Generation of "I-type" granitic rocks by melting heterogeneous lower crust

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Methods

For each sample, apatite and zircon was extracted via standard procedures and mounted in epoxy, polished, and imaged by BSE and CL techniques (Fig. A-3). For samples MG1 and SS3, the discrete mesosome and leucosome components were analysed separately. Oxygen isotopes in zircon were acquired via a Cameca 1270 ion microprobe at the University of Edinburgh. Zircon U-Pb ages were obtained by using either the Sensitive High-Resolution Ion Microprobe (SHRIMP II) at the National Institute for Polar Research (NIPR), Tokyo (samples HD9 and HD20), or by Cameca 1270 at Edinburgh (samples MG1 and SS3). In situ Sm-Nd and Lu-Hf analyses were carried out by laser ablation MCICPMS, at the University of Bristol, James Cook University and the University of Western Australia. Analytical procedures were similar to those outlined by Hammerli et al. (2014) (Sm-Nd) and Kemp et al. (2009) (Lu-Hf). Whole rock samples were analyzed at the Intertek Genalysis Laboratory Services, Australia.

Whole rock Geochemistry

Samples for bulk rock geochemical analyses were powdered using a tungsten-carbide ring mill. Bulk rock samples were analyzed at the Intertek Genalysis Laboratory Services, Australia, following a customized litho-geochemical package (LITH/204x). XRF was used to analyse the major elements and FeO was determined via acid digestion and titration. Trace elements were quantified by ICP-OES and ICP-MS via dissolution of fused borate lithium glass. Acid digestion of rock powder, followed by ICP-OES and ICP-MS, was applied to quantify Co, Ni, Cu, Zn, Li, and Pb. The relative analytical error for major and trace elements is 1% and 1–8%, respectively, and for elements with very low concentrations (lower than 0.1 ppm) up to 10%. Detection limits for all the analyzed elements as well as the results of the analyzed internal standard material BB1 and KG1 (Morris, 2007) are given in Table A-1.

Whole rock compositions for the mafic and felsic regions of samples SS3 and MG1 are given in Table A-1. Importantly, aluminum saturation indices for the mafic regions of SS3 and MG1 (0.76 and 0.64, respectively) overlap with ASI values typically found in mafic rocks of the HMB (e.g., Shimura et al., 2004, Kojima and Shimura 2014). Similarly, chondrite normalized trace element patterns and major element concentrations, such as MgO, Fe_2O_3 and CaO, for SS3 and MG1 fall within the expected range for typical mafic rocks from the region.

Whole rock Nd and Hf isotopes

The Sm-Nd and Lu-Hf isotope data were obtained from 250 mg powder splits, closely following the method outlined by Vervoort et al. (2011). In brief, rock powders were dissolved at high pressure in steel-jacketed Teflon digestion vessels with a 10:1 mix of concentrated HF and HNO3 at 150°C for 5 days. After conversion from fluoride to chloride form, samples were spiked with mixed ^{149}Sm-^{150}Nd and ^{176}Lu-^{180}Hf tracers and fluxed on a hotplate at 120°C for 2-3 days. Hf, Lu-Yb, and the light REE (LREE) were initially separated on cation exchange columns using AG 50W-X12 resin. Hf aliquots were further purified using columns with Ln spec resin following the methods of Münker et al. (2001). Lu was separated from Yb on columns with Ln spec resin (Vervoort et al., 2004). Nd and Sm were separated from the LREE aliquot on columns with Ln spec resin, mirroring the procedure using HDEHP-coated Teflon powder and HCl (Vervoort and Blichert-Toft, 1999).

All isotope analyses were conducted using a Thermo-Scientific Neptune multicollector (MC)-ICPMS. Nd analyses were corrected for mass fractionation using $^{146}Nd/^{144}Nd$ = 0.7219 and normalized using an in-house Ames Nd solution tied to the La Jolla Nd reference solution. Sm analyses were corrected for fractionation using $^{147}Sm/^{152}Sm$ = 0.56081. Whole-rock Hf analyses were corrected for mass fractionation using $^{179}Hf/^{177}Hf$ = 0.7325 (Patchett and Tatsumoto, 1983) and normalized using the JMC-475 standard. Lu measurements were made according to the procedure of Vervoort et al. (2004). All mass fractionation corrections were made using the exponential law.

U-Pb geochronology (zircon) (SHRIMP II, Tokyo)

Analytical methods for zircon (U-Th)-Pb analysis by SHRIMP II at NIPR (samples HD9 and HD20) closely follow (Ishizuka et al., 2011). To summarise, a primary O_2^- ion beam with a surface current of ca. -3 nA was used to produce 25 × 20 µm flat-floored oval craters. Reference zircon FC1 ($^{206}Pb/^{238}U$ age = 1099 Ma, Paces and Miller, 1989) was used to calibrate Pb/U ratios of sample zircons, and U concentrations were calibrated against zircon standard SL13 (238 ppm). Mass resolution (ΔM/M) on 206Pb was >5000, with a sensitivity of approximately 20cps/ppm/nA of primary beam current. Reduction of raw data for standards and samples was performed using the SQUID v.1.12a (Ludwig, 2001), and Isoplot v.3.71 (Ludwig, 2003) add-ins for Microsoft Excel 2003. Scatter on ^{207}Pb-corrected

(Pb/U)/(UO/U^2) ratios of FC1 was 0.60 % (1σ), with an external spot-to-spot error of 3.18% (1σ); the latter was included in the errors of weighted mean ages for each sample. Zircon isotopic compositions and ages are listed in Table A-3, with weighted mean histograms in Figure A-5. Corrections for common Pb on U/Pb values and ages were performed using the ^{207}Pb-correction method described in Ireland and Williams (2003), which assumes concordance between ^{206}Pb/^{238}U and ^{207}Pb/^{235}U ages, and the common Pb model of Stacey and Kramers (1975) for the approximate age of each analysis. Ages reported in the main text and figures are weighted means of ^{207}Pb-corrected ^{206}Pb/^{238}U ages, quoted at the 95% confidence level. Geochronology results for tonalite HD9 and granite HD20 are listed in supplementary Table A-3.

U-Pb geochronology (zircon) (Cameca 1270, Edinburgh)

The U-Pb isotope data for samples MG1 and SS3 were obtained with a Cameca ims 1270 ion microprobe housed in the School of Geosciences, University of Edinburgh. Operating conditions and analytical protocols were as described by Hinton et al. (2006) and Kemp et al. (2007). Each analysis was about 28 minutes in duration (including a preliminary 2 minute, 15 μm raster across the analysis site) and employed a 4 nA primary O_2- ion beam current and Kohler illumination to produce a spot approximately 20 μm in diameter on the sample. O_2 flooding was used to enhance the Pb ion yield by a factor of two. Isotope ratios were measured over 20 cycles, the first five being rejected to minimize surficial common lead contamination. The Pb/U calibration was performed relative to the Geostandards zircon 91500, which was analysed after 3-4 analyses of sample zircons. Forty-two analyses of 91500 over two separate analytical sessions yielded a weighted average ^{207}Pb/^{206}Pb age of 1062.7 ± 6.6 Ma (95% conf., MSWD = 1.7, a common lead correction based on the measured abundance of ^{204}Pb was applied), identical to the TIMS age reported by Weidenbeck et al.

(1999). Repeat analyses of standard zircons Temora 2 (TIMS Pb/U age 416.8 ± 0.3 Ma, Black et al. 2004) were also interspersed throughout each session to monitor data quality (Table A-1). Seventeen analyses of Temora 2 returned a common lead corrected $^{206}Pb/^{238}U$ age of 419.6 ± 3.2 Ma (95% conf., MSWD = 1.7).

The isotope ratios in Table A-4 are corrected for common Pb according to the ^{204}Pb method or, where the inferred ^{207}Pb concentration was below 0.15 ppm, the ^{208}Pb correction (denoted as 'Th Corrd' in Table A-4). Errors are quoted at 1σ precision and incorporate counting statistics and the uncertainty in the Pb/U calibration. Isoplot (Ludwig, 2001) was used to perform the age calculations and to construct the concordia diagrams.

Geochronology results from mafic granulites MG1 and SS3 are listed in the supplementary Table A-4. All samples contain zircon crystals with oscillatory and/or sector zoning, that yield $^{206}Pb/^{238}U$ dates around 19 Ma (Figure A-5). There is no evidence for an older, inherited component. These results are consistent with granulite facies anatexis at ca. 19 Ma (Kemp et al., 2007).

Oxygen isotope analysis (Cameca ims1270, Edinburgh)

Oxygen isotope data (supplementary Tables A-5 & A-6) were acquired at the Edinburgh Ion Microprobe Facility (EIMF), University of Edinburgh with a Cameca ims1270, using a 6 nA primary $^{133}Cs^+$ beam and charge compensation by normal incidence electron gun (see also Cavosie et al., 2005; Kemp et al., 2006). Secondary ions were extracted at 10 kV, and ^{18}O and ^{16}O were monitored simultaneously on dual Faraday cups (H'2 and L'2). Each analysis involved a pre-sputtering time of 45 seconds, followed by data collection in two blocks of five cycles, amounting to a total count time of 40 seconds. A fixed primary beam was focused directly onto the sample, sputtering material from an oval area measuring ~20 µm in the longest dimension.

To correct for instrumental mass fractionation and within-session drift, all data were normalised to a reference zircon, Geostandards zircon 91500 ($\delta^{18}O_{VSMOW}$ = 9.86 ± 0.11‰, Wiedenbeck et al., 2007), which was assumed to be homogeneous under the analytical conditions employed. Chips of this zircon were embedded into grain mounts and analysed (in blocks of five to ten) to bracket every 10-15 measurements on the sample zircons. The reference zircons KIM-5 ($\delta^{18}O_{VSMOW}$ = 5.09 ± 0.06‰, Valley, 2003) and Temora 2 ($\delta^{18}O_{VSMOW}$ = 8.2 ‰, Black et al. 2004) were also periodically analysed as a monitor of data quality (Table A-6). Oxygen isotope values obtained from these zircons showed excellent agreement with published values. Analyses of Temora 2 (n=60) returned an average $\delta^{18}O$ value of 8.1 ± 0.4 ‰ (2 SD), and zircon KIM5 returned 5.0 ± 0.4‰ (2SD). Quoted uncertainties in sample $\delta^{18}O$ combine measured error plus the spot-to-spot reproducibility of the bracketing standards. All pits were inspected by secondary electron imaging after analysis to check for impingement on cracks, inclusions or altered domains, since this can compromise oxygen isotope data (e.g. Cavosie et al. 2005).

Sm-Nd isotope analysis (LAICPMCMS)

We conducted in situ laser ablation analyses on polished apatite and monazite grains embedded in epoxy pucks following the procedures described in Hammerli et al. (2014) at the Advanced Analytical Centre (AAC), James Cook University and at the University of Western Australia (UWA). At both laboratories, the grains were analysed for 60 s using spot sizes of 15-110 μm, pulse rates of 4 Hz and a laser energy density at the sample surface site of ~5 J/cm^2. At the AAC, the typical He flow rate was ~0.8 l/min and optimized daily, the N_2 flow, added prior to transport to plasma, was set to ~0.008 l/min. Analytical conditions at UWA and JCU are given in table A-7. The mass bias and interference were corrected according to Fisher et al. (2011). We calibrated $^{147}Sm/^{144}Nd$ ratios against a synthetic LREErich silicate glass ($^{147}Sm/^{144}Nd$ = 0.2451; Fisher et al., 2011), which was routinely analyzed during each session. The $^{143}Nd/^{144}Nd$ ratios of the samples were normalized via bracketing analyses against a Nd-doped glass (JNdi-1, $^{143}Nd/^{144}Nd$ = 0.512115; Tanaka et al., 2000). Three apatite grains and one monazite grain were used as quality control material. The Nd isotope data for Otter Lake Apatite, Durango Apatite, Apatite 1, and Mae Klang Monazite are in excellent agreement with in situ LA-MC-ICP-MS values and whole grain solution analysis reported by Yang et al. (2014) and Fisher et al. (2011) (see Table A-8). All Nd isotope data of the standards and samples are given in supplementary Tables A-8 and A-9.

Lu-Hf isotope analysis (LAICPMCMS)

Hafnium isotopes (zircon) were measured in three different laboratories, being (1) University of Bristol, using a Thermo-Scientific Neptune coupled to a New Wave 193 nm ArF laser, (2) the Advanced Analytical Centre, James Cook University (JCU) via a Thermo-Scientific Neptune coupled to a Coherent GeoLas 193 nm ArF laser, and (3) at the University of Western Australia (UWA), using a Thermo-Scientific Neptune PLUS MC-ICP-MS and Analyte G2 Excimer laser system (193 nm wavelength) with a dual volume cell. The instrumental set-up and analytical protocols for the Bristol and JCU laboratories are described by Kemp et al. (2009) and Naeraa et al. (2012), respectively. Similar analytical conditions were employed in the UWA laboratory (Table A-7). In all cases, a laser fluence of ~5-6 J/cm^2 and an ablation rate of 4 Hz was used. Spot sizes varied between 31 to 58 microns in diameter, depending on the width of the targeted growth zone.

Throughout each session reference zircons of variable (Yb+Lu)/Hf ratios were analyzed, which yielded mean $^{176}Hf/^{177}Hf$ ratios indistinguishable to those determined by solution analysis and a spot to spot reproducibility of around ± 1 epsilon Hf units or better (see Table A-10 [JCU], Table A-11 [UWA], Table A-12 [Bristol]). Hafnium isotope data of all zircon analyses were normalized to the solution $^{176}Hf/^{177}Hf$ value of Mud Tank zircon (0.282507 ± 6, Woodhead and Hergt, 2005, reported relative to JMC 475 $^{176}Hf/^{177}Hf$ = 0.282160). Analytical uncertainties represent a combination of in-run uncertainty with the reproducibility of Mud Tank zircon analyses generated within the same analytical session, added in quadrature. All Hf isotope data of the studied samples are given in Table A-13 (JCU and UWA) and Table A-14 (Bristol).

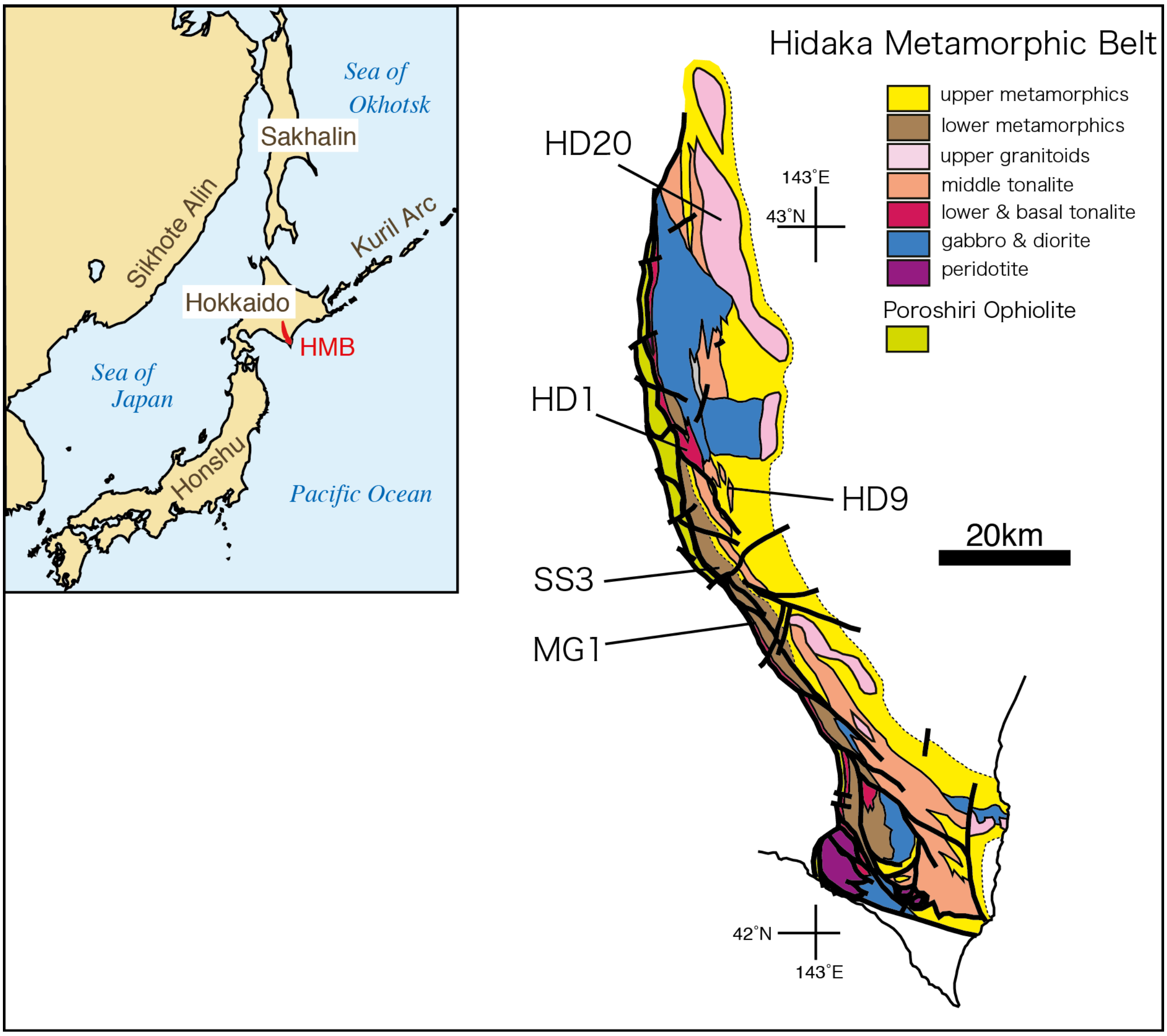

Figure A-1: Schematic map of the Hidaka Metamorphic Belt and sample locations modified from Kemp et al. (2007).

