Appendix A

Figure A.1. Stratigraphic sections of two well developed paleosol horizons from the Cerro Quirma section.

Appendix B

Table B.1. U/Pb data from 13CP97s, 13AC71t, 12YR07t, 12MN54t, and 12SG19t. All calculations and plots are made with Isoplot 3.7 (Ludwig, 2008).

Appendix C

Detailed methodology

Pollen Extraction

The palynological samples are processed following the standard technique (Traverse 2007), including digestion of 10 grams of rock in HCL for 12 hours, addition of water and decantation after 12 hours, followed by digestion in HF for at least 24 hours; addition of water and decantation of the acid solution after 24 hours. Sieving of the dissolved mineral fraction is done initially by mesh 250 microns to eliminate the thick fraction, followed by sieving through a 10 microns mesh. Panning of the fraction >10 μm is done in ultrasonic equipment to recover the less dense organic matter fraction. This residue is cleaned in ultrasonic equipment for few seconds, and the organic residue is concentrated by centrifugation, followed by mounting of a first cover slide in a solution of polyvinyl alcohol. A second cover slide is mounted after oxidation with nitric acid, and sealed with Canadian balsam.

Carbonate

Micritic carbonate samples are crushed (or microdrilled in the cases where minor sparite was present) in the stable isotope laboratory (SIREAL) at the University of Rochester. The $\delta^{18}O_c$ values are measured from CO_2 evolved from carbonate samples during reaction with 103% H_3PO_4. The $\delta^{18}O_c$ analysis is carried out using a Finnigan DeltaPlus XP mass spectrometer and is normalized with respect to internal crayola, prang and thermo chalk standards at SIREAL. The Δ_{47} values are measured using a Thermo-Finnigan MAT 253 mass spectrometer at CalTech from the CO_2 evolved after reaction of the samples with ≥100% H_3PO_4 at 90ºC. All Δ_{47} values are normalized relative to high-temperature equilibrium gases (after Eiler, 2007) at CalTech.

Leaf wax *n*-alkane

The leaf wax n-alkane extraction and analyses are carried out at the University of Texas at Austin. Lipid extractions are performed on 100-150g of freeze-dried and homogenized sediments by microwave solvent extraction (CEM MARS) with CH2Cl2: CH3OH (9:1, v/v). Extracts are filtered over Na2SO4 and separated into nonpolar and polar fractions over silica gel (fraction 1 (F1): 5 ml hexane; fraction 2 (F2): 4 ml methanol). n-alkanes were quantified using a gas chromatograph-flame ionization detector (GC-FID) with a split-splitless detector operated in splitless mode (300°C) and a 30m DB-column with H2 carrier gas flow rate of 1.5 ml/min. The GC temperature program was initialized at 40 °C for 3 minutes and increased at 15°C/min to 320°C where it was held for 10 min. Each sample was run in duplicate and quantitation was performed using calibrations developed using a series of authentic n-alkane standards of varying

concentration measured using the same GC-temperature program and injection conditions. Compound specific stable isotope analyses were performed using a Thermo Scientific Trace GC Ultra coupled to a Delta V isotope ratio mass spectrometer via a high temperature pyrolysis system. The GC was equipped with a programmable temperature vaporization (PTV) injector operated in splitless mode with a 2.0 mm i.d. Siltek deactivated liner packed with silanized glass wool. A DB-5 column (30 m 0.25 mm i.d., 0.25 μm stationary phase) was used with a He carrier gas flow of 1.4 ml min-1. The GC oven temperature was increased from 60 °C to 320°C at 6°C min-1 and held for 20 minutes. Prior to running samples and standards the aluminum oxide reactor in the high temperature pyrolysis device was conditioned by injecting ~1 ml of hexane at 1440 °C. Every 50-70 injections, the reactor was reconditioned to maintain pyrolysis efficiency. System leaks were assessed daily by monitoring background Argon (m/z = 40 <25 mV). The H3+ factor was determined daily prior to calibration and sample analysis and was stable throughout the period of analysis (2.8 ± 0.13). On a daily basis we also assessed the stability of dD values as a function of GC conditions by injecting methane reference gas at 100 s intervals while running the GC temperature program and found the dD values of the reference gas to be stable (-156.3 ± 1.2). A laboratory standard containing a series of n-alkanes of known isotopic composition (B4 standard, Dr. Arndt Schimmelmann, Indiana University) was measured 3-5 times at the beginning and end of each day and after every four to assess the external precision of the δD analyses (<±5.0‰) and to determine the value of the methane reference gas on the VSMOW scale . During sample analysis, injection volumes were optimized to keep the

target peaks between 3-6 volts. Individual samples were run in triplicate and the average value is reported here, with a mean error of ±3.9‰. Sample values were calibrated to the VSMOW scale using 3 injections of the methane reference gas at the beginning and end of each GC run. Within run precision of the propane reference peaks was ±3.5‰.

Figure C.1. Representative GC trace of leaf-wax samples. GC trace of one sample each from Member B and C are shown.

Appendix D

Figure D.1. Plot of $\delta^{13}C$ (VPDB), $\delta^{18}O$ (VPDB) and $T\Delta_{47}$ values. Type of samples are distinguished by the color highlighting the sample name: blue for lacustrine, orange for calcrete, yellow for concretion and green for paleosol. Two diagenetically altered samples (10PE40c and 10PE41c) are shown in red. In these two samples, high $T\Delta_{47}$ corresponds with negative incursion in both $\delta^{13}C$ (VPDB) and $\delta^{18}O_c$ (VPDB) values.

Figure D.2. Map of the collecting localities for pollen specimens included in the analysis. *Podocarpus* in Perú is represented by six species and it is only found in the eastern slope of the Andes. Data from Global Biodiversity and Information Facility, www.gbif.org (2011), Hijmans et al. (2005) and Punyasena et al. (2011).

Figure D.3. Box plots of altitudinal, temperature and precipitation distributions for the 91 specimens included in the analysis. Median values are designated by horizontal bars. The

edges of the box are the 25th and 75th percentiles. Whiskers represent ±2.72σ or 99% of the data. Outliers are plotted as single points. Summary plot of Podocarpus in Peru is depicted in the first column. The number of specimens included in the box plot is referenced in parentheses.

Figure D.4. Fossil leaves with serrated edges found in the Cerro Pucara section. They are tentatively identified as *Polyepis*. *Polyepis* is found in modern high elevation condition (Gregory-Wodzicki, 1998) and indicative of ~10ºC MAAT.

Table D.1. Palynological contents of samples from members B and C. Numbers are in numerical counts of palynopmorphs.

Table D.2. Summary of all analyzed carbonate data: Δ_{47} and $\delta^{18}O_c$ (VPDB) and the reconstructed MAAT, WAMT and $\delta^{18}O_{mwc}$ (VSMOW). The reported errors are 1σ. We do not show WAMT values for lacustrine/palustrine carbonates as their $T\Delta_{47}$ values are interpreted as representative of warmer air temperature.

Table D.3. Concentration data of the all the analyzed leaf wax samples.

Table D.4. Summary of all analyzed leaf wax data, with individual C27-33 values and the average δD_{wax} (VSMOW) of each sample. The reported errors are in 1σ. The errors reported for each individual chain length is calculated by the methodology described in

Polissar and D'Andrea. (2014). We used vegetation specific enrichment factors ($\varepsilon_{mw/wax}$) of -98±6‰ and -120±9‰ (Polissar and Freeman, 2010) to calculate δD_{mwwax} (VSMOW) and local water line relationship (Gonfiantini et al., 2001) to calculate $\delta^{18}O_{mwwax}$ (VSMOW).

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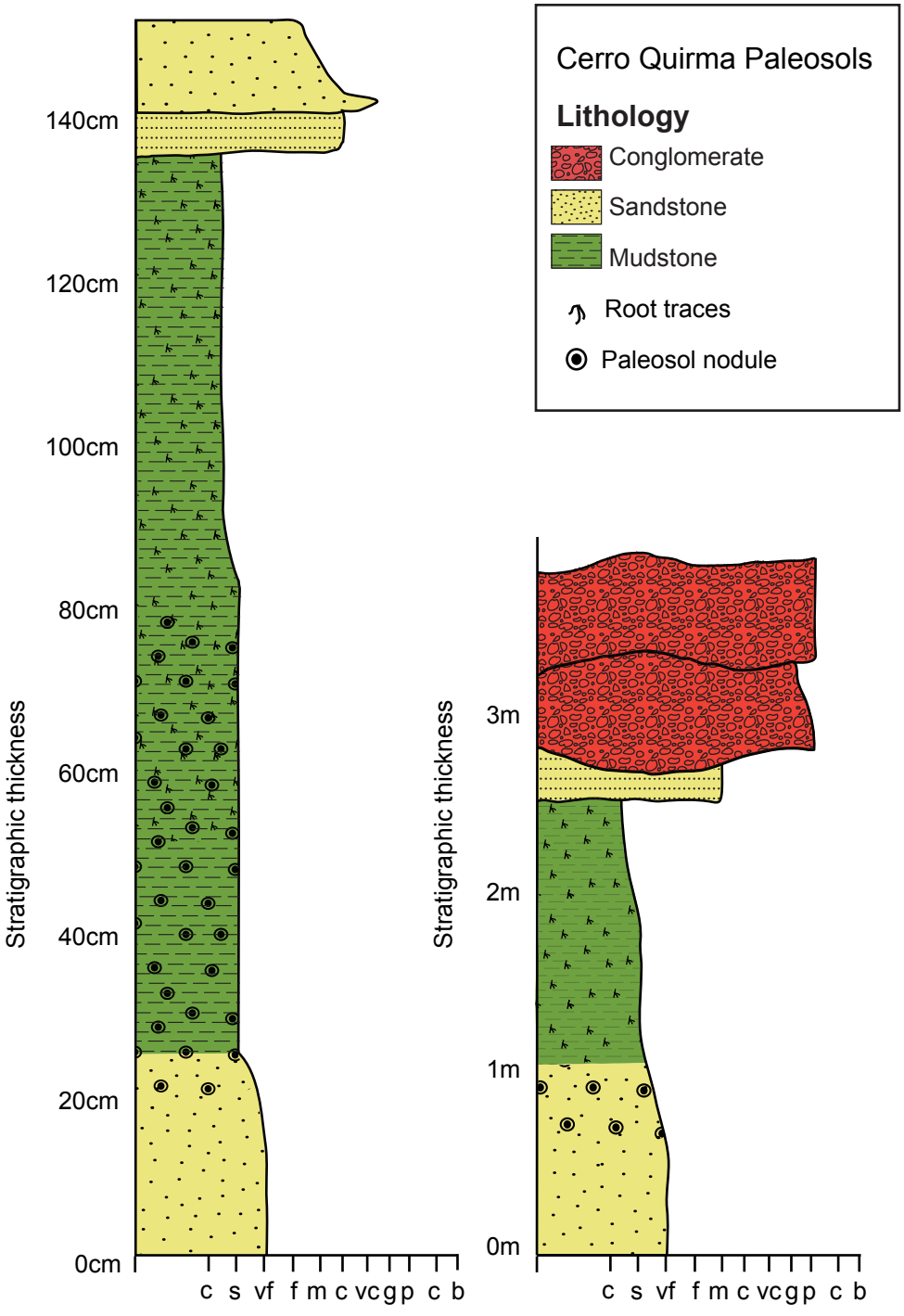

Cerro Quirma Paleosols
Lithology
Conglomerate
Sandstone
Mudstone
Root traces
Paleosol nodule
Stratigraphic thickness
140cm
120cm
100cm
80cm
60cm
40cm
20cm
0cm
c s vf f m c vc g p c b
Stratigraphic thickness
3m
2m
1m
0m
c s vf f m c vc g p c b

Figure A.1.

Samples	Latitude (WGS84)	Longitude (WGS84)	Altitude
13CP97s	-14.791	-71.395	3917
13AC71t	-14.812	-71.242	3949
12YR07t	-14.785	-71.416	3924
12MN54t	-14.741	-71.419	3890
12SG19t	-14.740	-71.325	4061

Table B1. U-Pb geochronologic analyses.

