Volatile Budget of the Galapagos Plume

M. PETERSON[1]*, A. SAAL[1], E. HAURI[2], M. KURZ[3], R. WERNER[4], F. HAUFF[4], D. GEIST[5] AND K, HARPP[5]

[1]Brown University, Providence, RI, 02912, USA (*correspondence: mary_peterson@brown.edu)
[2]DTM CIW, Washinton DC, 20015, USA
[3]WHOI, Woods Hole, MA, 02543, USA
[4]GEOMAR, Kiel, 24148, Germany
[5]University of Idaho, Moscow, ID, 83844, USA

The study of volatiles (H_2O, CO_2, F, S, and Cl) is important because volatiles influence melting and crystallization, as well as the rheology of the mantle. New volatile data obtained from 89 submarine glass chips collected from the Galapagos show variations between regional mantle sources forming the Galapagos Archipelago.

The concentration of volatiles can be affected by degassing, sulfide saturation, and assimilation of hydrothermally altered material. We use ratios between volatile and refractory elements that have similar incompatibilities to account for melting and crystal fracitonation. Degassing has affected the concentration of CO_2 of the samples, but has had a minor impact on the concentration of H_2O, F, Cl and S. Our samples are sulfide undersaturated. Assimilation of hydrothermally altered material is assessed using Cl/K ratios and the magnitude of the Sr anomaly (Sr/Sr*>1), which can indicate plagiocalse assimilation. Samples depleted in trace elements (TE) have Cl/K ratios greater than the 0.01 expected for a depleted source. They also show a positive correlation between Sr/Sr* and volatile/refractory ratios, indicating assimilation has affected all of the volatile concentrations of these depleted samples. Intermediate to enriched TE samples have been less affected by contamination.

Within our sample suite there are 3 end-member compositions; a high $^3He/^4He$ group (>20*Ra), a TE-enriched group similar to Pinta Is., and a TE-depleted group. The S/Dy ratios for the sample suite cluster around a mean value of 220±41. Between the high $^3He/^4He$ group and the TE-enriched group, H_2O/Ce ranges from 160±33 to 146±28 and the F/Nd varies from 19±1 to 25±2 respectively. The H_2O/Ce ratios of TE-depleted samples are significantly contaminated, but the F/Nd ratio is 16±2. The high $^3He/^4He$ and TE-enriched samples are significantly degassed but the TE-depleted have CO_2/Nb ratios up to 400, slightly higher than expected for undegassed MORB. Uncontaminated Cl/K ratios are defined as the lowest ratios at a given TE enrichment (Nb/La). Our uncontaminated values are consistent with those previously reported for MORB and OIB.

U-Pb-Hf – isotopes of zircon from the eastern part of the Sveconorwegian Orogen, SW Sweden: Implications for the growth of Fennoscandia

ANDREAS PETERSSON[1], ANDERS SCHERSTÉN[1], JENNY ANDERSSON[2] AND CHARLOTTE MÖLLER[1]

[1]Department of Geology, Lund University, Sölvegatan 12, SE-223 62 Lund, Sweden. (andreas.petersson@geol.lu.se; anders.schersten@geol.lu.se; charlotte.moller@geol.lu.se)
[2]Geological Survey of Sweden, Box 670, SE-751 28 Uppsala, Sweden.(jenny.andersson@sgu.se)

Models for the growth of Fennoscandia, including the crust in the eastern part of the Sveconorwegian orogen, have largely been based on U-Pb data and do not discriminate between juvenile and reworked crust. These growth models also stand in contrast with current estimated reworking rates of the Palaeoproterozoic. The present comprehension of the growth of southwestern Fennoscandia involve ~330 million years of semi-continuous, subduction-related magmatism. We present new combined U-Pb and Hf isotopic data, from the Eastern Segment and the Idefjorden terrane of the Sveconorwegian Province, and suggest a revised model of crustal growth. Most of the crystalline basement in this part of the shield formed by mixing of a 2.1 to 1.9 Ga juvenile component and Archaean crust. Our combined U-Pb-Hf data reveal that Archaean reworking decreased between 1.9 and 1.7 Ga and a mixed Svecofennian crustal reservoir was generated. Succeeding magmatism between 1.7 and 1.4 Ga involved reworking of this reservoir with little or no crust generation. An influx of juvenile magma is recorded at *c*. 1.2 Ga by granite to quartz-syenite magmatism with mildly depleted ($\varepsilon Hf_{(1.18\ Ga)}$ of *c*. 3) signatures. The amount of recycled crust in the 1.9-1.7 Ga arc system as recorded by the U-Pb-Hf system is thus in contrast to previously proposed models for the growth of the southwestern part of the Fennoscandian Shield. Our data agree with the proposed long-term subduction along the western margin of Fennoscandia, but suggest substantial reworking of existing crust and minor amounts crustal growth after 1.9 Ga.

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