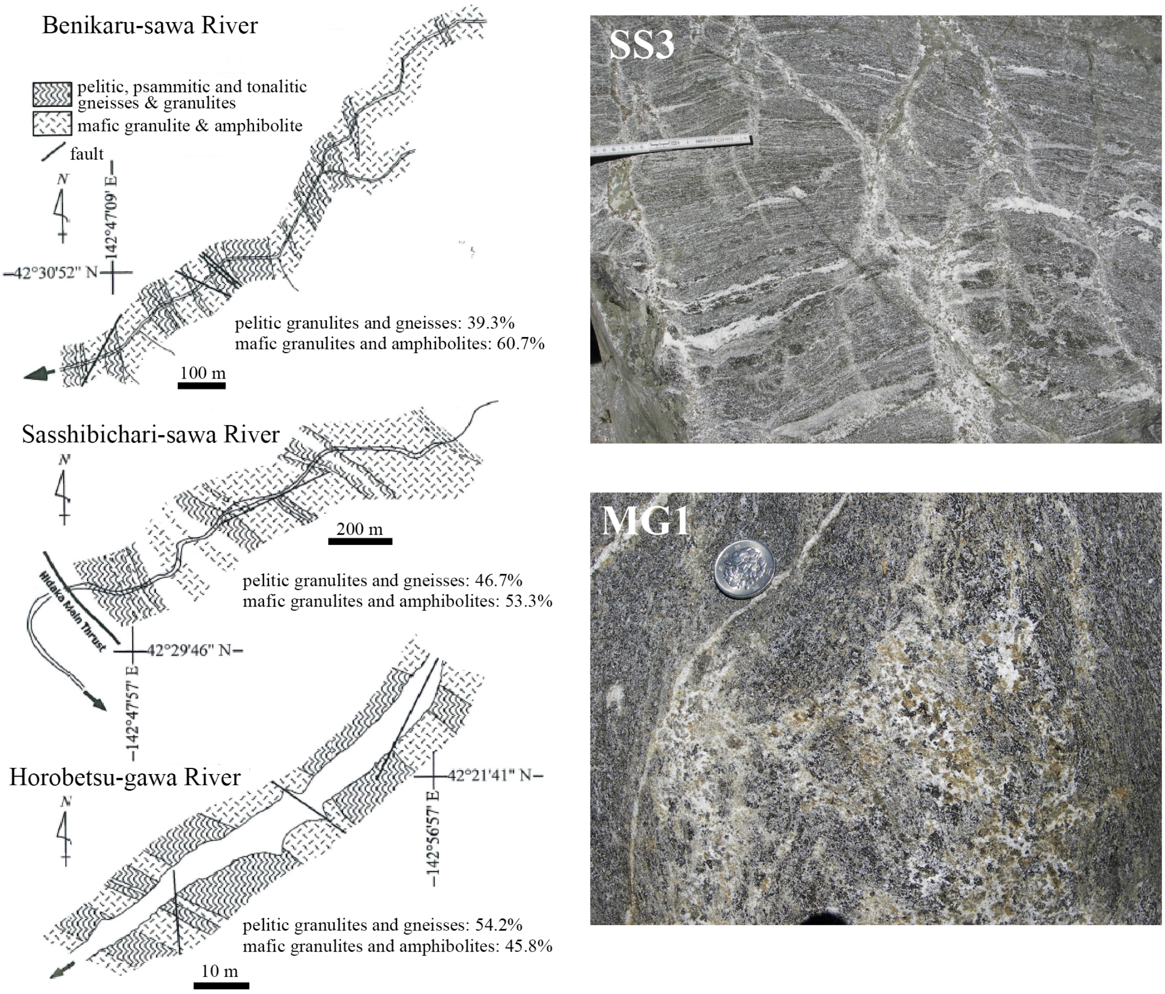

Figure A-2: Geologic maps showing outcrops of the heterogeneous lower crust where metasedimentary units are intercalated with mafic granulites on different scales (modified from Osanai et al. (2006). Photos of SS3 and MG1 outcrops showing the mafic granulites with an extensive melt network. The leucosomic veins are externally derived melt of metasedimentary protoliths. Local melt-mafic granulite interaction results in a hybridisation of the melt composition, which shifts the melt's Hf isotope signature to more radiogenic values.

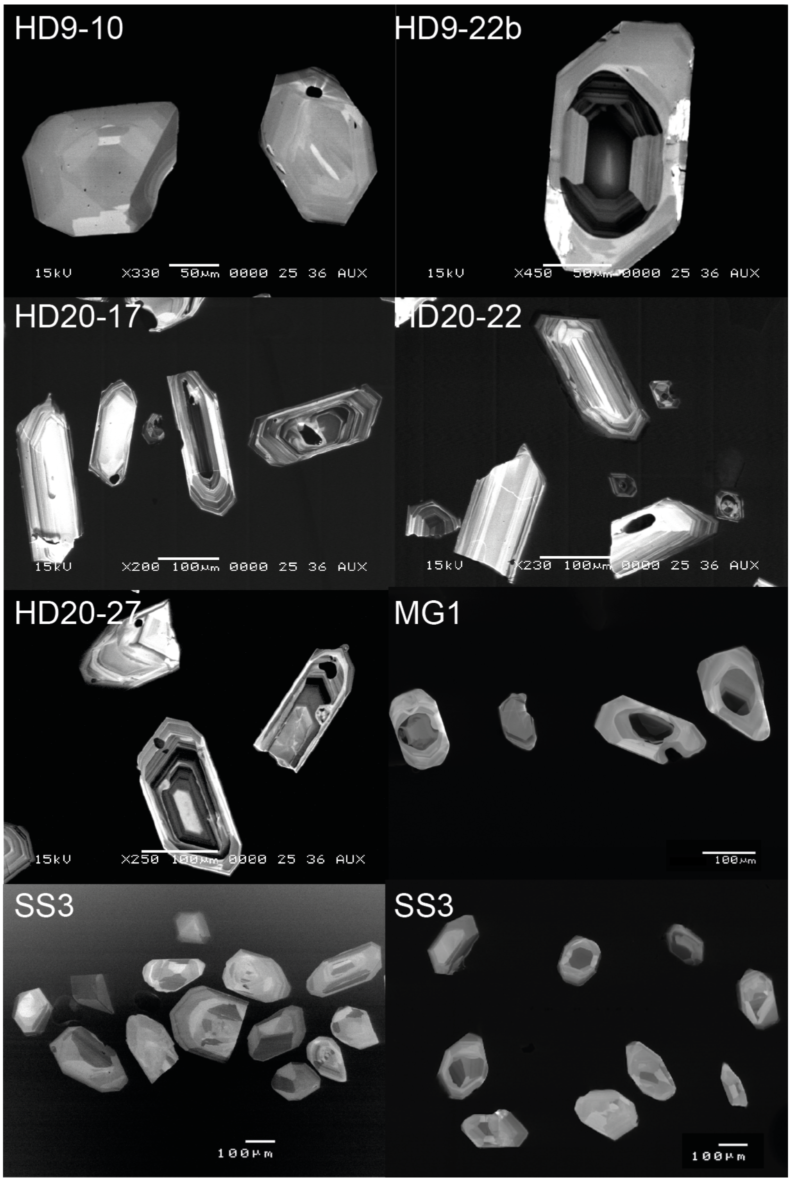

Figure A-3: CL-images of zircons from the studied key samples. No inherited older cores have been identified.

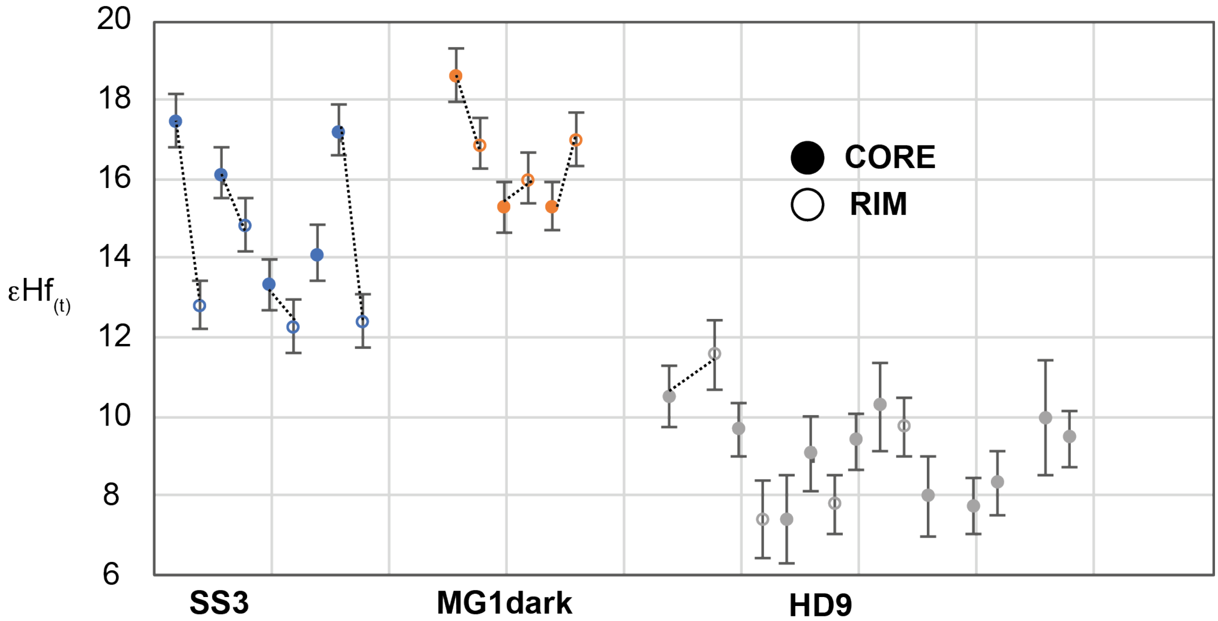

Figure A-4: $\varepsilon_{Hf(t)}$ of zircon rims and cores. Dotted line shows rims and cores of the same individual grain.

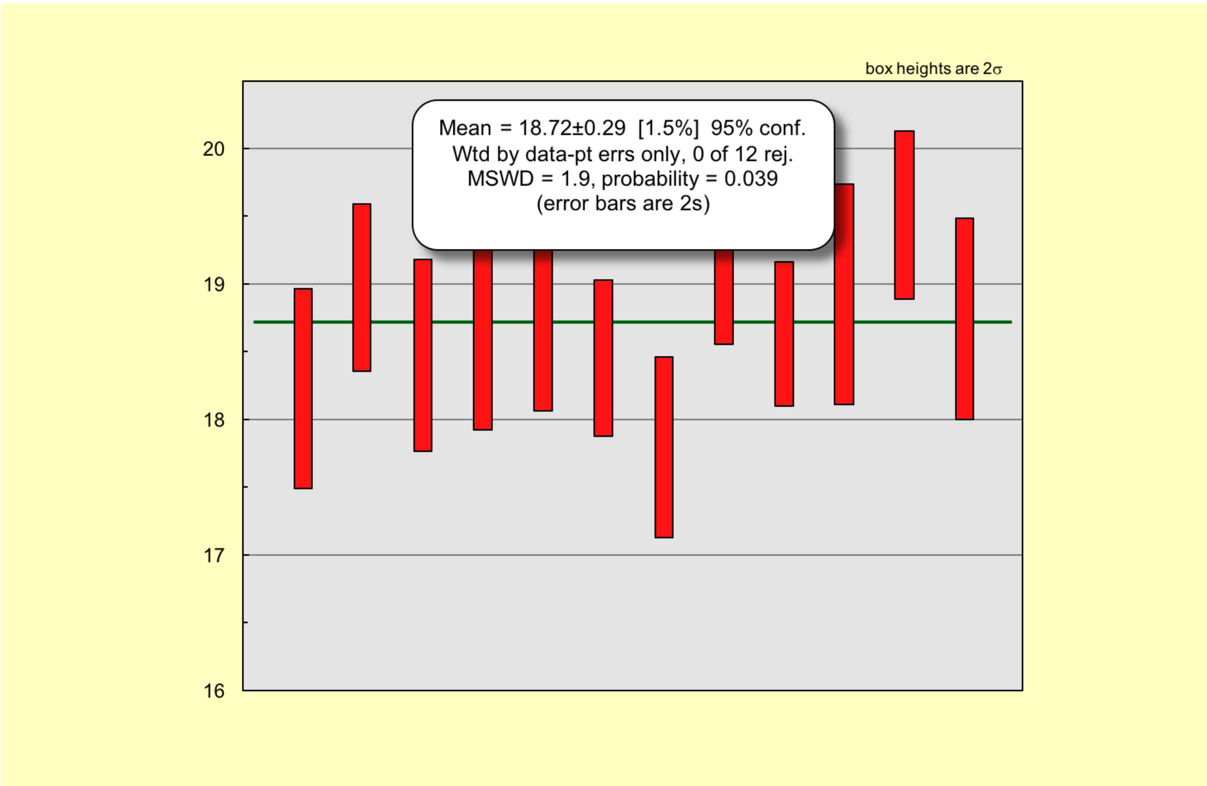

Figure A-5a: Weighted mean histograms of ^{207}Pb-corrected ^{206}Pb/^{238}U ages of sample SS3. Y-axis is in million years.

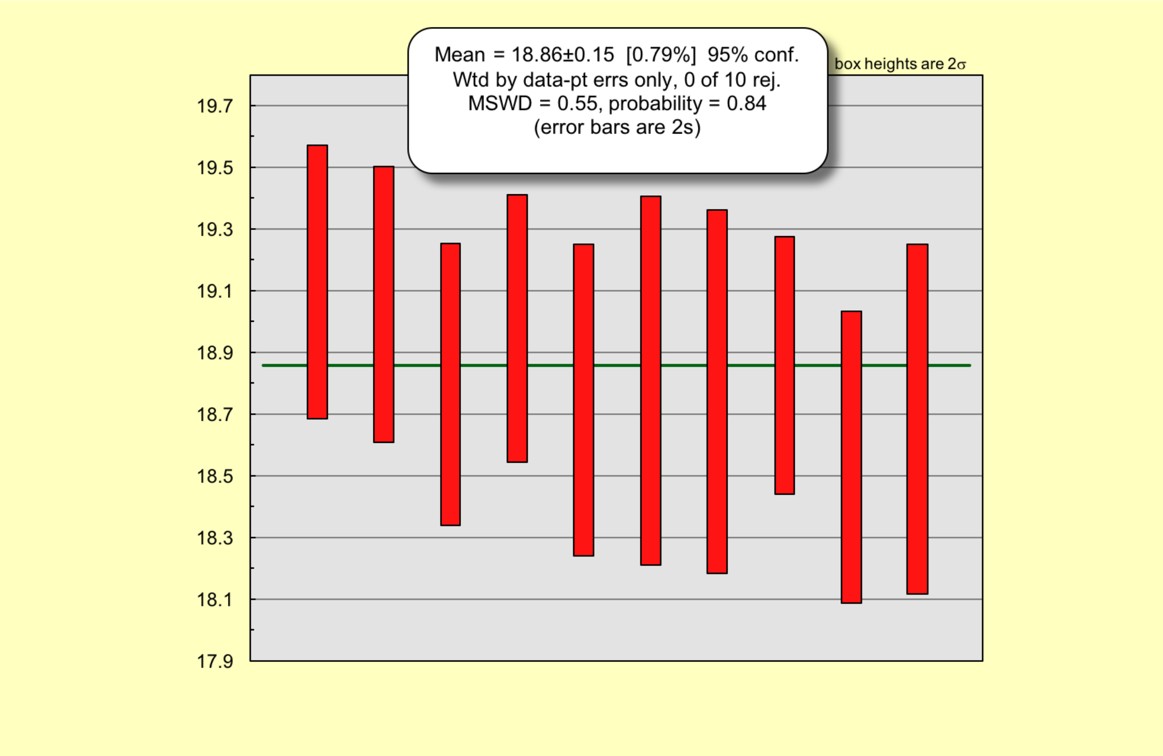

Figure A-5b: Figure A-3a: Weighted mean histograms of ^{207}Pb-corrected $^{206}Pb/^{238}U$ ages of sample MG1. Y-axis is in million years.

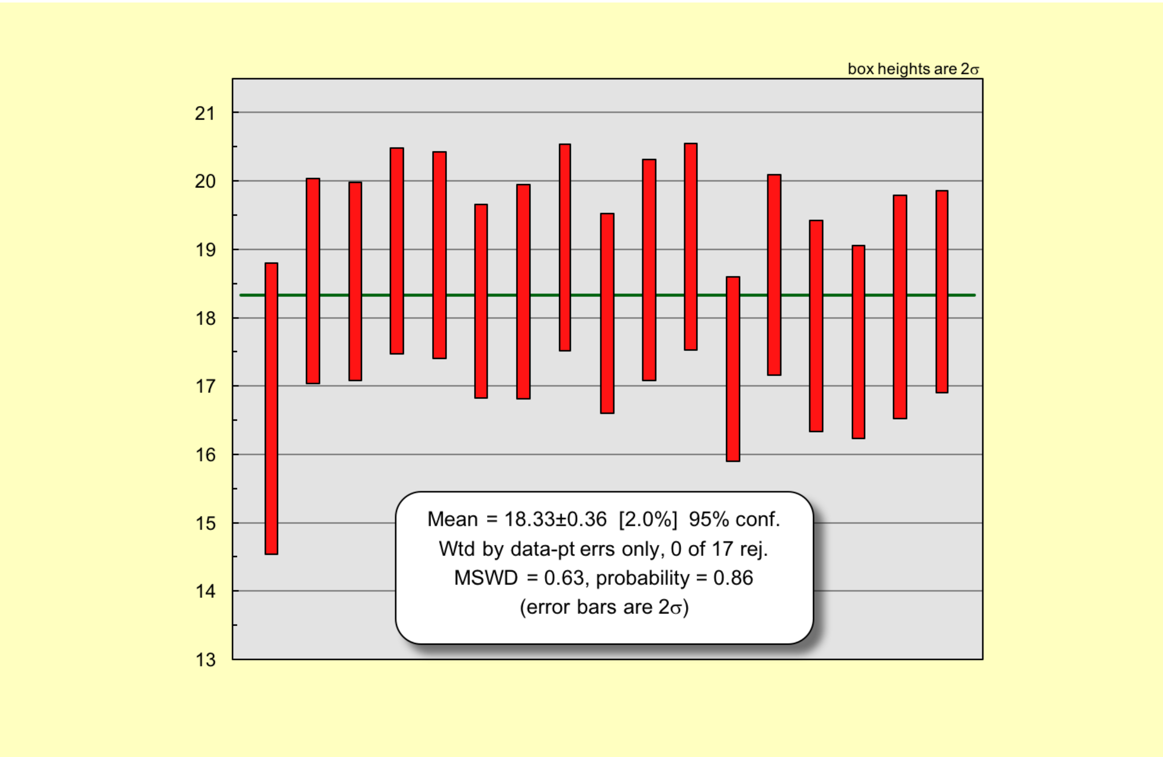

Figure A-5c: Figure A-3a: Weighted mean histograms of ^{207}Pb-corrected $^{206}Pb/^{238}U$ ages of sample HD20. Y-axis is in million years.