						Isotope ratios					Apparent ages (Ma)								
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	Best age	±	Conc
	(ppm)	204Pb		207Pb*	(%)	235U*	(%)	238U	(%)	corr.	238U*	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)
12MN54t																			
12MN54T-1T	306	517	1.1	7.5203	48.3	0.0	50.2	0.0	13.9	0.3	14.9	2.1	42.1	20.7	2137.6	905.2	14.9	2.1	NA
12MN54T-2T	460	38571	3.2	19.4731	2.4	0.3	2.7	0.0	1.4	0.5	248.2	3.5	249.0	6.1	256.7	54.1	248.2	3.5	NA
12MN54T-3T	1249	6674	0.4	25.1845	38.9	0.0	39.2	0.0	4.3	0.1	12.2	0.5	10.5	4.1	-370.0	1042.9	12.2	0.5	NA
12MN54T-4C	1528	4324	1.9	29.3579	71.3	0.0	72.0	0.0	9.8	0.1	4.7	0.5	3.5	2.5	-784.8	2299.4	4.7	0.5	NA
12MN54T-5T	299	1090	0.6	6.8092	176.5	0.0	179.1	0.0	29.9	0.2	11.4	3.4	35.8	63.1	2309.7	166.7	11.4	3.4	NA
12MN54T-6T	306	1317	0.7	6.3770	291.3	0.0	292.2	0.0	22.3	0.1	12.2	2.7	40.8	117.4	2421.6	173.2	12.2	2.7	NA
12MN54T-7T	264	3448	1.2	5.5073	202.7	0.0	204.9	0.0	29.6	0.1	12.5	3.7	48.3	96.9	2667.3	301.4	12.5	3.7	NA
12MN54T-7TB	274	1860	1.1	12.8930	66.5	0.0	81.9	0.0	47.8	0.6	11.3	5.4	18.9	15.4	1135.6	1517.0	11.3	5.4	NA
12MN54T-9T	230	324	0.8	12.8229	75.7	0.0	82.0	0.0	31.6	0.4	12.1	3.8	20.4	16.5	1146.5	1830.9	12.1	3.8	NA
12MN54T-10T	216	376	0.7	12.0417	100.5	0.0	107.1	0.0	37.0	0.3	12.3	4.6	22.0	23.3	1270.3	131.2	12.3	4.6	NA
12MN54T-11C	462	3677	1.5	26.2673	30.7	0.0	31.4	0.0	6.8	0.2	25.8	1.7	21.2	6.6	-480.3	830.3	25.8	1.7	NA
12MN54T-12T	430	1528	1.0	17.3686	63.0	0.0	66.2	0.0	20.4	0.3	11.7	2.4	14.5	9.5	513.6	1545.4	11.7	2.4	NA
12SG19t						Isotope ratios					Apparent ages (Ma)								
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	Best age	±	Conc
	(ppm)	204Pb		207Pb*	(%)	235U*	(%)	238U	(%)	corr.	238U*	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)
12SG19T-1T	447	2941	1.7	9.7821	181.1	0.0	181.8	0.0	15.7	0.1	9.6	1.5	21.2	38.1	1664.9	301.8	9.6	1.5	NA
12SG19T-2T	700	3135	0.7	19.2136	120.2	0.0	120.6	0.0	9.4	0.1	9.4	0.9	10.6	12.7	287.5	981.2	9.4	0.9	NA
12SG19T-3T	422	1214	1.2	-4.5477	456.3	0.0	456.7	0.0	18.9	0.0	8.9	1.7	-43.5	-205.7	NA	NA	8.9	1.7	NA
12SG19T-4T	590	620	1.2	12.4152	55.4	0.0	58.3	0.0	18.3	0.3	8.9	1.6	15.4	8.9	1210.4	1189.4	8.9	1.6	NA
12SG19T-5T	380	240	1.9	15.2894	60.1	0.0	75.5	0.0	45.7	0.6	7.5	3.4	10.6	7.9	787.4	1396.0	7.5	3.4	NA
12SG19T-7T	457	2889	1.6	19.9922	34.2	0.0	34.4	0.0	4.0	0.1	22.2	0.9	23.9	8.1	195.9	816.5	22.2	0.9	NA
12SG19T-8T	135	424	0.9	-4.2966	125.4	0.0	139.6	0.0	61.3	0.4	7.6	4.6	-39.0	-55.5	NA	NA	7.6	4.6	NA
12SG19T-9T	175	1196	1.1	14.3409	89.1	0.0	91.7	0.0	21.9	0.2	20.0	4.4	29.9	27.1	920.5	282.5	20.0	4.4	NA
12SG19T-10T	460	1815	1.7	1.9778	929.2	0.1	929.3	0.0	9.7	0.0	9.3	0.9	97.8	1288.3	NA	NA	9.3	0.9	NA
12SG19T-11T	392	2504	1.4	6.8187	197.1	0.0	199.1	0.0	28.1	0.1	9.6	2.7	30.2	59.3	2307.3	82.5	9.6	2.7	NA
12SG19T-12T	420	440	1.1	13.3770	50.0	0.0	53.4	0.0	18.6	0.3	9.9	1.8	16.0	8.5	1061.9	1077.3	9.9	1.8	NA
12SG19T-13T	451	4502	1.5	19.0165	15.7	0.0	16.9	0.0	6.3	0.4	26.5	1.7	29.9	5.0	311.0	358.5	26.5	1.7	NA
12SG19T-14T	713	4265	1.0	23.6937	49.6	0.0	50.8	0.0	11.3	0.2	9.7	1.1	8.9	4.5	-214.2	1318.2	9.7	1.1	NA
12SG19T-15T	289	900	1.2	16.7090	78.8	0.0	83.7	0.0	28.3	0.3	15.6	4.4	20.1	16.7	598.1	2105.7	15.6	4.4	NA
12SG19T-17T	1662	4305	0.6	23.7112	31.5	0.0	31.7	0.0	3.5	0.1	12.7	0.4	11.6	3.7	-216.1	809.6	12.7	0.4	NA

Table B1 continued. U-Pb geochronologic analyses.

12SG19t						Isotope ratios					Apparent ages (Ma)								
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	Best age	±	Conc
	(ppm)	204Pb		207Pb*	(%)	235U*	(%)	238U	(%)	corr.	238U*	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)
12SG19T-18T	434	1829	1.8	2.2821	1045.2	0.1	1045.3	0.0	11.7	0.0	9.0	1.0	82.0	1147.2	4045.6	233.4	9.0	1.0	NA
12SG19T-19T	508	342	0.6	18.8717	72.2	0.0	73.0	0.0	11.2	0.2	8.6	1.0	9.8	7.2	328.4	1913.3	8.6	1.0	NA
12SG19T-20T	665	1589	0.7	9.6237	35.9	0.0	39.7	0.0	16.9	0.4	8.4	1.4	18.8	7.4	1695.1	685.9	8.4	1.4	NA
12YR07t						Isotope ratios					Apparent ages (Ma)								
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	Best age	±	Conc
	(ppm)	204Pb		207Pb*	(%)	235U*	(%)	238U	(%)	corr.	238U*	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)
12YR07T-1T	263.6	357.5	1.2	5.8638	89.9	0.0	103.1	0.0	50.5	0.5	4.6	2.3	16.7	17.1	2562.9	NA	4.6	2.3	NA
12YR07T-2T	502.1	943.9	0.9	6.9258	122.4	0.0	130.0	0.0	43.9	0.3	4.8	2.1	14.9	19.3	2280.5	385.8	4.8	2.1	NA
12YR07T-3T	390.8	303.9	1.1	-5.2128	507.6	0.0	510.0	0.0	49.9	0.1	4.8	2.4	-20.2	-104.2	NA	NA	4.8	2.4	NA
12YR07T-4T	182.9	165.7	1.3	-0.1714	2234.7	-0.6	2235.2	0.0	49.0	0.0	4.5	2.2	-850.8	NA	NA	NA	4.5	2.2	NA
12YR07T-5T	223.5	238.1	1.0	4.0546	119.2	0.0	159.1	0.0	105.4	0.7	4.8	5.1	25.5	40.1	3163.3	920.2	4.8	5.1	NA
12YR07T-6T	313.7	629.7	1.3	-0.3853	1706.2	-0.3	1706.6	0.0	39.6	0.0	4.7	1.9	-309.2	NA	NA	NA	4.7	1.9	NA
12YR07T-7T	256.0	695.0	1.1	0.6080	665.4	0.2	667.4	0.0	52.4	0.1	4.5	2.4	150.7	1615.7	NA	NA	4.5	2.4	NA
12YR07T-8T	275.3	461.5	1.0	1.7417	278.3	0.1	283.0	0.0	51.3	0.2	4.4	2.3	53.8	149.3	NA	NA	4.4	2.3	NA
12YR07T-9T	355.1	647.4	1.0	-5.8818	324.4	0.0	325.9	0.0	30.6	0.1	4.6	1.4	-17.3	-56.9	NA	NA	4.6	1.4	NA
12YR07T-10T	284.6	770.0	1.1	-2.2999	598.1	-0.1	599.4	0.0	38.8	0.1	5.7	2.2	-55.2	-353.4	NA	NA	5.7	2.2	NA
12YR07T-11T	201.6	407.9	1.4	1.9420	181.2	0.1	196.9	0.0	77.2	0.4	5.3	4.1	57.3	110.1	NA	NA	5.3	4.1	NA
12YR07T-12T	232.0	345.5	1.4	-0.2295	2852.9	-0.5	2853.7	0.0	63.5	0.0	4.9	3.1	-625.0	NA	NA	NA	4.9	3.1	NA
12YR07T-13T	244.1	518.3	1.1	9.4157	174.3	0.0	191.3	0.0	78.7	0.4	4.4	3.4	10.0	19.1	1735.3	218.0	4.4	3.4	NA
12YR07T-14T	115.7	69.3	1.3	2.9416	45.2	0.0	108.6	0.0	98.7	0.9	4.5	4.5	33.1	35.3	3662.5	1540.1	4.5	4.5	NA
12YR07T-15T	253.4	1641.8	0.8	4.6316	211.0	0.0	219.7	0.0	61.1	0.3	5.1	3.1	23.5	51.1	2950.4	455.7	5.1	3.1	NA
12YR07T-17T	456.3	709.9	0.9	-3.4856	331.4	0.0	332.4	0.0	25.9	0.1	5.2	1.4	-33.2	-112.6	NA	NA	5.2	1.4	NA
12YR07T-18T	302.5	402.1	1.2	10.4184	91.6	0.0	99.8	0.0	39.5	0.4	4.9	2.0	10.3	10.2	1547.4	99.7	4.9	2.0	NA
12YR07T-19T	134.1	154.7	1.3	1.4304	162.9	0.1	196.2	0.0	109.3	0.6	3.5	3.8	52.0	99.7	NA	NA	3.5	3.8	NA
13AC71t							Isotope						Apparent						
							ratios						Ages (Ma)				Best		
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	age	±	Conc
	(ppm)	204Pb		207Pb*	(%)	235U*	(%)	238U	(%)	corr.	238U*	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)
13AC71T-1	125	1338	1.4	22.1315	2.5	0.0266	3.3	0.0043	2.2	0.66	27.5	0.6	26.7	0.9	-45.7	60.8	27.5	0.6	NA
13AC71T-2	110	1237	1.4	21.4801	2.2	0.0269	2.4	0.0042	1.0	0.40	26.9	0.3	26.9	0.6	26.4	53.4	26.9	0.3	NA
13AC71T-3	834	5500	1.0	21.2508	0.7	0.0217	1.2	0.0033	1.0	0.83	21.5	0.2	21.8	0.3	52.1	16.7	21.5	0.2	NA
13AC71T-4	173	1648	0.5	20.2415	2.7	0.0212	3.0	0.0031	1.4	0.45	20.0	0.3	21.3	0.6	167.0	62.4	20.0	0.3	NA
13AC71T-5	116	74311	0.8	9.4021	0.5	4.3256	1.7	0.2950	1.6	0.95	1666.3	23.1	1698.3	13.7	1737.9	9.6	1737.9	9.6	95.9
13AC71T-6	77	1039	0.9	19.9319	3.2	0.0313	3.4	0.0045	0.9	0.26	29.1	0.3	31.3	1.0	202.9	75.3	29.1	0.3	NA
13AC71T-7	2269	5609	0.7	20.4850	1.1	0.0055	1.1	0.0008	0.4	0.33	5.3	0.0	5.6	0.1	139.0	25.4	5.3	0.0	NA

