01085	0.06914	0.00081	0.0559	0.00113	0.5	3.8	431.0	9.7
G22	759	275	0.10784	0.00363	0.01591	0.00021	0.04923	0.00168	2.3	36.0	101.7	2.6
G23	376	207	0.10399	0.0049	0.01531	0.00023	0.04931	0.00236	2.4	39.7	98.0	2.9
G24	752	316	0.10663	0.00368	0.01559	0.0002	0.04966	0.00173	3.2	44.3	99.7	2.6
G26	613	236	0.09775	0.00374	0.01447	0.0002	0.04907	0.0019	2.3	38.7	92.6	2.5
G27	341	175	0.124	0.00562	0.01775	0.00026	0.05072	0.00234	4.7	50.3	113.4	3.3
G28	618	325	0.10716	0.00389	0.01539	0.00021	0.05055	0.00186	5.0	55.3	98.5	2.6
G31	829	292	0.09998	0.00337	0.01491	0.00019	0.04868	0.00166	1.5	28.0	95.4	2.5
G32	663	440	0.37453	0.00841	0.05048	0.0006	0.05388	0.00121	1.8	13.2	317.4	7.3
G33	192	213	0.27076	0.01134	0.03636	0.00052	0.05407	0.0023	5.7	38.4	230.2	6.5
G34	968	431	0.09611	0.0031	0.01469	0.00019	0.04752	0.00155	-0.9	-25.8	94.0	2.4
G37	183	82	0.27957	0.01181	0.03915	0.00056	0.05185	0.00223	1.1	11.3	247.5	6.9
G39	576	307	4.56843	0.06988	0.29409	0.00333	0.11279	0.00167	4.9	9.9	1844.9	53.2
G40	428	193	0.11254	0.00479	0.01599	0.00023	0.0511	0.00221	5.9	58.3	102.3	2.9
G42	345	395	0.26268	0.00856	0.03698	0.00048	0.05158	0.0017	1.2	12.2	234.1	6.0
G46	318	203	0.10319	0.00548	0.01607	0.00024	0.04661	0.00251	-3.0	-252	102.8	3.1
G48	1063	1003	0.09203	0.00289	0.01387	0.00018	0.04816	0.00152	0.7	17.2	88.8	2.2
G49	720	524	0.09365	0.00685	0.01416	0.00027	0.04802	0.00358	0.3	8.6	90.6	3.4
G51	261	160	0.11368	0.00634	0.01619	0.00026	0.05099	0.00289	5.6	56.9	103.5	3.3
G52	1097	758	0.10525	0.00311	0.01553	0.00019	0.0492	0.00147	2.2	36.8	99.4	2.5
G53	591	248	0.11282	0.00425	0.01558	0.00021	0.05256	0.00201	8.8	67.8	99.7	2.7
G54	638	457	0.10314	0.00393	0.01515	0.0002	0.04943	0.00191	2.9	42.4	96.9	2.6
G56	795	559	0.11161	0.00372	0.01623	0.00021	0.04992	0.00168	3.5	45.7	103.8	2.7
G57	413	326	0.10464	0.00485	0.01555	0.00023	0.04885	0.0023	1.6	29.3	99.5	2.9
G58	1195	816	0.09335	0.00284	0.014	0.00018	0.04841	0.00148	1.1	24.9	89.6	2.2
G59	626	200	0.10186	0.00388	0.01552	0.00021	0.04765	0.00184	-0.8	-22.4	99.3	2.6
G62	162	111	10.04577	0.16597	0.45737	0.00532	0.15946	0.00258	0.5	0.9	2449.9	54.3
G64	437	214	0.3617	0.00984	0.04806	0.0006	0.05463	0.0015	3.6	23.8	302.6	7.3
G65	648	318	0.12243	0.00435	0.0178	0.00024	0.04993	0.0018	3.1	40.6	113.8	3.0
G66	421	259	0.33599	0.00946	0.04636	0.00058	0.05262	0.00149	0.7	6.5	292.1	7.1
G67	516	289	0.10036	0.00425	0.0155	0.00022	0.04702	0.00202	-2.0	-98.6	99.1	2.7
G68	527	226	0.57476	0.01265	0.07348	0.00087	0.05678	0.00125	0.9	5.2	457.1	10.5
G69	284	188	0.10343	0.00587	0.01547	0.00024	0.04853	0.0028	0.9	21.1	99.0	3.1
G71	425	320	0.10838	0.00477	0.01558	0.00022	0.05051	0.00226	4.9	54.4	99.6	2.9
G72	1973	905	0.08347	0.00225	0.01241	0.00015	0.04882	0.00132	2.4	42.9	79.5	1.9
G73	726	389	0.10703	0.00382	0.015	0.0002	0.0518	0.00188	7.5	65.3	96.0	2.5
G75	758	231	0.12469	0.00404	0.01787	0.00023	0.05065	0.00166	4.5	49.2	114.2	2.9
G77	215	113	0.10399	0.00661	0.01563	0.00027	0.04831	0.00313	0.5	12.6	100.0	3.4
G78	52	20	0.59771	0.0327	0.07629	0.00126	0.05687	0.00317	0.4	2.4	474.0	15.1
G79	538	293	0.10564	0.00428	0.01536	0.00021	0.04994	0.00205	3.9	48.9	98.2	2.7
G80	1033	370	0.1004	0.00314	0.01512	0.00019	0.04819	0.00152	0.3	10.9	96.8	2.4
G82	704	400	0.11772	0.00405	0.01712	0.00022	0.04992	0.00174	3.3	42.8	109.4	2.8
G83	798	595	0.10639	0.0037	0.0153	0.0002	0.05048	0.00178	4.9	54.9	97.9	2.6
G84	275	129	0.11487	0.00624	0.01809	0.00028	0.0461	0.00255	-4.4	-3625	115.5	3.6
G85	601	376	0.09899	0.00396	0.01519	0.00021	0.04731	0.00192	-1.4	-50.9	97.2	2.6
G88	659	399	0.27336	0.00707	0.03946	0.00048	0.05028	0.00131	-1.6	-19.8	249.5	5.9
G89	321	184	0.09863	0.00533	0.01485	0.00023	0.04822	0.00265	0.5	13.6	95.0	3.0
G91	50	20	1.65663	0.05764	0.1719	0.00243	0.06995	0.00247	-3.0	-10.3	1022.6	26.7
G92	698	550	0.10956	0.00391	0.01561	0.00021	0.05095	0.00184	5.8	58.2	99.8	2.6
G93	427	199	0.09858	0.00465	0.01526	0.00022	0.04688	0.00224	-2.2	-127	97.6	2.8

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G94	218	101	0.11982	0.00738	0.01797	0.0003	0.0484	0.00303	0.1	3.5	114.8	3.7
G95	349	138	0.3167	0.00995	0.04346	0.00056	0.05289	0.00168	1.9	15.3	274.3	6.9
G98	378	155	0.10299	0.00517	0.01519	0.00023	0.04922	0.00251	2.4	38.6	97.2	2.9
G100	414	324	0.11079	0.00514	0.01663	0.00024	0.04835	0.00228	0.4	8.8	106.3	3.1
G101	986	58	4.95563	0.0845	0.31222	0.00356	0.1152	0.00193	3.4	7.0	1883.0	59.7
G102	1193	1296	0.09844	0.00303	0.01422	0.00018	0.05025	0.00156	4.7	56.0	91.0	2.3
G103	702	333	0.10606	0.00392	0.01594	0.00021	0.0483	0.00181	0.5	10.5	101.9	2.7
G104	704	454	0.0993	0.00379	0.01481	0.0002	0.04867	0.00188	1.4	28.1	94.8	2.5
G105	219	142	0.10008	0.0066	0.01556	0.00027	0.04668	0.00313	-2.7	- 206	99.5	3.4
G106	217	124	0.10386	0.00689	0.01579	0.00027	0.04772	0.00322	-0.7	-19.2	101.0	3.4
G108	445	169	0.61648	0.01481	0.07798	0.00094	0.05737	0.00138	0.7	4.2	484.1	11.3
G109	772	394	0.09767	0.00359	0.0151	0.0002	0.04695	0.00175	-2.1	- 109	96.6	2.5
G110	245	114	0.1295	0.00698	0.01869	0.0003	0.05028	0.00276	3.5	42.6	119.4	3.8
G112	329	234	0.1234	0.00602	0.01747	0.00026	0.05127	0.00254	5.8	55.9	111.6	3.3
G113	400	180	0.10038	0.00491	0.01535	0.00023	0.04746	0.00236	-1.1	-37.2	98.2	2.9
G115	362	344	5.07009	0.09358	0.3227	0.00375	0.11402	0.00208	1.6	3.3	1864.5	65.2
G118	638	309	4.84644	0.08786	0.30651	0.00353	0.11475	0.00205	4.0	8.1	1875.9	63.8
G119	740	321	0.10266	0.00379	0.01563	0.00021	0.04766	0.00178	-0.8	-22.5	100.0	2.6
G120	626	298	0.10158	0.00397	0.01529	0.00021	0.04822	0.00191	0.4	11.1	97.8	2.6
G122	194	124	0.1018	0.00691	0.01543	0.00027	0.04788	0.00331	-0.3	-6.8	98.7	3.4
G123	25894	-2	0.70838	0.03696	0.09024	0.00147	0.05696	0.00303	-2.4	-13.8	557.0	17.4
G125	285	125	0.1189	0.00609	0.01773	0.00027	0.04866	0.00254	0.7	13.7	113.3	3.5
G126	327	176	0.12527	0.0059	0.01784	0.00026	0.05097	0.00244	5.1	52.4	114.0	3.4
G127	456	258	0.10458	0.00456	0.01474	0.00021	0.05148	0.00228	7.1	64.0	94.3	2.7
G130	411	250	0.09916	0.0047	0.01481	0.00022	0.04858	0.00234	1.3	25.6	94.8	2.8
G131	482	259	3.02	0.05887	0.24284	0.00283	0.09024	0.00175	0.8	2.0	1430.6	73.0
G132	763	279	0.10456	0.00375	0.0154	0.0002	0.04928	0.00179	2.5	38.9	98.5	2.6
G133	597	322	0.10659	0.00427	0.01597	0.00022	0.04842	0.00197	0.6	14.7	102.2	2.8
G136	561	100	4.92441	0.09436	0.31167	0.00362	0.11465	0.00218	3.3	6.7	1874.4	67.8
G137	564	343	0.10616	0.00432	0.01569	0.00022	0.0491	0.00203	2.1	34.3	100.3	2.8
G138	1066	4233	0.22922	0.00581	0.03307	0.0004	0.0503	0.00128	0.0	-0.4	209.7	5.0
G139	502	201	0.11859	0.00478	0.01781	0.00025	0.04832	0.00198	0.0	0.9	113.8	3.1
G140	377	217	0.12286	0.00559	0.01784	0.00026	0.04998	0.00231	3.2	41.2	114.0	3.3
G141	754	329	0.10098	0.00375	0.01508	0.0002	0.04858	0.00183	1.2	24.3	96.5	2.6
G142	214	112	0.09431	0.00673	0.01492	0.00026	0.04586	0.00332	-4.2	- 954	95.5	3.3
G143	1181	529	0.0949	0.00305	0.01418	0.00018	0.04857	0.00158	1.5	28.8	90.7	2.3
G144	275	92	0.12658	0.00663	0.01865	0.00029	0.04925	0.00263	1.6	25.5	119.1	3.7
G145	265	182	0.26308	0.01001	0.03684	0.00051	0.05181	0.002	1.7	15.8	233.2	6.3
G146	419	222	0.11424	0.0052	0.01761	0.00025	0.04707	0.00218	-2.4	- 114	112.5	3.2
G147	1160	721	0.09729	0.0031	0.0148	0.00019	0.04768	0.00154	-0.4	-14.6	94.7	2.4
G148	337	137	10.19706	0.20063	0.45892	0.00537	0.16122	0.00315	0.7	1.4	2468.5	65.3
G149	335	208	0.50812	0.01433	0.06753	0.00084	0.0546	0.00155	-0.9	-6.4	421.2	10.2
G150	701	376	0.1051	0.00387	0.0148	0.0002	0.05151	0.00192	7.2	64.1	94.7	2.5

River R

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	762	371	0.10221	0.00388	0.01509	0.0002	0.04914	0.0019	2.3	37.4	96.6	2.6
G2	525	349	0.23886	0.00773	0.03457	0.00044	0.05013	0.00165	-0.7	-9.1	219.1	5.5
G3	213	87	0.55533	0.01829	0.07235	0.00095	0.05568	0.00187	-0.4	-2.5	450.3	11.4
G4	440	301	0.11702	0.00536	0.01741	0.00025	0.04876	0.00228	1.0	18.2	111.3	3.2
G5	149	98	0.10662	0.00863	0.01658	0.00032	0.04667	0.00385	-2.9	-230	106.0	4.1
G6	34	22	1.3061	0.06398	0.13202	0.0022	0.07177	0.0036	6.1	18.4	799.4	25.0
G7	302	127	0.11305	0.00622	0.01783	0.00028	0.04601	0.00258	-4.5	-1138	113.9	3.5
G8	458	153	0.11877	0.00533	0.01786	0.00026	0.04824	0.00221	-0.1	-2.9	114.1	3.2
G9	731	574	0.10085	0.00396	0.01506	0.00021	0.04858	0.00195	1.2	24.6	96.4	2.6
G10	294	160	0.54092	0.01677	0.07137	0.00091	0.05499	0.00174	-1.2	-7.9	444.4	11.0
G11	859	109	0.38824	0.01035	0.05021	0.00061	0.0561	0.00152	5.5	30.7	315.8	7.5
G12	481	42	5.17776	0.11397	0.32771	0.00387	0.11463	0.00256	1.2	2.5	1874.1	79.6
G13	203	200	0.26812	0.01204	0.03629	0.00053	0.0536	0.00246	5.0	35.1	229.8	6.6
G14	68	36	0.10028	0.01424	0.01572	0.00042	0.04629	0.00666	-3.5	-691	100.5	5.3
G15	302	42	4.65169	0.10619	0.29905	0.00358	0.11285	0.00262	4.3	8.6	1845.9	82.9
G16	311	451	0.98688	0.02673	0.11067	0.00137	0.0647	0.00179	3.0	11.5	676.6	15.9
G17	424	95	5.17374	0.116	0.32792	0.00389	0.11447	0.00261	1.1	2.3	1871.5	81.2
G18	472	232	0.1039	0.00487	0.01522	0.00022	0.04951	0.00237	3.1	43.5	97.4	2.8
G19	612	280	1.04383	0.02552	0.11362	0.00137	0.06665	0.00166	4.6	16.1	693.7	15.8
G20	254	117	0.19562	0.00885	0.02784	0.00041	0.05099	0.00236	2.5	26.3	177.0	5.1
G21	229	161	0.09337	0.00653	0.01454	0.00026	0.04659	0.00332	-2.7	-231	93.1	3.3
G22	267	138	0.26903	0.01101	0.0366	0.00052	0.05333	0.00223	4.4	32.4	231.7	6.4
G23	452	169	0.10927	0.00528	0.01513	0.00023	0.05239	0.00259	8.8	68.0	96.8	2.9
G24	755	549	0.10152	0.00397	0.01452	0.0002	0.05074	0.00203	5.7	59.4	92.9	2.5
G25	1976	2722	0.22864	0.00599	0.03255	0.00039	0.05097	0.00136	1.3	13.7	206.5	4.9
G26	524	403	0.09586	0.00466	0.01419	0.00021	0.04902	0.00243	2.3	39.1	90.8	2.7
G27	608	229	0.09974	0.0045	0.01485	0.00021	0.04873	0.00225	1.6	29.5	95.0	2.7
G28	316	78	5.13496	0.12296	0.32694	0.00394	0.11395	0.00279	1.0	2.1	1863.4	87.2
G29	702	376	0.09461	0.00401	0.0147	0.00021	0.04671	0.00203	-2.3	-174	94.0	2.6
G30	118	106	0.27193	0.01554	0.03615	0.0006	0.05458	0.00319	6.7	42.1	228.9	7.5
G31	276	102	0.11968	0.00669	0.01729	0.00028	0.05023	0.00287	3.9	46.3	110.5	3.5
G32	890	300	0.12256	0.0044	0.01801	0.00024	0.04937	0.00181	2.0	30.4	115.1	3.0
G33	179	69	0.1212	0.0083	0.0176	0.00031	0.04997	0.00349	3.3	41.9	112.5	4.0
G34	637	306	0.10646	0.00447	0.01498	0.00021	0.05158	0.00222	7.2	64.1	95.8	2.7
G35	482	84	5.31053	0.1301	0.3251	0.0039	0.11852	0.00298	3.1	6.2	1934.0	88.7
G36	856	368	0.10241	0.0039	0.01458	0.0002	0.05095	0.00199	6.1	60.9	93.3	2.5
G37	75	40	0.09839	0.01332	0.0159	0.00039	0.04489	0.00616	-6.3	-1016	101.7	5.0
G38	235	132	1.06835	0.03204	0.11969	0.00153	0.06476	0.002	1.2	4.9	728.8	17.6
G39	293	121	0.11878	0.00667	0.0178	0.00028	0.0484	0.00278	0.2	4.5	113.8	3.6
G40	410	147	0.10326	0.00526	0.01563	0.00024	0.04793	0.0025	-0.2	-5.5	100.0	3.0
G41	129	63	0.10536	0.0097	0.01659	0.00034	0.04609	0.00432	-4.1	-4718	106.0	4.3
G42	1459	1513	0.09526	0.00332	0.01378	0.00018	0.05014	0.0018	4.6	56.2	88.3	2.3
G43	487	203	0.13402	0.00588	0.01882	0.00027	0.05167	0.00233	6.2	55.6	120.2	3.4
G44	222	54	0.1064	0.00736	0.01559	0.00028	0.04951	0.0035	3.0	42.0	99.7	3.5
G45	491	287	0.10312	0.00493	0.01417	0.00021	0.05282	0.00259	9.9	71.7	90.7	2.7
G46	481	55	5.04142	0.12892	0.32177	0.0039	0.11368	0.003	1.6	3.3	1859.1	93.8
G47	350	195	0.09627	0.00564	0.01485	0.00024	0.04704	0.00282	-1.8	-85.9	95.0	3.0
G48	146	21	0.52271	0.0219	0.06858	0.00098	0.0553	0.00238	-0.1	-0.8	427.6	11.8
G49	441	201	0.37016	0.01251	0.05036	0.00066	0.05334	0.00186	1.0	7.7	316.7	8.1
G50	287	392	0.37335	0.01413	0.0506	0.00069	0.05353	0.00208	1.2	9.4	318.2	8.4
G51	466	171	0.10891	0.0052	0.0151	0.00022	0.05234	0.00256	8.7	67.8	96.6	2.9
G52	473	188	0.10427	0.00501	0.0151	0.00023	0.05011	0.00247	4.2	51.7	96.6	2.9
G53	714	371	0.26095	0.00849	0.03721	0.00048	0.05089	0.00171	0.0	0.1	235.5	5.9
G54	355	253	0.27338	0.01043	0.03569	0.00049	0.05558	0.00218	8.5	48.1	226.1	6.1
G55	553	480	0.10038	0.00465	0.015	0.00022	0.04854	0.00231	1.1	23.6	96.0	2.8
G56	2896	846	0.08806	0.00276	0.01304	0.00016	0.04899	0.00158	2.6	43.3	83.5	2.1
G57	693	372	0.10218	0.00429	0.01537	0.00021	0.04823	0.00208	0.5	11.3	98.3	2.7
G58	57	65	0.10171	0.01464	0.01503	0.00043	0.04911	0.00719	2.4	37.3	96.1	5.4
G59	330	123	0.12168	0.00637	0.01812	0.00028	0.04873	0.00262	0.8	14.2	115.7	3.5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G60	160	135	0.27065	0.01376	0.03632	0.00057	0.05407	0.00282	5.7	38.5	230.0	7.0
G61	541	236	0.11417	0.00512	0.01564	0.00023	0.05297	0.00244	9.8	69.5	100.0	2.9
G62	235	96	0.12764	0.00766	0.01882	0.00031	0.04922	0.00303	1.5	24.1	120.2	4.0
G63	658	454	0.3089	0.01026	0.04257	0.00055	0.05266	0.00181	1.7	14.4	268.7	6.8
G64	714	733	0.10601	0.00446	0.01494	0.00021	0.05149	0.00223	7.0	63.6	95.6	2.7
G65	389	284	0.19091	0.00808	0.0269	0.00038	0.05149	0.00225	3.7	34.9	171.1	4.8
G66	561	241	0.10394	0.00472	0.01472	0.00021	0.05122	0.00239	6.6	62.4	94.2	2.7
G67	556	216	0.26208	0.00931	0.0367	0.00048	0.05182	0.0019	1.7	16.3	232.3	6.0
G68	135	100	0.1145	0.0091	0.0157	0.00032	0.05292	0.00431	9.7	69.1	100.4	4.0
G69	333	6	0.25842	0.01057	0.0364	0.00051	0.05151	0.00217	1.3	12.6	230.5	6.3
G70	862	935	0.09854	0.00414	0.01488	0.00021	0.04806	0.00208	0.2	6.7	95.2	2.6
G71	339	122	0.12426	0.00666	0.01791	0.00028	0.05033	0.00277	3.8	45.6	114.5	3.6
G72	216	111	0.12211	0.00801	0.01753	0.00031	0.05055	0.0034	4.5	49.2	112.0	3.9
G73	419	69	0.3531	0.01304	0.04732	0.00064	0.05414	0.00207	3.0	20.9	298.1	7.8
G74	237	86	0.12649	0.008	0.01799	0.00031	0.05102	0.00331	5.2	52.5	114.9	3.9
G75	628	426	0.11361	0.00512	0.01721	0.00025	0.04791	0.00222	-0.6	-17.1	110.0	3.1
G76	140	98	0.27027	0.01519	0.03662	0.0006	0.05355	0.00309	4.7	34.1	231.9	7.5
G77	201	106	0.09754	0.00772	0.01418	0.00028	0.04991	0.00404	4.1	52.4	90.8	3.5
G78	1531	462	0.23365	0.00763	0.03225	0.00041	0.05257	0.00179	4.2	34.1	204.6	5.2
G79	847	601	0.31348	0.01066	0.03994	0.00052	0.05695	0.00201	9.7	48.3	252.5	6.5
G80	267	235	0.11154	0.00706	0.01576	0.00027	0.05135	0.00334	6.5	60.7	100.8	3.5
G81	1077	313	0.10126	0.00413	0.0155	0.00021	0.0474	0.002	-1.3	-44.0	99.2	2.7
G82	163	80	0.10667	0.00879	0.01603	0.00032	0.0483	0.00407	0.4	9.9	102.5	4.0
G83	550	424	0.36132	0.01292	0.04957	0.00066	0.05288	0.00196	0.4	3.7	311.9	8.1
G84	744	442	0.09932	0.00457	0.01458	0.00021	0.04944	0.00235	3.0	44.7	93.3	2.7
G85	204	83	0.12523	0.00873	0.01772	0.00032	0.05129	0.00367	5.8	55.4	113.2	4.1
G86	296	143	0.12166	0.0073	0.0177	0.0003	0.04988	0.00308	3.1	40.3	113.1	3.7
G87	1061	499	0.12009	0.00476	0.01642	0.00023	0.05306	0.00218	9.7	68.3	105.0	2.9
G88	743	89	0.50074	0.01665	0.06665	0.00086	0.05451	0.00189	-0.9	-6.0	416.0	10.4
G89	1167	886	0.10916	0.00436	0.01563	0.00021	0.05069	0.0021	5.2	55.8	100.0	2.7
G90	350	101	4.87789	0.14934	0.30598	0.00389	0.11568	0.00371	4.5	9.0	1890.4	113.4
G91	970	315	0.5747	0.01851	0.07348	0.00094	0.05675	0.00191	0.9	5.0	457.1	11.3
G92	747	391	0.10706	0.00484	0.01538	0.00022	0.05052	0.00236	5.0	55.0	98.4	2.8
G93	708	16	0.59465	0.01969	0.07553	0.00097	0.05713	0.00198	0.9	5.3	469.4	11.7
G94	563	207	0.10795	0.00522	0.01524	0.00023	0.05139	0.00257	6.8	62.3	97.5	2.9
G95	687	143	0.12542	0.00551	0.01764	0.00025	0.05159	0.00235	6.5	57.8	112.7	3.2

River S

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	55	42	11.1555	0.199	0.47998	0.00612	0.16866	0.00298	0.4	0.7	2544.4	58.6
G2	303	173	0.10348	0.00572	0.01486	0.00024	0.05055	0.00285	5.2	56.8	95.1	3.0
G3	240	150	0.10401	0.00582	0.0149	0.00024	0.05064	0.00288	5.3	57.5	95.4	3.0
G4	20347	8405	0.08674	0.00115	0.01239	0.00014	0.05081	0.00064	6.4	65.8	79.4	1.8
G6	535	211	0.24873	0.00636	0.03562	0.00043	0.05068	0.0013	0.0	0.2	225.6	5.4
G7	265	279	0.11194	0.00631	0.01541	0.00025	0.0527	0.00302	9.2	68.8	98.6	3.2
G8	424	181	0.10117	0.00431	0.01489	0.00021	0.04929	0.00213	2.7	41.1	95.3	2.7
G9	180	129	0.1072	0.00699	0.01555	0.00027	0.05002	0.00332	3.9	49.2	99.5	3.4
G11	740	470	0.53026	0.00935	0.06841	0.00079	0.05625	0.00097	1.3	7.5	426.6	9.5
G13	365	464	0.10539	0.00474	0.01522	0.00022	0.05025	0.0023	4.4	52.8	97.4	2.8
G14	1365	748	0.08277	0.00228	0.01256	0.00015	0.04781	0.00132	0.2	9.4	80.5	2.0
G15	165	142	0.13478	0.0084	0.01882	0.00032	0.05198	0.0033	6.8	57.8	120.2	4.1
G16	224	174	0.10109	0.00605	0.01545	0.00025	0.04747	0.00289	-1.1	-37.0	98.9	3.2
G17	647	165	0.5939	0.01059	0.07633	0.00088	0.05646	0.00099	-0.2	-0.9	474.2	10.5
G18	98	74	0.11519	0.00987	0.01684	0.00034	0.04964	0.00433	2.8	39.5	107.7	4.3
G21	317	93	0.30785	0.00893	0.04126	0.00052	0.05415	0.00158	4.6	30.9	260.6	6.5
G22	397	275	0.09583	0.00431	0.01496	0.00021	0.04648	0.00212	-2.9	-325	95.7	2.7
G24	405	176	0.10222	0.00441	0.01532	0.00022	0.04841	0.00212	0.8	18.0	98.0	2.8
G25	264	170	0.10199	0.00617	0.01528	0.00026	0.04844	0.00298	0.8	19.0	97.8	3.3
G26	38	38	4.18065	0.10074	0.28584	0.00382	0.10614	0.00258	3.1	6.5	1734.1	87.8

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G27	186	173	0.09923	0.00665	0.01499	0.00026	0.04803	0.00327	0.2	4.7	95.9	3.3
G28	96	68	0.09929	0.00957	0.01502	0.00033	0.04798	0.0047	0.0	0.8	96.1	4.2
G29	101	82	0.09914	0.01062	0.01439	0.00034	0.04999	0.00545	4.2	52.6	92.1	4.3
G30	515	315	0.10636	0.00432	0.01511	0.00021	0.05107	0.0021	6.1	60.4	96.7	2.7
G31	164	160	0.10582	0.00719	0.01495	0.00027	0.05136	0.00356	6.7	62.8	95.7	3.4
G32	234	102	5.09308	0.07165	0.31695	0.00363	0.11661	0.00157	3.4	6.8	1904.9	48.0
G33	73	78	0.40214	0.02056	0.05084	0.00082	0.0574	0.00299	7.4	36.9	319.7	10.0
G34	1216	507	0.0847	0.00342	0.0124	0.00017	0.04958	0.00203	4.0	54.7	79.4	2.2
G36	563	66	0.43463	0.01056	0.05414	0.00066	0.05826	0.00142	7.8	36.9	339.9	8.1
G37	148	106	0.10927	0.00756	0.01568	0.00029	0.05056	0.00357	5.0	54.6	100.3	3.7
G38	128	120	4.7357	0.07645	0.30105	0.00355	0.11415	0.0018	4.5	9.1	1866.5	56.4
G39	162	183	0.09696	0.0083	0.01572	0.00031	0.04475	0.00389	-6.6	-1005	100.6	3.9
G40	138	98	0.10879	0.00963	0.01551	0.00034	0.05089	0.0046	5.7	58.0	99.2	4.3
G41	219	190	0.10205	0.00612	0.01541	0.00025	0.04807	0.00293	0.1	4.1	98.6	3.2
G42	148	122	0.10248	0.00761	0.01581	0.00029	0.04703	0.00356	-2.0	-101	101.1	3.7
G43	234	245	0.2593	0.00953	0.03675	0.0005	0.0512	0.00191	0.6	6.8	232.7	6.2
G44	264	97	0.11946	0.00606	0.01725	0.00027	0.05026	0.00259	4.0	46.8	110.2	3.4
G45	248	108	0.1195	0.00635	0.01839	0.00028	0.04715	0.00254	-2.5	-108	117.5	3.6
G46	518	251	0.1012	0.00393	0.01543	0.00021	0.04759	0.00187	-0.8	-26.2	98.7	2.7
G47	153	111	0.10584	0.00775	0.01569	0.00029	0.04895	0.00365	1.8	30.9	100.4	3.7
G48	215	185	0.1034	0.00622	0.01535	0.00025	0.04888	0.00299	1.7	30.8	98.2	3.2
G49	986	568	0.09086	0.00278	0.01387	0.00018	0.04753	0.00147	-0.6	-17.9	88.8	2.2
G50	324	78	4.99484	0.06726	0.31557	0.00358	0.11486	0.00147	2.8	5.8	1877.7	45.7
G52	680	438	0.09789	0.00341	0.0149	0.0002	0.04768	0.00168	-0.5	-15.7	95.3	2.5
G53	24	17	0.0858	0.02872	0.01338	0.00076	0.04653	0.01579	-2.5	-238	85.7	9.7
G57	267	305	0.1038	0.00651	0.01579	0.00027	0.0477	0.00304	-0.7	-20.7	101.0	3.4
G58	141	90	0.106	0.0079	0.01597	0.0003	0.04815	0.00365	0.1	4.4	102.2	3.8
G60	104	77	0.10256	0.01105	0.01533	0.00038	0.04856	0.00533	1.1	22.7	98.0	4.8
G63	170	104	0.11013	0.00836	0.01518	0.0003	0.05263	0.00408	9.3	69.0	97.1	3.8
G64	210	189	0.10577	0.00631	0.0153	0.00025	0.05016	0.00305	4.3	51.7	97.9	3.2
G67	95	54	0.10573	0.01016	0.01566	0.00034	0.04899	0.00478	1.9	32.0	100.2	4.3
G69	304	185	0.1024	0.0051	0.01495	0.00023	0.0497	0.00252	3.4	47.1	95.7	2.9
G70	110	79	0.09655	0.00904	0.01545	0.00032	0.04536	0.00431	-5.3	-987	98.8	4.0
G72	33	42	1.16598	0.05268	0.12623	0.00201	0.06703	0.00309	2.4	8.6	766.3	23.0
G74	262	248	0.10265	0.00558	0.01502	0.00024	0.0496	0.00274	3.2	45.5	96.1	3.0
G75	167	161	0.10821	0.00722	0.01574	0.00028	0.04989	0.00339	3.6	46.9	100.7	3.6
G76	189	171	0.53357	0.01534	0.06888	0.00088	0.05621	0.00163	1.1	6.7	429.4	10.6
G77	157	121	0.10737	0.00757	0.01594	0.00029	0.04889	0.00351	1.7	28.6	101.9	3.6
G78	126	116	0.11185	0.00972	0.01541	0.00034	0.05268	0.00467	9.2	68.7	98.6	4.3
G79	157	119	0.10214	0.00736	0.01576	0.00028	0.04704	0.00345	-2.0	-98.4	100.8	3.6
G80	235	240	0.09574	0.00572	0.01497	0.00024	0.04642	0.00282	-3.1	-396	95.8	3.1
G82	171	159	0.08735	0.00659	0.01387	0.00026	0.04569	0.0035	-4.3	-887	88.8	3.2
G83	261	161	0.10925	0.00685	0.01594	0.00028	0.04973	0.00318	3.2	44.0	102.0	3.5
G85	157	107	0.10107	0.00787	0.01558	0.0003	0.04709	0.00373	-1.8	-87.2	99.6	3.8
G88	648	476	0.10215	0.00357	0.01549	0.0002	0.04786	0.00169	-0.3	-8.3	99.1	2.6
G89	285	258	0.10831	0.007	0.01511	0.00027	0.05202	0.00343	8.0	66.2	96.7	3.4
G91	564	361	0.10234	0.00474	0.01497	0.00022	0.04962	0.00234	3.2	46.0	95.8	2.8
G92	109	114	1.07472	0.0363	0.11697	0.00163	0.06667	0.00229	3.9	13.8	713.1	18.8
G93	238	331	0.10271	0.00588	0.01568	0.00025	0.04754	0.00277	-1.0	-32.5	100.3	3.2
G94	125	121	0.26292	0.01336	0.03692	0.00058	0.05168	0.00267	1.4	13.9	233.7	7.2
G95	134	152	0.27774	0.01279	0.03888	0.00058	0.05184	0.00243	1.2	11.7	245.9	7.2
G97	135	125	0.09955	0.00795	0.01546	0.0003	0.04673	0.0038	-2.5	-178	98.9	3.8
G98	179	126	0.1037	0.00687	0.01509	0.00027	0.04987	0.00336	3.8	49.0	96.5	3.4
G99	864	556	0.10047	0.00309	0.01482	0.00019	0.04921	0.00153	2.5	39.9	94.8	2.4
G101	154	135	0.10309	0.00771	0.0153	0.00028	0.0489	0.00372	1.7	31.6	97.9	3.6
G102	381	119	5.02846	0.0668	0.31959	0.00361	0.11418	0.00144	2.0	4.2	1867.0	45.0
G103	177	121	0.10408	0.00714	0.01618	0.00028	0.04669	0.00326	-2.8	-211	103.4	3.6
G104	209	156	0.10588	0.00651	0.01601	0.00027	0.04798	0.003	-0.2	-5.5	102.4	3.4
G105	267	226	0.54338	0.01362	0.07076	0.00087	0.05573	0.0014	0.0	0.1	440.7	10.5
G108	816	89	4.985	0.06386	0.31474	0.00353	0.11494	0.00138	3.0	6.1	1878.9	43.0
G110	107	83	0.10997	0.0096	0.01575	0.00032	0.05066	0.0045	5.1	55.3	100.8	4.1

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G111	135	101	0.09882	0.008	0.01525	0.00029	0.04704	0.00387	-1.8	-91.9	97.5	3.7
G112	473	138	5.14393	0.06683	0.32367	0.00364	0.11533	0.00141	2.0	4.1	1885.0	43.7
G113	150	116	0.10505	0.00756	0.01633	0.0003	0.04668	0.00342	-2.9	-219	104.4	3.8
G114	122	83	0.09963	0.00869	0.01523	0.00031	0.04746	0.00421	-1.1	-36.2	97.5	3.9
G115	595	171	5.11795	0.06532	0.32116	0.0036	0.11564	0.00138	2.4	5.0	1889.9	42.8
G116	75	51	0.10166	0.01183	0.01588	0.00038	0.04647	0.00549	-3.2	-359	101.5	4.8
G117	377	487	0.10757	0.00476	0.01567	0.00023	0.04982	0.00224	3.5	46.3	100.2	2.9
G118	145	172	0.09656	0.00905	0.01553	0.00034	0.04512	0.00431	-5.8	-9930	99.4	4.3
G120	132	76	0.10766	0.01024	0.01561	0.00035	0.05005	0.00485	4.0	49.4	99.8	4.4
G121	281	135	5.17236	0.07084	0.32715	0.00372	0.11473	0.0015	1.3	2.7	1875.7	46.6
G122	318	394	5.11048	0.07017	0.32313	0.00368	0.11477	0.0015	1.8	3.8	1876.3	46.8
G123	536	359	7.70647	0.09635	0.4061	0.00455	0.13771	0.00161	0.0	0.1	2198.6	40.3
G124	519	327	0.1057	0.00408	0.01603	0.00022	0.04786	0.00187	-0.5	-12.5	102.5	2.8
G125	171	140	0.10282	0.00844	0.01577	0.00032	0.04732	0.00396	-1.4	-55.1	100.8	4.1
G126	181	216	4.68805	0.07058	0.30336	0.00352	0.11214	0.00163	3.3	6.9	1834.4	52.3
G127	128	89	0.10576	0.00841	0.01567	0.00031	0.04899	0.00396	1.9	31.9	100.2	3.9
G128	548	300	0.10336	0.00388	0.01538	0.00021	0.04877	0.00186	1.5	28.0	98.4	2.6
G129	276	242	5.76361	0.07803	0.34815	0.00396	0.12014	0.00154	0.8	1.7	1958.2	45.5
G130	128	83	0.1127	0.0085	0.01577	0.00031	0.05185	0.00399	7.4	63.8	100.9	3.9
G131	124	89	0.10764	0.0087	0.01577	0.00031	0.04954	0.00408	3.0	42.0	100.8	4.0
G133	235	141	0.14	0.00686	0.0195	0.0003	0.05209	0.0026	6.8	57.0	124.5	3.8
G134	529	467	0.10301	0.00396	0.01568	0.00021	0.04766	0.00186	-0.7	-22.8	100.3	2.7
G137	149	109	0.09325	0.01017	0.01484	0.00037	0.0456	0.00507	-4.7	-9490	95.0	4.7
G140	318	365	0.1065	0.00541	0.01542	0.00024	0.05013	0.00259	4.3	51.0	98.6	3.0
G141	325	185	0.09907	0.00489	0.01526	0.00023	0.04711	0.00236	-1.7	-80.1	97.6	2.9
G142	227	162	0.11234	0.00626	0.01548	0.00025	0.05267	0.00299	9.2	68.5	99.0	3.2
G143	237	117	0.10228	0.0061	0.01509	0.00025	0.04917	0.00298	2.4	38.1	96.6	3.1
G144	527	247	0.10283	0.00477	0.01487	0.00022	0.05018	0.00237	4.4	53.2	95.2	2.8
G145	416	150	0.10969	0.00599	0.01614	0.00026	0.04932	0.00274	2.4	36.8	103.2	3.3
G146	356	110	5.16411	0.06993	0.32684	0.00371	0.11466	0.00147	1.3	2.7	1874.5	46.0
G147	325	238	0.10541	0.00514	0.01607	0.00024	0.04759	0.00236	-1.0	-31.1	102.8	3.0
G148	401	155	5.27871	0.07449	0.33403	0.00383	0.11468	0.00155	0.4	0.9	1874.9	48.3
G149	136	93	0.10364	0.00826	0.01589	0.0003	0.04734	0.00384	-1.5	-53.9	101.6	3.8
G150	289	182	0.43471	0.01407	0.05745	0.00076	0.05491	0.0018	1.8	11.8	360.1	9.2

River T

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	163	124	13.10502	0.18356	0.54168	0.00638	0.17555	0.00232	-3.7	-6.9	2611.2	43.6
G2	1038	809	0.10891	0.00342	0.01596	0.00021	0.04953	0.00156	2.8	40.9	102.1	2.6
G3	276	175	0.0899	0.00615	0.01392	0.00024	0.04687	0.00326	-1.9	-109	89.1	3.1
G4	86	111	0.42247	0.03452	0.05729	0.00123	0.05351	0.00446	-0.4	-2.5	359.1	15.0
G5	454	324	0.13977	0.0084	0.01984	0.00034	0.05112	0.00313	4.9	48.6	126.6	4.4
G6	718	607	0.11161	0.00421	0.01666	0.00023	0.04862	0.00185	0.8	17.8	106.5	2.9
G7	363	625	6.14666	0.087	0.36466	0.00425	0.12231	0.00163	-0.4	-0.7	1990.1	47.1
G8	569	339	0.1144	0.00463	0.01584	0.00023	0.05239	0.00215	8.6	66.5	101.3	2.9
G9	551	290	0.1006	0.00443	0.01546	0.00022	0.0472	0.00211	-1.6	-67.6	98.9	2.8
G10	822	1006	0.1047	0.0038	0.01596	0.00022	0.04759	0.00174	-1.0	-30.6	102.1	2.7
G11	449	202	0.11024	0.00517	0.01643	0.00025	0.04868	0.00232	1.0	20.7	105.1	3.1
G12	1630	1022	0.08215	0.00245	0.01228	0.00016	0.04854	0.00146	1.9	37.4	78.7	2.0
G13	340	277	0.10108	0.00572	0.01576	0.00025	0.04654	0.00267	-3.0	-292	100.8	3.2
G14	136	121	0.55903	0.02155	0.07364	0.00104	0.05508	0.00215	-1.6	-10.3	458.1	12.5
G15	471	195	1.75579	0.02855	0.16919	0.00198	0.0753	0.00118	2.2	6.4	1007.6	21.9
G16	1697	31	0.55219	0.00872	0.07092	0.00082	0.0565	0.00085	1.1	6.3	441.7	9.9
G17	535	251	0.10718	0.0046	0.01634	0.00023	0.0476	0.00207	-1.1	-33.1	104.5	3.0
G18	426	208	0.12378	0.00925	0.01727	0.00034	0.05202	0.00397	7.3	61.4	110.4	4.4
G19	621	216	0.10663	0.00703	0.01514	0.00028	0.05111	0.00344	6.2	60.6	96.9	3.5
G20	587	262	0.11303	0.00461	0.01605	0.00023	0.05109	0.00211	5.8	58.0	102.7	2.9
G21	497	336	0.10383	0.00479	0.01597	0.00024	0.04718	0.00221	-1.8	-76.9	102.1	3.0

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G22	634	352	0.11839	0.00461	0.0162	0.00023	0.05304	0.00209	9.7	68.6	103.6	2.9
G23	131	135	1.27608	0.03475	0.14261	0.00186	0.06493	0.00178	-2.8	-11.3	859.4	21.0
G24	1092	657	0.10653	0.00333	0.01588	0.00021	0.04869	0.00153	1.3	23.6	101.5	2.6
G25	752	458	0.28698	0.00694	0.03948	0.00049	0.05274	0.00127	2.6	21.5	249.6	6.0
G26	1046	828	0.10463	0.00336	0.0158	0.00021	0.04804	0.00155	-0.1	0.3	101.1	2.6
G27	674	349	0.11093	0.00428	0.01617	0.00022	0.04978	0.00195	3.3	44.0	103.4	2.8
G28	713	536	0.10847	0.00414	0.01614	0.00022	0.04877	0.00188	1.4	24.5	103.2	2.8
G29	571	322	0.10605	0.00452	0.01554	0.00022	0.04951	0.00214	2.9	42.3	99.4	2.8
G30	468	292	0.10958	0.00509	0.01545	0.00023	0.05145	0.00243	6.8	62.1	98.9	3.0
G31	1944	980	0.40244	0.00831	0.05343	0.00064	0.05465	0.00111	2.4	15.7	335.5	7.8
G32	731	320	0.09887	0.00392	0.01561	0.00022	0.04596	0.00184	-4.1	-997	99.8	2.7
G33	1006	682	0.09596	0.00422	0.01366	0.0002	0.05096	0.00227	6.3	63.4	87.5	2.6
G34	3728	4792	0.08943	0.00295	0.01321	0.00017	0.04912	0.00163	2.8	44.9	84.6	2.2
G35	954	512	0.10872	0.0037	0.01605	0.00021	0.04914	0.00169	2.0	33.5	102.7	2.7
G36	1002	701	0.08889	0.00317	0.01356	0.00018	0.04757	0.00171	-0.3	-12.7	86.8	2.3
G37	670	357	0.10753	0.00424	0.01615	0.00022	0.04831	0.00193	0.4	9.6	103.3	2.8
G38	182	89	5.58813	0.08845	0.3542	0.00423	0.11448	0.00174	-2.1	-4.4	1871.7	54.4
G39	291	186	0.10875	0.00646	0.01657	0.00027	0.04761	0.00288	-1.1	-34.0	106.0	3.5
G40	680	440	0.10528	0.00426	0.01591	0.00022	0.04802	0.00197	-0.1	-2.6	101.7	2.8
G41	509	314	0.10408	0.0056	0.01562	0.00025	0.04834	0.00265	0.6	13.7	99.9	3.2
G42	557	209	0.11448	0.00578	0.01624	0.00026	0.05116	0.00263	6.1	58.1	103.8	3.2
G43	904	136	0.0913	0.00343	0.01386	0.00019	0.0478	0.00182	0.0	-0.2	88.7	2.4
G44	433	259	0.10109	0.00517	0.01559	0.00024	0.04704	0.00244	-1.9	-95.1	99.7	3.0
G45	487	340	0.11468	0.0053	0.01689	0.00025	0.04928	0.00231	2.1	33.0	107.9	3.2
G46	665	322	0.10528	0.00548	0.01551	0.00025	0.04925	0.00261	2.4	37.8	99.2	3.1
G47	742	365	0.1047	0.00406	0.01565	0.00022	0.04854	0.0019	1.0	20.5	100.1	2.7
G48	156	95	0.08526	0.00869	0.01348	0.0003	0.0459	0.00475	-3.7	-862	86.3	3.8
G49	858	555	0.10937	0.00389	0.01637	0.00022	0.04847	0.00174	0.7	14.3	104.7	2.8
G50	440	246	0.10456	0.00523	0.01612	0.00025	0.04706	0.00239	-2.0	-97.9	103.1	3.1
G51	3761	1563	0.09677	0.00201	0.01383	0.00016	0.05077	0.00104	6.0	61.6	88.5	2.1
G52	256	72	0.55443	0.01661	0.0717	0.00094	0.05611	0.00169	0.3	2.1	446.4	11.3
G53	325	260	0.1102	0.00633	0.01573	0.00026	0.05083	0.00297	5.6	56.8	100.6	3.3
G54	699	267	0.1091	0.00429	0.01586	0.00022	0.04991	0.00199	3.6	46.8	101.4	2.8
G55	1091	606	0.10671	0.00347	0.01599	0.00021	0.04843	0.00158	0.7	14.8	102.3	2.6
G56	561	353	0.11106	0.00481	0.01596	0.00023	0.0505	0.00222	4.7	53.1	102.1	2.9
G57	115	107	0.10988	0.01944	0.0162	0.00062	0.0492	0.00888	2.2	34.2	103.6	7.9
G58	269	91	5.40768	0.08049	0.3411	0.00401	0.11503	0.00163	-0.3	-0.6	1880.4	50.6
G59	231	65	0.5765	0.02074	0.07622	0.00106	0.05488	0.002	-2.4	-16.2	473.5	12.7
G60	528	97	0.26587	0.01043	0.03815	0.00054	0.05057	0.00201	-0.8	-9.1	241.4	6.7
G61	100	93	0.12765	0.01367	0.01746	0.00042	0.05304	0.00578	9.3	66.2	111.6	5.3
G62	46	56	0.09411	0.02152	0.01526	0.00061	0.04475	0.01037	-6.5	-975	97.6	7.7
G63	500	134	5.4032	0.07429	0.33559	0.00388	0.11682	0.00151	1.1	2.2	1908.2	45.9
G64	406	332	0.10941	0.00569	0.01625	0.00025	0.04885	0.00258	1.4	26.0	103.9	3.2
G65	31320	22245	0.08487	0.00117	0.01286	0.00015	0.04789	0.00062	0.4	11.4	82.4	1.9
G66	577	391	0.10132	0.00462	0.01567	0.00023	0.04691	0.00217	-2.2	-124	100.2	2.9
G67	511	280	0.32364	0.00904	0.0443	0.00056	0.05301	0.00149	1.9	15.0	279.5	7.0
G68	1023	809	0.101	0.00349	0.01482	0.0002	0.04946	0.00172	3.1	44.2	94.8	2.5
G69	13883	5787	0.0865	0.00132	0.01271	0.00015	0.04938	0.00072	3.4	51.0	81.4	1.9
G70	680	453	0.10185	0.00413	0.01548	0.00022	0.04773	0.00196	-0.5	-16.2	99.0	2.8
G71	568	226	0.10444	0.00484	0.0156	0.00023	0.04857	0.00228	1.1	21.4	99.8	2.9
G72	501	380	0.0969	0.00479	0.01352	0.00021	0.052	0.00261	8.4	69.6	86.6	2.7
G73	91	69	0.10629	0.01547	0.01526	0.00048	0.05053	0.0075	5.1	55.6	97.6	6.1
G74	328	101	5.61581	0.08702	0.35722	0.00424	0.11407	0.00169	-2.6	-5.6	1865.3	53.2
G75	460	355	0.10666	0.00534	0.0161	0.00025	0.04808	0.00244	0.0	0.1	102.9	3.1
G76	1515	986	0.10997	0.00314	0.01595	0.0002	0.05004	0.00144	3.8	48.2	102.0	2.6
G77	375	275	0.08527	0.0071	0.013	0.00027	0.04758	0.00404	-0.2	-7.3	83.3	3.4
G78	380	268	5.69322	0.08035	0.34796	0.00405	0.11872	0.00158	0.3	0.6	1937.1	47.2
G79	1263	778	0.08421	0.00285	0.0129	0.00017	0.04735	0.00161	-0.7	-24.5	82.7	2.2
G80	498	309	0.11312	0.00523	0.01624	0.00024	0.05053	0.00237	4.7	52.6	103.9	3.1
G81	303	191	0.08672	0.00587	0.0135	0.00024	0.0466	0.00321	-2.4	-201	86.5	3.0
G82	595	345	0.10866	0.00458	0.01557	0.00022	0.05065	0.00217	5.1	55.7	99.6	2.8

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G83	177	130	0.09257	0.00803	0.01418	0.00029	0.04736	0.00418	-1.0	-36.3	90.8	3.7
G84	505	311	0.5358	0.01226	0.06958	0.00085	0.05588	0.00127	0.5	3.0	433.6	10.3
G85	2314	1626	0.08611	0.00247	0.01219	0.00016	0.05124	0.00147	7.4	69.0	78.1	2.0
G86	244	177	0.48024	0.01523	0.06116	0.00082	0.05698	0.00182	4.1	21.9	382.7	9.9
G87	419	310	8.48363	0.13387	0.41488	0.00503	0.14837	0.00226	2.1	3.9	2327.2	51.7
G88	853	581	0.11201	0.00406	0.01598	0.00022	0.05086	0.00187	5.5	56.4	102.2	2.8
G89	539	267	0.10303	0.00477	0.01564	0.00023	0.04781	0.00224	-0.4	-12.5	100.0	2.9
G90	439	109	5.585	0.078	0.35063	0.00407	0.11558	0.00152	-1.2	-2.6	1888.9	46.9
G91	325	244	0.10682	0.00649	0.01651	0.00027	0.04695	0.0029	-2.4	-128	105.6	3.5
G92	1597	814	0.09676	0.00282	0.01452	0.00018	0.04836	0.00142	1.0	20.7	92.9	2.3
G93	173	222	5.412	0.08887	0.33657	0.00406	0.11668	0.00186	0.9	1.9	1905.9	56.6
G94	698	326	0.10342	0.00422	0.01572	0.00022	0.04775	0.00197	-0.6	-17.1	100.5	2.8
G95	600	297	0.10496	0.0053	0.01554	0.00024	0.04902	0.00251	1.9	33.2	99.4	3.1
G96	488	245	7.17608	0.10877	0.38552	0.00459	0.13506	0.00196	1.5	2.9	2164.8	50.2
G97	132	118	0.27601	0.01612	0.04033	0.00067	0.04965	0.00295	-2.9	-42.6	254.9	8.3
G98	336	180	0.10856	0.00776	0.01586	0.0003	0.04967	0.00362	3.2	43.5	101.4	3.8
G99	123	68	0.09378	0.01156	0.01337	0.00038	0.0509	0.0064	6.3	63.8	85.6	4.8
G100	1186	616	0.10762	0.00338	0.01556	0.0002	0.05017	0.00159	4.2	50.9	99.6	2.6
G101	536	298	0.11246	0.005	0.01645	0.00024	0.04962	0.00224	2.9	40.6	105.2	3.1
G102	517	316	0.10535	0.005	0.01584	0.00024	0.04827	0.00233	0.4	10.0	101.3	3.0
G103	828	516	0.10779	0.00393	0.0157	0.00021	0.04982	0.00184	3.5	46.1	100.4	2.7
G104	374	185	0.09474	0.01137	0.01435	0.0004	0.04791	0.00587	0.1	2.2	91.8	5.1
G105	301	220	0.09393	0.00618	0.0135	0.00024	0.05049	0.00338	5.6	60.3	86.4	3.1
G106	709	409	0.10574	0.00418	0.01592	0.00022	0.04819	0.00193	0.3	6.3	101.8	2.8
G107	497	281	0.11972	0.0058	0.01722	0.00026	0.05044	0.00248	4.3	48.9	110.1	3.3
G108	785	426	0.09109	0.0059	0.01348	0.00024	0.04903	0.00324	2.5	42.2	86.3	3.1
G109	548	426	0.11834	0.00499	0.01656	0.00024	0.05185	0.00222	7.3	62.0	105.9	3.0
G110	830	388	0.10195	0.00377	0.01565	0.00021	0.04728	0.00177	-1.5	-59.4	100.1	2.7
G111	171	129	0.56571	0.02001	0.07416	0.00102	0.05535	0.00198	-1.3	-8.3	461.2	12.2
G112	856	308	0.10909	0.00391	0.01604	0.00022	0.04935	0.00178	2.4	37.6	102.6	2.7
G113	304	243	0.10363	0.00656	0.01509	0.00026	0.04984	0.00321	3.7	48.5	96.5	3.3
G114	192	160	0.09463	0.00781	0.01358	0.00028	0.05054	0.00425	5.5	60.5	87.0	3.5
G115	905	566	0.28328	0.00668	0.03996	0.00049	0.05144	0.00121	0.3	3.1	252.6	6.0
G116	1186	699	0.11086	0.00343	0.01597	0.00021	0.05037	0.00157	4.6	51.9	102.1	2.6
G117	355	295	0.11328	0.00618	0.0164	0.00026	0.05012	0.00278	3.9	47.7	104.9	3.4
G118	984	459	0.10521	0.00369	0.01588	0.00021	0.04808	0.0017	0.0	1.6	101.6	2.7
G119	486	175	0.10823	0.00516	0.01607	0.00024	0.04888	0.00236	1.6	27.7	102.7	3.1
G120	628	150	0.12421	0.00824	0.01841	0.00034	0.04896	0.00331	1.1	19.5	117.6	4.2
G121	583	521	0.10792	0.0047	0.01591	0.00023	0.04922	0.00217	2.4	35.8	101.7	2.9
G122	273	230	0.08582	0.0063	0.01357	0.00025	0.04588	0.00342	-3.8	-868	86.9	3.2
G123	994	964	0.10319	0.00348	0.01572	0.00021	0.04761	0.00162	-0.9	-26.7	100.6	2.6
G124	137	88	0.09998	0.00973	0.01377	0.00032	0.05267	0.00522	9.8	72.0	88.2	4.0
G125	834	459	0.10633	0.00389	0.01599	0.00022	0.04826	0.00179	0.4	8.8	102.2	2.8
G126	489	327	0.10616	0.00502	0.01602	0.00024	0.04809	0.00231	0.0	1.3	102.4	3.0
G127	430	300	0.55467	0.01351	0.0718	0.00089	0.05606	0.00136	0.2	1.6	447.0	10.7

River U

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	481	317	0.10248	0.00416	0.01549	0.00022	0.048	0.00197	0.0	-0.9	99.1	2.7
G4	613	307	0.14212	0.00629	0.02029	0.0003	0.05083	0.00228	4.2	44.4	129.5	3.8
G5	254	39	5.50293	0.08268	0.35163	0.00412	0.11356	0.00164	-2.1	-4.6	1857.1	51.6
G6	215	124	0.09687	0.00633	0.01446	0.00025	0.04862	0.00323	1.5	28.7	92.5	3.2
G7	400	269	0.09607	0.00584	0.0138	0.00024	0.05053	0.00313	5.4	59.8	88.3	3.0
G8	292	270	0.27599	0.00913	0.04015	0.00053	0.04988	0.00166	-2.5	-34.1	253.8	6.5
G9	198	95	0.09416	0.00818	0.01475	0.00031	0.04631	0.0041	-3.2	-584	94.4	3.9
G12	846	942	0.11446	0.00522	0.01607	0.00024	0.05169	0.00239	7.0	62.2	102.8	3.0
G14	1838	206	0.50337	0.00749	0.06405	0.00073	0.05702	0.00081	3.4	18.6	400.2	8.8
G16	117	83	0.10346	0.00923	0.01473	0.00031	0.05095	0.00463	6.0	60.5	94.3	4.0