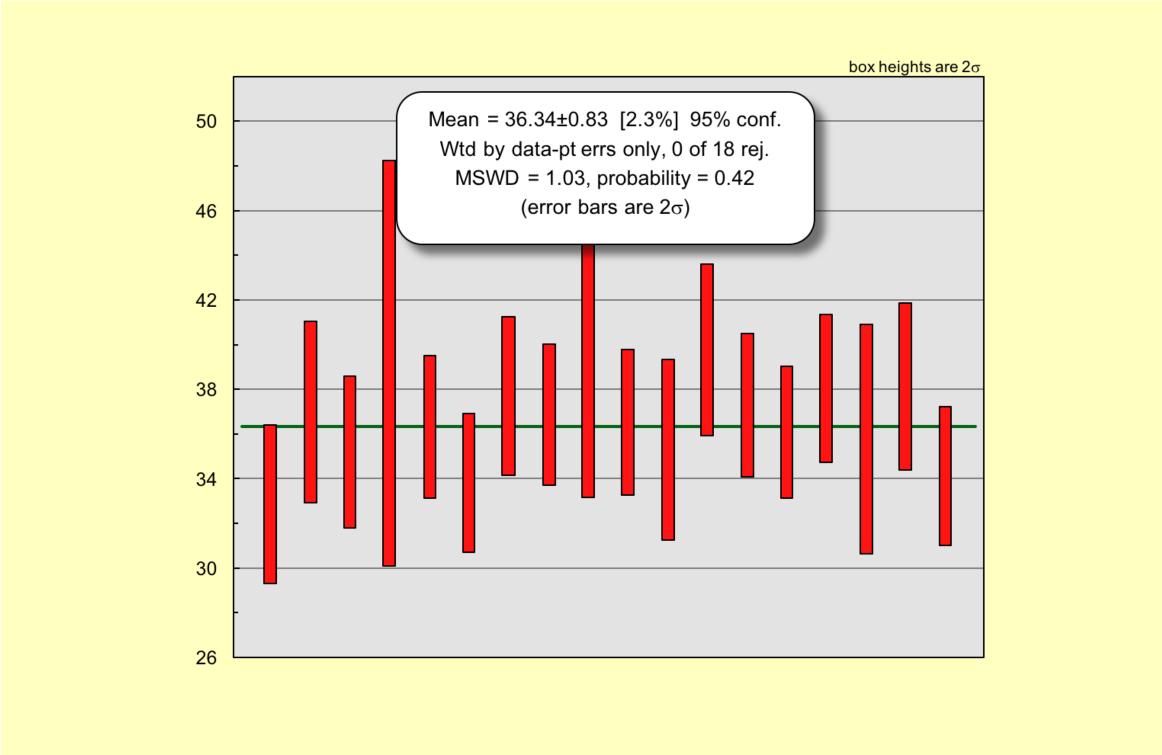

Figure A-5d: Weighted mean histograms of ^{207}Pb-corrected ^{206}Pb/^{238}U ages of sample HD9. Y-axis is in million years.

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Table A-1: Whole rock geochemistry

	SS3	SS3	MG1	MG1	HD9	HD20	HD1*	HD1*	Standards			
Elements	**Mafic**	**Leuco**	**Mafic**	**Leuco**					**BB1**	**BB1**	**KB1**	**KB1**
wt.%										Reference**		Reference
SiO2	49.30	57.04	50.66	56.06	59.94	75.91	64.63	64.63	52.23	51.82	71.21	71.37
TiO2	0.98	0.32	1.12	0.82	1.06	0.21	0.71	0.71	2.06	2.02	0.23	0.24
Al2O3	17.23	20.14	15.08	17.35	15.84	12.90	16.07	16.07	15.43	15.33	15.02	14.95
Fe2O3	9.25	4.85	10.00	7.87	7.35	1.32	0.56	0.56	12.26	12.22	2.08	20.80
FeO	7.66	3.96	8.05	6.20			4.83	4.83	7.89	7.99	1.37	
MnO	0.16	0.09	0.17	0.12	0.12	0.02	0.08	0.08	0.16	0.16	0.04	0.04
MgO	9.13	3.81	8.86	5.92	3.98	0.25	2.41	2.41	4.63	4.72	0.47	0.48
CaO	9.66	7.44	10.45	7.08	5.66	0.92	3.28	3.28	8.70	8.71	2.11	2.16
Na2O	2.87	4.80	2.52	3.54	3.52	3.38	3.86	3.86	3.12	3.03	4.18	4.07
K2O	0.27	0.19	0.38	0.68	1.58	4.80	2.50	2.50	0.45	0.46	3.45	3.47
P2O5	0.08	0.54	0.06	0.08	0.17	0.03	0.10	0.10	0.25	0.25	0.07	0.08
LOI	0.53	0.24	0.24	0.12					0.28		0.49	
SO3	0.01	0.01	b.d.	0.05					0.16	0.16	0.01	0.03
S	b.d.	b.d.	b.d.	0.02					0.06		b.d.	
Total	99.64	99.54	99.72	99.76	99.22	99.74	99.03	99.03	99.78		99.63	
A.S.I	***0.76***	***0.93***	***0.64***	***0.89***	***0.89***	***1.04***	***1.09***	***1.09***				
ppm												
Sc	31.0	12.0	33.0	24.0					25.0	27.7	b.d.	2.4
V	235.0	92.0	259.0	203.0	162.4	14.2	184.3	135.1	238.0		15.0	14.6
Cr	344.0	140.0	301.0	195.0	116.7	19.1	55.6	36.3	144.0	150.0	163.0	170.0
Ni	126.3	36.3	123.0	82.4	39.5	b.d.	56.1	31.1	38.5	41.0	3.1	8.0
Co	54.7	28.1	52.8	41.6			90.0	131.3	34.8	37.0	3.3	
Cu	1.3	7.6	9.8	13.0			62.4	37.5	75.6	82.0	4.7	6.2
Zn	55.6	49.8	83.6	81.0			93.1	74.9	123.8	116.0	45.8	41.0
Ga	15.7	18.8	14.4	18.3			20.3	17.7	24.9	23.0	19.9	20.0
Nb	0.8	0.9	0.7	2.1	5.1	6.4	8.4	7.5	6.9	7.6	9.1	
Y	26.3	24.1	28.5	17.8	34.5	28.6	12.5	13.6	36.6	39.8	4.5	4.5
Zr	48.0	15.0	61.0	27.0	152.4	159.9	211.5	217.1	141.0	153.0	214.0	190.0
Li	6.4	3.7	4.7	10.9					8.3	7.6	30.5	
Cs	0.3	0.2	0.2	2.7			2.1	2.3	0.4		2.4	2.2
Rb	3.6	1.7	2.3	16.3	50.1	162.4	42.4	48.6	11.6	12.4	97.9	96.0
Sr	138.8	193.6	114.6	155.6	288.0	55.8	460.4	441.2	243.5	245.0	548.2	515.0
Ba	31.9	83.0	44.6	104.3	264.2	561.9	890.7	1430.0	150.5	152.0	1460.2	1373.0
La	3.6	10.8	2.5	4.0			25.4	22.2	11.4	11.0	42.1	43.8
Ce	9.3	27.9	7.8	9.8			50.0	43.8	26.3	26.8	69.3	71.3
Pr	1.6	3.5	1.3	1.4			4.7	4.2	3.6	3.6	6.4	6.6
Nd	8.0	17.7	8.8	7.0			19.6	17.3	17.8	18.8	20.5	22.4
Sm	2.6	5.0	3.3	2.4			3.7	3.3	5.9	5.7	2.7	2.8
Eu	0.8	1.1	1.0	1.0			1.6	1.6	2.0	2.0	0.8	0.8
Gd	4.4	5.8	4.0	3.4			2.9	2.6	6.4	7.3	1.7	1.5
Tb	0.9	0.8	0.7	0.5			0.4	0.4	1.1	1.2	0.2	0.2
Dy	4.3	4.6	5.2	3.0			2.2	2.3	7.0	7.3	1.0	0.8
Ho	1.2	1.0	1.2	0.7			0.4	0.5	1.4	1.5	0.2	0.1
Er	2.8	2.3	3.3	1.9			1.3	1.6	3.4	4.0	0.3	0.4
Tm	0.4	0.3	0.5	0.3			0.2	0.3	0.5	0.5	b.d.	
Yb	2.8	1.9	3.2	1.8			1.4	1.8	3.5	3.3	0.5	0.5
Lu	0.5	0.3	0.5	0.3			0.2	0.3	0.5	0.5	b.d.	0.1
Hf	1.5	0.6	2.4	1.0			4.9	5.1	4.2	4.0	5.3	5.0
Ta	0.2	0.2	0.2	0.4			0.6	0.7	0.6	0.5	1.0	1.0
Pb	2.2	6.4	2.8	4.4			11.1	19.2	4.8	4.4	36.0	40.0
Th	0.3	1.9	0.2	0.8			4.0	3.2	1.6	1.8	15.9	17.4
U	0.2	1.3	0.2	0.6			1.1	1.3	0.3	0.3	3.9	4.2

*Shimura et al. (2004)   **Morris (2007)

Table A-2 Whole rock Hf and Nd isotopes

Sample	rock type	rock	Sm ppm	Nd ppm	Lu ppm	Hf ppm	$^{147}Sm/^{144}Nd$	$^{143}Nd/^{144}Nd$	2s	$^{176}Lu/^{177}Hf$	2s	$^{176}Hf/^{177}Hf$	2s	$^{178}Hf/^{177}Hf$	2s	age	εNd	2s	εHf	2s
HD6	grt-crd-opx tonalite	tonalite	7.2	26.6	0.4	3.6	0.16384	0.51260	0.00001	0.01733	0.00003	0.282934	0.000003	1.467159	0.000011	19	**-0.70**	**0.15**	**5.47**	**0.10**
HD1	grt-crd-opx tonalite	tonalite	3.6	20.3	0.3	5.2	0.10842	0.51263	0.00001	0.00806	0.00002	0.282873	0.000003	1.467167	0.000012	19	**-0.02**	**0.16**	**3.44**	**0.12**
SS3	mafic granulite	mafic granulite	2.7	7.5	0.4	1.5	0.21948	0.51312	0.00001	0.03631	0.00007	0.283348	0.000003	1.467163	0.000012	19	**9.27**	**0.12**	**19.88**	**0.12**
HD06-15	metagreywacke	metagreywacke	3.5	16.8	0.0	3.9	0.12461	0.51271	0.00001	0.00054	0.00000	0.282907	0.000003	1.467183	0.000009	19	**1.65**	**0.13**	**4.73**	**0.10**
4HB29	grt-crd-opx migmatite	metased granulite	4.6	23.2	0.4	3.7	0.11856	0.51259	0.00001	0.01624	0.00003	0.282918	0.000003	1.467171	0.000013	19	**-0.73**	**0.12**	**4.93**	**0.10**
HD17	grt-crd gneiss	metased granulite	4.7	22.6	0.3	4.1	0.12460	0.51254	0.00001	0.01061	0.00002	0.282871	0.000005	1.467171	0.000024	19	**-1.70**	**0.12**	**3.35**	**0.17**
SS1	grt-crd-opx migmatite	metased granulite	3.4	19.8	0.4	6.5	0.10530	0.51254	0.00001	0.00899	0.00002	0.282838	0.000005	1.467183	0.000017	19	**-1.63**	**0.12**	**2.18**	**0.18**
HD19e	grt-opx granulite	metased granulite	3.1	16.1	0.3	3.8	0.11490	0.51266	0.00000	0.00969	0.00002	0.282905	0.000004	1.467151	0.000027	19	**0.57**	**0.08**	**4.53**	**0.15**
HD4_2	grt-crd-opx migmatite	metased granulite	1.2	6.4	0.7	4.5	0.11014	0.51255	0.00001	0.02293	0.00005	0.282874	0.000004	1.467161	0.000023	19	**-1.53**	**0.10**	**3.30**	**0.15**

Table A-3: U-Pb analyses at NIPR

Spot Name	% comm 206	ppm U	ppm Th	232Th /238U	Total 238 /206	% err	Total 207 /206	% err	207corr 206Pb /238U Age	1s err
HD9										
9-1.1	8.7	321	189	0.61	178.5	5.3	0.1152	6.9	32.9	1.8
9-2.1	2.6	432	250	0.60	169.1	5.5	0.0672	5.2	37.0	2.0
9-2.2	6.2	248	66	0.28	171.0	4.7	0.0961	6.6	35.2	1.7
9-3.1	1.4	397	240	0.62	161.7	11.5	0.0576	5.7	39.2	4.5
9-4.1	2.8	278	75	0.28	171.8	4.4	0.0693	5.4	36.4	1.6
9-5.1	4.3	217	90	0.43	181.8	4.5	0.0807	5.6	33.9	1.5
9-6.1	3.4	162	72	0.46	164.5	4.6	0.0740	8.3	37.7	1.8
9-7.1	2.6	423	292	0.71	169.6	4.2	0.0677	4.7	36.9	1.6
9-8.1	2.3	321	201	0.65	153.1	9.5	0.0652	4.8	41.0	3.9
9-9.1	1.9	237	120	0.52	172.5	4.4	0.0616	9.5	36.6	1.6
9-10.1	9.7	73	22	0.30	164.2	5.5	0.1238	9.7	35.3	2.0
9-11.1	5.2	124	38	0.31	153.1	4.8	0.0879	6.7	39.8	1.9
9-12.1	2.6	287	160	0.58	167.7	4.3	0.0674	5.9	37.3	1.6
9-13.1	2.0	568	437	0.79	174.5	4.1	0.0624	3.7	36.1	1.5
9-14.1	3.0	227	110	0.50	163.8	4.3	0.0701	5.4	38.1	1.7
9-15.1	8.2	124	35	0.29	164.7	7.1	0.1119	6.4	35.8	2.6
9-16.1	1.6	430	292	0.70	165.7	4.9	0.0596	4.3	38.2	1.9
9-17.1	4.4	191	95	0.51	180.0	4.5	0.0812	5.8	34.2	1.5
HD20										
20-1.1	4.1	226	124	0.56	370.3	6.3	0.0788	6.3	16.7	1.1
20-1.2	1.5	512	214	0.43	341.7	4.0	0.0586	4.2	18.5	0.7
20-2.1	0.6	1088	497	0.47	345.2	3.9	0.0508	3.2	18.5	0.7
20-3.1	0.7	773	279	0.37	336.9	3.9	0.0517	3.7	19.0	0.7
20-2.2	0.8	891	407	0.47	337.6	4.0	0.0525	3.7	18.9	0.8
20-4.1	1.1	1525	814	0.55	348.8	3.9	0.0554	2.6	18.2	0.7
20-5.1	1.5	651	205	0.33	344.6	4.2	0.0586	4.1	18.4	0.8
20-6.1	0.7	1135	472	0.43	336.1	3.9	0.0516	4.8	19.0	0.8
20-7.1	2.4	721	262	0.38	347.8	4.0	0.0652	4.2	18.1	0.7
20-8.1	0.7	3233	2165	0.69	341.9	4.3	0.0516	2.2	18.7	0.8
20-9.1	1.3	1074	444	0.43	333.6	3.9	0.0567	3.3	19.0	0.8
20-10.1	1.3	1370	658	0.50	368.3	3.9	0.0566	3.1	17.3	0.7
20-11.1	0.7	1558	758	0.50	343.1	3.9	0.0521	3.2	18.6	0.7
20-12.1	3.9	325	150	0.48	345.9	4.3	0.0771	5.3	17.9	0.8
20-13.1	2.3	879	536	0.63	356.1	4.0	0.0649	3.8	17.7	0.7
20-14.1	7.3	218	110	0.52	328.5	4.4	0.1041	5.3	18.2	0.8
20-15.1	1.0	2135	1195	0.58	346.7	4.0	0.0540	2.5	18.4	0.7