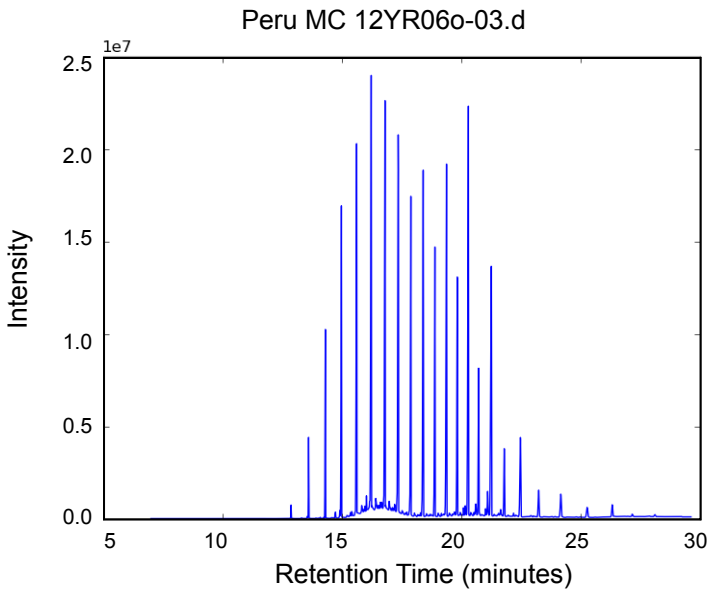
Table B1 continued. U-Pb geochronologic analyses.																				
13AC71t						Isotope ratios					Apparent ages (Ma)									
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	Best age	±	Conc
	(ppm)	204Pb		207Pb*	(%)	235U*	(%)	238U	(%)	corr.	238U*	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)
13AC71T-8	84	70292	1.0	10.0242	2.5	3.6770	4.9	0.2673	4.2	0.86	1527.2	57.6	1566.4	39.4	1619.6	47.0	1619.6	47.0	94.3
13AC71T-9	410	1160	0.7	21.6234	2.7	0.0075	2.8	0.0012	0.8	0.29	7.6	0.1	7.6	0.2	10.5	64.9	7.6	0.1	NA
13AC71T-10	967	11704	0.9	21.1042	1.9	0.0224	2.6	0.0034	1.7	0.67	22.1	0.4	22.5	0.6	68.6	46.2	22.1	0.4	NA
13AC71T-11	261	2047	0.5	19.5298	1.9	0.0099	2.1	0.0014	0.8	0.39	9.0	0.1	10.0	0.2	250.0	44.5	9.0	0.1	NA
13AC71T-12	101	33613	0.3	13.9356	0.8	1.4896	1.7	0.1506	1.5	0.89	904.1	12.6	926.2	10.2	979.1	15.5	979.1	15.5	92.3
13AC71T-13	102	1737	1.3	20.8784	4.1	0.0295	4.2	0.0045	0.5	0.13	28.7	0.2	29.5	1.2	94.1	97.6	28.7	0.2	NA
13AC71T-14	95	246	0.4	24.9241	5.2	0.0056	5.3	0.0010	1.3	0.24	6.6	0.1	5.7	0.3	-343.1	133.0	6.6	0.1	NA
13AC71T-15	141	2171	0.8	20.8802	1.8	0.0402	1.9	0.0061	0.7	0.34	39.2	0.3	40.1	0.7	93.9	42.3	39.2	0.3	NA
13AC71T-16	141	1995	0.8	20.2564	4.2	0.0293	5.4	0.0043	3.3	0.62	27.7	0.9	29.3	1.5	165.3	98.7	27.7	0.9	NA
13AC71T-17	146	34441	27.0	17.0562	0.9	0.6848	1.1	0.0847	0.6	0.53	524.2	2.8	529.7	4.3	553.4	19.5	524.2	2.8	94.7
13AC71T-18	112	74146	1.4	7.8903	1.1	6.4133	1.7	0.3670	1.2	0.74	2015.3	21.2	2034.1	14.5	2053.2	19.7	2053.2	19.7	98.2
13AC71T-19	211	2577	0.9	21.2447	2.4	0.0285	2.5	0.0044	0.6	0.24	28.2	0.2	28.5	0.7	52.8	57.2	28.2	0.2	NA
13AC71T-20	244	2096	2.6	20.3162	2.8	0.0284	2.9	0.0042	0.7	0.26	26.9	0.2	28.4	0.8	158.4	65.4	26.9	0.2	NA
13AC71T-21	193	2124	1.3	21.2818	1.9	0.0289	2.5	0.0045	1.6	0.65	28.6	0.5	28.9	0.7	48.7	45.2	28.6	0.5	NA
13AC71T-23	250	3476	0.8	20.3527	4.1	0.0299	4.1	0.0044	0.6	0.15	28.4	0.2	29.9	1.2	154.2	95.7	28.4	0.2	NA
13AC71T-24	275	4992	1.0	20.9164	1.9	0.0289	2.0	0.0044	0.7	0.34	28.2	0.2	28.9	0.6	89.9	44.7	28.2	0.2	NA
13AC71T-25	119	30342	2.1	16.6937	0.8	0.7900	0.8	0.0957	0.3	0.32	588.9	1.5	591.2	3.6	600.0	16.6	588.9	1.5	98.1
13AC71T-26	106	900	0.6	21.3604	3.3	0.0209	3.3	0.0032	0.6	0.18	20.9	0.1	21.0	0.7	39.9	78.7	20.9	0.1	NA
13AC71T-27	101	749	0.4	16.7952	14.2	0.0236	14.2	0.0029	1.3	0.09	18.5	0.2	23.7	3.3	586.9	308.4	18.5	0.2	NA
13AC71T-28	174	95191	2.3	8.3225	2.9	4.6478	3.2	0.2805	1.4	0.44	1594.1	19.9	1757.9	26.7	1958.5	51.1	1958.5	51.1	81.4
13AC71T-30	51	617	1.5	21.2218	2.3	0.0279	3.2	0.0043	2.2	0.70	27.7	0.6	28.0	0.9	55.4	55.0	27.7	0.6	NA
13AC71T-31	29	16238	3.3	11.5876	1.0	2.5970	4.9	0.2183	4.8	0.98	1272.6	55.1	1299.8	35.7	1344.9	18.8	1344.9	18.8	94.6
13AC71T-32	83	27865	1.2	13.8740	0.9	1.6578	1.5	0.1668	1.3	0.83	994.5	11.8	992.5	9.8	988.1	17.5	988.1	17.5	100.6
13AC71T-33	83	20681	1.3	17.5208	0.9	0.6398	2.2	0.0813	2.1	0.92	503.9	10.0	502.2	8.9	494.4	19.1	503.9	10.0	101.9
13AC71T-34	195	2769	1.0	21.9325	1.6	0.0385	1.8	0.0061	0.8	0.46	39.4	0.3	38.4	0.7	-23.8	38.0	39.4	0.3	NA
13AC71T-36	786	80291	0.5	19.1281	0.8	0.3608	1.3	0.0500	1.0	0.75	314.8	2.9	312.8	3.4	297.6	19.2	314.8	2.9	NA
13AC71T-37	70	215	0.9	24.0028	4.0	0.0059	4.5	0.0010	2.0	0.45	6.7	0.1	6.0	0.3	-246.9	101.5	6.7	0.1	NA
13AC71T-38	113	1562	0.9	21.2088	2.9	0.0285	3.3	0.0044	1.6	0.47	28.2	0.4	28.5	0.9	56.9	69.9	28.2	0.4	NA
13AC71T-39	251	25014	1.0	19.0518	0.5	0.3553	0.7	0.0491	0.4	0.63	308.9	1.3	308.7	1.9	306.7	12.4	308.9	1.3	NA
13AC71T-40	75	1004	1.5	20.7579	3.3	0.0280	3.4	0.0042	1.0	0.28	27.1	0.3	28.0	0.9	107.9	76.8	27.1	0.3	NA
13AC71T-41	92	919	1.4	21.3472	2.8	0.0290	2.9	0.0045	1.0	0.33	28.9	0.3	29.1	0.8	41.3	66.1	28.9	0.3	NA
13AC71T-42	139	1403	1.4	13.8226	24.4	0.0824	26.0	0.0083	9.0	0.35	53.0	4.7	80.4	20.1	995.7	502.6	53.0	4.7	NA
13AC71T-43	196	100789	1.1	12.9339	1.3	2.0136	1.5	0.1889	0.9	0.57	1115.4	9.0	1120.1	10.4	1129.3	25.1	1129.3	25.1	98.8
13AC71T-44	218	12847	2.1	20.4055	0.6	0.1899	2.7	0.0281	2.6	0.98	178.7	4.6	176.6	4.4	148.1	13.5	178.7	4.6	NA
13AC71T-45	55	820	1.2	20.9298	2.3	0.0302	3.1	0.0046	2.1	0.68	29.5	0.6	30.2	0.9	88.4	53.6	29.5	0.6	NA
13AC71T-46	162	523	0.7	20.5826	7.8	0.0077	8.0	0.0012	1.6	0.20	7.4	0.1	7.8	0.6	127.9	184.7	7.4	0.1	NA
13AC71T-47	96	1115	1.3	19.3819	3.2	0.0321	3.9	0.0045	2.2	0.57	29.0	0.6	32.1	1.2	267.5	73.3	29.0	0.6	NA