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G18	167	188	1.07863	0.02591	0.12485	0.00155	0.06269	0.0015	-2.0	-8.7	758.4	17.8
G19	351	146	0.1104	0.00629	0.01705	0.00027	0.04698	0.00272	-2.5	-126	109.0	3.5
G20	82	37	1.49173	0.04158	0.15542	0.00204	0.06965	0.00196	-0.5	-1.5	931.3	22.8
G21	426	393	0.25279	0.00838	0.03521	0.00047	0.0521	0.00174	2.6	23.0	223.1	5.8
G22	115	158	0.10053	0.00917	0.01572	0.00032	0.04641	0.0043	-3.2	-423	100.5	4.1
G23	217	190	0.09289	0.0063	0.01448	0.00025	0.04654	0.0032	-2.7	-262	92.7	3.2
G24	18221	1579	5.51934	0.06852	0.3371	0.0038	0.11881	0.00136	1.7	3.4	1938.4	40.6
G25	808	830	0.09835	0.00326	0.01451	0.00019	0.04919	0.00164	2.5	40.8	92.9	2.4
G26	133	72	0.2656	0.01328	0.03752	0.00057	0.05136	0.00261	0.7	7.6	237.5	7.1
G27	250	167	0.10412	0.00606	0.0146	0.00024	0.05173	0.00307	7.6	65.8	93.5	3.1
G29	439	181	0.10513	0.00463	0.0155	0.00022	0.04922	0.0022	2.3	37.3	99.2	2.8
G30	233	165	0.54682	0.01495	0.07134	0.0009	0.05562	0.00153	-0.3	-1.6	444.2	10.9
G32	344	287	0.1166	0.0055	0.0168	0.00025	0.05036	0.00242	4.3	49.3	107.4	3.2
G33	498	277	0.27287	0.00738	0.039	0.00049	0.05077	0.00138	-0.7	-7.2	246.7	6.0
G34	435	207	0.1045	0.00464	0.01565	0.00023	0.04846	0.00218	0.8	17.7	100.1	2.9
G36	486	356	0.10345	0.00444	0.01524	0.00022	0.04925	0.00214	2.6	38.9	97.5	2.8
G37	167	99	0.12481	0.00836	0.01743	0.00031	0.05197	0.00354	7.2	60.8	111.4	4.0
G39	391	242	0.09948	0.00492	0.01479	0.00022	0.0488	0.00245	1.7	31.4	94.7	2.8
G40	188	148	0.28095	0.01174	0.03988	0.00057	0.05112	0.00217	-0.3	-2.4	252.1	7.1
G41	678	795	0.10333	0.00378	0.01471	0.0002	0.05097	0.00189	6.1	60.7	94.1	2.5
G43	943	132	0.54521	0.00938	0.07095	0.00082	0.05576	0.00093	0.0	0.2	441.9	9.9
G44	438	348	0.10948	0.00486	0.01642	0.00024	0.04839	0.00218	0.5	11.3	105.0	3.0
G45	196	116	0.09746	0.00727	0.0151	0.00028	0.04683	0.00355	-2.3	-139	96.6	3.5
G47	132	93	0.10306	0.00946	0.0162	0.00033	0.04615	0.0043	-3.9	-1854	103.6	4.2
G48	682	677	0.09511	0.004	0.01418	0.0002	0.04866	0.00208	1.7	30.8	90.8	2.6
G49	277	175	0.09578	0.00578	0.01482	0.00024	0.04688	0.00287	-2.1	-120	94.9	3.1
G50	97	69	0.10128	0.01274	0.01437	0.0004	0.05114	0.00656	6.5	62.8	92.0	5.1
G51	984	50	0.29854	0.00717	0.04113	0.0005	0.05267	0.00126	2.1	17.4	259.8	6.2
G52	416	289	0.09549	0.00503	0.01414	0.00022	0.04901	0.00262	2.3	38.9	90.5	2.8
G53	223	285	0.28096	0.01085	0.03933	0.00055	0.05183	0.00203	1.1	10.5	248.7	6.8
G54	572	355	0.09622	0.00484	0.01416	0.00022	0.04931	0.00252	3.0	44.3	90.6	2.8
G57	3106	0	0.07276	0.15438	0.01156	0.00263	0.04565	0.09741	-3.8	-740	74.1	33.6
G58	223	198	0.52811	0.01505	0.07087	0.0009	0.05407	0.00155	-2.4	-18.1	441.4	10.9
G59	177	156	0.67686	0.01934	0.08433	0.00109	0.05824	0.00167	0.6	3.0	521.9	12.9
G60	413	175	0.1046	0.00489	0.01522	0.00023	0.04987	0.00237	3.7	48.5	97.4	2.9
G63	498	236	0.10653	0.00448	0.01556	0.00022	0.04968	0.00212	3.3	44.7	99.5	2.8
G64	31	37	5.1599	0.1551	0.31653	0.00484	0.11829	0.00363	4.1	8.2	1930.5	107.8
G66	465	362	2.37464	0.03493	0.2075	0.00239	0.08304	0.00117	1.6	4.3	1270.2	54.1
G67	342	101	5.3258	0.07277	0.33604	0.00385	0.115	0.00148	0.3	0.7	1879.9	46.1
G68	795	470	0.09797	0.00346	0.01438	0.00019	0.04943	0.00176	3.0	45.2	92.1	2.4
G70	810	459	0.09459	0.00329	0.01407	0.00019	0.04879	0.00171	1.9	34.6	90.1	2.4
G71	208	151	0.26758	0.01072	0.03694	0.00052	0.05257	0.00214	3.0	24.6	233.8	6.5
G72	268	102	0.27794	0.00994	0.03885	0.00053	0.05191	0.00188	1.3	12.6	245.7	6.5
G73	656	177	0.10576	0.00382	0.01568	0.00021	0.04893	0.00179	1.8	30.7	100.3	2.7
G74	89	78	0.56189	0.02428	0.0713	0.00106	0.05718	0.00251	2.0	10.8	444.0	12.8
G75	205	134	0.09862	0.00684	0.01467	0.00026	0.04877	0.00344	1.7	31.3	93.9	3.3
G76	897	170	0.32043	0.00662	0.04537	0.00054	0.05125	0.00105	-1.3	-13.4	286.0	6.6
G77	898	554	0.56543	0.00973	0.07165	0.00083	0.05726	0.00096	2.0	11.0	446.1	10.0
G78	1838	751	0.08561	0.00223	0.01282	0.00016	0.04845	0.00126	1.6	32.4	82.1	2.0
G80	597	199	8.10276	0.10496	0.39094	0.00446	0.15039	0.00182	5.4	9.5	2350.4	41.0
G81	863	229	0.2475	0.00567	0.03539	0.00043	0.05075	0.00116	0.1	2.4	224.2	5.3
G82	395	210	0.10589	0.00561	0.01571	0.00025	0.04891	0.00263	1.7	30.0	100.5	3.1
G83	272	351	1.02017	0.02623	0.11345	0.00144	0.06525	0.00168	3.1	11.5	692.7	16.7
G84	1153	629	0.26612	0.00529	0.03767	0.00044	0.05126	0.001	0.5	5.7	238.4	5.5
G88	532	468	0.10494	0.00427	0.01526	0.00021	0.0499	0.00206	3.8	48.7	97.6	2.7
G89	262	124	0.10101	0.00596	0.01487	0.00025	0.04928	0.00296	2.6	41.0	95.2	3.1
G90	787	469	0.10317	0.00356	0.01479	0.0002	0.05061	0.00176	5.3	57.5	94.7	2.5
G91	242	197	0.10403	0.00761	0.01464	0.00028	0.05154	0.00385	7.3	64.7	93.7	3.6
G92	488	352	0.09579	0.00437	0.01509	0.00022	0.04607	0.00213	-3.7	-964	96.5	2.8
G93	64	58	1.88259	0.05469	0.18398	0.00249	0.07425	0.00218	-1.3	-3.9	1088.7	27.1
G94	332	209	0.10544	0.007	0.01467	0.00027	0.05216	0.00353	8.4	67.9	93.9	3.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G95	434	636	0.2707	0.00796	0.03852	0.00049	0.05099	0.00151	-0.2	-1.4	243.7	6.1
G96	642	440	0.09476	0.00371	0.01402	0.00019	0.04906	0.00195	2.5	40.4	89.7	2.5
G97	202	124	0.13117	0.01038	0.02044	0.00039	0.04658	0.00375	-4.1	-375	130.4	4.9
G98	434	166	0.11069	0.00642	0.01635	0.00027	0.04914	0.0029	2.0	32.3	104.5	3.5
G99	473	265	0.24277	0.00722	0.0346	0.00044	0.05091	0.00152	0.6	7.4	219.3	5.5
G100	250	62	5.51063	0.07808	0.34562	0.00399	0.11569	0.00156	-0.6	-1.2	1890.7	48.0
G101	191	96	0.10231	0.01077	0.01495	0.00037	0.04965	0.00534	3.3	46.5	95.7	4.8
G103	189	266	0.29312	0.015	0.03896	0.00062	0.0546	0.00285	5.9	37.7	246.4	7.8
G105	983	72	0.09729	0.00309	0.0142	0.00018	0.04971	0.00159	3.7	49.9	90.9	2.3
G108	359	402	8.40535	0.11696	0.42818	0.00497	0.14244	0.00188	-0.9	-1.8	2257.1	45.1
G109	895	445	0.56019	0.00977	0.07245	0.00084	0.0561	0.00095	0.2	1.1	450.9	10.1
G111	286	272	0.09635	0.00588	0.01493	0.00025	0.04682	0.0029	-2.2	-139	95.5	3.1
G112	315	200	0.11349	0.00817	0.017	0.00032	0.04843	0.00355	0.5	9.7	108.7	4.0
G113	121	48	0.38484	0.01786	0.05286	0.00079	0.05282	0.00249	-0.5	-3.4	332.1	9.7
G115	174	136	0.25642	0.0118	0.0387	0.00057	0.04808	0.00224	-5.3	-137	244.8	7.0
G116	246	158	0.10464	0.00657	0.01533	0.00026	0.04954	0.00316	3.0	43.5	98.1	3.3
G117	655	272	0.10491	0.00401	0.01572	0.00021	0.04842	0.00187	0.7	16.2	100.6	2.7
G118	381	309	0.10473	0.00524	0.01506	0.00023	0.05047	0.00257	5.0	55.6	96.3	2.9
G119	302	198	0.11012	0.00589	0.01603	0.00025	0.04984	0.00271	3.5	45.3	102.5	3.2
G120	126	63	0.1099	0.00938	0.01713	0.00034	0.04657	0.00404	-3.3	-307	109.5	4.3
G121	534	303	0.54332	0.01107	0.07041	0.00084	0.05599	0.00113	0.5	2.9	438.6	10.1
G122	199	180	0.10743	0.00704	0.0156	0.00028	0.04996	0.00333	3.8	48.4	99.8	3.5
G123	1727	1691	0.08491	0.00222	0.01274	0.00016	0.04838	0.00126	1.5	30.8	81.6	2.0
G124	781	296	0.23656	0.00572	0.03378	0.00041	0.05082	0.00123	0.7	8.0	214.1	5.1
G125	169	119	0.29416	0.0135	0.0391	0.00059	0.0546	0.00255	5.9	37.5	247.2	7.4
G126	539	240	0.10393	0.00429	0.0153	0.00022	0.0493	0.00206	2.6	39.6	97.9	2.7
G127	1641	1664	0.08054	0.00278	0.01143	0.00015	0.05115	0.00178	7.5	70.4	73.2	1.9
G128	276	234	0.10861	0.0062	0.01584	0.00026	0.04975	0.00289	3.4	44.8	101.3	3.3
G129	410	311	0.0991	0.00487	0.01494	0.00022	0.04813	0.0024	0.3	9.6	95.6	2.8
G130	283	71	5.14113	0.07293	0.3333	0.00385	0.11193	0.00151	-0.6	-1.3	1831.0	48.4
G131	249	290	13.17054	0.17232	0.51367	0.0059	0.18605	0.00228	0.7	1.3	2707.6	40.1
G132	241	166	0.09597	0.00757	0.01399	0.00027	0.04979	0.004	3.9	51.7	89.5	3.5
G133	626	307	0.09552	0.00526	0.0145	0.00023	0.04781	0.00268	-0.2	-4.2	92.8	3.0
G134	527	256	0.11549	0.00458	0.01607	0.00023	0.05215	0.0021	8.0	64.8	102.8	2.9
G135	420	299	0.10473	0.00487	0.016	0.00023	0.04749	0.00224	-1.3	-40.1	102.4	3.0
G136	690	329	0.11512	0.00411	0.01609	0.00022	0.05192	0.00187	7.5	63.5	102.9	2.7
G137	337	218	0.11156	0.00725	0.01595	0.00029	0.05076	0.00336	5.3	55.6	102.0	3.6
G138	398	432	0.28129	0.00848	0.03867	0.0005	0.05278	0.0016	2.9	23.4	244.6	6.2
G139	330	178	0.10805	0.00561	0.0154	0.00024	0.05091	0.00269	5.8	58.4	98.5	3.0
G141	159	93	0.0964	0.00812	0.01479	0.00029	0.04728	0.00404	-1.4	-50.3	94.7	3.7
G142	415	204	0.10002	0.00561	0.01529	0.00025	0.04746	0.00271	-1.0	-36.4	97.8	3.1
G143	287	194	0.09918	0.00571	0.01463	0.00024	0.0492	0.00288	2.6	40.5	93.6	3.0
G144	539	440	0.09585	0.00468	0.01435	0.00022	0.04848	0.0024	1.2	25.1	91.8	2.7
G145	249	198	5.03207	0.07916	0.32439	0.00383	0.11256	0.00171	0.8	1.6	1841.2	54.5
G146	861	706	0.12808	0.00384	0.01918	0.00024	0.04846	0.00146	-0.1	-0.4	122.5	3.1
G147	317	206	0.09842	0.00542	0.01515	0.00024	0.04715	0.00264	-1.7	-71.8	96.9	3.0
G148	196	129	0.08632	0.00661	0.0132	0.00025	0.04745	0.0037	-0.5	-18.3	84.5	3.2
G149	542	300	0.29245	0.00747	0.04169	0.00051	0.0509	0.0013	-1.1	-11.4	263.3	6.3
G150	575	167	4.65782	0.06111	0.31502	0.00358	0.10729	0.00131	-0.3	-0.7	1753.9	44.4

River V

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G4	263	156	0.12063	0.00601	0.01771	0.00027	0.04942	0.0025	2.1	32.6	113.2	3.4
G5	188	75	0.20104	0.00933	0.02824	0.00042	0.05165	0.00243	3.6	33.5	179.5	5.3
G6	3505	1853	1.01406	0.01478	0.11144	0.00128	0.06602	0.00091	4.4	15.6	681.1	14.8
G7	538	352	0.27886	0.00704	0.03899	0.00048	0.05189	0.00131	1.3	12.1	246.6	6.0
G8	1390	1168	0.09151	0.00248	0.01318	0.00016	0.05037	0.00137	5.3	60.2	84.4	2.1
G11	725	139	5.20752	0.07621	0.31799	0.00367	0.11881	0.00165	4.2	8.2	1938.4	49.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G18	121	64	0.14106	0.0103	0.0202	0.00038	0.05066	0.00376	4.0	42.8	128.9	4.7
G19	989	512	0.31469	0.00638	0.04429	0.00053	0.05155	0.00103	-0.6	-5.2	279.4	6.5
G22	461	248	0.21418	0.00642	0.03069	0.00039	0.05064	0.00153	1.2	13.2	194.8	4.9
G23	157	101	9.94596	0.15631	0.43927	0.00521	0.16427	0.00248	3.5	6.1	2500.1	50.4
G24	227	66	0.10296	0.00627	0.01517	0.00025	0.04923	0.00305	2.5	38.9	97.1	3.2
G25	1225	577	0.09934	0.00278	0.01382	0.00017	0.05216	0.00146	8.7	69.8	88.5	2.2
G26	399	188	0.10008	0.00459	0.01519	0.00022	0.04781	0.00222	-0.4	-9.2	97.2	2.8
G27	657	518	0.10177	0.00364	0.01461	0.0002	0.05053	0.00183	5.2	57.4	93.5	2.5
G29	1848	602	0.50397	0.00832	0.06393	0.00074	0.05719	0.00091	3.7	19.8	399.5	9.0
G30	49	42	0.19453	0.01959	0.02708	0.00062	0.05212	0.00534	4.8	40.7	172.3	7.8
G31	1650	216	0.58211	0.00963	0.07145	0.00083	0.05911	0.00094	4.7	22.1	444.9	10.0
G32	1078	499	0.09249	0.00279	0.01364	0.00017	0.04919	0.00149	2.9	44.4	87.3	2.2
G33	115	69	4.9961	0.09122	0.32038	0.00391	0.11314	0.00203	1.5	3.2	1850.4	64.0
G34	1049	444	0.09975	0.00295	0.01408	0.00018	0.0514	0.00153	7.1	65.2	90.1	2.3
G35	623	199	0.11182	0.00383	0.01533	0.00021	0.0529	0.00183	9.7	69.8	98.1	2.6
G36	396	209	0.43715	0.01057	0.05799	0.00071	0.05469	0.00132	1.3	9.2	363.4	8.7
G37	315	69	10.35735	0.15642	0.44873	0.00522	0.16746	0.00241	3.2	5.6	2532.4	47.9
G39	951	660	0.10823	0.00316	0.01637	0.00021	0.04795	0.00141	-0.4	-9.2	104.7	2.6
G40	424	215	10.64909	0.15907	0.46047	0.00533	0.16779	0.00238	2.1	3.7	2535.7	47.3
G43	222	120	0.19683	0.00855	0.02718	0.0004	0.05253	0.00232	5.5	44.0	172.9	5.0
G46	312	192	0.10676	0.0055	0.01519	0.00024	0.05101	0.00267	6.0	59.7	97.2	3.0
G48	688	224	8.0339	0.12082	0.39598	0.00457	0.1472	0.00211	3.9	7.0	2313.6	48.7
G49	422	142	0.09879	0.00441	0.01493	0.00022	0.048	0.00217	0.2	2.7	95.5	2.7
G50	265	179	0.10836	0.00588	0.01567	0.00025	0.05016	0.00276	4.2	50.4	100.3	3.2
G54	1624	348	0.09287	0.00243	0.01366	0.00017	0.04934	0.00129	3.2	46.6	87.4	2.2
G55	380	226	1.03393	0.02074	0.11048	0.00133	0.0679	0.00134	6.7	21.9	675.6	15.4
G56	1075	356	0.09153	0.00277	0.01377	0.00018	0.04824	0.00147	0.9	20.8	88.1	2.2
G57	992	248	0.10164	0.00304	0.01475	0.00019	0.04999	0.00151	4.1	51.5	94.4	2.4
G63	378	145	0.12549	0.00535	0.01833	0.00026	0.04968	0.00215	2.5	35.0	117.1	3.3
G66	636	267	0.12766	0.00431	0.01884	0.00025	0.04915	0.00167	1.4	22.5	120.3	3.2
G67	1287	285	0.09846	0.00275	0.01405	0.00018	0.05085	0.00142	6.1	61.6	89.9	2.3
G68	515	245	0.10939	0.00423	0.01566	0.00022	0.05067	0.00199	5.2	55.6	100.2	2.8
G69	774	209	0.10973	0.0036	0.01532	0.0002	0.05197	0.00172	7.9	65.5	98.0	2.6
G70	546	186	0.10148	0.004	0.01516	0.00021	0.04857	0.00194	1.1	23.9	97.0	2.7
G71	316	268	0.52322	0.0133	0.06742	0.00084	0.05631	0.00143	1.6	9.3	420.6	10.2
G72	375	258	0.50753	0.01242	0.06575	0.00081	0.056	0.00137	1.5	9.2	410.5	9.8
G73	1401	158	0.09484	0.00262	0.01393	0.00017	0.04938	0.00137	3.1	46.3	89.2	2.2
G74	168	86	0.12434	0.00818	0.01937	0.00033	0.04658	0.00311	-3.8	- 349	123.7	4.2
G75	725	245	0.09929	0.00345	0.01539	0.0002	0.04683	0.00164	-2.3	- 145	98.4	2.6
G78	331	109	8.38192	0.1383	0.40532	0.00475	0.15004	0.00239	3.6	6.5	2346.4	54.0
G79	191	97	0.12208	0.00726	0.01754	0.00029	0.05051	0.00306	4.4	48.7	112.1	3.7
G80	401	161	0.10965	0.00482	0.01558	0.00023	0.05106	0.00228	5.9	59.1	99.7	2.9
G81	478	438	0.53536	0.01217	0.07108	0.00086	0.05465	0.00123	-1.6	-11.2	442.6	10.4
G82	421	177	0.1147	0.00474	0.0159	0.00023	0.05235	0.00219	8.5	66.2	101.7	2.9
G85	504	143	0.24981	0.00714	0.03554	0.00045	0.05101	0.00146	0.6	6.6	225.1	5.6
G86	287	54	0.10357	0.0055	0.01571	0.00025	0.04784	0.00258	-0.4	-11.4	100.5	3.1
G87	383	184	0.12471	0.00535	0.01845	0.00026	0.04905	0.00213	1.3	21.6	117.8	3.3
G88	877	256	0.23931	0.00583	0.03404	0.00042	0.05101	0.00124	1.0	10.6	215.8	5.2
G89	339	207	0.10982	0.00525	0.01571	0.00024	0.05071	0.00246	5.3	55.8	100.5	3.0
G90	348	131	0.12847	0.0056	0.01969	0.00028	0.04734	0.00209	-2.4	-91.6	125.7	3.6
G91	204	117	0.12351	0.00714	0.01892	0.00031	0.04738	0.00278	-2.2	-78.7	120.8	3.9
G92	1085	432	0.09431	0.00292	0.01464	0.00019	0.04675	0.00146	-2.3	- 158	93.7	2.4
G93	343	181	0.12636	0.0056	0.01769	0.00026	0.05184	0.00233	6.9	59.4	113.0	3.3
G95	580	55	5.29056	0.09055	0.32967	0.00386	0.11644	0.00193	1.7	3.4	1902.3	59.0
G97	367	159	0.10864	0.00502	0.01514	0.00023	0.05206	0.00244	8.0	66.3	96.9	2.9
G98	686	408	0.09799	0.00359	0.01498	0.0002	0.04746	0.00176	-1.0	-33.6	95.9	2.6
G99	349	150	4.913	0.08741	0.31083	0.00368	0.11468	0.00199	3.4	6.9	1874.9	61.9
G100	66	76	10.79776	0.21134	0.46596	0.00585	0.16814	0.00325	1.6	2.9	2539.2	64.1
G103	325	246	0.08378	0.00465	0.01184	0.00019	0.05134	0.0029	7.6	70.4	75.9	2.4
G105	210	243	0.2698	0.01071	0.0377	0.00053	0.05193	0.00209	1.7	15.5	238.5	6.6
G108	536	317	0.10321	0.00415	0.01528	0.00021	0.049	0.002	1.9	33.7	97.8	2.7

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G109	598	410	0.26124	0.00707	0.03609	0.00045	0.05253	0.00143	3.2	25.9	228.5	5.6
G110	281	154	5.00154	0.09321	0.32299	0.00385	0.11236	0.00205	0.8	1.8	1837.9	65.4
G111	109	65	0.28066	0.0149	0.03661	0.0006	0.05562	0.00301	8.4	46.9	231.8	7.4
G112	410	162	0.10833	0.00478	0.01591	0.00023	0.04941	0.00221	2.7	39.2	101.7	2.9
G113	337	137	0.10974	0.00528	0.01601	0.00024	0.04973	0.00243	3.2	43.9	102.4	3.1
G115	679	252	0.09696	0.00361	0.01524	0.00021	0.04617	0.00174	-3.6	-1355	97.5	2.6
G117	155	106	0.12731	0.00814	0.01852	0.00032	0.04988	0.00325	2.9	37.5	118.3	4.1
G119	301	154	0.12234	0.00586	0.01848	0.00028	0.04803	0.00233	-0.8	-17.4	118.1	3.5
G120	195	135	0.12255	0.00731	0.0182	0.0003	0.04886	0.00297	0.9	17.6	116.3	3.8
G121	580	605	0.54484	0.01259	0.07044	0.00086	0.05612	0.00129	0.6	4.0	438.8	10.4
G122	1101	391	0.25493	0.00604	0.03475	0.00042	0.05323	0.00126	4.7	34.9	220.2	5.3
G123	209	129	0.10822	0.00653	0.01622	0.00027	0.04841	0.00297	0.6	12.9	103.7	3.5
G124	675	271	0.10536	0.0038	0.01534	0.00021	0.04985	0.00182	3.7	47.8	98.1	2.6
G126	910	418	0.1254	0.00382	0.01857	0.00024	0.04899	0.0015	1.2	19.5	118.6	3.0
G127	42	76	8.50793	0.19596	0.42017	0.00555	0.14692	0.00339	1.1	2.1	2310.4	78.1
G128	614	274	0.10452	0.00392	0.01579	0.00022	0.04802	0.00182	-0.1	-1.8	101.0	2.7
G129	97	67	0.25943	0.01525	0.0365	0.00061	0.05157	0.00308	1.3	13.2	231.1	7.6
G130	457	213	0.10056	0.00441	0.01517	0.00022	0.04811	0.00214	0.3	7.4	97.0	2.8
G131	2636	291	0.57968	0.01134	0.06878	0.00081	0.06116	0.00118	8.3	33.5	428.8	9.8
G134	59	55	11.0604	0.23577	0.49309	0.00626	0.16276	0.00345	-2.2	-4.0	2484.5	70.5
G138	558	302	0.1103	0.00425	0.01603	0.00022	0.04991	0.00195	3.6	46.3	102.5	2.8
G140	432	341	0.1172	0.00489	0.01604	0.00023	0.05301	0.00225	9.6	68.8	102.6	2.9
G141	530	361	0.10566	0.00425	0.01574	0.00022	0.04872	0.00199	1.4	25.2	100.6	2.8
G142	119	105	1.06042	0.03198	0.11943	0.00159	0.06443	0.00196	0.9	3.8	727.3	18.3
G143	179	107	0.16823	0.00891	0.02418	0.00038	0.05047	0.00272	2.5	29.0	154.0	4.8
G145	1246	378	0.09346	0.00289	0.01419	0.00018	0.04778	0.00149	-0.2	-4.1	90.9	2.3
G146	629	233	0.10355	0.00395	0.01566	0.00022	0.04797	0.00185	-0.2	-3.6	100.2	2.7
G147	65	37	0.11331	0.01343	0.01696	0.00041	0.04848	0.00583	0.6	11.6	108.4	5.3
G150	150	107	5.23492	0.11349	0.33719	0.00416	0.11265	0.00242	-0.8	-1.7	1842.6	76.9

River W

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	197	105	1.71887	0.03408	0.17225	0.00209	0.0724	0.00141	-0.9	-2.7	1024.5	23.0
G2	452	83	8.12395	0.11393	0.39841	0.00463	0.14793	0.00196	3.8	6.9	2322.1	45.0
G3	287	186	1.24014	0.0243	0.13335	0.00161	0.06747	0.0013	1.5	5.3	806.9	18.3
G4	679	395	0.52259	0.01217	0.07	0.00086	0.05416	0.00125	-2.1	-15.5	436.1	10.3
G5	505	146	0.26992	0.00745	0.03858	0.00049	0.05076	0.0014	-0.6	-6.1	244.0	6.0
G6	471	316	2.44432	0.03912	0.20721	0.00243	0.08558	0.00132	3.5	8.6	1328.6	59.2
G7	807	404	0.3515	0.00732	0.04986	0.0006	0.05115	0.00105	-2.5	-26.7	313.6	7.3
G8	159	170	0.27168	0.0131	0.03938	0.00059	0.05005	0.00245	-2.0	-26.3	249.0	7.3
G10	4303	206	0.23175	0.00363	0.03313	0.00038	0.05074	0.00076	0.7	8.3	210.1	4.8
G11	105	502	0.75497	0.02631	0.09412	0.0013	0.05819	0.00205	-1.5	-8.1	579.9	15.3
G12	174	78	0.31966	0.01329	0.04483	0.00064	0.05174	0.00218	-0.4	-3.3	282.7	7.9
G13	518	83	5.19258	0.07283	0.33087	0.00382	0.11386	0.0015	0.5	1.0	1861.8	47.3
G15	303	129	4.99561	0.07414	0.32792	0.00383	0.11052	0.00156	-0.5	-1.1	1808.0	50.9
G16	101	92	0.42979	0.02049	0.05811	0.00089	0.05366	0.0026	-0.3	-2.1	364.1	10.9
G17	713	291	0.24885	0.00632	0.03534	0.00044	0.05109	0.0013	0.8	8.6	223.9	5.5
G18	277	312	1.38404	0.0269	0.13909	0.00168	0.07219	0.00138	5.1	15.3	839.5	19.0
G19	689	164	0.36573	0.00803	0.04924	0.0006	0.05388	0.00117	2.1	15.3	309.9	7.3
G20	1199	730	0.53934	0.00914	0.07031	0.00082	0.05565	0.00091	0.0	0.0	438.0	9.9
G21	307	171	1.41324	0.0267	0.15055	0.0018	0.0681	0.00126	-1.1	-3.7	904.0	20.2
G22	748	405	0.41618	0.00866	0.0569	0.00068	0.05306	0.00109	-1.0	-7.7	356.8	8.3
G23	1786	734	0.24332	0.00461	0.03444	0.00041	0.05126	0.00095	1.3	13.5	218.3	5.1
G24	547	226	0.53622	0.01133	0.06868	0.00083	0.05664	0.00118	1.8	10.2	428.2	10.0
G25	709	218	1.86874	0.02834	0.17979	0.00209	0.07541	0.00109	0.4	1.3	1065.8	22.8
G26	86	36	9.85918	0.16235	0.44938	0.00552	0.15917	0.00255	1.2	2.2	2446.8	53.6
G27	74	57	0.59947	0.02838	0.07579	0.00119	0.05739	0.00276	1.3	6.9	470.9	14.2
G28	358	126	0.29038	0.00904	0.04156	0.00054	0.0507	0.00159	-1.4	-15.6	262.5	6.7

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G29	269	144	0.52812	0.0146	0.0691	0.00088	0.05545	0.00154	0.0	-0.1	430.7	10.6
G30	395	485	1.21917	0.02885	0.12836	0.00162	0.0689	0.00163	4.0	13.1	778.5	18.5
G32	850	435	0.97978	0.01605	0.11304	0.00132	0.06288	0.00099	0.4	1.9	690.4	15.3
G33	420	303	0.17356	0.00647	0.02382	0.00033	0.05287	0.002	7.1	53.0	151.7	4.2
G34	753	564	0.27444	0.00651	0.03709	0.00046	0.05368	0.00127	4.9	34.4	234.8	5.7
G35	1984	839	0.50089	0.0079	0.06151	0.00071	0.05908	0.00089	7.1	32.5	384.8	8.7
G36	744	159	0.24579	0.00613	0.03495	0.00043	0.05102	0.00127	0.8	8.3	221.5	5.4
G37	439	322	0.40909	0.01035	0.05445	0.00068	0.05451	0.00138	1.9	12.8	341.8	8.3
G38	229	144	15.79207	0.21869	0.53351	0.00623	0.21474	0.0028	3.9	6.3	2941.7	41.8
G40	909	171	1.19613	0.01865	0.12974	0.00151	0.06689	0.001	1.6	5.7	786.4	17.2
G41	457	290	1.96789	0.03177	0.18205	0.00214	0.07842	0.00122	2.4	6.9	1078.2	23.3
G42	1323	123	0.30136	0.00583	0.03923	0.00047	0.05572	0.00106	7.8	43.7	248.1	5.8
G43	487	477	0.63054	0.01319	0.07965	0.00096	0.05743	0.00119	0.5	2.7	494.0	11.5
G44	2401	484	0.23146	0.00469	0.03118	0.00037	0.05386	0.00108	6.8	45.8	197.9	4.7
G45	1354	547	1.61294	0.02308	0.15166	0.00175	0.07715	0.00104	7.1	19.1	910.3	19.5
G46	915	543	0.27549	0.00616	0.03846	0.00047	0.05196	0.00115	1.6	14.2	243.3	5.8
G48	1587	994	1.6104	0.02272	0.15126	0.00174	0.07724	0.00103	7.3	19.5	908.0	19.5
G49	259	136	4.15966	0.06511	0.29322	0.00346	0.10292	0.00155	0.5	1.2	1677.4	55.0
G50	557	388	0.17297	0.00563	0.02526	0.00033	0.04968	0.00163	0.7	10.6	160.8	4.2
G51	331	140	0.2309	0.0085	0.033	0.00045	0.05076	0.00189	0.8	8.9	209.3	5.6
G52	201	187	0.2349	0.01074	0.03613	0.00053	0.04717	0.00219	-6.4	-298	228.8	6.6
G53	513	268	0.24757	0.0092	0.03327	0.00046	0.05399	0.00203	6.4	43.0	211.0	5.8
G54	551	351	9.62097	0.13011	0.44066	0.00507	0.15839	0.002	1.9	3.5	2438.6	42.5
G55	396	175	1.53334	0.02674	0.15677	0.00186	0.07096	0.0012	0.5	1.8	938.8	20.7
G57	470	335	0.52346	0.01184	0.06887	0.00084	0.05514	0.00124	-0.4	-2.7	429.3	10.1
G58	303	189	0.57912	0.01466	0.0764	0.00096	0.05499	0.00139	-2.3	-15.3	474.6	11.4
G59	423	272	0.25224	0.00776	0.03626	0.00047	0.05046	0.00156	-0.5	-6.1	229.6	5.9
G60	316	241	0.25039	0.00893	0.03472	0.00047	0.05232	0.00189	3.1	26.5	220.0	5.9
G61	1508	39	0.25719	0.00501	0.03601	0.00043	0.05181	0.00099	1.9	17.7	228.1	5.3
G62	134	212	0.5275	0.01983	0.0655	0.00093	0.05842	0.00223	5.2	25.1	409.0	11.3
G63	582	69	0.43819	0.00973	0.05679	0.00069	0.05598	0.00123	3.6	21.1	356.1	8.4
G65	49	56	1.0604	0.05443	0.11912	0.00206	0.06458	0.00338	1.2	4.6	725.5	23.7
G66	496	197	4.98906	0.07053	0.32053	0.00371	0.11292	0.00151	1.4	3.0	1846.9	47.8
G68	468	257	0.26952	0.00782	0.0378	0.00048	0.05173	0.00151	1.3	12.6	239.2	6.0
G69	144	73	4.53535	0.07848	0.30508	0.0037	0.10785	0.00182	1.2	2.7	1763.4	61.0
G70	1635	989	0.46733	0.00772	0.06056	0.0007	0.05598	0.00089	2.7	16.0	379.0	8.6
G71	507	330	0.28841	0.00793	0.04166	0.00053	0.05023	0.00138	-2.2	-28.0	263.1	6.5
G72	1312	677	0.2507	0.0059	0.03577	0.00044	0.05084	0.00119	0.2	3.0	226.6	5.4
G73	176	81	9.54172	0.15012	0.43085	0.00521	0.16066	0.00244	3.6	6.2	2462.7	50.8
G75	134	57	1.17403	0.0313	0.13175	0.0017	0.06465	0.00173	-1.2	-4.6	797.9	19.4
G76	290	125	0.26802	0.00968	0.03903	0.00053	0.04982	0.00182	-2.3	-32.3	246.8	6.6
G77	871	580	0.53888	0.01	0.07014	0.00083	0.05573	0.00101	0.2	1.0	437.0	10.0
G78	2830	399	0.2084	0.00366	0.02911	0.00034	0.05194	0.00089	3.9	34.6	185.0	4.3
G79	240	48	1.61706	0.03169	0.1626	0.00197	0.07215	0.00139	0.6	1.9	971.2	21.8
G81	282	304	1.17735	0.0246	0.13043	0.00159	0.06549	0.00135	0.0	0.0	790.3	18.1
G82	34	62	5.86514	0.14418	0.3596	0.00501	0.11833	0.00293	-1.2	-2.5	1931.1	87.4
G83	765	706	0.22377	0.00581	0.03304	0.00041	0.04914	0.00128	-2.1	-35.7	209.5	5.1
G84	665	142	1.62664	0.02537	0.16282	0.00189	0.07248	0.00108	0.8	2.7	972.4	21.0
G85	1683	550	0.08666	0.0024	0.01326	0.00017	0.04742	0.00132	-0.6	-21.8	84.9	2.1
G86	61	29	0.40436	0.02885	0.05197	0.00102	0.05645	0.00411	5.6	30.4	326.6	12.5
G87	145	96	0.59445	0.02139	0.07374	0.00103	0.05849	0.00213	3.3	16.3	458.6	12.4
G88	532	140	0.57725	0.0122	0.07564	0.00091	0.05537	0.00116	-1.6	-10.1	470.0	10.9
G90	408	185	0.24028	0.0079	0.03476	0.00046	0.05015	0.00166	-0.7	-9.1	220.3	5.7
G91	627	48	5.23828	0.07274	0.33785	0.00389	0.11248	0.00147	-0.9	-2.0	1839.9	46.9
G92	258	168	1.51645	0.03026	0.15274	0.00186	0.07203	0.00142	2.3	7.2	916.3	20.8
G93	1240	224	0.21291	0.00567	0.02999	0.00038	0.05151	0.00137	2.9	27.7	190.5	4.7
G94	119	71	0.26723	0.01639	0.03954	0.00067	0.04903	0.00306	-3.8	-67.7	250.0	8.4
G95	344	96	5.32948	0.08921	0.34048	0.00411	0.11356	0.00185	-0.8	-1.7	1857.1	58.2
G96	603	239	1.60962	0.02573	0.16254	0.0019	0.07184	0.0011	0.3	1.1	970.9	21.0
G97	26	45	10.41373	0.23479	0.45521	0.00649	0.16597	0.00377	2.2	3.9	2517.4	75.3
G98	751	1051	0.00988	0.00152	0.00145	0.00005	0.04955	0.00779	7.5	94.6	9.3	0.6

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G99	361	295	0.57397	0.01411	0.07347	0.00091	0.05667	0.00139	0.8	4.4	457.0	11.0
G101	1124	237	0.22296	0.0051	0.03181	0.00039	0.05085	0.00115	1.2	13.6	201.9	4.8
G102	337	83	5.29129	0.07817	0.33667	0.00393	0.11402	0.0016	-0.2	-0.3	1864.4	50.3
G103	998	183	0.22234	0.00535	0.03248	0.0004	0.04967	0.00119	-1.0	-14.8	206.0	5.0
G104	537	44	1.96864	0.03613	0.18403	0.00221	0.07761	0.00139	1.5	4.2	1088.9	24.1
G105	225	117	4.92934	0.07762	0.31752	0.00376	0.11263	0.00171	1.7	3.5	1842.2	54.4
G106	496	295	0.27872	0.00959	0.03819	0.00052	0.05295	0.00184	3.3	26.0	241.6	6.4
G108	370	115	5.06816	0.0774	0.31108	0.00367	0.1182	0.00173	4.9	9.5	1929.1	51.9
G109	942	520	1.4994	0.02285	0.14653	0.0017	0.07424	0.00108	5.5	15.9	881.5	19.1
G110	274	93	5.25909	0.08023	0.33604	0.00396	0.11354	0.00166	-0.3	-0.6	1856.8	52.3
G111	384	219	0.24851	0.0085	0.03525	0.00047	0.05115	0.00177	0.9	9.8	223.3	5.9
G112	766	456	0.52532	0.01241	0.06809	0.00084	0.05598	0.00132	1.0	5.9	424.6	10.1
G114	263	16	0.73216	0.01858	0.09093	0.00114	0.05842	0.00148	-0.6	-2.9	561.0	13.5
G115	2415	1156	1.79288	0.02451	0.1594	0.00182	0.0816	0.00104	9.4	22.9	953.4	20.3
G116	645	375	0.66221	0.01284	0.08236	0.00098	0.05833	0.00111	1.1	5.8	510.2	11.7
G117	429	232	13.51804	0.18468	0.53525	0.0062	0.18322	0.00234	-1.7	-3.0	2682.3	42.0
G119	537	197	0.5619	0.0122	0.07308	0.00089	0.05578	0.0012	-0.4	-2.6	454.7	10.6
G120	597	121	5.27659	0.07387	0.33736	0.0039	0.11347	0.00149	-0.5	-1.0	1855.7	47.2
G121	392	181	0.33619	0.00996	0.04834	0.00062	0.05045	0.0015	-3.3	-41.0	304.3	7.7
G122	279	139	0.24822	0.01017	0.03593	0.00051	0.05011	0.00208	-1.1	-13.6	227.6	6.3
G123	346	163	1.32389	0.02536	0.14184	0.0017	0.06771	0.00127	0.1	0.5	855.1	19.2
G124	331	186	0.23567	0.00882	0.03375	0.00047	0.05066	0.00192	0.4	5.1	214.0	5.8
G127	869	29	1.28676	0.02321	0.138	0.00164	0.06764	0.00119	0.8	2.8	833.4	18.6
G128	1147	1058	10.38471	0.13717	0.46825	0.00536	0.16089	0.00197	-0.3	-0.4	2465.1	41.1
G129	2705	363	0.19053	0.00351	0.02773	0.00033	0.04984	0.0009	0.5	6.0	176.3	4.1
G130	959	177	0.24892	0.0064	0.03524	0.00044	0.05124	0.00132	1.1	11.3	223.3	5.5
G131	303	150	1.69523	0.03139	0.17327	0.00207	0.07098	0.00129	-2.3	-7.7	1030.1	22.8
G132	247	203	0.30758	0.012	0.04456	0.00063	0.05008	0.00198	-3.1	-41.4	281.0	7.7
G133	1706	17	0.54246	0.0088	0.06772	0.00079	0.05811	0.00091	4.2	20.8	422.4	9.5
G134	441	97	1.57348	0.02722	0.16255	0.00192	0.07023	0.00118	-1.1	-3.9	970.9	21.3
G135	1372	604	0.2278	0.00487	0.03249	0.00039	0.05087	0.00107	1.1	12.2	206.1	4.9
G137	33	31	1.22841	0.07336	0.13732	0.0026	0.0649	0.00396	-1.9	-7.6	829.5	29.5
G138	922	552	0.53529	0.00998	0.06914	0.00082	0.05617	0.00102	1.0	6.0	431.0	9.9
G139	142	198	2.53831	0.05252	0.22096	0.00275	0.08334	0.00171	-0.3	-0.8	1277.0	79.1
G140	638	212	0.24108	0.00674	0.03459	0.00044	0.05056	0.00142	0.0	0.8	219.2	5.5
G141	330	178	0.17142	0.00754	0.02473	0.00036	0.05029	0.00225	2.0	24.4	157.5	4.6
G142	632	418	0.13473	0.00485	0.02007	0.00027	0.04869	0.00177	0.2	3.7	128.1	3.4
G143	454	196	8.9704	0.12298	0.40887	0.00472	0.15917	0.00205	5.7	9.7	2446.8	43.2
G144	939	474	0.24388	0.00577	0.03514	0.00043	0.05035	0.00118	-0.4	-5.3	222.6	5.3
G145	335	311	0.22802	0.00859	0.03355	0.00046	0.04931	0.00188	-1.9	-30.7	212.7	5.8
G147	119	58	5.31433	0.09266	0.34105	0.00416	0.11304	0.00192	-1.1	-2.3	1848.9	60.9
G148	719	216	0.29326	0.0072	0.04158	0.00051	0.05116	0.00125	-0.6	-5.8	262.6	6.3
G149	1143	781	0.20101	0.00475	0.02911	0.00036	0.05009	0.00118	0.5	7.2	185.0	4.5
G150	841	284	2.68775	0.0391	0.22295	0.00258	0.08746	0.00121	2.1	5.3	1370.6	52.5

River X

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	1313	162	0.26097	0.00645	0.037	0.00044	0.05118	0.00128	0.5	5.9	234.2	5.5
G2	230	87	0.54992	0.01754	0.07012	0.00091	0.05691	0.00185	1.8	10.4	436.9	11.0
G3	415	315	0.23688	0.00822	0.03425	0.00045	0.05019	0.00177	-0.6	-6.5	217.1	5.6
G4	1114	66	0.07085	0.00261	0.01076	0.00014	0.04776	0.00179	0.7	20.1	69.0	1.8
G5	1128	363	0.21482	0.0057	0.03036	0.00037	0.05135	0.00138	2.5	24.9	192.8	4.6
G6	422	295	0.27244	0.00895	0.03824	0.00049	0.0517	0.00173	1.1	11.2	241.9	6.1
G7	457	316	0.23636	0.00785	0.03426	0.00044	0.05007	0.00169	-0.8	-9.6	217.1	5.5
G8	440	171	0.18936	0.00689	0.02719	0.00036	0.05054	0.00187	1.9	21.4	172.9	4.6
G9	51	23	0.34126	0.02527	0.04573	0.00088	0.05415	0.00409	3.4	23.6	288.3	10.9
G10	400	201	0.23747	0.00827	0.03387	0.00045	0.05088	0.0018	0.7	8.8	214.7	5.6
G11	573	28	5.10853	0.10874	0.31529	0.0037	0.11758	0.00253	4.0	8.0	1919.8	76.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G12	1357	348	0.2224	0.00568	0.03158	0.00038	0.0511	0.00132	1.7	18.3	200.5	4.8
G13	81	63	0.28494	0.01785	0.04039	0.0007	0.05119	0.00327	-0.3	-2.3	255.3	8.6
G14	636	461	3.10445	0.0676	0.24679	0.0029	0.09129	0.00201	0.8	2.1	1452.5	83.0
G15	365	131	0.51759	0.01477	0.06776	0.00084	0.05543	0.00161	0.2	1.6	422.6	10.2
G16	334	545	0.63369	0.01773	0.08065	0.001	0.05702	0.00162	-0.3	-1.7	500.0	12.0
G17	383	215	0.63807	0.01759	0.07611	0.00095	0.06084	0.00171	6.0	25.4	472.9	11.3
G18	1199	782	0.67546	0.01562	0.0777	0.00092	0.06309	0.00148	8.6	32.2	482.4	11.0
G19	322	256	0.79651	0.02181	0.09826	0.00121	0.05882	0.00164	-1.5	-7.8	604.2	14.2
G20	684	283	4.99552	0.1089	0.31782	0.00373	0.11406	0.00252	2.2	4.6	1865.1	78.7
G21	332	62	0.23178	0.00858	0.03398	0.00046	0.0495	0.00187	-1.7	-25.5	215.4	5.7
G22	226	170	5.20487	0.11858	0.33237	0.00398	0.11364	0.00263	0.2	0.5	1858.5	82.5
G23	474	210	0.42525	0.01198	0.05721	0.00071	0.05395	0.00155	0.3	2.7	358.6	8.6
G24	604	172	5.26757	0.11636	0.33415	0.00393	0.1144	0.00256	0.3	0.6	1870.5	79.8
G25	1295	157	0.23878	0.00637	0.03364	0.00041	0.05151	0.0014	1.9	19.1	213.3	5.1
G26	1971	272	0.2095	0.00525	0.02816	0.00034	0.05399	0.00138	7.9	51.7	179.0	4.2
G27	228	365	10.4541	0.23504	0.4644	0.00553	0.16336	0.00373	0.7	1.3	2490.8	76.0
G28	162	111	0.5236	0.01901	0.06804	0.00092	0.05585	0.00207	0.8	4.8	424.4	11.1
G29	246	173	4.97571	0.11657	0.31633	0.0038	0.11415	0.00272	2.4	5.1	1866.5	84.9
G30	157	110	0.30962	0.01366	0.04403	0.00063	0.05104	0.0023	-1.4	-14.5	277.7	7.8
G31	129	164	0.38284	0.01646	0.05148	0.00074	0.05397	0.00237	1.7	12.4	323.6	9.1
G32	641	165	0.24083	0.00739	0.03314	0.00042	0.05274	0.00165	4.2	33.8	210.2	5.2
G33	59	48	0.16776	0.01566	0.02519	0.00054	0.04833	0.0046	-1.8	-38.8	160.4	6.8
G34	123	58	0.35128	0.01612	0.04673	0.0007	0.05455	0.00256	3.8	25.3	294.4	8.6
G35	2060	268	0.20036	0.00524	0.02767	0.00033	0.05256	0.0014	5.4	43.2	175.9	4.2
G36	63	49	2.13567	0.06854	0.19163	0.0026	0.08088	0.00266	2.7	7.3	1218.6	126.4
G37	738	290	2.08377	0.04997	0.17621	0.0021	0.08582	0.0021	9.3	21.6	1046.3	23.1
G38	577	51	0.24921	0.00792	0.03505	0.00045	0.05161	0.00168	1.7	17.2	222.1	5.6
G39	51	8	0.44833	0.02725	0.05534	0.00098	0.0588	0.00366	8.3	38.0	347.2	11.9
G40	219	151	0.14916	0.00773	0.02086	0.00033	0.05191	0.00275	6.1	52.7	133.1	4.1
G41	65690	13	5.55773	0.15227	0.36069	0.00464	0.11183	0.00314	-3.8	-8.5	1829.4	100.2
G42	162	89	0.39956	0.01583	0.05269	0.00073	0.05503	0.00223	3.1	20.0	331.0	9.0
G43	83	69	1.77171	0.05655	0.17319	0.0023	0.07424	0.00243	0.5	1.8	1029.7	25.3
G44	125	94	3.25808	0.08865	0.25387	0.00319	0.09314	0.0026	0.9	2.2	1490.8	103.8
G45	1100	332	0.21706	0.00637	0.03059	0.00038	0.05149	0.00155	2.7	26.1	194.3	4.8
G46	674	495	0.5785	0.01581	0.07364	0.0009	0.05702	0.0016	1.2	6.8	458.0	10.8
G47	774	21	1.14305	0.02943	0.11842	0.00143	0.07006	0.00185	7.3	22.4	721.5	16.5
G48	756	28	0.22303	0.00692	0.0313	0.0004	0.05171	0.00164	2.9	27.1	198.7	4.9
G49	90	47	1.20419	0.04185	0.1318	0.00179	0.06631	0.00236	0.6	2.2	798.1	20.4
G50	606	428	0.26159	0.00836	0.03617	0.00046	0.05249	0.00172	3.0	25.4	229.0	5.8
G51	356	126	0.23379	0.00884	0.03271	0.00044	0.05187	0.00201	2.8	25.8	207.5	5.5
G52	705	122	0.22591	0.00726	0.03215	0.00041	0.051	0.00168	1.4	15.3	204.0	5.1
G53	184	32	13.99382	0.35681	0.49637	0.00607	0.20462	0.00536	5.8	9.3	2863.4	84.0
G54	1816	169	0.18266	0.00522	0.02624	0.00032	0.05052	0.00148	2.0	23.7	167.0	4.1
G55	281	123	0.33523	0.0121	0.04614	0.00062	0.05273	0.00195	1.0	8.4	290.8	7.6
G56	119	49	1.49093	0.04693	0.1544	0.00201	0.07009	0.00227	0.1	0.6	925.6	22.5
G57	443	457	0.23648	0.00834	0.03332	0.00044	0.05152	0.00186	2.0	20.0	211.3	5.5
G58	491	192	0.24426	0.00833	0.03503	0.00046	0.05061	0.00177	0.0	0.6	221.9	5.7
G59	331	278	0.26551	0.00984	0.038	0.00051	0.05071	0.00193	-0.5	-5.5	240.4	6.3
G60	188	161	1.72414	0.05047	0.16947	0.00214	0.07385	0.00222	0.8	2.7	1009.2	23.6
G61	332	112	0.74069	0.02248	0.08802	0.00112	0.06108	0.00191	3.5	15.3	543.8	13.2
G62	370	60	0.28019	0.00997	0.03874	0.00051	0.0525	0.00192	2.4	20.2	245.0	6.4
G63	635	163	0.24053	0.00782	0.03249	0.00042	0.05374	0.0018	6.2	42.8	206.1	5.2
G64	323	208	0.23155	0.00894	0.03308	0.00045	0.05081	0.00201	0.8	9.7	209.8	5.6
G65	145	6	0.25517	0.01264	0.03549	0.00054	0.05218	0.00265	2.7	23.4	224.8	6.7
G66	321	141	0.28819	0.0107	0.03943	0.00053	0.05305	0.00202	3.1	24.7	249.3	6.6
G67	1111	24	0.21064	0.00655	0.02924	0.00037	0.0523	0.00168	4.5	37.7	185.8	4.6
G68	1274	112	0.22782	0.007	0.03205	0.0004	0.05159	0.00163	2.5	23.9	203.4	5.0
G69	200	72	0.33854	0.01413	0.04715	0.00067	0.05212	0.00223	-0.3	-2.2	297.0	8.2
G70	677	370	0.56702	0.01702	0.07225	0.00091	0.05697	0.00176	1.4	8.1	449.7	10.9
G71	285	144	0.18746	0.00832	0.02654	0.00038	0.05128	0.00234	3.4	33.4	168.8	4.8
G72	101	82	0.27611	0.01594	0.03555	0.0006	0.05638	0.00334	9.9	51.7	225.2	7.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G73	641	186	0.23699	0.00809	0.03301	0.00043	0.05211	0.00183	3.2	27.9	209.4	5.4
G74	639	154	0.23578	0.00802	0.03311	0.00043	0.0517	0.00181	2.4	22.8	210.0	5.4
G75	714	277	4.79903	0.13394	0.30262	0.00372	0.11512	0.00332	4.7	9.4	1881.7	102.2
G76	254	505	0.65288	0.02188	0.07972	0.00104	0.05945	0.00206	3.2	15.3	494.5	12.4
G77	1949	157	0.20317	0.00618	0.02707	0.00034	0.05447	0.00171	9.1	55.9	172.2	4.3
G78	375	495	0.49101	0.01629	0.06344	0.00082	0.05619	0.00192	2.3	13.6	396.5	10.0
G79	96	57	0.29123	0.01632	0.0409	0.00066	0.05169	0.00297	0.4	4.9	258.4	8.2
G80	370	262	1.92224	0.05685	0.17986	0.00226	0.07758	0.00238	2.1	6.2	1066.2	24.7
G81	445	229	5.63027	0.16111	0.34021	0.00422	0.12014	0.00356	1.7	3.6	1958.3	104.0
G82	414	296	0.24054	0.00906	0.03395	0.00046	0.05144	0.002	1.7	17.4	215.2	5.7
G83	6952	107	0.02588	0.00088	0.00398	0.00005	0.0472	0.00165	1.2	56.7	25.6	0.7
G84	192	158	0.30468	0.0131	0.04076	0.00058	0.05426	0.0024	4.9	32.6	257.5	7.2
G85	1137	117	0.20386	0.00667	0.02821	0.00036	0.05247	0.00177	5.1	41.4	179.3	4.5
G86	32	21	1.09925	0.05563	0.12068	0.00198	0.06612	0.00345	2.5	9.4	734.5	22.8
G87	452	182	0.2365	0.00877	0.03319	0.00044	0.05172	0.00198	2.4	23.0	210.5	5.5
G88	251	148	1.61698	0.0504	0.15871	0.00203	0.07396	0.00239	2.9	8.7	949.6	22.6
G89	1346	587	0.21609	0.00694	0.0305	0.00039	0.05143	0.00171	2.5	25.5	193.7	4.9
G90	542	285	10.1488	0.2971	0.43987	0.00548	0.1675	0.00509	4.2	7.2	2532.8	100.2
G91	693	186	0.28061	0.00964	0.03808	0.0005	0.0535	0.0019	4.2	31.2	240.9	6.2
G92	723	44	0.24749	0.00856	0.03449	0.00045	0.0521	0.00186	2.7	24.5	218.6	5.6
G93	230	222	0.56911	0.02077	0.0722	0.00097	0.05723	0.00216	1.8	10.1	449.4	11.7
G94	388	47	0.58782	0.0198	0.07425	0.00097	0.05748	0.00201	1.7	9.4	461.7	11.6
G95	203	116	10.68787	0.32373	0.46038	0.00585	0.16854	0.00531	2.3	4.0	2543.2	103.7
G96	369	283	0.24121	0.00965	0.0343	0.00047	0.05106	0.00211	0.9	10.6	217.4	5.9
G97	565	364	0.24698	0.00913	0.03353	0.00045	0.05348	0.00205	5.4	39.1	212.6	5.6
G98	197	161	0.2802	0.01253	0.03778	0.00055	0.05384	0.00248	4.9	34.4	239.1	6.8
G99	77	103	0.49763	0.02528	0.06181	0.00097	0.05845	0.00306	6.1	29.3	386.6	11.8
G100	384	130	0.74045	0.02497	0.08687	0.00113	0.06188	0.00217	4.8	19.9	537.0	13.4
G101	154	42	0.56432	0.02302	0.06758	0.00096	0.06063	0.00256	7.8	32.7	421.6	11.6
G102	294	303	0.41839	0.01599	0.05397	0.00074	0.05629	0.00223	4.8	26.8	338.8	9.0
G103	979	173	1.30415	0.04092	0.13165	0.00167	0.07192	0.00235	6.3	19.0	797.3	19.0
G104	292	158	11.22553	0.3478	0.46731	0.00593	0.17441	0.00563	2.8	4.9	2600.4	105.7

River Y

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G5	1014	119	1.59602	0.02404	0.15667	0.00182	0.07392	0.00106	3.3	9.7	938.2	20.2
G7	581	532	0.32702	0.00911	0.04155	0.00053	0.0571	0.0016	9.4	47.0	262.5	6.6
G8	268	142	3.0702	0.05189	0.24262	0.0029	0.09182	0.00151	1.8	4.3	1463.6	61.9
G9	1128	490	0.83577	0.0133	0.09401	0.00109	0.06451	0.00099	6.5	23.6	579.2	12.9
G11	1727	115	1.33907	0.02142	0.13871	0.00162	0.07005	0.00108	3.0	9.9	837.4	18.3
G12	353	255	24.47779	0.31799	0.64367	0.00748	0.27594	0.00332	2.6	4.1	3340.1	37.4
G13	898	234	1.59366	0.02441	0.15551	0.00181	0.07436	0.00109	3.9	11.4	931.8	20.2
G14	346	165	18.30017	0.23566	0.56443	0.00651	0.23525	0.0028	4.2	6.6	3088.1	37.7
G15	722	258	5.01192	0.06777	0.31483	0.00363	0.11551	0.00146	3.2	6.5	1887.8	45.1
G16	347	177	0.47048	0.01487	0.06105	0.00081	0.05592	0.00178	2.5	14.9	382.0	9.9
G17	179	88	4.31519	0.07882	0.29473	0.00363	0.10623	0.0019	1.9	4.1	1735.8	64.9
G20	662	969	0.83011	0.01677	0.0978	0.00118	0.06159	0.00123	2.0	8.8	601.5	13.8
G21	375	398	1.5025	0.02785	0.15343	0.00184	0.07106	0.00129	1.2	4.0	920.2	20.5
G22	707	531	0.53911	0.01159	0.06987	0.00084	0.05598	0.00119	0.6	3.5	435.4	10.2
G24	299	243	0.51547	0.01738	0.06719	0.00091	0.05567	0.0019	0.7	4.4	419.2	11.0
G25	351	215	0.58446	0.01724	0.07203	0.00094	0.05888	0.00175	4.2	20.3	448.4	11.4
G26	2431	794	0.20014	0.00394	0.02758	0.00033	0.05265	0.00102	5.6	44.1	175.4	4.1
G27	570	570	0.49365	0.01165	0.06628	0.00081	0.05404	0.00127	-1.5	-11.0	413.7	9.8
G28	387	382	1.10724	0.02399	0.12151	0.00149	0.06612	0.00142	2.4	8.7	739.3	17.2
G30	140	196	3.9104	0.07201	0.28198	0.00346	0.10062	0.00182	0.9	2.1	1635.7	66.4
G31	363	265	0.62354	0.01694	0.07798	0.001	0.05802	0.00158	1.7	8.7	484.1	11.9
G32	803	248	0.59347	0.01408	0.07418	0.00092	0.05805	0.00137	2.6	13.2	461.3	11.0
G33	1295	643	0.26831	0.00708	0.03627	0.00046	0.05368	0.00142	5.1	35.8	229.7	5.7
G34	1653	319	0.45094	0.00851	0.05777	0.00068	0.05664	0.00105	4.4	24.1	362.0	8.3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G35	883	520	0.94112	0.01709	0.10487	0.00124	0.06512	0.00115	4.8	17.4	642.9	14.5
G36	450	385	0.03077	0.00307	0.00438	0.0001	0.05096	0.00518	9.2	88.2	28.2	1.3
G37	239	204	1.71959	0.03504	0.16978	0.00208	0.07349	0.00148	0.5	1.6	1010.9	22.9
G38	893	815	0.31525	0.00911	0.04213	0.00054	0.05429	0.00158	4.6	30.5	266.0	6.7
G39	362	187	1.59447	0.03209	0.15943	0.00194	0.07257	0.00144	1.5	4.8	953.6	21.6
G41	213	125	0.26034	0.02056	0.03508	0.00075	0.05386	0.00435	5.7	39.1	222.2	9.3
G43	1659	56	1.46778	0.0221	0.14853	0.00172	0.07171	0.00103	2.7	8.7	892.7	19.3
G44	2119	236	0.45034	0.00763	0.05784	0.00067	0.05649	0.00093	4.1	23.0	362.5	8.2
G48	341	265	0.49812	0.0194	0.06063	0.00088	0.05961	0.00236	8.1	35.6	379.5	10.7
G50	221	167	4.09896	0.06667	0.29182	0.00348	0.10192	0.0016	0.2	0.5	1659.3	57.6
G51	1602	3301	0.34723	0.00741	0.04669	0.00056	0.05397	0.00114	2.9	20.4	294.1	6.9
G52	686	25	0.93651	0.01997	0.10115	0.00124	0.06718	0.00142	8.0	26.3	621.2	14.5
G53	126	91	0.42404	0.02317	0.05197	0.00089	0.05921	0.0033	9.9	43.2	326.6	10.9
G54	554	69	0.96432	0.02072	0.10554	0.00129	0.0663	0.00141	6.0	20.7	646.8	15.1
G55	1656	890	0.45825	0.00784	0.057	0.00067	0.05834	0.00097	7.2	34.1	357.3	8.1
G56	296	184	1.11276	0.02456	0.12515	0.00154	0.06452	0.00141	-0.1	-0.2	760.1	17.7
G57	764	98	1.00564	0.01747	0.11203	0.00132	0.06514	0.0011	3.2	12.1	684.5	15.3
G58	506	142	0.28037	0.00839	0.03912	0.00051	0.052	0.00157	1.5	13.4	247.4	6.3
G59	608	218	0.43102	0.01036	0.05815	0.00072	0.05378	0.00129	-0.1	-0.7	364.4	8.7
G60	357	318	0.59222	0.01973	0.07582	0.00103	0.05667	0.00191	0.2	1.4	471.2	12.3
G61	909	618	0.03703	0.00224	0.00552	0.00009	0.04867	0.003	3.9	73.1	35.5	1.2
G62	1024	119	1.29589	0.0204	0.13873	0.00161	0.06778	0.00102	0.8	2.8	837.5	18.3
G63	57	27	0.33687	0.03207	0.04673	0.0011	0.05231	0.00508	0.1	1.5	294.4	13.6
G64	3666	126	0.84293	0.01203	0.09419	0.00108	0.06493	0.00087	7.0	24.9	580.3	12.7
G65	161	96	0.42955	0.02077	0.05767	0.00091	0.05404	0.00266	0.4	3.0	361.5	11.1
G66	566	461	0.57382	0.01476	0.07216	0.00091	0.0577	0.00149	2.5	13.3	449.2	10.9
G67	3539	23	0.22371	0.00413	0.02964	0.00035	0.05476	0.00099	8.9	53.2	188.3	4.4
G69	747	549	0.30748	0.00826	0.04417	0.00055	0.05051	0.00136	-2.3	-27.6	278.7	6.8
G70	3015	2491	0.07267	0.00195	0.01047	0.00013	0.05036	0.00135	6.1	68.3	67.1	1.7
G71	252	142	6.48547	0.10482	0.3664	0.00443	0.12843	0.00201	1.6	3.1	2076.7	54.5
G72	201	77	2.90207	0.05527	0.23906	0.00293	0.08808	0.00165	0.1	0.2	1384.3	71.0
G73	1066	747	3.09906	0.0436	0.25131	0.0029	0.08948	0.00118	-0.9	-2.2	1414.3	50.1
G74	391	331	0.5454	0.01393	0.07032	0.00088	0.05628	0.00144	0.9	5.3	438.1	10.6
G75	419	269	7.8961	0.12158	0.39068	0.00469	0.14665	0.00217	4.4	7.9	2307.2	50.4
G77	142	110	0.54059	0.02683	0.06971	0.00113	0.05627	0.00284	1.0	6.0	434.4	13.6
G78	728	499	4.42266	0.06118	0.30337	0.0035	0.10578	0.00137	0.5	1.2	1727.9	47.3
G79	229	21	0.7988	0.02521	0.09498	0.00128	0.06102	0.00194	1.9	8.6	584.9	15.1
G80	557	586	0.43253	0.01249	0.05655	0.00073	0.0555	0.00161	2.9	17.9	354.6	8.9
G83	1181	251	0.65509	0.01336	0.08154	0.00098	0.05829	0.00117	1.2	6.5	505.3	11.7
G84	1734	41	0.12287	0.00343	0.01827	0.00023	0.04879	0.00136	0.9	15.4	116.7	2.9
G85	777	254	0.61482	0.01267	0.07645	0.00092	0.05835	0.00119	2.5	12.6	474.9	11.0
G86	673	63	1.57126	0.02691	0.16064	0.0019	0.07097	0.00118	-0.1	-0.4	960.3	21.1
G87	538	174	1.46904	0.02601	0.14772	0.00175	0.07216	0.00124	3.3	10.3	888.2	19.7
G88	250	145	0.37638	0.01625	0.04924	0.00074	0.05546	0.00243	4.7	28.0	309.9	9.1
G89	568	171	0.31032	0.00945	0.04228	0.00055	0.05326	0.00163	2.8	21.5	266.9	6.8
G90	1362	301	1.37925	0.02178	0.13505	0.00158	0.07411	0.00112	7.8	21.8	816.6	17.9
G91	330	201	1.9124	0.03954	0.17697	0.00219	0.07841	0.00161	3.3	9.2	1050.4	23.9
G92	2147	180	0.43726	0.00754	0.05477	0.00064	0.05793	0.00097	7.2	34.7	343.7	7.8
G93	640	386	1.36908	0.02536	0.14081	0.00168	0.07055	0.00128	3.1	10.1	849.3	19.0
G94	552	194	10.92299	0.14193	0.47636	0.00547	0.16638	0.002	0.2	0.4	2521.6	40.1
G95	355	146	5.26861	0.0749	0.33681	0.00392	0.1135	0.00152	-0.4	-0.8	1856.2	48.1
G96	530	91	1.62904	0.03235	0.15625	0.0019	0.07565	0.00148	4.9	13.8	935.9	21.2
G97	284	267	0.55569	0.01715	0.06934	0.00092	0.05815	0.00181	3.8	19.2	432.2	11.1
G99	185	163	0.43993	0.02108	0.05883	0.00093	0.05426	0.00265	0.5	3.5	368.5	11.3
G100	305	188	0.59039	0.01687	0.07667	0.00099	0.05588	0.0016	-1.1	-6.5	476.2	11.9
G101	374	247	1.08971	0.02415	0.12123	0.00149	0.06522	0.00144	1.5	5.6	737.7	17.2
G103	172	179	0.99874	0.03265	0.11727	0.00161	0.0618	0.00204	-1.6	-7.2	714.8	18.6
G104	681	235	1.87886	0.03119	0.17536	0.00207	0.07774	0.00125	3.1	8.7	1041.6	22.7
G105	683	318	0.55513	0.01252	0.07084	0.00087	0.05686	0.00127	1.6	9.1	441.2	10.4
G106	1024	521	1.19244	0.01965	0.13066	0.00153	0.06622	0.00105	0.7	2.7	791.6	17.4
G108	803	251	0.28439	0.00852	0.03907	0.00051	0.05281	0.00159	2.8	22.9	247.1	6.3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G109	202	108	0.29092	0.01317	0.04012	0.0006	0.05261	0.00242	2.2	18.7	253.6	7.5
G110	603	935	0.24613	0.00795	0.03457	0.00046	0.05166	0.00168	2.0	19.0	219.1	5.7
G111	212	212	0.57582	0.0203	0.07353	0.00102	0.05683	0.00203	1.0	5.5	457.4	12.2
G113	1185	354	0.29982	0.00716	0.04127	0.00051	0.05271	0.00125	2.1	17.6	260.7	6.3
G114	342	86	9.37895	0.13291	0.43804	0.00515	0.15536	0.00208	1.5	2.7	2405.8	45.1
G117	635	170	1.34935	0.03961	0.14089	0.0019	0.0695	0.00206	2.1	7.0	849.7	21.5
G119	164	113	1.48983	0.04078	0.15429	0.00204	0.07006	0.00193	0.1	0.6	925.0	22.8
G121	261	150	1.19224	0.03642	0.12039	0.00165	0.07186	0.00222	8.8	25.4	732.8	19.0
G122	1343	1091	0.26493	0.00657	0.0374	0.00046	0.0514	0.00127	0.8	8.6	236.7	5.7
G123	2603	1106	0.41868	0.00742	0.05439	0.00064	0.05585	0.00096	4.0	23.5	341.4	7.8
G124	942	220	1.25748	0.02577	0.13274	0.00162	0.06874	0.00139	2.9	9.8	803.5	18.4
G127	148	127	1.28567	0.03606	0.13975	0.00184	0.06675	0.00188	-0.5	-1.6	843.2	20.9
G128	2338	35	0.02594	0.00125	0.00397	0.00006	0.04736	0.00231	1.6	61.7	25.6	0.8
G129	463	283	0.33735	0.01019	0.04748	0.00061	0.05156	0.00157	-1.3	-12.5	299.0	7.6
G130	498	427	1.97281	0.03282	0.18434	0.00217	0.07766	0.00125	1.4	4.2	1090.6	23.7
G132	1474	1257	0.26761	0.0054	0.03587	0.00043	0.05413	0.00108	6.0	39.6	227.2	5.3
G133	2259	82	0.44534	0.00809	0.05826	0.00069	0.05546	0.00098	2.5	15.3	365.0	8.3
G134	945	566	0.52532	0.01039	0.06713	0.0008	0.05678	0.0011	2.3	13.1	418.9	9.7
G136	510	300	1.39387	0.02725	0.14159	0.00171	0.07143	0.00137	3.8	12.0	853.6	19.3
G137	2297	47	0.54052	0.00883	0.06748	0.00078	0.05812	0.00091	4.3	21.2	420.9	9.5
G138	511	429	9.81991	0.14073	0.43534	0.00514	0.16367	0.00222	3.8	6.6	2494.0	45.4
G140	450	256	10.95401	0.15236	0.4678	0.00549	0.16991	0.00222	1.8	3.2	2556.7	43.5
G142	69	39	1.10756	0.05373	0.11648	0.00198	0.06899	0.00342	6.6	21.0	710.3	22.9
G143	127	228	0.8077	0.03579	0.09573	0.00149	0.06122	0.00276	2.0	8.9	589.3	17.6
G144	499	218	1.63684	0.03166	0.16261	0.00197	0.07304	0.00139	1.4	4.3	971.3	21.8
G145	737	448	1.09	0.02232	0.12142	0.00147	0.06514	0.00132	1.3	5.1	738.7	16.9
G146	214	214	0.16798	0.01125	0.02559	0.00046	0.04763	0.00325	-3.2	-103	162.9	5.8
G147	238	264	4.0061	0.067	0.29381	0.00352	0.09894	0.0016	-1.5	-3.5	1604.2	59.9
G148	1767	383	0.50107	0.00836	0.06417	0.00075	0.05666	0.00091	2.9	16.1	400.9	9.1