Table A-4: U-Pb analyses at EIMF

	U ppm wt	Th ppm wt	Pb ppm wt	Th/U atomic	Com. ^{204}Pb ppb wt	f206 (%)	Isotope ratios (common lead corrected) 204/206	$^{207}Pb/^{206}Pb$	1σ	$^{208}Pb/^{206}Pb$	1σ	$^{207}Pb/^{235}U$	1σ	$^{206}Pb/^{238}U$	1σ	err. Corr.	isotope ages $^{206}Pb/^{238}U$	1σ	$^{207}Pb/^{235}U$	1σ	$^{207}Pb/^{206}Pb$	1σ	conc. %
September 2007																							
91500	77.6	26.9	14.5	0.355	0.0	0.000	0.0000001	0.0755	0.0007	0.1075	0.0005	1.9031	0.0268	0.1828	0.0020	0.77	1082.1	10.8	1082.2	9.3	1082.0	18	0.0
91500	79.6	27.7	14.7	0.357	0.0	0.000	0.0000001	0.0755	0.0009	0.1099	0.0009	1.8768	0.0300	0.1802	0.0020	0.70	1068.0	11.0	1072.9	10.5	1082.0	23	-1.3
91500	77.2	26.7	14.5	0.355	0.0	0.000	0.0000001	0.0748	0.0004	0.1084	0.0008	1.8962	0.0230	0.1839	0.0020	0.89	1088.3	10.8	1079.8	8.0	1062.0	11	2.5
91500	81.5	28.4	15.1	0.357	0.1	0.011	0.0000057	0.0745	0.0006	0.1088	0.0010	1.8625	0.0254	0.1814	0.0020	0.81	1074.5	11.0	1067.9	9.0	1054.0	16	1.9
91500	79.3	27.6	14.7	0.357	0.0	0.000	0.0000001	0.0748	0.0005	0.1097	0.0006	1.8728	0.0244	0.1817	0.0020	0.84	1076.2	10.9	1071.5	8.6	1062.0	14	1.3
91500	79.8	27.8	14.7	0.357	0.0	0.000	0.0000001	0.0760	0.0006	0.1096	0.0004	1.8764	0.0260	0.1792	0.0020	0.79	1062.4	10.7	1072.8	9.1	1094.0	17	-2.9
91500	80.4	27.9	14.9	0.356	0.0	0.000	0.0000001	0.0757	0.0008	0.1103	0.0008	1.8881	0.0278	0.1810	0.0020	0.74	1072.2	10.7	1076.9	9.7	1086.0	20	-1.3
91500	78.2	27.0	14.6	0.355	0.4	0.056	0.0000302	0.0741	0.0005	0.1065	0.0008	1.8636	0.0244	0.1823	0.0020	0.85	1079.5	11.1	1068.3	8.6	1045.0	14	3.3
91500	79.8	27.8	14.3	0.358	0.5	0.078	0.0000416	0.0757	0.0006	0.1090	0.0006	1.8325	0.0258	0.1756	0.0020	0.79	1042.6	10.8	1057.2	9.2	1087.0	17	-4.1
91500	78.8	27.4	14.6	0.357	0.0	0.000	0.0000001	0.0745	0.0008	0.1084	0.0008	1.8605	0.0288	0.1811	0.0019	0.69	1073.2	10.6	1067.2	10.2	1054.0	23	1.8
91500	78.7	27.5	14.4	0.359	0.0	0.000	0.0000001	0.0746	0.0007	0.1089	0.0009	1.8411	0.0275	0.1790	0.0021	0.80	1061.3	11.7	1060.2	9.8	1058.0	17	0.3
91500	79.7	27.9	14.5	0.359	0.0	0.000	0.0000001	0.0747	0.0006	0.1068	0.0006	1.8274	0.0240	0.1774	0.0019	0.83	1052.9	10.5	1055.3	8.6	1060.0	15	-0.7
91500	84.6	30.3	15.6	0.368	0.0	0.000	0.0000001	0.0746	0.0007	0.1091	0.0007	1.8520	0.0277	0.1802	0.0020	0.75	1067.9	11.0	1064.1	9.8	1056.0	20	1.1
91500	80.9	28.8	14.6	0.365	0.0	0.000	0.0000001	0.0744	0.0004	0.1086	0.0011	1.8028	0.0222	0.1757	0.0020	0.91	1043.2	10.7	1046.5	8.0	1053.0	10	-0.9
91500	84.2	30.1	15.4	0.367	0.0	0.000	0.0000001	0.0740	0.0010	0.1083	0.0010	1.8169	0.0312	0.1780	0.0020	0.65	1055.8	10.9	1051.6	11.2	1042.0	26	1.3
91500	82.2	29.1	14.9	0.363	0.0	0.000	0.0000001	0.0739	0.0005	0.1106	0.0008	1.8052	0.0237	0.1772	0.0020	0.87	1051.8	11.1	1047.4	8.5	1038.0	12	1.3
91500	79.8	28.2	14.9	0.362	0.0	0.000	0.0000001	0.0744	0.0005	0.1074	0.0009	1.8749	0.0238	0.1827	0.0020	0.84	1081.8	10.7	1072.3	8.4	1053.0	13	2.7
91500	80.3	28.4	14.7	0.363	0.0	0.000	0.0000001	0.0738	0.0008	0.1080	0.0010	1.8258	0.0285	0.1793	0.0020	0.72	1063.2	11.0	1054.8	10.2	1037.0	21	2.5
91500	84.0	29.9	15.7	0.365	0.0	0.000	0.0000001	0.0746	0.0005	0.1084	0.0012	1.8699	0.0238	0.1819	0.0020	0.84	1077.4	10.6	1070.5	8.4	1056.0	14	2.0
91500	84.3	30.2	15.5	0.367	0.0	0.000	0.0000001	0.0760	0.0005	0.1095	0.0009	1.8764	0.0243	0.1790	0.0019	0.84	1061.7	10.6	1072.8	8.6	1095.0	14	-3.0
91500	82.5	29.4	15.0	0.366	0.0	0.000	0.0000001	0.0738	0.0008	0.1105	0.0008	1.8028	0.0276	0.1771	0.0019	0.71	1051.1	10.5	1046.5	9.9	1036.0	22	1.5
91500	83.7	29.8	15.3	0.366	0.0	0.000	0.0000001	0.0760	0.0004	0.1093	0.0008	1.8604	0.0237	0.1776	0.0020	0.89	1053.7	11.0	1067.1	8.4	1094.0	12	-3.7
91500	82.7	28.9	15.0	0.358	0.0	0.000	0.0000001	0.0743	0.0005	0.1087	0.0006	1.8109	0.0240	0.1767	0.0020	0.87	1049.0	11.1	1049.4	8.6	1050.0	13	-0.1
91500	82.8	29.3	14.8	0.363	0.0	0.000	0.0000001	0.0745	0.0005	0.1091	0.0008	1.7897	0.0246	0.1742	0.0021	0.86	1035.5	11.3	1041.7	8.9	1054.0	15	-1.8
91500	81.7	29.1	15.0	0.366	0.0	0.000	0.0000001	0.0752	0.0006	0.1072	0.0011	1.8579	0.0253	0.1792	0.0020	0.83	1062.8	11.0	1066.3	8.9	1073.0	15	-0.9
91500	84.3	30.1	15.5	0.366	0.0	0.000	0.0000001	0.0749	0.0006	0.1110	0.0011	1.8550	0.0250	0.1796	0.0019	0.80	1064.6	10.5	1065.2	8.9	1066.0	16	-0.1
91500	81.9	29.3	14.8	0.366	0.0	0.000	0.0000001	0.0746	0.0006	0.1091	0.0009	1.8104	0.0253	0.1759	0.0019	0.79	1044.6	10.6	1049.2	9.1	1058.0	18	-1.3
91500	82.8	29.4	15.3	0.365	0.0	0.000	0.0000001	0.0752	0.0005	0.1093	0.0008	1.8663	0.0240	0.1799	0.0020	0.88	1066.4	11.1	1069.2	8.5	1075.0	12	-0.8
91500	79.8	28.2	14.9	0.362	0.0	0.000	0.0000001	0.0742	0.0007	0.1084	0.0007	1.8599	0.0284	0.1818	0.0021	0.76	1076.9	11.4	1067.0	10.0	1046.0	20	3.0
91500	83.0	29.6	15.0	0.365	0.0	0.000	0.0000001	0.0759	0.0007	0.1099	0.0008	1.8433	0.0257	0.1762	0.0019	0.79	1046.0	10.6	1061.1	9.1	1092.0	17	-4.2
91500	85.0	30.3	15.5	0.366	0.0	0.000	0.0000001	0.0764	0.0010	0.1106	0.0008	1.8693	0.0321	0.1775	0.0020	0.64	1053.3	10.7	1070.3	11.3	1105.0	26	-4.7
fc1-1	992.6	528.4	199.9	0.546	0.0	0.000	0.0000000	0.0759	0.0002	0.1637	0.0003	1.9636	0.0210	0.1876	0.0020	0.98	1108.4	10.6	1103.1	7.2	1092.0	5	1.5
fc1-1	1011.9	535.3	203.9	0.543	0.0	0.000	0.0000000	0.0761	0.0002	0.1621	0.0003	1.9715	0.0214	0.1878	0.0020	0.97	1109.6	10.7	1105.8	7.3	1098.0	6	1.1
mg1-1	**956.5**	**81.0**	**2.6**	**0.087**	**0.0**	**0.349**	**Th Corrd**	**0.0449**	**0.0013**	**Th Corrd**	**Th Corrd**	**0.0184**	**0.0006**	**0.0030**	**0.0000**	**0.37**	**19.1**	**0.2**	**18.5**	**0.6**	**#N/A**	**#N/A**	**#N/A**
mg1-10	**581.5**	**47.7**	**1.6**	**0.084**	**0.0**	**0.232**	**Th Corrd**	**0.0457**	**0.0018**	**Th Corrd**	**Th Corrd**	**0.0186**	**0.0008**	**0.0030**	**0.0000**	**0.28**	**19.1**	**0.2**	**18.8**	**0.8**	**#N/A**	**#N/A**	**#N/A**
mg1-2	**939.9**	**97.0**	**2.55**	**0.106**	**0.0**	**0.465**	**Th Corrd**	**0.0415**	**0.0010**	**Th Corrd**	**Th Corrd**	**0.0167**	**0.0004**	**0.0029**	**0.0000**	**0.46**	**18.8**	**0.2**	**16.8**	**0.4**	**#N/A**	**#N/A**	**#N/A**
mg1-3	**838.8**	**107.5**	**2.3**	**0.131**	**0.0**	**0.270**	**Th Corrd**	**0.0454**	**0.0013**	**Th Corrd**	**Th Corrd**	**0.0185**	**0.0006**	**0.0029**	**0.0000**	**0.37**	**19.0**	**0.2**	**18.6**	**0.6**	**#N/A**	**#N/A**	**#N/A**
mg1-4	**940.2**	**125.9**	**2.6**	**0.137**	**0.0**	**0.127**	**Th Corrd**	**0.0460**	**0.0013**	**Th Corrd**	**Th Corrd**	**0.0185**	**0.0006**	**0.0029**	**0.0000**	**0.43**	**18.7**	**0.3**	**18.6**	**0.6**	**#N/A**	**#N/A**	**#N/A**
mg1-5	**640.2**	**55.9**	**1.7**	**0.090**	**0.0**	**0.189**	**Th Corrd**	**0.0469**	**0.0015**	**Th Corrd**	**Th Corrd**	**0.0189**	**0.0007**	**0.0029**	**0.0000**	**0.45**	**18.8**	**0.3**	**19.0**	**0.7**	**45.0**	**144**	**-58.2**
mg1-6	**698.8**	**59.8**	**1.9**	**0.088**	**0.0**	**0.227**	**Th Corrd**	**0.0424**	**0.0017**	**Th Corrd**	**Th Corrd**	**0.0170**	**0.0007**	**0.0029**	**0.0000**	**0.37**	**18.8**	**0.3**	**17.2**	**0.7**	**#N/A**	**#N/A**	**#N/A**
mg1-7	**813.7**	**71.0**	**2.2**	**0.090**	**0.0**	**0.179**	**Th Corrd**	**0.0456**	**0.0012**	**Th Corrd**	**Th Corrd**	**0.0184**	**0.0005**	**0.0029**	**0.0000**	**0.39**	**18.9**	**0.2**	**18.5**	**0.5**	**#N/A**	**#N/A**	**#N/A**

mg1-8	**682.1**	**68.8**	**1.8**	**0.103**	**0.0**	**0.277**	**Th Corrd**	**0.0451**	**0.0014**	**Th Corrd**	**Th Corrd**	**0.0179**	**0.0006**	**0.0029**	**0.0000**	**0.37**	**18.6**	**0.2**	**18.0**	**0.6**	**#N/A**	**#N/A**	**#N/A**
mg1-9	**404.7**	**29.0**	**1.1**	**0.073**	**0.0**	**0.355**	**Th Corrd**	**0.0449**	**0.0015**	**Th Corrd**	**Th Corrd**	**0.0179**	**0.0006**	**0.0029**	**0.0000**	**0.42**	**18.7**	**0.3**	**18.1**	**0.6**	**#N/A**	**#N/A**	**#N/A**
temora	108.9	36.3	7.4	0.342	0.0	0.000	0.0000001	0.0556	0.0007	0.1118	0.0016	0.5183	0.0100	0.0676	0.0010	0.78	421.9	6.1	424.0	6.7	435.0	27	-3.0
temora	130.3	35.0	8.7	0.275	1.1	0.257	0.0001382	0.0538	0.0005	0.0839	0.0007	0.5013	0.0073	0.0675	0.0008	0.76	421.2	4.5	412.6	4.9	364.0	21	15.7
temora	141.9	72.5	10.2	0.524	0.6	0.126	0.0000678	0.0541	0.0006	0.1658	0.0010	0.5075	0.0082	0.0681	0.0007	0.68	424.5	4.5	416.7	5.5	374.0	26	13.5
temora	121.8	58.6	8.4	0.494	0.1	0.021	0.0000115	0.0551	0.0010	0.1578	0.0013	0.5035	0.0107	0.0662	0.0008	0.55	413.4	4.7	414.1	7.2	417.0	40	-0.9
temora	131.5	64.7	9.3	0.504	0.0	0.000	0.0000002	0.0547	0.0009	0.1566	0.0018	0.5101	0.0100	0.0676	0.0008	0.59	421.9	4.7	418.5	6.7	399.0	35	5.7
temora	134.0	44.1	9.1	0.337	0.0	0.000	0.0000001	0.0565	0.0006	0.1055	0.0011	0.5283	0.0080	0.0679	0.0007	0.72	423.3	4.4	430.7	5.3	470.0	23	-9.9
temora	97.6	34.3	6.5	0.360	0.0	0.000	0.0000002	0.0564	0.0010	0.1125	0.0005	0.5141	0.0112	0.0661	0.0008	0.56	412.9	4.9	421.2	7.5	466.0	40	-11.4
temora	122.7	58.0	8.9	0.485	0.0	0.000	0.0000001	0.0562	0.0008	0.1523	0.0020	0.5382	0.0095	0.0695	0.0008	0.62	433.1	4.6	437.2	6.2	458.0	31	-5.4
temora	214.6	72.8	14.4	0.348	0.0	0.000	0.0000001	0.0561	0.0005	0.1076	0.0010	0.5161	0.0073	0.0667	0.0007	0.77	416.3	4.4	422.5	4.9	456.0	20	-8.7
temora	255.4	71.2	16.5	0.286	0.0	0.000	0.0000001	0.0547	0.0004	0.0855	0.0005	0.4909	0.0067	0.0651	0.0007	0.82	406.4	4.4	405.5	4.6	400.0	17	1.6
temora	229.2	65.5	15.5	0.293	0.0	0.000	0.0000001	0.0546	0.0007	0.0899	0.0006	0.5139	0.0089	0.0683	0.0007	0.63	425.9	4.5	421.0	5.9	394.0	30	8.1