Table B1 continued. U-Pb geochronologic analyses.																				
13AC71t						Isotope ratios					Apparent ages (Ma)									
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	Best age	±	Conc
	(ppm)	204Pb		207Pb*	(%)	235U*	(%)	238U	(%)	corr.	238U*	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)
13AC71T-48	198	2386	0.9	21.1596	1.1	0.0276	2.9	0.0042	2.7	0.92	27.2	0.7	27.6	0.8	62.4	26.4	27.2	0.7	NA
13AC71T-49	118	1402	1.1	20.6471	2.7	0.0300	2.9	0.0045	1.0	0.34	28.9	0.3	30.0	0.8	120.5	63.5	28.9	0.3	NA
13AC71T-50	195	5958	1.1	19.8383	6.3	0.0872	7.0	0.0125	2.8	0.41	80.3	2.3	84.8	5.7	213.9	147.1	80.3	2.3	NA
13AC71T-51	59	67242	1.2	5.4727	0.6	12.7260	0.8	0.5051	0.5	0.63	2635.7	10.8	2659.6	7.4	2677.8	10.1	2677.8	10.1	98.4
13AC71T-52	375	9154	1.1	14.8679	0.6	0.6213	9.3	0.0670	9.3	1.00	418.0	37.7	490.7	36.3	845.8	11.7	418.0	37.7	49.4
13AC71T-53	137	51480	1.3	13.6051	0.5	1.8145	0.8	0.1790	0.7	0.78	1061.7	6.4	1050.7	5.5	1027.8	10.6	1027.8	10.6	103.3
13AC71T-54	234	3934	0.7	20.7504	1.8	0.0292	1.9	0.0044	0.4	0.22	28.3	0.1	29.2	0.5	108.7	43.3	28.3	0.1	NA
13AC71T-56	204	20248	1.0	19.2794	0.6	0.3114	0.9	0.0435	0.7	0.72	274.7	1.8	275.2	2.2	279.6	14.7	274.7	1.8	NA
13AC71T-57	265	3381	0.5	21.0193	1.5	0.0264	5.8	0.0040	5.6	0.96	25.9	1.4	26.4	1.5	78.2	36.5	25.9	1.4	NA
13AC71T-58	97	1154	0.8	18.6363	4.1	0.0328	4.2	0.0044	0.8	0.19	28.5	0.2	32.8	1.4	356.7	93.2	28.5	0.2	NA
13AC71T-59	151	598	1.1	20.0396	2.7	0.0089	3.3	0.0013	1.8	0.55	8.3	0.1	9.0	0.3	190.4	63.8	8.3	0.1	NA
13AC71T-60	79	750	1.1	21.9353	2.4	0.0265	2.5	0.0042	0.6	0.22	27.1	0.1	26.6	0.7	-24.1	58.9	27.1	0.1	NA
13AC71T-61	56	716	0.5	10.1617	10.7	0.1632	10.8	0.0120	1.2	0.12	77.1	1.0	153.5	15.4	1594.2	201.3	77.1	1.0	NA
13AC71T-62	62	47312	0.9	10.4826	1.0	3.6164	1.2	0.2749	0.7	0.59	1565.8	10.0	1553.1	9.7	1535.9	18.6	1535.9	18.6	101.9
13AC71T-63	194	8043	5.4	20.6350	0.9	0.1357	1.1	0.0203	0.6	0.59	129.7	0.8	129.2	1.3	121.9	20.8	129.7	0.8	NA
13AC71T-64	328	3057	1.0	21.2754	1.8	0.0272	2.0	0.0042	0.8	0.41	27.0	0.2	27.2	0.5	49.3	42.7	27.0	0.2	NA
13AC71T-65	321	3726	1.0	21.1143	1.3	0.0280	1.7	0.0043	1.1	0.65	27.6	0.3	28.1	0.5	67.5	31.4	27.6	0.3	NA
13AC71T-66	54	1151	0.8	22.4084	2.0	0.0714	2.3	0.0116	1.1	0.48	74.4	0.8	70.0	1.6	-76.0	49.2	74.4	0.8	NA
13AC71T-67	99	11381	1.3	19.1763	0.5	0.2921	1.4	0.0406	1.3	0.92	256.7	3.1	260.2	3.1	291.9	12.1	256.7	3.1	NA
13AC71T-68	55	55863	0.5	9.0059	0.6	4.9866	1.0	0.3257	0.8	0.78	1817.6	12.3	1817.1	8.4	1816.5	11.4	1816.5	11.4	100.1
13AC71T-69	107	1619	1.3	20.7432	4.4	0.0286	5.1	0.0043	2.6	0.50	27.7	0.7	28.6	1.4	109.5	104.7	27.7	0.7	NA
13AC71T-70	260	2347	0.6	21.0768	2.7	0.0325	2.9	0.0050	1.0	0.33	32.0	0.3	32.5	0.9	71.7	65.4	32.0	0.3	NA
13AC71T-71	279	68184	3.6	17.2566	0.6	0.7143	1.3	0.0894	1.1	0.88	552.0	5.9	547.3	5.3	527.8	12.8	552.0	5.9	104.6
13AC71T-72	273	1288	0.4	20.6443	4.1	0.0184	7.9	0.0028	6.8	0.86	17.7	1.2	18.5	1.5	120.8	96.0	17.7	1.2	NA
13AC71T-73	137	1619	1.3	19.6281	3.4	0.0384	3.6	0.0055	1.0	0.29	35.2	0.4	38.3	1.3	238.4	78.7	35.2	0.4	NA
13AC71T-74	81	789	0.6	21.0091	4.5	0.0275	6.0	0.0042	3.9	0.65	27.0	1.1	27.5	1.6	79.3	107.9	27.0	1.1	NA
13AC71T-75	159	108158	1.6	12.0522	0.9	2.4075	1.8	0.2104	1.6	0.86	1231.2	17.4	1244.8	12.9	1268.6	17.9	1268.6	17.9	97.1
13AC71T-76	72	14010	1.7	12.7921	0.7	1.7898	3.8	0.1660	3.8	0.99	990.3	34.7	1041.7	25.0	1151.3	13.1	1151.3	13.1	86.0
13AC71T-77	1065	9543	0.6	21.4893	0.8	0.0279	1.2	0.0044	1.0	0.78	28.0	0.3	28.0	0.3	25.4	18.6	28.0	0.3	NA
13AC71T-78	73	644	2.0	22.8045	2.8	0.0262	2.9	0.0043	0.5	0.19	27.8	0.2	26.2	0.8	-119.0	70.2	27.8	0.2	NA
13AC71T-79	94	47501	1.0	12.6805	0.8	2.1018	1.9	0.1933	1.7	0.90	1139.2	17.6	1149.4	12.9	1168.6	16.3	1168.6	16.3	97.5
13AC71T-80	165	1520	1.0	20.6615	2.7	0.0289	3.3	0.0043	1.8	0.55	27.8	0.5	28.9	0.9	118.8	64.5	27.8	0.5	NA
13AC71T-82	240	37683	0.7	17.6890	0.8	0.6247	2.3	0.0801	2.2	0.94	497.0	10.3	492.8	9.0	473.3	18.0	497.0	10.3	105.0
13AC71T-83	212	2341	1.0	20.9573	1.7	0.0296	1.7	0.0045	0.5	0.29	29.0	0.1	29.7	0.5	85.2	39.4	29.0	0.1	NA
13AC71T-85	263	128891	1.5	13.7203	1.8	1.7584	2.0	0.1750	0.9	0.44	1039.5	8.5	1030.3	13.0	1010.7	36.6	1010.7	36.6	102.8
13AC71T-86	57	14121	1.7	16.7055	0.8	0.7974	1.6	0.0966	1.4	0.87	594.6	8.0	595.4	7.3	598.5	17.3	594.6	8.0	99.3
13AC71T-88	162	1727	1.1	21.3847	2.2	0.0287	2.3	0.0045	0.5	0.21	28.7	0.1	28.8	0.6	37.1	53.1	28.7	0.1	NA

Table B1 continued. U-Pb geochronologic analyses.																				
13AC71t						Isotope ratios					Apparent ages (Ma)									
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	Best age	±	Conc	
	(ppm)	204Pb		207Pb*	(%)	235U*	(%)	238U	(%)	corr.	238U*	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)	
13AC71T-89	67	27383	1.1	13.9697	0.7	1.6221	1.9	0.1643	1.7	0.93	980.9	15.7	978.8	11.7	974.1	14.3	974.1	14.3	100.7	
13AC71T-91	305	3337	0.9	21.7611	1.4	0.0287	1.4	0.0045	0.4	0.31	29.2	0.1	28.8	0.4	-4.8	33.1	29.2	0.1	NA	
13AC71T-92	111	59991	0.3	12.4195	0.8	2.3508	1.8	0.2118	1.6	0.91	1238.1	18.3	1227.8	12.7	1209.7	14.8	1209.7	14.8	102.4	
13AC71T-93	428	2936	1.1	19.9513	7.3	0.0264	7.5	0.0038	1.7	0.22	24.6	0.4	26.4	2.0	200.6	169.8	24.6	0.4	NA	
13AC71T-94	151	45715	2.0	16.3061	0.5	0.8910	1.5	0.1054	1.4	0.93	645.8	8.6	646.9	7.2	650.7	11.7	645.8	8.6	99.3	
13AC71T-95	107	1069	0.4	19.7806	2.5	0.0250	3.5	0.0036	2.5	0.70	23.1	0.6	25.1	0.9	220.6	58.7	23.1	0.6	NA	
13AC71T-96	154	1417	0.9	21.3821	3.5	0.0223	3.7	0.0035	0.9	0.25	22.2	0.2	22.4	0.8	37.4	84.9	22.2	0.2	NA	
13AC71T-97	246	36127	1.3	18.9140	0.6	0.3355	2.5	0.0460	2.4	0.97	290.1	6.8	293.8	6.3	323.3	13.2	290.1	6.8	NA	
13AC71T-98	187	2354	1.0	20.9015	1.2	0.0281	1.3	0.0043	0.3	0.22	27.4	0.1	28.1	0.4	91.5	29.3	27.4	0.1	NA	
13AC71T-99	50	379	1.4	22.9641	5.3	0.0252	5.4	0.0042	1.1	0.21	27.0	0.3	25.2	1.3	-136.3	130.2	27.0	0.3	NA	
13AC71T-100	428	3440	0.4	21.7708	1.2	0.0277	2.4	0.0044	2.0	0.85	28.2	0.6	27.8	0.6	-5.9	29.8	28.2	0.6	NA	
13AC71T-101	67	61899	0.6	9.5353	0.9	4.2143	1.8	0.2914	1.6	0.86	1648.7	22.7	1676.8	14.9	1712.1	16.8	1712.1	16.8	96.3	
13AC71T-102	456	93716	90.5	16.9428	1.1	0.7262	1.9	0.0892	1.5	0.80	551.0	7.9	554.3	7.9	567.9	23.9	551.0	7.9	97.0	
13AC71T-103	218	3248	2.6	21.4035	1.7	0.0383	2.2	0.0059	1.4	0.64	38.2	0.5	38.1	0.8	35.0	40.4	38.2	0.5	NA	
13AC71T-104	10	2921	1.0	14.2288	1.5	1.4979	2.0	0.1546	1.3	0.64	926.6	10.8	929.6	12.0	936.5	31.2	936.5	31.2	98.9	
13AC71T-105	94	17281	0.8	16.4308	0.6	0.8075	1.2	0.0962	1.0	0.86	592.2	5.8	601.0	5.4	634.4	13.1	592.2	5.8	93.4	
13AC71T-106	529	3980	2.2	18.2054	16.7	0.0298	17.2	0.0039	3.9	0.23	25.3	1.0	29.8	5.1	409.3	376.4	25.3	1.0	NA	
13AC71T-107	78	8988	0.5	18.7524	0.8	0.3577	2.9	0.0486	2.7	0.96	306.2	8.2	310.5	7.7	342.7	18.5	306.2	8.2	NA	
13CP97s							Isotope						Apparent							
							ratios						Ages (Ma)				Best			
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	age	±	Conc	
	(ppm)	204Pb		207Pb*	(%)	235U*	(%)	238U	(%)	corr.	238U*	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)	
13CP97S-56	55	67	1.3	18.2985	7.4	0.0041	9.4	0.0005	5.8	0.62	3.5	0.2	4.1	0.4	397.9	166.1	3.5	0.2	NA	
13CP97S-105	46	79	0.6	10.3456	10.1	0.0073	11.4	0.0005	5.2	0.45	3.5	0.2	7.4	0.8	1560.6	190.6	3.5	0.2	NA	
13CP97S-93	99	90	1.1	153.5099	40.8	0.0005	40.9	0.0006	2.2	0.05	3.7	0.1	0.5	0.2	0.0	0.0	3.7	0.1	NA	
13CP97S-98	63	113	0.6	16.2211	13.3	0.0049	14.0	0.0006	4.2	0.30	3.7	0.2	5.0	0.7	661.9	287.3	3.7	0.2	NA	
13CP97S-32	97	120	1.1	16.5596	20.7	0.0050	22.3	0.0006	8.2	0.37	3.8	0.3	5.0	1.1	617.5	452.3	3.8	0.3	NA	
13CP97S-65	73	117	0.5	19.2376	10.3	0.0043	10.6	0.0006	2.5	0.24	3.9	0.1	4.4	0.5	284.6	235.4	3.9	0.1	NA	
13CP97S-28	160	168	0.8	21.1047	24.8	0.0039	25.9	0.0006	7.5	0.29	3.9	0.3	4.0	1.0	68.6	597.9	3.9	0.3	NA	
13CP97S-62	122	152	0.4	29.5924	9.6	0.0028	10.5	0.0006	4.1	0.39	3.9	0.2	2.9	0.3	-807.3	274.3	3.9	0.2	NA	
13CP97S-31	137	126	0.9	30.7019	10.7	0.0028	11.0	0.0006	2.2	0.21	4.0	0.1	2.8	0.3	-913.1	312.4	4.0	0.1	NA	
13CP97S-96	104	139	0.4	17.2718	13.9	0.0049	14.0	0.0006	1.1	0.08	4.0	0.0	5.0	0.7	525.9	306.4	4.0	0.0	NA	
13CP97S-22	117	137	1.0	20.2664	12.4	0.0043	12.8	0.0006	3.3	0.25	4.0	0.1	4.3	0.6	164.1	291.2	4.0	0.1	NA	
13CP97S-81	133	170	1.1	20.4653	6.0	0.0042	6.7	0.0006	2.9	0.43	4.0	0.1	4.3	0.3	141.3	141.1	4.0	0.1	NA	
13CP97S-102	95	128	1.1	24.7365	5.3	0.0035	5.7	0.0006	1.9	0.34	4.1	0.1	3.6	0.2	-323.6	137.2	4.1	0.1	NA	
13CP97S-9	190	165	1.0	32.7223	9.7	0.0027	9.8	0.0006	1.5	0.16	4.1	0.1	2.7	0.3	-1102.4	293.6	4.1	0.1	NA	