d) Placer and coastal sands

Sample MB1

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G3	58	83	0.09738	0.02137	0.01467	0.00056	0.04817	0.01071	0.5	12.7	93.9	7.1
G4	886	556	0.13703	0.00434	0.01974	0.00027	0.05037	0.00159	3.5	40.5	126.0	3.4
G6	341	353	0.09995	0.00717	0.01494	0.00029	0.04853	0.00354	1.2	23.6	95.6	3.7
G7	113	64	0.28123	0.0233	0.03844	0.00084	0.05309	0.00448	3.5	26.9	243.1	10.5
G8	482	233	0.29765	0.00861	0.0413	0.00056	0.0523	0.0015	1.4	12.6	260.9	6.9
G9	244	130	0.57479	0.01705	0.07322	0.001	0.05696	0.00168	1.2	6.9	455.5	12.1
G10	3331	1692	0.11355	0.00316	0.01557	0.00021	0.05291	0.00146	9.6	69.3	99.6	2.6
G11	541	320	0.30726	0.00864	0.04081	0.00055	0.05463	0.00152	5.5	35.1	257.8	6.8
G13	627	490	0.55955	0.01219	0.07151	0.00092	0.05677	0.0012	1.3	7.6	445.3	11.0
G15	77	48	0.53631	0.05077	0.06469	0.00165	0.06015	0.00582	7.9	33.6	404.1	20.0
G16	664	128	0.28863	0.00776	0.0395	0.00052	0.05302	0.00141	3.1	24.2	249.7	6.5
G17	392	687	0.27668	0.00946	0.0372	0.00053	0.05396	0.00185	5.3	36.2	235.5	6.5
G18	257	486	0.27547	0.01381	0.04035	0.00065	0.04953	0.00251	-3.1	-47.2	255.0	8.1
G21	559	176	0.27745	0.008	0.03929	0.00053	0.05124	0.00147	0.1	1.3	248.4	6.6
G24	1370	581	0.09721	0.00489	0.01445	0.00023	0.04881	0.00249	1.8	33.3	92.5	3.0
G27	194	161	0.27414	0.01331	0.03791	0.0006	0.05246	0.00258	2.5	21.5	239.9	7.5
G29	249	474	0.27407	0.01198	0.03807	0.00058	0.05223	0.00231	2.1	18.4	240.9	7.3
G30	15174	5633	0.09734	0.00183	0.01362	0.00017	0.05185	0.00093	8.1	68.7	87.2	2.2
G31	527	192	0.29624	0.00848	0.04021	0.00054	0.05346	0.00152	3.7	27.0	254.1	6.7
G34	238	442	0.26734	0.01109	0.03714	0.00056	0.05223	0.00219	2.3	20.4	235.1	6.9
G37	959	365	0.28955	0.00669	0.03899	0.0005	0.05389	0.00121	4.7	32.7	246.5	6.2
G39	983	258	0.56922	0.01063	0.07238	0.00091	0.05706	0.00101	1.6	8.7	450.5	10.9
G41	332	255	0.56249	0.01603	0.06776	0.00092	0.06023	0.00171	7.2	30.9	422.7	11.2
G42	6023	3471	0.1083	0.0024	0.01555	0.0002	0.05054	0.00109	4.9	54.8	99.5	2.5
G44	474	229	0.31444	0.00972	0.04291	0.00059	0.05316	0.00164	2.5	19.3	270.9	7.3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G45	123	103	0.58122	0.02916	0.07422	0.00124	0.05682	0.00289	0.8	4.6	461.5	14.9
G46	688	430	0.29014	0.00796	0.03959	0.00053	0.05318	0.00144	3.4	25.6	250.3	6.5
G50	1166	454	0.10438	0.00487	0.01475	0.00023	0.05134	0.00243	6.8	63.2	94.4	3.0
G51	131	97	0.28883	0.01731	0.03833	0.00068	0.05467	0.00333	6.2	39.2	242.5	8.5
G52	98	63	0.57685	0.02857	0.07047	0.00117	0.05939	0.00298	5.3	24.5	439.0	14.1
G64	1871	285	0.57697	0.00954	0.07455	0.00092	0.05616	0.00086	-0.2	-1.1	463.5	11.1
G65	411	343	0.27518	0.00932	0.03953	0.00055	0.05051	0.00171	-1.2	-14.5	249.9	6.9
G66	212	215	0.13454	0.00938	0.01935	0.00036	0.05044	0.00357	3.7	42.6	123.6	4.6
G67	358	264	0.88377	0.02049	0.10522	0.00137	0.06094	0.00138	-0.3	-1.2	644.9	16.0
G68	304	202	0.28241	0.01115	0.03898	0.00058	0.05257	0.00209	2.5	20.5	246.5	7.1
G69	183	194	0.30	0.0146	0.03969	0.00064	0.05534	0.0027	7.0	41.1	250.9	8.0
G71	6820	3214	0.10	0.00185	0.01454	0.00018	0.05051	0.00087	5.2	57.4	93.1	2.3
G75	609	268	0.34	0.0088	0.04545	0.0006	0.05413	0.00138	3.5	23.8	286.5	7.4
G76	4150	2793	0.11	0.00219	0.01507	0.00019	0.05163	0.00101	7.3	64.2	96.4	2.4
G77	11209	5396	0.11	0.00213	0.0151	0.00019	0.0528	0.00098	9.5	69.8	96.6	2.4
G78	310	314	0.11	0.00652	0.01585	0.00027	0.0493	0.00303	2.5	37.5	101.4	3.5
G79	1305	959	0.11	0.0032	0.01559	0.00021	0.04948	0.00148	2.9	41.6	99.7	2.7
G81	221	185	0.28	0.01279	0.03914	0.00061	0.05208	0.0024	1.6	14.4	247.5	7.6
G82	152	151	0.59	0.02359	0.07185	0.00109	0.06007	0.00241	6.0	26.2	447.3	13.1
G84	488	223	0.30	0.00924	0.0395	0.00054	0.05461	0.00169	5.8	37.0	249.8	6.8
G86	2605	13	0.55	0.00861	0.07172	0.00088	0.05527	0.0008	-0.9	-5.5	446.5	10.6
G87	179	152	0.12	0.00953	0.01703	0.00034	0.05077	0.00412	5.0	52.7	108.9	4.3
G90	5484	3642	0.10	0.00187	0.01392	0.00017	0.05042	0.00093	5.3	58.5	89.1	2.2
G91	806	351	0.54	0.01105	0.06996	0.00089	0.05644	0.0011	1.2	7.1	435.9	10.7
G93	1450	26	0.59	0.01033	0.07302	0.00091	0.05852	0.00096	3.5	17.3	454.3	10.9
G94	327	249	0.28	0.0105	0.03793	0.00055	0.05267	0.00202	2.9	23.8	240.0	6.9
G98	3290	1518	0.10326	0.00228	0.01432	0.00018	0.05232	0.00112	9.0	69.4	91.6	2.3
G101	634	291	0.10249	0.00488	0.01545	0.00024	0.04811	0.00231	0.2	5.7	98.9	3.0
G102	216	168	0.28154	0.0138	0.03891	0.00062	0.0525	0.00261	2.4	19.8	246.1	7.7
G103	317	259	0.28326	0.0114	0.0383	0.00057	0.05367	0.00218	4.5	32.1	242.3	7.1
G105	1720	780	0.11425	0.00387	0.01582	0.00022	0.05241	0.00178	8.5	66.6	101.2	2.8
G113	320	185	0.30766	0.0121	0.04254	0.00063	0.05248	0.00208	1.4	12.3	268.6	7.8
G115	646	426	0.14291	0.00541	0.01992	0.00029	0.05207	0.00198	6.7	55.9	127.1	3.7
G117	5760	3206	0.10501	0.00198	0.01463	0.00018	0.0521	0.00093	8.3	67.7	93.6	2.3
G118	118	103	0.28624	0.01901	0.03811	0.00071	0.0545	0.00368	6.0	38.5	241.1	8.8
G120	1365	576	0.31371	0.01007	0.04129	0.00058	0.05513	0.00177	6.2	37.5	260.8	7.1
G121	193	195	0.28714	0.01457	0.04028	0.00065	0.05172	0.00266	0.7	6.7	254.6	8.1
G123	577	794	0.10783	0.00508	0.01521	0.00024	0.05145	0.00245	6.9	62.7	97.3	3.0
G124	552	207	1.77143	0.03063	0.17657	0.00221	0.07279	0.00118	-1.3	-4.0	1048.2	24.2
G125	6732	3589	0.09906	0.00185	0.01456	0.00018	0.04936	0.00088	2.9	43.5	93.2	2.3
G126	292	239	0.56313	0.01927	0.07332	0.00105	0.05572	0.00191	-0.5	-3.4	456.1	12.6
G127	525	368	0.10248	0.00543	0.0157	0.00025	0.04735	0.00254	-1.3	-51.4	100.4	3.2
G130	618	175	0.28126	0.00855	0.04003	0.00054	0.05098	0.00154	-0.5	-5.5	253.0	6.8
G131	120	138	0.5414	0.02606	0.07	0.00114	0.05612	0.00274	0.7	4.5	436.1	13.8
G132	556	220	0.28695	0.00935	0.04116	0.00057	0.05058	0.00165	-1.5	-17.2	260.0	7.1
G133	1524	47	0.60462	0.01084	0.07792	0.00097	0.0563	0.00095	-0.7	-4.4	483.7	11.6
G134	300	245	0.56854	0.01778	0.07388	0.00103	0.05584	0.00174	-0.5	-3.1	459.5	12.3
G136	691	405	0.10095	0.00461	0.01508	0.00023	0.04858	0.00224	1.2	24.4	96.5	2.9
G137	7972	5650	0.09911	0.00175	0.01483	0.00018	0.04849	0.0008	1.2	23.0	94.9	2.3
G141	869	315	0.28788	0.00787	0.04004	0.00053	0.05217	0.00141	1.5	13.6	253.1	6.6
G143	527	319	0.11176	0.00566	0.01564	0.00025	0.05185	0.00266	7.6	64.1	100.0	3.2
G144	1176	781	0.27495	0.00816	0.03794	0.00052	0.05259	0.00155	2.8	22.8	240.0	6.4
G148	864	492	0.10741	0.00438	0.01583	0.00023	0.04924	0.00202	2.4	36.6	101.2	3.0
G149	438	257	0.30601	0.01338	0.03944	0.00062	0.0563	0.00249	8.7	46.2	249.4	7.6
G150	7450	3327	0.10101	0.00199	0.01427	0.00018	0.05138	0.00097	7.0	64.6	91.3	2.3
G003	307	168	0.10053	0.0056	0.01465	0.00023	0.04978	0.00282	3.7	49.2	93.8	2.9
G004	461	417	2.31791	0.03461	0.19938	0.00219	0.08434	0.00125	3.9	9.9	1300.3	57.0
G005	120	113	0.52755	0.01941	0.06883	0.00092	0.0556	0.00208	0.3	1.7	429.1	11.2
G006	6732	3219	0.09605	0.00155	0.01419	0.00015	0.0491	0.00079	2.5	40.5	90.8	2.0
G008	800	457	1.765	0.02547	0.17517	0.0019	0.0731	0.00104	-0.7	-2.3	1040.5	20.9
G009	116	73	0.28743	0.01909	0.03969	0.00072	0.05254	0.00356	2.2	18.8	250.9	8.9

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G012	79	66	0.26117	0.01812	0.03485	0.00064	0.05436	0.00385	6.7	42.8	220.8	7.9
G013	7742	2839	0.09704	0.00169	0.01378	0.00015	0.0511	0.00089	6.6	64.1	88.2	1.9
G014	101	73	0.08478	0.01329	0.01295	0.00041	0.04749	0.00757	-0.5	-13.5	83.0	5.2
G015	826	358	0.2268	0.00677	0.03524	0.00042	0.04669	0.00141	-7.0	-572	223.3	5.2
G018	64	40	0.25285	0.03558	0.03384	0.00109	0.05421	0.00779	6.7	43.5	214.5	13.6
G021	284	174	0.25517	0.00907	0.03568	0.00047	0.05188	0.00188	2.1	19.3	226.0	5.8
G023	1057	704	0.10194	0.00428	0.01437	0.0002	0.05147	0.00221	7.2	64.9	92.0	2.5
G022	14236	4680	0.09641	0.00168	0.0141	0.00016	0.04959	0.00086	3.5	48.7	90.3	2.0
G024	155	191	0.5107	0.01724	0.06596	0.00086	0.05617	0.00193	1.7	10.2	411.8	10.4
G026	434	257	0.09578	0.00545	0.01463	0.00023	0.04751	0.00276	-0.7	-26.0	93.6	3.0
G027	5331	2683	0.10169	0.00207	0.01444	0.00016	0.05109	0.00104	6.4	62.3	92.4	2.1
G028	6335	3142	0.10591	0.00246	0.01471	0.00017	0.05222	0.00123	8.5	68.1	94.2	2.2
G029	5171	2521	0.09648	0.00207	0.01436	0.00016	0.04876	0.00105	1.7	32.5	91.9	2.1
G030	1150	615	0.09891	0.00395	0.01438	0.0002	0.04991	0.00203	4.1	51.8	92.0	2.5
G032	40	36	0.10844	0.02353	0.01489	0.00065	0.05282	0.01167	9.7	70.3	95.3	8.2
G033	516	81	0.30652	0.01075	0.0402	0.00053	0.05532	0.00198	6.8	40.2	254.1	6.6
G034	319	255	0.26884	0.00909	0.03871	0.00049	0.05038	0.00173	-1.2	-15.1	244.8	6.1
G035	178	166	0.25855	0.01145	0.0362	0.00052	0.05181	0.00234	1.8	17.2	229.3	6.4
G036	344	117	0.10051	0.00522	0.01514	0.00023	0.04816	0.00255	0.3	9.4	96.9	2.9
G037	743	694	0.26491	0.00624	0.03698	0.00043	0.05197	0.00124	1.9	17.6	234.1	5.3
G039	224	37	0.31945	0.02176	0.04447	0.00083	0.05211	0.00363	0.4	3.3	280.5	10.3
G040	130	124	0.10794	0.01334	0.01516	0.00043	0.05165	0.00652	7.3	64.0	97.0	5.4
G041	825	542	0.09113	0.00374	0.01344	0.00018	0.0492	0.00206	2.9	45.2	86.1	2.3
G042	148	97	2.88296	0.05963	0.2344	0.0028	0.08923	0.00187	1.5	3.7	1409.0	78.9
G046	743	487	0.0935	0.00346	0.01366	0.00018	0.04965	0.00187	3.8	51.0	87.5	2.3
G048	440	486	0.09322	0.0044	0.01415	0.0002	0.0478	0.0023	-0.1	-2.4	90.6	2.6
G049	542	96	0.26886	0.00711	0.03765	0.00045	0.0518	0.00139	1.5	13.8	238.3	5.6
G051	1080	316	0.09727	0.00299	0.0146	0.00018	0.04834	0.00151	1.0	19.6	93.4	2.3
G053	800	397	0.26312	0.00618	0.03656	0.00042	0.05221	0.00124	2.5	21.4	231.5	5.3
G057	575	232	0.11544	0.00451	0.01724	0.00023	0.04856	0.00193	0.6	13.1	110.2	2.9
G059	627	315	0.25942	0.00666	0.03667	0.00043	0.05132	0.00133	0.9	9.0	232.2	5.4
G060	283	129	0.26892	0.01141	0.03737	0.00053	0.05221	0.00226	2.2	19.7	236.5	6.6
G061	205	289	0.11161	0.01047	0.01665	0.00037	0.04862	0.00465	0.8	17.8	106.5	4.7
G062	73	64	0.09123	0.01591	0.01386	0.00047	0.04775	0.00846	0.0	-3.1	88.7	5.9
G063	330	229	0.51751	0.01347	0.06666	0.0008	0.05632	0.00148	1.8	10.4	416.0	9.7
G065	1675	918	0.49724	0.00806	0.06697	0.00073	0.05386	0.00087	-1.9	-14.4	417.9	8.9
G067	167	276	0.26474	0.01471	0.03585	0.00058	0.05358	0.00304	5.1	35.7	227.0	7.3
G068	1088	304	0.27941	0.00595	0.04042	0.00046	0.05015	0.00107	-2.0	-26.3	255.4	5.7
G070	260	116	0.09792	0.00705	0.01491	0.00027	0.04764	0.0035	-0.5	-18.2	95.4	3.4
G072	1153	371	0.09743	0.00308	0.01472	0.00018	0.04801	0.00154	0.2	4.4	94.2	2.3
G073	440	252	0.12144	0.00603	0.01814	0.00027	0.04857	0.00246	0.4	9.0	115.9	3.4
G074	591	577	0.1097	0.0053	0.0151	0.00023	0.05271	0.0026	9.4	69.5	96.6	2.9
G075	132	132	0.24577	0.01455	0.03509	0.00058	0.05082	0.00307	0.4	4.4	222.3	7.2
G076	82	101	0.37245	0.02105	0.04804	0.00079	0.05625	0.00325	6.3	34.5	302.4	9.8
G077	1333	1755	0.09892	0.00468	0.01497	0.00022	0.04794	0.00231	0.0	-0.7	95.8	2.8
G078	549	156	0.09411	0.00459	0.01416	0.00021	0.0482	0.00239	0.7	16.9	90.7	2.6
G079	928	284	0.10042	0.00368	0.015	0.00019	0.04856	0.00181	1.3	24.2	96.0	2.5
G080	263	90	0.24748	0.01188	0.0353	0.00052	0.05086	0.00249	0.4	4.5	223.7	6.5
G081	23495	11013	0.08576	0.00143	0.013	0.00014	0.04784	0.00079	0.2	8.0	83.3	1.8
G082	1341	471	0.09735	0.00277	0.01479	0.00018	0.04775	0.00138	-0.3	-10.1	94.6	2.3
G083	1277	238	0.26645	0.00558	0.03831	0.00043	0.05045	0.00106	-1.0	-12.3	242.4	5.4
G084	16545	5909	0.09348	0.0016	0.01339	0.00015	0.05066	0.00087	5.8	62.0	85.7	1.9
G085	24646	11863	0.08705	0.00139	0.01315	0.00014	0.04801	0.00076	0.7	14.6	84.2	1.8
G086	3579	130	0.30766	0.00742	0.04019	0.00047	0.05554	0.00135	7.2	41.4	254.0	5.9
G088	503	318	2.92919	0.04297	0.23867	0.00262	0.08904	0.00129	0.7	1.8	1404.9	54.9
G089	307	369	0.09252	0.0074	0.01395	0.00027	0.0481	0.00392	0.6	14.3	89.3	3.5
G090	447	327	0.09506	0.00963	0.01409	0.00034	0.04896	0.00507	2.2	38.2	90.2	4.4
G094	1236	402	0.27041	0.00567	0.03917	0.00044	0.05008	0.00106	-1.9	-24.8	247.7	5.5
G096	706	226	0.37563	0.01123	0.05364	0.00065	0.0508	0.00154	-3.9	-45.3	336.8	7.9
G098	446	260	0.1215	0.00855	0.01751	0.00033	0.05035	0.00362	4.0	47.0	111.9	4.2
G099	1775	338	0.09692	0.00261	0.01468	0.00017	0.0479	0.0013	0.0	-0.5	93.9	2.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G100	424	230	0.24779	0.00791	0.0356	0.00045	0.0505	0.00164	-0.3	-3.5	225.5	5.5

Sample MB2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	141	173	0.238	0.02011	0.03584	0.00073	0.04823	0.00414	-4.5	-105	227.0	9.1
G2	455	219	0.11432	0.00669	0.01577	0.00028	0.05266	0.00314	9.0	67.9	100.8	3.5
G3	1125	434	0.09578	0.00414	0.01466	0.00022	0.04745	0.00207	-1.0	-31.4	93.8	2.8
G5	2355	1133	0.08132	0.00271	0.0124	0.00017	0.04762	0.00159	-0.1	0.4	79.5	2.2
G7	446	231	0.10198	0.00653	0.01508	0.00028	0.04913	0.0032	2.2	37.3	96.5	3.5
G8	2106	184	0.26721	0.0062	0.03682	0.00047	0.0527	0.00119	3.2	26.2	233.1	5.9
G9	685	357	0.10995	0.0055	0.01558	0.00025	0.05127	0.0026	6.3	60.6	99.6	3.2
G11	329	150	0.10666	0.00779	0.01575	0.00032	0.0492	0.00366	2.2	36.0	100.7	4.0
G12	271	191	0.10648	0.00981	0.01465	0.00035	0.05279	0.00497	9.5	70.7	93.8	4.4
G13	312	211	0.26541	0.02054	0.03584	0.00077	0.05378	0.00425	5.3	37.3	227.0	9.6
G14	354	442	0.10096	0.00836	0.01404	0.00031	0.05224	0.00441	8.8	69.7	89.8	3.9
G16	1441	1070	0.09841	0.00563	0.01417	0.00025	0.05043	0.00293	5.1	57.8	90.7	3.1
G17	360	217	0.13192	0.00887	0.01903	0.00036	0.05036	0.00344	3.5	42.5	121.5	4.5
G18	247	198	0.25432	0.01455	0.03604	0.00063	0.05125	0.00298	0.8	9.6	228.2	7.8
G19	141	194	0.11131	0.01328	0.01609	0.00045	0.05026	0.00611	4.2	50.3	102.9	5.7
G20	727	379	0.24899	0.00912	0.0341	0.00049	0.05303	0.00195	4.4	34.5	216.2	6.1
G21	946	58	0.636	0.01717	0.07425	0.001	0.06221	0.00167	8.3	32.2	461.7	12.0
G22	413	256	0.13051	0.00808	0.01887	0.00034	0.05023	0.00317	3.4	41.4	120.5	4.3
G24	564	376	0.27224	0.0106	0.03854	0.00057	0.05131	0.00201	0.3	4.2	243.8	7.0
G25	148	79	0.10902	0.01336	0.01613	0.00044	0.04907	0.00612	1.8	31.8	103.2	5.6
G27	626	235	0.09506	0.00555	0.0151	0.00026	0.04572	0.00271	-4.6	-965	96.6	3.3
G28	570	275	0.10519	0.00747	0.01453	0.00029	0.05257	0.00381	9.2	70.0	93.0	3.7
G29	246	135	0.10122	0.01009	0.01444	0.00035	0.05092	0.00518	6.0	61.0	92.4	4.5
G30	390	195	0.10339	0.00741	0.0168	0.00032	0.04471	0.00326	-7.0	-1073	107.4	4.0
G31	357	213	0.2886	0.01389	0.03864	0.00063	0.05424	0.00265	5.4	35.8	244.4	7.8
G32	2578	125	0.66224	0.01484	0.08231	0.00106	0.05843	0.00128	1.2	6.6	509.9	12.6
G33	339	143	0.09639	0.00782	0.01552	0.00032	0.0451	0.00372	-5.9	-992	99.3	4.1
G34	601	120	2.90818	0.05513	0.2328	0.00296	0.09073	0.00164	2.6	6.4	1440.8	68.3
G35	183	173	0.11361	0.01145	0.01599	0.0004	0.0516	0.00531	6.8	61.8	102.3	5.1
G40	705	337	0.09797	0.00555	0.01488	0.00025	0.04783	0.00275	-0.3	-6.0	95.2	3.2
G42	461	1385	0.26704	0.01112	0.03688	0.00056	0.0526	0.00221	3.0	25.0	233.4	6.9
G43	553	378	0.12354	0.00685	0.01827	0.00031	0.04911	0.00276	1.4	23.7	116.7	3.9
G44	881	373	0.09735	0.00478	0.01443	0.00023	0.049	0.00244	2.2	37.6	92.3	2.9
G45	411	169	0.11961	0.00774	0.01829	0.00033	0.04749	0.00312	-1.9	-59.7	116.9	4.2
G46	1087	1626	0.25836	0.00787	0.03671	0.0005	0.05112	0.00155	0.4	5.6	232.4	6.2
G48	864	368	0.10943	0.00524	0.01547	0.00025	0.05137	0.00249	6.5	61.6	99.0	3.1
G49	811	510	0.10526	0.00534	0.01583	0.00026	0.04828	0.00248	0.3	10.4	101.3	3.2
G51	90	81	0.10111	0.01649	0.01448	0.00051	0.05071	0.00843	5.5	59.3	92.7	6.5
G52	500	221	0.10568	0.00656	0.01572	0.00028	0.04882	0.00308	1.4	27.7	100.6	3.6
G53	319	209	0.2733	0.01313	0.03639	0.00059	0.05454	0.00266	6.5	41.4	230.4	7.3
G54	1600	676	0.09477	0.00364	0.01383	0.0002	0.04978	0.00193	3.8	52.1	88.5	2.6
G56	499	246	0.11186	0.00687	0.01561	0.00028	0.05205	0.00325	7.9	65.3	99.8	3.6
G59	921	703	0.12108	0.00529	0.01813	0.00028	0.0485	0.00214	0.3	6.5	115.8	3.5
G60	964	641	0.10222	0.00478	0.01513	0.00024	0.04907	0.00232	2.1	36.0	96.8	3.0
G61	687	375	0.097	0.00536	0.01487	0.00025	0.04737	0.00265	-1.3	-41.0	95.2	3.2
G62	288	245	0.2578	0.0138	0.03678	0.00062	0.0509	0.00276	0.0	1.5	232.9	7.7
G65	1160	896	0.09641	0.0042	0.01546	0.00023	0.04529	0.00199	-5.5	-988	98.9	2.9
G66	855	534	0.12007	0.00636	0.01771	0.00029	0.04923	0.00265	1.7	28.8	113.2	3.7
G67	2191	1174	0.09551	0.00316	0.01429	0.0002	0.04855	0.00161	1.3	27.6	91.4	2.5
G68	667	371	0.09952	0.00543	0.01506	0.00025	0.04798	0.00266	-0.1	0.7	96.4	3.2
G69	981	20	0.53598	0.01392	0.06874	0.00091	0.05663	0.00145	1.7	10.0	428.6	11.0
G71	314	127	0.31214	0.01468	0.04299	0.00068	0.05273	0.00251	1.6	14.4	271.4	8.5
G72	256	123	0.10369	0.0091	0.0155	0.00035	0.04859	0.00435	1.0	22.4	99.2	4.4
G73	837	562	0.10136	0.00539	0.01443	0.00024	0.05101	0.00276	6.1	61.7	92.4	3.1

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G74	507	462	0.09676	0.00624	0.01458	0.00027	0.04819	0.00316	0.5	14.0	93.3	3.4
G76	380	283	0.11126	0.00757	0.01565	0.0003	0.05164	0.00358	7.0	62.9	100.1	3.8
G77	288	186	0.10306	0.00835	0.015	0.00032	0.04991	0.00412	3.7	49.6	96.0	4.1
G78	389	196	0.11395	0.00796	0.0169	0.00033	0.04897	0.00348	1.5	26.2	108.0	4.2
G79	475	649	0.09679	0.00736	0.01427	0.00029	0.04927	0.00382	2.7	43.2	91.3	3.7
G80	320	323	0.27323	0.01282	0.03805	0.00061	0.05216	0.00248	1.9	17.7	240.7	7.5
G81	1278	142	0.27563	0.00938	0.03864	0.00054	0.05182	0.00177	1.1	11.9	244.4	6.8
G82	351	160	0.1067	0.00858	0.01466	0.00032	0.05285	0.00434	9.7	70.9	93.8	4.1
G83	464	236	0.28959	0.01121	0.04114	0.0006	0.05113	0.00199	-0.7	-5.4	259.9	7.5
G84	588	454	0.13316	0.00643	0.01903	0.0003	0.05083	0.00249	4.4	47.9	121.5	3.8
G85	514	579	10.39959	0.17577	0.45403	0.00572	0.16636	0.00263	2.4	4.3	2521.3	52.7
G86	233	129	0.0954	0.00903	0.0138	0.00033	0.05019	0.00485	4.6	56.6	88.4	4.2
G87	304	141	0.12147	0.01009	0.01659	0.00037	0.05317	0.00451	9.7	68.4	106.1	4.7
G88	249	201	0.09138	0.00827	0.01448	0.00032	0.04585	0.00423	-4.1	-925	92.6	4.1
G90	553	398	0.10963	0.00732	0.01523	0.00029	0.05229	0.00356	8.4	67.3	97.4	3.7
G91	317	117	0.10608	0.00774	0.01537	0.00031	0.05013	0.00373	4.2	51.1	98.3	3.9
G93	665	496	0.10931	0.00994	0.01556	0.00037	0.05102	0.00474	5.8	58.8	99.5	4.7
G95	875	291	0.10189	0.00461	0.01463	0.00023	0.05059	0.00232	5.2	57.9	93.6	2.9
G97	632	310	0.09996	0.00531	0.01512	0.00025	0.04801	0.00258	-0.1	1.7	96.8	3.2
G98	698	303	0.26833	0.00867	0.03649	0.00051	0.05342	0.00173	4.5	33.3	231.0	6.3
G99	884	304	0.0979	0.00442	0.01525	0.00023	0.04663	0.00213	-2.9	-222	97.6	3.0
G100	739	511	0.10076	0.00487	0.01511	0.00024	0.04842	0.00237	0.8	19.3	96.7	3.0
G101	185	122	0.52806	0.02473	0.06741	0.0011	0.05689	0.0027	2.4	13.6	420.5	13.3
G102	557	243	0.10607	0.00607	0.01543	0.00027	0.04994	0.0029	3.7	48.6	98.7	3.4
G103	631	272	0.27322	0.00926	0.03903	0.00055	0.05084	0.00173	-0.6	-5.7	246.8	6.8
G104	3513	82	0.46077	0.00853	0.05996	0.00075	0.05581	0.00098	2.5	15.5	375.4	9.1
G105	689	379	0.11181	0.00586	0.0156	0.00026	0.05207	0.00277	7.8	65.4	99.8	3.3
G106	379	198	0.10247	0.00691	0.0156	0.00029	0.04772	0.00327	-0.7	-18.4	99.8	3.7
G107	464	551	0.11126	0.00651	0.0165	0.00029	0.04898	0.00291	1.5	28.1	105.5	3.6
G109	433	436	0.11238	0.00667	0.01602	0.00028	0.05095	0.00308	5.5	57.0	102.5	3.6
G112	211	142	0.12558	0.01027	0.01769	0.00038	0.05157	0.0043	6.3	57.6	113.0	4.9
G113	1240	287	0.10336	0.0043	0.01539	0.00023	0.04879	0.00205	1.5	28.6	98.4	2.9
G115	156	161	0.27914	0.01691	0.0372	0.00068	0.0545	0.00336	6.2	39.9	235.4	8.5
G116	221	115	0.26823	0.01736	0.04148	0.00076	0.04696	0.00309	-7.9	-456	262.0	9.4
G117	189	207	0.5261	0.02162	0.06995	0.00106	0.05462	0.00227	-1.5	-9.8	435.9	12.8
G118	696	169	0.11387	0.00704	0.01601	0.00029	0.05166	0.00325	6.9	62.1	102.4	3.7
G119	466	195	4.88142	0.0854	0.30818	0.00388	0.11504	0.0019	3.9	7.9	1880.5	58.9
G120	90	74	0.49353	0.03003	0.07023	0.00127	0.05104	0.00315	-6.9	-80.5	437.6	15.3
G121	475	230	0.28123	0.01026	0.03946	0.00057	0.05176	0.0019	0.8	9.2	249.5	7.0
G124	416	203	0.10011	0.00622	0.01574	0.00028	0.04619	0.00292	-3.8	-1207	100.7	3.5
G125	649	280	0.11271	0.00531	0.01609	0.00025	0.05087	0.00243	5.3	56.2	102.9	3.2
G126	144	115	0.27995	0.01771	0.04009	0.00074	0.05071	0.00326	-1.1	-11.2	253.4	9.2
G127	194	138	0.55657	0.02179	0.07044	0.00106	0.05739	0.00227	2.4	13.3	438.8	12.8
G128	389	84	5.20606	0.09233	0.32901	0.00416	0.11492	0.00193	1.1	2.4	1878.7	59.9
G129	394	271	0.09516	0.00603	0.01514	0.00027	0.04566	0.00294	-4.7	-968	96.9	3.4
G130	661	421	0.27846	0.00876	0.03936	0.00054	0.05138	0.00162	0.2	3.5	248.9	6.7
G131	598	276	0.1075	0.0053	0.01577	0.00025	0.0495	0.00247	2.8	41.2	100.9	3.2
G132	235	138	0.63174	0.0216	0.07699	0.00111	0.05959	0.00205	4.0	18.8	478.1	13.3
G133	251	141	0.11395	0.00983	0.01656	0.00037	0.04998	0.0044	3.5	45.4	105.9	4.7
G134	136	123	11.05064	0.20443	0.4903	0.00641	0.16369	0.00289	-1.7	-3.1	2494.2	58.9
G135	1021	521	0.29103	0.00777	0.04128	0.00054	0.05121	0.00135	-0.5	-4.3	260.8	6.7
G136	817	386	0.11013	0.00488	0.01584	0.00024	0.0505	0.00227	4.7	53.6	101.3	3.1
G137	1260	212	1.40585	0.02561	0.14775	0.00185	0.06911	0.00119	0.3	1.5	888.4	20.8
G138	188	256	0.10846	0.00995	0.01694	0.00038	0.04649	0.00434	-3.4	-366	108.3	4.8
G139	393	3	0.60279	0.02417	0.07612	0.00116	0.05751	0.00233	1.3	7.4	472.9	13.9
G140	26165	9191	0.0806	0.00144	0.01221	0.00015	0.04792	0.00081	0.5	17.1	78.3	1.9
G141	172	156	0.29556	0.0173	0.04085	0.00073	0.05255	0.00313	1.9	16.5	258.1	9.0
G142	404	212	0.31034	0.01225	0.04393	0.00065	0.05131	0.00204	-1.0	-8.9	277.2	8.0
G143	339	150	0.14793	0.00871	0.02159	0.00038	0.04976	0.00298	1.7	25.0	137.7	4.8
G145	345	161	0.30229	0.01414	0.03961	0.00064	0.05543	0.00263	7.1	41.7	250.4	7.9
G148	314	148	0.11339	0.00852	0.01683	0.00034	0.04893	0.00375	1.4	25.5	107.6	4.3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G149	604	764	0.31314	0.01291	0.04189	0.00064	0.05429	0.00226	4.5	30.9	264.6	7.9
G150	310	240	0.30883	0.01349	0.04267	0.00066	0.05257	0.00232	1.5	13.2	269.3	8.1

Sample MB3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	189	100	0.11613	0.00804	0.01737	0.00031	0.04851	0.00341	0.5	10.7	111.0	3.9
G2	291	145	0.54557	0.01414	0.07144	0.0009	0.05541	0.00143	-0.6	-3.8	444.8	10.8
G3	171	121	0.54619	0.01795	0.07095	0.00096	0.05586	0.00185	0.1	1.0	441.9	11.5
G4	655	54	0.50573	0.01009	0.06732	0.0008	0.05451	0.00107	-1.0	-7.1	420.0	9.7
G5	212	92	0.12704	0.00893	0.01893	0.00035	0.0487	0.00349	0.4	9.4	120.9	4.4
G6	391	892	0.2568	0.01198	0.03653	0.00056	0.05101	0.00242	0.3	4.2	231.3	6.9
G8	326	273	0.10291	0.00818	0.01547	0.00031	0.04828	0.00391	0.6	12.6	98.9	3.9
G9	623	483	0.29041	0.00714	0.04162	0.00051	0.05063	0.00124	-1.5	-17.5	262.9	6.4
G11	711	310	0.10953	0.00376	0.01648	0.00022	0.04823	0.00167	0.1	4.4	105.4	2.8
G15	947	591	0.0989	0.00407	0.01489	0.00021	0.04819	0.00201	0.5	12.4	95.3	2.7
G16	560	327	0.53702	0.01107	0.06998	0.00084	0.05568	0.00113	0.1	0.8	436.0	10.1
G18	327	116	0.52912	0.01348	0.06982	0.00088	0.05499	0.0014	-0.9	-5.7	435.0	10.6
G21	142	171	0.09298	0.01197	0.01406	0.00039	0.04799	0.00629	0.3	7.9	90.0	5.0
G22	448	302	0.53712	0.01193	0.07019	0.00086	0.05552	0.00122	-0.2	-1.0	437.3	10.3
G23	325	346	0.12738	0.00722	0.01911	0.00031	0.04837	0.00279	-0.2	-4.0	122.0	4.0
G24	367	331	0.10759	0.00544	0.0158	0.00025	0.0494	0.00254	2.7	39.4	101.1	3.1
G25	257	184	0.55694	0.0153	0.07248	0.00093	0.05576	0.00154	-0.3	-1.9	451.0	11.1
G26	268	197	0.09659	0.0072	0.01454	0.00028	0.0482	0.00366	0.5	14.6	93.1	3.6
G27	940	790	0.27686	0.00595	0.03889	0.00047	0.05165	0.00109	0.9	8.9	246.0	5.8
G30	412	80	0.10893	0.00816	0.01644	0.00032	0.04808	0.00367	-0.1	-2.0	105.1	4.1
G31	618	362	0.10009	0.00501	0.01515	0.00023	0.04794	0.00244	0.0	-1.9	96.9	3.0
G32	678	373	0.09879	0.00485	0.01474	0.00023	0.04862	0.00242	1.5	27.2	94.3	2.9
G33	274	190	0.52213	0.01413	0.06799	0.00087	0.05572	0.00151	0.6	3.8	424.0	10.5
G34	71	71	0.09992	0.01739	0.01503	0.00054	0.04822	0.00855	0.5	12.6	96.2	6.9
G35	1002	992	0.10076	0.00317	0.01518	0.0002	0.04816	0.00152	0.4	9.5	97.1	2.5
G36	332	72	0.27378	0.01181	0.03813	0.00056	0.0521	0.00228	1.9	16.8	241.2	7.0
G38	248	172	0.11143	0.00692	0.01558	0.00027	0.05188	0.00328	7.6	64.4	99.7	3.4
G39	92	47	0.56235	0.03151	0.0744	0.00127	0.05485	0.00313	-2.1	-14.0	462.6	15.3
G40	336	202	0.10162	0.00601	0.01525	0.00025	0.04834	0.00291	0.7	15.9	97.6	3.2
G41	221	176	0.11395	0.00687	0.01684	0.00028	0.04909	0.00301	1.8	29.1	107.7	3.6
G42	368	376	0.54934	0.01299	0.0722	0.00089	0.05521	0.0013	-1.1	-6.9	449.4	10.7
G43	243	214	0.10094	0.00733	0.01498	0.00028	0.0489	0.00362	1.9	33.0	95.8	3.6
G44	142	138	0.0981	0.00856	0.01485	0.0003	0.04795	0.00425	0.0	0.5	95.0	3.9
G45	466	465	0.31571	0.0084	0.04394	0.00055	0.05214	0.00139	0.5	4.8	277.2	6.8
G46	361	240	0.11534	0.01117	0.01757	0.00041	0.04763	0.00471	-1.3	-39.9	112.3	5.2
G47	101	41	0.10366	0.01313	0.01494	0.00042	0.05033	0.0065	4.7	54.5	95.6	5.4
G48	94	133	0.09412	0.01065	0.01422	0.00035	0.04801	0.00552	0.3	7.9	91.0	4.4
G49	322	266	0.10472	0.00657	0.0153	0.00027	0.04965	0.00317	3.3	45.2	97.9	3.4
G52	398	363	0.1289	0.00714	0.01917	0.00031	0.04879	0.00275	0.6	11.0	122.4	4.0
G53	600	238	5.15513	0.07043	0.33147	0.00382	0.11285	0.00144	0.0	0.0	1845.7	45.7
G54	105	59	0.09527	0.01084	0.01401	0.00036	0.04934	0.00572	3.0	45.3	89.7	4.5
G55	238	72	0.28182	0.01058	0.03944	0.00055	0.05184	0.00197	1.1	10.4	249.4	6.8
G56	127	88	0.10623	0.01701	0.01602	0.00055	0.04811	0.00785	0.0	2.1	102.5	7.0
G57	1195	317	0.09417	0.00342	0.01429	0.00019	0.04783	0.00175	0.0	-1.9	91.4	2.5
G58	571	224	0.10303	0.00472	0.01554	0.00023	0.04812	0.00224	0.2	5.3	99.4	2.9
G59	97	63	0.12262	0.01409	0.01835	0.00047	0.04849	0.00568	0.2	4.9	117.2	6.0
G60	264	99	0.10683	0.00641	0.01605	0.00027	0.04829	0.00295	0.5	9.6	102.6	3.4
G61	2378	2658	0.10466	0.00305	0.01567	0.0002	0.04847	0.00142	0.9	18.1	100.2	2.5
G62	632	1475	0.25856	0.01047	0.03697	0.00053	0.05074	0.00208	-0.2	-2.1	234.0	6.6
G63	1147	273	0.10108	0.00645	0.01404	0.00025	0.05224	0.0034	8.8	69.6	89.9	3.2
G65	272	364	0.10264	0.01208	0.01557	0.00042	0.04785	0.00574	-0.4	-9.9	99.6	5.4
G66	415	254	0.12529	0.00641	0.01815	0.00029	0.0501	0.0026	3.5	41.9	115.9	3.6
G69	326	410	0.1015	0.00615	0.01449	0.00025	0.05083	0.00314	5.9	60.2	92.7	3.2
G70	709	302	0.11146	0.00439	0.01542	0.00022	0.05245	0.00209	8.8	67.7	98.6	2.8

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G72	473	158	1.21902	0.02196	0.12561	0.0015	0.07042	0.00124	6.1	18.9	762.7	17.1
G73	265	168	0.10743	0.00742	0.0162	0.0003	0.04812	0.00338	0.0	1.3	103.6	3.8
G74	285	203	0.09454	0.00932	0.01438	0.00034	0.0477	0.0048	-0.3	-10.2	92.0	4.3
G75	655	312	0.10495	0.00378	0.01569	0.00021	0.04855	0.00176	1.0	20.5	100.3	2.7
G76	344	154	0.13065	0.00591	0.01867	0.00028	0.05077	0.00233	4.5	48.2	119.3	3.5
G78	174	258	0.09738	0.00961	0.01453	0.00034	0.04863	0.00489	1.5	28.4	93.0	4.3
G79	423	287	0.09967	0.00555	0.01508	0.00025	0.04794	0.00272	0.0	-1.4	96.5	3.1
G80	427	22	0.28975	0.00901	0.04114	0.00054	0.05111	0.0016	-0.6	-5.8	259.9	6.7
G81	98	115	0.1266	0.01461	0.01817	0.00048	0.05055	0.00595	4.2	47.3	116.1	6.0
G82	414	210	0.10475	0.00498	0.01581	0.00024	0.04809	0.00232	0.1	2.3	101.1	3.0
G83	94	50	0.55773	0.02723	0.07336	0.00116	0.05517	0.00274	-1.4	-9.0	456.3	14.0
G85	167	79	0.10161	0.00878	0.01507	0.00032	0.04893	0.00431	2.0	33.3	96.4	4.1
G86	238	134	0.11179	0.00693	0.01671	0.00028	0.04856	0.00306	0.7	15.6	106.8	3.6
G87	912	812	0.10846	0.00351	0.01641	0.00021	0.04796	0.00156	-0.3	-8.9	104.9	2.7
G88	148	175	0.12154	0.01009	0.01834	0.00037	0.04809	0.00406	-0.5	-13.0	117.1	4.6
G89	422	328	0.1028	0.00639	0.0154	0.00027	0.04844	0.00307	0.9	18.6	98.5	3.4
G90	80	71	0.29319	0.02008	0.0385	0.00072	0.05525	0.00386	7.2	42.3	243.6	9.0
G91	1227	312	0.27503	0.00542	0.03942	0.00047	0.05062	0.00098	-1.0	-11.5	249.3	5.8
G92	234	131	0.1248	0.00925	0.0172	0.00034	0.05263	0.00398	8.5	64.9	110.0	4.3
G93	513	128	0.53683	0.01125	0.07012	0.00085	0.05555	0.00115	-0.1	-0.6	436.9	10.2
G94	45	21	0.1245	0.01994	0.01815	0.00053	0.04978	0.00807	2.8	37.2	115.9	6.7
G95	1822	950	0.51617	0.00806	0.06398	0.00074	0.05853	0.00087	5.7	27.3	399.8	9.0
G96	760	649	0.10537	0.0041	0.01548	0.00022	0.0494	0.00194	2.7	40.7	99.0	2.7
G98	136	166	0.09166	0.0105	0.01418	0.00035	0.04689	0.00546	-1.9	-109	90.8	4.5
G100	523	165	0.26212	0.00717	0.03741	0.00047	0.05084	0.00139	-0.2	-1.5	236.8	5.9
G101	532	239	0.13239	0.00575	0.01855	0.00027	0.05179	0.00228	6.5	57.1	118.5	3.5
G102	651	688	0.26526	0.0064	0.03775	0.00046	0.05099	0.00122	0.0	0.5	238.9	5.8
G104	557	224	0.09212	0.00683	0.01398	0.00027	0.04782	0.00361	0.0	-0.2	89.5	3.4
G105	112	72	0.27621	0.01715	0.04021	0.0007	0.04984	0.00315	-2.6	-35.6	254.1	8.7
G106	506	302	0.09929	0.00422	0.01509	0.00022	0.04774	0.00205	-0.5	-13.2	96.6	2.7
G107	66373	0	0.35496	0.01791	0.0484	0.00077	0.05321	0.00273	1.2	9.8	304.7	9.4
G108	612	250	0.12795	0.0045	0.01887	0.00025	0.04919	0.00175	1.5	23.2	120.5	3.2
G109	86	210	0.25898	0.02229	0.03845	0.00082	0.04887	0.00428	-3.9	-71.9	243.2	10.1
G111	135	206	0.27107	0.01555	0.0392	0.00065	0.05017	0.00293	-1.7	-22.2	247.9	8.1
G112	127	96	0.60054	0.02141	0.07612	0.00106	0.05725	0.00206	1.0	5.5	472.9	12.7
G113	1181	598	0.10245	0.00362	0.01457	0.0002	0.05102	0.00182	6.2	61.5	93.2	2.5
G114	314	369	4.85095	0.07126	0.30791	0.0036	0.11431	0.00159	3.7	7.4	1869.0	49.8
G115	285	149	0.09972	0.00595	0.01518	0.00025	0.04767	0.00289	-0.6	-18.3	97.1	3.2
G117	361	75	4.66909	0.0777	0.29988	0.00361	0.11297	0.00182	4.2	8.5	1847.8	57.7
G118	614	124	0.53253	0.01269	0.0683	0.00085	0.05657	0.00134	1.8	10.2	425.9	10.2
G119	240	286	0.10017	0.00927	0.01483	0.00033	0.04902	0.00462	2.1	36.3	94.9	4.2
G120	663	675	0.09761	0.00483	0.01409	0.00022	0.05028	0.00253	4.9	56.6	90.2	2.8
G121	124	68	0.26382	0.01518	0.03777	0.00063	0.05068	0.00296	-0.5	-5.7	239.0	7.8
G122	231	178	0.10997	0.00721	0.01585	0.00028	0.05035	0.00336	4.4	52.0	101.4	3.5
G123	173	104	0.11397	0.01011	0.01714	0.00037	0.04825	0.00436	0.0	1.5	109.6	4.7
G124	449	264	0.12907	0.0054	0.01939	0.00028	0.04829	0.00205	-0.4	-9.1	123.8	3.5
G125	206	131	0.11303	0.00816	0.01696	0.00032	0.04836	0.00355	0.3	7.3	108.4	4.0
G126	272	126	0.13298	0.0076	0.01989	0.00033	0.04851	0.00282	-0.2	-2.3	127.0	4.1
G127	843	306	0.10685	0.00578	0.01616	0.00026	0.04796	0.00264	-0.3	-7.3	103.4	3.3
G128	295	193	0.3338	0.01409	0.04648	0.00068	0.0521	0.00223	-0.1	-1.0	292.9	8.4
G129	180	127	0.10196	0.00756	0.01526	0.00029	0.04847	0.00365	1.0	20.3	97.6	3.6
G131	1655	714	1.21695	0.01728	0.13261	0.00153	0.06659	0.00089	0.7	2.7	802.7	17.4
G132	260	219	0.295	0.01061	0.04201	0.00057	0.05095	0.00185	-1.1	-11.3	265.3	7.1
G133	458	164	0.44368	0.01066	0.05967	0.00074	0.05395	0.00129	-0.2	-1.2	373.6	9.0
G134	159	140	0.10448	0.00814	0.01536	0.0003	0.04935	0.00391	2.6	40.2	98.3	3.8
G135	171	85	0.11705	0.00886	0.01749	0.00034	0.04855	0.00374	0.5	11.4	111.8	4.3
G137	822	333	0.10149	0.00542	0.01539	0.00025	0.04784	0.0026	-0.3	-9.1	98.5	3.1
G139	83	35	0.12049	0.01616	0.01657	0.0005	0.05277	0.00722	9.1	66.8	105.9	6.4
G140	375	174	0.0992	0.00566	0.01514	0.00025	0.04755	0.00276	-0.9	-27.3	96.9	3.2
G141	168	97	0.56274	0.01826	0.07325	0.00098	0.05574	0.00182	-0.5	-3.2	455.7	11.8
G142	68	27	0.10505	0.01486	0.01591	0.00045	0.0479	0.00688	-0.4	-9.0	101.8	5.7

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G143	145	112	0.54333	0.01926	0.07	0.00097	0.05632	0.00202	1.0	6.0	436.2	11.7
G145	164	105	0.31293	0.01625	0.04263	0.00069	0.05326	0.00281	2.7	20.8	269.1	8.5
G146	944	543	0.30287	0.00715	0.04266	0.00052	0.05151	0.00121	-0.3	-2.1	269.3	6.5
G148	1021	927	0.10207	0.00319	0.01559	0.0002	0.04752	0.00149	-1.0	-33.5	99.7	2.6
G150	577	376	0.09504	0.00492	0.01449	0.00023	0.04761	0.00251	-0.5	-17.3	92.7	2.9

Sample MB4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G2	359	216	0.13085	0.00629	0.0195	0.00031	0.04868	0.00237	0.3	6.1	124.5	3.9
G3	1197	357	0.28474	0.00547	0.04051	0.00051	0.051	0.00093	-0.6	-6.3	256.0	6.4
G4	150	103	0.11698	0.0142	0.01793	0.0005	0.04733	0.00585	-2.0	-76.0	114.6	6.3
G6	1174	750	0.09527	0.00392	0.01471	0.00022	0.047	0.00195	-1.8	-92.4	94.1	2.8
G7	322	249	0.27331	0.00854	0.03861	0.00053	0.05136	0.0016	0.5	5.1	244.2	6.6
G10	429	204	3.20136	0.04901	0.25588	0.0032	0.09077	0.00126	-0.8	-1.9	1441.7	52.5
G11	132	114	0.11549	0.01251	0.01718	0.00044	0.04879	0.00538	1.1	20.2	109.8	5.6
G12	315	193	0.29957	0.00892	0.04306	0.00059	0.05048	0.00149	-2.1	-25.3	271.8	7.3
G14	185	107	0.54016	0.01605	0.06921	0.00096	0.05663	0.00167	1.6	9.4	431.4	11.5
G15	619	384	3.13485	0.04564	0.25375	0.00315	0.08963	0.00116	-1.1	-2.8	1417.7	49.2
G16	698	349	2.83388	0.04141	0.23036	0.00286	0.08926	0.00117	2.1	5.2	1409.7	49.5
G17	171	206	0.53914	0.01788	0.06927	0.00099	0.05647	0.00187	1.4	8.2	431.8	11.9
G18	387	172	0.10542	0.00625	0.01529	0.00027	0.05002	0.00301	4.1	50.1	97.8	3.4
G19	313	282	0.10188	0.00514	0.01492	0.00024	0.04953	0.00253	3.1	44.8	95.5	3.1
G20	382	279	0.26538	0.00784	0.03719	0.00051	0.05177	0.00152	1.5	14.5	235.4	6.3
G21	62	73	0.09469	0.01408	0.01431	0.00041	0.04802	0.00724	0.3	7.7	91.6	5.2
G22	428	254	0.27631	0.00781	0.03916	0.00053	0.0512	0.00143	0.0	0.8	247.6	6.6
G23	135	116	0.50453	0.01806	0.06362	0.00093	0.05754	0.00207	4.3	22.3	397.6	11.3
G24	101	85	0.53415	0.02182	0.06959	0.00106	0.05569	0.00229	0.2	1.4	433.7	12.8
G25	831	354	0.10598	0.00403	0.01578	0.00023	0.04871	0.00186	1.3	24.6	101.0	2.9
G26	219	99	0.12546	0.00919	0.01871	0.00037	0.04865	0.00362	0.4	8.8	119.5	4.6
G27	634	158	0.10094	0.00458	0.01548	0.00024	0.0473	0.00217	-1.4	-54.9	99.0	3.0
G28	1443	1035	0.10034	0.00389	0.01503	0.00022	0.04844	0.00189	0.9	20.5	96.2	2.8
G29	358	161	0.28286	0.01571	0.04017	0.0007	0.05109	0.00288	-0.4	-3.8	253.9	8.6
G30	777	349	0.10187	0.00373	0.01547	0.00022	0.04779	0.00175	-0.4	-12.6	98.9	2.8
G31	342	137	0.6225	0.01564	0.07782	0.00104	0.05804	0.00143	1.7	9.0	483.1	12.4
G32	1486	1022	0.09797	0.00265	0.0149	0.0002	0.0477	0.00127	-0.5	-14.3	95.4	2.5
G33	1088	1987	0.24343	0.00555	0.03506	0.00045	0.05037	0.00112	-0.5	-4.7	222.2	5.7
G34	437	388	0.10357	0.00505	0.01559	0.00025	0.04819	0.00238	0.3	7.9	99.8	3.1
G35	360	205	0.12245	0.00608	0.01839	0.00029	0.0483	0.00242	-0.2	-3.1	117.5	3.7
G36	1179	520	0.098	0.00409	0.01456	0.00022	0.04882	0.00205	1.8	33.0	93.2	2.8
G37	14334	-2	0.31745	0.06712	0.04077	0.00162	0.0565	0.01212	8.7	45.3	257.6	20.1
G40	3914	53	3.978	0.05398	0.28813	0.00354	0.10017	0.00118	-0.2	-0.3	1627.3	43.5
G41	359	266	0.2878	0.00936	0.04164	0.00058	0.05015	0.00163	-2.4	-30.4	263.0	7.2
G42	38	32	0.09992	0.02321	0.01458	0.00062	0.04974	0.01172	3.6	49.0	93.3	7.8
G43	357	214	0.11593	0.00574	0.01772	0.00028	0.04748	0.00238	-1.6	-56.1	113.2	3.6
G44	391	316	0.37002	0.0101	0.04967	0.00067	0.05405	0.00146	2.3	16.2	312.5	8.2
G45	318	146	0.11348	0.00607	0.01677	0.00028	0.04911	0.00266	1.8	29.9	107.2	3.5
G46	841	493	0.10969	0.00367	0.01621	0.00023	0.04909	0.00164	1.9	31.8	103.7	2.9
G47	161	142	0.56359	0.01865	0.07438	0.00106	0.05498	0.00182	-1.9	-12.5	462.5	12.7
G48	339	222	0.11275	0.00766	0.01582	0.0003	0.05172	0.00358	7.2	62.9	101.2	3.8
G49	303	113	0.11037	0.00726	0.01676	0.00031	0.04779	0.00319	-0.7	-21.6	107.1	3.9
G51	132	73	0.60932	0.02208	0.07851	0.00115	0.05631	0.00205	-0.8	-5.0	487.2	13.8
G52	1434	229	0.10686	0.0032	0.01596	0.00022	0.04859	0.00145	1.1	20.5	102.0	2.8
G53	286	396	0.11102	0.0099	0.01606	0.00037	0.05015	0.00456	4.1	49.2	102.7	4.7
G54	215	185	0.54728	0.01709	0.07085	0.00099	0.05605	0.00175	0.4	2.8	441.3	11.9
G55	150	113	0.45297	0.03594	0.06226	0.00131	0.05279	0.00426	-2.6	-21.8	389.4	15.8
G56	341	235	0.30302	0.01327	0.03896	0.00061	0.05643	0.0025	9.1	47.4	246.4	7.6
G57	496	368	0.10215	0.00558	0.01594	0.00026	0.0465	0.00257	-3.0	-330	101.9	3.3
G58	112	169	0.10116	0.01084	0.01463	0.00035	0.05017	0.00546	4.5	53.8	93.6	4.5
G59	574	291	0.27412	0.00762	0.03993	0.00054	0.04981	0.00137	-2.5	-35.5	252.4	6.7