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91500	81.2	28.2	14.6	0.356	0.63	0.095	0.00005	0.0741	0.0006	0.1079	0.0009	1.8029	0.0255	0.1764	0.0020	0.81	1047.5	11.1	1046.5	9.2	1044	17	0.34
91500	81.4	28.4	15.0	0.357	0.16	0.024	0.00001	0.0761	0.0008	0.1067	0.0009	1.8828	0.0298	0.1795	0.0021	0.74	1064.2	11.5	1075.1	10.5	1097	21	-2.99
91500	81.0	28.2	15.0	0.357	0.32	0.048	0.00003	0.0754	0.0007	0.1083	0.0009	1.8802	0.0278	0.1807	0.0021	0.79	1071.0	11.4	1074.1	9.8	1080	18	-0.83
91500	81.7	28.4	15.1	0.356	0.16	0.023	0.00001	0.0764	0.0007	0.1081	0.0011	1.9034	0.0294	0.1806	0.0022	0.78	1070.3	11.8	1082.3	10.2	1106	19	-3.22
91500	79.4	27.7	14.6	0.358	0.31	0.047	0.00003	0.0753	0.0006	0.1086	0.0012	1.8650	0.0253	0.1797	0.0020	0.82	1065.6	10.9	1068.8	8.9	1075	15	-0.87
91500	80.9	28.4	15.0	0.360	0.46	0.067	0.00004	0.0737	0.0007	0.1068	0.0011	1.8442	0.0287	0.1815	0.0022	0.77	1075.1	11.8	1061.4	10.2	1033	20	4.08
91500	80.2	27.8	14.6	0.356	0.61	0.091	0.00005	0.0749	0.0008	0.1077	0.0014	1.8412	0.0296	0.1784	0.0021	0.75	1058.2	11.7	1060.3	10.5	1064	21	-0.55
91500	79.0	27.5	14.4	0.358	0.00	0.001	0.00000	0.0752	0.0007	0.1090	0.0010	1.8471	0.0271	0.1782	0.0020	0.78	1056.9	11.1	1062.4	9.6	1073	19	-1.50
91500	80.7	28.2	14.8	0.358	0.61	0.091	0.00005	0.0732	0.0006	0.1059	0.0006	1.8158	0.0265	0.1799	0.0021	0.80	1066.5	11.4	1051.2	9.5	1019	18	4.66
91500	79.1	27.5	14.2	0.357	0.59	0.092	0.00005	0.0730	0.0006	0.1067	0.0013	1.7760	0.0258	0.1764	0.0021	0.82	1047.2	11.6	1036.7	9.4	1014	17	3.28
91500	86.5	30.1	15.9	0.357	0.30	0.042	0.00002	0.0739	0.0008	0.1083	0.0012	1.8288	0.0299	0.1796	0.0022	0.76	1064.8	12.1	1055.9	10.7	1037	21	2.68
Temora2-1	309.3	156.1	21.9	0.518	1.20	0.125	0.00007	0.0542	0.0006	0.1620	0.0010	0.5025	0.0084	0.0672	0.0008	0.70	419.3	4.7	413.4	5.6	380	27	10.34
Temora2-2	282.0	143.0	20.1	0.520	0.17	0.019	0.00001	0.0551	0.0007	0.1629	0.0011	0.5136	0.0087	0.0676	0.0008	0.67	421.7	4.6	420.9	5.8	416	28	1.38
temora-2-3	237.3	119.1	16.8	0.515	9.05	1.209	0.00066	0.0568	0.0008	0.1638	0.0017	0.5265	0.0095	0.0673	0.0008	0.67	419.6	4.9	429.5	6.3	482	29	-12.94
Temora2-4	83.1	27.6	5.6	0.341	0.16	0.062	0.00003	0.0556	0.0009	0.1077	0.0019	0.5122	0.0112	0.0668	0.0009	0.62	416.8	5.5	419.9	7.5	436	38	-4.40
temora2-5	87.1	44.3	6.2	0.522	0.16	0.061	0.00003	0.0566	0.0009	0.1642	0.0017	0.5239	0.0110	0.0672	0.0010	0.69	419.0	5.9	427.8	7.3	475	33	-11.79
temora2-6	158.8	39.3	10.4	0.254	0.00	0.001	0.00000	0.0551	0.0006	0.0795	0.0011	0.5043	0.0082	0.0664	0.0008	0.73	414.7	4.7	414.6	5.5	414	25	0.16
SS3-1	**267.9**	**49.9**	**0.7**	**0.191**	**0.00**	**0.391**	**Th Corrd**	**0.0480**	**0.0019**	**Th Corrd**	**Th Corrd**	**0.0187**	**0.0008**	**0.0028**	**0.0001**	**0.46**	**18.2**	**0.4**	**18.9**	**0.8**	**99**	**#N/A**	**-81.59**
SS3-2	**199.1**	**45.4**	**0.6**	**0.234**	**0.00**	**0.066**	**Th Corrd**	**0.0467**	**0.0023**	**Th Corrd**	**Th Corrd**	**0.0190**	**0.0010**	**0.0029**	**0.0000**	**0.31**	**19.0**	**0.3**	**19.1**	**1.0**	**33**	**#N/A**	**-42.50**
SS3-3	**327.3**	**84.1**	**0.9**	**0.264**	**0.00**	**0.154**	**Th Corrd**	**0.0464**	**0.0016**	**Th Corrd**	**Th Corrd**	**0.0183**	**0.0007**	**0.0029**	**0.0001**	**0.48**	**18.5**	**0.4**	**18.5**	**0.7**	**16**	**137**	**15.46**
SS3-4	**170.7**	**32.4**	**0.5**	**0.194**	**0.00**	**0.365**	**Th Corrd**	**0.0442**	**0.0038**	**Th Corrd**	**Th Corrd**	**0.0178**	**0.0016**	**0.0029**	**0.0001**	**0.26**	**18.8**	**0.4**	**17.9**	**1.6**	**#N/A**	**#N/A**	**#N/A**
SS3-5	**184.9**	**45.6**	**0.5**	**0.253**	**0.00**	**0.409**	**Th Corrd**	**0.0474**	**0.0026**	**Th Corrd**	**Th Corrd**	**0.0191**	**0.0011**	**0.0029**	**0.0001**	**0.34**	**18.8**	**0.4**	**19.2**	**1.1**	**71**	**#N/A**	**-73.52**
SS3-6	**250.5**	**77.1**	**0.7**	**0.316**	**0.00**	**0.610**	**Th Corrd**	**0.0441**	**0.0031**	**Th Corrd**	**Th Corrd**	**0.0174**	**0.0013**	**0.0029**	**0.0000**	**0.22**	**18.4**	**0.3**	**17.6**	**1.3**	**#N/A**	**#N/A**	**#N/A**
SS3-7	**233.7**	**43.8**	**0.6**	**0.192**	**0.00**	**0.726**	**Th Corrd**	**0.0457**	**0.0027**	**Th Corrd**	**Th Corrd**	**0.0174**	**0.0011**	**0.0028**	**0.0001**	**0.31**	**17.8**	**0.3**	**17.5**	**1.1**	**#N/A**	**#N/A**	**#N/A**
SS3-8	**377.0**	**116.4**	**1.1**	**0.317**	**0.00**	**0.470**	**Th Corrd**	**0.0429**	**0.0022**	**Th Corrd**	**Th Corrd**	**0.0176**	**0.0009**	**0.0030**	**0.0000**	**0.29**	**19.1**	**0.3**	**17.7**	**0.9**	**#N/A**	**#N/A**	**#N/A**
SS3-9	**666.9**	**145.8**	**1.9**	**0.224**	**0.00**	**0.240**	**Th Corrd**	**0.0481**	**0.0017**	**Th Corrd**	**Th Corrd**	**0.0192**	**0.0007**	**0.0029**	**0.0000**	**0.38**	**18.6**	**0.3**	**19.3**	**0.7**	**102**	**165**	**-81.74**
SS3-10	**158.2**	**28.6**	**0.4**	**0.186**	**0.00**	**0.338**	**Th Corrd**	**0.0473**	**0.0033**	**Th Corrd**	**Th Corrd**	**0.0192**	**0.0014**	**0.0029**	**0.0001**	**0.29**	**18.9**	**0.4**	**19.3**	**1.4**	**62**	**#N/A**	**-69.47**
SS3-11	**295.4**	**43.7**	**0.8**	**0.152**	**0.00**	**0.131**	**Th Corrd**	**0.0445**	**0.0026**	**Th Corrd**	**Th Corrd**	**0.0186**	**0.0011**	**0.0030**	**0.0000**	**0.26**	**19.5**	**0.3**	**18.7**	**1.1**	**#N/A**	**#N/A**	**#N/A**
SS3-12	**174.1**	**27.2**	**0.5**	**0.160**	**0.00**	**0.697**	**Th Corrd**	**0.0438**	**0.0037**	**Th Corrd**	**Th Corrd**	**0.0176**	**0.0015**	**0.0029**	**0.0001**	**0.23**	**18.7**	**0.4**	**17.7**	**1.5**	**#N/A**	**#N/A**	**#N/A**

Table A-5: Oxygen isotope analyses

no in sequence	Sample Name	filename	18O/16O measured	%1se	18O/16O corrected	± 2 se (incl. std)	$\delta^{18}O$	± 2 se
13-Feb-07								
1	91500	0601-91500-2@80.asc	0.0020262	0.018				
2	91500	0601-91500-2@81.asc	0.0020250	0.014				
3	91500	0601-91500-2@82.asc	0.0020258	0.017				
4	91500	0601-91500-2@83.asc	0.0020259	0.010				
5	91500	0601-91500-2@84.asc	0.0020248	0.006				
6	91500	0601-91500-2@85.asc	0.0020255	0.009				
7	91500	0601-91500-2@86.asc	0.0020261	0.008				
8	91500	0601-91500-2@87.asc	0.0020262	0.016				
9	91500	0601-91500-2@88.asc	0.0020258	0.015				
10	91500	0601-91500-2@89.asc	0.0020254	0.016				
11	Temora2	0601-temora@11.asc	0.0020222	0.009	0.0020218	0.0000004	8.3	0.2
12	Temora2	0601-temora@12.asc	0.0020217	0.021	0.0020213	0.0000009	8.0	0.4
13	Temora2	0601-temora@13.asc	0.0020216	0.011	0.0020213	0.0000005	8.0	0.3
14	Temora2	0601-temora@14.asc	0.0020212	0.017	0.0020208	0.0000007	7.8	0.4
15	Temora2	0601-temora@15.asc	0.0020213	0.018	0.0020209	0.0000008	7.8	0.4
16	Temora2	0601-temora@16.asc	0.0020222	0.015	0.0020218	0.0000007	8.3	0.3
17	Temora2	0601-temora@17.asc	0.0020217	0.014	0.0020213	0.0000006	8.0	0.3
18	Temora2	0601-temora@18.asc	0.0020210	0.012	0.0020207	0.0000005	7.7	0.3
19	Temora2	0601-temora@19.asc	0.0020215	0.016	0.0020211	0.0000007	8.0	0.3
20	Temora2	0601-temora@19.asc	0.0020215	0.016	0.0020211	0.0000007	8.0	0.3
21	91500	0601-91500-2@90.asc	0.0020257	0.007				
22	91500	0601-91500-2@91.asc	0.0020264	0.014				
23	91500	0601-91500-2@92.asc	0.0020256	0.008				
24	91500	0601-91500-2@93.asc	0.0020258	0.011				
25	91500	0601-91500-2@94.asc	0.0020257	0.011				
26	91500	0601-91500-2@95.asc	0.0020260	0.012				
27	91500	0601-91500-2@96.asc	0.0020262	0.016				
28	91500	0601-91500-2@97.asc	0.0020257	0.015				
29	91500	0601-91500-2@98.asc	0.0020258	0.018				
30	91500	0601-91500-2@99.asc	0.0020261	0.017				
53	91500	0601-91500-2@110.asc	0.0020256	0.006				
54	91500	0601-91500-2@111.asc	0.0020254	0.013				
55	91500	0601-91500-2@112.asc	0.0020257	0.022				
56	91500	0601-91500-2@113.asc	0.0020258	0.012				
57	91500	0601-91500-2@114.asc	0.0020263	0.012				
68	91500	0601-91500-2@115.asc	0.0020254	0.017				
69	91500	0601-91500-2@116.asc	0.0020260	0.020				
70	91500	0601-91500-2@117.asc	0.0020253	0.014				
71	91500	0601-91500-2@118.asc	0.0020257	0.009				
72	91500	0601-91500-2@119.asc	0.0020257	0.015				
73	**HD9-01**	**0601-9@1.asc**	**0.0020216**	**0.013**	**0.0020213**	**0.0000006**	**8.0**	**0.3**
74	**HD9-02**	**0601-9@2.asc**	**0.0020221**	**0.017**	**0.0020218**	**0.0000007**	**8.3**	**0.4**
75	**HD9-03**	**0601-9@3.asc**	**0.0020224**	**0.018**	**0.0020221**	**0.0000008**	**8.4**	**0.4**
76	**HD9-04**	**0601-9@4.asc**	**0.0020227**	**0.019**	**0.0020224**	**0.0000008**	**8.6**	**0.4**
77	**HD9-05**	**0601-9@5.asc**	**0.0020223**	**0.010**	**0.0020220**	**0.0000005**	**8.4**	**0.2**
78	**HD9-06**	**0601-9@6.asc**	**0.0020225**	**0.020**	**0.0020222**	**0.0000008**	**8.5**	**0.4**
79	**HD9-07**	**0601-9@7.asc**	**0.0020216**	**0.018**	**0.0020213**	**0.0000008**	**8.0**	**0.4**
80	**HD9-08**	**0601-9@8.asc**	**0.0020212**	**0.011**	**0.0020209**	**0.0000005**	**7.8**	**0.2**
81	**HD9-09**	**0601-9@9.asc**	**0.0020196**	**0.019**	**0.0020193**	**0.0000008**	**7.0**	**0.4**
82	**HD9-10**	**0601-9@10.asc**	**0.0020225**	**0.010**	**0.0020222**	**0.0000005**	**8.5**	**0.2**

83	**HD9-11**	**0601-9@11.asc**	**0.0020235**	**0.013**	**0.0020232**	**0.0000006**	**9.0**	**0.3**
84	**HD9-12**	**0601-9@12.asc**	**0.0020227**	**0.013**	**0.0020223**	**0.0000006**	**8.6**	**0.3**
85	**HD9-13**	**0601-9@13.asc**	**0.0020219**	**0.016**	**0.0020216**	**0.0000007**	**8.2**	**0.3**
86	**HD9-14**	**0601-9@14.asc**	**0.0020226**	**0.016**	**0.0020223**	**0.0000007**	**8.5**	**0.3**
87	**HD9-15**	**0601-9@15.asc**	**0.0020219**	**0.012**	**0.0020216**	**0.0000005**	**8.2**	**0.3**
88	91500	0601-91500-2@120.asc	0.0020259	0.012				
89	91500	0601-91500-2@121.asc	0.0020260	0.014				
90	91500	0601-91500-2@122.asc	0.0020255	0.012				
91	91500	0601-91500-2@123.asc	0.0020256	0.010				
92	91500	0601-91500-2@124.asc	0.0020257	0.015				
93	**HD9-16**	**0601-9@16.asc**	**0.0020192**	**0.006**	**0.0020187**	**0.0000004**	**6.7**	**0.2**
94	**HD9-17**	**0601-9@17.asc**	**0.0020218**	**0.009**	**0.0020213**	**0.0000005**	**8.0**	**0.2**
95	**HD9-18**	**0601-9@18.asc**	**0.0020225**	**0.012**	**0.0020220**	**0.0000005**	**8.4**	**0.3**
96	**HD9-19**	**0601-9@19.asc**	**0.0020215**	**0.016**	**0.0020210**	**0.0000007**	**7.9**	**0.4**
97	**HD9-20**	**0601-9@20.asc**	**0.0020224**	**0.013**	**0.0020219**	**0.0000006**	**8.3**	**0.3**
98	**HD9-21**	**0601-9@21.asc**	**0.0020216**	**0.011**	**0.0020211**	**0.0000005**	**7.9**	**0.3**
99	**HD9-22**	**0601-9@22.asc**	**0.0020219**	**0.009**	**0.0020214**	**0.0000004**	**8.1**	**0.2**
100	**HD9-23**	**0601-9@23.asc**	**0.0020227**	**0.019**	**0.0020222**	**0.0000008**	**8.5**	**0.4**
101	**HD9-24**	**0601-9@24.asc**	**0.0020221**	**0.011**	**0.0020216**	**0.0000005**	**8.2**	**0.3**
102	**HD9-25**	**0601-9@25.asc**	**0.0020224**	**0.011**	**0.0020219**	**0.0000005**	**8.3**	**0.3**
103	**HD9-26**	**0601-9@26.asc**	**0.0020222**	**0.007**	**0.0020217**	**0.0000004**	**8.2**	**0.2**
104	**HD9-27**	**0601-9@27.asc**	**0.0020236**	**0.010**	**0.0020231**	**0.0000005**	**8.9**	**0.2**
105	**HD9-28**	**0601-9@28.asc**	**0.0020216**	**0.007**	**0.0020211**	**0.0000004**	**7.9**	**0.2**
106	**HD9-29**	**0601-9@29.asc**	**0.0020227**	**0.012**	**0.0020222**	**0.0000006**	**8.5**	**0.3**
107	**HD9-30**	**0601-9@30.asc**	**0.0020228**	**0.017**	**0.0020222**	**0.0000007**	**8.5**	**0.4**
108	91500	0601-91500-2@125.asc	0.0020266	0.013				
109	91500	0601-91500-2@126.asc	0.0020263	0.015				
110	91500	0601-91500-2@128.asc	0.0020258	0.013				
111	91500	0601-91500-2@127.asc	0.0020260	0.010				
112	91500	0601-91500-2@129.asc	0.0020258	0.020				
14-Feb-07								
1	91500	0602-91500-1@1.asc	0.0020261	0.009				
2	91500	0602-91500-1@2.asc	0.0020250	0.011				
3	91500	0602-91500-1@3.asc	0.0020262	0.018				
4	91500	0602-91500-1@4.asc	0.0020248	0.014				
5	91500	0602-91500-1@5.asc	0.0020258	0.014				
6	91500	0602-91500-1@6.asc	0.0020262	0.010				
7	91500	0602-91500-1@7.asc	0.0020262	0.012				
8	91500	0602-91500-1@8.asc	0.0020262	0.012				
9	91500	0602-91500-1@9.asc	0.0020258	0.014				
10	91500	0602-91500-1@10.asc	0.0020261	0.006				
11	91500	0602-91500-1@11.asc	0.0020255	0.010				
12	91500	0602-91500-1@12.asc	0.0020257	0.019				
13	91500	0602-91500-1@13.asc	0.0020259	0.016				
14	91500	0602-91500-1@14.asc	0.0020263	0.015				
15	91500	0602-91500-1@15.asc	0.0020260	0.015				
16	Temora2	0602-tem2@1.asc	0.0020223	0.013	0.0020218	0.0000006	8.3	0.3
17	Temora2	0602-tem2@2.asc	0.0020215	0.004	0.0020210	0.0000003	7.9	0.1
18	Temora2	0602-tem2@3.asc	0.0020222	0.009	0.0020217	0.0000004	8.3	0.2
19	Temora2	0602-tem2@4.asc	0.0020222	0.015	0.0020217	0.0000006	8.2	0.3
20	Temora2	0602-tem2@5.asc	0.0020216	0.012	0.0020211	0.0000005	8.0	0.3
21	**HD20-01**	**0602-20@1.asc**	**0.0020211**	**0.006**	**0.0020206**	**0.0000003**	**7.7**	**0.2**
22	**HD20-02**	**0602-20@2.asc**	**0.0020214**	**0.013**	**0.0020209**	**0.0000006**	**7.8**	**0.3**