Table B1 continued. U-Pb geochronologic analyses.																				
13CP97s						Isotope ratios					Apparent ages (Ma)									
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	Best age	±	Conc
	(ppm)	204Pb		207Pb*	(%)	235U*	(%)	238U	(%)	corr.	238U*	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)
13CP97S-23	117	133	1.1	18.3801	9.6	0.0048	9.9	0.0006	2.1	0.21	4.1	0.1	4.8	0.5	387.9	217.0	4.1	0.1	NA
13CP97S-4	144	125	1.0	48.3202	10.6	0.0018	10.9	0.0006	2.8	0.26	4.1	0.1	1.8	0.2	-2488.3	448.8	4.1	0.1	NA
13CP97S-6	158	193	0.7	22.9270	5.4	0.0038	6.7	0.0006	3.9	0.58	4.1	0.2	3.9	0.3	-132.3	134.7	4.1	0.2	NA
13CP97S-5	156	141	1.1	34.3389	9.0	0.0026	9.1	0.0006	1.4	0.15	4.1	0.1	2.6	0.2	-1251.2	281.4	4.1	0.1	NA
13CP97S-37	149	213	0.9	18.5116	8.4	0.0048	8.8	0.0006	2.7	0.30	4.2	0.1	4.9	0.4	371.9	189.2	4.2	0.1	NA
13CP97S-44	89	139	1.2	21.3478	7.5	0.0042	7.7	0.0006	2.1	0.27	4.2	0.1	4.2	0.3	41.3	178.7	4.2	0.1	NA
13CP97S-70	133	194	1.0	19.2360	10.8	0.0047	11.2	0.0007	2.8	0.25	4.2	0.1	4.7	0.5	284.8	247.9	4.2	0.1	NA
13CP97S-71	168	196	1.1	23.6017	4.5	0.0038	5.2	0.0007	2.5	0.49	4.2	0.1	3.9	0.2	-204.5	113.3	4.2	0.1	NA
13CP97S-20	127	151	0.9	14.6221	15.8	0.0062	17.4	0.0007	7.3	0.42	4.2	0.3	6.3	1.1	880.4	329.1	4.2	0.3	NA
13CP97S-26	119	152	1.1	22.9308	7.8	0.0040	8.1	0.0007	2.1	0.25	4.2	0.1	4.0	0.3	-132.7	194.2	4.2	0.1	NA
13CP97S-33	329	299	0.9	25.1396	4.9	0.0036	6.3	0.0007	4.0	0.63	4.3	0.2	3.7	0.2	-365.3	127.6	4.3	0.2	NA
13CP97S-16	508	609	0.4	18.7241	17.6	0.0049	18.1	0.0007	4.4	0.24	4.3	0.2	4.9	0.9	346.1	400.8	4.3	0.2	NA
13CP97S-66	142	239	0.8	19.9063	10.5	0.0046	10.8	0.0007	2.4	0.22	4.3	0.1	4.7	0.5	205.9	243.6	4.3	0.1	NA
13CP97S-34	172	193	0.9	23.4711	6.8	0.0039	7.0	0.0007	1.6	0.23	4.3	0.1	4.0	0.3	-190.6	169.6	4.3	0.1	NA
13CP97S-47	214	274	0.8	17.5018	7.7	0.0053	8.0	0.0007	2.2	0.27	4.3	0.1	5.3	0.4	496.8	170.1	4.3	0.1	NA
13CP97S-89	185	241	1.0	22.2763	8.9	0.0041	9.2	0.0007	2.5	0.27	4.3	0.1	4.2	0.4	-61.6	216.3	4.3	0.1	NA
13CP97S-7	154	178	0.9	28.9557	8.0	0.0032	8.1	0.0007	1.6	0.20	4.3	0.1	3.2	0.3	-745.9	223.4	4.3	0.1	NA
13CP97S-17	217	220	0.7	22.5868	13.6	0.0041	13.7	0.0007	1.8	0.13	4.3	0.1	4.1	0.6	-95.4	335.4	4.3	0.1	NA
13CP97S-92	436	406	1.1	19.6609	3.5	0.0047	4.1	0.0007	2.1	0.50	4.3	0.1	4.8	0.2	234.6	81.5	4.3	0.1	NA
13CP97S-60	238	295	1.0	23.1252	10.1	0.0040	10.2	0.0007	1.5	0.15	4.3	0.1	4.1	0.4	-153.6	251.4	4.3	0.1	NA
13CP97S-61	143	200	1.0	13.0061	17.1	0.0071	18.1	0.0007	5.8	0.32	4.3	0.3	7.2	1.3	1118.3	344.6	4.3	0.3	NA
13CP97S-14	228	245	1.1	25.2264	8.1	0.0037	8.4	0.0007	2.0	0.24	4.3	0.1	3.7	0.3	-374.3	211.0	4.3	0.1	NA
13CP97S-45	289	286	0.9	26.1119	4.5	0.0036	4.8	0.0007	1.8	0.37	4.4	0.1	3.6	0.2	-464.6	118.3	4.4	0.1	NA
13CP97S-21	108	161	1.0	20.6887	5.6	0.0045	5.9	0.0007	1.8	0.30	4.4	0.1	4.6	0.3	115.7	132.9	4.4	0.1	NA
13CP97S-59	295	294	0.9	21.9428	6.8	0.0042	6.9	0.0007	1.1	0.15	4.4	0.0	4.3	0.3	-24.9	165.8	4.4	0.0	NA
13CP97S-91	432	429	0.7	23.8345	2.9	0.0039	3.1	0.0007	1.0	0.33	4.4	0.0	4.0	0.1	-229.2	72.8	4.4	0.0	NA
13CP97S-13	101	110	1.0	30.6855	13.9	0.0030	14.1	0.0007	2.5	0.18	4.4	0.1	3.1	0.4	-911.6	405.0	4.4	0.1	NA
13CP97S-40	313	279	0.8	26.2557	3.8	0.0036	4.1	0.0007	1.6	0.39	4.4	0.1	3.6	0.1	-479.1	100.5	4.4	0.1	NA
13CP97S-48	318	326	0.7	27.9235	6.5	0.0033	6.8	0.0007	2.0	0.29	4.4	0.1	3.4	0.2	-645.2	178.5	4.4	0.1	NA
13CP97S-54	217	258	0.7	22.6482	3.9	0.0041	5.7	0.0007	4.2	0.73	4.4	0.2	4.2	0.2	-102.1	95.7	4.4	0.2	NA
13CP97S-73	158	251	0.8	16.5342	5.4	0.0057	5.5	0.0007	1.2	0.21	4.4	0.1	5.7	0.3	620.8	116.8	4.4	0.1	NA
13CP97S-58	455	557	0.6	18.5120	14.7	0.0051	16.8	0.0007	8.2	0.49	4.4	0.4	5.1	0.9	371.8	331.9	4.4	0.4	NA
13CP97S-24	805	695	0.3	18.2054	10.2	0.0052	10.3	0.0007	1.6	0.15	4.4	0.1	5.2	0.5	409.3	227.7	4.4	0.1	NA
13CP97S-90	367	427	0.9	21.9083	3.3	0.0043	3.6	0.0007	1.6	0.43	4.4	0.1	4.4	0.2	-21.1	79.3	4.4	0.1	NA
13CP97S-77	620	731	0.6	21.5386	3.1	0.0044	3.6	0.0007	1.9	0.52	4.4	0.1	4.4	0.2	19.9	74.4	4.4	0.1	NA
13CP97S-68	261	340	0.5	19.0799	5.1	0.0050	5.4	0.0007	1.5	0.29	4.4	0.1	5.0	0.3	303.4	117.3	4.4	0.1	NA
13CP97S-72	211	335	0.9	19.9930	5.7	0.0047	6.0	0.0007	1.8	0.31	4.4	0.1	4.8	0.3	195.8	131.9	4.4	0.1	NA