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G60	316	169	0.12168	0.00773	0.0184	0.00033	0.04798	0.0031	-0.8	-21.3	117.5	4.2
G61	195	15	1.61334	0.035	0.1639	0.00216	0.07142	0.0015	-0.3	-0.9	978.4	23.9
G62	2239	1965	0.10724	0.00347	0.01638	0.00023	0.04751	0.00153	-1.2	-40.7	104.7	2.9
G63	348	188	0.13007	0.00992	0.01971	0.0004	0.04789	0.00371	-1.3	-35.4	125.8	5.0
G64	926	895	0.10575	0.00365	0.01581	0.00022	0.04853	0.00168	1.0	19.4	101.1	2.8
G65	1831	331	0.27937	0.00506	0.03917	0.00049	0.05176	0.00088	1.0	9.8	247.7	6.1
G66	199	179	0.10014	0.00765	0.01532	0.0003	0.04743	0.00368	-1.1	-39.4	98.0	3.9
G70	178	142	0.52245	0.01823	0.07101	0.00102	0.05338	0.00187	-3.5	-28.3	442.3	12.3
G71	1420	660	0.10725	0.00306	0.01633	0.00022	0.04765	0.00134	-1.0	-28.6	104.4	2.8
G72	265	182	0.50126	0.01414	0.06709	0.00091	0.05421	0.00151	-1.4	-10.2	418.6	11.0
G73	63	57	0.10405	0.02443	0.01502	0.00072	0.05027	0.01202	4.6	53.7	96.1	9.1
G74	104	96	0.5458	0.02223	0.07048	0.00108	0.05619	0.00231	0.7	4.3	439.1	13.0
G76	1689	802	0.10334	0.0028	0.01537	0.0002	0.04878	0.00131	1.6	28.5	98.3	2.6
G77	268	248	0.09587	0.00614	0.0146	0.00026	0.04764	0.00309	-0.4	-15.7	93.4	3.3
G78	413	251	0.19383	0.01203	0.0282	0.00052	0.04987	0.00315	0.3	5.1	179.3	6.5
G79	134	66	0.10197	0.0104	0.01533	0.00036	0.04827	0.00501	0.5	13.0	98.1	4.6
G80	1509	1074	0.26884	0.00515	0.03865	0.00049	0.05047	0.00092	-1.1	-12.9	244.5	6.1
G81	250	228	0.10623	0.00666	0.01601	0.00028	0.04814	0.00306	0.1	3.7	102.4	3.6
G82	242	102	4.87213	0.0789	0.31782	0.00404	0.11123	0.00166	1.0	2.2	1819.6	53.8
G83	103	104	0.11162	0.01335	0.01853	0.00046	0.0437	0.0053	-9.3	-1183	118.4	5.8
G85	357	249	0.29799	0.01425	0.03867	0.00063	0.05591	0.00271	8.3	45.5	244.6	7.9
G87	565	278	0.10476	0.00597	0.01588	0.00027	0.04788	0.00277	-0.3	-10.1	101.5	3.4
G89	490	261	0.48723	0.01164	0.0668	0.00088	0.05292	0.00123	-3.3	-28.1	416.8	10.6
G90	306	232	0.10962	0.00626	0.01598	0.00027	0.04977	0.00288	3.3	44.5	102.2	3.5
G91	200	192	0.26201	0.01207	0.03815	0.00059	0.04984	0.00232	-2.1	-28.8	241.3	7.4
G92	341	78	0.35713	0.0108	0.04915	0.00068	0.05272	0.00159	0.3	2.3	309.3	8.3
G93	580	481	0.10259	0.00543	0.01495	0.00025	0.0498	0.00267	3.8	48.5	95.6	3.2
G94	2600	1505	0.10117	0.00266	0.0151	0.0002	0.04861	0.00126	1.3	25.1	96.6	2.5
G97	360	150	0.11519	0.00652	0.01648	0.00028	0.05071	0.00291	5.0	53.7	105.4	3.6
G98	798	923	0.10204	0.00357	0.01523	0.00022	0.04862	0.0017	1.3	24.8	97.4	2.7
G99	1111	377	0.10442	0.00318	0.01514	0.00021	0.05003	0.00151	4.1	50.7	96.9	2.6
G100	105	110	0.11352	0.01191	0.0173	0.00039	0.04761	0.00506	-1.3	-39.3	110.6	5.0
G101	1470	46	0.55997	0.00935	0.07288	0.00091	0.05575	0.00086	-0.4	-2.6	453.5	10.9
G102	232	229	0.5321	0.01779	0.06963	0.001	0.05545	0.00186	-0.2	-0.9	433.9	12.0
G103	2508	10	1.19839	0.31985	0.13393	0.00891	0.06492	0.01774	-1.3	-5.0	810.3	101.3
G106	512	289	0.10709	0.00498	0.01536	0.00024	0.05058	0.00238	5.1	55.7	98.3	3.1
G107	636	521	0.57147	0.01278	0.07076	0.00092	0.0586	0.00127	4.2	20.2	440.7	11.1
G109	255	353	0.10034	0.00688	0.01473	0.00028	0.04943	0.00344	3.1	44.1	94.2	3.5
G110	793	708	0.10905	0.00414	0.01587	0.00023	0.04987	0.00191	3.5	46.3	101.5	2.9
G113	491	268	0.10532	0.00839	0.01506	0.00032	0.05075	0.00412	5.6	58.0	96.3	4.1
G116	1069	605	0.0989	0.00491	0.01493	0.00024	0.04806	0.00242	0.3	6.6	95.5	3.1
G119	505	221	0.10601	0.0045	0.0159	0.00024	0.04837	0.00207	0.6	13.4	101.7	3.0
G121	173	96	0.52841	0.0175	0.07059	0.001	0.05431	0.0018	-2.0	-14.5	439.7	12.1
G122	1288	670	0.10234	0.00288	0.01531	0.00021	0.04848	0.00135	0.9	20.3	98.0	2.6
G123	539	293	0.27699	0.00781	0.03915	0.00053	0.05133	0.00143	0.3	3.1	247.6	6.6
G124	307	168	0.12604	0.00654	0.01933	0.00031	0.04732	0.00248	-2.4	-90.4	123.4	3.9
G126	667	512	0.10228	0.00407	0.01565	0.00023	0.04742	0.0019	-1.2	-43.0	100.1	2.9
G127	2718	1693	0.11492	0.00317	0.01601	0.00022	0.05209	0.00142	7.9	64.6	102.4	2.7
G128	888	621	0.26781	0.00624	0.03858	0.0005	0.05037	0.00114	-1.3	-15.1	244.0	6.2
G130	614	993	0.09858	0.00451	0.01486	0.00023	0.04813	0.00222	0.4	9.9	95.1	2.9
G131	490	366	0.09605	0.00516	0.0158	0.00026	0.04411	0.00239	-7.8	-1009	101.0	3.2
G132	526	379	0.12115	0.00559	0.01652	0.00026	0.05321	0.00248	9.9	68.7	105.6	3.3
G135	754	574	0.12092	0.00457	0.01774	0.00026	0.04944	0.00188	2.2	32.8	113.4	3.3
G138	662	2156	0.30254	0.00815	0.04127	0.00055	0.05318	0.00141	3.0	22.5	260.7	6.9
G139	639	96	0.71226	0.01435	0.08544	0.0011	0.06049	0.00117	3.3	14.9	528.5	13.0
G141	1682	489	0.56804	0.00955	0.0754	0.00094	0.05466	0.00085	-2.5	-17.6	468.6	11.3
G142	411	297	0.5846	0.01479	0.07497	0.001	0.05658	0.00141	0.3	1.8	466.0	12.0
G143	189	221	0.55332	0.02011	0.07213	0.00106	0.05566	0.00203	-0.4	-2.4	449.0	12.7
G144	372	219	0.09775	0.00991	0.01486	0.00037	0.04772	0.00493	-0.4	-12.8	95.1	4.7
G146	877	576	0.10526	0.00402	0.01486	0.00022	0.05141	0.00198	6.8	63.3	95.1	2.8
G147	311	147	0.10684	0.00691	0.01629	0.00029	0.0476	0.00312	-1.0	-32.4	104.1	3.7

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G148	229	244	0.10951	0.00834	0.01562	0.00031	0.05088	0.00394	5.6	57.6	99.9	3.9
G149	376	313	0.10169	0.00562	0.01502	0.00025	0.04912	0.00275	2.3	37.5	96.1	3.2
G150	1041	480	0.11372	0.00457	0.01706	0.00025	0.04836	0.00195	0.3	6.7	109.1	3.2

Sample MB5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	485	374	0.53652	0.01097	0.06977	0.00085	0.0558	0.00112	0.3	2.1	434.8	10.2
G2	101	48	0.29017	0.01594	0.03971	0.00065	0.05303	0.00296	3.1	23.9	251.0	8.1
G3	170	106	0.28941	0.01182	0.0402	0.00058	0.05224	0.00216	1.6	14.2	254.1	7.2
G4	240	249	0.10082	0.00622	0.01495	0.00025	0.04894	0.00306	1.9	33.9	95.7	3.2
G5	1304	659	0.29264	0.00549	0.03853	0.00046	0.05511	0.001	6.9	41.5	243.7	5.7
G6	211	287	0.10789	0.00671	0.01549	0.00027	0.05053	0.00319	4.9	54.9	99.1	3.4
G7	606	317	0.11054	0.004	0.0158	0.00022	0.05075	0.00185	5.3	56.0	101.1	2.8
G8	299	220	0.11211	0.00583	0.01621	0.00025	0.05017	0.00265	4.1	48.9	103.7	3.2
G9	861	487	0.11078	0.00346	0.01642	0.00022	0.04896	0.00154	1.6	28.0	105.0	2.7
G10	169	148	0.10972	0.00826	0.01537	0.0003	0.05179	0.00397	7.5	64.4	98.3	3.8
G11	183	13	0.38816	0.01384	0.05218	0.00072	0.05398	0.00194	1.6	11.4	327.9	8.9
G12	1115	200	5.23525	0.06832	0.33029	0.00384	0.11502	0.00136	1.0	2.1	1880.1	42.3
G13	328	246	0.13968	0.00621	0.0191	0.00028	0.05306	0.00239	8.9	63.2	122.0	3.6
G14	1078	382	0.10542	0.0035	0.01591	0.00021	0.04809	0.0016	0.1	1.7	101.7	2.7
G15	197	216	0.11073	0.00794	0.01563	0.00029	0.05142	0.00375	6.7	61.5	99.9	3.7
G16	1167	362	0.29083	0.00579	0.03897	0.00047	0.05415	0.00105	5.2	34.7	246.4	5.9
G17	1523	198	7.77875	0.099	0.40849	0.00474	0.13818	0.00158	-0.1	-0.2	2204.5	39.5
G18	751	465	0.13679	0.00428	0.01983	0.00026	0.05005	0.00157	2.8	35.8	126.6	3.3
G19	201	188	0.38216	0.01349	0.04957	0.00069	0.05595	0.00199	5.4	30.7	311.9	8.5
G20	447	518	0.0984	0.00475	0.01437	0.00022	0.0497	0.00243	3.7	49.2	91.9	2.8
G21	351	268	0.1107	0.00563	0.0156	0.00024	0.0515	0.00266	6.8	62.1	99.8	3.1
G22	311	188	0.11584	0.006	0.01733	0.00027	0.04849	0.00255	0.5	10.2	110.8	3.4
G23	397	270	0.26601	0.0081	0.03889	0.00051	0.04963	0.00152	-2.6	-38.4	246.0	6.3
G24	446	235	0.3237	0.00876	0.04222	0.00054	0.05564	0.0015	6.8	39.1	266.6	6.7
G25	874	548	0.28286	0.00621	0.03967	0.00049	0.05175	0.00112	0.8	8.5	250.8	6.0
G26	654	62	5.59719	0.10705	0.32805	0.00422	0.12381	0.00232	4.7	9.1	2011.8	65.9
G27	482	250	0.6229	0.01298	0.0785	0.00096	0.05758	0.00118	0.9	5.1	487.2	11.5
G28	169	135	0.5221	0.01738	0.06709	0.00092	0.05647	0.00189	1.9	11.0	418.6	11.1
G29	326	272	0.10916	0.00583	0.01704	0.00027	0.0465	0.00252	-3.4	-363	108.9	3.4
G30	741	517	0.30502	0.00695	0.03979	0.00049	0.05562	0.00125	7.5	42.5	251.5	6.1
G31	404	333	0.09787	0.00484	0.01516	0.00023	0.04684	0.00235	-2.3	-137	97.0	2.9
G32	480	226	0.10605	0.00467	0.01604	0.00023	0.04796	0.00214	-0.3	-6.5	102.6	3.0
G33	412	227	0.13801	0.00572	0.02012	0.00029	0.04978	0.00209	2.3	30.6	128.4	3.7
G34	491	89	0.53353	0.01164	0.07069	0.00087	0.05477	0.00118	-1.4	-9.3	440.3	10.5
G35	353	240	0.28447	0.00896	0.03883	0.00052	0.05316	0.00168	3.5	26.8	245.6	6.4
G36	1167	665	0.10475	0.00317	0.01614	0.00021	0.04708	0.00143	-1.9	-94.7	103.2	2.7
G37	300	181	0.53963	0.01426	0.0689	0.00088	0.05684	0.0015	2.0	11.4	429.5	10.7
G38	321	236	0.10709	0.00581	0.01657	0.00026	0.04689	0.00258	-2.5	-144	106.0	3.3
G39	241	214	0.62514	0.03275	0.07905	0.00134	0.05739	0.00306	0.6	3.1	490.4	16.0
G40	183	156	0.54071	0.01813	0.06903	0.00095	0.05684	0.00192	2.0	11.2	430.3	11.4
G41	229	155	0.09509	0.00833	0.01368	0.0003	0.05046	0.00451	5.3	59.4	87.6	3.8
G42	249	189	0.52748	0.01557	0.06964	0.00092	0.05496	0.00163	-0.9	-5.7	434.0	11.0
G43	396	417	0.09726	0.00517	0.01438	0.00023	0.04908	0.00265	2.4	39.3	92.0	2.9
G44	843	476	0.10516	0.00383	0.01611	0.00022	0.04738	0.00174	-1.5	-52.1	103.0	2.8
G45	230	200	0.11274	0.0077	0.01628	0.00029	0.05025	0.00349	4.2	49.6	104.1	3.7
G46	1399	573	0.1044	0.00297	0.01529	0.0002	0.04953	0.00141	3.1	43.5	97.8	2.5
G47	353	144	0.29391	0.01046	0.03987	0.00055	0.05349	0.00192	3.8	27.9	252.0	6.8
G48	843	481	0.13607	0.00435	0.01982	0.00026	0.04981	0.0016	2.4	32.0	126.5	3.3
G49	897	227	0.5691	0.0105	0.07247	0.00087	0.05698	0.00102	1.4	8.0	451.0	10.5
G50	173	85	3.14894	0.05765	0.25332	0.00313	0.0902	0.0016	-0.7	-1.8	1429.8	67.1
G51	347	201	0.13716	0.00677	0.01972	0.0003	0.05048	0.00253	3.7	42.0	125.9	3.8
G52	838	567	0.13167	0.00433	0.01853	0.00025	0.05156	0.00171	6.1	55.5	118.4	3.1
G53	97	69	0.49072	0.02378	0.06517	0.00103	0.05464	0.00269	-0.4	-2.4	407.0	12.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G54	919	369	0.28266	0.0065	0.03989	0.00049	0.05142	0.00117	0.3	3.0	252.1	6.1
G55	606	207	0.11464	0.00465	0.01674	0.00024	0.04968	0.00204	3.0	40.6	107.0	3.0
G56	981	213	1.46256	0.02175	0.14554	0.00171	0.07292	0.00102	4.5	13.4	875.9	19.3
G57	270	183	0.54591	0.01553	0.06947	0.00091	0.05702	0.00162	2.1	12.0	433.0	11.0
G58	271	121	0.29788	0.01094	0.04064	0.00057	0.05319	0.00197	3.1	23.7	256.8	7.1
G59	355	176	0.12903	0.00644	0.01945	0.0003	0.04815	0.00244	-0.8	-16.7	124.2	3.8
G60	407	218	0.10828	0.00548	0.01582	0.00025	0.04966	0.00255	3.2	43.5	101.2	3.1
G61	956	309	0.11041	0.00365	0.01537	0.00021	0.05214	0.00174	8.1	66.3	98.3	2.6
G62	433	355	0.10146	0.00515	0.01464	0.00023	0.0503	0.00259	4.7	55.1	93.7	2.9
G63	257	161	1.60558	0.03217	0.16409	0.00203	0.071	0.00139	-0.7	-2.3	979.5	22.5
G64	191	120	0.5402	0.01804	0.07097	0.00097	0.05523	0.00186	-0.8	-4.9	442.0	11.7
G65	330	433	0.40864	0.0123	0.05572	0.00073	0.05322	0.00161	-0.5	-3.4	349.6	9.0
G66	153	83	0.59303	0.02148	0.07225	0.00103	0.05956	0.00218	5.1	23.5	449.7	12.4
G67	280	377	0.30027	0.01121	0.03952	0.00056	0.05514	0.00208	6.7	40.2	249.8	6.9
G68	342	215	0.09578	0.00712	0.01456	0.00028	0.04773	0.00361	-0.3	-9.4	93.2	3.5
G69	515	356	0.13114	0.00551	0.01796	0.00026	0.053	0.00226	9.1	65.1	114.7	3.3
G70	923	585	0.09895	0.00362	0.0153	0.00021	0.04692	0.00173	-2.1	-118	97.9	2.7
G71	623	152	3.54923	0.05059	0.27286	0.00321	0.09439	0.00125	-1.1	-2.6	1515.9	49.5
G72	267	335	0.28253	0.01151	0.03931	0.00057	0.05216	0.00215	1.7	15.0	248.5	7.0
G73	709	880	0.21062	0.00614	0.02924	0.00038	0.05226	0.00153	4.5	37.4	185.8	4.8
G74	405	179	0.21439	0.00801	0.02958	0.00041	0.05259	0.00199	4.9	39.6	187.9	5.2
G75	834	200	0.27183	0.00657	0.03931	0.00049	0.05017	0.0012	-1.8	-22.4	248.6	6.1
G76	704	718	0.10757	0.00463	0.0164	0.00024	0.04761	0.00207	-1.0	-32.5	104.8	3.0
G77	1676	594	0.11384	0.00293	0.01607	0.0002	0.05139	0.00132	6.5	60.2	102.8	2.6
G78	399	385	0.10326	0.00567	0.01493	0.00024	0.0502	0.0028	4.5	53.3	95.5	3.1
G79	457	290	0.10601	0.01068	0.0151	0.00037	0.05096	0.00524	5.9	59.6	96.6	4.6
G80	118	89	0.12823	0.01194	0.01768	0.0004	0.05263	0.00499	8.4	63.9	113.0	5.1
G81	611	462	0.13583	0.00525	0.01951	0.00028	0.05052	0.00197	3.8	43.2	124.6	3.5
G82	1054	73	0.29951	0.00657	0.0422	0.00052	0.05151	0.00111	-0.2	-1.1	266.4	6.4
G83	936	423	0.63117	0.01139	0.0816	0.00098	0.05613	0.00098	-1.7	-10.6	505.6	11.6
G84	226	213	0.1089	0.008	0.01571	0.0003	0.05031	0.00376	4.5	52.1	100.5	3.8
G85	564	318	0.13322	0.00538	0.01822	0.00026	0.05305	0.00217	9.1	64.8	116.4	3.3
G86	1451	98	0.2774	0.00569	0.03941	0.00048	0.05107	0.00102	-0.2	-2.0	249.2	5.9
G87	181	126	0.52667	0.01915	0.06888	0.00097	0.05549	0.00204	0.0	0.5	429.4	11.7
G88	321	297	0.10858	0.00671	0.01578	0.00027	0.04993	0.00314	3.8	47.3	100.9	3.5
G89	272	185	0.20992	0.00986	0.02981	0.00046	0.0511	0.00243	2.2	22.9	189.3	5.7
G90	475	404	0.12571	0.00572	0.01876	0.00028	0.04861	0.00224	0.3	7.2	119.8	3.5
G91	296	157	3.08051	0.05095	0.24675	0.00298	0.09059	0.00143	0.4	1.1	1437.9	59.7
G92	555	260	1.58992	0.02647	0.16051	0.00192	0.07188	0.00114	0.7	2.3	959.6	21.3
G93	429	268	0.13909	0.00617	0.0193	0.00029	0.0523	0.00235	7.3	58.7	123.2	3.7
G94	1337	450	0.10157	0.0031	0.01539	0.0002	0.04788	0.00146	-0.3	-6.7	98.5	2.5
G95	330	329	0.10763	0.0065	0.01481	0.00025	0.05272	0.00324	9.5	70.1	94.8	3.2
G96	158	83	0.12266	0.01064	0.01699	0.00036	0.05239	0.00463	8.2	64.1	108.6	4.5
G97	950	374	0.10442	0.00378	0.01517	0.00021	0.04994	0.00182	3.8	49.5	97.1	2.6
G98	461	353	0.11449	0.00557	0.01605	0.00025	0.05175	0.00256	7.2	62.5	102.7	3.1
G99	611	364	0.10757	0.00472	0.01556	0.00023	0.05018	0.00223	4.2	51.0	99.5	2.9
G100	609	745	0.52238	0.01146	0.06675	0.00082	0.05679	0.00123	2.4	13.7	416.5	10.0
G101	245	196	0.30197	0.01214	0.03966	0.00058	0.05526	0.00225	6.9	40.6	250.7	7.2
G102	205	123	0.11381	0.00856	0.01735	0.00033	0.04759	0.00363	-1.4	-41.8	110.9	4.1
G103	429	157	0.11016	0.00575	0.01616	0.00025	0.04948	0.00262	2.7	39.4	103.3	3.2
G104	1271	457	0.21327	0.00512	0.03033	0.00038	0.05103	0.00121	1.9	20.5	192.6	4.7
G105	1137	223	0.12834	0.00341	0.01876	0.00023	0.04964	0.00132	2.3	32.8	119.8	3.0
G106	864	424	0.10989	0.00354	0.0157	0.00021	0.05079	0.00165	5.5	56.6	100.4	2.6
G107	489	224	0.29793	0.00823	0.0406	0.00052	0.05324	0.00147	3.2	24.4	256.5	6.4
G108	590	10	0.58642	0.01189	0.07568	0.00091	0.05622	0.00112	-0.4	-2.2	470.3	10.9
G109	788	405	0.11431	0.00377	0.01592	0.00021	0.05209	0.00173	8.0	64.8	101.8	2.7
G110	230	188	0.54475	0.01574	0.06969	0.00091	0.05671	0.00165	1.7	9.5	434.3	10.9
G111	235	174	0.11289	0.00722	0.01596	0.00028	0.05131	0.00333	6.4	59.9	102.1	3.5
G112	519	222	0.28534	0.00757	0.03999	0.0005	0.05177	0.00137	0.8	8.1	252.8	6.2
G113	392	165	0.54786	0.01293	0.07061	0.00087	0.05629	0.00132	0.9	5.0	439.8	10.5
G114	206	126	0.54269	0.01656	0.06854	0.00091	0.05744	0.00176	3.0	15.9	427.4	10.9

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G115	449	505	0.27682	0.00829	0.0381	0.00049	0.05271	0.00159	2.9	23.9	241.0	6.1
G116	1056	604	0.10372	0.00329	0.01519	0.0002	0.04953	0.00158	3.1	43.8	97.2	2.5
G117	251	123	0.12485	0.0078	0.01751	0.00031	0.05174	0.00329	6.8	59.1	111.9	3.9
G118	1067	425	0.27832	0.00596	0.03869	0.00047	0.05218	0.0011	1.9	16.6	244.7	5.8
G119	471	214	0.11224	0.00642	0.0155	0.00026	0.05254	0.00306	9.0	67.9	99.1	3.3
G120	174	160	0.10824	0.00968	0.01491	0.00033	0.05268	0.0048	9.4	69.7	95.4	4.2
G121	160	172	0.54884	0.02028	0.0692	0.00098	0.05754	0.00215	3.0	15.8	431.3	11.8
G122	1248	1243	0.26559	0.00531	0.03793	0.00045	0.0508	0.001	-0.3	-3.6	240.0	5.6
G123	288	203	0.09616	0.00679	0.01465	0.00027	0.04763	0.00342	-0.5	-17.3	93.7	3.4
G124	842	1088	0.28439	0.00728	0.03759	0.00047	0.05489	0.0014	6.8	41.7	237.9	5.9
G125	331	173	0.12398	0.00611	0.0187	0.00029	0.0481	0.0024	-0.6	-14.8	119.4	3.6
G126	515	464	0.505	0.01111	0.06687	0.00081	0.05479	0.00119	-0.5	-3.4	417.3	9.8
G127	665	368	0.10506	0.00395	0.01572	0.00022	0.0485	0.00184	0.9	18.6	100.5	2.7
G128	840	1560	0.28019	0.00635	0.03897	0.00047	0.05216	0.00117	1.8	15.8	246.4	5.9
G129	398	226	0.29106	0.00886	0.04073	0.00053	0.05184	0.00159	0.8	7.6	257.4	6.6
G130	702	976	0.10256	0.00378	0.0148	0.0002	0.05029	0.00188	4.6	54.6	94.7	2.6
G131	1194	633	0.11213	0.00321	0.01717	0.00022	0.04738	0.00136	-1.6	-61.3	109.7	2.8
G132	213	209	0.09824	0.00853	0.01456	0.00031	0.04897	0.00433	2.1	36.3	93.2	3.9
G133	1456	598	0.28932	0.00549	0.04098	0.00049	0.05121	0.00095	-0.3	-3.4	258.9	6.0
G134	308	76	5.32097	0.07853	0.33744	0.00396	0.1144	0.0016	-0.1	-0.2	1870.4	50.0
G135	631	210	5.09877	0.07045	0.32638	0.00378	0.11334	0.00146	0.8	1.8	1853.6	46.3
G136	273	220	0.56415	0.01934	0.07266	0.001	0.05633	0.00195	0.4	2.7	452.2	12.0
G137	1065	552	0.09923	0.0031	0.01497	0.00019	0.0481	0.00151	0.3	8.1	95.8	2.5
G138	188	133	0.29505	0.01237	0.03999	0.00058	0.05352	0.00228	3.8	28.0	252.8	7.2
G139	288	175	0.54013	0.01438	0.07029	0.00089	0.05575	0.00149	0.1	1.0	437.9	10.8
G140	785	435	0.10409	0.00376	0.01473	0.0002	0.05127	0.00187	6.6	62.7	94.3	2.6

Sample MB6

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	205	59	0.54984	0.01729	0.07062	0.00095	0.05651	0.00179	1.1	6.7	439.9	11.4
G2	1429	1419	0.10455	0.00289	0.01566	0.0002	0.04845	0.00134	0.8	17.5	100.2	2.5
G3	240	141	0.25969	0.01073	0.03612	0.00052	0.05218	0.00218	2.5	22.0	228.7	6.5
G4	711	288	0.10433	0.00639	0.01557	0.00027	0.04862	0.00303	1.2	23.1	99.6	3.4
G5	212	112	0.09776	0.00886	0.01478	0.00032	0.048	0.00443	0.1	3.8	94.6	4.1
G6	286	174	0.13801	0.01013	0.01948	0.00038	0.05142	0.00385	5.5	52.1	124.4	4.8
G7	349	274	0.1207	0.00606	0.01693	0.00026	0.05175	0.00264	6.9	60.6	108.2	3.3
G8	425	196	0.10928	0.00614	0.01598	0.00026	0.04963	0.00284	3.0	42.5	102.2	3.3
G9	160	68	0.11228	0.01269	0.01687	0.00044	0.0483	0.00557	0.2	5.6	107.8	5.6
G10	162	90	1.09085	0.02835	0.12242	0.00158	0.06467	0.00168	0.6	2.5	744.5	18.2
G11	1216	454	0.11614	0.00457	0.01676	0.00024	0.05028	0.002	4.1	48.5	107.2	3.0
G12	1291	611	4.26455	0.05672	0.29585	0.00342	0.10461	0.00127	0.9	2.2	1707.5	44.5
G13	114	100	0.5292	0.02194	0.07	0.00103	0.05487	0.0023	-1.1	-7.3	436.2	12.4
G14	370	128	5.39203	0.07773	0.33475	0.00394	0.1169	0.00158	1.2	2.5	1909.3	48.0
G15	123	85	0.10857	0.01205	0.01504	0.00038	0.05238	0.00592	8.8	68.2	96.2	4.8
G16	151	70	5.28734	0.08817	0.33504	0.00408	0.11453	0.00184	0.2	0.5	1872.5	57.3
G17	14364	2	0.70015	0.05765	0.08133	0.00183	0.06247	0.00525	6.9	27.0	504.1	21.8
G19	513	247	0.10246	0.00457	0.01513	0.00022	0.04916	0.00222	2.3	37.7	96.8	2.8
G20	1272	540	0.11296	0.0043	0.016	0.00022	0.05122	0.00197	6.3	59.2	102.3	2.8
G21	459	152	0.1098	0.00575	0.01594	0.00025	0.04999	0.00266	3.8	47.6	101.9	3.2
G22	577	177	0.10517	0.00433	0.01538	0.00022	0.04961	0.00207	3.2	44.4	98.4	2.8
G23	1372	460	2.9926	0.04046	0.23951	0.00277	0.09068	0.00113	1.6	3.9	1439.7	47.0
G24	409	185	0.11153	0.00536	0.01703	0.00026	0.04754	0.00232	-1.3	-43.7	108.8	3.3
G25	434	195	0.12331	0.00536	0.01772	0.00026	0.05049	0.00222	4.2	48.0	113.3	3.3
G26	260	168	0.1059	0.00683	0.01604	0.00027	0.04792	0.00314	-0.4	-8.8	102.6	3.5
G28	786	282	0.09809	0.00364	0.01506	0.00021	0.04726	0.00177	-1.5	-55.7	96.4	2.6
G29	928	335	0.10743	0.00357	0.01594	0.00021	0.04891	0.00164	1.6	28.8	102.0	2.7
G30	727	291	0.29156	0.00714	0.03983	0.0005	0.05312	0.00129	3.2	24.6	251.8	6.1
G31	1080	650	0.10255	0.00327	0.01538	0.0002	0.04838	0.00155	0.7	16.4	98.4	2.6
G32	1046	307	0.09896	0.00369	0.01481	0.0002	0.04848	0.00183	1.1	22.9	94.8	2.6

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G33	533	222	0.26901	0.00764	0.03857	0.00049	0.05062	0.00144	-0.9	-9.2	244.0	6.1
G34	976	409	0.28506	0.00629	0.0396	0.00048	0.05224	0.00114	1.7	15.4	250.4	6.0
G35	602	260	0.45287	0.01011	0.05878	0.00072	0.05591	0.00123	3.0	17.9	368.2	8.8
G36	187	71	0.46994	0.01667	0.06374	0.00088	0.05351	0.00192	-1.8	-13.7	398.3	10.6
G37	273	146	0.1088	0.00649	0.01567	0.00026	0.05039	0.00305	4.7	53.0	100.2	3.4
G40	689	219	0.10518	0.00404	0.01609	0.00022	0.04744	0.00184	-1.4	-45.3	102.9	2.8
G41	1404	660	0.57044	0.00944	0.07104	0.00084	0.05827	0.00092	3.6	18.0	442.4	10.1
G42	319	107	5.18348	0.07662	0.32884	0.00389	0.11439	0.00159	0.9	2.0	1870.4	49.7
G43	638	343	0.10259	0.00411	0.01561	0.00022	0.04769	0.00193	-0.7	-20.2	99.9	2.8
G45	459	163	0.1103	0.00509	0.01578	0.00024	0.05073	0.00237	5.3	55.8	100.9	3.0
G46	641	317	0.11016	0.00439	0.01541	0.00022	0.05188	0.00209	7.6	64.8	98.6	2.8
G47	423	162	0.13855	0.00593	0.01897	0.00028	0.05301	0.0023	8.8	63.2	121.1	3.5
G48	508	139	0.11372	0.00491	0.01629	0.00024	0.05068	0.00222	5.1	54.0	104.1	3.0
G49	124	96	5.04718	0.08891	0.32441	0.004	0.11291	0.00193	0.9	1.9	1846.7	61.2
G51	426	132	1.05942	0.02222	0.1153	0.00142	0.06668	0.00138	4.3	15.0	703.5	16.4
G52	255	138	0.29145	0.01189	0.03761	0.00055	0.05624	0.00233	9.1	48.4	238.0	6.9
G53	391	118	0.13649	0.00611	0.01899	0.00028	0.05216	0.00237	7.1	58.5	121.3	3.6
G56	2355	87	0.27492	0.00476	0.03861	0.00046	0.05167	0.00086	1.0	9.9	244.2	5.6
G57	313	136	0.51785	0.01455	0.06758	0.00087	0.05561	0.00156	0.5	3.4	421.6	10.6
G58	472	251	0.26971	0.00831	0.03799	0.0005	0.05152	0.00159	0.9	9.1	240.4	6.2
G59	619	46	4.91847	0.06809	0.31118	0.00363	0.11471	0.00147	3.4	6.9	1875.3	45.9
G62	596	88	3.06928	0.04476	0.23862	0.0028	0.09335	0.00128	3.3	7.7	1494.9	51.3
G64	295	142	3.81895	0.06639	0.27991	0.00341	0.09902	0.00166	0.4	0.9	1605.7	62.0
G65	22	20	0.10046	0.04155	0.01502	0.00097	0.04854	0.0203	1.1	23.4	96.1	12.3
G66	598	39	0.278	0.00753	0.03919	0.0005	0.05148	0.00139	0.5	5.5	247.8	6.2
G67	889	274	0.53574	0.01021	0.06916	0.00083	0.05622	0.00104	1.0	6.3	431.1	10.0
G68	646	185	0.11171	0.00437	0.01555	0.00022	0.05214	0.00206	8.0	65.9	99.5	2.8
G69	1034	399	0.12375	0.00628	0.01747	0.00028	0.05141	0.00266	6.2	56.9	111.6	3.5
G70	989	382	0.1052	0.00342	0.01557	0.00021	0.04905	0.0016	2.0	33.7	99.6	2.6
G71	160	93	0.26563	0.0133	0.03808	0.0006	0.05062	0.00257	-0.7	-7.8	240.9	7.4
G72	411	152	0.26345	0.0097	0.0375	0.00052	0.05098	0.0019	0.0	1.2	237.3	6.5
G73	148	120	0.24385	0.0186	0.03469	0.0007	0.05101	0.00397	0.8	8.9	219.8	8.7
G74	106	58	0.56062	0.02704	0.0665	0.00108	0.06118	0.00301	8.9	35.7	415.0	13.1
G77	303	371	0.10238	0.00605	0.01414	0.00024	0.05255	0.00316	9.4	70.7	90.5	3.1
G79	469	145	0.28589	0.00847	0.03889	0.00051	0.05335	0.00159	3.8	28.4	246.0	6.3
G80	1302	595	0.32796	0.00891	0.04262	0.00055	0.05584	0.00152	7.0	39.6	269.1	6.8
G81	388	159	0.31735	0.01177	0.04324	0.00061	0.05326	0.002	2.6	19.7	272.9	7.5
G82	927	339	0.10429	0.00338	0.01496	0.0002	0.0506	0.00165	5.2	57.0	95.7	2.5
G83	238	7	0.44521	0.01792	0.05475	0.00081	0.05901	0.00241	8.8	39.5	343.6	9.9
G84	256	81	10.57193	0.14844	0.46743	0.00552	0.16414	0.00214	0.6	1.1	2498.7	43.7
G86	502	123	0.10021	0.00606	0.01495	0.00026	0.04866	0.00299	1.5	27.4	95.6	3.3
G87	916	589	0.10901	0.00358	0.01573	0.00021	0.0503	0.00166	4.5	51.8	100.6	2.6
G88	463	225	0.2906	0.00866	0.03992	0.00052	0.05283	0.00158	2.6	21.4	252.4	6.5
G89	1371	430	0.1094	0.00367	0.01576	0.00021	0.05038	0.0017	4.6	52.6	100.8	2.7
G90	5137	5223	0.10222	0.00187	0.01537	0.00018	0.04827	0.00085	0.5	12.8	98.3	2.3
G91	222	144	0.10387	0.00848	0.01477	0.00031	0.05102	0.00425	6.1	60.9	94.5	3.9
G92	422	222	0.13381	0.00765	0.01872	0.00032	0.05188	0.00302	6.7	57.4	119.5	4.0
G94	516	38	0.57045	0.01271	0.07291	0.0009	0.05678	0.00125	1.0	5.9	453.7	10.8
G95	958	969	0.12918	0.00395	0.01907	0.00025	0.04916	0.00151	1.3	21.5	121.8	3.1
G96	135840	3	0.51638	0.02141	0.0642	0.00096	0.05837	0.00246	5.4	26.2	401.1	11.6
G97	336	185	0.10146	0.00657	0.01508	0.00027	0.04882	0.00322	1.7	30.6	96.5	3.4
G98	810	256	0.30061	0.00762	0.04188	0.00052	0.05209	0.00131	0.9	8.6	264.5	6.5
G99	722	178	0.27885	0.0083	0.03812	0.0005	0.05309	0.00159	3.5	27.5	241.2	6.2
G100	270	136	0.5552	0.01578	0.07079	0.00092	0.05692	0.00162	1.7	9.6	440.9	11.1
G101	399	148	5.07862	0.07329	0.32566	0.00383	0.11318	0.00153	0.8	1.8	1851.0	48.4
G102	681	428	0.09904	0.00485	0.01447	0.00022	0.04967	0.00247	3.6	48.4	92.6	2.8
G103	1434	455	0.11268	0.00359	0.01597	0.00021	0.05122	0.00164	6.2	59.3	102.1	2.7
G104	284	160	0.12245	0.0069	0.01866	0.0003	0.04762	0.00272	-1.6	-49.9	119.2	3.8
G105	220	169	0.10089	0.00688	0.01476	0.00027	0.04961	0.00344	3.4	46.7	94.4	3.4
G106	330	221	0.10453	0.00586	0.015	0.00025	0.05056	0.00288	5.1	56.6	96.0	3.1
G107	1937	598	0.26255	0.00479	0.03675	0.00044	0.05184	0.00091	1.7	16.4	232.7	5.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G108	197	149	0.10155	0.00848	0.01526	0.00031	0.04828	0.0041	0.5	13.6	97.7	3.9
G109	672	264	0.45988	0.00956	0.05958	0.00072	0.05601	0.00114	3.0	17.6	373.1	8.8
G111	500	170	0.13631	0.0059	0.01909	0.00028	0.05182	0.00228	6.5	56.0	121.9	3.6
G112	183	112	0.5442	0.01788	0.06822	0.00093	0.05789	0.00192	3.7	19.0	425.4	11.2
G113	1195	1275	0.09834	0.00375	0.01491	0.00021	0.04787	0.00184	-0.2	-3.9	95.4	2.6
G114	629	244	0.09781	0.00521	0.01477	0.00024	0.04806	0.0026	0.3	7.7	94.5	3.0
G115	737	257	0.10205	0.00411	0.0154	0.00022	0.04808	0.00196	0.2	4.4	98.5	2.8
G116	405	231	0.09614	0.00605	0.01538	0.00026	0.04537	0.0029	-5.3	-983	98.4	3.3
G118	412	173	2.94855	0.0453	0.23647	0.00279	0.09049	0.00132	1.9	4.7	1435.8	55.0
G119	471	235	0.10095	0.00521	0.01518	0.00024	0.04828	0.00253	0.5	13.9	97.1	3.0
G120	352	245	0.10484	0.00556	0.01559	0.00025	0.0488	0.00263	1.5	28.0	99.7	3.1
G122	131	94	3.30158	0.06458	0.25527	0.00319	0.09386	0.0018	1.1	2.6	1505.4	71.7
G123	634	263	0.10324	0.00409	0.01581	0.00022	0.04739	0.0019	-1.3	-48.0	101.1	2.8
G124	988	544	0.12276	0.00416	0.01828	0.00024	0.04873	0.00166	0.7	13.5	116.8	3.1
G125	332	289	5.60316	0.08135	0.34104	0.00402	0.11923	0.00162	1.3	2.7	1944.8	48.3
G126	927	314	0.10082	0.00456	0.01547	0.00023	0.0473	0.00217	-1.5	-54.9	99.0	2.9
G127	483	146	0.26796	0.00798	0.03849	0.0005	0.05053	0.00151	-0.9	-11.0	243.4	6.2
G128	2280	130	0.26606	0.00467	0.03735	0.00044	0.05169	0.00087	1.3	13.0	236.4	5.5
G129	2048	594	0.1001	0.00243	0.01503	0.00019	0.04833	0.00116	0.7	16.7	96.2	2.4
G130	301	176	0.25486	0.0129	0.03595	0.00057	0.05145	0.00265	1.2	12.8	227.7	7.1
G133	583	269	0.10131	0.00419	0.01694	0.00024	0.04341	0.00181	-9.5	-1082	108.3	3.0
G134	239	77	0.11453	0.0112	0.01681	0.0004	0.04945	0.00493	2.4	36.5	107.5	5.0
G135	346	137	0.10567	0.00558	0.01539	0.00025	0.04982	0.00267	3.6	47.2	98.5	3.1
G136	206	82	1.57569	0.03281	0.14795	0.00184	0.07729	0.00159	8.0	21.2	889.5	20.7
G137	1672	562	0.1083	0.00393	0.01583	0.00022	0.04965	0.00182	3.2	43.4	101.2	2.8
G138	1769	436	0.10065	0.00258	0.01496	0.00019	0.04884	0.00124	1.8	31.6	95.7	2.4
G139	172	96	0.26246	0.01246	0.03865	0.00059	0.04928	0.00237	-3.2	-51.5	244.5	7.3
G140	1631	626	0.11312	0.00289	0.01629	0.0002	0.0504	0.00128	4.4	51.2	104.2	2.6
G141	1820	84	0.54431	0.00854	0.06691	0.00078	0.05904	0.00088	5.7	26.6	417.5	9.5
G142	158	46	10.25538	0.15171	0.44087	0.00529	0.16882	0.00236	4.4	7.5	2545.9	46.4
G143	1227	574	0.09838	0.00294	0.01467	0.00019	0.04866	0.00145	1.5	28.5	93.9	2.4
G146	460	233	0.09916	0.00466	0.01485	0.00022	0.04846	0.00231	1.1	21.9	95.0	2.8
G147	472	167	0.11299	0.00496	0.01615	0.00024	0.05077	0.00226	5.2	55.2	103.3	3.0
G148	1502	515	0.09908	0.00276	0.01487	0.00019	0.04835	0.00134	0.7	18.1	95.2	2.4
G149	273	55	3.16664	0.05201	0.25326	0.00303	0.09074	0.00143	-0.4	-1.0	1441.1	59.4
G150	286	136	0.10562	0.00691	0.01505	0.00027	0.05093	0.00339	5.9	59.5	96.3	3.4

Sample MB7

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	605	207	0.11577	0.00726	0.01687	0.00029	0.04977	0.00319	3.2	41.5	107.8	3.7
G2	124	90	0.14052	0.01579	0.01934	0.0005	0.05271	0.00605	8.1	61.0	123.5	6.4
G3	124	257	1.37048	0.04079	0.13869	0.00183	0.07167	0.00217	4.7	14.3	837.3	20.7
G4	907	414	0.27316	0.0055	0.03884	0.00044	0.05102	0.00103	-0.2	-1.7	245.6	5.5
G5	201	145	0.1212	0.00848	0.01751	0.00032	0.05019	0.00358	3.8	45.1	111.9	4.0
G6	95	96	0.26072	0.01955	0.03667	0.0007	0.05156	0.00394	1.3	12.7	232.2	8.7
G7	343	601	0.27926	0.00974	0.04172	0.00054	0.04855	0.00172	-5.1	- 109	263.5	6.7
G8	763	363	0.28802	0.00791	0.04064	0.00049	0.0514	0.00143	0.1	0.8	256.8	6.1
G9	653	200	0.1025	0.00367	0.01551	0.0002	0.04794	0.00174	-0.1	-4.2	99.2	2.5
G10	855	259	0.10135	0.00316	0.01537	0.00019	0.04781	0.00151	-0.4	-10.6	98.4	2.4
G11	363	195	3.13515	0.04467	0.24972	0.00277	0.09106	0.00127	0.3	0.7	1447.7	52.6
G12	826	277	5.34634	0.06661	0.33355	0.00363	0.11625	0.00139	1.1	2.3	1899.4	42.7
G13	839	470	0.30607	0.00667	0.04162	0.00048	0.05333	0.00117	3.1	23.3	262.9	6.0
G14	290	234	0.14195	0.00739	0.02045	0.00032	0.05033	0.00267	3.3	38.0	130.5	4.0
G15	356	419	5.23508	0.07144	0.32525	0.0036	0.11674	0.00155	2.4	4.8	1906.9	47.3
G16	315	62	5.56965	0.07538	0.35008	0.00387	0.11539	0.00152	-1.2	-2.6	1886.0	47.0
G17	1233	595	0.10879	0.00404	0.01638	0.00022	0.04818	0.00182	0.2	3.1	104.7	2.7
G18	1082	338	0.11996	0.00378	0.01679	0.00021	0.05181	0.00166	7.1	61.2	107.4	2.7
G19	325	106	0.09435	0.00643	0.01399	0.00025	0.04891	0.0034	2.1	37.6	89.6	3.2
G20	173	84	0.66372	0.02178	0.08176	0.00107	0.05888	0.00196	2.0	10.0	506.6	12.8
G21	497	311	0.13446	0.00483	0.01949	0.00025	0.05004	0.00182	3.0	36.9	124.4	3.2
G22	503	549	0.26924	0.00898	0.03716	0.00048	0.05255	0.00178	2.9	23.9	235.2	6.0
G23	2608	2728	0.10505	0.00249	0.01557	0.00018	0.04894	0.00117	1.8	31.4	99.6	2.3
G24	156	228	1.29631	0.03064	0.13971	0.00169	0.0673	0.00161	0.1	0.5	843.0	19.2
G25	1531	645	0.1012	0.0025	0.01534	0.00018	0.04785	0.00119	-0.2	-8.0	98.1	2.3
G26	17859	1	0.60519	0.06094	0.08016	0.0016	0.05476	0.00558	-3.3	-23.5	497.1	19.2
G27	673	288	0.13901	0.00689	0.02066	0.00031	0.04881	0.00246	0.3	4.8	131.8	3.9
G28	393	676	0.27574	0.00794	0.039	0.00048	0.05128	0.00149	0.3	2.7	246.6	6.0
G29	180	178	0.75371	0.02066	0.09414	0.00116	0.05807	0.00161	-1.7	-9.0	580.0	13.7
G30	1117	314	0.28327	0.00546	0.03947	0.00045	0.05205	0.001	1.5	13.3	249.5	5.5
G31	426	101	0.28871	0.00905	0.04054	0.00051	0.05165	0.00164	0.5	5.1	256.2	6.3
G32	444	274	0.26623	0.00828	0.03814	0.00048	0.05063	0.00159	-0.7	-7.7	241.3	6.0
G33	270	186	0.53759	0.01423	0.06974	0.00085	0.05591	0.00149	0.5	3.1	434.6	10.2
G34	721	489	0.27192	0.00635	0.03834	0.00045	0.05144	0.00121	0.7	6.8	242.6	5.6
G35	187	88	0.10357	0.00732	0.0156	0.00028	0.04816	0.00346	0.3	7.0	99.8	3.5
G36	332	59	1.7836	0.02938	0.17368	0.00196	0.07448	0.00121	0.7	2.1	1032.4	21.5
G37	207	145	0.54807	0.01653	0.07229	0.00091	0.05499	0.00168	-1.4	-9.3	450.0	11.0
G38	373	333	4.91443	0.06662	0.31665	0.0035	0.11256	0.00148	1.8	3.7	1841.2	47.3
G39	996	586	0.10363	0.00309	0.01567	0.00019	0.04795	0.00144	-0.2	-4.7	100.3	2.4
G40	266	211	0.10519	0.00928	0.01547	0.00033	0.04933	0.00444	2.7	39.6	98.9	4.2
G41	253	117	0.59192	0.02117	0.07604	0.00103	0.05646	0.00205	-0.1	-0.6	472.4	12.3
G42	382	198	0.12328	0.00577	0.01817	0.00026	0.0492	0.00235	1.6	26.2	116.1	3.3
G43	160	120	0.21735	0.02138	0.03111	0.00075	0.05067	0.00509	1.1	12.5	197.5	9.4
G44	658	408	0.10131	0.00527	0.01469	0.00023	0.05003	0.00265	4.3	52.2	94.0	2.9
G45	623	415	0.10032	0.00412	0.01531	0.00021	0.04753	0.00198	-0.8	-30.0	97.9	2.6
G46	2003	1587	0.10305	0.00298	0.01559	0.00019	0.04794	0.0014	-0.1	-4.8	99.7	2.4
G47	1383	585	0.11043	0.0033	0.01664	0.0002	0.04814	0.00146	0.0	-0.1	106.4	2.6
G48	1762	637	0.10671	0.00325	0.01535	0.00019	0.05043	0.00155	4.9	54.3	98.2	2.4
G49	619	299	0.10523	0.00431	0.01595	0.00022	0.04786	0.00199	-0.4	-11.6	102.0	2.8
G50	732	763	0.10071	0.00537	0.01526	0.00024	0.04786	0.0026	-0.3	-7.2	97.7	3.0
G51	636	421	0.10834	0.00479	0.01633	0.00023	0.04811	0.00216	0.0	0.5	104.4	2.9
G52	377	167	0.56685	0.0138	0.07284	0.00087	0.05644	0.00139	0.6	3.4	453.2	10.4
G53	1212	788	0.09854	0.00378	0.01458	0.0002	0.04901	0.00191	2.3	37.1	93.3	2.5
G54	416	224	0.55192	0.01291	0.07224	0.00085	0.05541	0.0013	-0.7	-4.9	449.6	10.3
G55	278	169	0.32928	0.01654	0.04419	0.00069	0.05404	0.00277	3.7	25.2	278.8	8.5
G56	634	504	0.10176	0.00511	0.01544	0.00023	0.04781	0.00244	-0.4	-11.1	98.8	2.9
G57	1012	495	0.1096	0.00396	0.01578	0.00021	0.05038	0.00185	4.7	52.5	100.9	2.6
G58	282	129	5.02187	0.07244	0.32223	0.00361	0.11303	0.0016	1.2	2.6	1848.7	50.7
G59	3294	2066	0.11065	0.00336	0.01655	0.00021	0.04849	0.00149	0.8	14.3	105.8	2.6

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G60	4560	1255	0.30642	0.00564	0.04068	0.00046	0.05463	0.001	5.6	35.3	257.0	5.7
G61	501	274	0.58461	0.01234	0.07502	0.00087	0.05652	0.0012	0.2	1.2	466.3	10.4
G62	1228	1182	0.27743	0.00555	0.03969	0.00045	0.05069	0.00101	-0.9	-10.6	250.9	5.6
G63	602	383	0.14469	0.00694	0.01984	0.0003	0.0529	0.00259	8.4	61.0	126.6	3.8
G64	278	333	0.24961	0.01133	0.03603	0.00052	0.05025	0.00232	-0.8	-10.5	228.2	6.5
G65	2332	927	0.53345	0.00773	0.06948	0.00076	0.05568	0.00079	0.3	1.5	433.0	9.2
G66	591	331	0.12465	0.00475	0.01767	0.00024	0.05115	0.00198	5.7	54.4	112.9	3.0
G67	781	446	0.10073	0.0063	0.01503	0.00026	0.04861	0.0031	1.2	25.6	96.2	3.3
G68	255	24	0.28994	0.01123	0.04086	0.00055	0.05147	0.00203	0.2	1.5	258.1	6.9
G69	221	160	0.08843	0.0092	0.01262	0.0003	0.05083	0.00539	6.4	65.3	80.8	3.8
G70	712	590	0.09348	0.00548	0.01423	0.00023	0.04766	0.00285	-0.4	-11.6	91.1	3.0
G71	326	282	0.51005	0.01374	0.06688	0.00082	0.05531	0.00151	0.3	1.7	417.3	9.9
G72	237	219	0.32734	0.02163	0.04564	0.00084	0.05201	0.00351	-0.1	-0.6	287.7	10.3
G73	1530	3227	0.55691	0.00875	0.07285	0.00081	0.05544	0.00086	-0.8	-5.5	453.3	9.7
G74	51	20	0.24519	0.03204	0.0354	0.00095	0.05024	0.00667	-0.7	-8.8	224.2	11.8
G75	1068	1087	0.2855	0.00629	0.04012	0.00046	0.05161	0.00114	0.6	5.5	253.6	5.7
G76	805	275	0.12003	0.00652	0.01703	0.00027	0.05113	0.00284	5.8	55.9	108.8	3.5
G77	281	147	0.0911	0.01072	0.0139	0.00038	0.04752	0.00571	-0.6	-19.0	89.0	4.8
G78	62	89	0.09649	0.02121	0.01457	0.00064	0.04803	0.01074	0.2	7.4	93.3	8.1
G79	1350	313	1.31367	0.01818	0.1385	0.00152	0.06879	0.00093	1.9	6.3	836.2	17.2
G80	369	192	0.13945	0.00784	0.02064	0.00033	0.04899	0.00281	0.7	10.7	131.7	4.2
G81	434	250	0.29278	0.01402	0.04114	0.00062	0.05162	0.00252	0.3	3.2	259.9	7.7
G82	369	247	0.12508	0.00675	0.01875	0.00029	0.04839	0.00266	0.0	-1.3	119.7	3.7
G83	310	244	0.2829	0.01043	0.03844	0.00052	0.05338	0.002	4.0	29.5	243.2	6.4
G84	123	90	0.11749	0.01551	0.01651	0.00049	0.0516	0.00695	6.8	60.6	105.6	6.2
G85	129	58	3.17608	0.06186	0.25419	0.00303	0.09062	0.00177	-0.6	-1.5	1438.6	73.6
G86	980	345	0.65907	0.01328	0.08473	0.00097	0.05641	0.00114	-2.0	-12.0	524.3	11.6
G87	1051	725	0.11982	0.00481	0.01648	0.00024	0.05275	0.00214	9.0	66.9	105.4	3.0
G88	100	158	0.25575	0.03249	0.03901	0.00115	0.04756	0.00616	-6.3	-221	246.7	14.2
G89	1179	545	0.09643	0.00538	0.01457	0.00024	0.04801	0.00272	0.2	5.3	93.3	3.1
G90	36371	7	0.29093	0.02564	0.03826	0.00088	0.05517	0.00497	7.1	42.3	242.0	10.9
G91	819	605	0.1047	0.0053	0.01561	0.00025	0.04866	0.0025	1.3	24.1	99.8	3.1
G92	185	91	0.1338	0.00924	0.01888	0.00036	0.05141	0.00362	5.7	53.5	120.6	4.5
G93	609	303	0.10234	0.00472	0.01542	0.00023	0.04816	0.00225	0.3	8.1	98.6	2.9
G94	1325	801	0.08734	0.003	0.01322	0.00018	0.04792	0.00165	0.4	10.2	84.7	2.3
G95	197	141	0.12306	0.01109	0.01849	0.0004	0.04827	0.00443	-0.3	-4.8	118.1	5.1
G96	409	536	0.3008	0.0096	0.0422	0.00057	0.05171	0.00166	0.2	2.3	266.5	7.0
G97	2411	2295	0.28782	0.00506	0.03887	0.00047	0.05373	0.0009	4.5	31.6	245.8	5.8
G98	234	140	0.57786	0.01741	0.07214	0.00097	0.05811	0.00176	3.1	15.8	449.1	11.6
G99	305	230	0.5348	0.01476	0.06887	0.0009	0.05634	0.00155	1.3	7.6	429.4	10.8
G100	284	175	1.71432	0.03262	0.17153	0.00211	0.07251	0.00134	-0.6	-2.0	1020.5	23.2
G101	882	356	0.10655	0.00369	0.01566	0.00021	0.04937	0.00172	2.7	39.6	100.1	2.7
G102	90	61	0.11741	0.01627	0.0163	0.0005	0.05226	0.00738	8.2	64.9	104.2	6.3
G103	580	321	0.31267	0.00949	0.04229	0.00056	0.05364	0.00163	3.4	25.0	267.0	6.9
G104	209	87	3.61328	0.06488	0.2712	0.00335	0.09666	0.00167	0.4	0.9	1560.6	64.2
G105	287	293	0.10356	0.0084	0.01564	0.00032	0.04804	0.00397	0.1	1.5	100.0	4.1
G106	589	559	0.09734	0.00541	0.01467	0.00024	0.04815	0.00272	0.4	11.9	93.9	3.1
G107	1273	481	0.10645	0.00386	0.01561	0.00022	0.04948	0.00181	2.9	41.5	99.8	2.7
G108	235	167	1.18792	0.03084	0.12989	0.0017	0.06635	0.00172	1.0	3.7	787.2	19.4
G109	190	345	0.29756	0.01415	0.04054	0.00063	0.05325	0.00257	3.2	24.5	256.2	7.8
G110	204	59	0.4127	0.01607	0.05194	0.00076	0.05764	0.00227	7.5	36.7	326.4	9.3
G111	110	56	0.42191	0.02225	0.05342	0.0009	0.0573	0.00308	6.5	33.2	335.5	11.0
G112	1311	997	0.1125	0.0035	0.01668	0.00022	0.04895	0.00152	1.6	26.6	106.6	2.8
G113	161176	-2	0.32078	0.01091	0.0453	0.00062	0.05137	0.00176	-1.1	-10.9	285.6	7.6
G114	6419	2489	0.11028	0.00197	0.01569	0.00019	0.05099	0.00087	5.8	58.2	100.4	2.4
G115	148	54	0.29762	0.01585	0.03998	0.00066	0.05401	0.00292	4.7	31.9	252.7	8.1
G116	1805	1067	0.10791	0.00285	0.0159	0.0002	0.04924	0.00129	2.4	36.2	101.7	2.6
G117	251	189	3.18261	0.05563	0.25273	0.0031	0.09136	0.00153	0.0	0.1	1454.0	63.1
G118	970	588	0.13364	0.00469	0.02	0.00027	0.04849	0.00171	-0.2	-3.7	127.6	3.5
G119	411	235	0.08794	0.00515	0.01329	0.00022	0.04803	0.00285	0.6	15.3	85.1	2.8
G120	91	62	0.28407	0.01963	0.03843	0.00073	0.05362	0.00377	4.4	31.5	243.1	9.0

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G121	608	435	0.10177	0.00459	0.01488	0.00022	0.04963	0.00227	3.4	46.4	95.2	2.8
G122	471	114	5.20729	0.07677	0.33119	0.00395	0.11407	0.00156	0.5	1.1	1865.2	49.0
G123	435	366	1.29298	0.02428	0.14056	0.00172	0.06674	0.00121	-0.6	-2.2	847.8	19.4
G124	309	247	0.29499	0.01413	0.03832	0.00061	0.05585	0.00272	8.3	45.7	242.4	7.6
G125	1141	366	0.29805	0.00668	0.04191	0.00052	0.0516	0.00114	0.1	1.0	264.7	6.4
G126	589	216	0.94672	0.02041	0.10381	0.0013	0.06617	0.0014	6.2	21.6	636.7	15.2
G127	271	244	0.5591	0.01831	0.07425	0.00101	0.05463	0.0018	-2.3	-16.2	461.7	12.2
G128	310	376	0.29395	0.0112	0.03933	0.00056	0.05422	0.00209	5.2	34.5	248.7	7.0
G129	349	397	0.27785	0.00995	0.0387	0.00054	0.05209	0.00188	1.7	15.4	244.8	6.7
G130	1156	536	0.0961	0.00616	0.01419	0.00026	0.04915	0.00321	2.6	41.3	90.8	3.3
G131	864	472	0.10289	0.00395	0.01553	0.00022	0.04805	0.00186	0.0	2.5	99.4	2.8
G132	545	103	5.44694	0.07966	0.34284	0.00408	0.11527	0.00156	-0.4	-0.9	1884.0	48.4
G133	458	250	0.29426	0.00924	0.0403	0.00054	0.05297	0.00167	2.8	22.2	254.7	6.7
G134	718	374	0.106	0.00561	0.0159	0.00026	0.04838	0.0026	0.6	13.6	101.7	3.2
G135	442	190	0.29727	0.01383	0.04089	0.00064	0.05274	0.00249	2.3	18.7	258.4	7.9
G136	495	319	0.29203	0.0096	0.0393	0.00053	0.05391	0.00178	4.7	32.3	248.5	6.6
G137	616	346	0.12517	0.00688	0.01837	0.0003	0.04944	0.00276	2.1	30.6	117.3	3.8
G138	1167	649	0.11262	0.00368	0.01645	0.00022	0.04966	0.00163	3.0	41.3	105.2	2.8
G139	365	233	0.43349	0.01285	0.05484	0.00073	0.05734	0.0017	6.2	31.8	344.2	8.9
G140	216	196	0.11927	0.00873	0.01659	0.00032	0.05215	0.00389	7.8	63.7	106.1	4.1
G141	945	465	0.28297	0.00662	0.03895	0.00049	0.05271	0.00122	2.7	22.1	246.3	6.0
G142	297	192	0.0932	0.0063	0.01372	0.00025	0.04926	0.00338	3.0	45.2	87.9	3.1
G143	525	181	0.31025	0.0089	0.04146	0.00054	0.05429	0.00156	4.8	31.6	261.9	6.7
G144	229	124	1.1089	0.02695	0.12123	0.00156	0.06636	0.0016	2.7	9.8	737.6	17.9
G145	226	293	0.26496	0.013	0.0378	0.00059	0.05085	0.00253	-0.2	-2.2	239.2	7.3
G146	1182	938	0.27909	0.00606	0.03825	0.00047	0.05294	0.00113	3.3	25.8	242.0	5.9
G147	634	264	0.12399	0.00649	0.01696	0.00028	0.05305	0.00282	9.5	67.2	108.4	3.5
G148	29450	30	0.35443	0.03668	0.04737	0.00124	0.05428	0.00574	3.2	22.0	298.4	15.3
G149	660	1316	0.10612	0.00448	0.01578	0.00023	0.04878	0.00208	1.4	26.3	101.0	2.9
G150	1015	986	0.27919	0.00646	0.03785	0.00047	0.05352	0.00122	4.4	31.7	239.5	5.9
G151	280	118	0.34722	0.01212	0.04815	0.00066	0.05232	0.00184	-0.2	-1.2	303.1	8.2
G152	285	145	0.10991	0.00698	0.0167	0.00029	0.04774	0.00308	-0.8	-25.2	106.8	3.6
G153	450	219	0.12422	0.00563	0.01909	0.00028	0.04722	0.00216	-2.5	-104	121.9	3.6
G154	225	183	0.28	0.01332	0.0388	0.0006	0.05235	0.00253	2.2	18.4	245.4	7.5
G155	1147	340	0.27548	0.00606	0.03888	0.00048	0.0514	0.00111	0.5	5.0	245.9	6.0
G156	595	366	0.11235	0.00456	0.01643	0.00024	0.0496	0.00203	2.9	40.4	105.1	3.0
G157	282	123	0.14975	0.01336	0.02086	0.00048	0.05209	0.00475	6.5	54.0	133.1	6.0
G158	72	64	0.25244	0.02716	0.03734	0.00094	0.04904	0.00537	-3.3	-57.6	236.3	11.7
G159	775	760	0.11216	0.00435	0.01673	0.00024	0.04862	0.0019	0.8	17.6	107.0	3.0

Sample Q1

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	157	139	0.28133	0.01317	0.04015	0.00061	0.05128	0.00243	-0.8	-0.2	253.7	7.6
G4	119	167	0.27129	0.01761	0.03915	0.00071	0.0507	0.00335	-1.6	-9.0	247.6	8.8
G6	84	37	2.68234	0.06096	0.23253	0.00301	0.08439	0.0019	-1.8	-3.5	1301.6	86.6
G8	1296	678	0.57634	0.01017	0.07693	0.00092	0.05481	0.00093	-3.3	-18.1	477.7	11.0
G10	241	113	2.76394	0.05108	0.23092	0.00284	0.08755	0.00157	0.5	2.4	1372.7	68.3
G11	411	1292	0.50698	0.01195	0.06736	0.00084	0.05505	0.00129	-0.9	-1.5	420.3	10.2
G13	122	107	0.26456	0.0159	0.03847	0.00066	0.0503	0.00307	-2.1	-16.6	243.4	8.2
G14	430	62	0.29621	0.00799	0.04187	0.00054	0.05175	0.00139	-0.4	3.6	264.4	6.6
G16	77	81	0.11779	0.01259	0.01871	0.00042	0.04605	0.00499	-5.4	-119	119.5	5.3
G17	202	309	0.10831	0.00734	0.01644	0.00029	0.04818	0.00332	-0.7	3.0	105.1	3.7
G18	98	117	0.27771	0.0165	0.0391	0.00067	0.05194	0.00314	0.6	12.5	247.3	8.3
G19	444	158	0.2748	0.00788	0.04048	0.00052	0.04964	0.00142	-3.6	-43.5	255.8	6.5
G20	242	169	0.57112	0.0149	0.07377	0.00095	0.05661	0.00147	0.0	3.5	458.9	11.4
G22	168	120	0.28163	0.01309	0.04045	0.00062	0.05091	0.0024	-1.4	-8.0	255.6	7.7
G23	283	222	0.3491	0.01394	0.04823	0.0007	0.05293	0.00214	0.1	6.8	303.6	8.6
G24	198	148	0.2646	0.01113	0.03791	0.00055	0.05103	0.00217	-0.6	0.9	239.9	6.9
G25	484	292	2.66556	0.04637	0.22415	0.00272	0.08695	0.00146	1.2	4.1	1359.4	63.9