23	**HD20-03**	**0602-20@3.asc**	**0.0020249**	**0.018**	**0.0020244**	**0.0000007**	**9.6**	**0.4**
24	**HD20-04**	**0602-20@4.asc**	**0.0020221**	**0.010**	**0.0020216**	**0.0000005**	**8.2**	**0.2**
25	**HD20-05**	**0602-20@5.asc**	**0.0020219**	**0.013**	**0.0020214**	**0.0000006**	**8.1**	**0.3**
26	**HD20-06**	**0602-20@6.asc**	**0.0020226**	**0.006**	**0.0020221**	**0.0000003**	**8.4**	**0.2**
27	**HD20-07**	**0602-20@7.asc**	**0.0020228**	**0.012**	**0.0020223**	**0.0000005**	**8.5**	**0.3**
28	**HD20-08**	**0602-20@8.asc**	**0.0020223**	**0.011**	**0.0020218**	**0.0000005**	**8.3**	**0.2**
29	**HD20-09**	**0602-20@9.asc**	**0.0020227**	**0.009**	**0.0020222**	**0.0000004**	**8.5**	**0.2**
30	**HD20-10**	**0602-20@10.asc**	**0.0020224**	**0.015**	**0.0020220**	**0.0000006**	**8.4**	**0.3**
31	**HD20-11**	**0602-20@11.asc**	**0.0020240**	**0.013**	**0.0020235**	**0.0000006**	**9.1**	**0.3**
32	**HD20-12**	**0602-20@12.asc**	**0.0020234**	**0.019**	**0.0020229**	**0.0000008**	**8.8**	**0.4**
33	91500	0602-91500-1@16.asc	0.0020264	0.011				
34	91500	0602-91500-1@17.asc	0.0020262	0.018				
35	91500	0602-91500-1@18.asc	0.0020254	0.009				
36	91500	0602-91500-1@19.asc	0.0020258	0.008				
37	91500	0602-91500-1@20.asc	0.0020260	0.013				
38	91500	0602-91500-1@21.asc	0.0020256	0.018				
39	91500	0602-91500-1@22.asc	0.0020251	0.013				
40	91500	0602-91500-1@23.asc	0.0020262	0.009				
41	91500	0602-91500-1@24.asc	0.0020259	0.010				
42	91500	0602-91500-1@25.asc	0.0020259	0.014				
43	**HD20-13**	**0602-20@13.asc**	**0.0020207**	**0.012**	**0.0020200**	**0.0000006**	**7.4**	**0.3**
44	**HD20-14**	**0602-20@14.asc**	**0.0020218**	**0.016**	**0.0020211**	**0.0000007**	**7.9**	**0.3**
45	**HD20-15**	**0602-20@15.asc**	**0.0020212**	**0.013**	**0.0020205**	**0.0000006**	**7.7**	**0.3**
46	**HD20-16**	**0602-20@16.asc**	**0.0020234**	**0.013**	**0.0020227**	**0.0000006**	**8.7**	**0.3**
47	**HD20-17**	**0602-20@17.asc**	**0.0020233**	**0.011**	**0.0020226**	**0.0000005**	**8.7**	**0.3**
48	**HD20-18**	**0602-20@18.asc**	**0.0020219**	**0.008**	**0.0020212**	**0.0000004**	**8.0**	**0.2**
49	**HD20-19**	**0602-20@19.asc**	**0.0020228**	**0.008**	**0.0020221**	**0.0000005**	**8.4**	**0.2**
50	**HD20-20**	**0602-20@20.asc**	**0.0020241**	**0.006**	**0.0020234**	**0.0000004**	**9.1**	**0.2**
51	**HD20-21**	**0602-20@21.asc**	**0.0020213**	**0.012**	**0.0020206**	**0.0000006**	**7.7**	**0.3**
52	**HD20-22**	**0602-20@22.asc**	**0.0020222**	**0.013**	**0.0020216**	**0.0000006**	**8.2**	**0.3**
53	**HD20-23**	**0602-20@23.asc**	**0.0020225**	**0.007**	**0.0020218**	**0.0000004**	**8.3**	**0.2**
54	**HD20-24**	**0602-20@24.asc**	**0.0020229**	**0.010**	**0.0020222**	**0.0000005**	**8.5**	**0.3**
55	91500	0602-91500-1@26.asc	0.0020271	0.008				
56	91500	0602-91500-1@27.asc	0.0020267	0.018				
57	91500	0602-91500-1@28.asc	0.0020260	0.008				
58	91500	0602-91500-1@29.asc	0.0020265	0.020				
59	91500	0602-91500-1@30.asc	0.0020263	0.005				
62	HD1-22	0602-1@3.asc	0.0020281	0.015	0.0020270	0.0000006	10.9	0.32
63	HD1-50	0602-1@4.asc	0.0020275	0.010	0.0020263	0.0000005	10.5	0.24
69	HD1-51	0602-1@10.asc	0.0020273	0.010	0.0020262	0.0000005	10.5	0.23
79	HD1-52	0602-1@14.asc	0.0020286	0.013	0.0020275	0.0000006	11.1	0.28
81	91500	0602-91500-1@37.asc	0.0020300	0.012				
82	91500	0602-91500-1@38.asc	0.0020300	0.016				
83	91500	0602-91500-1@39.asc	0.0020300	0.015				
84	91500	0602-91500-1@40.asc	0.0020300	0.015				
85	91500	0602-91500-1@41.asc	0.0020300	0.006				
86	91500	0602-91500-1@42.asc	0.0020300	0.008				
87	91500	0602-91500-1@43.asc	0.0020300	0.019				
88	91500	0602-91500-1@44.asc	0.0020300	0.020				
89	91500	0602-91500-1@45.asc	0.0020300	0.013				
90	91500	0602-91500-1@46.asc	0.0020300	0.014				

Table A-6: Standard data for oxygen isotope analyses

Date	filename	18O/16O measured	18O/16O corrected	± 2 se (incl. std)	$\delta^{18}O$	± 2 se
Zircon KIM-5						
2/12/2007	kim5-8@1.asc	0.0020139	0.0020148	0.0000005	4.8	0.3
2/12/2007	kim5-8@2.asc	0.0020145	0.0020154	0.0000004	5.1	0.2
2/12/2007	kim5-8@3.asc	0.0020150	0.0020159	0.0000006	5.3	0.3
2/12/2007	kim5-8@4.asc	0.0020143	0.0020153	0.0000005	5.0	0.2
2/12/2007	kim5-8@5.asc	0.0020144	0.0020154	0.0000003	5.1	0.2
2/12/2007	kim5-8@6.asc	0.0020145	0.0020155	0.0000006	5.1	0.3
2/12/2007	kim5-8@7.asc	0.0020140	0.0020149	0.0000005	4.9	0.2
2/12/2007	kim5-8@8.asc	0.0020138	0.0020148	0.0000006	4.8	0.3
2/12/2007	kim5-8@9.asc	0.0020137	0.0020146	0.0000007	4.7	0.3
2/12/2007	kim5-8@10.asc	0.0020140	0.0020149	0.0000006	4.8	0.3
2/12/2007	kim5-8@11.asc	0.0020142	0.0020152	0.0000008	5.0	0.4
2/12/2007	kim5-8@12.asc	0.0020147	0.0020157	0.0000006	5.2	0.3
2/12/2007	kim5-8@13.asc	0.0020145	0.0020154	0.0000006	5.1	0.3
2/12/2007	kim5-8@14.asc	0.0020145	0.0020154	0.0000007	5.1	0.3
2/12/2007	kim5-8@15.asc					
2/12/2007	kim5-8@16.asc	0.0020149	0.0020158	0.0000005	5.3	0.2
2/12/2007	kim5-8@17.asc	0.0020144	0.0020154	0.0000009	5.1	0.5
2/12/2007	kim5-8@18.asc	0.0020151	0.0020161	0.0000005	5.4	0.2
2/12/2007	kim5-8@19.asc	0.0020149	0.0020158	0.0000004	5.3	0.2
2/12/2007	kim5-8@20.asc	0.0020150	0.0020160	0.0000008	5.4	0.4
02/14/07	0702-kim5-1@:	0.0020087	0.0020156	0.0000008	5.2	0.4
02/14/07	0702-kim5-1@(	0.0020077	0.0020145	0.0000010	4.7	0.5
02/14/07	0702-kim5-1@'	0.0020084	0.0020152	0.0000006	5.0	0.3
02/14/07	0702-kim5-1@!	0.0020084	0.0020153	0.0000008	5.0	0.4
02/14/07	0702-kim5-1@!	0.0020076	0.0020144	0.0000007	4.6	0.3
02/16/07	0701-kim5@1.a	0.0020157	0.0020154	0.0000005	5.1	0.3
02/16/07	0701-kim5@2.a	0.0020159	0.0020157	0.0000005	5.2	0.2
02/16/07	0701-kim5@3.a	0.0020155	0.0020153	0.0000006	5.0	0.3
02/16/07	0701-kim5@4.a	0.0020152	0.0020150	0.0000005	4.9	0.2
02/16/07	0701-kim5@5.a	0.0020155	0.0020152	0.0000006	5.0	0.3
02/16/07	0701-kim5@6.a	0.0020155	0.0020151	0.0000005	4.9	0.2

date	filename	18O/16O measured	18O/16O corrected	± 2 se (incl. std)	$\delta^{18}O$	± 2 se
Zircon Temora-2						
2/12/2007	0601-temora@1.asc	0.0020196	0.0020219	0.0000006	8.3	0.3
2/12/2007	0601-temora@2.asc	0.0020201	0.0020225	0.0000008	8.6	0.4
2/12/2007	0601-temora@3.asc	0.0020193	0.0020216	0.0000006	8.2	0.3
2/12/2007	0601-temora@4.asc	0.0020189	0.0020213	0.0000004	8.0	0.2
2/12/2007	0601-temora@5.asc	0.0020188	0.0020212	0.0000003	8.0	0.2
2/12/2007	0601-temora@6.asc	0.0020203	0.0020216	0.0000007	8.2	0.4
2/12/2007	0601-temora@7.asc	0.0020205	0.0020218	0.0000005	8.3	0.3
2/12/2007	0601-temora@8.asc	0.0020204	0.0020217	0.0000007	8.2	0.3
2/12/2007	0601-temora@9.asc	0.0020207	0.0020220	0.0000004	8.4	0.2
2/12/2007	0601-temora@10.asc	0.0020201	0.0020214	0.0000006	8.1	0.3
02/13/07	0601-temora@11.asc	0.0020222	0.0020218	0.0000004	8.3	0.2
02/13/07	0601-temora@12.asc	0.0020217	0.0020213	0.0000009	8.0	0.4
02/13/07	0601-temora@13.asc	0.0020216	0.0020213	0.0000005	8.0	0.3
02/13/07	0601-temora@14.asc	0.0020212	0.0020208	0.0000007	7.8	0.4
02/13/07	0601-temora@15.asc	0.0020213	0.0020209	0.0000008	7.8	0.4
02/13/07	0601-temora@16.asc	0.0020222	0.0020218	0.0000007	8.3	0.3
02/13/07	0601-temora@17.asc	0.0020217	0.0020213	0.0000006	8.0	0.3
02/13/07	0601-temora@18.asc	0.0020210	0.0020207	0.0000005	7.7	0.3
02/13/07	0601-temora@19.asc	0.0020215	0.0020211	0.0000007	8.0	0.3
02/13/07	0601-temora@19.asc	0.0020215	0.0020211	0.0000007	8.0	0.3
02/14/07	0702-tem2@1.asc	0.0020153	0.0020221	0.0000006	8.4	0.3
02/14/07	0702-tem2@2.asc	0.0020148	0.0020217	0.0000010	8.2	0.5
02/14/07	0702-tem2@3.asc	0.0020150	0.0020218	0.0000010	8.3	0.5
02/14/07	0702-tem2@4.asc	0.0020145	0.0020214	0.0000010	8.1	0.5
02/14/07	0702-tem2@5.asc	0.0020151	0.0020219	0.0000009	8.3	0.4
02/14/07	0702-tem2@6.asc	0.0020143	0.0020211	0.0000008	7.9	0.4
02/14/07	0702-tem2@7.asc	0.0020141	0.0020210	0.0000010	7.9	0.5
02/14/07	0702-tem2@8.asc	0.0020141	0.0020210	0.0000013	7.9	0.6
02/14/07	0702-tem2@9.asc	0.0020143	0.0020212	0.0000008	8.0	0.4
02/14/07	0702-tem2@10.asc	0.0020144	0.0020213	0.0000009	8.0	0.4
02/14/07	0602-tem2@1.asc	0.0020223	0.0020218	0.0000006	8.3	0.3

02/16/07	0701-kim5@7.a	0.0020158	0.0020154	0.0000004	5.1	0.2
02/16/07	0701-kim5@8.a	0.0020155	0.0020151	0.0000007	4.9	0.4
02/16/07	0701-kim5@9.a	0.0020153	0.0020150	0.0000006	4.9	0.3
02/16/07	0701-kim5@10	0.0020155	0.0020151	0.0000004	5.0	0.2
02/16/07	0701-kim5@11	0.0020152	0.0020147	0.0000005	4.7	0.3
02/16/07	0701-kim5@12	0.0020157	0.0020151	0.0000006	4.9	0.3
02/16/07	0701-kim5@13	0.0020156	0.0020151	0.0000003	4.9	0.2
02/16/07	0701-kim5@14	0.0020160	0.0020155	0.0000006	5.1	0.3
02/16/07	0701-kim5@15	0.0020154	0.0020149	0.0000005	4.8	0.3
02/17/07	0701-kim5@16	0.0020157	0.0020150	0.0000007	4.9	0.3
02/17/07	0701-kim5@17	0.0020159	0.0020153	0.0000004	5.0	0.2
02/17/07	0701-kim5@18	0.0020154	0.0020148	0.0000006	4.8	0.3
02/17/07	0701-kim5@19	0.0020160	0.0020153	0.0000005	5.1	0.3
02/17/07	0701-kim5@20	0.0020158	0.0020152	0.0000007	5.0	0.3
02/17/07	0701-kim5@21	0.0020153	0.0020148	0.0000005	4.8	0.3
02/17/07	0701-kim5@22	0.0020158	0.0020153	0.0000006	5.0	0.3
02/17/07	0701-kim5@23	0.0020161	0.0020156	0.0000005	5.2	0.2
02/17/07	0701-kim5@24	0.0020159	0.0020155	0.0000006	5.1	0.3
02/17/07	0701-kim5@25	0.0020158	0.0020153	0.0000008	5.1	0.4
02/17/07	0701-kim5@26	0.0020160	0.0020155	0.0000007	5.1	0.4
02/17/07	0701-kim5@27	0.0020159	0.0020154	0.0000004	5.1	0.2
02/17/07	0701-kim5@28	0.0020165	0.0020160	0.0000007	5.4	0.3
02/17/07	0701-kim5@29	0.0020158	0.0020153	0.0000006	5.1	0.3
02/17/07	0701-kim5@30	0.0020155	0.0020150	0.0000004	4.9	0.2
				average	**5.02**	
				1 s.d.	**0.18**	

02/14/07	0602-tem2@2.asc	0.0020215	0.0020210	0.0000003	7.9	0.1
02/14/07	0602-tem2@3.asc	0.0020222	0.0020217	0.0000004	8.3	0.2
02/14/07	0602-tem2@4.asc	0.0020222	0.0020217	0.0000006	8.2	0.3
02/14/07	0602-tem2@5.asc	0.0020216	0.0020211	0.0000005	8.0	0.3
02/15/07	0604-tem2@1.asc	0.0020218	0.0020218	0.0000006	8.3	0.3
02/15/07	0604-tem2@2.asc	0.0020209	0.0020209	0.0000008	7.8	0.4
02/15/07	0604-tem2@3.asc	0.0020216	0.0020217	0.0000006	8.2	0.3
02/15/07	0604-tem2@4.asc	0.0020214	0.0020215	0.0000005	8.1	0.3
02/15/07	0604-tem2@5.asc	0.0020211	0.0020211	0.0000009	7.9	0.4
02/18/07	TK7-tem2@1.asc	0.0020212	0.0020218	0.0000009	8.3	0.4
02/18/07	TK7-tem2@2.asc	0.0020212	0.0020217	0.0000007	8.2	0.3
02/18/07	TK7-tem2@3.asc	0.0020214	0.0020220	0.0000005	8.4	0.2
02/18/07	TK7-tem2@4.asc	0.0020214	0.0020219	0.0000006	8.3	0.3
02/18/07	TK7-tem2@5.asc	0.0020212	0.0020218	0.0000006	8.3	0.3
02/18/07	TK7-tem2@6.asc	0.0020209	0.0020219	0.0000006	8.3	0.3
02/18/07	TK7-tem2@7.asc	0.0020206	0.0020216	0.0000006	8.2	0.3
02/18/07	TK7-tem2@8.asc	0.0020200	0.0020210	0.0000006	7.9	0.3
02/18/07	TK7-tem2@9.asc	0.0020203	0.0020213	0.0000009	8.0	0.4
02/18/07	TK7-tem2@10.asc	0.0020204	0.0020215	0.0000005	8.1	0.3
02/18/07	TK7-tem2@13.asc	0.0020205	0.0020217	0.0000006	8.2	0.3
02/18/07	TK7-tem2@14.asc	0.0020213	0.0020225	0.0000005	8.6	0.3
02/18/07	TK7-tem2@15.asc	0.0020207	0.0020219	0.0000008	8.3	0.4
02/18/07	TK7-tem2@16.asc	0.0020204	0.0020216	0.0000006	8.2	0.3
02/18/07	TK7-tem2@17.asc	0.0020205	0.0020217	0.0000007	8.2	0.4
02/18/07	TK7-tem2@18.asc	0.0020205	0.0020217	0.0000006	8.2	0.3
02/18/07	TK7-tem2@19.asc	0.0020206	0.0020217	0.0000006	8.2	0.3
02/18/07	TK7-tem2@20.asc	0.0020202	0.0020214	0.0000007	8.1	0.3
02/18/07	TK7-tem2@21.asc	0.0020204	0.0020216	0.0000008	8.2	0.4
02/18/07	TK7-tem2@22.asc	0.0020201	0.0020213	0.0000006	8.0	0.3
				average	**8.14**	
				1 s.d.	**0.19**	

Table A-7: Analytical set up for Nd and Hf analysis by LAMCICPMS at JCU and UWA

Analytical facility: AAC, James Cook University

Laser Ablation System	GeoLas
Spot size	44-110 µm
Pulse repetition rate	4 Hz
Energy Density	~5 J/cm^2 for apatite and ~1 J/cm^2 for monazite

Mass Spectrometer System

Instrument	Thermo Scientific Neptune		
RF power	1.4 kw		
Gas flow rates	Ar cooling: 15 l min^{-1} N_2: 0.008 l min^{-1}	Ar auxilirary: 0.8 l min^{-1} He carrier: 0.9 l min^{-1}	Ar sample: 0.8 l min^{-1}
Mass resolution	~300		
Data aquisation mode	Time resolved		
Integration time	1.049 s		
Analysis Mode	Static		

Cup	L4	L3	L2	L1	C	H1	H2	H3	H4
Analyte	^{142}Nd ^{142}Ce	^{143}Nd	^{144}Nd ^{144}Sm	^{145}Nd	^{146}Nd	^{147}Sm	^{149}Sm	^{153}Eu	^{155}Gd
Potential interferences		^{103}Rh^{40}Ar	^{104}Pd^{40}Ar ^{130}Ba^{14}N	^{105}Pd^{40}Ar	^{106}Pd^{40}Ar ^{132}Ba^{14}N ^{130}Ba^{16}O	^{133}Cs^{14}N			^{139}La^{16}O

Analytical facility: UWA

Laser Ablation System	G2 Analyte
Spot size	15-110 µm
Pulse repetition rate	4 Hz
Energy Density	~5 J/cm^2 for apatite and ~1 J/cm^2 for monazite

Mass Spectrometer System

Instrument	Thermo Scientific Neptune		
RF power	1.4 kw		
Gas flow rates	Ar cooling: 15 l min^{-1} N_2: 0.012 l min^{-1}	Ar auxilirary: 0.8 l min^{-1} He carrier: 0.9 l min^{-1}	Ar sample: 0.8 l min^{-1}
Mass resolution	~300		
Data aquisation mode	Time resolved		
Integration time	1.049 s		
Analysis Mode	Static		