13CP97S-76	4803	4126	3.5	19.1404	4.3	0.0050	6.9	0.0007	5.4	0.79	4.5	0.2	5.0	0.3	296.2	97.6	4.5	0.2	NA
13CP97S-83	893	984	2.6	20.0521	10.9	0.0048	11.0	0.0007	1.4	0.12	4.5	0.1	4.9	0.5	188.9	255.4	4.5	0.1	NA
13CP97S-57	1585	2557	1.8	20.5205	3.3	0.0047	3.5	0.0007	1.2	0.33	4.5	0.1	4.8	0.2	134.9	77.7	4.5	0.1	NA
13CP97S-41	2498	2159	2.9	20.3689	6.6	0.0048	6.7	0.0007	0.7	0.10	4.5	0.0	4.8	0.3	152.3	155.3	4.5	0.0	NA
13CP97S-63	1062	1357	1.4	21.2710	3.3	0.0046	4.1	0.0007	2.4	0.59	4.5	0.1	4.6	0.2	49.9	79.6	4.5	0.1	NA
13CP97S-75	310	483	0.9	17.4805	24.9	0.0056	25.0	0.0007	1.8	0.07	4.6	0.1	5.6	1.4	499.5	556.1	4.6	0.1	NA
13CP97S-78	457	461	1.0	22.0028	8.4	0.0044	8.7	0.0007	2.3	0.27	4.6	0.1	4.5	0.4	-31.5	202.9	4.6	0.1	NA
13CP97S-64	7985	11288	4.0	20.5543	1.3	0.0048	2.3	0.0007	1.8	0.81	4.6	0.1	4.8	0.1	131.1	31.5	4.6	0.1	NA
13CP97S-103	1038	1297	1.8	14.4191	15.2	0.0068	15.2	0.0007	0.9	0.06	4.6	0.0	6.9	1.0	909.2	314.2	4.6	0.0	NA
13CP97S-27	464	603	1.2	15.8369	10.9	0.0062	11.0	0.0007	2.0	0.18	4.6	0.1	6.3	0.7	713.1	231.3	4.6	0.1	NA
13CP97S-51	4458	4482	6.0	20.4709	1.9	0.0048	2.3	0.0007	1.3	0.56	4.6	0.1	4.8	0.1	140.6	45.7	4.6	0.1	NA
13CP97S-79	478	577	0.8	20.9170	4.8	0.0047	5.1	0.0007	1.5	0.30	4.6	0.1	4.7	0.2	89.8	114.6	4.6	0.1	NA
13CP97S-35	596	839	1.0	20.4810	4.6	0.0048	7.4	0.0007	5.8	0.78	4.6	0.3	4.9	0.4	139.5	108.2	4.6	0.3	NA
13CP97S-25	706	755	0.9	21.7193	2.7	0.0046	2.8	0.0007	0.8	0.28	4.6	0.0	4.6	0.1	-0.2	64.6	4.6	0.0	NA
13CP97S-30	3386	1911	3.3	16.2480	10.1	0.0061	10.1	0.0007	0.6	0.06	4.7	0.0	6.2	0.6	658.4	217.2	4.7	0.0	NA
13CP97S-42	194	258	0.8	20.3324	9.3	0.0049	9.4	0.0007	1.2	0.12	4.7	0.1	5.0	0.5	156.5	218.5	4.7	0.1	NA
13CP97S-10	4178	2254	3.4	14.4136	8.5	0.0069	10.2	0.0007	5.7	0.56	4.7	0.3	7.0	0.7	910.0	175.4	4.7	0.3	NA
13CP97S-11	372	356	2.4	16.5716	29.5	0.0061	29.6	0.0007	2.8	0.09	4.7	0.1	6.2	1.8	615.9	650.1	4.7	0.1	NA
13CP97S-95	7363	7739	4.5	19.1116	1.6	0.0053	2.2	0.0007	1.6	0.70	4.8	0.1	5.4	0.1	299.6	36.2	4.8	0.1	NA
13CP97S-15	3912	4152	3.9	19.4575	6.6	0.0052	6.8	0.0007	1.6	0.23	4.8	0.1	5.3	0.4	258.5	151.4	4.8	0.1	NA
13CP97S-69	8702	4719	0.9	17.9869	13.2	0.0058	13.3	0.0008	2.2	0.17	4.8	0.1	5.8	0.8	436.3	294.1	4.8	0.1	NA
13CP97S-100	11009	10789	4.4	20.3219	0.8	0.0052	1.2	0.0008	0.9	0.78	4.9	0.0	5.2	0.1	157.8	17.8	4.9	0.0	NA
13CP97S-39	5902	4908	3.4	19.5192	10.0	0.0054	10.1	0.0008	1.9	0.19	5.0	0.1	5.5	0.6	251.2	229.5	5.0	0.1	NA
13CP97S-52	3160	3823	1.2	21.0723	2.1	0.0051	2.4	0.0008	1.3	0.52	5.0	0.1	5.1	0.1	72.2	49.2	5.0	0.1	NA
13CP97S-67	3728	3698	4.1	20.9670	1.7	0.0052	1.7	0.0008	0.5	0.31	5.1	0.0	5.3	0.1	84.1	39.3	5.1	0.0	NA
13CP97S-18	1663	1650	5.1	19.4138	2.9	0.0058	3.1	0.0008	1.2	0.38	5.3	0.1	5.9	0.2	263.7	66.4	5.3	0.1	NA
13CP97S-86	2484	1953	1.3	15.6907	5.4	0.0072	5.5	0.0008	1.1	0.20	5.3	0.1	7.3	0.4	732.8	113.6	5.3	0.1	NA
13CP97S-3	2485	1848	2.9	20.3648	6.6	0.0056	8.3	0.0008	5.1	0.61	5.3	0.3	5.6	0.5	152.8	153.6	5.3	0.3	NA
13CP97S-50	1894	1810	3.9	21.1639	2.4	0.0053	3.3	0.0008	2.3	0.69	5.3	0.1	5.4	0.2	61.9	57.6	5.3	0.1	NA
13CP97S-80	10956	11371	2.6	20.7028	1.0	0.0055	2.3	0.0008	2.1	0.90	5.3	0.1	5.6	0.1	114.1	24.2	5.3	0.1	NA
13CP97S-49	1721	3296	3.2	20.5238	1.5	0.0059	2.2	0.0009	1.6	0.73	5.7	0.1	6.0	0.1	134.5	36.1	5.7	0.1	NA
13CP97S-1	78	317	0.4	21.8305	5.7	0.0185	6.1	0.0029	2.2	0.37	18.8	0.4	18.6	1.1	-12.5	138.1	18.8	0.4	NA
13CP97S-99	96	450	1.0	21.6409	3.2	0.0190	3.5	0.0030	1.4	0.40	19.2	0.3	19.1	0.7	8.6	77.5	19.2	0.3	NA
13CP97S-43	242	1098	1.7	21.9208	1.7	0.0207	2.6	0.0033	1.9	0.74	21.1	0.4	20.8	0.5	-22.5	42.3	21.1	0.4	NA
13CP97S-94	386	2010	1.1	21.8444	2.6	0.0213	4.4	0.0034	3.5	0.81	21.8	0.8	21.4	0.9	-14.0	62.1	21.8	0.8	NA
13CP97S-87	111	11997	2.0	17.5654	0.9	0.5856	2.1	0.0746	1.9	0.91	463.8	8.5	468.1	7.9	488.8	19.2	463.8	8.5	94.9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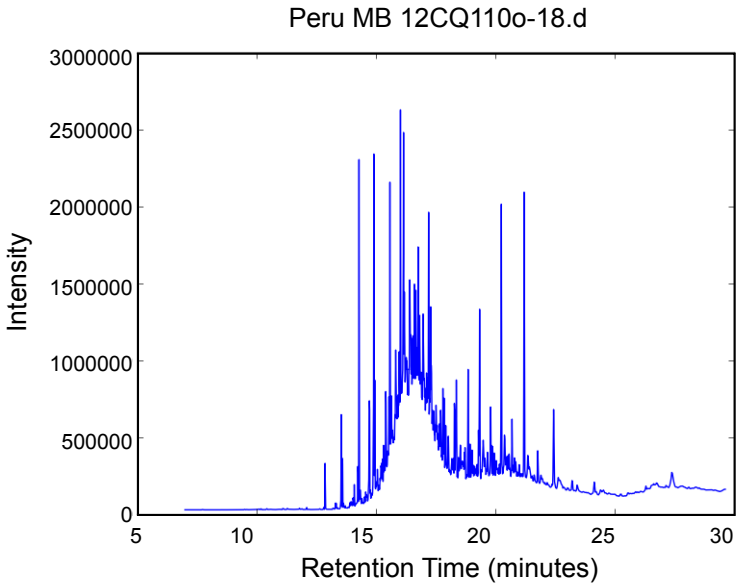
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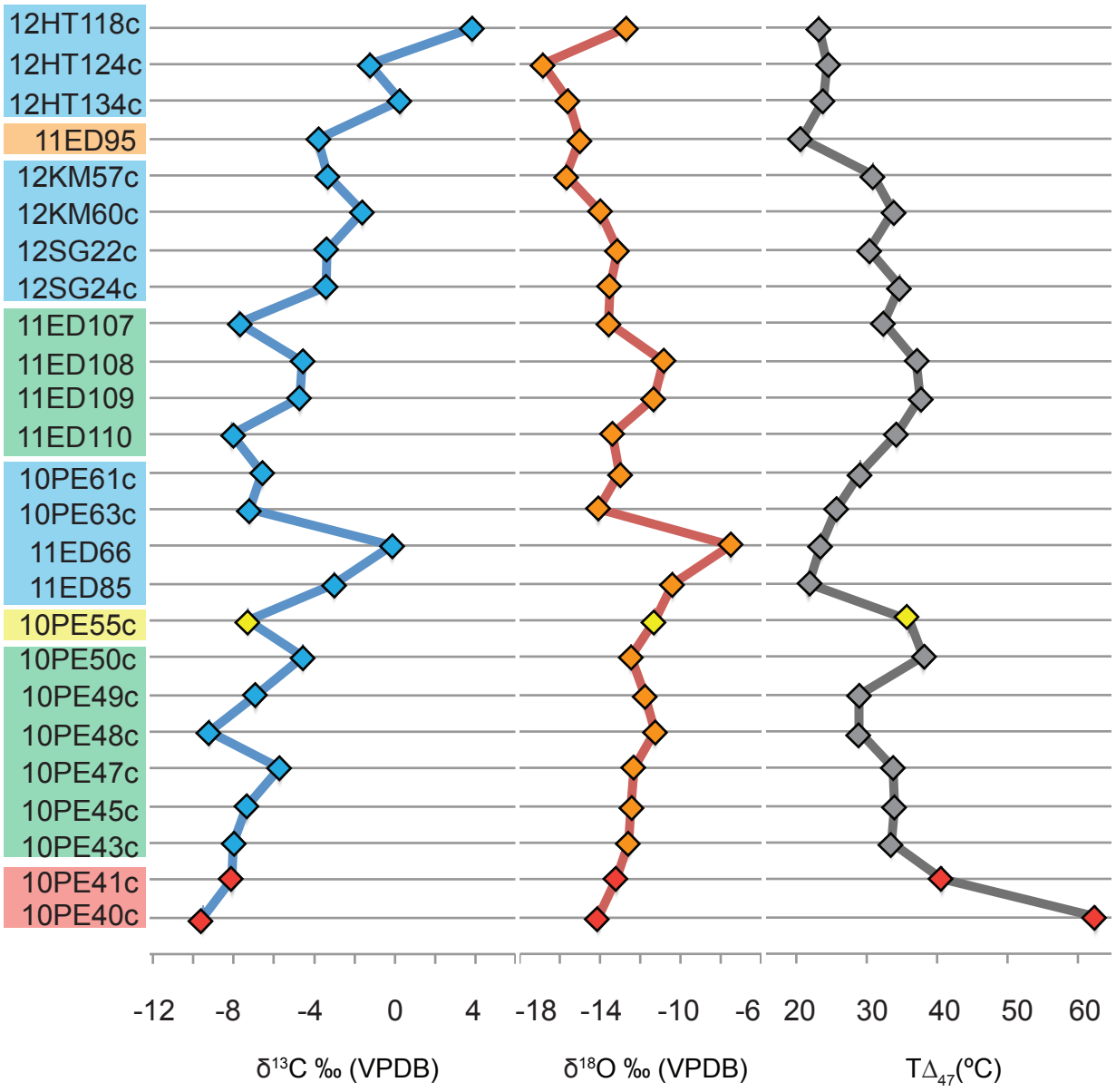
Retention Time (minutes)

Figure C. 1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-18
-14
-10
-6
δ18O ‰ (VPDB)
20
30
40
50
60
TΔ47(°C)

Figure D.1

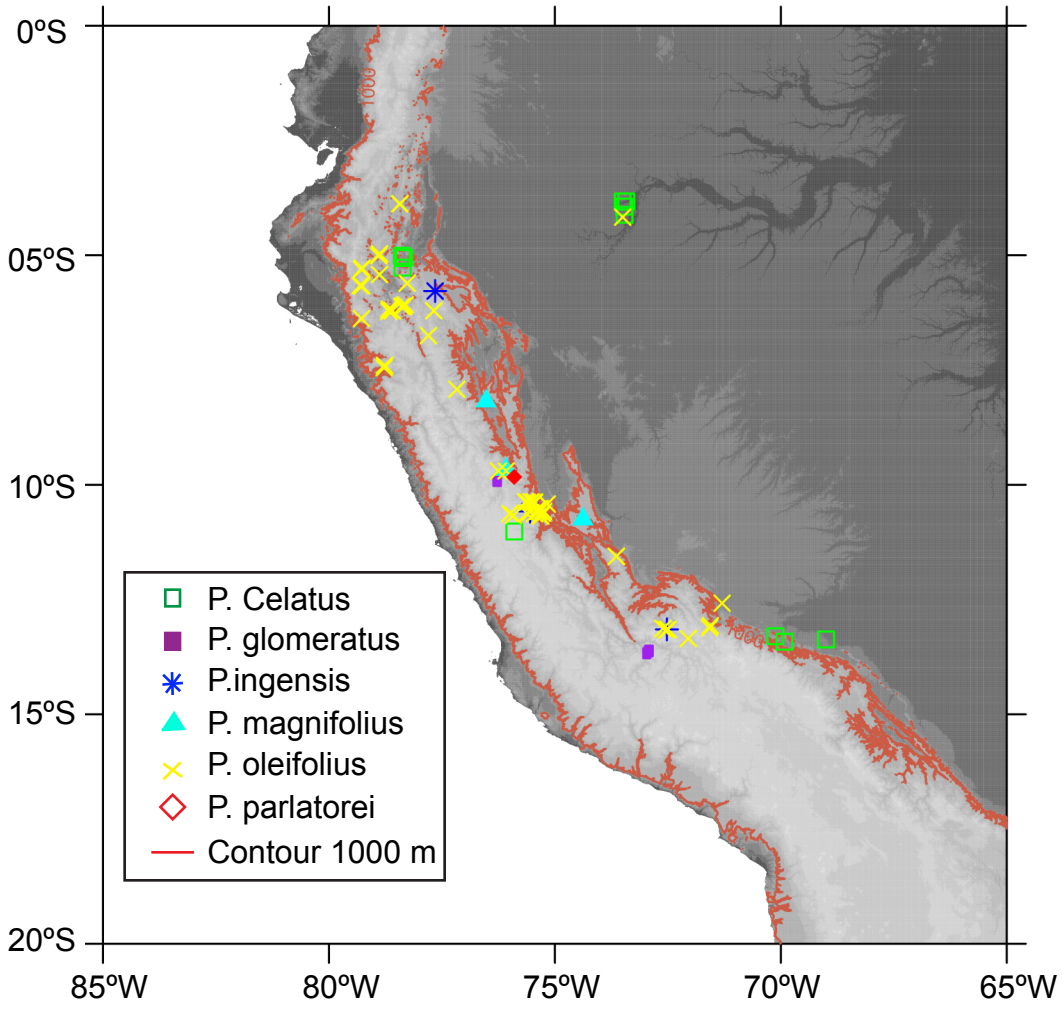
0ºS
05ºS
10ºS
15ºS
20ºS
85ºW
80ºW
75ºW
70ºW
65ºW
1000
P. Celatus
P. glomeratus
P.ingensis
P. magnifolius
P. oleifolius
P. parlatorei
Contour 1000 m