A110

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G26	311	186	0.5428	0.01328	0.07206	0.00091	0.05508	0.00134	-1.8	-8.0	448.5	10.9
G27	706	418	0.28245	0.00656	0.04024	0.0005	0.05132	0.00118	-0.7	0.4	254.3	6.2
G30	497	99	0.56055	0.01461	0.07473	0.00096	0.05483	0.00142	-2.7	-14.6	464.6	11.5
G34	515	171	0.28671	0.00822	0.04082	0.00053	0.05134	0.00147	-0.7	-0.7	257.9	6.6
G35	21	81	0.43694	0.05104	0.05931	0.00159	0.05385	0.0064	-0.9	-1.9	371.4	19.3
G36	303	883	0.28252	0.00995	0.03949	0.00055	0.0523	0.00186	1.2	16.3	249.7	6.8
G37	845	56	0.28996	0.00641	0.04135	0.00051	0.05125	0.00111	-1.0	-3.7	261.2	6.3
G40	285	95	0.53035	0.01412	0.07046	0.00091	0.05501	0.00146	-1.6	-6.4	438.9	10.9
G41	239	172	0.56911	0.01544	0.07553	0.00098	0.05507	0.00149	-2.6	-13.2	469.4	11.7
G43	164	301	0.1086	0.00764	0.01631	0.00029	0.04866	0.00347	0.4	20.7	104.3	3.7
G46	564	52	0.39866	0.00949	0.05512	0.00069	0.05285	0.00124	-1.5	-7.3	345.9	8.4
G47	604	55	0.37511	0.00879	0.05378	0.00067	0.05096	0.00118	-4.2	-41.2	337.7	8.2
G48	181	72	0.28899	0.01396	0.0425	0.00066	0.04968	0.00244	-3.9	-48.9	268.3	8.2
G50	296	106	0.29104	0.00908	0.04053	0.00054	0.05246	0.00164	1.3	16.2	256.1	6.7
G51	455	581	18.22188	0.27983	0.56938	0.0068	0.23379	0.00337	3.3	5.6	3078.2	45.7
G52	451	279	0.26038	0.00829	0.03914	0.00052	0.0486	0.00155	-5.1	-92.5	247.5	6.5
G53	218	130	0.29222	0.01428	0.03744	0.00061	0.05701	0.00284	9.8	51.8	237.0	7.5
G54	294	144	1.49014	0.0297	0.15626	0.00193	0.06966	0.00135	-1.0	-1.9	935.9	21.5
G55	147	102	0.25678	0.01269	0.03786	0.00059	0.04954	0.00248	-3.1	-38.0	239.5	7.3
G57	173	129	0.52989	0.01785	0.07007	0.00097	0.05523	0.00187	-1.1	-3.6	436.6	11.6
G58	59	85	0.09361	0.01247	0.01446	0.00041	0.04729	0.00641	-1.7	-45.9	92.5	5.2
G59	372	231	0.25716	0.00758	0.03741	0.00049	0.0502	0.00148	-1.9	-16.0	236.8	6.1
G60	112	146	0.27834	0.01398	0.04021	0.00063	0.05055	0.00258	-1.9	-15.3	254.2	7.9
G61	651	2	3.07569	0.05073	0.25422	0.00304	0.08835	0.00138	-2.3	-5.0	1390.2	59.4
G63	236	182	0.56158	0.01499	0.073	0.00094	0.05617	0.00149	-0.4	0.9	454.2	11.3
G64	137	129	0.28807	0.01341	0.04081	0.00062	0.05154	0.00243	-0.3	2.7	257.9	7.7
G65	1220	321	0.29492	0.00597	0.04183	0.00051	0.05148	0.00101	-0.7	-0.6	264.2	6.3
G67	165	131	0.26951	0.01073	0.03893	0.00056	0.05055	0.00203	-1.6	-11.7	246.2	6.9
G68	189	146	0.29769	0.01322	0.04272	0.00064	0.05088	0.00229	-1.9	-14.5	269.6	8.0
G70	271	208	0.2775	0.00913	0.03945	0.00053	0.05135	0.0017	-0.3	2.7	249.5	6.6
G71	138	124	0.27021	0.01228	0.03861	0.00058	0.05109	0.00235	-0.5	0.3	244.2	7.2
G72	392	157	0.28781	0.00935	0.04058	0.00055	0.05177	0.00169	0.1	6.8	256.5	6.8
G73	85	96	0.1135	0.01328	0.01702	0.00044	0.04869	0.00579	0.4	18.1	108.8	5.5
G74	201	131	0.26187	0.0101	0.03812	0.00054	0.05015	0.00195	-2.1	-19.5	241.2	6.7
G75	65	50	0.26865	0.02244	0.03781	0.00082	0.05187	0.00442	1.0	14.5	239.2	10.2
G76	399	200	0.57397	0.01314	0.07506	0.00094	0.05582	0.00126	-1.3	-4.9	466.6	11.3
G77	299	154	0.26719	0.00964	0.03778	0.00053	0.05162	0.00188	0.5	10.9	239.1	6.5
G79	480	50	2.66993	0.04623	0.22817	0.00275	0.0854	0.00141	-0.4	0.0	1324.7	63.5
G83	120	118	0.11285	0.01382	0.01619	0.00046	0.05086	0.00636	4.9	55.9	103.5	5.9
G86	143	110	0.28591	0.01224	0.03957	0.00059	0.05272	0.00228	2.0	21.0	250.2	7.3
G87	618	181	0.2941	0.00859	0.04171	0.00055	0.05145	0.0015	-0.6	-0.8	263.4	6.8
G90	163	199	0.25392	0.01209	0.03776	0.00058	0.04907	0.00237	-3.8	-58.1	238.9	7.2
G91	283	86	0.25295	0.0144	0.0355	0.00058	0.05199	0.003	1.8	21.0	224.9	7.3
G93	116	83	0.53902	0.02045	0.06998	0.00101	0.05619	0.00215	0.4	5.0	436.0	12.2
G94	9764	29653	0.12669	0.00225	0.01907	0.00023	0.04846	0.00082	-0.6	0.1	121.8	2.9
G95	189	357	0.29425	0.01266	0.04075	0.00061	0.05268	0.00229	1.7	18.3	257.5	7.5
G96	134	111	0.10047	0.00901	0.01508	0.00032	0.04861	0.00444	0.7	25.2	96.5	4.1
G97	188	135	0.52634	0.01569	0.07109	0.00094	0.05401	0.00161	-3.0	-19.3	442.7	11.3
G98	334	353	0.11177	0.00694	0.01707	0.0003	0.04776	0.00301	-1.4	-26.3	109.1	3.8
G99	318	203	0.12384	0.00596	0.01785	0.00028	0.05059	0.00247	3.9	48.6	114.1	3.5
G100	259	276	0.09758	0.00743	0.01495	0.0003	0.04761	0.00369	-1.3	-21.0	95.7	3.7
G101	162	126	0.28017	0.01146	0.03946	0.00057	0.05178	0.00214	0.5	9.5	249.5	7.1
G102	477	130	0.28495	0.00835	0.04029	0.00053	0.05157	0.00151	0.0	4.4	254.7	6.6
G103	138	124	0.54146	0.02004	0.07298	0.00104	0.0541	0.00202	-3.2	-21.0	454.1	12.5
G104	85	64	0.28546	0.02326	0.04184	0.00088	0.04976	0.00413	-3.5	-43.9	264.2	10.9
G105	103	99	0.27412	0.01623	0.04112	0.0007	0.0486	0.00292	-5.3	-101	259.8	8.6
G106	51	37	0.40116	0.02874	0.05764	0.00112	0.05075	0.0037	-5.2	-57.4	361.2	13.7
G107	200	156	0.10625	0.00676	0.01564	0.00027	0.04953	0.0032	2.5	42.2	100.0	3.5
G108	601	216	0.55119	0.01197	0.07197	0.00089	0.05584	0.00118	-0.5	-0.5	448.0	10.7
G109	462	309	0.2534	0.0174	0.03632	0.0006	0.05087	0.00353	-0.3	2.0	230.0	7.5
G110	259	216	1.8803	0.03866	0.17977	0.00223	0.07626	0.00153	0.8	3.3	1065.7	24.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G112	589	131	0.27329	0.00699	0.03956	0.0005	0.05036	0.00127	-1.9	-18.1	250.1	6.2
G113	350	556	0.29361	0.01009	0.03879	0.00054	0.05518	0.00191	6.6	41.5	245.3	6.7
G116	649	102	0.55788	0.01202	0.07336	0.00091	0.05543	0.00117	-1.4	-6.3	456.4	10.9
G117	194	325	0.11009	0.0067	0.016	0.00028	0.05015	0.0031	3.6	49.4	102.3	3.5
G121	256	237	0.27197	0.00927	0.03883	0.00053	0.05105	0.00175	-0.5	-1.1	245.6	6.6
G122	176	363	0.26783	0.01332	0.03976	0.00063	0.04909	0.00247	-4.1	-65.3	251.4	7.8
G124	129	178	0.25948	0.01315	0.03686	0.00059	0.05129	0.00263	0.3	8.1	233.4	7.3
G125	83	79	0.30973	0.01599	0.04415	0.00071	0.05112	0.00268	-1.6	-13.1	278.5	8.7
G129	297	179	0.28546	0.0092	0.04079	0.00055	0.05099	0.00164	-1.0	-7.2	257.7	6.8
G132	477	11	0.61726	0.01433	0.07989	0.001	0.05629	0.00128	-1.5	-7.0	495.5	12.0
G133	400	205	0.27862	0.00957	0.04094	0.00056	0.04958	0.00171	-3.5	-47.6	258.7	6.9
G135	489	315	0.2796	0.00985	0.03966	0.00055	0.05135	0.00182	-0.2	2.3	250.7	6.8
G136	143	118	0.27251	0.01171	0.03849	0.00057	0.05157	0.00224	0.5	8.6	243.5	7.1
G137	71	68	0.12438	0.01515	0.01886	0.00051	0.04803	0.00595	-1.2	-19.9	120.5	6.5
G138	416	101	0.72882	0.0177	0.08657	0.0011	0.06132	0.00147	3.9	17.7	535.2	13.1
G139	243	127	0.27664	0.00963	0.04	0.00055	0.05037	0.00176	-1.9	-19.1	252.8	6.8
G140	213	188	0.27017	0.00999	0.0382	0.00054	0.05151	0.00192	0.5	8.4	241.7	6.7
G141	93	57	0.55883	0.02853	0.07313	0.00121	0.05566	0.00289	-0.9	-3.8	455.0	14.6
G142	451	241	0.27542	0.00936	0.03952	0.00054	0.05075	0.00173	-1.2	-8.8	249.9	6.7
G143	206	173	0.28655	0.01085	0.03834	0.00055	0.05443	0.00208	5.5	37.6	242.5	6.8
G149	68	96	1.92655	0.05467	0.17601	0.0024	0.0797	0.00226	4.3	12.1	1045.1	26.3
G150	71	52	0.30028	0.02834	0.04188	0.001	0.0522	0.00503	0.8	10.1	264.5	12.4
G83	493	378	0.53563	0.01315	0.06878	0.00086	0.0565	0.00138	1.6	9.0	428.8	10.4
G84	875	140	0.52101	0.01032	0.06783	0.00081	0.05572	0.00108	0.6	4.1	423.1	9.8
G85	118	85	0.28626	0.01661	0.03897	0.00066	0.05329	0.00315	3.7	27.7	246.5	8.2
G86	833	639	2.77911	0.04624	0.23007	0.00274	0.08763	0.00141	1.1	2.9	1374.5	61.1
G87	403	337	0.1137	0.00574	0.01714	0.00026	0.04813	0.00247	-0.2	-3.8	109.5	3.3
G89	579	165	0.2879	0.00823	0.03959	0.00051	0.05276	0.00151	2.6	21.4	250.3	6.3
G90	234	163	0.2546	0.01901	0.03576	0.00072	0.05166	0.00394	1.7	16.2	226.5	8.9
G91	559	316	0.52544	0.01193	0.06815	0.00084	0.05594	0.00126	0.9	5.5	425.0	10.1
G92	203	140	0.51168	0.01776	0.06615	0.00091	0.05611	0.00197	1.6	9.6	412.9	11.0
G94	961	264	0.15797	0.00492	0.02297	0.0003	0.04989	0.00156	1.7	22.9	146.4	3.8
G95	391	267	0.25734	0.01486	0.03375	0.00061	0.05532	0.00327	8.6	49.7	214.0	7.5
G96	156	164	0.0895	0.00966	0.01386	0.00031	0.04685	0.00513	-1.9	-113	88.7	4.0
G97	268	182	0.55697	0.01762	0.07128	0.00095	0.05669	0.00181	1.3	7.3	443.8	11.5
G98	408	251	0.25527	0.00892	0.03677	0.0005	0.05037	0.00178	-0.9	-9.7	232.8	6.2
G99	369	159	0.64138	0.02631	0.08351	0.00124	0.05572	0.00232	-2.7	-17.3	517.1	14.7
G100	694	641	0.27393	0.00798	0.03787	0.00049	0.05248	0.00154	2.6	21.8	239.6	6.1
G101	264	190	0.2666	0.01252	0.03883	0.00059	0.04981	0.00237	-2.3	-32.0	245.6	7.3
G102	438	190	5.26666	0.0851	0.33816	0.00406	0.11299	0.00176	-0.8	-1.6	1848.0	55.7
G103	272	198	0.27505	0.01189	0.0397	0.00058	0.05026	0.0022	-1.7	-21.2	251.0	7.2
G104	87	74	0.10898	0.01556	0.01723	0.00047	0.04589	0.00664	-4.6	-110	110.1	6.0
G105	285	191	0.2668	0.01082	0.03877	0.00055	0.04993	0.00205	-2.1	-27.8	245.2	6.8
G106	648	194	0.28017	0.00789	0.03828	0.00049	0.0531	0.0015	3.6	27.3	242.2	6.1
G107	1160	760	0.26877	0.00623	0.03804	0.00046	0.05126	0.00118	0.4	4.7	240.7	5.8
G108	536	197	0.609	0.01373	0.07884	0.00097	0.05604	0.00125	-1.3	-7.8	489.2	11.5
G109	167	168	0.12122	0.00977	0.01837	0.00036	0.04788	0.00393	-0.9	-27.1	117.3	4.6
G110	624	855	0.27398	0.00778	0.0386	0.00049	0.0515	0.00147	0.7	7.2	244.1	6.1
G111	41	30	0.27808	0.03229	0.03725	0.00099	0.05416	0.00641	5.6	37.5	235.8	12.2
G112	267	90	0.3234	0.01572	0.04474	0.0007	0.05245	0.00259	0.9	7.5	282.1	8.7
G113	308	377	0.2581	0.01079	0.03685	0.00053	0.05081	0.00215	-0.1	-0.5	233.3	6.6
G114	186	197	0.12575	0.01165	0.01864	0.00042	0.04893	0.00462	1.0	17.6	119.1	5.3
G115	866	417	0.28834	0.00715	0.04154	0.00051	0.05036	0.00124	-1.9	-23.9	262.4	6.4
G116	429	349	0.09948	0.00519	0.01495	0.00023	0.04827	0.00256	0.6	14.9	95.7	3.0
G117	826	530	0.27532	0.00683	0.03853	0.00048	0.05184	0.00128	1.3	12.4	243.7	5.9
G118	287	317	0.2608	0.01041	0.03746	0.00053	0.05051	0.00204	-0.8	-8.5	237.1	6.6
G119	203	105	0.26912	0.0127	0.03823	0.00058	0.05107	0.00245	0.0	0.8	241.9	7.2

Sample Q2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	168	390	0.24738	0.02148	0.03645	0.00081	0.04924	0.00436	-2.8	-44.7	230.8	10.1
G2	441	172	0.28558	0.0088	0.04081	0.00054	0.05078	0.00157	-1.0	-11.7	257.8	6.7
G3	1000	472	0.28808	0.00676	0.04062	0.0005	0.05146	0.0012	0.1	1.9	256.7	6.2
G5	483	66	2.97449	0.04453	0.24609	0.00292	0.0877	0.00124	-1.2	-3.1	1375.9	53.8
G6	982	90	0.26224	0.00734	0.0374	0.00048	0.05088	0.00143	-0.1	-0.6	236.7	6.0
G7	446	205	2.9542	0.04483	0.23842	0.00283	0.0899	0.00129	1.3	3.2	1423.4	54.3
G8	3214	673	0.47185	0.00694	0.06346	0.00074	0.05395	0.00074	-1.0	-7.5	396.6	9.0
G9	276	123	0.12164	0.01004	0.01824	0.00038	0.04839	0.00407	0.1	1.4	116.5	4.8
G10	1067	87	5.36667	0.07061	0.32067	0.00374	0.12143	0.00146	4.8	9.3	1977.4	42.7
G12	220	193	0.10529	0.00964	0.01589	0.00035	0.04808	0.00448	0.0	1.6	101.6	4.5
G13	618	555	0.24654	0.01026	0.03598	0.00053	0.04971	0.0021	-1.8	-25.4	227.9	6.5
G14	451	176	0.52088	0.01235	0.07001	0.00088	0.05399	0.00127	-2.4	-17.8	436.2	10.5
G15	329	81	0.25128	0.01056	0.03768	0.00055	0.04838	0.00206	-4.6	-101	238.5	6.8
G16	317	120	0.27207	0.01195	0.03926	0.00059	0.05029	0.00224	-1.6	-19.2	248.2	7.3
G17	921	508	0.26527	0.00726	0.03818	0.00049	0.05042	0.00138	-1.1	-12.7	241.5	6.1
G18	207	137	0.5228	0.01804	0.06888	0.00096	0.05507	0.00192	-0.6	-3.5	429.4	11.5
G19	509	328	0.26808	0.0092	0.03885	0.00053	0.05007	0.00173	-1.8	-24.0	245.7	6.6
G20	614	284	0.28026	0.00819	0.03967	0.00052	0.05126	0.0015	0.0	0.8	250.8	6.4
G21	120	187	0.11103	0.01577	0.01524	0.00049	0.05286	0.00767	9.6	69.8	97.5	6.2
G22	159	69	0.26172	0.01498	0.03765	0.00064	0.05044	0.00294	-0.9	-10.5	238.2	7.9
G23	1550	37	0.27324	0.00564	0.03974	0.00048	0.04989	0.00101	-2.3	-32.3	251.2	6.0
G24	443	381	0.26601	0.01007	0.03793	0.00054	0.05089	0.00195	-0.2	-1.7	240.0	6.7
G25	678	432	0.25233	0.00778	0.03795	0.0005	0.04825	0.00149	-4.8	-115	240.1	6.2
G26	345	327	0.26309	0.01075	0.03706	0.00054	0.0515	0.00213	1.1	10.9	234.6	6.7
G27	1111	476	0.27502	0.0069	0.03978	0.0005	0.05017	0.00125	-1.9	-24.1	251.5	6.2
G28	2794	781	0.27493	0.00503	0.03909	0.00047	0.05104	0.0009	-0.2	-2.0	247.2	5.8
G29	244	243	0.25807	0.01176	0.03739	0.00057	0.05008	0.00231	-1.5	-19.1	236.6	7.0
G30	173	93	0.09817	0.0085	0.01523	0.00032	0.04676	0.00412	-2.5	-165	97.5	4.0
G31	300	92	0.54254	0.01511	0.07113	0.00093	0.05534	0.00154	-0.7	-4.0	443.0	11.1
G32	339	260	0.40804	0.01172	0.05703	0.00074	0.05191	0.00149	-2.8	-26.9	357.5	9.0
G33	142	56	4.67277	0.08057	0.30188	0.00373	0.11231	0.00188	3.6	7.4	1837.2	60.0
G34	1273	1478	0.3959	0.00725	0.05428	0.00065	0.05292	0.00094	-0.6	-4.8	340.8	7.9
G35	1523	435	0.27103	0.00599	0.03973	0.00049	0.0495	0.00108	-3.0	-46.2	251.1	6.0
G36	144	102	0.11304	0.01198	0.01547	0.0004	0.05302	0.00574	9.9	70.0	98.9	5.0
G37	772	194	0.5439	0.01056	0.07248	0.00088	0.05445	0.00103	-2.2	-15.8	451.1	10.5
G39	265	68	0.55907	0.01825	0.07152	0.00098	0.05672	0.00187	1.3	7.2	445.3	11.8
G40	265	198	0.26711	0.01173	0.03823	0.00057	0.0507	0.00226	-0.6	-6.5	241.8	7.1
G41	140	113	0.11749	0.01183	0.01788	0.00041	0.04769	0.00489	-1.2	-37.9	114.2	5.3
G42	471	279	0.27297	0.01126	0.03887	0.00057	0.05095	0.00213	-0.3	-3.1	245.9	7.1
G43	460	237	0.53169	0.01258	0.07006	0.00088	0.05506	0.00129	-0.8	-5.3	436.5	10.6
G44	383	78	0.52568	0.01544	0.07121	0.00094	0.05357	0.00158	-3.3	-25.7	443.4	11.3
G45	1287	443	0.26339	0.00622	0.03761	0.00047	0.05081	0.00119	-0.3	-2.5	238.0	5.8
G46	413	217	0.27969	0.00895	0.03947	0.00053	0.05141	0.00166	0.3	3.8	249.6	6.5
G48	771	234	0.30045	0.00773	0.03938	0.0005	0.05537	0.00142	7.1	41.7	249.0	6.2
G49	396	233	0.27119	0.00965	0.03776	0.00052	0.0521	0.00187	1.9	17.6	239.0	6.5
G50	952	98	0.27652	0.00633	0.03985	0.00049	0.05035	0.00114	-1.6	-19.3	251.9	6.1
G51	287	73	1.27597	0.02662	0.14023	0.00174	0.06602	0.00136	-1.3	-4.8	846.0	19.7
G52	13033	7511	0.09881	0.00157	0.01475	0.00017	0.04862	0.00073	1.4	27.0	94.4	2.2
G53	304	91	0.27486	0.01011	0.0396	0.00055	0.05036	0.00187	-1.5	-18.2	250.4	6.8
G54	600	250	0.27633	0.00989	0.03835	0.00053	0.05228	0.00189	2.1	18.5	242.6	6.6
G55	706	103	0.50147	0.01117	0.06662	0.00082	0.05462	0.0012	-0.7	-4.8	415.8	10.0
G56	394	290	0.26305	0.00956	0.03761	0.00052	0.05074	0.00186	-0.4	-3.8	238.0	6.5
G57	389	181	0.53597	0.01338	0.07081	0.0009	0.05492	0.00137	-1.2	-7.8	441.0	10.8
G58	6431	4064	0.29222	0.00508	0.04091	0.00049	0.05183	0.00087	0.7	7.0	258.5	6.0
G59	500	207	0.27499	0.00796	0.03935	0.00051	0.05071	0.00147	-0.8	-9.4	248.8	6.3
G60	595	301	1.86489	0.02913	0.18345	0.00218	0.07376	0.00109	-1.6	-4.9	1085.8	23.7
G61	418	319	0.28413	0.01118	0.03795	0.00055	0.05432	0.00217	5.7	37.5	240.1	6.8
G62	661	248	0.28031	0.00738	0.03968	0.0005	0.05126	0.00135	0.0	0.6	250.9	6.3
G63	1158	71	0.17661	0.03036	0.02582	0.0009	0.04963	0.00867	0.4	7.4	164.4	11.3
G64	326	141	13.54031	0.18101	0.53399	0.00629	0.18399	0.00227	-1.5	-2.6	2689.1	40.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G65	214	199	0.2896	0.02026	0.04124	0.0008	0.05095	0.00364	-0.9	-9.2	260.5	9.9
G66	1884	306	0.52651	0.00836	0.06988	0.00082	0.05467	0.00083	-1.4	-9.2	435.4	9.9
G67	357	86	0.55388	0.01547	0.07201	0.00094	0.05581	0.00156	-0.2	-0.8	448.2	11.3
G68	469	138	0.27177	0.00811	0.04018	0.00052	0.04908	0.00147	-3.9	-67.5	253.9	6.5
G70	472	234	0.87113	0.0172	0.10591	0.00129	0.05968	0.00115	-2.0	-9.6	649.0	15.0
G71	406	234	0.26899	0.00876	0.03889	0.00052	0.05019	0.00165	-1.6	-20.6	245.9	6.5
G72	160	103	0.54324	0.02007	0.07121	0.00101	0.05536	0.00207	-0.6	-4.0	443.4	12.2
G73	185	91	0.29032	0.01322	0.04144	0.00063	0.05083	0.00235	-1.1	-12.2	261.7	7.8
G74	165	151	1.04668	0.02872	0.1224	0.00161	0.06205	0.00171	-2.3	-10.2	744.4	18.5
G75	1280	547	0.2767	0.00736	0.03778	0.00048	0.05315	0.00141	3.8	28.7	239.0	6.0
G77	364	299	0.09633	0.00766	0.01434	0.0003	0.04874	0.00396	1.7	32.1	91.8	3.8
G78	671	520	0.2622	0.0074	0.03611	0.00047	0.05269	0.00149	3.4	27.5	228.7	5.8
G79	414	167	0.25154	0.0091	0.03824	0.00053	0.04773	0.00174	-5.8	-184	241.9	6.5
G81	837	609	0.2626	0.00623	0.03719	0.00046	0.05124	0.00121	0.6	6.4	235.4	5.7
G82	631	721	0.10699	0.00501	0.01492	0.00023	0.05202	0.00248	8.1	66.7	95.5	2.9
G83	679	449	3.45616	0.04848	0.26314	0.00309	0.0953	0.00124	0.8	1.8	1534.0	48.8
G84	436	96	0.53732	0.01272	0.06976	0.00087	0.05589	0.00131	0.5	2.9	434.7	10.5
G85	410	210	0.39728	0.02013	0.05978	0.0009	0.04822	0.00247	-9.2	-240	374.3	10.9
G86	117	58	0.28298	0.0165	0.04009	0.00069	0.05122	0.00304	-0.2	-1.0	253.4	8.5
G88	169	134	0.10422	0.00916	0.01549	0.00033	0.04883	0.00437	1.6	29.2	99.1	4.1
G90	457	252	0.29316	0.00989	0.04325	0.00059	0.04918	0.00167	-4.4	-74.3	272.9	7.2
G91	3501	64	0.28506	0.0045	0.04083	0.00048	0.05065	0.00076	-1.3	-14.7	258.0	5.9
G92	1511	629	0.09794	0.00268	0.0149	0.00019	0.04771	0.00131	-0.4	-13.5	95.3	2.4
G93	689	218	4.9585	0.06698	0.32224	0.00377	0.11165	0.00139	0.6	1.4	1826.5	44.9
G94	995	462	0.27147	0.00616	0.03891	0.00048	0.05062	0.00113	-0.9	-10.1	246.1	6.0
G95	373	244	0.25193	0.00974	0.03782	0.00053	0.04833	0.00189	-4.7	-107	239.3	6.6
G97	99	58	0.1214	0.01231	0.01709	0.0004	0.05153	0.00532	6.4	58.7	109.3	5.1
G98	399	267	0.26584	0.00956	0.03879	0.00053	0.04973	0.0018	-2.4	-34.5	245.3	6.6
G99	313	104	0.28684	0.01272	0.04108	0.00062	0.05066	0.00228	-1.3	-15.1	259.5	7.7
G101	259	125	0.27179	0.01144	0.04098	0.0006	0.04813	0.00205	-5.7	-145	258.9	7.4
G102	300	201	0.28502	0.0126	0.04135	0.00062	0.05001	0.00224	-2.5	-33.6	261.2	7.7
G103	85	120	0.2779	0.01987	0.03846	0.00075	0.05242	0.00382	2.3	19.9	243.3	9.3
G105	207	177	0.32527	0.01305	0.04481	0.00065	0.05267	0.00214	1.2	10.2	282.6	8.0
G107	554	308	0.10832	0.00497	0.01661	0.00025	0.04733	0.0022	-1.7	-62.9	106.2	3.1
G108	206	93	0.29755	0.0122	0.04283	0.00062	0.05041	0.00209	-2.1	-26.4	270.3	7.7
G109	1280	805	0.28875	0.00574	0.04142	0.0005	0.05059	0.00098	-1.5	-17.8	261.6	6.2
G110	1134	343	0.29329	0.00611	0.04186	0.00051	0.05083	0.00104	-1.2	-13.3	264.4	6.3
G111	101	83	0.27037	0.01664	0.03916	0.00069	0.05009	0.00314	-1.9	-24.3	247.6	8.5
G112	264	133	0.28356	0.01405	0.04065	0.00064	0.05061	0.00255	-1.3	-15.2	256.9	7.9
G113	505	197	3.0509	0.04499	0.25082	0.00296	0.08826	0.00122	-1.5	-3.9	1388.1	52.7
G114	210	171	0.29035	0.01208	0.03975	0.00059	0.053	0.00224	3.0	23.6	251.3	7.3
G115	1370	403	0.27856	0.0056	0.03963	0.00048	0.05101	0.001	-0.4	-3.9	250.5	5.9
G116	650	99	0.28016	0.00787	0.0411	0.00053	0.04946	0.00139	-3.4	-52.8	259.6	6.5
G117	164	119	0.10394	0.01187	0.01554	0.00041	0.04852	0.00565	1.0	20.4	99.4	5.2
G119	1971	1159	0.27785	0.00642	0.04014	0.0005	0.05022	0.00115	-1.9	-23.6	253.7	6.2
G120	521	158	0.57966	0.01269	0.0743	0.00092	0.05661	0.00122	0.5	2.8	462.0	11.0
G121	757	148	0.28438	0.0071	0.04075	0.00051	0.05063	0.00126	-1.3	-14.9	257.5	6.3
G122	278	44	0.53039	0.01758	0.07103	0.00097	0.05418	0.00181	-2.3	-16.9	442.4	11.7
G123	140	71	0.48342	0.02845	0.06999	0.00117	0.05012	0.00299	-8.2	-117	436.1	14.1
G124	446	316	0.28885	0.01122	0.04067	0.00058	0.05154	0.00203	0.3	3.0	257.0	7.2
G125	221	173	0.26672	0.01171	0.03872	0.00057	0.04999	0.00222	-2.0	-26.0	244.9	7.1
G127	265	297	0.26586	0.01093	0.03747	0.00055	0.05149	0.00214	1.0	9.7	237.1	6.8
G130	412	333	0.27264	0.0085	0.03853	0.00051	0.05135	0.00161	0.5	5.0	243.7	6.3
G131	1449	723	0.26135	0.00529	0.03838	0.00046	0.04941	0.00098	-2.9	-45.1	242.8	5.8
G132	306	254	0.39783	0.05495	0.05986	0.00184	0.04822	0.00678	-9.3	-240	374.8	22.3
G134	823	95	0.27248	0.00694	0.03869	0.00049	0.0511	0.0013	0.0	0.3	244.7	6.1
G135	826	243	0.27027	0.00648	0.03936	0.00049	0.04982	0.00118	-2.4	-33.4	248.9	6.1
G137	127	83	0.25989	0.01569	0.03674	0.00064	0.05132	0.00315	0.9	8.9	232.6	8.0
G139	457	277	5.79867	0.07992	0.35636	0.00419	0.11807	0.00151	-1.0	-2.0	1927.2	45.5
G140	190	593	0.26948	0.01222	0.03819	0.00058	0.05121	0.00236	0.3	3.4	241.6	7.1
G141	124	125	0.10026	0.01302	0.01499	0.00043	0.04853	0.00642	1.1	23.3	95.9	5.5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G143	1534	720	2.92567	0.04018	0.24104	0.00282	0.08807	0.00112	-0.3	-0.6	1384.0	48.4
G144	124	118	0.24277	0.01554	0.0366	0.00065	0.04813	0.00313	-4.7	-119	231.7	8.0
G145	1086	181	0.31649	0.00764	0.04253	0.00053	0.05399	0.0013	4.0	27.5	268.5	6.6
G146	743	489	0.52785	0.01026	0.06988	0.00084	0.05481	0.00104	-1.1	-7.7	435.4	10.2
G147	406	193	0.0965	0.00489	0.01464	0.00023	0.04781	0.00246	-0.2	-5.4	93.7	2.9
G148	176	112	0.53398	0.02494	0.07087	0.00112	0.05467	0.0026	-1.6	-10.7	441.4	13.5
G149	222	118	0.2501	0.01229	0.03585	0.00056	0.05062	0.00253	-0.2	-1.7	227.1	7.0
G150	641	343	0.28324	0.00706	0.04059	0.00051	0.05063	0.00125	-1.3	-14.4	256.5	6.3

SampleQ3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	1725	614	0.11627	0.00355	0.0168	0.00023	0.0502	0.00153	4.0	47.5	107.4	2.9
G2	969	640	0.54214	0.00948	0.06952	0.00085	0.05658	0.00093	1.5	8.7	433.3	10.3
G3	534	317	0.09753	0.0046	0.01519	0.00023	0.0466	0.00222	-2.8	-238	97.2	2.9
G4	673	174	0.2709	0.00652	0.03841	0.00049	0.05117	0.00121	0.2	2.3	243.0	6.1
G5	340	453	0.12538	0.00703	0.01837	0.00031	0.04953	0.00282	2.2	32.3	117.3	3.9
G6	378	229	0.10749	0.00649	0.01617	0.00028	0.04824	0.00296	0.3	7.1	103.4	3.6
G7	161	144	0.27729	0.01364	0.03783	0.0006	0.05319	0.00265	3.8	28.9	239.3	7.5
G8	1470	1484	0.25736	0.00548	0.03642	0.00046	0.05127	0.00106	0.8	8.8	230.6	5.7
G9	363	195	0.2982	0.01084	0.0394	0.00056	0.05491	0.00201	6.4	39.1	249.1	7.0
G10	31	36	0.12046	0.03906	0.01769	0.00099	0.0494	0.01624	2.1	32.3	113.1	12.6
G11	482	696	0.09787	0.00559	0.0147	0.00025	0.04829	0.0028	0.7	17.2	94.1	3.2
G13	244	186	0.28336	0.01019	0.03976	0.00056	0.05172	0.00187	0.8	7.9	251.3	7.0
G15	351	313	0.30669	0.00943	0.04357	0.00059	0.05108	0.00157	-1.2	-12.6	274.9	7.3
G16	737	35	0.56143	0.01048	0.07231	0.00089	0.05634	0.001	0.6	3.2	450.0	10.7
G17	425	346	0.30364	0.00924	0.04255	0.00057	0.05178	0.00157	0.2	2.6	268.6	7.1
G18	811	302	0.29121	0.01	0.04052	0.00057	0.05215	0.0018	1.4	12.3	256.0	7.0
G19	1443	792	0.10622	0.00269	0.01617	0.00021	0.04765	0.00119	-0.9	-27.7	103.4	2.6
G20	97	72	0.30491	0.02055	0.0449	0.00084	0.04928	0.00338	-4.6	-75.8	283.1	10.4
G21	651	321	0.32369	0.00779	0.04517	0.00058	0.05199	0.00123	0.0	0.1	284.8	7.1
G22	244	126	0.59935	0.01542	0.07707	0.00101	0.05643	0.00144	-0.4	-2.2	478.6	12.1
G23	143	152	1.57346	0.04072	0.16335	0.0022	0.06989	0.00179	-1.6	-5.4	975.4	24.3
G25	1328	694	0.1102	0.00368	0.01627	0.00022	0.04916	0.00164	2.1	33.0	104.0	2.8
G26	797	709	3.23135	0.04592	0.25557	0.00308	0.09174	0.00117	-0.2	-0.4	1461.9	48.3
G27	402	530	0.27821	0.0093	0.03914	0.00054	0.05158	0.00173	0.7	7.3	247.5	6.7
G28	1402	910	0.11493	0.00306	0.01715	0.00022	0.04862	0.00128	0.8	15.4	109.6	2.8
G30	575	309	0.51618	0.01063	0.06741	0.00084	0.05556	0.00111	0.5	3.3	420.5	10.2
G31	960	323	0.30141	0.00629	0.04151	0.00052	0.05269	0.00106	2.0	16.9	262.2	6.4
G32	121	62	7.0078	0.12414	0.40057	0.00515	0.12694	0.00214	-2.7	-5.6	2056.0	59.0
G34	165	144	0.27894	0.02136	0.03974	0.00082	0.05093	0.00397	-0.6	-5.7	251.2	10.1
G37	1711	630	0.30894	0.0062	0.04404	0.00055	0.0509	0.00098	-1.6	-17.5	277.8	6.8
G39	310	193	0.29076	0.01107	0.04208	0.0006	0.05013	0.00192	-2.4	-32.1	265.7	7.5
G40	678	397	0.30001	0.00702	0.04222	0.00054	0.05156	0.00118	-0.1	-0.2	266.6	6.6
G41	467	415	4.36379	0.06381	0.31332	0.0038	0.10105	0.00134	-2.9	-6.9	1643.6	48.9
G43	265	255	0.10567	0.00727	0.01594	0.00029	0.0481	0.00336	0.1	2.2	101.9	3.7
G44	418	156	0.29178	0.01063	0.04072	0.00058	0.05199	0.0019	1.0	9.7	257.3	7.2
G45	844	669	0.11457	0.00402	0.0173	0.00024	0.04806	0.00169	-0.5	-8.3	110.6	3.0
G46	759	76	0.39521	0.00836	0.05379	0.00067	0.05331	0.00109	0.1	1.3	337.7	8.3
G47	794	79	0.40215	0.0082	0.055	0.00069	0.05305	0.00104	-0.6	-4.3	345.2	8.4
G48	366	386	0.29136	0.00879	0.04106	0.00055	0.05149	0.00155	0.1	1.3	259.4	6.8
G49	359	264	0.55843	0.01867	0.07249	0.00102	0.0559	0.00188	-0.1	-0.7	451.1	12.2
G50	1563	507	0.11247	0.00272	0.01659	0.00021	0.0492	0.00117	2.1	32.7	106.0	2.7
G51	187	260	0.12546	0.01363	0.01932	0.00049	0.04712	0.00521	-2.8	-124	123.4	6.2
G52	129	120	0.13011	0.01151	0.01953	0.00041	0.04834	0.00434	-0.4	-7.6	124.7	5.2
G53	322	258	0.11058	0.00579	0.01666	0.00026	0.04816	0.00255	0.0	0.7	106.5	3.4
G54	1439	643	0.11029	0.0033	0.0166	0.00022	0.0482	0.00144	0.0	2.5	106.2	2.8
G56	1104	772	0.57395	0.00982	0.07477	0.00091	0.0557	0.0009	-0.9	-5.6	464.8	11.0
G57	189	155	0.11955	0.01397	0.01821	0.00048	0.04763	0.00567	-1.4	-44.8	116.3	6.1
G58	554	314	0.12009	0.00466	0.01831	0.00026	0.0476	0.00186	-1.5	-48.5	116.9	3.3

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G60	1061	472	0.11278	0.00325	0.01678	0.00022	0.04877	0.0014	1.1	21.7	107.3	2.8
G61	372	180	3.16994	0.04926	0.25536	0.00312	0.09007	0.00129	-1.1	-2.7	1427.0	54.3
G62	1387	390	0.30485	0.0058	0.04239	0.00052	0.05219	0.00095	1.0	8.8	267.6	6.5
G63	4112	3384	0.25128	0.00437	0.03296	0.0004	0.05532	0.00091	8.9	50.8	209.0	5.0
G64	554	467	0.11358	0.00541	0.01646	0.00026	0.05007	0.00241	3.8	47.0	105.2	3.3
G65	574	149	0.10439	0.00483	0.01579	0.00024	0.04798	0.00225	-0.2	-3.8	101.0	3.1
G67	269	44	0.60525	0.0157	0.07676	0.00101	0.05721	0.00147	0.8	4.5	476.7	12.1
G68	1207	607	0.11039	0.00326	0.01665	0.00022	0.04811	0.00142	-0.1	-1.4	106.4	2.8
G69	90	130	0.12153	0.01561	0.01828	0.0005	0.04824	0.0063	-0.3	-5.1	116.8	6.3
G70	221	245	0.11035	0.00696	0.01671	0.00029	0.04793	0.00306	-0.5	-12.7	106.8	3.7
G71	527	497	0.28232	0.00756	0.04025	0.00052	0.05089	0.00135	-0.7	-7.9	254.4	6.5
G72	2396	85	0.30245	0.00503	0.04289	0.00052	0.05117	0.0008	-0.9	-8.9	270.7	6.4
G73	56	62	0.10716	0.01778	0.01608	0.00049	0.04836	0.00813	0.6	12.1	102.8	6.2
G74	207	176	0.27967	0.01439	0.03953	0.00064	0.05133	0.00268	0.2	2.3	249.9	8.0
G75	295	232	0.09878	0.00769	0.01494	0.0003	0.04799	0.0038	0.1	1.8	95.6	3.8
G76	735	475	0.3049	0.00879	0.04317	0.00057	0.05125	0.00147	-0.8	-8.1	272.4	7.1
G77	253	445	0.27241	0.01075	0.03841	0.00056	0.05145	0.00205	0.7	7.0	243.0	6.9
G78	1941	771	0.10244	0.00334	0.01557	0.00021	0.04775	0.00156	-0.6	-15.8	99.6	2.7
G79	210	152	0.11222	0.00814	0.01683	0.00031	0.04838	0.00356	0.4	8.6	107.6	4.0
G80	1644	501	0.27921	0.00547	0.03947	0.00049	0.05133	0.00097	0.2	2.4	249.5	6.1
G81	704	512	0.11424	0.00449	0.01659	0.00024	0.04996	0.00198	3.5	45.1	106.1	3.0
G82	1520	796	0.55034	0.00921	0.07278	0.00089	0.05487	0.00086	-1.7	-11.3	452.9	10.7
G83	479	149	0.28134	0.00869	0.03956	0.00053	0.0516	0.00159	0.6	6.5	250.1	6.6
G85	638	495	0.13351	0.00558	0.01998	0.00029	0.04848	0.00204	-0.2	-3.8	127.5	3.7
G86	198	167	0.27674	0.0139	0.03911	0.00062	0.05134	0.00261	0.3	3.4	247.3	7.7
G87	56	79	0.10197	0.02006	0.01545	0.00055	0.04789	0.00955	-0.2	-6.4	98.8	7.0
G88	220	145	0.1019	0.0082	0.01537	0.00031	0.04812	0.00394	0.2	6.5	98.3	4.0
G89	125	113	0.28054	0.01864	0.03984	0.00074	0.05109	0.00345	-0.3	-2.9	251.9	9.2
G90	331	326	0.11108	0.00591	0.01604	0.00026	0.05023	0.00271	4.3	50.1	102.6	3.3
G91	474	153	0.28041	0.00789	0.04032	0.00053	0.05046	0.00141	-1.5	-17.9	254.8	6.6
G92	147	129	0.52289	0.01832	0.07101	0.001	0.05343	0.00188	-3.4	-27.4	442.2	12.0
G93	303	154	0.30326	0.01053	0.04253	0.00059	0.05173	0.0018	0.1	1.9	268.5	7.3
G94	286	158	0.48995	0.01352	0.06425	0.00085	0.05533	0.00152	0.9	5.6	401.4	10.3
G95	882	324	0.11125	0.00352	0.01678	0.00023	0.04811	0.00152	-0.2	-2.4	107.3	2.9
G96	153	202	0.10633	0.01511	0.01597	0.0005	0.0483	0.00699	0.4	10.4	102.2	6.4
G97	260	232	0.11236	0.00683	0.0169	0.00029	0.04823	0.00298	0.0	2.3	108.1	3.7
G98	704	852	0.1075	0.00421	0.0162	0.00023	0.04815	0.0019	0.1	3.0	103.6	2.9
G99	395	280	0.27653	0.00994	0.03942	0.00056	0.0509	0.00184	-0.5	-5.4	249.2	6.9
G100	829	447	0.53934	0.01213	0.06943	0.00088	0.05637	0.00124	1.2	7.2	432.7	10.6
G101	214	113	0.42591	0.01463	0.05772	0.00081	0.05354	0.00184	-0.4	-2.8	361.7	9.8
G102	351	232	0.57164	0.01409	0.07354	0.00095	0.0564	0.00137	0.4	2.2	457.4	11.4
G103	148	114	0.58263	0.02351	0.07638	0.00114	0.05535	0.00226	-1.8	-11.4	474.5	13.7
G104	252	153	0.58733	0.01697	0.07665	0.00103	0.0556	0.0016	-1.4	-9.2	476.1	12.3
G105	774	248	0.55526	0.01098	0.07191	0.0009	0.05603	0.00107	0.2	1.2	447.6	10.8
G106	411	361	0.10782	0.00641	0.01627	0.00028	0.04809	0.0029	0.0	-0.1	104.0	3.5
G107	1265	1459	0.13347	0.00352	0.01996	0.00026	0.04851	0.00126	-0.2	-2.6	127.4	3.3
G108	203	139	0.11882	0.01083	0.01782	0.00039	0.04838	0.00448	0.1	3.5	113.9	4.9
G109	237	197	0.10012	0.0075	0.0151	0.00029	0.0481	0.00366	0.3	7.4	96.6	3.7
G110	758	172	0.57096	0.01102	0.07457	0.00093	0.05555	0.00103	-1.1	-6.7	463.6	11.1
G111	2349	482	0.2904	0.00494	0.04112	0.0005	0.05124	0.00082	-0.3	-3.3	259.8	6.2
G112	386	347	3.23721	0.05019	0.26236	0.00321	0.08953	0.00128	-2.4	-6.1	1415.5	54.2
G113	464	348	0.13665	0.00574	0.02028	0.0003	0.04889	0.00207	0.5	9.3	129.4	3.8
G114	1609	305	0.28446	0.00663	0.04056	0.00052	0.05088	0.00116	-0.8	-8.8	256.3	6.4
G115	141	185	0.09979	0.0128	0.01463	0.00042	0.0495	0.00647	3.2	45.4	93.6	5.4
G116	676	602	0.46151	0.00978	0.0631	0.00079	0.05307	0.00109	-2.3	-18.9	394.5	9.6
G117	526	530	0.2819	0.00784	0.0404	0.00053	0.05063	0.0014	-1.2	-14.0	255.3	6.6
G119	331	418	0.29472	0.01343	0.04215	0.00065	0.05073	0.00234	-1.5	-16.4	266.2	8.1
G121	386	534	0.11269	0.00906	0.01693	0.00035	0.0483	0.00396	0.2	5.0	108.2	4.5
G122	698	188	3.00919	0.04394	0.24416	0.00296	0.08943	0.00119	0.1	0.4	1413.3	50.3
G123	1225	668	0.29935	0.006	0.04251	0.00053	0.0511	0.00099	-0.9	-9.5	268.4	6.5
G124	437	248	0.57661	0.01522	0.07426	0.00098	0.05634	0.00147	0.1	0.7	461.8	11.7

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G125	602	250	5.11573	0.08209	0.32209	0.004	0.11524	0.00173	2.2	4.4	1883.7	53.5
G126	306	207	0.29823	0.0123	0.04219	0.00063	0.05128	0.00213	-0.5	-5.0	266.4	7.7
G127	423	204	0.30277	0.00962	0.0413	0.00056	0.05319	0.00169	3.0	22.6	260.9	7.0
G128	450	289	0.28428	0.01251	0.04111	0.00063	0.05017	0.00223	-2.2	-27.9	259.7	7.8
G129	2246	1004	0.56426	0.00881	0.07363	0.00089	0.05561	0.0008	-0.8	-4.9	458.0	10.7
G130	125	129	0.30313	0.02313	0.04264	0.00087	0.05159	0.00401	-0.1	-0.8	269.2	10.8
G131	145	183	0.12306	0.01344	0.01689	0.00044	0.05288	0.00589	9.2	66.6	107.9	5.6
G132	547	370	0.57648	0.01262	0.07598	0.00096	0.05505	0.00117	-2.1	-14.0	472.1	11.5
G133	447	459	0.27686	0.0084	0.03949	0.00053	0.05087	0.00154	-0.6	-6.2	249.6	6.6
G134	261	398	0.1091	0.00787	0.01629	0.00031	0.0486	0.00357	0.9	18.9	104.2	3.9
G135	297	85	0.2973	0.01413	0.0419	0.00066	0.05149	0.00248	-0.1	-0.7	264.6	8.2
G136	1484	559	0.09938	0.00397	0.01505	0.00022	0.04792	0.00193	-0.1	-2.1	96.3	2.8
G137	1551	566	0.10632	0.00285	0.01607	0.00021	0.04802	0.00127	-0.1	-3.9	102.7	2.6
G138	171	168	0.10403	0.00866	0.01575	0.00031	0.04791	0.00404	-0.3	-7.3	100.8	4.0
G139	162	190	0.10425	0.00886	0.01582	0.00032	0.04782	0.00412	-0.5	-13.5	101.2	4.0
G141	265	207	0.59705	0.01618	0.0746	0.00099	0.05807	0.00156	2.5	12.8	463.8	11.9
G142	185	101	0.2969	0.01462	0.0432	0.00069	0.04987	0.00249	-3.2	-44.4	272.6	8.5
G143	214	163	0.11449	0.00798	0.01713	0.00031	0.0485	0.00343	0.5	11.6	109.5	4.0
G144	331	158	0.31819	0.01083	0.04324	0.0006	0.05339	0.00182	2.8	21.0	272.9	7.5
G145	384	237	0.5526	0.0133	0.07183	0.00092	0.05582	0.00132	-0.1	-0.5	447.2	11.1
G146	360	281	0.27081	0.00892	0.03848	0.00053	0.05106	0.00169	0.0	0.1	243.4	6.6
G148	255	119	7.64576	0.1141	0.40017	0.00492	0.13863	0.0019	0.9	1.8	2210.2	47.1
G149	1093	502	0.10206	0.00385	0.0154	0.00022	0.04808	0.00183	0.2	4.6	98.5	2.8
G150	921	817	0.28896	0.00836	0.03953	0.00053	0.05303	0.00153	3.1	24.3	249.9	6.5

Sample Q4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G3	785	966	4.68494	0.07367	0.30248	0.00371	0.1124	0.00164	3.6	7.3	1838.5	52.3
G4	411	543	0.26328	0.00979	0.0378	0.00054	0.05054	0.00189	-0.8	-8.8	239.2	6.7
G5	503	308	0.10208	0.00582	0.01585	0.00027	0.04674	0.0027	-2.7	-184	101.4	3.4
G6	2326	1089	0.09844	0.00273	0.01512	0.0002	0.04725	0.0013	-1.4	-57.2	96.7	2.5
G7	447	232	2.96456	0.05238	0.24082	0.00301	0.08933	0.0015	0.5	1.4	1411.2	63.4
G8	816	124	0.2801	0.00797	0.03952	0.00052	0.05144	0.00145	0.4	4.1	249.8	6.5
G9	1544	1114	0.10654	0.0034	0.01536	0.00021	0.05034	0.00161	4.6	53.3	98.3	2.7
G11	760	906	0.48191	0.0106	0.06356	0.00081	0.05502	0.00118	0.6	3.8	397.2	9.8
G12	1365	700	0.10028	0.00292	0.01536	0.0002	0.04739	0.00137	-1.2	-44.2	98.2	2.6
G13	920	580	0.27089	0.00748	0.03832	0.00051	0.05129	0.00141	0.4	4.6	242.4	6.3
G14	303	325	2.04316	0.04327	0.19208	0.00248	0.07719	0.00159	-0.2	-0.6	1126.1	81.1
G15	209	201	0.52376	0.01734	0.07079	0.00098	0.05369	0.00178	-3.0	-23.2	440.9	11.9
G16	149	127	0.62594	0.02703	0.07928	0.00123	0.0573	0.0025	0.4	2.1	491.8	14.6
G17	413	306	0.28732	0.00895	0.03954	0.00054	0.05273	0.00164	2.6	21.2	250.0	6.7
G18	1888	152	0.28972	0.00625	0.04032	0.00051	0.05215	0.00109	1.4	12.7	254.8	6.3
G19	255	224	0.28424	0.01371	0.04097	0.00065	0.05035	0.00246	-1.9	-22.5	258.8	8.0
G20	280	78	0.53375	0.01848	0.07113	0.00101	0.05445	0.00189	-2.0	-13.7	443.0	12.1
G21	572	221	0.09779	0.00548	0.0146	0.00024	0.0486	0.00276	1.4	27.4	93.4	3.1
G22	624	192	0.09603	0.00508	0.01471	0.00024	0.04736	0.00254	-1.2	-40.8	94.2	3.0
G23	1381	710	0.09803	0.00362	0.01531	0.00022	0.04647	0.00173	-3.0	-347	97.9	2.7
G24	351	573	0.09588	0.00727	0.01426	0.00028	0.04881	0.00377	2.0	34.2	91.2	3.6
G25	189	177	0.28029	0.01284	0.03939	0.0006	0.05164	0.00239	0.8	7.6	249.0	7.5
G26	1075	702	0.10736	0.00421	0.016	0.00023	0.04868	0.00192	1.2	22.9	102.3	2.9
G28	454	348	13.72763	0.20611	0.50824	0.00621	0.196	0.00269	3.1	5.2	2793.2	44.6
G29	204	137	0.25895	0.01215	0.03746	0.00058	0.05017	0.00238	-1.4	-17.0	237.1	7.2
G30	663	407	0.52998	0.01128	0.0702	0.00089	0.05479	0.00113	-1.3	-8.4	437.3	10.7
G31	637	320	0.1108	0.00437	0.01669	0.00024	0.04818	0.00191	0.0	1.5	106.7	3.0
G32	580	237	0.10803	0.00456	0.01606	0.00024	0.0488	0.00208	1.5	25.8	102.7	3.0
G33	235	156	0.13879	0.01	0.02052	0.00039	0.04909	0.0036	0.8	13.9	130.9	5.0
G34	631	457	0.13837	0.00487	0.02039	0.00028	0.04924	0.00174	1.2	18.3	130.1	3.6
G35	774	550	0.14617	0.00908	0.02136	0.00038	0.04965	0.00314	1.6	23.7	136.3	4.9
G36	111	161	0.54589	0.03058	0.07029	0.00123	0.05635	0.00321	1.0	5.9	437.9	14.8

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G37	451	382	0.1387	0.0059	0.02086	0.00031	0.04825	0.00207	-0.9	-19.3	133.1	3.9
G38	577	313	0.28252	0.00766	0.04096	0.00054	0.05005	0.00134	-2.4	-31.2	258.8	6.6
G39	1063	845	0.112	0.00465	0.0169	0.00025	0.04809	0.00202	-0.2	-4.2	108.0	3.2
G40	413	431	0.27509	0.01076	0.03847	0.00056	0.05189	0.00205	1.4	13.3	243.3	7.0
G41	480	312	0.10156	0.00602	0.0153	0.00026	0.04818	0.0029	0.3	9.4	97.9	3.3
G42	172	162	0.28614	0.02527	0.04068	0.00093	0.05104	0.0046	-0.6	-6.0	257.1	11.5
G43	613	337	0.10855	0.0044	0.01637	0.00024	0.04813	0.00197	-0.1	0.9	104.7	3.0
G44	4555	1983	0.2667	0.0048	0.03741	0.00046	0.05174	0.00088	1.4	13.5	236.8	5.7
G45	462	315	0.13393	0.0074	0.02	0.00033	0.04858	0.00272	-0.1	0.1	127.7	4.2
G46	561	627	0.1124	0.00455	0.01674	0.00024	0.04872	0.00199	1.1	20.3	107.0	3.1
G48	200	165	0.13042	0.01183	0.01947	0.00043	0.04862	0.00449	0.2	3.9	124.3	5.5
G50	1234	423	2.71086	0.04327	0.232	0.00284	0.08479	0.00126	-1.0	-2.6	1310.7	57.1
G51	10066 3	1	0.3038	0.02531	0.04113	0.0009	0.0536	0.00455	3.7	26.6	259.8	11.2
G52	208	155	0.27041	0.01433	0.03854	0.00064	0.05092	0.00274	-0.3	-2.8	243.8	7.9
G53	716	1401	0.27982	0.00723	0.03972	0.00052	0.05112	0.0013	-0.2	-1.9	251.1	6.4
G54	188	227	0.27609	0.01417	0.03931	0.00064	0.05097	0.00265	-0.4	-3.8	248.5	8.0
G55	536	487	0.13423	0.007	0.01901	0.00031	0.05125	0.00271	5.4	51.8	121.4	4.0
G56	543	105	0.31667	0.01048	0.0437	0.00061	0.05258	0.00174	1.3	11.2	275.8	7.5
G57	389	214	0.28938	0.00953	0.04052	0.00056	0.05182	0.00171	0.8	7.7	256.1	6.9
G58	286	151	0.29242	0.01344	0.04162	0.00065	0.05098	0.00237	-0.9	-9.5	262.9	8.0
G59	1121	487	0.11968	0.00445	0.01695	0.00024	0.05124	0.00192	6.0	56.9	108.3	3.1
G60	401	140	5.33103	0.09132	0.33908	0.00425	0.11409	0.00185	-0.4	-0.9	1865.5	57.8
G61	1073	717	0.10568	0.00447	0.01587	0.00024	0.04834	0.00206	0.5	12.3	101.5	3.0
G62	271	138	0.11961	0.0099	0.01777	0.00037	0.04884	0.00412	1.0	19.0	113.6	4.7
G64	167	191	0.54625	0.02389	0.07012	0.0011	0.05653	0.0025	1.3	7.5	436.9	13.2
G65	160	25	4.16676	0.08754	0.29111	0.00384	0.10387	0.00213	1.2	2.8	1694.3	74.7
G66	879	557	0.10578	0.00417	0.01521	0.00022	0.05045	0.00201	4.9	54.9	97.3	2.8
G67	673	561	0.13826	0.00582	0.01883	0.00028	0.05328	0.00227	9.3	64.7	120.3	3.6
G69	337	392	0.2738	0.01132	0.03849	0.00057	0.05162	0.00215	0.9	9.3	243.5	7.1
G70	455	162	4.84425	0.08358	0.30996	0.00389	0.11341	0.00185	3.0	6.2	1854.8	58.4
G71	2982	2709	0.0956	0.00354	0.01408	0.0002	0.04926	0.00183	2.8	43.6	90.2	2.5
G72	209	225	0.6479	0.02557	0.07747	0.00117	0.06069	0.00242	5.4	23.4	481.0	14.0
G73	176	143	0.12695	0.0123	0.01883	0.00043	0.04893	0.00482	1.0	16.9	120.2	5.4
G74	1244	524	0.098	0.00334	0.01467	0.0002	0.04848	0.00166	1.1	23.6	93.9	2.6
G75	1055	601	0.10936	0.00447	0.01635	0.00024	0.04853	0.002	0.8	16.3	104.6	3.0
G76	1318	856	0.10493	0.00423	0.01574	0.00023	0.04838	0.00197	0.6	14.5	100.7	2.9
G78	1044	756	0.09667	0.00339	0.01469	0.0002	0.04777	0.00168	-0.3	-8.4	94.0	2.6
G79	445	319	0.11212	0.00525	0.01628	0.00025	0.04999	0.00237	3.7	46.5	104.1	3.2
G80	676	425	0.12997	0.00583	0.01928	0.00029	0.04891	0.00222	0.8	14.2	123.1	3.7
G81	396	1048	0.27895	0.01202	0.03831	0.00058	0.05283	0.0023	3.1	24.6	242.4	7.3
G82	163	148	5.65967	0.11676	0.34846	0.00463	0.11786	0.00237	-0.1	-0.2	1924.0	71.2
G83	3299	2365	0.09711	0.0027	0.01466	0.00019	0.04807	0.00133	0.3	8.7	93.8	2.4
G84	273	423	0.28289	0.0116	0.03982	0.00059	0.05156	0.00213	0.5	5.3	251.7	7.3
G85	1005	1003	0.11528	0.00468	0.0173	0.00025	0.04837	0.00198	0.3	5.8	110.5	3.2
G87	484	266	0.1053	0.00696	0.0159	0.00029	0.04805	0.00323	0.0	0.2	101.7	3.7
G88	316	207	0.27168	0.01359	0.03809	0.00062	0.05175	0.00263	1.2	12.2	241.0	7.7
G89	212	110	2.72955	0.05418	0.22617	0.00289	0.08758	0.00168	1.7	4.3	1373.3	72.8
G90	466	294	0.1212	0.00725	0.01767	0.00031	0.04977	0.00302	2.9	38.7	112.9	3.9
G91	504	126	0.27646	0.01113	0.03916	0.00058	0.05124	0.00208	0.1	1.5	247.6	7.2
G92	365	231	0.11993	0.00658	0.01813	0.0003	0.04801	0.00267	-0.7	-17.4	115.8	3.8
G93	1182	835	0.10016	0.00465	0.01517	0.00023	0.04791	0.00225	-0.2	-3.4	97.1	2.9
G94	250	253	0.10943	0.01115	0.01701	0.00041	0.04669	0.00484	-3.0	- 224	108.7	5.1
G95	30	30	6.39038	0.18321	0.36965	0.00572	0.12545	0.00362	0.2	0.4	2035.2	100. 4
G97	599	223	5.05229	0.08184	0.32766	0.00405	0.11189	0.00169	0.1	0.2	1830.4	54.3
G98	187	121	0.12565	0.01034	0.01896	0.00038	0.04809	0.00402	-0.7	-16.6	121.1	4.9
G99	701	689	0.10952	0.00515	0.01641	0.00025	0.04842	0.0023	0.6	12.5	104.9	3.2
G101	434	658	0.11821	0.00576	0.01788	0.00028	0.04796	0.00236	-0.8	-18.6	114.3	3.5
G103	194	156	0.11528	0.01212	0.01604	0.00041	0.05216	0.0056	8.0	64.9	102.6	5.2
G104	722	548	0.10064	0.00546	0.01532	0.00025	0.04767	0.00262	-0.6	-19.4	98.0	3.2
G105	503	436	0.10546	0.00525	0.01581	0.00025	0.04839	0.00244	0.7	14.6	101.1	3.2
G107	437	403	0.52288	0.01709	0.06945	0.00097	0.05463	0.00179	-1.3	-8.9	432.8	11.6