Cup	L4	L3	L2	L1	C	H1	H2	H3	H4
Analyte		^{142}Nd ^{142}Ce	^{143}Nd	^{144}Nd ^{144}Sm	^{145}Nd	^{146}Nd	^{147}Sm	^{148}Nd	^{149}Sm
Potential interferences		^{103}Rh^{40}Ar	^{103}Rh^{40}Ar	^{104}Pd^{40}Ar ^{130}Ba^{14}N	^{105}Pd^{40}Ar	^{106}Pd^{40}Ar ^{132}Ba^{14}N ^{130}Ba^{16}O	^{133}Cs^{14}N		

Analytical facility: AAC, James Cook University

Laser Ablation System	GeoLas
Spot size	31-58 µm
Pulse repetition rate	4 Hz
Energy Density	~5-6 J/cm^2

Mass Spectrometer System

Instrument	Thermo Scientific Neptune
RF power	1.4 kw
Gas flow rates	Ar cooling: 15 l min^{-1} Ar auxilirary: 0.8 l min^{-1} He carrier: 1.0 l min^{-1} Ar sample: 0.9 l min^{-1} N_2: 0.005 l min^{-1}
Mass resolution	~300
Data aquisation mode	Time resolved
Integration time	1.049 s
Analysis Mode	Static

Cup	L4	L3	L2	L1	C	H1	H2	H3	H4
Analyte	^{171}Yb	^{173}Yb	^{175}Lu	^{176}Hf+Lu+Yb	^{177}Hf	^{178}Hf	^{179}Hf	^{180}Hf	^{182}W

Analytical facility: UWA

Laser Ablation System	Analyte G2
Spot size	35-50µm
Pulse repetition rate	4 Hz
Energy Density	~5 J/cm^2

Mass Spectrometer System

Instrument	Thermo Scientific Neptune Plus
RF power	1.4 kw
Gas flow rates	Ar cooling: 15 l min^{-1} Ar auxilirary: 0.8 l min^{-1} He carrier: 1.0 l min^{-1} Ar sample: 0.9 l min^{-1} N_2: 0.012 l min^{-1}
Mass resolution	~300
Data aquisation mode	Time resolved
Integration time	1.049 s
Analysis Mode	Static

Cup	L4	L3	L2	L1	C	H1	H2	H3	H4
Analyte	^{171}Yb	^{173}Yb	^{175}Lu	^{176}Hf+Lu+Yb	^{177}Hf	^{178}Hf	^{179}Hf		

Table A-8: Standard data for Nd isotope analyses by LAMCICPMS

	Analytical facility	Standard	$^{143}Nd/^{144}Nd$ Average	(2SD)	Standard	$^{147}Sm/^{144}Nd$ Average	(2SD)
17/04/2014	JCU	JNdi-1 (n=10)	0.512089	0.000008	LREE_glass (n=11)	0.2439	0.0038
5/08/2015	JCU	JNdi-1 (n=16)	0.512089	0.000012	LREE_glass (n=12)	0.2460	0.0018
6/08/2015	JCU	JNdi-1 (n=17)	0.512089	0.000014	LREE_glass (n=15)	0.2446	0.0022
7/01/2017	UWA	JNdi-1 (n=25)	0.512084	0.000016	LREE_glass (n=17)	0.2382	0.0024

Technique *Session*	Analytical facility	**Ap1** Reference[1] Solution $^{143}Nd/^{144}Nd_{(i)}$	**Ap1** Reference[1] LA-MC-ICP-MS $^{143}Nd/^{144}Nd_{(i)}$	**Ap1** This study LA-MC-ICP-MS $^{143}Nd/^{144}Nd_{(i)}$	**Otterlake Ap** Reference[1] Solution $^{143}Nd/^{144}Nd_{(i)}$	**Otterlake Ap** Reference[1] LA-MC-ICP-MS $^{143}Nd/^{144}Nd_{(i)}$	**Otterlake Ap** This study LA-MC-ICP-MS $^{143}Nd/^{144}Nd_{(i)}$	**Durango Ap** Reference[1] Solution $^{143}Nd/^{144}Nd_{(i)}$
17/04/2014	JCU	0.511095	0.511094 (40)	(n=10) 0.511084 (50)				
5/08/2015	JCU				0.511446	0.511447 (45)	(n=13) 0.511442 (19)	
6/08/2015	JCU				0.511446	0.511447 (45)	(n=15) 0.511445 (29)	0.512475
7/01/2017	UWA				0.511446	0.511447 (45)	(n=16) 0.511441 (31)	

Technique *Session*	Analytical facility	**Durango Ap** Reference[1] Solution $^{143}Nd/^{144}Nd_{(i)}$	**Durango Ap** Reference[1] LA-MC-ICP-MS $^{143}Nd/^{144}Nd_{(i)}$	**Durango Ap** This study LA-MC-ICP-MS $^{143}Nd/^{144}Nd_{(i)}$	**Mea Klang Mnz** Reference[2] Solution $^{143}Nd/^{144}Nd_{(i)}$	**Mae Klang Mnz** Reference[2] LA-MC-ICP-MS $^{143}Nd/^{144}Nd_{(i)}$	**Mae Klang Mnz** This study LA-MC-ICP-MS $^{143}Nd/^{144}Nd_{(i)}$
17/04/2014	JCU						
5/08/2015	JCU				0.511629 (10)	0.511619 (24)	(n=3) 0.511632 (15)
6/08/2015	JCU	0.512475	0.512472 (46)	(n=8) 0.512466 (54)			
7/01/2017	UWA				0.511629 (10)	0.511619 (24)	(n=15) 0.511620 (20)

Uncertainty of isotope ratio measurements (in brackets) are expressed as 2 standard deviation in the last two decimal places.

[1)]Yang et al. (2014)

[2)]Fisher et al. (2011)

Secondary standards

	Standard	$^{147}Sm/^{144}Nd$	2s	$^{143}Nd/^{144}Nd$	2s	Age (Ma)	$^{143}Nd/^{144}Nd(i)$
17/04/2014	Ap1_60_1	0.0745	0.0012	0.511294	0.000051	475	0.511062
	Ap1_60_2	0.0744	0.0012	0.511281	0.000052	475	0.511049
	Ap1_60_3	0.0779	0.0012	0.511323	0.000051	475	0.511080
	Ap1_60_4	0.0766	0.0013	0.511361	0.000054	475	0.511123
	Ap1_60_5	0.0772	0.0012	0.511349	0.000048	475	0.511109
	Ap1_60_6	0.0806	0.0013	0.511329	0.000054	475	0.511079
	Ap1_60_8	0.0737	0.0012	0.511295	0.000046	475	0.511066
	Ap1_60_9	0.0802	0.0013	0.511314	0.000032	475	0.511065
	Ap1_60_10	0.0809	0.0013	0.511343	0.000037	475	0.511092
	Ap1_60_11	0.0810	0.0013	0.511367	0.000031	475	0.511115
5/08/2015	Otterlake_1	0.0844	0.0007	0.511940	0.000029	913	0.511434
	Otterlake_2	0.0843	0.0006	0.511953	0.000033	913	0.511448
	Otterlake_3	0.0822	0.0007	0.511943	0.000024	913	0.511451
	Otterlake_4	0.0828	0.0008	0.511928	0.000031	913	0.511432
	Otterlake_5	0.0830	0.0007	0.511924	0.000033	913	0.511427
	Otterlake_6	0.0849	0.0007	0.511953	0.000026	913	0.511444
	Otterlake_7	0.0800	0.0007	0.511927	0.000029	913	0.511448
	Otterlake_8	0.0819	0.0006	0.511933	0.000034	913	0.511443
	Otterlake_9	0.0818	0.0006	0.511919	0.000031	913	0.511429
	Otterlake_10	0.0818	0.0006	0.511936	0.000024	913	0.511445
	Otterlake_11	0.0815	0.0007	0.511950	0.000032	913	0.511461
	Otterlake_12	0.0819	0.0006	0.511930	0.000026	913	0.511439
	Otterlake_13	0.0820	0.0006	0.511930	0.000028	913	0.511438
	Mea Klang_1	0.0914	0.0007	0.512640	0.000021	26.8	0.512624
	Mea Klang_2	0.0908	0.0007	0.512654	0.000019	26.8	0.512638
	Mea Klang_3	0.0906	0.0007	0.512651	0.000019	26.8	0.512635
6/08/2015	Otterlake_1	0.0823	0.0005	0.511936	0.000029	913	0.511442
	Otterlake_2	0.0817	0.0006	0.511924	0.000029	913	0.511435
	Otterlake_3	0.0812	0.0005	0.511912	0.000034	913	0.511426
	Otterlake_4	0.0803	0.0005	0.511936	0.000027	913	0.511455
	Otterlake_5	0.0814	0.0006	0.511956	0.000033	913	0.511469
	Otterlake_6	0.0793	0.0008	0.511905	0.000035	913	0.511430
	Otterlake_7	0.0809	0.0006	0.511943	0.000031	913	0.511458
	Otterlake_8	0.0798	0.0008	0.511917	0.000028	913	0.511439

	Otterlake_9	0.0815	0.0005	0.511922	0.000033	913	0.511434
	Otterlake_10	0.0798	0.0007	0.511950	0.000028	913	0.511472
	Otterlake_11	0.0804	0.0005	0.511923	0.000031	913	0.511441
	Otterlake_12	0.0776	0.0008	0.511923	0.000034	913	0.511458
	Otterlake_13	0.0787	0.0005	0.511924	0.000023	913	0.511452
	Otterlake_14	0.0798	0.0005	0.511906	0.000033	913	0.511428
	Otterlake_15	0.0802	0.0005	0.511920	0.000031	913	0.511439
	Durango_1	0.0776	0.0005	0.512452	0.000060	31	0.512437
	Durango_2	0.0775	0.0005	0.512459	0.000046	31	0.512443
	Durango_3	0.0771	0.0005	0.512464	0.000040	31	0.512448
	Durango_4	0.0775	0.0005	0.512486	0.000046	31	0.512471
	Durango_5	0.0771	0.0005	0.512486	0.000060	31	0.512470
	Durango_6	0.0767	0.0005	0.512518	0.000055	31	0.512503
	Durango_7	0.0769	0.0005	0.512523	0.000057	31	0.512507
	Durango_8	0.0769	0.0005	0.512466	0.000054	31	0.512450
7/01/2017	Mae_Klang_1	0.0898	0.0009	0.512645	0.000026	26.8	0.512629
	Mae_Klang_2	0.0858	0.0009	0.512644	0.000025	26.8	0.512629
	Mae_Klang_3	0.0962	0.0010	0.512636	0.000028	26.8	0.512619
	Mae_Klang_4	0.0969	0.0010	0.512629	0.000027	26.8	0.512612
	Mae_Klang_5	0.0908	0.0010	0.512634	0.000028	26.8	0.512618
	Mae_Klang_6	0.0858	0.0009	0.512646	0.000029	26.8	0.512631
	Mae_Klang_7	0.1027	0.0011	0.512635	0.000025	26.8	0.512617
	Mae_Klang_8	0.0997	0.0010	0.512636	0.000027	26.8	0.512619
	Mae_Klang_9	0.0928	0.0010	0.512644	0.000027	26.8	0.512627
	Mae_Klang_10	0.0880	0.0009	0.512634	0.000026	26.8	0.512618
	Mae_Klang_11	0.1033	0.0011	0.512621	0.000029	26.8	0.512603
	Mae_Klang_12	0.1031	0.0011	0.512619	0.000026	26.8	0.512601
	Mae_Klang_13	0.0955	0.0010	0.512654	0.000025	26.8	0.512637
	Mae_Klang_14	0.0895	0.0009	0.512634	0.000024	26.8	0.512619
	Mae_Klang_15	0.1044	0.0014	0.512628	0.000027	26.8	0.512610
	Otterlake_1	0.0816	0.0008	0.511919	0.000025	913	0.511431
	Otterlake_2	0.0820	0.0009	0.511933	0.000025	913	0.511441
	Otterlake_3	0.0816	0.0009	0.511947	0.000025	913	0.511458
	Otterlake_4	0.0814	0.0008	0.511950	0.000025	913	0.511463
	Otterlake_5	0.0814	0.0008	0.511908	0.000023	913	0.511420
	Otterlake_6	0.0818	0.0008	0.511934	0.000027	913	0.511444
	Otterlake_7	0.0791	0.0010	0.511942	0.000036	913	0.511469
	Otterlake_8	0.0828	0.0009	0.511935	0.000025	913	0.511439
	Otterlake_9	0.0815	0.0008	0.511931	0.000023	913	0.511443
	Otterlake_10	0.0813	0.0009	0.511927	0.000027	913	0.511440
	Otterlake_11	0.0815	0.0008	0.511915	0.000024	913	0.511427
	Otterlake_12	0.0816	0.0008	0.511932	0.000026	913	0.511443
	Otterlake_13	0.0816	0.0008	0.511910	0.000023	913	0.511421
	Otterlake_14	0.0809	0.0008	0.511908	0.000022	913	0.511423
	Otterlake_15	0.0819	0.0008	0.511953	0.000025	913	0.511463
	Otterlake_16	0.0815	0.0008	0.511922	0.000023	913	0.511435

Table A-9: Nd isotope data (LAMCICPMS)

Sample	$^{147}Sm/^{144}Nd$	2s	$^{143}Nd/^{144}Nd$	2s	t (Ma)	$^{143}Nd/^{144}Nd(t)$	εNd(t)	2s
MG1_leuco_ap1	0.2286	0.0017	0.512774	2.59E-05	19	0.512746	2.6	0.5
MG1_leuco_ap2	0.1637	0.0012	0.512758	3.45E-05	19	0.512738	2.4	0.7
MG1_leuco_ap3	0.1628	0.0012	0.512771	3.92E-05	19	0.512751	2.7	0.8
MG1_leuco_ap4	0.1635	0.0012	0.512757	3.57E-05	19	0.512737	2.4	0.7
MG1_leuco_ap5	0.1685	0.0013	0.512740	3.18E-05	19	0.512719	2.0	0.6
MG1_leuco_ap6	0.1612	0.0012	0.512737	3.32E-05	19	0.512717	2.0	0.6
MG1_leuco_ap7	0.1638	0.0012	0.512765	3.72E-05	19	0.512745	2.6	0.7
MG1_leuco_ap8	0.1680	0.0013	0.512778	2.81E-05	19	0.512757	2.8	0.5
MG1_leuco_ap5b	0.1303	0.0009	0.512771	3.73E-05	19	0.512755	2.8	0.7
MG1_mafic_ap1	0.1569	0.0010	0.513238	8.37E-05	19	0.513219	11.8	1.6
MG1_mafic_ap2	0.1502	0.0010	0.513311	8.93E-05	19	0.513292	13.2	1.7
MG1_mafic_ap3	0.1506	0.0010	0.513196	7.93E-05	19	0.513177	11.0	1.5
MG1_mafic_ap4	0.1545	0.0010	0.513241	7.18E-05	19	0.513222	11.9	1.4
MG1_mafic_ap6	0.1552	0.0011	0.513200	5.84E-05	19	0.513180	11.1	1.1
MG1_mafic_ap7	0.1537	0.0011	0.513251	5.38E-05	19	0.513232	12.1	1.0
MG1_mafic_ap8	0.1492	0.0011	0.513248	7.75E-05	19	0.513229	12.0	1.5
MG1_mafic_ap9	0.1471	0.0010	0.513284	8.02E-05	19	0.513266	12.7	1.6
MG1_mafic_ap10	0.1494	0.0010	0.513143	7.74E-05	19	0.513124	10.0	1.5
SS3_leuco_ap1	0.1286	0.0009	0.512735	5.56E-05	19	0.512719	2.1	1.1
SS3_leuco_ap2	0.1300	0.0009	0.512762	4.76E-05	19	0.512746	2.6	0.9
SS3_leuco_ap3	0.1247	0.0010	0.512776	4.49E-05	19	0.512760	2.9	0.9
SS3_leuco_ap4	0.1312	0.0010	0.512761	5.45E-05	19	0.512745	2.6	1.1
SS3_leuco_ap5	0.1286	0.0009	0.512790	4.99E-05	19	0.512774	3.1	1.0
SS3_leuco_ap6	0.1286	0.0009	0.512788	5.16E-05	19	0.512772	3.1	1.0
SS3_leuco_ap7	0.1316	0.0011	0.512762	3.52E-05	19	0.512746	2.6	0.7
SS3_leuco_ap8	0.1259	0.0010	0.512786	4.50E-05	19	0.512770	3.1	0.9
SS3_leuco_ap9	0.1258	0.0010	0.512734	4.46E-05	19	0.512718	2.0	0.9
SS3_leuco_ap10	0.1270	0.0010	0.512798	5.73E-05	19	0.512782	3.3	1.1
SS3_leuco_ap11	0.1279	0.0009	0.512758	5.29E-05	19	0.512742	2.5	1.0
SS3_leuco_ap12	0.1629	0.0011	0.512722	2.86E-05	19	0.512702	1.7	0.6
SS3_leuco_ap13	0.1534	0.0026	0.512749	5.91E-05	19	0.512730	2.3	1.2
SS3_leuco_ap14	0.1544	0.0027	0.512758	4.26E-05	19	0.512739	2.4	0.8
SS3_leuco_ap15	0.1563	0.0026	0.512701	4.26E-05	19	0.512682	1.3	0.8
SS3_leuco_ap16	0.1523	0.0026	0.512730	4.94E-05	19	0.512711	1.9	1.0
SS3_leuco_ap17	0.1529	0.0026	0.512760	4.60E-05	19	0.512741	2.5	0.9
SS3_leuco_ap18	0.1598	0.0028	0.512769	4.27E-05	19	0.512749	2.6	0.8
SS3_leuco_ap19	0.1509	0.0026	0.512755	4.60E-05	19	0.512736	2.4	0.9
SS3_leuco_ap20	0.1516	0.0026	0.512732	4.35E-05	19	0.512713	1.9	0.8
SS3_leuco_ap21	0.1507	0.0026	0.512686	4.50E-05	19	0.512667	1.0	0.9
SS3_leuco_ap22	0.1410	0.0023	0.512781	3.88E-05	19	0.512764	2.9	0.8
SS3_leuco_ap23	0.1544	0.0025	0.512769	3.86E-05	19	0.512750	2.7	0.8
SS3_leuco_ap24	0.1516	0.0025	0.512756	3.95E-05	19	0.512737	2.4	0.8
SS3_leuco_ap25	0.1552	0.0025	0.512768	3.64E-05	19	0.512749	2.6	0.7
SS3_leuco_ap26	0.1422	0.0023	0.512764	4.71E-05	19	0.512747	2.6	0.9
SS3_leuco_ap27	0.1510	0.0025	0.512737	3.07E-05	19	0.512718	2.0	0.6
SS3_leuco_ap28	0.1634	0.0028	0.512783	3.97E-05	19	0.512763	2.9	0.8
SS3_leuco_ap29	0.1481	0.0026	0.512772	4.05E-05	19	0.512754	2.7	0.8
SS3_leuco_ap30	0.1534	0.0026	0.512730	3.63E-05	19	0.512711	1.9	0.7
SS3_leuco_ap31	0.1532	0.0026	0.512760	3.62E-05	19	0.512741	2.5	0.7
SS3_mafic_ap1	0.1240	0.0008	0.513156	7.98E-05	19	0.513141	10.3	1.6
SS3_mafic_ap2	0.1321	0.0009	0.513293	1.02E-04	19	0.513277	12.9	2.0
SS3_mafic_ap3	0.1311	0.0009	0.513315	8.21E-05	19	0.513299	13.4	1.6
SS3_mafic_ap4	0.1348	0.0009	0.513262	7.21E-05	19	0.513245	12.3	1.4
SS3_mafic_ap5	0.1427	0.0010	0.512795	4.02E-05	19	0.512777	3.2	0.8
SS3_mafic_ap6	0.1567	0.0011	0.512917	4.76E-05	19	0.512897	5.5	0.9
SS3_mafic_ap7	0.1233	0.0008	0.513128	5.62E-05	19	0.513113	9.7	1.1
SS3_mafic_ap8	0.1348	0.0009	0.513321	7.52E-05	19	0.513304	13.5	1.5
SS3_mafic_ap9	0.1253	0.0008	0.513151	6.37E-05	19	0.513136	10.2	1.2
SS3_mafic_ap10	0.1239	0.0009	0.513160	5.81E-05	19	0.513145	10.4	1.1
SS3_mafic_ap11	0.1401	0.0010	0.513298	6.30E-05	19	0.513280	13.0	1.2
SS3_mafic_ap12	0.1343	0.0009	0.513233	7.28E-05	19	0.513217	11.8	1.4
SS3_mafic_ap13	0.1329	0.0023	0.513266	7.74E-05	19	0.513249	12.4	1.5
SS3_mafic_ap14	0.1305	0.0022	0.513190	8.59E-05	19	0.513173	10.9	1.7
SS3_mafic_ap15	0.1266	0.0020	0.512892	4.23E-05	19	0.512877	5.1	0.8
SS3_mafic_ap16	0.1341	0.0023	0.512833	4.30E-05	19	0.512817	4.0	0.8
SS3_mafic_ap17	0.1439	0.0024	0.513301	8.45E-05	19	0.513283	13.1	1.6