Figure D.2

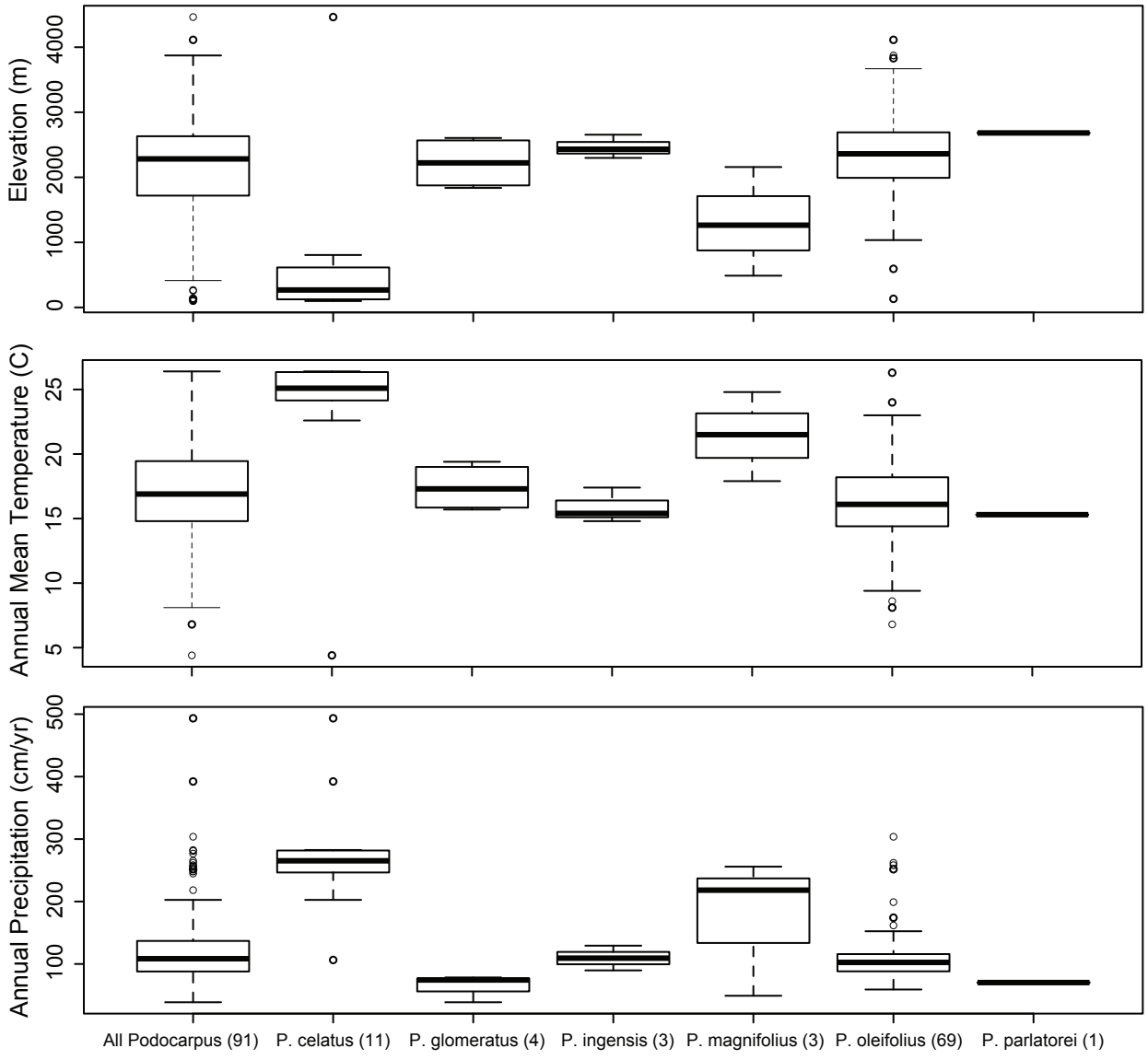
Elevation (m)
0
1000
2000
3000
4000
Annual Mean Temperature (C)
5
10
15
20
25
Annual Precipitation (cm/yr)
100
200
300
400
500
All Podocarpus (91)
P. celatus (11)
P. glomeratus (4)
P. ingensis (3)
P. magnifolius (3)
P. oleifolius (69)
P. parlatorei (1)

Figure D.3

Figure D.4

Table D.1. Palynological content for several samples of Members B and C. Numbers are in numerical counts of palynomorphs

		Latitude (WGS84)		-14.72755	-14.72755	-14.72755	-14.72755	-14.72755	-14.72755	-14.72755	-14.7395	-14.7395	-14.7395	-14.7395
		Longitude (WGS84)		-71.26745	-71.26745	-71.26745	-71.26745	-71.26745	-71.26745	-71.26745	-71.3251	-71.3251	-71.3251	-71.3251
		Locality		Accocunca North							Huano Huano			
		Member		B	B	B	B	B	B	B	C	C	C	C
		Altitude (meters)		3983	3983	3986	3986	3986	3986	3986	4036	4036	4036	4036
		STRI ID		36579	36566	36590	36589	36569	36569_S2	36584	36573	36563	36594	36583
Morphotype	Family	Species	FIELD ID	13ACN41p	13ACN46p	13ACN74p	13ACN75p	13ACN76p	13ACN76p	13ACN77p	13HH80p	13HH82p	13HH84p	13SM87p
Type4	Podocarpaceae	*Podocarpus* 1	Arboreal	72		24	68	163	94		6			10
Type25	Podocarpaceae	*Podocarpus* 2	Arboreal							80				
Type31	Arecaceae 1	Psilamonocolpites	Arboreal		1					2	1			
Type10	Arecaceae 2	Psilamonocolpites	Arboreal		2			20	1	2				7
Type11	Arecaceae 3	Baculimonocolpites	Arboreal											3
Type61	Arecaceae 4	Echimonocolpites	Arboreal	3		6								
Type40	Euphorbiaceae	cf. *Sapium*	Arboreal	1				1						
Type69	Meliaceae	Tetracolporate	Arboreal						1					
Type33	Rosaceae	*Polylepis*	Arboreal	3	61			3	5					
Type14	Anacardiaceae	Retitricolporites	Shrub					12					1	
Type68	Cactaceae	*Opuntia*	Shrub						1					
Type47	Chloranthaceae	*Hedyosmum*	Shrub	4	7	1	1		24		1			
Type44	Euphorbiaceae	cf. Croton	Shrub				1	1	4					
Type38	Euphorbiaceae	cf. *Tetrorchidium*	Shrub				2	2	2					
Type12	Fabaceae 1	Psilatricolporites	Shrub	3				1	6				1	
Type49	Fabaceae 2	Psilatricolpites	Shrub				2							
Type18	Malpighiaceae	aff. *Tetrapteris*	Shrub											
Type70	Malvaceae-Bomb	aff. *Mortoniodendron*	Shrub											
Type65	Primulaceae	*Myrsine*	Shrub						2					
Type35	Solanaceae	*Solanum*	Shrub	4	9	1	11	15	30					
Type48	Vochysiaceae	*Vochysia*	Shrub		1		1							
Type63	Unknown 2	Retitricolporites	Shrub	1						7				

Table D.1 continued. Palynological content for several samples of Members B and C. Numbers are in numerical counts of palynomorphs

Type5	Amaranthaceae	cf. *Amaranthus* sp. 1	Herb	17	40		30	30	76			2	4	10
Type29	Amaranthaceae	cf. *Amaranthus* sp. 2	Herb					3		1				
Type6	Amaranthaceae	*Chenopodium*	Herb		1		3	5			2			3
Type17	Araceae	cf. *Anthurium*	Herb	1	5		6	19	20	5			4	
Type16	Asteraceae	aff. *Ambrosia*	Herb	4	1			1	2	2				
Type45	Asteraceae	*Mutisia*	Herb		2			1	3					
Type1	Asteraceae	Echitricolporites 1	Herb				1	11		1			1	3
Type28	Asteraceae	Echitricolporites 2	Herb		1		3		6	1				
Type52	aff. Buxaceae	Retiperiporites	Herb		1									
Type41	Caprifoliaceae	*Valeriana*	Herb					1				1		
Type39	Ericaceae	cf. *Gaultheria*	Herb				1	1						
Type42a	Fabaceae-Mim	cf. *Acacia*	Herb	1				1						
Type3	Poaceae 1	Monoporate 45 µ	Herb						13	20				21
Type23	Poaceae 2	Monoporate 30 µ	Herb		2		1	7			1	2		
Type7	Polygonaceae	*Polygonum*	Herb	1				6	2					5
Type46	Alismataceae	*Echinodorus*	Aquatic	1			3							
Type51	Unknown 1	Triporate	Incertae											
Type57	Unknown 2	Echitriporites	n.a.	13										
Type62	Unknown 3	Retitricolporites	n.a.	1										
Type64	Unknown 4	Retitricolporites	n.a.						3					
Type66	Unknown 5	Echiperiporites	n.a.						1					
Type22	Aspleniaceae	*Asplenium*	Fern		1								1	
Type36	Blechnaceae	*Blechnum*	Fern	3				2						
Type9	Cyatheaceae	*Cyathea* 1	Fern	45	20	11	29	81	44		7	3	1	8
Type13	Cyatheaceae	*Cyathea* 2	Fern	2		14	3	1		6	1			
Type21	Hymenophyllaceae	*Hymenophyllum*	Fern				1						1	
Type26	Dennstaedtiaceae	*Hypolepys*	Fern							7				
Type32	Lycopodiaceae	*Lycopodium*	Fern					2		3	1			
Type50	Lycopodiaceae	Foveotriletes ornatus	Fern			2								

Table D.1. continued. Palynological content for several samples of Members B and C. Numbers are in numerical counts of palynomorphs

Type2	Polypodiaceae	*Polypodium* 1	Fern	13	1	1	4	6	2		1			17
Type27	Polypodiaceae	*Polypodium* 2	Fern	9	3	5	2	8	5	7				
Type54	Polypodiaceae	*Polypodium* 3	Fern		1				3					
Type37	Pteridaceae	*Ceratopteris*	Fern			1	1	1	1					
Type15	Pteridaceae	*Jamesonia*	Fern	2			1							
Type42b	Selaginellaceae	*Selaginella 1*	Fern	7				1						
Type67	Selaginellaceae	*Selaginella 2*	Fern						1					
Type53	Fern spore Unk 1	Retitriletes 1	Fern	1	1									
Type59	Fern spore Unk 2	Retitriletes 2	Fern	4										
Type55	Fern spore Unk 3	Echimonoletes	Fern		1									
Type58	Fern spore Unk 4	Scabratriletes	Fern	5										
Type60	Fern spore Unk 5	Rugulatriletes	Fern	1							1			