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G108	729	378	2.89905	0.04998	0.22945	0.00285	0.09169	0.00149	3.8	8.8	1460.8	61.5
G109	155	86	0.28229	0.02096	0.03957	0.0008	0.05178	0.00392	1.0	9.2	250.1	9.9
G111	229	220	0.52768	0.02258	0.06946	0.00107	0.05513	0.00239	-0.6	-3.7	432.9	12.9
G112	848	694	0.10726	0.00415	0.01614	0.00023	0.04823	0.00188	0.3	6.4	103.2	2.9
G113	706	334	0.44643	0.0126	0.06098	0.00081	0.05312	0.00149	-1.8	-14.3	381.6	9.9
G114	446	509	0.12754	0.00635	0.01789	0.00029	0.05174	0.00261	6.6	58.3	114.3	3.6
G115	348	264	0.31126	0.01193	0.04323	0.00063	0.05225	0.00202	0.9	8.0	272.8	7.8
G116	1220	1675	0.56927	0.01255	0.07524	0.00095	0.05491	0.00118	-2.2	-14.5	467.6	11.4
G117	489	316	0.29878	0.0086	0.04255	0.00057	0.05096	0.00146	-1.2	-12.5	268.6	7.0
G119	293	267	0.10838	0.00722	0.01632	0.0003	0.04819	0.00326	0.1	4.0	104.4	3.8
G121	526	86	4.66109	0.07737	0.29889	0.00371	0.11316	0.00176	4.4	8.9	1850.8	55.8
G122	660	370	0.27811	0.00799	0.03948	0.00053	0.05111	0.00146	-0.2	-1.5	249.6	6.5
G123	1331	681	0.10269	0.0031	0.01563	0.00021	0.04769	0.00144	-0.7	-20.3	100.0	2.6
G124	637	402	0.28383	0.00939	0.04033	0.00056	0.05107	0.00169	-0.5	-4.4	254.9	6.9
G125	538	298	0.13695	0.00569	0.02038	0.0003	0.04875	0.00204	0.2	4.3	130.1	3.8
G126	498	306	0.11574	0.0056	0.01808	0.00028	0.04644	0.00227	-3.7	-460	115.5	3.5
G127	200	61	5.30616	0.10311	0.31858	0.00415	0.12087	0.00227	4.9	9.5	1969.0	66.3
G128	327	196	0.13383	0.00771	0.02012	0.00034	0.04827	0.00282	-0.7	-13.9	128.4	4.3
G129	184	219	0.14317	0.01235	0.01996	0.00044	0.05206	0.00458	6.7	55.8	127.4	5.5
G130	390	367	3.15075	0.05829	0.25614	0.00323	0.08926	0.00158	-1.7	-4.3	1409.8	66.9
G131	955	536	0.11013	0.00389	0.01634	0.00023	0.0489	0.00173	1.5	26.8	104.5	2.9
G132	487	256	0.15425	0.00716	0.02113	0.00033	0.05296	0.00249	8.1	58.8	134.8	4.2
G133	440	229	2.71569	0.04777	0.22629	0.00282	0.08709	0.00145	1.4	3.5	1362.4	63.6
G134	432	118	0.56661	0.01769	0.07103	0.00098	0.05789	0.00181	3.0	15.8	442.4	11.8
G135	582	426	0.10034	0.00588	0.0165	0.00028	0.04412	0.00262	-8.0	-1054	105.5	3.5
G136	385	316	0.55415	0.0188	0.07157	0.00101	0.05619	0.00191	0.5	2.9	445.6	12.2
G137	577	272	0.13484	0.0069	0.01906	0.00031	0.05133	0.00267	5.5	52.4	121.7	3.9
G138	413	204	9.67306	0.14854	0.47295	0.0058	0.14842	0.0021	-3.7	-7.2	2327.8	48.1
G139	156	86	0.11393	0.01041	0.01704	0.00037	0.04851	0.0045	0.6	12.2	108.9	4.6
G140	828	493	0.10629	0.00434	0.01616	0.00024	0.04774	0.00196	-0.7	-20.5	103.3	3.0
G141	413	346	0.28693	0.0099	0.04091	0.00057	0.05089	0.00176	-0.9	-9.6	258.5	7.1
G142	68	87	0.30466	0.04226	0.03907	0.00129	0.05658	0.00802	9.3	47.9	247.1	16.0
G143	2292	1614	0.10838	0.00272	0.01589	0.0002	0.04951	0.00123	2.9	40.9	101.6	2.6
G144	579	337	0.11791	0.00516	0.01654	0.00025	0.05173	0.00229	7.1	61.4	105.7	3.2
G145	705	648	0.48723	0.0128	0.06497	0.00085	0.05442	0.00142	-0.7	-4.5	405.8	10.3
G146	736	511	0.13672	0.00614	0.01992	0.0003	0.0498	0.00226	2.3	31.4	127.2	3.9
G147	165	137	0.1225	0.01159	0.01827	0.00042	0.04866	0.00469	0.5	11.1	116.7	5.4
G148	814	631	0.11045	0.00405	0.01664	0.00023	0.04818	0.00178	0.0	1.5	106.4	3.0
G149	570	226	0.13169	0.00889	0.0187	0.00036	0.0511	0.00352	5.2	51.3	119.4	4.5
G150	673	497	0.29355	0.00986	0.04176	0.00058	0.05101	0.00172	-0.9	-9.3	263.7	7.2

Sample Q5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G3	151	92	0.55874	0.01811	0.06759	0.0009	0.05998	0.00197	6.9	30.1	421.6	10.9
G4	114	164	0.09774	0.00879	0.01534	0.00031	0.04622	0.00422	-3.6	-991	98.2	4.0
G5	207	207	0.09619	0.00619	0.01421	0.00025	0.04913	0.00322	2.6	40.9	90.9	3.1
G6	90	57	0.59113	0.02387	0.07625	0.0011	0.05626	0.00231	-0.4	-2.6	473.7	13.1
G7	160	149	0.09142	0.00771	0.01453	0.00028	0.04564	0.0039	-4.5	-929	93.0	3.5
G10	558	288	0.10281	0.00405	0.01512	0.00021	0.04936	0.00197	2.8	41.3	96.7	2.6
G11	399	209	0.10507	0.0048	0.01586	0.00023	0.04806	0.00223	-0.1	0.8	101.5	2.9
G12	712	856	0.10625	0.00373	0.01484	0.0002	0.05197	0.00185	8.0	66.6	94.9	2.5
G13	173	138	0.54831	0.01734	0.06981	0.00092	0.05699	0.00182	2.0	11.4	435.0	11.0
G15	308	114	0.30575	0.00981	0.04114	0.00054	0.05392	0.00175	4.2	29.3	259.9	6.7
G16	2769	426	0.22936	0.00404	0.03262	0.00037	0.05102	0.00088	1.4	14.4	206.9	4.7
G17	650	318	3.04793	0.04621	0.24291	0.00276	0.09105	0.00133	1.3	3.2	1447.4	55.3
G18	2089	626	0.08773	0.00219	0.01283	0.00016	0.04962	0.00124	3.9	53.6	82.2	2.0
G19	1695	566	0.09183	0.00241	0.01306	0.00016	0.05103	0.00135	6.7	65.5	83.6	2.0
G20	942	689	0.27651	0.00621	0.03881	0.00046	0.0517	0.00116	1.0	9.8	245.4	5.7
G21	685	563	0.09492	0.00364	0.01387	0.00019	0.04964	0.00193	3.7	50.2	88.8	2.4

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G22	214	456	0.26386	0.01077	0.03815	0.00053	0.05019	0.00208	-1.5	-18.5	241.3	6.6
G24	2515	837	0.09452	0.0022	0.01373	0.00016	0.04995	0.00116	4.3	54.4	87.9	2.1
G25	610	388	0.10125	0.00413	0.0149	0.00021	0.04932	0.00204	2.7	41.6	95.3	2.6
G27	296	141	0.57806	0.01511	0.07403	0.00092	0.05665	0.00149	0.6	3.5	460.4	11.0
G29	1342	516	0.09376	0.00282	0.01347	0.00017	0.0505	0.00153	5.4	60.5	86.3	2.2
G30	1350	2581	0.10416	0.00304	0.01465	0.00018	0.05159	0.00152	7.2	64.9	93.8	2.3
G32	178	215	2.92712	0.05684	0.23488	0.00282	0.09043	0.00175	2.1	5.2	1434.4	72.7
G33	498	457	0.27253	0.00791	0.03778	0.00048	0.05235	0.00153	2.4	20.5	239.0	5.9
G35	382	138	0.09755	0.00525	0.01501	0.00023	0.04716	0.00258	-1.6	-68.4	96.0	2.9
G37	272	73	0.50151	0.01449	0.06722	0.00085	0.05414	0.00158	-1.6	-11.4	419.4	10.3
G39	460	374	0.099	0.00474	0.01514	0.00022	0.04744	0.00231	-1.1	-36.9	96.9	2.8
G40	439	224	0.52116	0.01253	0.067	0.00081	0.05644	0.00136	1.9	10.9	418.1	9.8
G43	732	409	0.29745	0.00732	0.03902	0.00047	0.05531	0.00137	7.2	41.9	246.7	5.9
G45	429	510	0.27022	0.00849	0.03764	0.00049	0.05208	0.00166	2.0	17.6	238.2	6.0
G46	471	682	0.54031	0.01281	0.07	0.00085	0.056	0.00133	0.6	3.5	436.2	10.2
G47	335	211	0.10468	0.0055	0.0152	0.00024	0.04998	0.00267	4.0	49.9	97.2	3.0
G48	795	501	0.29481	0.00687	0.041	0.00049	0.05217	0.00122	1.3	11.6	259.0	6.1
G49	292	181	0.31611	0.01054	0.04148	0.00055	0.0553	0.00187	6.5	38.2	262.0	6.8
G50	356	277	0.09859	0.00508	0.0147	0.00023	0.04868	0.00255	1.6	29.1	94.0	2.9
G53	249	185	3.16586	0.05654	0.25098	0.00294	0.09153	0.00161	0.4	1.0	1457.5	66.6
G55	762	306	0.27292	0.00668	0.03863	0.00047	0.05126	0.00126	0.2	3.2	244.4	5.8
G56	306	279	0.11167	0.00585	0.01626	0.00025	0.04983	0.00265	3.4	44.4	104.0	3.2
G57	367	135	0.55044	0.01365	0.0702	0.00086	0.05689	0.00142	1.8	10.1	437.4	10.3
G58	239	181	0.12329	0.0069	0.01816	0.00029	0.04925	0.00281	1.8	27.4	116.0	3.7
G60	293	217	0.13553	0.00665	0.02021	0.0003	0.04865	0.00243	0.1	1.5	129.0	3.8
G61	269	223	0.11678	0.00643	0.01661	0.00027	0.051	0.00286	5.6	55.9	106.2	3.4
G62	568	102	0.27425	0.0075	0.03871	0.00048	0.05141	0.00142	0.5	5.6	244.8	5.9
G63	163	167	0.27935	0.0137	0.03914	0.0006	0.05178	0.00258	1.1	10.3	247.5	7.4
G64	629	390	0.10014	0.00401	0.01531	0.00021	0.04746	0.00193	-1.0	-36.0	97.9	2.7
G65	534	460	0.27329	0.00766	0.03925	0.00049	0.05053	0.00143	-1.2	-13.2	248.2	6.0
G66	210	125	0.11598	0.00734	0.01863	0.00031	0.04517	0.00291	-6.4	-1189	119.0	3.9
G67	561	514	0.119	0.0046	0.01795	0.00024	0.0481	0.00188	-0.4	-10.1	114.7	3.1
G68	400	299	0.26681	0.00853	0.03761	0.00049	0.05147	0.00167	0.9	9.2	238.0	6.0
G70	375	191	0.09812	0.00506	0.01551	0.00023	0.04591	0.00241	-4.2	-991	99.2	3.0
G72	258	143	0.51895	0.01508	0.06646	0.00084	0.05666	0.00166	2.3	13.1	414.8	10.2
G73	126	105	0.11933	0.00951	0.01681	0.00034	0.05152	0.00419	6.6	59.3	107.4	4.3
G74	391	178	0.10393	0.00502	0.01471	0.00022	0.05127	0.00252	6.7	62.8	94.1	2.8
G75	353	202	0.10366	0.0053	0.01547	0.00024	0.04862	0.00253	1.2	23.7	99.0	3.0
G76	387	255	0.26583	0.0084	0.03756	0.00048	0.05135	0.00164	0.7	7.4	237.7	6.0
G77	180	168	0.11336	0.00782	0.01656	0.0003	0.04968	0.00349	2.9	41.2	105.9	3.7
G78	574	275	0.11679	0.00437	0.0176	0.00024	0.04814	0.00183	-0.3	-5.9	112.5	3.0
G79	1487	1338	0.51553	0.00958	0.06609	0.00076	0.0566	0.00104	2.3	13.2	412.6	9.2
G81	333	313	0.28182	0.0092	0.03832	0.0005	0.05336	0.00176	4.0	29.6	242.4	6.2
G83	263	162	0.10948	0.00645	0.01726	0.00028	0.04603	0.00276	-4.4	-1102	110.3	3.6
G84	1938	1088	0.23165	0.00487	0.03149	0.00037	0.05338	0.00112	5.9	42.0	199.9	4.6
G86	276	231	0.10387	0.00635	0.01534	0.00026	0.04914	0.00306	2.2	36.5	98.1	3.2
G88	934	554	0.52891	0.01086	0.06901	0.00081	0.05561	0.00114	0.2	1.4	430.2	9.7
G89	471	241	0.1174	0.00519	0.01646	0.00024	0.05176	0.00233	7.1	61.7	105.2	3.0
G90	487	258	0.99068	0.02062	0.1051	0.00124	0.06839	0.00142	8.5	26.8	644.2	14.5
G93	257	160	0.10433	0.00625	0.01576	0.00026	0.04803	0.00293	0.0	0.0	100.8	3.3
G94	1976	1604	0.09204	0.00251	0.01358	0.00017	0.0492	0.00136	2.9	44.7	86.9	2.1
G95	165	155	0.09592	0.00793	0.01475	0.00029	0.04718	0.00397	-1.5	-63.3	94.4	3.7
G96	3838	964	0.24473	0.00461	0.03327	0.00038	0.05338	0.001	5.4	38.8	211.0	4.8
G97	356	269	0.09419	0.00521	0.01544	0.00024	0.04428	0.00249	-7.4	-986	98.7	3.0
G98	206	112	0.31834	0.01253	0.04384	0.00061	0.05269	0.00211	1.4	12.3	276.6	7.5
G99	450	274	0.10866	0.005	0.01613	0.00023	0.04889	0.00229	1.6	27.6	103.1	3.0
G100	453	202	0.11155	0.00496	0.01641	0.00024	0.04931	0.00223	2.3	35.4	105.0	3.0
G101	4735	1802	0.08547	0.0019	0.01251	0.00015	0.04956	0.0011	3.9	54.1	80.2	1.9
G102	639	254	0.22507	0.00669	0.03019	0.00038	0.05409	0.00163	7.5	48.8	191.8	4.8
G103	202	156	3.05137	0.06225	0.2461	0.00293	0.08997	0.00184	0.2	0.4	1424.7	77.0
G104	395	113	0.1067	0.00516	0.01649	0.00024	0.04696	0.00231	-2.4	-125	105.4	3.1

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G105	34	50	0.28208	0.03227	0.0392	0.00098	0.05221	0.00608	1.8	15.9	247.9	12.1
G106	2310	1882	0.08437	0.00226	0.0123	0.00015	0.04978	0.00134	4.3	57.4	78.8	1.9
G107	582	476	0.12191	0.00475	0.01819	0.00025	0.04862	0.00192	0.5	10.4	116.2	3.1
G108	409	238	3.01548	0.0567	0.24077	0.0028	0.09088	0.0017	1.5	3.7	1443.9	70.5
G111	145	135	0.09657	0.00803	0.0142	0.00028	0.04934	0.00418	3.0	44.6	90.9	3.6
G112	245	131	0.53384	0.01663	0.06762	0.00088	0.05729	0.00181	3.0	16.0	421.8	10.6
G113	218	232	0.09781	0.00697	0.01438	0.00026	0.04936	0.00358	3.0	44.2	92.0	3.3
G114	739	1868	0.11415	0.00417	0.01575	0.00021	0.05259	0.00195	9.0	67.6	100.7	2.7
G115	294	75	0.28063	0.01035	0.03902	0.00053	0.05218	0.00196	1.8	15.9	246.8	6.5
G118	457	350	1.58116	0.03209	0.15888	0.00186	0.07221	0.00147	1.3	4.2	950.5	20.7
G119	115	105	0.09836	0.01019	0.01434	0.00032	0.04977	0.00524	3.8	50.1	91.8	4.1
G120	705	398	0.40091	0.00982	0.05445	0.00065	0.05343	0.00132	0.1	1.5	341.8	8.0
G121	84	28	0.64656	0.02695	0.08154	0.00118	0.05754	0.00244	0.2	1.3	505.3	14.1
G122	139	101	0.2658	0.01337	0.03777	0.00058	0.05106	0.00262	0.1	1.9	239.0	7.2
G123	599	377	0.55242	0.0128	0.07112	0.00085	0.05636	0.00131	0.8	4.9	442.9	10.2
G124	1529	1428	0.08489	0.00253	0.01292	0.00016	0.04768	0.00144	-0.1	-0.5	82.8	2.1
G126	485	610	0.10631	0.0044	0.01591	0.00022	0.04849	0.00204	0.9	17.5	101.7	2.8
G127	587	1118	0.51854	0.01234	0.06651	0.0008	0.05657	0.00136	2.2	12.4	415.1	9.6
G128	159	111	0.50734	0.0181	0.06685	0.0009	0.05507	0.002	-0.1	-0.6	417.2	10.9
G129	424	292	0.12187	0.00534	0.01738	0.00025	0.05089	0.00227	5.1	52.9	111.1	3.2
G131	252	95	0.55353	0.01662	0.07049	0.0009	0.05698	0.00174	1.9	10.4	439.1	10.8
G133	88	62	0.29314	0.01768	0.03917	0.00067	0.0543	0.00334	5.4	35.4	247.7	8.3
G134	272	42	10.49597	0.20055	0.45022	0.00525	0.16916	0.00323	3.5	6.0	2549.4	63.3
G135	376	264	0.10344	0.00505	0.0147	0.00022	0.05107	0.00254	6.3	61.5	94.0	2.8
G136	52	37	0.10867	0.01578	0.01782	0.00048	0.04426	0.00652	-7.9	-1137	113.8	6.0
G137	171	232	0.10244	0.00752	0.01443	0.00027	0.0515	0.00386	7.1	64.9	92.4	3.5
G138	48	26	4.5521	0.12111	0.30344	0.00405	0.10886	0.00295	1.9	4.0	1780.3	97.3
G139	274	446	0.25449	0.00952	0.03674	0.0005	0.05026	0.00191	-1.0	-12.5	232.6	6.2
G140	773	379	0.10177	0.00369	0.01509	0.0002	0.04894	0.0018	2.0	33.4	96.5	2.5
G141	572	583	0.09721	0.00405	0.014	0.0002	0.05039	0.00214	5.1	57.9	89.6	2.5
G142	549	772	0.42697	0.01102	0.05739	0.0007	0.05399	0.00141	0.4	2.9	359.7	8.5
G143	602	312	0.10392	0.00409	0.01518	0.00021	0.04968	0.00199	3.4	46.0	97.1	2.6
G144	504	343	0.18763	0.00632	0.02801	0.00036	0.0486	0.00166	-2.0	-38.3	178.1	4.6
G145	572	386	0.53289	0.0131	0.06896	0.00083	0.05608	0.00139	0.9	5.5	429.9	10.0
G147	114	64	0.51079	0.02097	0.0692	0.00098	0.05356	0.00224	-2.9	-22.3	431.3	11.8
G148	197	102	0.12111	0.00727	0.01798	0.0003	0.04888	0.00299	1.0	19.1	114.9	3.8
G149	776	601	1.7645	0.03618	0.16421	0.00191	0.07797	0.00161	5.3	14.5	980.1	21.2
G150	1515	546	0.08355	0.00254	0.01252	0.00016	0.04844	0.00149	1.6	33.6	80.2	2.0

Sample Q6

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	452	116	0.12051	0.00543	0.01691	0.00026	0.05171	0.00236	6.8	60.4	108.1	3.3
G2	426	265	0.29817	0.00881	0.04002	0.00053	0.05407	0.0016	4.8	32.3	252.9	6.6
G3	1811	202	0.25043	0.00487	0.03397	0.00042	0.05348	0.001	5.3	38.3	215.4	5.2
G4	859	645	0.09314	0.00713	0.01471	0.00029	0.04594	0.00358	-3.9	-9400	94.1	3.7
G6	223	231	0.10202	0.00707	0.01528	0.00028	0.04843	0.00341	0.8	18.8	97.8	3.6
G7	978	481	0.28947	0.00642	0.04019	0.0005	0.05226	0.00113	1.6	14.4	254.0	6.2
G9	1050	382	0.11456	0.00345	0.01571	0.00021	0.0529	0.0016	9.6	69.0	100.5	2.7
G10	169	131	0.1173	0.0095	0.01648	0.00035	0.05164	0.00427	6.8	60.9	105.4	4.4
G11	268	146	0.26429	0.01214	0.03739	0.00058	0.05129	0.00239	0.6	6.8	236.6	7.2
G12	87	60	5.37421	0.1029	0.3375	0.00437	0.11554	0.00215	0.3	0.7	1888.3	66.2
G13	1455	1049	0.08878	0.00265	0.01322	0.00017	0.04874	0.00145	2.1	37.4	84.6	2.2
G14	940	279	0.09823	0.00332	0.01494	0.0002	0.04771	0.00162	-0.5	-13.9	95.6	2.6
G15	162	66	0.10439	0.01377	0.01571	0.00046	0.04823	0.00648	0.3	9.0	100.5	5.9
G16	359	133	5.64375	0.08199	0.35063	0.00423	0.11679	0.00156	-0.8	-1.6	1907.6	47.5
G17	757	361	0.28474	0.00826	0.03808	0.0005	0.05426	0.00157	5.6	36.9	240.9	6.3
G18	1422	284	0.26352	0.00528	0.03757	0.00046	0.05089	0.00099	-0.1	-0.9	237.8	5.7
G19	138	114	0.31541	0.01888	0.04313	0.00076	0.05307	0.00323	2.3	17.9	272.2	9.4
G20	548	404	0.28952	0.00806	0.04054	0.00053	0.05181	0.00144	0.8	7.6	256.2	6.6

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G22	933	571	0.10299	0.00353	0.01546	0.00021	0.04835	0.00166	0.6	14.9	98.9	2.7
G23	323	115	0.13646	0.00901	0.02055	0.00037	0.04818	0.00324	-0.9	-21.3	131.1	4.7
G24	843	407	0.57339	0.01065	0.07321	0.00089	0.05683	0.00101	1.0	5.9	455.5	10.7
G25	3393	1169	0.08212	0.00182	0.01237	0.00015	0.04817	0.00104	1.0	26.2	79.3	2.0
G26	506	202	0.11146	0.00495	0.01639	0.00025	0.04935	0.00222	2.4	36.3	104.8	3.1
G27	372	206	0.12349	0.00755	0.01807	0.00032	0.04958	0.00308	2.3	34.2	115.5	4.0
G28	232	210	0.29121	0.0117	0.04178	0.0006	0.05057	0.00205	-1.7	-19.2	263.9	7.5
G29	693	279	0.10321	0.00403	0.01567	0.00022	0.0478	0.00188	-0.5	-13.3	100.2	2.8
G30	2161	539	0.23726	0.00477	0.03282	0.0004	0.05245	0.00102	3.8	31.8	208.2	5.0
G35	962	1553	0.10163	0.00486	0.01445	0.00023	0.05105	0.00248	6.3	61.9	92.5	2.9
G41	659	79	5.60496	0.0779	0.32871	0.00394	0.12372	0.00156	4.6	8.9	2010.5	44.4
G42	575	193	0.11175	0.00536	0.01672	0.00026	0.04849	0.00236	0.7	13.2	106.9	3.3
G43	458	177	0.10485	0.00568	0.01595	0.00026	0.04771	0.00262	-0.8	-21.4	102.0	3.3
G44	415	292	0.27152	0.0091	0.03904	0.00053	0.05046	0.0017	-1.2	-14.1	246.9	6.6
G47	758	275	0.10985	0.0046	0.016	0.00024	0.0498	0.00211	3.3	44.9	102.4	3.0
G51	424	140	0.11147	0.00555	0.01557	0.00025	0.05193	0.00262	7.7	64.7	99.6	3.1
G53	333	226	0.10361	0.00625	0.01539	0.00026	0.04885	0.00299	1.7	30.1	98.4	3.4
G61	427	236	0.27358	0.01035	0.03806	0.00054	0.05216	0.00199	2.0	17.6	240.8	6.8
G63	756	537	0.10762	0.0039	0.01579	0.00022	0.04944	0.0018	2.8	40.2	101.0	2.8
G64	321	218	0.51381	0.01683	0.06434	0.00089	0.05794	0.00191	4.7	23.7	402.0	10.8
G65	668	340	0.28558	0.00802	0.03923	0.00051	0.05282	0.00148	2.8	22.7	248.1	6.4
G67	628	451	0.55782	0.0115	0.07089	0.00088	0.0571	0.00114	1.9	10.8	441.5	10.6
G68	943	638	0.72315	0.01739	0.0897	0.00115	0.0585	0.00139	-0.2	-1.0	553.7	13.6
G72	711	343	0.10762	0.00408	0.01573	0.00022	0.04964	0.0019	3.2	43.5	100.6	2.8
G73	781	134	5.353	0.07401	0.33568	0.00401	0.1157	0.00145	0.6	1.3	1890.9	44.7
G82	569	27	0.29821	0.00923	0.04101	0.00055	0.05276	0.00163	2.3	18.6	259.1	6.8
G84	1288	215	0.28127	0.0059	0.03971	0.00049	0.05139	0.00105	0.3	2.8	251.0	6.1
G86	624	247	0.11198	0.00443	0.01645	0.00024	0.0494	0.00197	2.5	37.0	105.2	3.0
G87	506	444	0.09554	0.00661	0.01453	0.00027	0.0477	0.00336	-0.3	-11.4	93.0	3.5
G88	590	310	0.29426	0.00772	0.04067	0.00052	0.0525	0.00137	1.9	16.3	257.0	6.5
G92	208	105	0.3042	0.01736	0.04041	0.00071	0.05462	0.00317	5.6	35.6	255.4	8.8
G94	446	212	0.0973	0.00476	0.0143	0.00022	0.04937	0.00245	3.1	44.6	91.5	2.8
G98	151	194	0.27784	0.01508	0.03683	0.00063	0.05474	0.00302	6.8	41.9	233.1	7.8
G100	1013	1753	0.10712	0.00534	0.01572	0.00025	0.04944	0.0025	2.8	40.5	100.5	3.2
G102	1237	491	0.0944	0.00288	0.01433	0.00019	0.0478	0.00146	-0.1	-3.9	91.7	2.4
G103	585	57	0.11437	0.00528	0.01622	0.00025	0.05117	0.00239	6.1	58.2	103.7	3.2
G104	148	161	0.10687	0.01039	0.01736	0.00039	0.04467	0.00441	-7.0	- 1108	110.9	4.9
G105	197	200	0.10795	0.00747	0.01567	0.0003	0.04999	0.00352	3.9	48.5	100.2	3.8
G107	347	137	0.11257	0.00573	0.0164	0.00026	0.04981	0.00257	3.2	43.6	104.9	3.3
G108	946	262	0.11439	0.00365	0.01715	0.00023	0.04838	0.00154	0.4	7.1	109.6	2.9
G111	163	164	0.10191	0.00855	0.01522	0.00031	0.0486	0.00414	1.2	24.3	97.3	3.9
G112	401	289	0.32607	0.0101	0.04481	0.0006	0.0528	0.00164	1.4	11.7	282.6	7.4
G113	167	269	0.10452	0.00856	0.01551	0.00031	0.04891	0.00407	1.7	30.9	99.2	4.0
G114	693	192	5.31211	0.07248	0.33345	0.00397	0.11559	0.00142	0.8	1.8	1889.1	43.9
G115	724	388	0.10608	0.00403	0.01573	0.00022	0.04894	0.00187	1.8	30.5	100.6	2.8
G116	2015	1721	0.10393	0.00257	0.01542	0.0002	0.04891	0.0012	1.8	31.3	98.6	2.5
G117	274	207	0.52085	0.01505	0.06891	0.00091	0.05484	0.00158	-0.9	-5.9	429.6	11.0
G119	108	141	0.0946	0.01713	0.01363	0.00054	0.05036	0.0093	5.2	58.7	87.3	6.9
G121	1324	839	0.09778	0.00307	0.01407	0.00019	0.05042	0.00158	5.1	58.0	90.1	2.4
G122	861	321	3.02563	0.04264	0.24476	0.00292	0.08969	0.00115	0.2	0.5	1418.9	48.6
G123	227	253	0.26471	0.0142	0.03732	0.00062	0.05146	0.00281	1.0	9.7	236.2	7.7
G124	239	181	0.11922	0.00768	0.01739	0.00031	0.04975	0.00326	3.0	39.5	111.1	3.9
G126	561	397	0.56618	0.01536	0.07314	0.00096	0.05617	0.00152	0.1	0.8	455.0	11.5
G127	1557	365	0.10454	0.00335	0.01564	0.00021	0.04849	0.00156	0.9	18.7	100.1	2.7
G133	81	49	1.16279	0.04665	0.12729	0.00197	0.06628	0.0027	1.4	5.3	772.4	22.5
G134	1254	1112	0.25174	0.00562	0.03557	0.00044	0.05136	0.00112	1.2	12.3	225.3	5.5
G137	581	349	0.10277	0.0044	0.01577	0.00023	0.04727	0.00204	-1.6	-61.2	100.9	2.9
G138	555	327	0.28929	0.00804	0.04061	0.00053	0.05168	0.00143	0.5	5.5	256.6	6.6
G139	600	412	0.10117	0.00564	0.01471	0.00025	0.0499	0.00283	4.0	50.5	94.1	3.1
G140	518	183	0.41157	0.0103	0.0553	0.00071	0.054	0.00134	0.9	6.4	347.0	8.6
G141	228	163	0.12242	0.00763	0.01761	0.00031	0.05044	0.0032	4.3	47.7	112.5	4.0

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G146	1293	639	0.09756	0.00294	0.01484	0.0002	0.0477	0.00144	-0.5	-13.5	95.0	2.5
G148	710	316	0.10653	0.00427	0.01526	0.00022	0.05066	0.00205	5.3	56.7	97.6	2.8
G149	6041	3749	0.23765	0.00404	0.03167	0.00038	0.05445	0.00088	7.7	48.4	201.0	4.8
G150	245	322	0.11216	0.01414	0.01635	0.00048	0.04977	0.00641	3.3	43.4	104.5	6.1
G24	638	167	0.11192	0.0045	0.01585	0.00023	0.05122	0.00208	6.2	59.6	101.4	2.9
G29	1924	694	0.27189	0.0053	0.03786	0.00047	0.0521	0.00098	1.9	17.3	239.6	5.8
G43	493	203	0.12789	0.00598	0.01889	0.00029	0.04912	0.00233	1.3	21.5	120.6	3.7
G44	383	211	0.534	0.01478	0.06807	0.0009	0.05691	0.00157	2.4	12.9	424.5	10.9
G46	5082	3096	0.08198	0.00196	0.01189	0.00015	0.05002	0.00117	5.0	61.1	76.2	1.9
G47	193	143	0.2708	0.01297	0.03819	0.0006	0.05145	0.00249	0.7	7.4	241.6	7.4
G49	1211	471	0.10577	0.00332	0.01586	0.00021	0.0484	0.00152	0.7	14.6	101.4	2.7
G50	387	84	5.17892	0.08332	0.32764	0.00406	0.11468	0.00172	1.2	2.6	1874.8	53.7
G51	1194	497	0.10989	0.00346	0.01533	0.00021	0.05202	0.00164	8.1	65.8	98.0	2.6
G52	253	14	0.44771	0.02171	0.05888	0.00096	0.05516	0.00271	1.9	11.9	368.8	11.7
G53	591	292	0.12181	0.00561	0.01664	0.00026	0.05312	0.00248	9.7	68.1	106.4	3.3
G65	277	93	0.58217	0.02298	0.07133	0.00107	0.05921	0.00236	4.9	22.8	444.1	12.9
G68	1467	608	0.10265	0.00302	0.01516	0.0002	0.04912	0.00144	2.3	36.9	97.0	2.5
G69	258	112	0.27797	0.01147	0.03973	0.00059	0.05076	0.00211	-0.9	-9.2	251.2	7.3
G70	229	258	0.29648	0.01255	0.04131	0.00062	0.05207	0.00223	1.0	9.5	261.0	7.6
G71	625	295	0.11535	0.00481	0.01688	0.00025	0.04958	0.00209	2.7	38.4	107.9	3.1

Sample Q7

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	222	101	0.09148	0.00648	0.01365	0.00025	0.04862	0.00351	1.7	32.6	87.4	3.2
G2	4351	3005	0.07612	0.00187	0.01144	0.00014	0.04828	0.00119	1.6	35.1	73.3	1.8
G4	478	191	0.10869	0.00573	0.0156	0.00025	0.05055	0.00271	5.0	54.7	99.8	3.1
G5	581	229	0.10703	0.00471	0.01526	0.00022	0.05087	0.00228	5.7	58.5	97.6	2.8
G6	265	262	0.09995	0.00652	0.01462	0.00026	0.04961	0.0033	3.3	47.0	93.6	3.3
G7	2302	733	0.08478	0.00211	0.01244	0.00015	0.04943	0.00123	3.6	52.6	79.7	1.9
G8	314	334	0.26888	0.0097	0.03811	0.00051	0.05119	0.00187	0.3	3.3	241.1	6.4
G9	398	201	0.10323	0.00578	0.01501	0.00024	0.04989	0.00285	3.9	49.4	96.1	3.1
G10	296	246	0.09941	0.00621	0.01491	0.00025	0.04836	0.00307	0.8	18.3	95.4	3.2
G11	1231	411	0.2283	0.00561	0.03231	0.00039	0.05126	0.00126	1.9	18.9	205.0	4.9
G13	792	295	0.27096	0.00652	0.03936	0.00047	0.04995	0.0012	-2.2	-29.3	248.9	5.9
G14	210	108	0.29225	0.01388	0.04382	0.00065	0.04838	0.00233	-5.9	-134	276.5	8.1
G15	161	133	0.11425	0.00888	0.01633	0.00032	0.05076	0.00402	5.2	54.6	104.4	4.1
G17	619	355	0.09703	0.0045	0.01469	0.00022	0.04792	0.00226	0.0	0.4	94.0	2.7
G18	399	125	0.27796	0.00869	0.03867	0.0005	0.05215	0.00165	1.8	16.2	244.6	6.2
G19	396	177	0.10017	0.00581	0.01488	0.00025	0.04885	0.00288	1.8	32.2	95.2	3.1
G21	418	226	0.10164	0.00511	0.01532	0.00023	0.04813	0.00246	0.3	7.5	98.0	3.0
G22	1853	748	0.08708	0.00243	0.01292	0.00016	0.04891	0.00137	2.5	42.4	82.7	2.0
G23	248	133	0.11414	0.00767	0.01667	0.0003	0.04968	0.0034	2.9	40.8	106.6	3.8
G24	1043	408	0.09438	0.00326	0.01433	0.00019	0.0478	0.00167	-0.1	-4.0	91.7	2.4
G25	906	560	0.09399	0.00344	0.01456	0.00019	0.04682	0.00173	-2.1	-133	93.2	2.5
G26	2889	1035	0.08411	0.00217	0.01168	0.00014	0.05225	0.00135	9.5	74.7	74.9	1.8
G27	999	476	0.52851	0.00981	0.07004	0.00081	0.05475	0.001	-1.3	-8.6	436.4	9.8
G28	1032	439	0.10489	0.00353	0.01545	0.0002	0.04925	0.00168	2.5	38.2	98.8	2.6
G29	2951	8161	0.08367	0.00197	0.01275	0.00015	0.04762	0.00112	0.0	-2.3	81.6	1.9
G30	239	192	0.52867	0.01638	0.0681	0.00089	0.05632	0.00176	1.5	8.5	424.7	10.7
G31	1091	900	0.10573	0.00343	0.01637	0.00021	0.04685	0.00153	-2.5	-152	104.7	2.7
G32	161	113	0.11732	0.00952	0.01626	0.00033	0.05235	0.00433	8.3	65.4	104.0	4.2
G33	523	290	0.26159	0.00792	0.03799	0.00048	0.04996	0.00152	-1.8	-24.4	240.3	6.0
G34	133	87	0.25485	0.01552	0.03556	0.00061	0.052	0.00323	2.4	21.1	225.2	7.6
G35	1425	579	0.09323	0.00278	0.0138	0.00017	0.04902	0.00147	2.5	40.6	88.3	2.2
G36	293	95	0.53931	0.01488	0.06915	0.00087	0.05658	0.00157	1.6	9.2	431.0	10.5
G37	638	326	0.12096	0.00465	0.01674	0.00023	0.05241	0.00204	8.3	64.7	107.0	2.9
G38	115	125	0.25514	0.01553	0.03688	0.00063	0.05019	0.00311	-1.2	-14.6	233.5	7.8
G39	281	210	0.50309	0.01444	0.06549	0.00083	0.05574	0.00161	1.2	7.4	408.9	10.1

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G41	93	103	0.09239	0.01128	0.01347	0.00035	0.04975	0.00618	3.9	52.9	86.3	4.4
G42	467	329	0.1216	0.00529	0.01838	0.00026	0.04801	0.00212	-0.8	-19.1	117.4	3.3
G43	212	175	0.09131	0.00719	0.01445	0.00028	0.04585	0.00368	-4.1	-924	92.5	3.5
G44	315	302	0.5121	0.01378	0.06628	0.00083	0.05605	0.00152	1.5	8.9	413.7	10.0
G45	337	191	0.08381	0.00641	0.01292	0.00025	0.04707	0.00367	-1.2	-57.8	82.7	3.2
G46	290	255	1.08198	0.02361	0.11858	0.00144	0.0662	0.00144	3.1	11.1	722.4	16.6
G47	492	471	0.08879	0.00457	0.01403	0.00021	0.04592	0.0024	-3.8	-897	89.8	2.7
G48	184	132	0.51693	0.01841	0.06829	0.00093	0.05492	0.00198	-0.6	-4.1	425.8	11.2
G49	685	562	0.11218	0.00423	0.01681	0.00023	0.04843	0.00185	0.6	10.6	107.4	2.9
G50	1450	620	0.09988	0.00296	0.01407	0.00018	0.05149	0.00154	7.3	65.7	90.1	2.3
G51	302	268	0.09603	0.00632	0.0145	0.00026	0.04806	0.00322	0.3	9.3	92.8	3.3
G52	688	376	0.09431	0.004	0.01435	0.0002	0.04768	0.00205	-0.4	-11.3	91.9	2.6
G53	671	395	0.10642	0.00431	0.015	0.00021	0.05147	0.00212	7.0	63.4	96.0	2.7
G54	855	193	0.25673	0.00641	0.0374	0.00045	0.0498	0.00124	-2.0	-27.5	236.7	5.6
G55	468	198	0.10029	0.00504	0.01491	0.00023	0.0488	0.00249	1.7	31.0	95.4	2.9
G56	322	126	0.11459	0.00776	0.01704	0.00031	0.04878	0.00337	1.2	20.8	108.9	3.9
G57	403	215	0.09517	0.00501	0.0149	0.00023	0.04634	0.00248	-3.2	-531	95.4	2.9
G58	472	316	0.50458	0.01193	0.06617	0.0008	0.05532	0.00131	0.4	2.8	413.0	9.7
G59	515	226	0.12021	0.00585	0.01822	0.00027	0.04787	0.00237	-0.9	-26.5	116.4	3.5
G60	385	321	0.25504	0.00894	0.03632	0.00048	0.05095	0.00181	0.3	3.6	230.0	6.0
G61	2115	88	0.21149	0.00516	0.02938	0.00036	0.05222	0.00128	4.3	36.7	186.7	4.5
G62	476	235	0.10734	0.00517	0.01509	0.00023	0.05163	0.00253	7.3	64.1	96.5	2.9
G63	393	493	0.09244	0.00642	0.01361	0.00025	0.04928	0.00349	3.1	45.9	87.1	3.2
G64	1130	491	0.10032	0.00324	0.01486	0.00019	0.04898	0.0016	2.1	35.2	95.1	2.4
G65	133	221	0.09453	0.00993	0.01361	0.00032	0.05038	0.00538	5.2	59.0	87.2	4.0
G66	639	535	0.25171	0.0069	0.03613	0.00045	0.05054	0.00139	-0.3	-4.0	228.8	5.6
G67	1216	645	0.10105	0.00311	0.01518	0.00019	0.04828	0.0015	0.5	14.0	97.2	2.4
G68	264	157	0.2837	0.01098	0.03821	0.00053	0.05386	0.00212	4.9	33.8	241.7	6.6
G69	75	40	0.10794	0.01518	0.01681	0.00045	0.04658	0.00664	-3.2	-290	107.5	5.7
G70	244	299	0.09621	0.00698	0.0147	0.00027	0.04748	0.00351	-0.9	-29.8	94.1	3.4
G71	439	194	0.29638	0.00901	0.04174	0.00053	0.05151	0.00158	0.0	0.1	263.6	6.6
G72	176	241	0.11628	0.00878	0.01773	0.00033	0.04759	0.00366	-1.4	-44.9	113.3	4.2
G73	1779	217	0.09439	0.00257	0.01445	0.00018	0.04738	0.0013	-1.0	-36.6	92.5	2.3
G74	569	108	1.42144	0.02703	0.13541	0.00161	0.07616	0.00143	9.7	25.5	818.7	18.3
G75	243	30	9.92637	0.14091	0.45264	0.00522	0.1591	0.00216	0.9	1.6	2446.2	45.6
G76	1029	910	0.12435	0.00381	0.01855	0.00024	0.04863	0.0015	0.4	8.7	118.5	3.0
G77	1079	589	0.12399	0.0037	0.01845	0.00023	0.04875	0.00147	0.7	13.1	117.9	2.9
G78	94	76	0.58889	0.02693	0.07312	0.00113	0.05843	0.00272	3.4	16.7	454.9	13.6
G79	512	106	0.89319	0.0172	0.10623	0.00125	0.061	0.00116	-0.4	-1.8	650.8	14.5
G80	280	149	0.12618	0.0071	0.01859	0.0003	0.04923	0.00282	1.6	25.3	118.8	3.8
G81	164	108	0.11105	0.00885	0.01697	0.00033	0.04747	0.00385	-1.5	-50.3	108.5	4.2
G82	1200	135	0.52409	0.00928	0.06884	0.00079	0.05523	0.00096	-0.3	-1.9	429.2	9.6
G84	148	204	0.10178	0.01291	0.01435	0.00042	0.05147	0.00667	7.2	65.0	91.8	5.4
G85	1113	887	0.10063	0.00323	0.01536	0.0002	0.04752	0.00154	-0.9	-31.9	98.3	2.5
G87	180	142	1.16671	0.02931	0.13043	0.00164	0.0649	0.00164	-0.7	-2.5	790.3	18.6
G88	273	838	1.09333	0.02646	0.112	0.0014	0.07082	0.00172	9.6	28.1	684.4	16.2
G91	783	860	0.43058	0.00914	0.05755	0.00068	0.05428	0.00115	0.8	5.7	360.7	8.3
G92	316	227	0.11372	0.00636	0.01686	0.00027	0.04894	0.00279	1.5	25.6	107.8	3.4
G93	1272	401	0.53216	0.01095	0.06316	0.00075	0.06112	0.00125	9.7	38.7	394.8	9.1
G94	581	239	0.10113	0.00446	0.01522	0.00022	0.04822	0.00216	0.4	11.4	97.4	2.8
G95	117	81	0.10677	0.01496	0.01506	0.00047	0.05144	0.00735	7.0	63.1	96.3	5.9
G96	301	168	0.11467	0.00735	0.0159	0.00028	0.05233	0.00342	8.4	66.1	101.7	3.6
G97	239	113	0.09769	0.00686	0.01561	0.00028	0.04541	0.00324	-5.2	-997	99.8	3.5
G100	299	187	0.12564	0.00688	0.01964	0.00031	0.04641	0.00258	-4.1	-567	125.4	3.9
G101	373	514	0.09697	0.00702	0.01451	0.00028	0.04848	0.00358	1.2	24.3	92.9	3.5
G102	111	97	0.09165	0.01072	0.01419	0.00034	0.04687	0.00557	-2.0	-113	90.8	4.4
G103	298	235	0.12891	0.00683	0.01827	0.00029	0.0512	0.00276	5.5	53.3	116.7	3.7
G104	420	317	0.10494	0.00512	0.01522	0.00023	0.05003	0.00248	4.0	50.5	97.4	2.9
G105	195	172	0.10168	0.00767	0.01637	0.00031	0.04505	0.00346	-6.1	-1046	104.7	3.9
G106	303	152	0.28493	0.01027	0.0407	0.00055	0.05079	0.00185	-1.0	-11.2	257.2	6.8
G107	78	34	0.28012	0.02442	0.04173	0.00089	0.0487	0.00433	-4.9	-97.7	263.6	11.0

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G108	264	417	0.10841	0.00691	0.01623	0.00028	0.04846	0.00314	0.7	14.8	103.8	3.5
G109	201	187	0.5477	0.01765	0.07225	0.00095	0.055	0.00179	-1.4	-9.1	449.7	11.4
G110	126	89	0.10734	0.01004	0.01594	0.00034	0.04887	0.00465	1.6	28.0	101.9	4.4
G111	395	570	0.10412	0.00534	0.01553	0.00024	0.04864	0.00254	1.3	23.9	99.3	3.0
G112	328	192	0.12492	0.00633	0.01856	0.00028	0.04882	0.00251	0.8	14.9	118.6	3.6
G113	567	434	3.08079	0.04448	0.24726	0.00281	0.09039	0.00125	0.2	0.7	1433.8	52.3
G114	268	237	0.11415	0.00676	0.0164	0.00027	0.05049	0.00305	4.7	51.8	104.9	3.5
G115	242	152	0.26989	0.01085	0.03811	0.00054	0.05138	0.0021	0.6	6.4	241.1	6.7
G116	1411	305	0.27212	0.00547	0.03803	0.00045	0.05191	0.00103	1.6	14.5	240.6	5.5
G117	344	158	0.11227	0.00767	0.01693	0.0003	0.04811	0.00335	-0.2	-3.2	108.2	3.9
G118	537	244	0.09741	0.00447	0.01487	0.00022	0.04754	0.00221	-0.7	-25.5	95.1	2.7
G119	318	140	0.26668	0.00958	0.03845	0.00052	0.05032	0.00183	-1.3	-15.9	243.2	6.4
G120	356	92	0.29086	0.0095	0.04009	0.00053	0.05264	0.00174	2.3	19.1	253.4	6.5
G121	270	197	0.1189	0.00688	0.01835	0.0003	0.04701	0.00276	-2.6	-138	117.2	3.8
G122	480	795	0.09807	0.00456	0.01452	0.00021	0.049	0.00232	2.3	37.1	92.9	2.7
G123	636	109	0.28379	0.00745	0.03991	0.00049	0.05159	0.00136	0.6	5.6	252.3	6.1
G124	500	301	0.27308	0.008	0.03887	0.00049	0.05097	0.0015	-0.2	-2.7	245.8	6.1
G125	367	258	0.11808	0.00593	0.01781	0.00027	0.0481	0.00246	-0.4	-9.4	113.8	3.4
G126	274	119	0.10732	0.00768	0.01578	0.0003	0.04934	0.0036	2.6	38.5	100.9	3.8
G127	1809	1493	1.44903	0.02336	0.15079	0.00173	0.06972	0.00109	0.5	1.6	905.4	19.4
G128	59	45	0.27524	0.02249	0.04341	0.00085	0.046	0.00382	-9.9	-2738	273.9	10.5
G129	6566	7542	0.08842	0.00158	0.01301	0.00015	0.04931	0.00087	3.2	48.8	83.3	1.9
G130	177	171	0.51398	0.01748	0.06805	0.00091	0.0548	0.00189	-0.8	-5.0	424.4	11.0
G131	658	305	0.10132	0.00396	0.01521	0.00021	0.04834	0.00192	0.7	16.1	97.3	2.6
G132	532	308	0.53538	0.01189	0.07082	0.00085	0.05484	0.00121	-1.3	-8.7	441.1	10.2
G133	431	255	0.27274	0.00837	0.03844	0.00049	0.05147	0.00159	0.7	7.1	243.2	6.1
G134	2432	2603	0.08566	0.00209	0.01289	0.00016	0.04822	0.00118	1.1	25.0	82.6	2.0
G135	797	216	3.09699	0.04333	0.24773	0.0028	0.0907	0.00121	0.4	0.9	1440.2	50.4
G136	164	89	0.11608	0.01059	0.01863	0.0004	0.04522	0.0042	-6.3	-1180	119.0	5.1
G137	2134	22	0.21914	0.00403	0.03102	0.00036	0.05125	0.00093	2.2	21.9	196.9	4.5
G138	1006	692	0.09264	0.0032	0.01356	0.00018	0.04958	0.00173	3.7	50.5	86.8	2.3
G139	674	286	0.12388	0.00433	0.01895	0.00025	0.04743	0.00168	-2.0	-72.1	121.0	3.2
G140	294	304	0.1044	0.00813	0.01529	0.00031	0.04952	0.00394	3.1	43.4	97.8	3.9
G141	918	432	0.09448	0.0033	0.0148	0.00019	0.0463	0.00164	-3.2	-617	94.7	2.5
G142	661	308	0.09688	0.00389	0.01502	0.00021	0.0468	0.00191	-2.3	-146	96.1	2.6
G143	200	151	0.09742	0.00841	0.01438	0.0003	0.04916	0.00433	2.6	40.9	92.0	3.9
G144	1761	765	0.2357	0.00454	0.03267	0.00038	0.05234	0.00099	3.7	30.9	207.3	4.7
G145	482	368	0.09883	0.0046	0.01498	0.00022	0.04788	0.00226	-0.1	-3.9	95.8	2.8
G146	1047	45	0.56398	0.00987	0.07295	0.00084	0.05609	0.00096	0.0	0.4	453.9	10.1
G147	344	208	0.10643	0.0058	0.016	0.00025	0.04826	0.00267	0.4	8.7	102.3	3.2
G148	1913	398	0.25102	0.00505	0.03388	0.0004	0.05376	0.00107	5.9	40.5	214.8	5.0
G150	558	655	0.53013	0.01153	0.06897	0.00082	0.05576	0.00121	0.4	2.8	430.0	9.9

Sample Q8

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G2	235	253	0.25535	0.01157	0.03617	0.00054	0.05121	0.00236	0.8	8.5	229.1	6.8
G4	340	97	0.28523	0.01409	0.04041	0.00064	0.05121	0.00257	-0.2	-2.0	255.4	7.9
G6	255	153	0.56795	0.01655	0.07168	0.00094	0.05748	0.00168	2.3	12.4	446.3	11.3
G7	537	957	0.09237	0.0063	0.01425	0.00026	0.04704	0.00326	-1.6	-79.2	91.2	3.3
G8	894	206	0.30935	0.00684	0.04137	0.0005	0.05425	0.00119	4.7	31.5	261.3	6.2
G9	226	246	0.51921	0.02243	0.06622	0.001	0.05688	0.0025	2.7	15.0	413.4	12.1
G10	125	64	0.27131	0.01792	0.03635	0.00068	0.05415	0.00365	5.9	39.0	230.2	8.4
G12	721	478	0.10309	0.0047	0.01525	0.00023	0.04903	0.00227	2.0	34.7	97.6	2.9
G15	314	205	0.11264	0.00715	0.01656	0.00029	0.04935	0.00319	2.4	35.7	105.9	3.7
G23	1136	689	0.26767	0.00685	0.03733	0.00047	0.05202	0.00133	1.9	17.5	236.3	5.8
G34	258	326	0.10466	0.00723	0.01514	0.00028	0.05016	0.00353	4.3	52.1	96.9	3.5
G36	454	186	0.11167	0.00526	0.01566	0.00024	0.05172	0.00248	7.3	63.3	100.2	3.0
G37	342	194	0.10034	0.00662	0.01518	0.00027	0.04794	0.00322	0.0	-2.0	97.1	3.4
G38	656	337	0.27412	0.00801	0.03856	0.0005	0.05157	0.00151	0.9	8.5	243.9	6.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G39	518	163	0.53767	0.01334	0.06892	0.00086	0.0566	0.0014	1.7	9.6	429.6	10.4
G42	714	238	0.26283	0.00835	0.03812	0.0005	0.05002	0.0016	-1.8	-23.0	241.2	6.2
G43	787	430	0.12636	0.00464	0.01864	0.00025	0.04918	0.00182	1.5	24.0	119.0	3.2
G45	3298	1148	0.0833	0.00197	0.01245	0.00015	0.04854	0.00114	1.8	36.6	79.8	1.9
G46	1531	216	0.24845	0.00614	0.03351	0.00042	0.05378	0.00132	6.0	41.3	212.5	5.2
G47	279	157	0.09613	0.00831	0.01448	0.00031	0.04816	0.00424	0.5	13.4	92.7	3.9
G48	299	140	0.57082	0.01617	0.07425	0.00096	0.05577	0.00158	-0.7	-4.2	461.7	11.5
G49	615	448	0.28605	0.00818	0.03852	0.0005	0.05387	0.00154	4.8	33.3	243.7	6.2
G51	540	463	0.1058	0.00509	0.0158	0.00024	0.0486	0.00237	1.1	21.3	101.0	3.0
G52	214	157	0.54714	0.01894	0.07122	0.00098	0.05573	0.00195	-0.1	-0.5	443.5	11.8
G53	863	393	0.60821	0.01165	0.07421	0.00089	0.05946	0.00111	4.5	21.0	461.5	10.7
G55	105	110	0.1011	0.01468	0.01543	0.00048	0.04754	0.00703	-0.9	-30.0	98.7	6.1
G58	1391	480	0.10403	0.0033	0.01559	0.0002	0.0484	0.00154	0.8	16.1	99.7	2.6
G60	772	396	0.27651	0.00777	0.03942	0.0005	0.05088	0.00143	-0.6	-5.8	249.3	6.2
G62	1026	55	0.56248	0.01152	0.07135	0.00086	0.0572	0.00115	2.0	10.9	444.3	10.4
G63	2370	157	0.27067	0.00598	0.03599	0.00044	0.05457	0.00119	6.7	42.2	227.9	5.5
G65	516	262	0.11003	0.00622	0.01532	0.00026	0.05212	0.003	8.2	66.3	98.0	3.2
G73	1194	503	0.10841	0.00386	0.01527	0.00021	0.05151	0.00185	7.0	63.0	97.7	2.6
G75	547	427	0.10283	0.00541	0.01458	0.00023	0.05115	0.00274	6.5	62.3	93.3	3.0
G80	527	330	0.09837	0.00565	0.01504	0.00025	0.04746	0.00277	-0.9	-34.4	96.2	3.1
G111	376	188	0.09702	0.00717	0.01546	0.00029	0.04554	0.00342	-5.0	-988	98.9	3.7
G113	1184	599	0.09635	0.00336	0.01423	0.00019	0.04911	0.00173	2.5	40.6	91.1	2.4
G121	611	301	3.58666	0.05251	0.27146	0.00318	0.09585	0.00132	-0.1	-0.2	1544.9	51.4
G122	239	150	0.27498	0.01419	0.03695	0.0006	0.054	0.00284	5.5	36.9	233.9	7.4
G125	627	500	0.10097	0.00502	0.01499	0.00023	0.04886	0.00247	1.9	32.0	95.9	2.9
G127	361	174	1.22947	0.02661	0.12798	0.00159	0.0697	0.00149	4.9	15.6	776.3	18.1
G128	1085	343	0.09653	0.00504	0.01435	0.00023	0.04881	0.00259	2.0	33.7	91.8	2.9
G129	710	377	0.28024	0.00752	0.03854	0.00049	0.05275	0.00141	2.9	23.3	243.8	6.0
G130	390	344	5.22451	0.07714	0.33165	0.00391	0.11429	0.00159	0.6	1.2	1868.7	49.9
G131	268	361	0.10661	0.00841	0.015	0.00031	0.05158	0.00415	7.2	64.0	96.0	3.9
G132	149	161	0.26798	0.01869	0.03828	0.00073	0.05079	0.00361	-0.5	-4.8	242.2	9.0
G133	275	225	0.53938	0.01871	0.0672	0.00093	0.05823	0.00204	4.5	22.0	419.3	11.3
G134	2183	973	0.24043	0.00495	0.03394	0.00041	0.05139	0.00104	1.7	16.7	215.2	5.1
G135	1304	716	0.09664	0.00355	0.01483	0.0002	0.04727	0.00175	-1.3	-51.8	94.9	2.6
G137	734	466	0.10491	0.00474	0.01633	0.00024	0.0466	0.00213	-3.0	-263	104.4	3.0
G138	416	421	0.25987	0.01009	0.03708	0.00052	0.05085	0.002	0.0	-0.4	234.7	6.5
G141	152	38	0.58714	0.02735	0.07129	0.00113	0.05975	0.00283	5.7	25.3	443.9	13.6
G144	1096	432	0.51032	0.01128	0.06733	0.00082	0.05499	0.0012	-0.3	-2.0	420.0	9.9
G145	423	298	0.10922	0.00709	0.01638	0.00029	0.04838	0.0032	0.6	11.2	104.7	3.7
G146	385	175	0.12042	0.00762	0.01788	0.00031	0.04886	0.00315	1.1	19.2	114.2	4.0
G148	54	46	0.1027	0.02216	0.01521	0.00062	0.049	0.01074	2.1	34.2	97.3	7.9
G150	2500	494	0.23184	0.00461	0.03296	0.00039	0.05103	0.00099	1.3	13.7	209.0	4.9
G78	1186	309	0.30923	0.00702	0.0418	0.00053	0.05367	0.00119	3.6	26.1	264.0	6.6
G81	319	232	0.10832	0.00805	0.01539	0.00031	0.05105	0.00386	6.0	59.5	98.5	3.9
G85	1107	972	0.25376	0.00601	0.03585	0.00046	0.05136	0.00119	1.1	11.7	227.0	5.7
G89	170	123	0.56896	0.02218	0.07234	0.00107	0.05706	0.00225	1.6	8.7	450.2	12.9
G90	381	225	0.59876	0.01585	0.07448	0.00098	0.05832	0.00153	2.9	14.4	463.1	11.8
G94	526	201	0.27942	0.00898	0.03963	0.00054	0.05115	0.00164	-0.1	-1.2	250.5	6.7
G97	111	143	0.28079	0.02185	0.03997	0.00082	0.05097	0.00404	-0.5	-5.5	252.6	10.2
G98	873	506	0.10802	0.0043	0.01517	0.00022	0.05166	0.00207	7.3	64.1	97.1	2.8
G105	988	377	0.56033	0.0118	0.07194	0.0009	0.05651	0.00116	0.9	5.1	447.8	10.9
G142	739	778	0.30001	0.00792	0.04195	0.00055	0.05189	0.00136	0.6	5.5	264.9	6.8
G143	367	288	0.28193	0.0107	0.04101	0.00059	0.04987	0.00191	-2.7	-37.2	259.1	7.3
G144	842	934	0.10942	0.00439	0.01584	0.00023	0.0501	0.00203	4.0	49.3	101.3	2.9
G147	954	637	0.09901	0.00505	0.01506	0.00024	0.04771	0.00247	-0.4	-14.9	96.3	3.1
G150	1100	245	0.30119	0.00728	0.0416	0.00053	0.05253	0.00125	1.8	14.8	262.7	6.6
G151	619	330	0.11015	0.00512	0.01639	0.00025	0.04875	0.00229	1.2	22.8	104.8	3.2
G156	590	535	0.29026	0.01061	0.03985	0.00057	0.05284	0.00194	2.7	21.7	251.9	7.1
G157	2906	407	0.23829	0.00464	0.03187	0.00039	0.05424	0.00102	7.3	46.9	202.2	4.9
G160	2264	1075	0.23143	0.0056	0.03222	0.00041	0.05211	0.00124	3.4	29.5	204.4	5.2
G161	876	382	0.27564	0.00878	0.04008	0.00054	0.0499	0.00159	-2.4	-33.1	253.3	6.8