Table D.2. Carbonate data

Section		Lat	Long	Alt	$\delta^{13}C$	$\delta^{18}Oc$	$\delta^{18}Oc$	Δ_{47}(extracted	Temp	MAAT	WAMT
Sample		WGS84	WGS84	(m)	vpdb	vpdb	vsmow	CO2)	(ºC)	(ºC)	(ºC)
Member C											
Cerro Pucara											
10PE57c	Carbonate lamina	-14.792	-71.391	3955				.644 ± .005	26 ± 2	23 ± 2	
10PE58C	Carbonate lamina	-14.7919	-71.391	3955	-7.5	-8.91	-9.7				
Member B											
Hector Tejada											
12HT118c	Limestone	-14.892	-71.252	4016	3.9	-12.7	-10.6	.654 ± .005	23 ± 2	21 ± 1	
12HT124c	Limestone	-14.892	-71.252	4028	-1.3	-16.9	-14.8	.649 ± .005	24 ± 2	22 ± 1	
12HT134c	Limestone	-14.893	-71.253	4083	0.3	-15.6	-13.5	.651 ± .005	24 ± 2	22 ± 1	
Kanamarka											
11ED95	Calcrete	-14.758	-71.316	4035	-3.8	-15.0	-11.2	.665 ± .005	21 ± 2		
11ED96	Calcrete	-14.758	-71.316	4035	-3.3	-13.2	-9.4				
12KM57c	Limestone	-14.759	-71.316	4039	-3.3	-15.7	-11.9	.644 ± .005	31 ± 2	25 ± 1	
12KM60c	Limestone	-14.759	-71.317	4055	-1.6	-14.0	-10.2	.653 ± .005	34 ± 2	25 ± 1	
San Genaro											
11ED103	Limestone	-14.705	-71.298	4019	-10.5	-14.0	-10.2				
11ED104	Limestone	-14.705	-71.298	4019	-9.2	-7.8	-4.0				
12SG22c	Limestone	-14.740	-71.325	4068	-3.4	-13.1	-9.3	.623 ± .005	30 ± 2	25 ± 1	
12SG24c	Limestone	-14.740	-71.325	4068	-3.4	-13.5	-9.7	.605 ± .005	35 ± 2	25 ± 1	
San Genaro north											
11ED107	Paleosol nodule	-14.699	-71.301	3989	-7.8	-13.6	-10.5	.614 ± .005	32 ± 2	26 ± 2	35 ± 2
11ED108	Paleosol nodule	-14.699	-71.301	3989	-4.6	-10.9	-7.7	.596 ± .005	37 ± 3	33 ± 3	40 ± 3
11ED109	Paleosol nodule	-14.699	-71.301	3989	-4.7	-11.3	-8.2	.593 ± .005	38 ± 3	33 ± 3	41 ± 3
11ED110	Paleosol nodule	-14.701	-71.295	4002	-8.1	-13.4	-10.3	.607 ± .005	34 ± 2	29 ± 2	37 ± 2
Ocoruro											
11ED93	Paleosol nodule	-14.833	-71.128	4049	-6.8	-14.9	-11.7				
Accocunca North											
10PE61c	Limestone	-14.699	-71.301	3989	-6.6	-13.1	-10.2	.628 ± .005	29 ± 2	24 ± 1	
10PE62c	Limestone	-14.699	-71.301	3989	-7.4	-11.0	-8.2				
10PE63c	Limestone	-14.699	-71.301	3989	-7.2	-14.1	-11.2	.643 ± .005	26 ± 2	23 ± 1	
San Miguel											
11ED83	Marl	-14.668	-71.300	3982	-7.1	-11.5	-9.7				
11ED85	Marl	-14.667	-71.303	3959	-3.0	-10.4	-8.7	.661 ± .005	22 ± 2	20 ± 1	
Checca											
11ED66	Marl	-14.521	-71.398	3860	-0.1	-7.5	-5.4	.653 ± .005	24 ± 2	21 ± 1	
El Descanso											
11ED102	Unknown	-14.705	-71.298	4019	-7.1	-10.5	-7.4				
11ED63	Unknown	-14.538	-71.324	3943	-6.0	-12.8	-8.9	.542 ± .005	51 ± 3		
11ED65	Unknown	-14.529	-71.362	3906	-7.2	-13.8	-9.9	.561 ± .005	46 ± 3		
Cerro Quirma											
10PE40c	Paleosol nodule	-14.519	-71.295	3988	-9.5	-14.1	-10.2	.506 ± .005	62 ± 3		
10PE41c	Paleosol nodule	-14.513	-71.312	4125	-8.1	-13.2	-9.3	.581 ± .005	41 ± 3		
10PE42C	Paleosol nodule	-14.513	-71.312	4125	-7.4	-12.4	-9.3				
10PE43c	Paleosol nodule	-14.513	-71.312	4122	-8.0	-12.6	-9.5	.610 ± .005	34 ± 2	28 ± 2	36 ± 2
10PE44C	Paleosol nodule	-14.514	-71.311	4124	-7.7	-12.7	-9.6				
10PE45c	Paleosol nodule	-14.514	-71.311	4124	-7.4	-12.5	-9.4	.608 ± .005	34 ± 2	28 ± 2	36 ± 2
10PE46c	Paleosol nodule	-14.514	-71.312	4110	-7.1	-11.9	-8.7				
10PE47c	Paleosol nodule	-14.514	-71.314	4117	-5.7	-12.3	-9.2	.609 ± .005	34 ± 2	28 ± 2	36 ± 2
10PE48c	Paleosol nodule	-14.516	-71.313	4106	-9.2	-11.3	-8.2	.629 ± .005	29 ± 2	21 ± 2	36 ± 2
10PE49c	Paleosol nodule	-14.522	-71.310	4076	-6.9	-11.8	-8.7	.629 ± .005	29 ± 2	21 ± 2	30 ± 2
10PE49C	Gastropod	-14.522	-71.310	4076	-7.9	-12.7	-9.6				
10PE50c	Paleosol nodule	-14.522	-71.310	4076	-4.6	-12.5	-9.3	.592 ± .005	38 ± 2	34 ± 3	41 ± 2
10PE54c	Paleosol nodule	-14.528	-71.310	4051	-9.2	-12.9	-9.8				
10PE55c	Concretion	-14.530	-71.311	4045	-7.3	-11.3	-7.4	.599 ± .005	36 ± 3		

Table D.3. Leaf wax concentration data

Section		Concentration (ng/ul)										CPI	OEP	ACL25-33	ACL24-33
Sample #		24	25	26	27	28	29	30	31	32	33				
Member C															
Cerro Pucara															
12YR11o	Mudstone	86.04	132.92	94.74	292.23	128.38	986	230.45	2197.26	243.74	944.05	5.93	5.81	30.45	30.34
12YR15o	Mudstone	32.91	82.55	56.42	144.23	65.11	228.37	71.94	354.88	101.06	152.01	3.16	2.94	29.67	29.52
Los Angeles															
12YR02o	Mudstone	25.62	162.58	202.3	646.33	691.14	2383	1213.3	3657.55	1111	1487.1	2.67	2.57	30.26	30.25
Versailles															
12YR04o	Mudstone	17.48	71.44	34.73	212.41	72.85	295.1	58.96	228.54	19.92	68.78	4.36	4.3	28.97	28.89
12YR06o	Mudstone	254.38	439.49	215.8	467.06	197.37	616.99	136.36	612.69	132	201.38	2.9	2.5	28.68	28.31
Hector Tejada															
12HT24co	Mudstone	41.76	84.21	42.04	346.66	133.44	1563.6	209.32	2002.53	159.35	663.68	8.36	7.95	30.16	30.11
12HT28co	Mudstone	0	24.58	93.44	351.51	182.05	304.72	50.05	300.29	15.56	103.35	2.95	3.18	28.89	28.89
Huano Hunao															
12HH36co	Mudstone	15.67	39.44	28.84	68.62	38.08	207.29	43.28	498.53	49.14	276.24	5.79	6.23	30.5	30.42
12HH38o	Mudstone	15.94	29.69	21.81	78.88	34.53	287.94	46.05	568.48	37.96	225.55	7.52	7.62	30.37	30.29
12HH45o	Mudstone	28.53	5.42	39.97	157.77	64.08	674.04	91.95	1149.74	81.64	494.98	8	8.11	30.48	30.42
12HH51o	Mudstone	21.79	30.37	29.57	74.76	50.29	248.86	72.33	602.21	59.43	240.83	5.01	5.13	30.43	30.33
Member B															
San Miguel															
12SM34co	Marl	16.78	65.63	20.4	112.56	44.24	490.24	78.68	1355.69	95.95	65.45	10.55	8.16	30.18	30.14
Checca															
12CH68co	Marl	111.69	319.96	193.6	647.48	170.37	397.38	22.61	297.41	56.52	98.75	3.54	3.17	28.03	27.83
Cerro Quirma															
12CQ65o	Paleosol	6.88	11.75	10.4	41.01	16.76	92.02	14.69	147.93	15.59	57.16	5.55	5.44	30	29.9
12CQ66o	Paleosol	5.03	7.61	2.4	11.35	4.57	22.55	3.6	28.71	2.83	8.85	4.87	4.29	29.43	29.15
12CQ67o	Paleosol	5.19	13.26	10.56	26.43	11.84	51.6	8.84	57.1	6.34	23.25	4.01	4.01	29.41	29.28
12CQ110o	Paleosol	6.57	18.4	7.51	28.29	12.99	36.95	9.18	58.23	8.78	23.48	3.8	3.67	29.39	29.23
12CQ111o	Paleosol	12.51	38.78	26.35	79.21	29.58	85.42	19.26	187.02	21.63	100.74	4.24	4.49	29.75	29.63
12CQ112o	Sand matrix	25.34	28.45	19.64	63.41	25.36	121.9	31.64	527.87	60.43	266.26	6.34	6.21	30.75	30.61
12CQ113o	Sand matrix	25.34	28.45	19.64	63.41	25.36	121.9	31.64	527.87	60.43	266.26	6.34	6.21	30.75	30.61

Table D.4. Leaf Wax Data

Section		Lat	Long	Alt	δD								δD Avg	$\delta D_{mw\text{-}wax}$	$\delta^{18}O_{mw\text{-}wax}$
Sample #		WGS84	WGS84	(m)	33		31		29		27		vsmow	(vsmow)	(vsmow)
						error		error		error		error			
Member C															
Cerro Pucara															
12YR11o	Mudstone	-14.783	-71.394	3967	-224.1	2.2	-222.6	2.2	-215.4	2.4			-220.7±4.7	-114.5±5.3	-16.2±0.7
12YR15o	Mudstone	-14.783	-71.393	3974	-189.3	2.9	-191.3	2.3	-183.1	2.3	-185.2	2.5	-187.2±3.7	-76.4±4.2	-11.4±0.5
Los Angeles															
12YR02o	Mudstone	-14.806	-71.416	3926	-181.0	2.9	-184.9	2.3	-178.3	2.5			-181.4±3.3	-69.8±3.8	-10.6±0.5
Versailles															
12YR04o	Mudstone	-14.785	-71.416	3924	-197.7	2.3	-216.9	2.2	-213.5	2.2	-210.7	2.4	-209.7±8.4	-101.9±9.6	-14.6±1.2
12YR06o	Mudstone	-14.785	-71.416	3924	-209.1	2.9	-207.6	2.3	-211.8	2.2	-206.0	2.4	-208.6±2.5	-100.7±2.8	-14.5±0.4
Hector Tejada															
12HT24co	Mudstone	-14.896	-71.222	3947	-208.0	2.3	-218.4	2.2	-216.2	2.2	-211.4	2.3	-213.5±4.7	-106.2±5.3	-15.2±0.7
12HT28co	Mudstone	-14.896	-71.222	3947	-198.1	2.3	-206.1	2.3	-198.5	2.3	-193.1	2.3	-199.0±5.4	-89.7±6.1	-13.1±0.8
Huano Hunao															
12HH36co	Mudstone	-14.739	-71.325	4036	-221.5	2.9	-220.1	2.4	-221.7	2.9			-221.1±0.9	-114.9±1.0	-16.2±0.1
12HH38o	Mudstone	-14.739	-71.325	4036	-205.1	2.4	-206.7	2.3	-202.4	2.4			-204.7±2.1	-96.3±2.4	-13.9±0.3
12HH45o	Mudstone	-14.739	-71.325	4036	-208.6	2.9	-212.6	2.2	-210.4	2.9	-202.0	2.4	-208.4±4.6	-100.4±5.2	-14.4±0.6
12HH51o	Mudstone	-14.739	-71.325	4036	-221.1	2.2	-218.6	2.2	-218.1	2.4			-219.4±1.6	-112.8±1.8	-16.0±0.2
Member B															
San Miguel															
12SM34co	Marl	-14.668	-71.290	3959	-155.9	3.0	-159.2	2.4	-154.1	2.5			-156.4±2.6	-64.7±3.0	-10.0±0.4
Checca															
12CH68co	Marl	-14.521	-71.398	3860	-146.0	2.5	-146.0	2.5	-132.9	2.6	-146.0	3.0	-142.7±7.5	-49.6±7.4	-8.1±0.9
Cerro Quirma															
12CQ65o	Paleosol	-14.509	-71.316	4153	-142.7	2.4	-152.4	2.4	-142.6	2.4	-138.0	2.6	-143.9±6.1	-50.9±6.9	-8.3±0.9
12CQ66o	Paleosol	-14.511	-71.314	4139	-145.2	2.4	-149.5	2.4	-145.4	2.4	-140.7	3.0	-145.2±3.6	-52.3±4.1	-8.4±0.5
12CQ67o	Paleosol	-14.512	-71.312	4133	-147.9	2.4	-154.1	2.4	-139.5	2.4	-135.3	2.6	-144.2±8.4	-51.2±9.6	-8.3±1.2
12CQ110o	Paleosol	-14.514	-71.312	4118	-170.6	2.9	-168.9	2.5	-166.3	2.9			-168.6±2.2	-78.3±2.5	-11.7±0.3
12CQ111o	Paleosol	-14.528	-71.310	4055	-144.2	2.4	-143.0	2.4	-140.1	2.4	-144.0	2.5	-142.8±1.9	-49.7±2.1	-8.1±0.3
12CQ112o	Sand matrix	-14.529	-71.311	4049	-140.2	3.0	-136.9	2.6	-134.4	3.0			-137.2±2.9	-43.5±3.3	-7.3±0.4
12CQ113o	Sand matrix	-14.530	-71.311	4068	-135.2	3.0	-133.3	2.6	-136.1	3.0			-134.9±1.4	-40.9±1.6	-7.0±0.2