Sample Q9

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	12.1	10.3	0.09454	0.00597	0.01428	0.00025	0.04802	0.00308	0.3	7.7	91.4	3.1
G3	9.5	4.6	0.09429	0.01055	0.01429	0.00037	0.04788	0.00547	0.1	0.9	91.4	4.7
G4	7.1	5.5	0.1083	0.01182	0.01597	0.0004	0.04921	0.00547	2.3	35.3	102.1	5.1
G6	36.8	18.7	0.28954	0.00599	0.03958	0.00047	0.05307	0.00108	3.2	24.5	250.3	5.9
G8	21.7	7.9	0.10505	0.00713	0.0158	0.00029	0.04824	0.00334	0.3	8.8	101.1	3.7
G9	11.5	7.4	0.27961	0.00919	0.03944	0.00052	0.05143	0.0017	0.4	4.1	249.4	6.5
G10	13.1	8.2	0.11417	0.00598	0.01696	0.00027	0.04883	0.0026	1.3	22.3	108.4	3.4
G11	1.6	1.7	0.10094	0.02321	0.01477	0.0006	0.0496	0.01156	3.3	46.4	94.5	7.6
G12	11.5	5.7	0.12946	0.00614	0.01953	0.00029	0.04809	0.00231	-0.9	-20.4	124.7	3.7
G14	22.6	2.9	0.55511	0.013	0.07009	0.00087	0.05746	0.00134	2.7	14.2	436.7	10.4
G16	20.0	9.1	0.10528	0.00424	0.01574	0.00022	0.04852	0.00198	0.9	19.2	100.7	2.8
G17	30.8	19.2	0.27592	0.00611	0.03919	0.00047	0.05108	0.00112	-0.2	-1.5	247.8	5.9
G18	3.4	1.7	0.54326	0.02373	0.07095	0.00106	0.05555	0.00246	-0.3	-1.7	441.8	12.8
G19	11.2	5.6	0.09508	0.00711	0.01428	0.00027	0.04831	0.00368	0.9	20.2	91.4	3.5
G20	16.2	8.6	0.28708	0.00794	0.04007	0.00051	0.05198	0.00144	1.2	11.0	253.3	6.3
G21	7.4	5.5	10.78464	0.14806	0.48686	0.00569	0.16071	0.00207	-2.0	-3.8	2463.1	43.1
G22	7.1	4.4	0.09813	0.0088	0.01492	0.00032	0.04771	0.00435	-0.5	-13.4	95.5	4.0
G23	9.0	6.2	0.25884	0.01005	0.03701	0.00052	0.05074	0.00199	-0.3	-2.4	234.3	6.4
G24	18.7	2.6	5.13717	0.06919	0.3233	0.00373	0.11528	0.00145	2.0	4.2	1884.3	44.8
G25	6.9	3.2	4.87615	0.07531	0.32608	0.00386	0.10849	0.0016	-1.2	-2.6	1774.1	53.6
G26	24.4	8.6	0.29698	0.007	0.0415	0.00051	0.05192	0.00122	0.7	7.1	262.1	6.3
G27	7.3	7.8	0.54073	0.0165	0.0715	0.00094	0.05487	0.00169	-1.4	-9.5	445.2	11.3
G28	24.0	9.7	0.11168	0.00582	0.01682	0.00027	0.04818	0.00255	0.0	0.4	107.5	3.4
G29	7.3	3.9	0.27091	0.01395	0.03915	0.00062	0.0502	0.00263	-1.7	-21.2	247.6	7.7
G30	20.0	8.2	0.11229	0.00432	0.01685	0.00023	0.04834	0.00188	0.4	7.2	107.7	2.9
G31	9.1	7.2	0.27412	0.01026	0.03885	0.00054	0.05119	0.00194	0.1	1.4	245.7	6.6
G32	11.7	9.2	0.10292	0.00842	0.01525	0.00031	0.04896	0.00408	1.9	33.2	97.6	4.0
G33	28.0	12.1	0.10621	0.00362	0.01528	0.0002	0.05042	0.00173	4.8	54.3	97.8	2.6
G34	19.1	23.6	0.25893	0.00715	0.03742	0.00047	0.0502	0.00139	-1.3	-16.0	236.8	5.9
G35	53.6	24.6	0.09716	0.0026	0.01466	0.00018	0.04808	0.00129	0.3	9.0	93.8	2.3
G36	17.8	11.1	0.19973	0.00851	0.02888	0.00042	0.05018	0.00217	0.8	9.7	183.5	5.3
G37	16.0	6.2	0.10137	0.0056	0.01534	0.00025	0.04793	0.00269	-0.2	-3.9	98.2	3.1
G38	6.8	5.2	0.11553	0.00963	0.01618	0.00034	0.0518	0.0044	7.2	62.6	103.5	4.3
G39	56.8	20.7	0.16197	0.00355	0.02386	0.00029	0.04924	0.00107	0.3	4.5	152.0	3.6
G40	9.8	7.1	0.10963	0.00843	0.01595	0.00032	0.04987	0.00391	3.5	45.9	102.0	4.0
G42	20.2	13.6	0.09864	0.00417	0.01481	0.00021	0.04834	0.00207	0.8	18.2	94.7	2.7
G43	5.8	3.1	1.62078	0.03706	0.16627	0.00209	0.07072	0.00161	-1.3	-4.4	991.5	23.1
G44	8.0	5.6	0.53024	0.01579	0.06971	0.00091	0.05519	0.00165	-0.6	-3.5	434.4	11.0
G46	6.2	3.6	0.10921	0.0088	0.01617	0.00032	0.04899	0.00402	1.7	29.8	103.4	4.0
G47	11.2	6.5	0.12647	0.00646	0.0189	0.00029	0.04855	0.00252	0.2	4.4	120.7	3.7
G50	6.9	4.8	0.09469	0.00725	0.01421	0.00027	0.04835	0.00377	1.1	22.0	90.9	3.5
G51	50.3	13.8	0.53505	0.00874	0.07076	0.00082	0.05486	0.00086	-1.2	-8.4	440.7	9.9
G52	44.2	17.9	0.10636	0.00393	0.01605	0.00022	0.04807	0.0018	-0.1	-0.1	102.7	2.8
G53	8.3	6.4	0.09717	0.00684	0.01473	0.00026	0.04787	0.00342	0.0	-2.5	94.2	3.3
G54	44.0	14.6	0.54493	0.00919	0.07089	0.00083	0.05577	0.00091	0.0	0.3	441.5	10.0
G55	267.0	433.1	0.10134	0.00195	0.01532	0.00018	0.04798	0.0009	0.0	-0.9	98.0	2.3
G56	97.8	112.9	0.09959	0.00255	0.01504	0.00019	0.04805	0.00123	0.2	5.6	96.2	2.4
G57	29.4	31.5	0.10037	0.0036	0.01523	0.0002	0.0478	0.00173	-0.4	-10.4	97.5	2.6
G58	11.2	8.3	0.12194	0.00642	0.0188	0.00029	0.04707	0.00251	-2.7	-129	120.0	3.7
G59	11.8	14.1	0.9882	0.02174	0.10802	0.00133	0.06637	0.00145	5.5	19.2	661.2	15.5
G60	40.0	23.4	0.10205	0.00423	0.01482	0.00022	0.04995	0.00211	4.0	50.7	94.9	2.8
G61	23.5	24.4	0.10277	0.00428	0.01516	0.00022	0.04919	0.00207	2.4	38.2	97.0	2.7
G62	9.6	4.5	0.09826	0.0067	0.01476	0.00026	0.04831	0.00335	0.8	17.4	94.4	3.3
G63	22.8	11.9	0.10185	0.00421	0.01545	0.00022	0.04784	0.002	-0.3	-9.7	98.8	2.8
G64	8.0	5.3	5.19034	0.07959	0.33409	0.00396	0.11271	0.00165	-0.4	-0.8	1843.6	52.6
G65	18.2	2.2	0.41758	0.01005	0.05674	0.0007	0.05339	0.00128	-0.4	-3.0	355.8	8.5
G66	3.8	3.9	0.26331	0.01872	0.03745	0.00071	0.05101	0.00369	0.1	1.8	237.0	8.8
G67	11.6	7.6	0.09417	0.00697	0.0143	0.00027	0.04778	0.0036	-0.1	-4.5	91.5	3.5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G68	51.8	30.8	0.09844	0.00279	0.01498	0.00019	0.04767	0.00135	-0.6	-16.7	95.9	2.4
G69	70.8	34.7	0.09045	0.00233	0.01381	0.00017	0.04751	0.00122	-0.6	-18.8	88.4	2.2
G71	9.5	3.8	3.05388	0.05243	0.25189	0.00302	0.08796	0.00147	-1.9	-4.8	1381.5	63.2
G72	9.3	6.9	0.10581	0.00896	0.016	0.00033	0.04799	0.00414	-0.2	-4.6	102.3	4.2
G73	31.2	14.6	0.11296	0.00571	0.01699	0.00026	0.04824	0.00248	0.1	2.1	108.6	3.4
G74	8.0	3.4	4.59942	0.07228	0.29577	0.00352	0.11282	0.0017	4.7	9.5	1845.3	54.2
G75	43.4	7.4	0.28012	0.007	0.03841	0.00048	0.0529	0.00132	3.2	25.1	243.0	5.9
G76	44.6	22.8	0.10755	0.00405	0.01618	0.00022	0.04822	0.00184	0.2	5.9	103.5	2.8
G78	14.1	8.2	0.10931	0.00606	0.01615	0.00026	0.0491	0.00277	1.9	32.2	103.3	3.3
G79	24.1	15.2	0.26693	0.00707	0.0378	0.00047	0.05123	0.00136	0.4	4.7	239.2	5.9
G80	9.4	9.3	0.11107	0.01167	0.01681	0.00041	0.04793	0.00513	-0.6	-13.8	107.5	5.2
G81	17.9	16.7	0.11015	0.0061	0.01659	0.00027	0.04816	0.00271	0.0	0.8	106.1	3.4
G82	18.1	12.1	0.1048	0.0069	0.01583	0.00028	0.04804	0.00322	0.0	0.1	101.2	3.6
G83	15.3	11.3	0.10082	0.00578	0.01528	0.00025	0.04788	0.00279	-0.2	-6.0	97.7	3.2
G85	12.2	11.9	0.1021	0.00629	0.01551	0.00026	0.04776	0.00299	-0.5	-14.7	99.2	3.3
G86	9.0	2.7	4.55798	0.07082	0.30738	0.00364	0.10758	0.0016	0.8	1.8	1758.8	53.9
G87	10.4	8.2	0.1026	0.00714	0.01548	0.00028	0.04809	0.0034	0.2	4.4	99.0	3.5
G88	45.4	47.8	0.10652	0.00323	0.01605	0.00021	0.04816	0.00147	0.2	4.1	102.6	2.6
G89	22.9	14.2	0.32249	0.00971	0.04593	0.00059	0.05094	0.00154	-2.0	-21.7	289.5	7.3
G90	18.6	6.8	0.29247	0.01042	0.04122	0.00056	0.05148	0.00185	0.0	0.8	260.4	7.0
G92	17.2	8.5	0.2875	0.00858	0.03912	0.00051	0.05331	0.0016	3.7	27.7	247.4	6.3
G93	82.7	12.8	0.26795	0.00474	0.03786	0.00044	0.05135	0.00088	0.7	6.6	239.5	5.5
G94	23.9	7.2	0.2554	0.00704	0.03668	0.00046	0.05052	0.00139	-0.5	-6.0	232.2	5.8
G95	25.3	21.8	0.10074	0.00446	0.01515	0.00022	0.04825	0.00217	0.6	13.2	96.9	2.8
G96	75.6	10.9	0.50377	0.0079	0.06621	0.00077	0.0552	0.00083	0.2	1.7	413.3	9.3
G97	30.9	21.5	0.10255	0.00513	0.01555	0.00024	0.04785	0.00243	-0.4	-9.5	99.5	3.0
G99	8.2	9.5	10.39338	0.14768	0.45682	0.0054	0.16506	0.00221	1.9	3.3	2508.2	44.8
G100	36.9	20.3	0.0892	0.00399	0.0134	0.0002	0.04828	0.00219	1.2	24.2	85.8	2.5
G101	14.9	3.5	0.26094	0.00967	0.03762	0.00052	0.05032	0.00188	-1.1	-13.5	238.1	6.4
G102	6.6	2.2	0.27981	0.01435	0.04004	0.00062	0.0507	0.00264	-1.0	-11.4	253.1	7.7
G103	53.5	25.0	0.10145	0.0038	0.0153	0.00021	0.04811	0.00182	0.2	6.6	97.9	2.7
G105	18.7	7.2	0.09833	0.00578	0.01483	0.00025	0.04812	0.00288	0.3	9.8	94.9	3.1
G106	9.9	7.1	0.1945	0.00981	0.02683	0.00042	0.05259	0.0027	5.7	45.1	170.7	5.3
G107	9.3	7.8	0.49216	0.01715	0.06409	0.00088	0.05571	0.00196	1.5	9.1	400.4	10.6
G108	55.1	46.2	0.10144	0.00358	0.01526	0.0002	0.04823	0.00172	0.5	11.5	97.6	2.6
G109	16.3	7.6	0.26042	0.01263	0.03722	0.00058	0.05076	0.0025	-0.3	-2.4	235.6	7.2
G111	122.7	20.1	0.61014	0.00867	0.07766	0.00089	0.057	0.00076	0.3	1.8	482.1	10.7
G112	12.3	8.7	9.16922	0.12604	0.41949	0.0049	0.15858	0.00204	4.3	7.5	2440.6	43.3
G113	45.9	36.8	0.09246	0.00478	0.0144	0.00022	0.04659	0.00245	-2.5	- 226	92.1	2.9
G114	5.6	1.9	0.31838	0.0193	0.04458	0.00078	0.05181	0.0032	-0.2	-1.5	281.2	9.6
G115	17.0	11.4	0.50964	0.01261	0.06567	0.00082	0.0563	0.00139	2.0	11.6	410.0	9.9
G117	18.9	16.2	0.1004	0.00787	0.01511	0.0003	0.0482	0.00385	0.4	11.5	96.7	3.8
G118	50.2	17.4	0.51544	0.00932	0.06851	0.00081	0.05458	0.00096	-1.2	-8.1	427.2	9.7
G119	4.1	5.5	0.09883	0.02145	0.01498	0.00065	0.04787	0.01057	-0.1	-4.1	95.8	8.3
G120	9.4	5.0	0.48284	0.0231	0.06314	0.00099	0.05548	0.0027	1.3	8.5	394.7	12.0
G121	13.8	9.6	0.1177	0.01321	0.01777	0.00047	0.04805	0.0055	-0.4	-11.4	113.5	5.9
G122	5.2	3.0	0.25536	0.01849	0.03682	0.00067	0.05031	0.0037	-0.9	-11.3	233.1	8.4
G123	11.7	4.8	0.09823	0.00829	0.01496	0.0003	0.04765	0.00409	-0.6	-18.1	95.7	3.8
G124	20.6	11.8	0.13511	0.00641	0.01834	0.00028	0.05345	0.00258	9.9	66.4	117.1	3.5
G125	12.6	9.2	0.11295	0.00884	0.01706	0.00034	0.04805	0.00383	-0.3	-7.3	109.0	4.3
G126	42.9	14.9	0.10251	0.00451	0.01553	0.00023	0.04788	0.00213	-0.3	-7.8	99.4	2.9
G127	18.3	6.2	0.27564	0.0088	0.03957	0.00052	0.05053	0.00162	-1.2	-14.0	250.2	6.4
G128	12.7	4.8	0.2886	0.01229	0.03889	0.00057	0.05383	0.00233	4.7	32.4	246.0	7.1
G129	18.2	19.7	0.11768	0.00788	0.01654	0.00031	0.05161	0.00352	6.8	60.5	105.8	3.9
G130	15.6	9.0	0.10984	0.00661	0.01596	0.00027	0.04992	0.00306	3.6	46.6	102.1	3.4
G131	12.0	7.0	1.18744	0.02621	0.12906	0.0016	0.06675	0.00146	1.6	5.7	782.5	18.2
G132	8.0	3.4	0.51124	0.01893	0.06947	0.00097	0.05339	0.002	-3.1	-25.3	432.9	11.6
G133	10.8	7.4	0.1025	0.00991	0.01564	0.00034	0.04755	0.00467	-0.9	-31.4	100.0	4.4
G134	7.5	5.4	0.09412	0.01003	0.0142	0.00034	0.04809	0.00522	0.4	12.2	90.9	4.4
G135	25.8	9.2	0.1031	0.00555	0.01558	0.00025	0.048	0.00263	-0.1	-1.7	99.7	3.2
G136	43.2	13.7	0.10753	0.00407	0.01632	0.00022	0.04781	0.00183	-0.6	-17.6	104.3	2.8

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G137	41.7	15.4	0.10441	0.00393	0.01486	0.00021	0.05098	0.00194	6.0	60.4	95.1	2.6
G138	13.2	6.9	0.097	0.00649	0.01449	0.00026	0.04856	0.0033	1.4	26.9	92.7	3.2
G139	8.7	5.8	0.48951	0.01902	0.06769	0.00096	0.05247	0.00206	-4.2	-38.0	422.2	11.6
G140	18.7	14.2	0.26864	0.00931	0.0373	0.0005	0.05225	0.00183	2.3	20.3	236.1	6.3
G142	16.0	9.3	0.10231	0.0086	0.01532	0.00032	0.04845	0.00415	0.9	19.3	98.0	4.1
G143	27.6	24.1	0.0873	0.00505	0.01332	0.00022	0.04755	0.0028	-0.4	-11.9	85.3	2.8
G145	9.9	8.8	0.09129	0.01171	0.01396	0.0004	0.04746	0.0062	-0.7	-24.7	89.3	5.1
G146	8.6	0.0	5.31836	0.08336	0.32572	0.00389	0.11846	0.00178	3.0	6.0	1933.1	53.4
G147	70.7	2.5	0.09516	0.00272	0.0144	0.00018	0.04795	0.00138	0.2	3.9	92.1	2.3
G148	21.6	10.0	0.27574	0.01258	0.03929	0.00059	0.05092	0.00236	-0.4	-4.7	248.4	7.3
G149	12.8	8.9	0.41186	0.01267	0.05474	0.00072	0.05459	0.00169	1.9	13.1	343.6	8.8

Sample Q10

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G1	426	198	0.28778	0.00855	0.04033	0.00052	0.05176	0.00155	0.7	7.3	254.9	6.4
G2	173	400	4.93067	0.07918	0.31222	0.0037	0.11455	0.00178	3.2	6.5	1872.8	55.6
G3	273	280	0.25237	0.01324	0.03572	0.00054	0.05124	0.00272	1.0	10.1	226.3	6.7
G5	140	176	0.09759	0.0107	0.01442	0.00036	0.04909	0.00549	2.5	39.4	92.3	4.6
G6	210	243	0.27634	0.01149	0.03904	0.00056	0.05134	0.00217	0.3	3.7	246.9	7.0
G7	341	318	0.27819	0.0092	0.03939	0.00052	0.05123	0.00171	0.1	0.9	249.0	6.4
G8	236	147	0.28253	0.01342	0.03725	0.00058	0.05502	0.00266	7.2	42.9	235.8	7.2
G11	1334	687	0.10622	0.00353	0.01604	0.00021	0.04802	0.00161	-0.1	-3.5	102.6	2.7
G12	722	232	1.41892	0.02719	0.13673	0.00164	0.07527	0.00142	8.6	23.2	826.2	18.6
G13	520	314	0.27461	0.0093	0.03821	0.00051	0.05213	0.00178	1.9	17.0	241.7	6.3
G14	715	244	0.52258	0.01251	0.06804	0.00083	0.05571	0.00133	0.6	3.7	424.4	10.1
G15	426	298	0.11379	0.00612	0.01684	0.00027	0.049	0.00268	1.6	27.3	107.7	3.4
G16	674	373	0.13725	0.00529	0.01983	0.00027	0.05021	0.00196	3.2	38.2	126.6	3.5
G17	451	265	0.09465	0.00556	0.01433	0.00024	0.04791	0.00287	0.1	2.2	91.7	3.0
G18	525	206	0.10223	0.00672	0.01548	0.00028	0.04791	0.00321	-0.2	-5.9	99.0	3.5
G20	57	46	1.60988	0.05365	0.16279	0.00231	0.07173	0.00243	0.2	0.6	972.3	25.6
G21	229	157	0.10853	0.00651	0.01585	0.00026	0.04967	0.00303	3.2	43.5	101.4	3.4
G22	284	147	0.11739	0.00755	0.01733	0.00031	0.04913	0.00322	1.7	28.0	110.8	3.9
G23	427	218	0.1066	0.00616	0.01616	0.00027	0.04786	0.00281	-0.4	-13.0	103.3	3.4
G24	1753	290	0.27877	0.00499	0.03953	0.00046	0.05115	0.00089	-0.1	-0.9	249.9	5.7
G25	850	250	0.12475	0.00377	0.01869	0.00024	0.04842	0.00147	0.0	0.2	119.4	3.0
G26	217	176	0.10125	0.00726	0.01467	0.00027	0.05005	0.00365	4.3	52.4	93.9	3.4
G27	408	183	3.08366	0.04569	0.24848	0.00287	0.09002	0.00127	-0.1	-0.3	1425.8	53.5
G29	1459	1149	0.09061	0.004	0.01372	0.0002	0.0479	0.00215	0.2	5.5	87.9	2.5
G31	709	58	0.55529	0.01055	0.0721	0.00085	0.05587	0.00104	-0.1	-0.5	448.8	10.2
G32	1577	811	0.25152	0.00569	0.03619	0.00043	0.05042	0.00113	-0.6	-7.0	229.2	5.4
G33	254	247	0.24507	0.01125	0.03486	0.00052	0.051	0.00238	0.8	8.2	220.9	6.5
G34	165	103	0.11924	0.00957	0.01789	0.00036	0.04834	0.00395	0.1	1.5	114.3	4.5
G35	260	225	0.28042	0.00998	0.03911	0.00053	0.05201	0.00187	1.5	13.4	247.3	6.6
G36	615	362	0.53255	0.01072	0.06936	0.00082	0.05569	0.00111	0.3	1.7	432.3	9.9
G37	708	271	0.09965	0.00442	0.01498	0.00022	0.04827	0.00217	0.7	14.8	95.8	2.8
G38	1068	332	0.54064	0.0122	0.06917	0.00084	0.05669	0.00127	1.8	10.0	431.2	10.1
G39	80	157	0.0982	0.01547	0.01496	0.00049	0.04761	0.00763	-0.6	-21.0	95.7	6.2
G40	162	173	0.27885	0.02312	0.03936	0.00085	0.05139	0.00435	0.4	3.7	248.8	10.6
G41	484	481	0.09186	0.00678	0.01394	0.00025	0.04781	0.00358	0.0	-0.6	89.2	3.2
G42	355	92	0.49674	0.01256	0.06463	0.0008	0.05575	0.00141	1.4	8.7	403.7	9.7
G43	193	131	6.96489	0.10345	0.38747	0.00453	0.13039	0.00185	-0.2	-0.4	2103.2	49.5
G44	270	142	0.30869	0.01078	0.04288	0.00058	0.05222	0.00184	1.0	8.3	270.6	7.1
G45	1706	1275	0.59895	0.0092	0.07647	0.00088	0.05682	0.00084	0.3	1.8	475.0	10.5
G46	204	180	0.10812	0.00765	0.01633	0.0003	0.04803	0.00346	-0.2	-3.9	104.4	3.7
G47	487	76	2.82817	0.04165	0.22509	0.00259	0.09114	0.00128	4.1	9.7	1449.4	53.0
G48	307	92	0.28653	0.00947	0.04113	0.00054	0.05053	0.00168	-1.5	-18.4	259.8	6.7
G49	128	71	0.28852	0.01466	0.03933	0.00062	0.05322	0.00275	3.5	26.4	248.7	7.7
G51	790	298	0.53997	0.01002	0.06981	0.00082	0.05611	0.00102	0.8	4.7	435.0	9.9
G52	936	328	0.10025	0.0036	0.01489	0.0002	0.04884	0.00177	1.8	31.9	95.3	2.5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G53	443	291	0.52371	0.01167	0.06776	0.00082	0.05606	0.00124	1.2	7.0	422.6	9.9
G55	919	380	0.11143	0.00477	0.01672	0.00024	0.04835	0.0021	0.4	8.3	106.9	3.0
G56	412	89	4.77008	0.07679	0.30512	0.00362	0.1134	0.00177	3.7	7.4	1854.6	55.9
G57	512	213	0.28791	0.00935	0.03908	0.00052	0.05344	0.00175	4.0	28.9	247.1	6.4
G58	306	86	0.1962	0.01155	0.02831	0.00046	0.05027	0.00301	1.1	13.3	180.0	5.8
G59	394	228	0.10272	0.00528	0.01542	0.00024	0.04832	0.00253	0.7	14.4	98.6	3.0
G60	285	330	0.09084	0.00621	0.01362	0.00025	0.04837	0.00337	1.3	25.7	87.2	3.2
G61	1535	157	1.27274	0.01845	0.13238	0.00151	0.06974	0.00096	4.0	12.9	801.4	17.2
G62	1180	447	0.09165	0.0044	0.01384	0.00021	0.04802	0.00235	0.5	11.8	88.6	2.7
G64	306	39	0.48401	0.01291	0.06408	0.0008	0.05478	0.00147	0.1	0.7	400.4	9.7
G65	246	234	0.27852	0.01225	0.03821	0.00057	0.05288	0.00236	3.2	25.3	241.7	7.0
G67	178	196	0.26909	0.02085	0.03601	0.00076	0.0542	0.00429	6.1	39.9	228.1	9.4
G68	241	101	0.11002	0.00906	0.01627	0.00034	0.04906	0.00412	1.9	30.9	104.0	4.3
G69	567	184	0.13268	0.00592	0.01891	0.00028	0.05089	0.00231	4.7	48.8	120.8	3.5
G70	128	79	0.26697	0.02301	0.03727	0.00083	0.05196	0.00457	1.9	16.8	235.9	10.3
G71	136	163	0.09444	0.01026	0.01433	0.00036	0.04779	0.00529	-0.1	-4.3	91.7	4.6
G72	85	122	0.09504	0.01347	0.01438	0.00042	0.04793	0.00691	0.1	2.8	92.1	5.3
G73	337122	7	0.31591	0.00935	0.04373	0.00056	0.0524	0.00156	1.1	8.9	275.9	6.9
G76	320	242	0.2715	0.00928	0.03886	0.00052	0.05068	0.00175	-0.8	-8.7	245.8	6.4
G77	276	184	0.28805	0.01015	0.04051	0.00055	0.05158	0.00184	0.4	4.1	256.0	6.8
G78	1224	853	0.10453	0.003	0.01565	0.0002	0.04846	0.0014	0.9	18.0	100.1	2.5
G79	66	94	0.26624	0.02374	0.03829	0.00084	0.05043	0.00458	-1.0	-12.7	242.2	10.4
G80	264	150	0.12277	0.00665	0.01812	0.00029	0.04916	0.00271	1.6	25.5	115.7	3.6
G81	621	186	0.85415	0.01516	0.0979	0.00115	0.06328	0.0011	4.1	16.1	602.1	13.5
G82	469	145	4.95367	0.06924	0.31524	0.00362	0.11398	0.00151	2.6	5.2	1863.9	47.3
G84	514	420	0.25635	0.01235	0.0352	0.00054	0.05283	0.00259	3.9	30.6	223.0	6.7
G86	301	58	0.5601	0.01787	0.06702	0.00089	0.06062	0.00195	8.0	33.2	418.2	10.7
G87	312	282	0.2653	0.01121	0.0379	0.00052	0.05077	0.00217	-0.4	-4.0	239.8	6.5
G88	146	195	0.1029	0.0092	0.01556	0.00032	0.04797	0.00436	0.0	-2.9	99.5	4.0
G89	723	838	0.10048	0.00441	0.01526	0.00022	0.04777	0.00213	-0.4	-12.4	97.6	2.8
G90	931	103	4.7497	0.06313	0.30919	0.00351	0.11143	0.00138	2.3	4.7	1822.8	44.8
G91	435	186	0.38303	0.00991	0.05189	0.00064	0.05354	0.00139	1.0	7.3	326.1	7.9
G92	721	769	0.2452	0.01377	0.03625	0.00059	0.04906	0.0028	-3.0	-52.3	229.6	7.3
G93	614	451	0.26534	0.0108	0.03733	0.00052	0.05155	0.00212	1.1	11.0	236.3	6.4
G95	377	177	0.2667	0.01481	0.0374	0.00061	0.05172	0.00292	1.4	13.4	236.7	7.6
G96	1402	449	0.27968	0.00552	0.03898	0.00046	0.05205	0.00101	1.6	14.2	246.5	5.7
G98	579	319	0.26857	0.00697	0.03885	0.00048	0.05014	0.0013	-1.7	-21.8	245.7	6.0
G99	711	122	0.52063	0.01486	0.06787	0.00087	0.05564	0.0016	0.5	3.3	423.3	10.5
G100	518	164	0.54259	0.01875	0.06899	0.00094	0.05705	0.002	2.3	12.7	430.1	11.4
G101	334	134	0.10153	0.00661	0.0151	0.00027	0.04877	0.00324	1.7	29.5	96.6	3.4
G103	471	289	0.08464	0.00527	0.01291	0.00022	0.04757	0.00302	-0.2	-7.4	82.7	2.8
G104	450	251	0.53536	0.01481	0.06987	0.00089	0.05558	0.00154	0.0	0.0	435.4	10.7
G105	142	183	0.26994	0.01355	0.03866	0.0006	0.05064	0.00258	-0.8	-8.9	244.5	7.5
G106	325	121	0.27568	0.00918	0.03947	0.00052	0.05066	0.0017	-0.9	-10.6	249.5	6.5
G107	7127	4904	0.09052	0.00163	0.01338	0.00016	0.04908	0.00086	2.7	43.5	85.7	2.0
G108	182	139	0.52948	0.01797	0.07022	0.00095	0.0547	0.00188	-1.4	-9.3	437.5	11.4
G109	76	122	0.10325	0.01381	0.01478	0.00041	0.05066	0.00689	5.5	58.0	94.6	5.2
G110	548	322	0.44562	0.01047	0.05978	0.00073	0.05407	0.00127	0.0	-0.1	374.3	8.9
G111	547	297	0.11036	0.00682	0.01642	0.00028	0.04875	0.00307	1.2	22.8	105.0	3.6
G113	506	43	0.54503	0.01183	0.07167	0.00086	0.05516	0.00119	-1.0	-6.6	446.2	10.4
G114	199	120	0.08501	0.00758	0.01296	0.00028	0.04757	0.00432	-0.2	-7.4	83.0	3.5
G115	124	92	0.60731	0.02215	0.0762	0.00106	0.05781	0.00214	1.8	9.4	473.4	12.8
G116	973	767	0.26402	0.00696	0.03627	0.00045	0.0528	0.00139	3.6	28.3	229.7	5.6
G117	656	380	0.09635	0.00383	0.01461	0.0002	0.04785	0.00192	-0.1	-3.0	93.5	2.6
G118	319	196	0.53952	0.0138	0.06996	0.00087	0.05594	0.00143	0.5	3.1	435.9	10.5
G119	738	433	0.1021	0.00372	0.01512	0.0002	0.04899	0.0018	2.1	34.3	96.7	2.6
G120	670	335	0.10517	0.00433	0.01563	0.00022	0.04882	0.00204	1.6	28.3	99.9	2.8
G122	289	120	0.10181	0.00675	0.01554	0.00027	0.04752	0.00321	-1.0	-32.7	99.4	3.4
G123	1287	333	0.2676	0.0067	0.0371	0.00045	0.05232	0.00131	2.6	21.6	234.8	5.7
G124	825	1510	0.41475	0.01388	0.05565	0.00075	0.05406	0.00183	0.9	6.5	349.1	9.1
G125	468	322	0.12987	0.00529	0.01951	0.00027	0.04829	0.00199	-0.5	-10.0	124.6	3.5

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G126	122	118	0.10484	0.0106	0.01544	0.00035	0.04926	0.00507	2.4	38.4	98.8	4.5
G127	205	198	0.11057	0.00934	0.01669	0.00035	0.04806	0.00414	-0.2	-4.4	106.7	4.4
G128	744	69	1.64398	0.02813	0.15042	0.00177	0.07927	0.00132	9.3	23.4	903.3	19.8
G129	311	314	0.09896	0.00548	0.01496	0.00024	0.04798	0.0027	0.1	1.6	95.7	3.0
G130	1343	508	0.10111	0.00337	0.01532	0.0002	0.04786	0.00161	-0.2	-7.1	98.0	2.5
G132	328	100	0.51557	0.01322	0.06807	0.00085	0.05494	0.00141	-0.5	-3.6	424.5	10.2
G133	189	99	0.52083	0.01668	0.069	0.00091	0.05475	0.00177	-1.0	-7.0	430.2	11.0
G134	983	638	0.30312	0.01272	0.03904	0.00057	0.05633	0.0024	8.9	46.8	246.9	7.1
G135	691	405	0.28718	0.00686	0.03991	0.00049	0.05219	0.00124	1.6	14.2	252.3	6.0
G136	783	287	0.1408	0.00859	0.01956	0.00034	0.05222	0.00325	7.1	57.7	124.9	4.3
G137	225	92	0.10919	0.00788	0.01649	0.00031	0.04803	0.00353	-0.2	-4.6	105.4	3.9
G138	901	414	0.10127	0.00326	0.01528	0.0002	0.04808	0.00156	0.2	5.2	97.7	2.5
G139	289	280	0.20606	0.01369	0.02977	0.00052	0.05021	0.00339	0.6	7.6	189.1	6.5
G140	642	381	0.27226	0.00838	0.03812	0.00049	0.05181	0.00161	1.4	12.9	241.2	6.1
G141	1797	724	0.09163	0.00298	0.01387	0.00018	0.04791	0.00157	0.2	5.4	88.8	2.3
G142	98	58	0.37356	0.02714	0.0511	0.00101	0.05303	0.00393	0.3	2.6	321.3	12.4
G143	433	394	0.09873	0.01188	0.01473	0.00038	0.04863	0.00596	1.5	27.6	94.2	4.9
G144	310	193	0.2708	0.01328	0.03762	0.00059	0.05222	0.00261	2.2	19.3	238.0	7.3
G146	539	307	7.91588	0.10498	0.39854	0.00454	0.14407	0.00179	2.7	5.0	2276.7	42.4
G147	437	423	0.26027	0.00738	0.03668	0.00046	0.05147	0.00147	1.2	11.3	232.2	5.8
G148	163	141	0.24943	0.01587	0.03551	0.00063	0.05095	0.0033	0.5	5.7	224.9	7.9
G149	672	335	0.10103	0.00411	0.01512	0.00021	0.04846	0.002	0.9	20.6	96.8	2.7
G150	658	319	0.10855	0.00533	0.0164	0.00025	0.048	0.0024	-0.3	-7.0	104.9	3.2

Sample Q11

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G2	283	183	8.84228	0.13409	0.40936	0.00504	0.15676	0.0022	5.0	8.6	2421.1	47.1
G4	93	73	0.29862	0.01905	0.04013	0.00073	0.05401	0.00351	4.6	31.7	253.6	9.1
G5	482	172	0.1138	0.00471	0.01721	0.00025	0.04798	0.002	-0.5	-13.2	110.0	3.2
G6	446	467	0.12945	0.00732	0.01805	0.00029	0.05206	0.00298	7.2	60.0	115.3	3.6
G7	508	367	0.09181	0.00411	0.0139	0.00021	0.04792	0.00217	0.2	5.7	89.0	2.6
G8	514	293	0.09428	0.00537	0.01417	0.00024	0.04829	0.00279	0.9	20.0	90.7	3.0
G10	646	396	0.21582	0.00609	0.03062	0.0004	0.05116	0.00143	2.1	21.5	194.4	5.0
G12	721	585	0.11226	0.00495	0.01664	0.00025	0.04896	0.00218	1.5	27.1	106.4	3.2
G13	936	67	0.41559	0.00931	0.05384	0.00068	0.05602	0.00123	4.4	25.3	338.1	8.3
G14	387	143	6.14151	0.09024	0.35346	0.00429	0.1261	0.00169	2.3	4.6	2044.3	47.1
G16	641	304	0.10635	0.004	0.01591	0.00022	0.04852	0.00183	0.9	18.4	101.7	2.8
G17	591	175	0.28735	0.00734	0.03932	0.00051	0.05304	0.00134	3.2	24.7	248.6	6.3
G23	296	277	0.10658	0.00737	0.01531	0.00028	0.05052	0.00355	5.0	55.3	97.9	3.6
G24	589	507	0.08976	0.0042	0.01309	0.0002	0.04977	0.00236	4.2	54.5	83.8	2.5
G25	140	78	0.08732	0.00829	0.01333	0.00028	0.04756	0.00458	-0.4	-11.4	85.3	3.6
G27	348	258	0.0939	0.00637	0.01423	0.00026	0.04788	0.0033	0.0	1.1	91.1	3.3
G30	320	178	0.10395	0.00686	0.01577	0.00028	0.04783	0.00321	-0.5	-12.2	100.9	3.6
G31	1022	392	0.08798	0.00311	0.01336	0.00018	0.04779	0.0017	0.0	2.8	85.6	2.3
G33	763	492	0.10373	0.00501	0.01459	0.00023	0.0516	0.00253	7.3	65.1	93.4	2.9
G34	377	259	0.53525	0.01281	0.06895	0.00088	0.05634	0.00133	1.3	7.6	429.8	10.7
G35	1605	665	0.10731	0.00341	0.015	0.0002	0.05191	0.00165	7.8	65.9	96.0	2.6
G37	276	95	0.1117	0.00671	0.01682	0.00029	0.0482	0.00294	0.0	1.6	107.5	3.6
G39	1671	751	0.29079	0.0056	0.04017	0.0005	0.05254	0.00097	2.1	17.8	253.9	6.1
G40	1004	394	0.10905	0.00348	0.01642	0.00022	0.04821	0.00154	0.1	4.2	105.0	2.8
G41	213	101	11.1409	0.17027	0.48702	0.00603	0.16602	0.00235	-0.9	-1.6	2517.9	47.1
G42	1489	543	0.10994	0.00333	0.01565	0.00021	0.05097	0.00154	5.8	58.2	100.1	2.7
G43	1406	586	0.29009	0.00577	0.04096	0.00051	0.0514	0.00099	-0.1	0.0	258.8	6.3
G44	1001	549	0.10359	0.00343	0.01562	0.00021	0.04812	0.00159	0.2	5.1	99.9	2.7
G46	638	320	0.30181	0.01137	0.0413	0.0006	0.05304	0.00201	2.6	21.0	260.9	7.4
G48	421	242	0.10067	0.00588	0.01479	0.00025	0.04939	0.00293	2.9	43.1	94.7	3.2
G49	538	325	0.10285	0.00455	0.01589	0.00024	0.04698	0.0021	-2.2	-112	101.6	3.0
G51	421	228	0.50556	0.01399	0.07243	0.00092	0.05066	0.00138	-7.8	-100	450.8	11.1
G52	654	451	0.11012	0.00547	0.01599	0.00025	0.04998	0.00252	3.7	47.2	102.3	3.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G53	99	49	1.12373	0.03671	0.12311	0.00176	0.06625	0.00218	2.2	8.1	748.4	20.2
G54	483	89	0.28582	0.00832	0.04045	0.00054	0.05129	0.00149	-0.1	-0.7	255.6	6.6
G55	524	148	0.10165	0.00447	0.01502	0.00022	0.04912	0.00218	2.3	37.4	96.1	2.8
G57	758	379	0.11126	0.00398	0.01619	0.00023	0.04987	0.00179	3.5	45.2	103.5	2.9
G58	329	314	2.59678	0.04371	0.21415	0.00264	0.08801	0.0014	3.9	9.5	1382.6	60.3
G60	620	490	0.09259	0.00396	0.01371	0.0002	0.049	0.00212	2.4	40.6	87.8	2.6
G61	1608	1314	0.08839	0.00311	0.01347	0.00019	0.04762	0.00168	-0.3	-8.3	86.3	2.4
G62	950	456	0.10627	0.00438	0.01579	0.00023	0.04885	0.00203	1.6	28.2	101.0	2.9
G63	513	311	0.0887	0.00615	0.0129	0.00025	0.0499	0.00352	4.5	56.6	82.6	3.1
G64	1521	702	0.10844	0.00292	0.01626	0.00021	0.04841	0.00129	0.5	13.0	104.0	2.7
G65	634	588	0.27557	0.00727	0.03971	0.00051	0.05036	0.00132	-1.6	-18.5	251.0	6.4
G66	633	659	0.10689	0.00513	0.01607	0.00025	0.04828	0.00234	0.3	8.9	102.8	3.2
G67	193	117	0.12935	0.01007	0.01846	0.00037	0.05085	0.00403	4.7	49.7	117.9	4.7
G68	700	505	0.10916	0.00396	0.01633	0.00023	0.04852	0.00177	0.8	16.4	104.4	2.9
G69	185	127	0.11314	0.01342	0.01596	0.00044	0.05144	0.00622	6.6	60.8	102.1	5.6
G70	497	325	0.12943	0.00545	0.01862	0.00027	0.05046	0.00215	4.0	45.0	118.9	3.5
G71	786	143	5.02599	0.07199	0.31645	0.00381	0.11527	0.0015	2.9	5.9	1884.0	46.4
G72	245	165	0.09617	0.00673	0.01376	0.00026	0.05071	0.00361	5.8	61.3	88.1	3.3
G73	373	162	0.11935	0.00603	0.01831	0.00029	0.0473	0.00242	-2.1	-83.4	117.0	3.6
G74	750	275	0.11363	0.00405	0.01634	0.00023	0.05048	0.00181	4.6	51.8	104.5	2.9
G75	506	414	0.26758	0.00893	0.03684	0.00051	0.05272	0.00177	3.3	26.3	233.2	6.3
G76	461	103	0.11051	0.00581	0.01668	0.00027	0.04809	0.00256	-0.2	-2.7	106.6	3.4
G77	305	276	0.11194	0.00904	0.01683	0.00034	0.04828	0.00397	0.1	4.9	107.6	4.4
G78	571	261	0.10142	0.00472	0.01515	0.00023	0.04859	0.00229	1.2	24.4	96.9	2.9
G79	539	199	0.54458	0.01236	0.07045	0.00089	0.0561	0.00125	0.6	3.7	438.9	10.8
G80	1482	743	0.09987	0.00404	0.01481	0.00022	0.04895	0.002	2.0	34.8	94.8	2.7
G81	883	656	0.10451	0.00379	0.01549	0.00022	0.04896	0.00179	1.8	32.0	99.1	2.7
G83	358	139	0.10894	0.00607	0.01639	0.00027	0.04824	0.00272	0.2	5.6	104.8	3.4
G85	334	177	0.3076	0.01373	0.04158	0.00064	0.05368	0.00243	3.7	26.6	262.6	7.9
G86	1001	353	0.5516	0.01028	0.07099	0.00087	0.05639	0.001	0.9	5.3	442.1	10.5
G88	740	328	0.1085	0.00438	0.01626	0.00024	0.04843	0.00197	0.6	13.5	104.0	3.0
G89	715	251	0.09982	0.00417	0.01513	0.00022	0.04789	0.00202	-0.2	-4.3	96.8	2.8
G90	348	384	0.09889	0.00763	0.01512	0.0003	0.04746	0.00373	-1.1	-35.2	96.8	3.8
G91	439	603	0.24891	0.00994	0.03588	0.00052	0.05035	0.00203	-0.7	-7.6	227.2	6.5
G92	99	75	0.29894	0.0257	0.03875	0.00088	0.05599	0.00491	8.4	45.7	245.1	10.9
G93	1148	757	0.08492	0.00323	0.01282	0.00018	0.04808	0.00184	0.9	20.4	82.1	2.3
G96	213	280	0.1021	0.00837	0.01473	0.0003	0.05029	0.00419	4.7	54.8	94.3	3.8
G97	242	286	0.43552	0.01796	0.05695	0.00086	0.0555	0.00231	2.8	17.3	357.1	10.5
G99	387	376	0.25426	0.00946	0.03601	0.00051	0.05125	0.00192	0.9	9.6	228.0	6.4
G100	270	115	0.11138	0.00711	0.01618	0.00029	0.04996	0.00324	3.6	46.4	103.5	3.7
G101	350	128	9.58506	0.14954	0.44939	0.00558	0.1548	0.00225	0.1	0.3	2399.6	48.9
G102	391	295	0.10442	0.00938	0.01455	0.00033	0.05209	0.00477	8.3	67.8	93.1	4.2
G104	1220	718	0.0875	0.00288	0.01282	0.00017	0.04954	0.00163	3.8	52.7	82.1	2.2
G106	680	578	0.82682	0.01565	0.10222	0.00126	0.0587	0.00106	-2.5	-12.8	627.4	14.8
G107	219	120	0.59835	0.01813	0.07212	0.00099	0.06021	0.00183	6.1	26.6	448.9	11.9
G108	103	64	2.79041	0.06727	0.22769	0.00308	0.08894	0.00212	2.3	5.7	1402.9	90.0
G110	1270	291	0.30421	0.00613	0.04289	0.00053	0.05148	0.001	-0.4	-3.2	270.7	6.6
G111	356	173	0.10558	0.00591	0.01703	0.00028	0.04499	0.00255	-6.4	-1088	108.9	3.5
G112	1078	762	0.10672	0.00375	0.01609	0.00022	0.04813	0.0017	0.1	2.6	102.9	2.8
G113	413	284	0.57037	0.01641	0.07596	0.00101	0.05449	0.00156	-2.9	-20.6	472.0	12.2
G114	972	473	0.10831	0.00429	0.0161	0.00023	0.04884	0.00195	1.5	26.5	102.9	2.9
G115	386	306	0.09247	0.00594	0.0133	0.00024	0.05045	0.0033	5.4	60.5	85.2	3.0
G116	643	213	0.52325	0.0113	0.06804	0.00086	0.05581	0.00117	0.7	4.6	424.3	10.3
G117	472	324	0.2782	0.00939	0.03762	0.00052	0.05366	0.00182	4.7	33.3	238.1	6.5
G118	1984	651	0.09762	0.00269	0.01479	0.00019	0.04792	0.00131	0.0	-0.6	94.6	2.4
G119	858	350	0.10566	0.00392	0.01548	0.00022	0.04954	0.00185	3.0	42.9	99.0	2.8
G121	292	119	0.11098	0.00742	0.01623	0.0003	0.04963	0.00337	3.0	41.6	103.8	3.8
G122	156	86	1.53449	0.03746	0.15537	0.00205	0.07168	0.00173	1.4	4.7	931.0	22.9
G123	794	301	0.10898	0.00515	0.01642	0.00025	0.04818	0.0023	0.0	2.9	105.0	3.2
G124	290	208	0.10901	0.00774	0.01572	0.0003	0.05034	0.00364	4.6	52.3	100.5	3.8
G125	623	295	0.2735	0.00735	0.03835	0.0005	0.05176	0.00138	1.2	11.8	242.6	6.2

	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	% disc. 5/8	% disc. 7/6	Best Age [Ma]	2 s
G126	445	518	0.26922	0.01148	0.03939	0.00059	0.04961	0.00214	-2.8	-41.0	249.0	7.3
G129	126	76	0.31453	0.01716	0.04405	0.00073	0.05182	0.00287	-0.1	-0.1	277.9	9.1
G130	922	492	0.11655	0.00445	0.01608	0.00023	0.05262	0.00202	8.9	67.1	102.8	2.9
G132	758	72	4.86103	0.06974	0.30425	0.00367	0.11595	0.00151	4.9	9.6	1894.8	46.5
G133	644	494	0.10815	0.00421	0.01633	0.00023	0.04808	0.00189	-0.1	-1.1	104.4	3.0
G134	689	893	0.19322	0.00559	0.02815	0.00037	0.04981	0.00143	0.2	3.9	179.0	4.7
G135	1213	457	0.10003	0.0033	0.01508	0.0002	0.04815	0.00159	0.3	9.7	96.5	2.6
G136	579	282	0.10906	0.00488	0.01594	0.00024	0.04967	0.00225	3.1	43.3	101.9	3.1
G137	400	244	0.09816	0.00689	0.01488	0.00028	0.04788	0.00342	-0.1	-3.1	95.2	3.5
G138	600	517	0.10136	0.00539	0.0153	0.00025	0.04809	0.00259	0.1	5.4	97.9	3.2
G139	155	98	0.11069	0.01122	0.01675	0.00039	0.04797	0.00494	-0.5	-10.9	107.1	4.9
G141	636	320	0.11193	0.00442	0.01643	0.00024	0.04943	0.00197	2.5	37.6	105.1	3.0
G142	274	126	0.10058	0.00811	0.01508	0.00031	0.04841	0.00397	0.8	19.2	96.5	4.0
G143	328	156	0.47288	0.01345	0.06287	0.00083	0.05459	0.00155	0.0	0.6	393.1	10.1
G144	902	543	0.10531	0.00525	0.01582	0.00025	0.04832	0.00244	0.5	11.8	101.2	3.2
G145	614	433	0.10338	0.00498	0.01517	0.00024	0.04945	0.00242	2.9	42.7	97.1	3.0
G146	1246	520	0.11212	0.00406	0.0159	0.00022	0.05116	0.00186	6.1	59.0	101.7	2.8
G147	624	374	0.17369	0.00585	0.02496	0.00034	0.05051	0.00171	2.3	27.3	158.9	4.3
G148	402	257	0.09149	0.00752	0.01323	0.00028	0.05017	0.0042	4.8	58.2	84.8	3.6
G149	1218	799	0.0968	0.0047	0.01456	0.00023	0.04826	0.00237	0.6	16.8	93.2	2.9
G150	340	175	0.29831	0.01327	0.03961	0.00061	0.05466	0.00246	5.9	37.1	250.4	7.6

iii) GRANITE AGES FOR CHAPTER 5

Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
08-05-15-10	3161	1542	0.10219	0.0027	0.01528	0.00019	0.0485	0.00128	97.8	1.22
08-05-15-10	35905	9487	0.09301	0.0017	0.01354	0.00016	0.04981	0.00088	86.7	1.02
08-05-15-10	858	396	0.09708	0.00353	0.01444	0.0002	0.04876	0.00179	92.4	1.26
08-05-15-10	3404	1534	0.10135	0.00269	0.01477	0.00019	0.04977	0.00132	94.5	1.19
08-05-15-10	6430	3311	0.09629	0.00226	0.01425	0.00018	0.04902	0.00114	91.2	1.12
08-05-15-10	5534	2507	0.09949	0.00248	0.01404	0.00018	0.0514	0.00127	89.9	1.12
08-05-15-10	7415	4821	0.09779	0.00277	0.01395	0.00018	0.05086	0.00144	89.3	1.14
08-05-15-10	5164	2629	0.09309	0.00199	0.01389	0.00017	0.04861	0.00102	88.9	1.07
08-05-15-10	5986	2620	0.10651	0.00268	0.01474	0.00019	0.0524	0.00131	94.4	1.18
08-05-15-10	579	265	0.10274	0.00637	0.01429	0.00026	0.05215	0.0033	91.5	1.63
Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
15-03-15-29	3274	945	0.10786	0.00338	0.01558	0.00021	0.05022	0.00158	99.7	1.31
15-03-15-29	999	296	0.10647	0.00391	0.01505	0.00021	0.0513	0.0019	96.3	1.33
15-03-15-29	1337	524	0.13854	0.00596	0.01923	0.00029	0.05227	0.00228	122.8	1.82
15-03-15-29	1219	348	0.10459	0.00409	0.0151	0.00022	0.05025	0.00199	96.6	1.37
15-03-15-29	299	94	0.11087	0.00616	0.01563	0.00026	0.05144	0.00291	100	1.64
15-03-15-29	9587	4414	0.09933	0.00249	0.01437	0.00018	0.05014	0.00125	92	1.15
15-03-15-29	1305	394	0.10898	0.00331	0.01605	0.00021	0.04924	0.0015	102.7	1.33
15-03-15-29	776	215	0.11021	0.00411	0.01615	0.00022	0.04949	0.00186	103.3	1.43
15-03-15-29	10681	3458	0.10031	0.00247	0.01469	0.00018	0.04952	0.0012	94	1.17
15-03-15-29	2046	913	0.10524	0.00287	0.01583	0.0002	0.04823	0.00131	101.3	1.28
15-03-15-29	2134	1057	0.10311	0.00355	0.01486	0.0002	0.05032	0.00174	95.1	1.29
15-03-15-29	1955	713	0.11004	0.0036	0.0154	0.00021	0.05182	0.0017	98.5	1.32
Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
11-05-15-29	294	257	0.12093	0.00921	0.01718	0.00035	0.05108	0.00397	109.8	2.21
11-05-15-29	237	151	0.1157	0.00963	0.01777	0.00037	0.04723	0.004	113.6	2.32
11-05-15-29	251	133	0.12078	0.00954	0.01757	0.00036	0.04987	0.00402	112.3	2.3
11-05-15-29	497	240	0.12104	0.00721	0.01759	0.00031	0.04993	0.00303	112.4	1.94
11-05-15-29	439	436	0.12275	0.00889	0.01713	0.00034	0.05199	0.00384	109.5	2.17
11-05-15-29	236	135	0.11305	0.00992	0.01691	0.00037	0.04851	0.00433	108.1	2.32
11-05-15-29	457	243	0.11348	0.00737	0.01658	0.0003	0.04967	0.00328	106	1.92
11-05-15-29	413	134	4.82364	0.0985	0.31081	0.00385	0.11259	0.00222	1841.7	35.35
11-05-15-29	341	244	0.11994	0.00847	0.01767	0.00034	0.04925	0.00354	112.9	2.13
11-05-15-29	159	87	0.12589	0.01382	0.01764	0.00047	0.05179	0.00581	112.7	2.98
11-05-15-29	342	112	0.12418	0.01	0.01786	0.00038	0.05043	0.00414	114.1	2.4
11-05-15-29	259	174	0.11556	0.00933	0.01798	0.00037	0.04662	0.00383	114.9	2.32
11-05-15-29	208	144	0.128	0.00874	0.01802	0.00033	0.05154	0.00358	115.1	2.09
11-05-15-29	482	212	0.27406	0.00975	0.03604	0.00051	0.05517	0.00197	228.2	3.15
11-05-15-29	293	237	0.12623	0.00707	0.01788	0.0003	0.05123	0.00291	114.2	1.88
11-05-15-29	230	140	0.12791	0.00824	0.01833	0.00033	0.05062	0.00331	117.1	2.07
11-05-15-29	806	603	0.12073	0.00504	0.01794	0.00026	0.04882	0.00206	114.6	1.66
11-05-15-29	199	150	0.12481	0.0087	0.01859	0.00035	0.04871	0.00345	118.7	2.19
11-05-15-29	454	196	0.12906	0.00606	0.01903	0.00029	0.0492	0.00234	121.5	1.85
Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
16-03-15-31	761	707	0.10492	0.00439	0.01629	0.00024	0.04673	0.00197	104.2	1.5
16-03-15-31	415	196	0.11524	0.00631	0.01618	0.00027	0.05167	0.00287	103.5	1.7
16-03-15-31	609	419	0.11042	0.00504	0.01701	0.00026	0.0471	0.00217	108.7	1.62
16-03-15-31	508	443	0.11005	0.00642	0.01577	0.00027	0.05062	0.003	100.9	1.72
16-03-15-31	560	385	0.11036	0.00518	0.01668	0.00025	0.04799	0.00227	106.7	1.61
16-03-15-31	433	279	0.11871	0.0101	0.01703	0.00038	0.05058	0.00439	108.8	2.38
16-03-15-31	591	363	0.11161	0.00514	0.01655	0.00025	0.04894	0.00228	105.8	1.59
16-03-15-31	496	382	0.11153	0.00551	0.01612	0.00025	0.05021	0.00251	103.1	1.61
16-03-15-31	774	715	0.11271	0.00494	0.01637	0.00025	0.04995	0.00221	104.7	1.56
16-03-15-31	671	565	0.1114	0.00503	0.01653	0.00025	0.04891	0.00223	105.7	1.58
16-03-15-31	516	321	0.10734	0.00559	0.0162	0.00026	0.04807	0.00253	103.6	1.64
16-03-15-31	533	350	0.10791	0.00553	0.01684	0.00026	0.04648	0.00241	107.7	1.68

Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
16-03-15-31	299	230	0.11591	0.0073	0.01727	0.0003	0.04869	0.00311	110.4	1.93
16-03-15-31	792	715	0.10974	0.00469	0.01666	0.00024	0.04779	0.00205	106.5	1.55
16-03-15-31	431	319	0.10681	0.00598	0.01677	0.00027	0.04621	0.00261	107.2	1.74
16-03-15-31	486	416	0.10762	0.00578	0.01652	0.00027	0.04727	0.00257	105.6	1.69
16-03-15-31	685	584	0.1084	0.00607	0.01634	0.00027	0.04813	0.00273	104.5	1.73
16-03-15-31	1243	461	0.1183	0.00417	0.01706	0.00024	0.05031	0.00177	109	1.5
16-03-15-31	455	312	0.11319	0.00615	0.01667	0.00027	0.04926	0.00271	106.6	1.74
16-03-15-31	655	584	0.10618	0.00516	0.01619	0.00025	0.04757	0.00233	103.6	1.58
16-03-15-31	321	221	0.11045	0.00944	0.01605	0.00035	0.04994	0.00434	102.6	2.21
Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
13-05-15-34	7937	10780	0.10745	0.00267	0.01595	0.0002	0.04889	0.00118	102	1.29
13-05-15-34	9097	14252	0.10109	0.003	0.01415	0.00019	0.05185	0.00152	90.5	1.19
13-05-15-34	1385	1184	0.12732	0.00426	0.0178	0.00024	0.0519	0.00173	113.7	1.55
13-05-15-34	809	643	0.13068	0.00521	0.01887	0.00027	0.05024	0.00201	120.5	1.73
13-05-15-34	558	248	0.12956	0.0061	0.01895	0.00029	0.0496	0.00235	121	1.85
13-05-15-34	1938	1272	0.10983	0.00352	0.01597	0.00022	0.04989	0.00159	102.1	1.37
13-05-15-34	12312	13215	0.11683	0.00373	0.0161	0.00022	0.05264	0.00166	103	1.39
13-05-15-34	24326	7195	0.1039	0.00261	0.01557	0.0002	0.04841	0.00117	99.6	1.27
13-05-15-34	2312	1871	0.11087	0.00353	0.01637	0.00022	0.04915	0.00154	104.7	1.4
13-05-15-34	300	206	0.30017	0.01346	0.04023	0.00062	0.05413	0.00244	254.3	3.84
13-05-15-34	911	760	0.12828	0.00681	0.01832	0.0003	0.0508	0.00272	117	1.92
13-05-15-34	11090	18404	0.10764	0.00301	0.01525	0.0002	0.05121	0.00139	97.6	1.27
13-05-15-34	493	232	0.13601	0.00889	0.0194	0.00036	0.05086	0.00337	123.9	2.27
13-05-15-34	937	788	0.29358	0.00976	0.04026	0.00056	0.0529	0.00174	254.5	3.44
Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
07-05-15-6A	419	134	0.11024	0.00528	0.01727	0.00026	0.04631	0.00225	110.4	1.63
07-05-15-6A	546	335	0.11744	0.00583	0.018	0.00028	0.04734	0.00239	115	1.76
07-05-15-6A	1057	400	0.11116	0.00308	0.01773	0.00022	0.0455	0.00127	113.3	1.4
07-05-15-6A	627	525	0.10012	0.00369	0.0152	0.00021	0.04781	0.00179	97.2	1.31
07-05-15-6A	286	143	0.09873	0.00534	0.01549	0.00024	0.04624	0.00254	99.1	1.55
07-05-15-6A	169	52	1.50506	0.03181	0.15743	0.00192	0.06937	0.00146	942.5	10.71
07-05-15-6A	348	154	0.10396	0.00491	0.01645	0.00024	0.04586	0.0022	105.2	1.54
07-05-15-6A	314	131	0.11518	0.00557	0.01749	0.00026	0.04779	0.00235	111.8	1.66
07-05-15-6A	495	384	0.11489	0.0068	0.01719	0.00029	0.04849	0.00293	109.9	1.86
07-05-15-6A	371	131	0.09609	0.00484	0.01528	0.00023	0.04564	0.00233	97.8	1.46
07-05-15-6A	733	801	0.09398	0.00336	0.01451	0.00019	0.04701	0.0017	92.9	1.23
07-05-15-6A	239	130	0.10102	0.00602	0.0158	0.00026	0.0464	0.00281	101.1	1.65
07-05-15-6A	1970	833	0.11592	0.00291	0.01744	0.00021	0.04824	0.00121	111.4	1.36
07-05-15-6A	316	203	0.10058	0.0052	0.01539	0.00024	0.04742	0.00249	98.5	1.52
07-05-15-6A	983	706	0.10698	0.00312	0.01718	0.00022	0.04519	0.00133	109.8	1.37
07-05-15-6A	495	243	0.11491	0.00453	0.01728	0.00024	0.04827	0.00193	110.4	1.52
07-05-15-6A	298	321	0.1011	0.00855	0.01537	0.00033	0.04774	0.00412	98.3	2.06
07-05-15-6A	223	133	0.11109	0.00822	0.01544	0.0003	0.05222	0.00395	98.8	1.93
07-05-15-6A	230	121	0.10752	0.00677	0.01555	0.00027	0.05016	0.00322	99.5	1.73
Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
07-05-15-6B	437	257	0.1186	0.00589	0.01756	0.00027	0.04901	0.00248	112.2	1.73
07-05-15-6B	566	216	0.2798	0.00786	0.04093	0.00052	0.04961	0.0014	258.6	3.21
07-05-15-6B	466	261	0.12181	0.00646	0.01749	0.00028	0.05054	0.00274	111.8	1.8
07-05-15-6B	557	218	0.11686	0.00442	0.01758	0.00024	0.04825	0.00185	112.3	1.53
07-05-15-6B	639	215	0.11914	0.00573	0.01819	0.00028	0.04754	0.00233	116.2	1.75
07-05-15-6B	367	119	0.28425	0.01039	0.03915	0.00054	0.05268	0.00195	247.6	3.37
07-05-15-6B	958	375	0.26499	0.00684	0.03789	0.00047	0.05075	0.00132	239.8	2.92
07-05-15-6B	720	229	0.10463	0.00403	0.01596	0.00022	0.04756	0.00186	102.1	1.39
07-05-15-6B	195	71	1.23374	0.04021	0.13941	0.00194	0.06422	0.00212	841.3	10.96
07-05-15-6B	3923	1240	0.11475	0.00219	0.01801	0.00021	0.04623	0.00087	115.1	1.34
07-05-15-6B	1312	476	0.10622	0.00363	0.01485	0.0002	0.05192	0.0018	95	1.27
07-05-15-6B	1736	557	0.12266	0.00294	0.01854	0.00023	0.048	0.00115	118.4	1.43
07-05-15-6B	61	42	0.11077	0.01589	0.01585	0.00044	0.05071	0.00738	101.4	2.8
07-05-15-6B	1070	319	0.12784	0.00345	0.01836	0.00023	0.05054	0.00137	117.3	1.46

Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
07-05-15-6B	797	288	0.11961	0.00385	0.01791	0.00023	0.04846	0.00158	114.4	1.48
07-05-15-6B	527	191	0.11675	0.00452	0.017	0.00024	0.04983	0.00196	108.7	1.5
07-05-15-6B	732	254	0.11132	0.00382	0.0168	0.00022	0.0481	0.00167	107.4	1.42
07-05-15-6B	800	423	0.10886	0.00664	0.01512	0.00027	0.05225	0.00326	96.7	1.72
07-05-15-6B	1159	233	0.11531	0.00319	0.01759	0.00022	0.04757	0.00132	112.4	1.4
07-05-15-6B	574	203	0.1177	0.0044	0.01825	0.00025	0.04681	0.00177	116.6	1.58
07-05-15-6B	3393	1300	0.09346	0.00196	0.01484	0.00018	0.04569	0.00095	95	1.12
Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
14-05-15-15	5458	1362	0.1061	0.00227	0.0146	0.00018	0.05275	0.00112	93.4	1.11
14-05-15-15	4355	1297	0.09709	0.00192	0.01472	0.00017	0.04786	0.00094	94.2	1.1
14-05-15-15	4086	1970	0.09848	0.00223	0.01368	0.00017	0.05223	0.00118	87.6	1.06
14-05-15-15	2807	1026	0.09402	0.00216	0.01438	0.00017	0.04746	0.00109	92	1.1
14-05-15-15	13379	3536	0.10506	0.00171	0.01492	0.00017	0.0511	0.00081	95.5	1.1
14-05-15-15	3976	1789	0.10202	0.00206	0.01465	0.00017	0.05054	0.00101	93.7	1.11
14-05-15-15	16484	2817	0.10421	0.0018	0.015	0.00017	0.05043	0.00085	96	1.11
14-05-15-15	14428	3092	0.10516	0.00174	0.0151	0.00017	0.05055	0.00081	96.6	1.11
14-05-15-15	14254	4880	0.09501	0.00171	0.01488	0.00017	0.04634	0.00082	95.2	1.1
14-05-15-15	14400	3419	0.09918	0.00166	0.01486	0.00017	0.04845	0.00079	95.1	1.09
14-05-15-15	4963	1877	0.0989	0.00195	0.01456	0.00017	0.0493	0.00096	93.2	1.1
14-05-15-15	490	196	0.09772	0.00533	0.01489	0.00024	0.04762	0.00264	95.3	1.53
14-05-15-15	1276	538	0.1133	0.0039	0.01678	0.00023	0.04901	0.00171	107.3	1.43
14-05-15-15	25211	4996	0.1015	0.00165	0.01477	0.00017	0.04986	0.00078	94.5	1.09
14-05-15-15	5443	1929	0.096	0.0019	0.0149	0.00018	0.04675	0.00091	95.4	1.12
14-05-15-15	3758	1238	0.10334	0.00217	0.0144	0.00017	0.05207	0.00108	92.2	1.1
Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
09-05-15-24	6368	428	0.10577	0.00198	0.01517	0.00018	0.05061	0.00093	97	1.13
09-05-15-24	680	495	0.11932	0.00749	0.01751	0.00031	0.04944	0.00316	111.9	1.98
09-05-15-24	344	164	0.10606	0.00555	0.01608	0.00025	0.04787	0.00255	102.8	1.6
09-05-15-24	4854	915	0.11216	0.00222	0.01574	0.00019	0.05172	0.00101	100.6	1.19
09-05-15-24	443	201	0.10396	0.00485	0.01615	0.00024	0.04671	0.00221	103.3	1.52
09-05-15-24	926	508	0.1063	0.00517	0.01488	0.00023	0.05183	0.00257	95.2	1.48
09-05-15-24	508	215	0.10166	0.00455	0.01548	0.00023	0.04767	0.00217	99	1.44
09-05-15-24	1296	95	0.10654	0.00312	0.01542	0.0002	0.05012	0.00148	98.7	1.25
09-05-15-24	317	108	0.11126	0.00628	0.01571	0.00026	0.0514	0.00295	100.5	1.66
09-05-15-24	450	190	0.11081	0.00581	0.01635	0.00026	0.04919	0.00262	104.5	1.66
09-05-15-24	788	421	0.10737	0.00385	0.01594	0.00022	0.04889	0.00177	101.9	1.37
09-05-15-24	225	61	0.10086	0.00809	0.01552	0.00031	0.04716	0.00385	99.3	1.95
09-05-15-24	498	233	0.11217	0.00477	0.01626	0.00024	0.05007	0.00216	103.9	1.5
09-05-15-24	352	106	0.10491	0.00704	0.01587	0.00029	0.04797	0.00328	101.5	1.84
09-05-15-24	1100	1299	0.11529	0.00732	0.01671	0.00026	0.05007	0.00321	106.8	1.64
09-05-15-24	617	359	0.09148	0.00407	0.0142	0.00021	0.04675	0.00211	90.9	1.32
Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
11-05-15-30	573	133	0.107	0.00477	0.01617	0.00024	0.048	0.00217	103.4	1.5
11-05-15-30	1174	677	0.11496	0.0036	0.01599	0.00021	0.05216	0.00165	102.3	1.33
11-05-15-30	1817	465	0.10625	0.00296	0.01491	0.00019	0.05172	0.00144	95.4	1.2
11-05-15-30	879	479	0.10514	0.00384	0.01593	0.00022	0.0479	0.00177	101.9	1.38
11-05-15-30	279	130	0.45066	0.01495	0.06027	0.00081	0.05426	0.00182	377.3	4.94
11-05-15-30	497	159	0.10884	0.00741	0.0155	0.00029	0.05094	0.00354	99.2	1.84
11-05-15-30	746	329	0.10772	0.00422	0.0158	0.00022	0.04947	0.00196	101.1	1.41
11-05-15-30	1993	1385	0.10987	0.00314	0.0152	0.00019	0.05246	0.0015	97.2	1.24
11-05-15-30	544	157	0.11875	0.00719	0.01725	0.0003	0.04995	0.00308	110.3	1.9
11-05-15-30	1493	109	0.10783	0.00323	0.01554	0.0002	0.05033	0.00152	99.4	1.28
11-05-15-30	809	243	0.10477	0.00403	0.01555	0.00022	0.0489	0.00191	99.4	1.38
11-05-15-30	1713	766	0.4563	0.00939	0.06152	0.00074	0.05381	0.00109	384.9	4.49
11-05-15-30	2502	751	0.10156	0.00266	0.01554	0.00019	0.0474	0.00124	99.4	1.23
11-05-15-30	2084	714	0.1033	0.00286	0.01571	0.0002	0.04771	0.00132	100.5	1.26
11-05-15-30	553	260	0.12399	0.00547	0.01851	0.00027	0.0486	0.00217	118.2	1.71
11-05-15-30	1042	435	0.09364	0.00396	0.01519	0.00022	0.04474	0.00191	97.2	1.38
11-05-15-30	593	194	0.10416	0.00457	0.01557	0.00023	0.04852	0.00216	99.6	1.44

Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
11-05-15-30	905	305	0.10187	0.0037	0.01596	0.00022	0.0463	0.0017	102.1	1.37
11-05-15-30	1221	549	0.1027	0.00343	0.01557	0.00021	0.04784	0.00161	99.6	1.31
11-05-15-30	955	232	0.10132	0.0036	0.01546	0.00021	0.04756	0.0017	98.9	1.33
Sample	**U [ppm]**	**Th [ppm]**	**207/235**	**± s.e.**	**206/238**	**± s.e.**	**207/206**	**± s.e.**	**Age [Ma]**	**2 s**
14-03-15-16	2688	964	0.11217	0.0018	0.0169	0.00019	0.04816	0.00078	108.1	1.23
14-03-15-16	620	835	0.09846	0.00239	0.01492	0.00019	0.0479	0.0012	95.5	1.23
14-03-15-16	1013	503	0.09881	0.00203	0.01496	0.00018	0.04792	0.00101	95.7	1.17
14-03-15-16	1106	532	0.10139	0.00189	0.0153	0.00018	0.04808	0.00092	97.9	1.16
14-03-15-16	364	162	0.08897	0.0037	0.01302	0.00023	0.0496	0.00216	83.4	1.45
14-03-15-16	453	229	0.0929	0.00263	0.01335	0.00019	0.0505	0.00148	85.5	1.19
14-03-15-16	560	251	0.09883	0.00213	0.01492	0.00019	0.04806	0.00106	95.5	1.18
14-03-15-16	391	161	0.09953	0.00413	0.01497	0.00026	0.04825	0.0021	95.8	1.65
14-03-15-16	877	335	0.09697	0.00172	0.01458	0.00017	0.04825	0.00087	93.3	1.09
14-03-15-16	1152	314	0.103	0.00193	0.01558	0.00019	0.04798	0.00092	99.7	1.18
14-03-15-16	328	133	0.09072	0.00329	0.01374	0.00022	0.04792	0.00181	88	1.38
14-03-15-16	694	258	0.09634	0.00188	0.0145	0.00017	0.04822	0.00096	92.8	1.11
14-03-15-16	406	145	0.09889	0.0028	0.01488	0.00021	0.04821	0.00142	95.2	1.32
14-03-15-16	545	179	0.09147	0.00227	0.01382	0.00018	0.04803	0.00123	88.5	1.15
14-03-15-16	776	344	0.09358	0.00229	0.01414	0.00018	0.04804	0.00121	90.5	1.18
14-03-15-16	698	202	0.0887	0.00218	0.01338	0.00018	0.04809	0.00122	85.7	1.12
14-03-15-16	296	132	0.08644	0.00449	0.01312	0.00027	0.04781	0.0026	84	1.69
14-03-15-16	682	237	0.08819	0.00201	0.01326	0.00017	0.04827	0.00114	84.9	1.07
14-03-15-16	1042	865	0.09515	0.00189	0.01451	0.00018	0.0476	0.00097	92.8	1.12
14-03-15-16	735	270	0.09497	0.00324	0.01427	0.00022	0.04828	0.00172	91.4	1.4
14-03-15-16	286	89	0.09465	0.00275	0.01426	0.0002	0.04817	0.00145	91.3	1.26
14-03-15-16	676	370	0.08985	0.00218	0.01369	0.00018	0.04761	0.00119	87.7	1.13
Sample	**U [ppm]**	**Th [ppm]**	**207/235**	**± s.e.**	**206/238**	**± s.e.**	**207/206**	**± s.e.**	**Age [Ma]**	**2 s**
14-03-15-23	5332	3067	0.12707	0.00208	0.01768	0.0002	0.05217	0.00087	113	1.3
14-03-15-23	488	168	0.0981	0.00244	0.01486	0.0002	0.04792	0.00123	95.1	1.24
14-03-15-23	2071	747	0.1117	0.00183	0.01682	0.00019	0.04818	0.0008	107.5	1.23
14-03-15-23	315	160	0.0999	0.00266	0.01515	0.0002	0.04785	0.00132	96.9	1.29
14-03-15-23	246	77	0.09906	0.00496	0.01482	0.00029	0.04852	0.00254	94.8	1.86
14-03-15-23	901	241	0.10059	0.00233	0.01474	0.00019	0.04952	0.00118	94.3	1.21
14-03-15-23	1259	372	0.11257	0.00312	0.01702	0.00024	0.04798	0.00138	108.8	1.5
14-03-15-23	1090	492	0.09748	0.00266	0.01476	0.0002	0.04792	0.00136	94.5	1.29
14-03-15-23	906	316	0.09742	0.00174	0.01481	0.00017	0.04772	0.00087	94.8	1.11
14-03-15-23	6987	2239	0.11108	0.00143	0.01541	0.00017	0.05232	0.00066	98.6	1.08
14-03-15-23	4144	1287	0.10508	0.00132	0.01593	0.00017	0.04786	0.00059	101.9	1.1
14-03-15-23	780	343	0.09802	0.00187	0.01478	0.00018	0.04812	0.00094	94.6	1.12
14-03-15-23	842	397	0.09521	0.00206	0.01428	0.00018	0.04839	0.00108	91.4	1.13
14-03-15-23	584	273	0.10236	0.00301	0.01546	0.00022	0.04806	0.00147	98.9	1.4
14-03-15-23	714	290	0.09553	0.00265	0.01423	0.0002	0.04873	0.0014	91.1	1.25
14-03-15-23	1122	400	0.1171	0.00207	0.01753	0.00021	0.04847	0.00087	112	1.3
14-03-15-23	1274	464	0.10134	0.00219	0.01492	0.00019	0.04929	0.0011	95.5	1.19
14-03-15-23	700	244	0.10078	0.00235	0.0152	0.0002	0.04811	0.00116	97.3	1.24
14-03-15-23	1259	539	0.10942	0.00189	0.01662	0.00019	0.04777	0.00084	106.3	1.23
14-03-15-23	873	225	0.09673	0.00232	0.01478	0.00019	0.04749	0.00117	94.6	1.21
14-03-15-23	2162	740	0.10369	0.00148	0.01562	0.00017	0.04819	0.00068	99.9	1.11
Sample	**U [ppm]**	**Th [ppm]**	**207/235**	**± s.e.**	**206/238**	**± s.e.**	**207/206**	**± s.e.**	**Age [Ma]**	**2 s**
14-03-15-24	1068	345	0.1039	0.00245	0.01574	0.0002	0.0479	0.00116	100.7	1.29
14-03-15-24	1185	362	0.1073	0.0021	0.01609	0.00019	0.0484	0.00097	102.9	1.23
14-03-15-24	477	135	0.10653	0.00351	0.01611	0.00024	0.04797	0.00165	103.1	1.54
14-03-15-24	2023	809	0.09769	0.00252	0.01478	0.0002	0.04797	0.00128	94.6	1.26
14-03-15-24	2757	1149	0.11223	0.00193	0.0159	0.00019	0.05122	0.00089	101.7	1.18
14-03-15-24	951	383	0.10514	0.00191	0.01575	0.00019	0.04844	0.0009	100.7	1.18
14-03-15-24	2245	856	0.10477	0.00177	0.01568	0.00018	0.04848	0.00083	100.3	1.16
14-03-15-24	1368	438	0.11415	0.00252	0.01724	0.00022	0.04806	0.00109	110.2	1.38
14-03-15-24	2448	1109	0.10075	0.00149	0.01551	0.00017	0.04714	0.0007	99.2	1.11
14-03-15-24	2977	1077	0.10605	0.00176	0.01479	0.00017	0.05202	0.00087	94.7	1.09

Sample	U [ppm]	Th [ppm]	207/235	± s.e.	206/238	± s.e.	207/206	± s.e.	Age [Ma]	2 s
14-03-15-24	534	194	0.09967	0.00237	0.01501	0.00019	0.0482	0.00118	96	1.23
14-03-15-24	1480	485	0.10939	0.00183	0.01658	0.00019	0.04788	0.00081	106	1.22
14-03-15-24	1439	478	0.10209	0.00172	0.01546	0.00018	0.04793	0.00082	98.9	1.14
14-03-15-24	1130	315	0.09973	0.00204	0.01505	0.00018	0.0481	0.00101	96.3	1.17
14-03-15-24	224	85	1.5916	0.021	0.16549	0.00186	0.06979	0.0009	987.2	10.31
14-03-15-24	677	283	0.10389	0.00271	0.01579	0.00021	0.04775	0.00129	101	1.35
14-03-15-24	1132	331	0.10418	0.00189	0.01589	0.00019	0.04758	0.00088	101.6	1.19
14-03-15-24	779	212	0.09809	0.00207	0.01489	0.00018	0.04782	0.00103	95.3	1.17
14-03-15-24	1630	666	0.11925	0.0021	0.01742	0.0002	0.04967	0.00089	111.4	1.3
Sample	**U [ppm]**	**Th [ppm]**	**207/235**	**± s.e.**	**206/238**	**± s.e.**	**207/206**	**± s.e.**	**Age [Ma]**	**2 s**
15-03-15-26	22263	8026	0.10862	0.00122	0.01657	0.00018	0.04756	0.00051	106	1.13
15-03-15-26	19310	4981	0.10313	0.0012	0.01546	0.00017	0.04841	0.00054	98.9	1.06
15-03-15-26	27589	2754	0.1	0.00117	0.0146	0.00016	0.04971	0.00056	93.4	1
15-03-15-26	6469	162	0.11712	0.00174	0.01689	0.00019	0.05032	0.00075	108	1.21
15-03-15-26	8201	2281	0.11487	0.00136	0.01646	0.00018	0.05065	0.00058	105.2	1.13
15-03-15-26	18042	5498	0.10435	0.00124	0.01571	0.00017	0.0482	0.00055	100.5	1.08
15-03-15-26	20465	7921	0.09968	0.0012	0.01511	0.00016	0.04789	0.00056	96.7	1.04
15-03-15-26	10902	2931	0.10433	0.00136	0.01545	0.00017	0.04899	0.00063	98.9	1.08
15-03-15-26	18963	7015	0.09891	0.00116	0.01467	0.00016	0.04893	0.00055	93.9	1.01
15-03-15-26	13259	3231	0.10072	0.00124	0.01489	0.00016	0.0491	0.00059	95.3	1.03
15-03-15-26	19005	6259	0.11179	0.00131	0.01578	0.00017	0.0514	0.00058	100.9	1.08
15-03-15-26	20559	7653	0.10911	0.00124	0.016	0.00017	0.0495	0.00054	102.3	1.09
15-03-15-26	20582	7402	0.10333	0.00117	0.01573	0.00017	0.04767	0.00052	100.6	1.07
15-03-15-26	20081	6815	0.10521	0.00122	0.01569	0.00017	0.04867	0.00054	100.3	1.08
15-03-15-26	8413	381	0.10894	0.00142	0.01537	0.00017	0.05143	0.00066	98.3	1.07
Sample	**U [ppm]**	**Th [ppm]**	**207/235**	**± s.e.**	**206/238**	**± s.e.**	**207/206**	**± s.e.**	**Age [Ma]**	**2 s**
15-03-15-30	254	203	0.09714	0.00444	0.01467	0.00027	0.04804	0.0023	93.9	1.72
15-03-15-30	451	551	0.09824	0.00287	0.01485	0.00021	0.04799	0.00145	95.1	1.33
15-03-15-30	345	148	0.09557	0.00318	0.01444	0.00022	0.04804	0.00167	92.4	1.38
15-03-15-30	694	1095	0.10383	0.00418	0.01572	0.00027	0.04792	0.00202	100.6	1.7
15-03-15-30	451	193	0.11107	0.00428	0.01544	0.00026	0.05222	0.00211	98.7	1.67
15-03-15-30	181	123	0.10458	0.00548	0.01579	0.00032	0.04805	0.00263	101	2.01
15-03-15-30	250	138	0.10117	0.00457	0.01525	0.00028	0.04814	0.00228	97.6	1.78
15-03-15-30	384	229	0.09641	0.00296	0.0144	0.00021	0.04859	0.00155	92.2	1.33
15-03-15-30	259	146	0.09674	0.00363	0.01484	0.00024	0.0473	0.00185	95	1.5
15-03-15-30	576	385	0.09944	0.00242	0.01505	0.0002	0.04793	0.00121	96.3	1.25
15-03-15-30	243	192	0.09943	0.00318	0.0151	0.00022	0.04778	0.00159	96.6	1.4
15-03-15-30	731	584	0.08984	0.00325	0.01369	0.00022	0.04761	0.0018	87.7	1.39
15-03-15-30	559	322	0.10543	0.00234	0.01592	0.0002	0.04806	0.0011	101.8	1.27
15-03-15-30	1107	461	0.10701	0.0028	0.01608	0.00022	0.04829	0.00131	102.8	1.38
15-03-15-30	872	166	4.74791	0.05309	0.30751	0.00333	0.11204	0.00119	1832.8	19.18
15-03-15-30	901	464	0.11414	0.00454	0.0165	0.00028	0.0502	0.00209	105.5	1.81
15-03-15-30	792	387	0.0956	0.00296	0.01323	0.00021	0.05246	0.00172	84.7	1.31
15-03-15-30	757	448	0.11529	0.00338	0.01694	0.00024	0.0494	0.00151	108.3	1.54
15-03-15-30	255	215	0.10649	0.00392	0.01519	0.00024	0.05089	0.00196	97.2	1.55

APPENDIX B: PUBLICATION

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Provenance, routing and weathering history of heavy minerals from coastal placer deposits of southern Vietnam

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Heavy mineral rich sands along the coastal margin of southern Vietnam often contain commercial deposits of ilmenite and zircon but their origin is unknown. A multi-method approach based on petrology, geochemistry and detrital zircon geochronology was used to define the provenance and transport history of these mainly Quaternary sands. A trend of progressive enrichment of ilmenite TiO_2 content, from north to south, was observed. This reflects increased levels of weathering attributed to a wider coastal margin and shelf in the south combined with a succession of erosion and reburial events associated with interstadial and interglacial sea-level changes. Weathering took place during lowstands. Detrital zircon U\\Pb age signatures collected from 25 major river outlets along the coast of Vietnam helped to locate potential sand sources. Prominent age groups spanning 90–120 Ma and 220–250 Ma with a minor group at 400–500 Ma are present in all of the detrital zircon U\\Pb age distributions of contemporary beach sands and Quaternary coastal dune placer deposits. Proterozoic grains are also present but constitute b10% of dated grains. The main source terrain for the placer sands is southern Vietnam where there are widespread outcrops of Mesozoic magmatic rocks. Detrital zircon U\\Pb age signatures from river sands that drain this area are identical to zircon age distributions in placer sands. River sands from northern Vietnam, the Mekong and its delta contain abundant Paleozoic and Proterozoic zircons, which are largely absent from the placer sands, and so are ruled out as primary sources.

1. Introduction

Beach and dune placer deposits occur along the 3260 km coastline of Vietnam, as well as offshore in water depths up to 30 m or more, are economically important sources of ilmenite, rutile and zircon (Fig. 1). The heavy mineral rich sands are mainly found in beach dunes, beach ridge, washover and backshore deposits associated with Holocene to Pleistocene sealevel changes. Onshore deposits occur as bands, typically 1–4 m thick, that extend 1–3 km inland from the coast, and are up to 10 km in length. Most of the high-value deposits are found south of latitude 16°N particularly in the central SE Vietnam provinces Ninh Thuan and Binh Thuan (Fig. 1), to the northeast of Ho Chi Minh City. Surveys made in 2011 by the Department of Geology and Mineral Resources of Vietnam estimated that there are at least 650 million tons of ore reserves along the coastal margins between northeastern Vietnam and Vung Tau in the south. Sand ilmenite content typically varies from 10 to 100 kg/m^3 although some locations have concentrations well above this. Rutile contents are usually b1 kg/m^3, although in some places it can reach up to 3–4 kg/m^3 (e.g., coastal areas north of Da Nang). Zircon abundances also vary; the highest average content (up to 12 kg/m^3) can be found in the coastal sections of Ham Tan in Binh Thuan Province (Fig. 1). Mineral grain sizes are typically in the range of 0.16–0.25 mm. Understanding the origin of these minerals and the processes by which they became concentrated is the primary motivation of this study.

Ilmenite is an important source of titanium oxide. Fresh unaltered ilmenite has TiO_2 wt% values up to the stoichmetric value of 52.6 wt%. Chemical weathering and alteration, especially in oxidising and/or acidic environments, can change ilmenite chemistry by reducing Fe and Mn, increasing Ti and adding Al, Si, Th, P, V and Cr (Pownceby, 2010). The distribution and proportions of the different types of altered grains in the heavy mineral sands influences their commercial value as a source of Ti, and therefore it is important to understand the distribution and proportions of the different types of altered grains in the deposits which requires identifying where the alteration occurred and defining grain transport history.

Coastal sands along the southeast-central coastline of Vietnam typically comprise an outer and inner sand barrier. The former consists of

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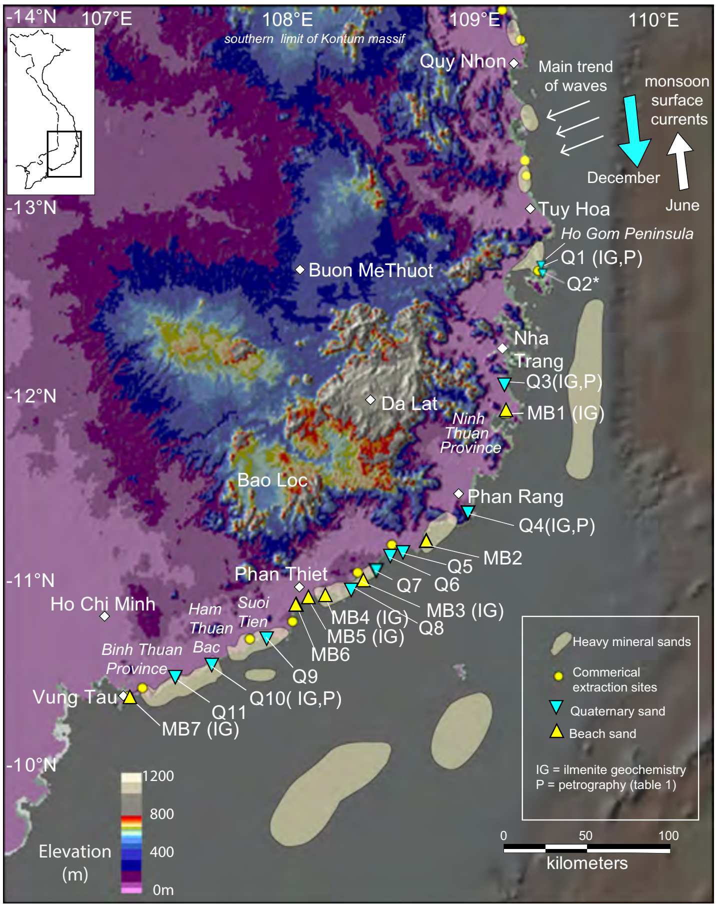

Fig. 1. Locations of placer and beach sands samples and main commercial extraction sites in southern Vietnam. Samples with illmenite composition data, and mineralogical data reported in Table 1, are also indicated.

loose white sand that sometimes form tombolos (e.g., Ho Gom Peninsula). The inner sand barrier located up to 20 km inland consists of light yellow to reddish yellow sands that include dunes found at elevations over 100 m above sea level, such as in the area north of Vung Tau or Ham Thuan Bac district (Fig. 1). Whether these sands are locally derived is unclear. The aim of this study is to better understand the environmental processes that led to the alteration and concentration of the heavy minerals and to define where the sand came from. It is known that the sands are closely linked to sea-level oscillations during the Quaternary, especially Holocene glacioeustatic changes between 8 and 5 ka (Stattegger et al., 2013). Falling sea level causes remobilisation of coastal sands deposited during highstands and increases bedrock erosion inland. Larger volumes of sediment would have been more intensely weathered during glacial periods (Wan et al., 2017) and the subaerial exposure of unconsolidated shelf sediments during associated lowstands would have affected ilmenite chemistry by causing enrichment in TiO_2. Wave action and longshore drift would also have contributed to the winnowing process, sorting grains according to size and density, hence it is entirely possible that sand grains are far removed from their original source areas.

2. Regional geology and geomorphology

The source and volume of beach sands depend on wind, wave and tide regimes as well as local erosion and fluvial transport rates. Detailed study of a river catchment in northern coastal Vietnam has indicated that greatest erosion reflected by river bedload and chemistry occurs within the mountainous regions where precipitation rates are highest, and that both weathering and erosion rates are linked to monsoon intensity (Jonell et al., 2017). Transport of sediment to the coast is dominated by discharge from the Mekong River in the south and by the Song Ma and Song Hong (Red River) in the north. Between these large rivers, that have their headwaters in Tibet and southwest China, the central areas of Vietnam are more locally drained by relatively small river catchments (Fig. 2) that have their headwaters in the nearby steep mountain ranges of the central highlands. Despite their small size, these rivers have been important sources of sediment to the coast and shelf as there is a relatively short distance between the wet highlands and the coastal plain, evidenced by high Quaternary sedimentation rates (from 0.5 to 1.2 m/ka) on the local continental shelf (Schimanski and Stattegger, 2005).

The trends of the coastline and shelf areas of Central Vietnam tend to follow the NNW- and NW-striking faults formed during the Triassic or earlier. Ordovician to Permo-Triassic granulite and amphibolite facies metamorphic rocks of the elevated Kontum Massif, which broadly lies between latitudes 14°N and 15°N, form the northern margin of the study area. Whilst zircon U—Pb geochronology has recorded Proterozoic ages between 1480 and 1350 and 900–600 Ma for local orthogneiss (Tran et al., 2003), charnokites, biotite-sillimanite-cordierite-garnet gneiss, schists, amphibolites, and granitoids originally mapped as Archean and Proterozoic have since been dated as Silurian and Triassic (Indosinian) (Carter et al., 2001; Nam et al., 2001; Hieu et al., 2015, 2016). These rock types are not seen south of latitude 13°N where Mesozoic granitoids dominate. West of Nha Trang are late Carboniferous-early Permian rocks of the Dac Lin Formation. These comprise terrigenous sediments interbedded with intermediate volcanics, mainly andesitic basalts and tuffs. During the Triassic, closure of Tethys and final welding between Indochina and South China blocks caused significant

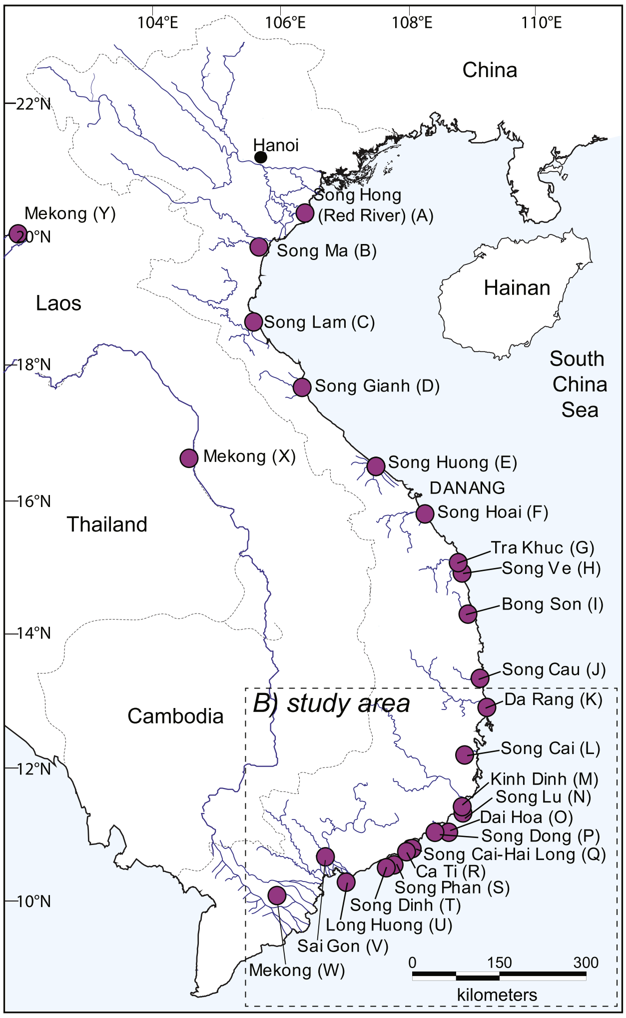

Fig. 2. Locations of river sand samples collected from each of the main river outlets along the coast of Vietnam. Sample prefixes are given in brackets.

deformation across much of northern Vietnam. This event is known as the Indosinian orogeny. Stratigraphy and radiometric ages of magmatic and metamorphic rocks support a Middle Triassic age for final closure of the Paleo-Tethys ocean (Faure et al., 2014). The study area was relatively unaffected by deformation related to this event. Triassic rocks are mainly confined to the northern part of the study area where the Mang Yang Formation includes rhyolites and tuffs associated with intracontinental rifts (Tran and Vu, 2011). Jurassic rocks are more widespread and occur as andesites, dacite and tuffaceous sandstones (Deo Bao Loc Formation). They are especially widespread in the western area between latitudes 13°30′N and 12°N. By contrast, the eastern region is dominated by Cretaceous magmatic rocks related to a former active continental margin. The widespread occurrence of arc-related magmatic rocks across the study area, including granitoids and rhyolites, is linked to subduction of the Palaeo-Pacific oceanic crust beneath southern China, Vietnam and southern Borneo (Shellnutt et al., 2013; Hall and Breitfeld, 2017).

Within the study area there are three main suites of Cretaceous magmatic rocks. The Dinhquan and Deoca complexes are found along the South Vietnamese coast. Petrological characteristics of the Dinhquan complex comprise hornblende-biotite diorites, granodiorites and minor granites. The Deoca complex consists of granodiorite, hornblende-biotite granite (phase I), biotite-hornblende granite, granosyenite and biotite syenite (phase II), and granite porphyry, granular aplite and pegmatite (dike phase). U—Pb zircon ages range from 88 ± 1.5–109 ± 7.0 Ma (Thuy et al., 2004) to 115.4 ± 1.2–118.2 ± 1.4 Ma (Shellnutt et al., 2013). The Ankroet Complex is smaller than the Dinhquan and Deoca complexes and is located further inland, at higher elevations. Rock types include medium to coarse grained porphyroid biotite granite. Published zircon U—Pb ages are 93.4 ± 2.0–96.1 ± 1.1 Ma (Thuy et al., 2004) and 86.8 ± 1.6 Ma (Shellnutt et al., 2013). Geochemical work by Shellnutt et al. (2013) show the upper Lower Cretaceous granitic batholiths are I-type (partial melting of dehydrated middle/lower crust) and the Upper Cretaceous (i.e., ~90 Ma) granitic rocks have compositions similar to A-type (differentiated mafic parental magmas) associated with an extensional tectonic regime, most probably trench retreat caused by slab rollback. Ankroet rocks are associated with this extensional setting.

Cenozoic fluvial-shallow marine clastic sedimentary rocks in the study area are the Oligo-Miocene Di Linh Formation, the early Pliocene to Pleistocene Song Luy Formation, and the late Pliocene to Pleistocene Ba Mieu Formation. Study of detrital zircon U—Pb ages from these units recorded abundant Cretaceous ages, as well as Permian–Triassic and Ordovician–Silurian sources. The youngest unit also records a significant increase in Precambrian zircons (Hennig et al., 2018). Also found across the study area are widespread late Cenozoic basaltic lava flows up to several hundred metres thick (Hoang and Flower, 1998). Alkali basaltic magmatism began in the middle Miocene and has a geochemistry that fits with sources of recycled eclogitic oceanic crust from the Hainan plume (An et al., 2017). Eruptions and lava flows often appear to have exploited local fault zones re-activated by South China Sea opening.

Patterns of sediment accumulation and concentration of heavy mineral sands along the coastal shelf and margins appear to track past sealevel changes. Direct evidence to support this can be found in optically stimulated luminescence (OSL) dating studies of stratigraphically oldest barrier sands exposed at Suoi Tien (10°57′16″N–108°15′30″E) and Hon Gom (12°41.64′N–109°45.27′E) (Fig. 1) (Quang-Minh et al., 2010) that include layers enriched in ilmenite and zircon. These gave deposition ages ranging from 8.3 ± 0.6 to 6.2 ± 0.3 ka BP, contemporaneous with the local postglacial maximum sealevel highstand. Much older red shallow marine sands at Suoi Tien were dated to 101 ± 16 ka whilst white sand at the bottom of the sequence could be as old as 276 ± 17 ka and correspond to an earlier sea-level highstand. Detailed reconstructions of mid to late Holocene sealevel for Southeast Vietnam can be found in Stattegger et al. (2013).

Although sealevel fluctuations are important, the concentration of heavy minerals likely involved a combination of factors that included sediment transport history along the shelf and coastline (influenced by sediment supply) and hydrodynamic conditions. The latter is dominated by the East Asian monsoon system that blows from the northeast in winter and southwest in the summer. The northeast monsoon has most impact on northern Vietnam and the southwest monsoon on central and southern regions (Pham, 2003). Although seasonal reversal of the monsoon system also switches longshore currents from southerly to northerly, the long-term trend of sediment transport can also be affected by local coastal geomorphology. This makes it difficult to predict long-term trends in coastal sediment transport, as demonstrated by modeling studies of longshore transport to define impacts of sealevel changes associated with climate change (Dastgheib et al., 2016).

3. Methods and approach

The study area covers the section of Vietnamese coastline where most heavy mineral sands are found, which is between 15°N and 10°N (Fig. 1). Since placer deposits represent biased sand composition we used a multi-method approach and defined the geochronological, geochemical and mineralogical signatures of representative placer deposits to locate sand source areas and define the extent of alteration and transport. Results are then compared against data collected from each of the main rivers along the Vietnamese coastline including 2 samples (X and Y) from the upper Mekong within Laos (Fig. 2). This approach will enable a model of locally derived vs longshore transport derived to be tested.

Sampling of placer deposits included nearby contemporary beach sands as these might preserve geographic links to source areas compared to older sands that are likely to have seen more extensive reworking and mixing, although reworking of older sediments would negate this assumption. Recognising that during transport selective entrainment based on variations in grain density produces a compositional bias we sampled sands with a typical grain size range between 65 and 500 μm. River sands were collected as close to river mouths as possible from active channel beds and point bars where heavy minerals tend to be concentrated. Beach sands were sampled (Fig. 3) in areas documented as rich in heavy minerals and taken from dark sand layers in the upper shoreface following removal of the lighter coloured top few centimeters. Also included are sand samples from onshore shallow boreholes drilled in prospective mining areas. In all cases efforts were made to avoid areas subject to obvious anthropogenic disturbance. In total 25 river and 18 onshore placer sand samples (typically between 1 and 2 kg) were collected.

Quantification of mineral types and abundances was made using automated energy-dispersive X-ray spectroscopy (SEM-EDS) coupled with expert software analysis on a QEMSCAN® platform which allows micron-scale mapping and mineral identification of samples (Pirrie and Rollinson, 2011). Polished grain mounts of untreated sands were scanned at a resolution of 10 μm yielding c. 5000 to 12,000 grain counts per slide. The acquired EDS spectra were interpreted automatically by reference to a database of mineral compositions.

Detrital zircon U—Pb geochronology is used to help define ilmenite provenance since both Ilmenite and zircon are normally found in similar source rock types and would be expected to behave similarly during transport as they have similar specific gravities (4.5–4.7). Detrital zircon geochronology is widely used in provenance studies due to stability of the mineral and U—Pb system (e.g., Jonell et al., 2017; Singh et al., 2017). Detrital zircon grains were separated by standard heavy liquid techniques. Grains for dating were selected randomly from polished grain mounts and analysed by laser ablation inductively coupled plasma mass spectrometry at the London Geochronology Centre based in University College London using a New Wave 193 nm laser ablation system coupled to an Agilent 7700 quadrupole-based ICP-MS. Typical

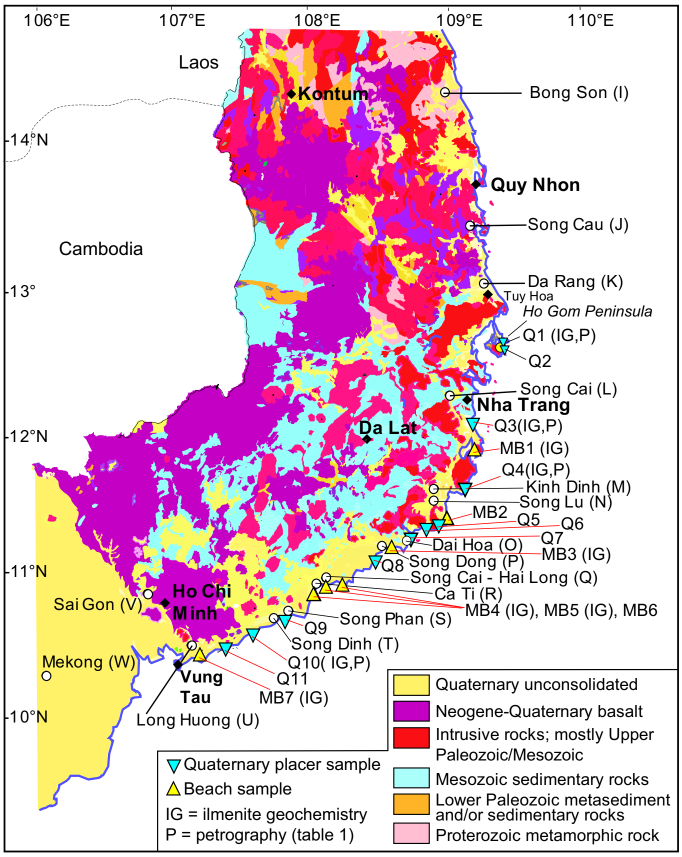

Fig. 3. Map of study area geology showing locations of sand samples.

ablation parameters used 25 μm spots with a 10 Hz repetition rate and an energy fluence of ca. 2:5 J/cm^2. Instrumental mass bias and depth-dependent inter-element fractionation of Pb, Th and U were corrected for using Plesovice as an external zircon standard (Sláma et al., 2008). Time-resolved signals that record evolving isotopic ratios with depth in each crystal were processed using Glitter 4.4 data reduction software. This removed spurious signals caused by inclusions, mixing of growth zones or fractures. Calculated $^{206}Pb/^{238}U$ ages were used for grains younger than 1000 Ma, and the $^{207}Pb/^{206}Pb$ age for older grains. Grains with a complex growth history or disturbed isotopic ratios, with >+5/−15% discordance, were rejected.

To characterize ilmenite chemistry and to test for ilmenite alteration by weathering grains (circa 100 per sample) from representative river and placer sands were selected for electron microprobe analysis. A JEOL JXA-8100 Electron Probe Microanalyzer Scanning Electron Microprobe fitted with an Oxford Instruments X-act PentaFET Precision detector was used to carry out the analyses on polished grain mounts. Qemscan mineral maps helped with grain identification.

4. Results and interpretation

4.1. Petrology

Table 1 summarises mineral abundances of representative river and Quaternary sands. Despite a wide presence of basaltic rocks olivines are rarely found in river sands and none were detected in the Qemscan analyses of untreated sand (Table 1). Pyroxenes are present in river sands but are missing from the coastal placer sands suggesting that there has been loss due to weathering. Minerals diagnostic of heavy to medium grade metamorphic rocks are common. Similar abundances of high-grade metamorphic minerals siliminite, kyanite and andalusite are present in both river and beach sands, although they are more abundant in the area between latitudes 14–16°N where outcrops of high-grade Proterozoic metamorphic rocks are more widespread. Amphiboles are especially common in the river sands between 12 and 16°N but abundances systematically decrease to the south (Fig. 4). By contrast, amphiboles are sparse in the contemporary beach sands

Table 1
QEMSCAN mineral percentages (by volume) for untreated river and Quaternary beach sands from central and southern Vietnam.

	F	G	H	I	J	K	L	Q1	Q2	Q3	Q4	Q10	MB7
Number of grains	7956	4826	3595	7077	7157	7055	11,709	3857	1586	4627	10,426	4553	7151
Grain composition (as % of total grains)	%	%	%	%	%	%	%	%	%	%	%	%	%
Quartz	79.2	61.6	68.4	64.8	51.6	54.1	41.5	95.3	94.6	96.6	67.0	90.2	90.5
Plagioclase feldspars	3.7	4.8	5.2	4.8	11.8	6.4	20.1	0.1	0.1	0.1	0.81	0.2	0.5
Alkali feldspars	6.1	7.2	7.6	9.6	17.8	14.0	19.1	1.1	1.9	0.1	14.1	1.4	1.4
Biotite	0.1	0.6	0.7	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Muscovite	0.9	2.0	3.0	4.7	1.6	2.3	2.1	0.1	0.1	0.0	0.7	0.1	0.1
Chlorite	0.4	0.8	1.0	0.7	0.2	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Smectite	0.66	1.1	0.9	1.0	1.3	1.9	1.9	0.1	0.1	0.1	2.3	0.2	0.4
Illite	1.0	1.6	1.8	2.0	3.0	3.6	3.4	0.1	0.2	0.0	2.9	0.3	0.4
Kaolinite/dickite	0.9	1.4	1.8	1.9	1.3	7.5	3.8	0.6	0.7	0.3	5.5	1.0	1.4
Other clays	1.7	1.5	2.1	1.9	2.0	4.4	2.9	1.3	1.6	0.8	3.6	2.3	3.0
Garnet	0.9	1.8	0.8	0.4	1.0	0.3	0.2	0.1	0.0	0.0	0.0	0.1	0.1
Apatite	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spinel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Amphibole	2.1	7.0	2.1	2.3	1.1	0.6	0.6	0.0	0.0	0.0	0.1	0.1	0.1
Rutile/anatase	0.0	0.3	0.2	0.5	0.3	0.2	0.2	0.1	0.1	0.2	0.2	0.6	0.1
Tourmaline	0.3	1.6	1.3	1.4	0.3	1.7	1.6	0.1	0.1	0.2	0.5	0.3	0.2
Zircon	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0
Calcite/aragonite/dolomite	0.0	0.4	0.1	0.0	2.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Siderite-magnesite	0.0	0.2	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ilmenite	0.0	0.7	0.1	1.6	1.2	0.2	0.1	0.3	0.3	0.8	0.6	1.8	1.1
Sillim/kyanite/andalusite	0.0	0.1	0.4	0.2	0.1	0.0	0.1	0.2	0.1	0.1	0.1	0.0	0.1
Olivine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Magnetite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Epidote	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OPX	0.0	0.5	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CPX	0.2	1.6	0.2	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Titanite	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Staurolite	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unclassified/other	1.8	2.7	1.9	1.7	2.2	1.9	1.5	0.5	0.1	0.7	1.5	1.1	0.6

(Table 1) suggesting either removal by weathering and physical abrasion, helped by its cleavage (Garzanti et al., 2015), or density sorting during transport. The latter is unlikely given that the ultrastable high-grade metamorphic minerals, siliminite and kyanite, which are only slightly denser than amphibole, are present in both river and beach sands (typically 0.1 to 0.4% of grains, Table 1). Aside from loss by weathering and abrasion it is also possible that the absence of amphiboles reflects minimal south-directed longshore transport, i.e., rivers sands are not dispersed very far along the coast. The latter seems more likely as the denser minerals garnet, rutile, ilmenite and zircon that do not breakdown as easily as amphibole during transport, also show decreasing abundances between northern and southern rivers and that levels in the beach sands always have a lower content than river sands. By contrast, levels of feldspars increase southwards in river samples but remain low in most heavy mineral sand samples. This provides clear evidence that some density separation is taking place in the marine environment.

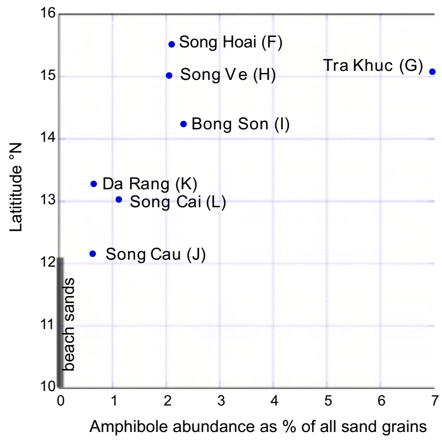

Fig. 4. Abundance of amphiboles in river sands from central Vietnam as a fraction of total grains scanned on the Qemscan slide.

4.2. Ilmenite geochemistry

Results of a subset of samples selected for ilmenite microprobe analyses (Fig. 5) show that although some fresh unaltered ilmenite grains are present most ilmenites have been altered and this increased grain titanium contents to above stoichiometric levels (i.e., >52.6 wt%). Plot 5A, of river sands, shows that there are some regional differences whereby the proportion of altered grains increases to the south. This implies that rivers in the north of the study area deliver fresher ilmenite to the coast and offshore. Plot 5B compares ilmenite from Holocene sands (Quang-Minh et al., 2010) along the coast. These data also show a trend of increased levels of weathering to the south. Comparison between river sands and nearby Holocene sands (Plot 5C) show dissimilar distributions supporting alteration after river deposition. Plot 5D compares modern beach sands along the coast and again the greatest amount of alteration is seen in the south.

4.3. Detrital zircon U—Pb river sand results

Data from each of the main river outlets along the coast of Vietnam provide a simple way of capturing signatures of the local geology against which coastal sand data may be compared (full analytical results are provided in the supplementary section). A summary of age distributions of individual river samples (Fig. 6), displayed as Kernel density (KDE) plots (Vermeesch, 2012), show rivers from northern and central Vietnam drain older rocks than rivers in southern Vietnam (Fig. 3). Both

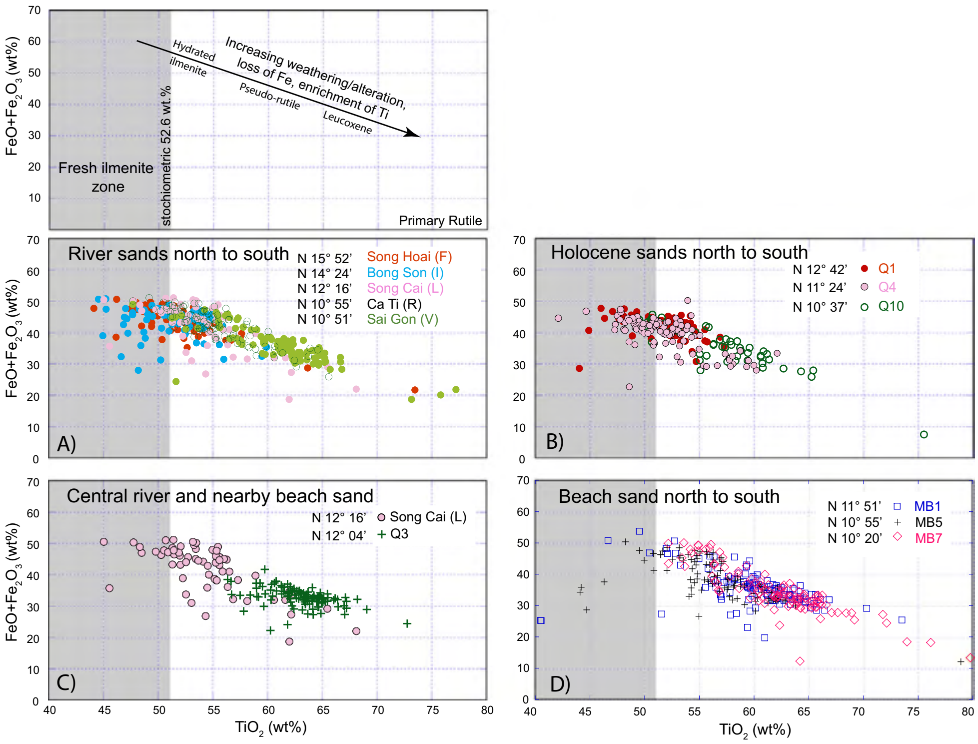

Fig. 5. Ti and Fe contents of ilmenite grains from river and coastal sand samples.

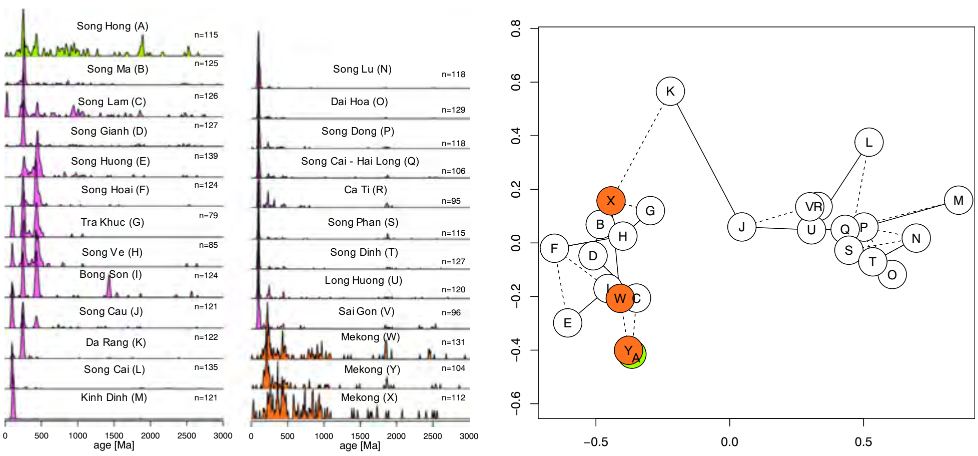

Fig. 6. Kernel density and Multidimensional Scaling plots of the detrital zircon U—Pb results from the river samples shown in Fig. 2.

the Song Hong (Red River) and Mekong have age distributions dominated by a wide range of Proterozoic ages that reflect source rocks in the catchments beyond Vietnam, e.g. Mekong samples X and Y from Laos (Fig. 2). The proportion of 400–500 Ma zircons is seen to increase southwards at the expense of Proterozoic grains (Fig. 6). South of 14°N, river (sample L onwards) zircon age distributions are dominated by either Permo-Triassic, Cretaceous or Ordovician-Silurian peaks (Fig. 6). The Permo-Triassic ages are likely to be volcanic rather than granitic as the main rocks types in the study area are rhyolites and tuffs belonging to the Mang Yang Formation although Triassic granulites are known in the Kontum area (Carter et al., 2001). The majority of age spectra contained a few Proterozoic ages, some of which are clearly related to inherited cores (Supplementary Fig. 1). This observation is consistent with Shellnutt et al. (2013) who noted magma mixing with older basement was required to explain the composition and inherited ages of the Cretaceous granites.

As visual comparison of KDE plots is subjective the data, were also plotted as Multidimensional Scaling (MDS) maps (Vermeesch, 2013). The MDS approach, based on Kolmogorov–Smirnov effect size, group samples with similar age spectra, and pull apart samples with different spectra. The MDS map (Fig. 6) clearly shows two groups of samples. The left group comprises rivers from northern Vietnam plus the Mekong that have abundant Proterozoic ages. The right-hand group comprises river samples from central and southern Vietnam which are dominated by Permo-Triassic and Cretaceous age peaks. These two groups reflect changes in regional geology whereby northern Vietnam is dominated by Proterozoic and Paleozoic metamorphic basement, compared to the south where Mesozoic granitoids and Cenozoic basalts dominate. A transition between these groups occurs around the Kontum massif, which marks the northern limit of the main study area. The catchment of river K (Da Rang) spans this junction and therefore plots between the two main clusters. Based on these results it will be possible to identify if any of the heavy mineral sands originated from northern Vietnam.

4.4. Detrital zircon U—Pb coastal sand results

KDE plots of detrital zircon ages from coastal Quaternary (Q) and modern beach (MB) sands (Fig. 7) show prominent age groups spanning 90–120 Ma and 220–250 Ma plus a minor group at 400–500 Ma. The age distributions are remarkably similar across the whole study area, differing only in the proportions of zircons within each age group. The accompanying MDS plot suggests samples Q1 and Q2, from north of Nha Trang (Fig. 1) are different from the rest but this is simply due to fewer Cretaceous ages compared to the other samples, despite being located <50 km from the Cretaceous Deo Ca magmatic Complex. The Da Rang (river K) is local to samples Q1 and Q2 and shows a similar age distribution (Fig. 7) although there are fewer Cretaceous and

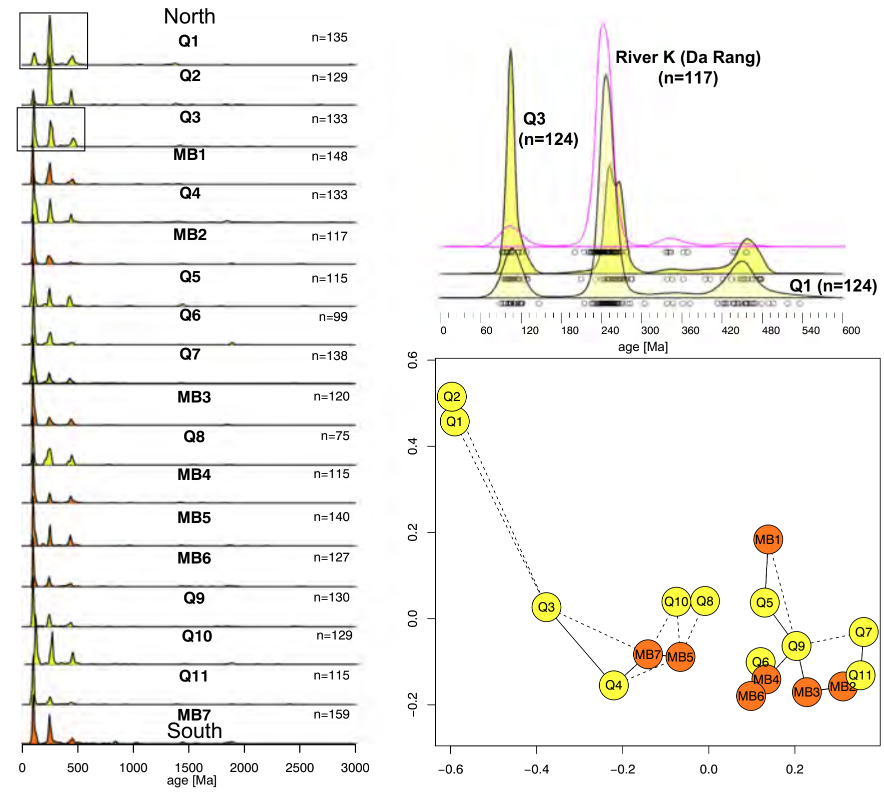

Fig. 7. Kernel density and Multidimensional Scaling plots of detrital zircon U—Pb results from coastal sands. Prefix Q indicates a Quaternary sand and MB modern beach sands.

Ordovician-Silurian zircons. South of the Da Rang, all other rivers, apart from the Mekong, are dominated by Cretaceous zircons.

5. Discussion

Heavy mineral sand mineralogy data support derivation from a mixture of magmatic and high-grade metamorphic lithologies. Many sands contain trace amounts of the high-grade metamorphic minerals sillimanite and kyanite (present in both river and coastal sands) but olivine and pyroxenes are missing despite the widespread occurrence of Neogene basalts throughout southern Vietnam (see Table 1). Likely sources of sillimanites are outcrops of biotite-sillimanite-cordierite-garnet gneiss in the Kontum district. This is supported by the higher amounts of sillimanite in rivers G and H (Fig. 2) that drain this area. However, sillimanite is also present farther south in the Song Cai (L in Fig. 2) and in Holocene heavy mineral sands near Phan Rang (Q4 in Fig. 1), a region dominated by Cretaceous granites. Rocks west of Nha Trang have been mapped as Proterozoic amphibole gneiss and schists so it is conceivable that sillimanite rocks may also exist in this area.

Feldspar contents in river sands, which are typically between 10 and 40%, have been reduced to <2% in most heavy mineral sands indicating considerable density separation (and/or weathering) within the marine environment. Whilst none of these observations enable specific source areas to be identified, several common trends have been recognized amongst the petrological, geochemical and geochronological datasets that reflect the sediment routing system. Amphibole abundances

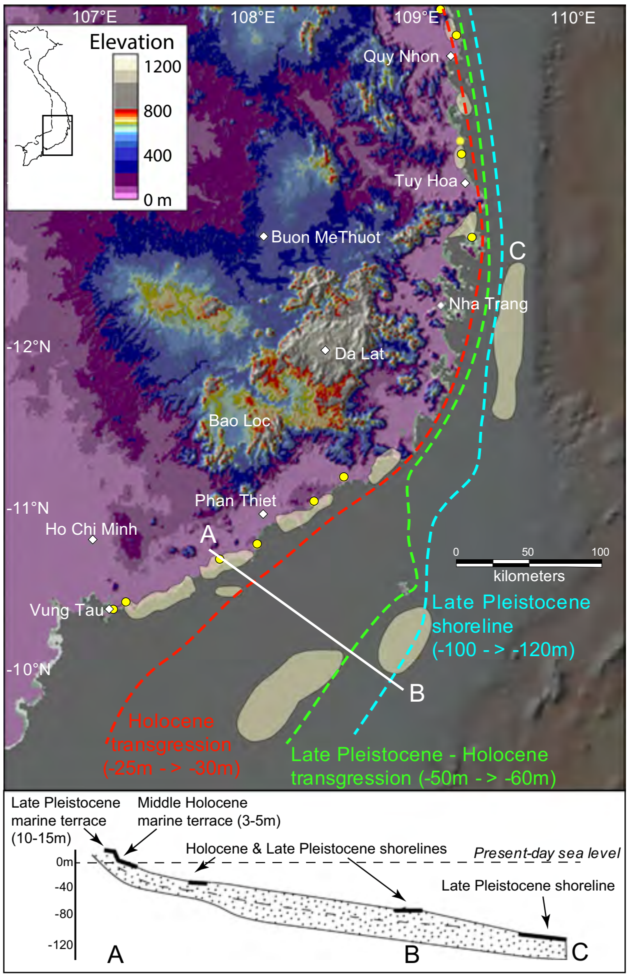

Fig. 8. Relationship between late Pleistocene to Holocene sealevel change, shorelines and locations of the heavy mineral sands. The lower plot shows the link between OSL dated sands and Holocene sea level based on data from Quang-Minh et al. (2010) and Stattegger et al. (2013).

decrease from north to south and ilmenite TiO_2 content increases southwards. Relatively fresh ilmenite is delivered to the oceans by rivers in central Vietnam (e.g., Song Cau) compared to rivers in the south (e.g., Sai Gon), where alteration due to weathering is more developed (Fig. 5A). However, ilmenite TiO_2 content in river sands do not match local heavy mineral deposits (Fig. 5C). Collectively, this evidence shows most of the alteration must have taken place after deposition by rivers. One possibility is that the wider coastal plains found in the south are more conducive to intermediate storage (and weathering) before remobilisation and final deposition (Fig. 8).

Southward widening of the SE Vietnam Shelf area has not only increased the distance between sediment sources to the middle and outer shelf but also created a wide plain that would have been exposed to weathering during the late Pleistocene and Holocene lowstands. With rising sealevel some of this sand would have been remobilised and transported inland, especially during the Holocene highstand between 6 and 7 ka. Sand was subsequently reworked by wave activity and redeposited during interstadial and interglacial transgressions. The narrow continental shelf farther north and the proximity of the mountainous terrain to the coast limit the amount of surface area exposed weathering in the northern and central coastal areas.

Studies of modern and late Pleistocene to Holocene stratigraphy of the shelf areas of central and southern Vietnam (Dung et al., 2013, 2014; Stattegger et al., 2013; Tan et al., 2014) have identified at least five major seismic units and three bounding surfaces that can be linked to known sealevel adjustments including relict beach-ridge deposits at water depths of about ~130 m below present that are associated with the last glacial lowstand. More importantly, in relation to understanding the processes by which sands became weathered and enriched in heavy minerals, studies (Dung et al., 2013, 2014) have noted an absence of falling stage systems tract deposits. This can be explained as the result of inner and middle shelf deposits being subjected to erosion and reworking during successive sea-level falls following highstands and reworking again during the following transgression. Repeating cycles of reworking would also have been influenced by strong monsoon driven bottom currents evidenced by numerous NE–SW oriented sand waves that today are found at modern water depths of 20–40 m (Dung et al., 2013). Fig. 8 shows former coastlines associated with past lowstands and their relationship to onshore and offshore placer sands (Quang-Minh et al., 2010; Stattegger et al., 2013).

Detrital zircon data help to define where placer sands came from. Results from rivers along the coast of Vietnam show clear differences in zircon age distributions between northern Vietnam and central to southern Vietnam that directly reflect changes in the local geology (Fig. 6). Differences between river and placer zircon age distributions (Fig. 9) rule out sources from northern and central Vietnam, which are dominated by older rocks. Exceptions are Mekong river samples that yielded significant numbers of Precambrian zircon ages. Similar old ages are also found in the late Pliocene to early Pleistocene Ba Mieu Formation (proto-Mekong) found east of Ho Chi Minh City (Hennig et al., 2018). Much of this formation has been eroded away and therefore if these rocks (and paleo Mekong deposits in general) were an important source there should be significant numbers of Precambrian zircon ages present in the coastal sands. That this is not the case shows that Mekong river sands (modern or ancient) could not have been the main source of the placer sands. Geochronological and geochemical characteristic of placer and contemporary sands support a local origin defined by river catchments that are dominated by Cretaceous magmatism associated with an active continental margin, i.e., the Da Lat zone and areas to the south. Apart from Quaternary samples Q1 and Q2 that contain a larger proportion of ages between 220 and 250 Ma and 400–500 Ma, there is no significant difference between modern and older sand deposits (Fig. 7). This is likely due to mixing associated with changes in sealevel. Lack of Precambrian grains in the coastal placer deposits and beach sands rule out significant longshore transport from the north or reworking of paleo-Mekong sands in the south.

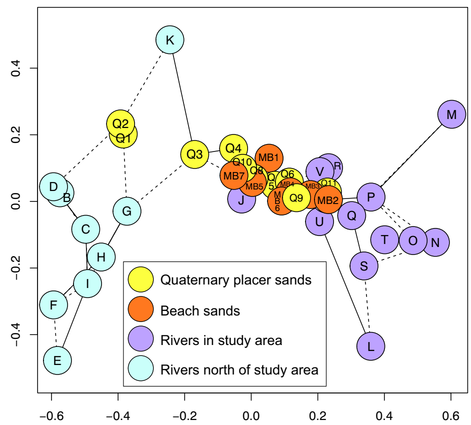

Fig. 9. Multidimensional Scaling plot combining all detrital zircon samples apart from the Mekong and Red rivers that have been excluded due to their markedly different age spectra that rule out these rivers as sand sources.

6. Conclusions

Placer sands along the coastal margins of central and southern Vietnam have been enriched in heavy minerals by cycles of deposition, weathering and erosion, and reburial associated with interstadial and interglacial sealevel changes. Weathering took place during lowstands. Geochemical and geochronological data show sands were derived from river catchments that contain outcrops of Cretaceous magmatic rocks. Results do not support significant longshore transport from northern Vietnam or from the Mekong delta in the south. Had there been significant transport from the north, placer sands would contain large numbers of zircons with Proterozoic and Paleozoic ages that typify the geology of these areas, including the large catchment area of the Red River that extends into South China. Mekong sources can be ruled out for similar reasons. Ilmenite sources were observed in all of the main river outlets along the southern to central Vietnamese coastline although fresh unaltered grains were mainly found in the central region. A progressive enrichment of ilmenite TiO_2 content was observed from north to south due to more intense weathering related to a widening of the shelf area. This would have increased surface area exposure of unconsolidated shelf sediments to weathering during glacial sea-level lowstands and remobilisation and mixing during subsequent transgressions.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.sedgeo.2018.06.008.

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