HD9_ap1	0.1189	0.0020	0.512831	6.52E-05	37	0.512803	4.1	1.3
HD9_ap2	0.1099	0.0019	0.512754	5.78E-05	37	0.512728	2.7	1.1
HD9_ap3	0.1096	0.0014	0.512788	8.05E-05	37	0.512762	3.3	1.6
HD9_ap4	0.1053	0.0009	0.512744	4.33E-05	37	0.512719	2.5	0.8
HD9_ap5	0.1213	0.0014	0.512758	5.75E-05	37	0.512728	2.7	1.1
HD9_ap6	0.1202	0.0010	0.512734	5.39E-05	37	0.512705	2.2	1.1
HD9_ap7	0.1434	0.0049	0.512820	1.00E-04	37	0.512785	3.8	2.0
HD9_ap8	0.1265	0.0014	0.512724	8.94E-05	37	0.512693	2.0	1.7
HD9_ap9	0.1059	0.0014	0.512834	5.24E-05	37	0.512808	4.3	1.0
HD9_ap10	0.1142	0.0009	0.512776	8.36E-05	37	0.512748	3.1	1.6
HD9_ap11	0.1111	0.0018	0.512792	6.60E-05	37	0.512765	3.4	1.3
HD9_ap12	0.1059	0.0011	0.512793	6.70E-05	37	0.512767	3.5	1.3
HD9_ap13	0.1262	0.0011	0.512834	7.13E-05	37	0.512803	4.2	1.4
HD9_ap14	0.1305	0.0023	0.512707	7.40E-05	37	0.512676	1.7	1.4
HD9_ap15	0.1129	0.0011	0.512777	5.59E-05	37	0.512750	3.1	1.1
HD9_ap16	0.1141	0.0016	0.512715	6.06E-05	37	0.512687	1.9	1.2
HD9_ap17	0.1260	0.0018	0.512774	5.10E-05	37	0.512744	3.0	1.0
HD20_ap1	0.1997	0.0031	0.512810	2.49E-05	19	0.512785	3.3	0.5
HD20_ap2	0.1475	0.0017	0.512802	2.81E-05	19	0.512784	3.3	0.5
HD20_ap3	0.2931	0.0033	0.512858	2.76E-05	19	0.512822	4.1	0.5
HD20_ap4	0.2024	0.0021	0.512805	2.42E-05	19	0.512780	3.2	0.5
HD20_ap5	0.1685	0.0049	0.512829	2.60E-05	19	0.512808	3.8	0.5
HD20_ap6	0.3038	0.0034	0.512837	2.57E-05	19	0.512800	3.6	0.5
HD20_ap7	0.3435	0.0035	0.512842	2.72E-05	19	0.512799	3.6	0.5
HD20_ap8	0.2861	0.0030	0.512813	3.35E-05	19	0.512777	3.2	0.7
HD20_ap9	0.3117	0.0038	0.512846	3.14E-05	19	0.512807	3.8	0.6
HD20_ap10	0.2885	0.0030	0.512834	3.36E-05	19	0.512798	3.6	0.7
HD20_ap11	0.3065	0.0033	0.512847	2.69E-05	19	0.512808	3.8	0.5
HD20_ap12	0.3046	0.0032	0.512840	2.83E-05	19	0.512802	3.7	0.6
HD20_ap13	0.3002	0.0034	0.512842	2.40E-05	19	0.512805	3.7	0.5
HD20_ap14	0.2011	0.0020	0.512775	2.87E-05	19	0.512750	2.7	0.6
HD20_ap15	0.2814	0.0033	0.512831	2.64E-05	19	0.512796	3.6	0.5
HD20_ap16	0.1681	0.0055	0.512794	2.65E-05	19	0.512773	3.1	0.5
HD20_ap17	0.1584	0.0020	0.512809	2.91E-05	19	0.512790	3.4	0.6
HD20_ap18	0.3228	0.0036	0.512838	3.36E-05	19	0.512798	3.6	0.7
HD20_mnz_1	0.1067	0.0012	0.512807	2.65E-05	19	0.512794	3.5	0.5
HD20_mnz_2	0.1067	0.0011	0.512808	2.72E-05	19	0.512795	3.5	0.5
HD20_mnz_3	0.1080	0.0011	0.512800	2.82E-05	19	0.512786	3.4	0.6
HD20_mnz_4	0.1096	0.0011	0.512802	2.65E-05	19	0.512788	3.4	0.5
HD20_mnz_5	0.1167	0.0012	0.512808	2.49E-05	19	0.512793	3.5	0.5
HD20_mnz_6	0.1076	0.0013	0.512795	2.60E-05	19	0.512781	3.3	0.5
HD20_mnz_7	0.1095	0.0012	0.512819	2.43E-05	19	0.512806	3.7	0.5
HD20_mnz_8	0.1140	0.0011	0.512813	2.48E-05	19	0.512799	3.6	0.5
HD20_mnz_9	0.1163	0.0013	0.512798	2.76E-05	19	0.512783	3.3	0.5
HD20_mnz_10	0.1052	0.0011	0.512801	2.51E-05	19	0.512788	3.4	0.5
HD20_mnz_11	0.1104	0.0011	0.512795	2.69E-05	19	0.512781	3.3	0.5
HD20_mnz_12	0.1159	0.0014	0.512783	2.47E-05	19	0.512768	3.0	0.5
HD20_mnz_13	0.1086	0.0011	0.512801	2.44E-05	19	0.512788	3.4	0.5
HD20_mnz_14	0.1068	0.0012	0.512801	2.72E-05	19	0.512788	3.4	0.5
HD20_mnz_15	0.1084	0.0011	0.512796	2.19E-05	19	0.512783	3.3	0.4
HD1_ap1	0.1827	0.0035	0.512629	6.30E-05	19	0.512606	-0.1	1.2
HD1_ap2	0.1836	0.0033	0.512663	5.22E-05	19	0.512640	0.5	1.0
HD1_ap3	0.1616	0.0042	0.512615	3.30E-05	19	0.512595	-0.4	0.6
HD1_ap4	0.1923	0.0031	0.512598	5.44E-05	19	0.512574	-0.8	1.1
HD1_ap5	0.1841	0.0029	0.512597	3.74E-05	19	0.512574	-0.8	0.7
HD1_ap6	0.2189	0.0059	0.512629	5.41E-05	19	0.512602	-0.2	1.1
HD1_ap7	0.1802	0.0029	0.512625	4.26E-05	19	0.512602	-0.2	0.8
HD1_ap8	0.1159	0.0019	0.512622	2.80E-05	19	0.512607	-0.1	0.5
HD1_mnz_1	0.1110	0.0005	0.512624	2.11E-05	19	0.512610	-0.1	0.4
HD1_mnz_2	0.1190	0.0004	0.512618	1.83E-05	19	0.512603	-0.2	0.4
HD1_mnz_3	0.1184	0.0003	0.512644	2.24E-05	19	0.512630	0.3	0.4
HD1_mnz_4	0.1232	0.0003	0.512619	1.86E-05	19	0.512604	-0.2	0.4
HD1_mnz_5	0.1137	0.0003	0.512630	3.06E-05	19	0.512615	0.0	0.6
HD1_mnz_6	0.1132	0.0004	0.512621	1.89E-05	19	0.512607	-0.1	0.4
HD1_mnz_7	0.1188	0.0005	0.512626	1.98E-05	19	0.512611	-0.1	0.4
HD1_mnz_8	0.1161	0.0009	0.512622	2.10E-05	19	0.512607	-0.1	0.4
HD1_mnz_9	0.1137	0.0003	0.512622	1.80E-05	19	0.512608	-0.1	0.4
HD1_mnz_10	0.1150	0.0005	0.512623	1.92E-05	19	0.512609	-0.1	0.4

Table A-10: Standard data for Hf isotope analyses by LAMCICPMS at JCU

Sample error includes stds

	Date	$^{176}Hf/^{177}Hf$	2σ	$^{178}Hf/^{177}Hf$	2s	$^{180}Hf/^{177}Hf$	2s	$^{176}Lu/^{177}Hf$	2σ	$^{176}Yb/^{177}Hf$	2σ	Age (Ma)	$\varepsilon Hf_{(0)}$	$\varepsilon Hf_{(t)}$	2σ	Hf (tot) (V)
MTZ_1	18-Aug-12	0.282485	0.000012	1.467231	0.000024	1.886769	0.000050	0.000007	0.000000	0.000221	0.000006	732	-10.6	5.7	0.4	23.3
MTZ_2	18-Aug-12	0.282489	0.000011	1.467244	0.000031	1.886822	0.000052	0.000009	0.000000	0.000286	0.000007	732	-10.5	5.9	0.4	23.6
MTZ_3	18-Aug-12	0.282501	0.000016	1.467246	0.000026	1.886755	0.000062	0.000026	0.000000	0.000799	0.000006	732	-10.1	6.3	0.6	22.0
MTZ_4	18-Aug-12	0.282487	0.000012	1.467222	0.000024	1.886815	0.000055	0.000025	0.000000	0.000758	0.000006	732	-10.6	5.8	0.4	22.0
MTZ_5	18-Aug-12	0.282506	0.000011	1.467256	0.000026	1.886796	0.000051	0.000007	0.000000	0.000210	0.000005	732	-9.9	6.5	0.4	23.2
MTZ_6	18-Aug-12	0.282499	0.000012	1.467251	0.000029	1.886840	0.000053	0.000009	0.000000	0.000276	0.000006	732	-10.1	6.3	0.4	23.9
MTZ_7	18-Aug-12	0.282494	0.000012	1.467239	0.000029	1.886834	0.000051	0.000017	0.000000	0.000488	0.000008	732	-10.3	6.1	0.4	23.0
MTZ_8	18-Aug-12	0.282503	0.000013	1.467255	0.000027	1.886792	0.000056	0.000017	0.000000	0.000502	0.000007	732	-10.0	6.4	0.5	22.9
MTZ_9	18-Aug-12	0.282488	0.000012	1.467234	0.000029	1.886805	0.000060	0.000018	0.000000	0.000540	0.000008	732	-10.5	5.9	0.4	22.9
MTZ_10	18-Aug-12	0.282490	0.000012	1.467248	0.000036	1.886850	0.000050	0.000018	0.000000	0.000528	0.000007	732	-10.4	5.9	0.4	22.9
MTZ_11	18-Aug-12	0.282495	0.000020	1.467230	0.000034	1.886877	0.000072	0.000025	0.000000	0.000736	0.000011	732	-10.3	6.1	0.7	11.9
MTZ_12	18-Aug-12	0.282496	0.000012	1.467250	0.000025	1.886786	0.000056	0.000026	0.000000	0.000773	0.000005	732	-10.2	6.1	0.4	22.3
MTZ_13	18-Aug-12	0.282494	0.000012	1.467229	0.000024	1.886785	0.000064	0.000025	0.000000	0.000767	0.000007	732	-10.3	6.1	0.4	22.8
MTZ_14	18-Aug-12	0.282498	0.000014	1.467243	0.000027	1.886809	0.000056	0.000023	0.000000	0.000673	0.000014	732	-10.1	6.2	0.5	22.6
MTZ_15	18-Aug-12	0.282499	0.000014	1.467224	0.000023	1.886761	0.000051	0.000025	0.000000	0.000739	0.000007	732	-10.1	6.2	0.5	22.2
synZc_7	18-Aug-12	0.282116	0.000032	1.467241	0.000032	1.886856	0.000067	0.011683	0.000002	0.25345	0.00064	0	-23.7	-23.7	1.1	16.1
synZc_6	18-Aug-12	0.282121	0.000020	1.467244	0.000028	1.886833	0.000039	0.011764	0.000009	0.25624	0.00067	0	-23.5	-23.5	0.7	31.9
synZc_5	18-Aug-12	0.282124	0.000017	1.467227	0.000026	1.886809	0.000044	0.011382	0.000031	0.24597	0.00028	0	-23.4	-23.4	0.6	33.7
synZc_4	18-Aug-12	0.282105	0.000025	1.467243	0.000026	1.886829	0.000060	0.016854	0.000060	0.36589	0.00087	0	-24.1	-24.1	0.9	22.7
synZc_3	18-Aug-12	0.282118	0.000030	1.467246	0.000034	1.886789	0.000062	0.015962	0.000058	0.34411	0.00054	0	-23.6	-23.6	1.0	20.9
synZc_2	18-Aug-12	0.282109	0.000022	1.467256	0.000028	1.886822	0.000045	0.012089	0.000001	0.26444	0.00079	0	-23.9	-23.9	0.8	29.2
synZc_1	18-Aug-12	0.282134	0.000023	1.467246	0.000034	1.886787	0.000050	0.012166	0.000036	0.26269	0.00065	0	-23.0	-23.0	0.8	27.9
91500_3	18-Aug-12	0.282295	0.000020	1.467239	0.000039	1.886836	0.000077	0.000328	0.000000	0.00914	0.00003	1062	-17.3	6.2	0.7	13.0
91500_2	18-Aug-12	0.282325	0.000020	1.467286	0.000040	1.886809	0.000070	0.000329	0.000000	0.00917	0.00003	1062	-16.3	7.3	0.7	12.2
91500_1	18-Aug-12	0.282300	0.000027	1.467241	0.000067	1.886674	0.000099	0.000329	0.000000	0.00905	0.00003	1062	-17.2	6.4	1.0	7.1
Tem2_1	18-Aug-12	0.282686	0.000016	1.467248	0.000038	1.886789	0.000068	0.001150	0.000003	0.03323	0.00007	417	-3.5	5.5	0.6	19.4
Tem2_2	18-Aug-12	0.282684	0.000014	1.467253	0.000047	1.886841	0.000061	0.000751	0.000008	0.01995	0.00017	417	-3.6	5.5	0.5	19.5
Tem2_3	18-Aug-12	0.282693	0.000015	1.467217	0.000042	1.886754	0.000067	0.000921	0.000011	0.02556	0.00050	417	-3.3	5.8	0.5	20.5
Tem2_4	18-Aug-12	0.282702	0.000012	1.467253	0.000028	1.886790	0.000051	0.000546	0.000010	0.01501	0.00028	417	-3.0	6.2	0.4	21.3

Tem2_5	18-Aug-12	0.282681	0.000016	1.467247	0.000031	1.886801	0.000059	0.001641	0.000012	0.04575	0.00029	417	-3.7	5.2	0.6	21.1
Tem2_6	18-Aug-12	0.282677	0.000011	1.467265	0.000034	1.886820	0.000057	0.000554	0.000005	0.01534	0.00014	417	-3.8	5.3	0.4	20.2
Tem2_7	18-Aug-12	0.282683	0.000013	1.467233	0.000033	1.886801	0.000050	0.000959	0.000011	0.02477	0.00030	417	-3.6	5.4	0.5	22.9
Tem2_8	18-Aug-12	0.282709	0.000017	1.467220	0.000032	1.886789	0.000063	0.000872	0.000013	0.02367	0.00035	417	-2.7	6.4	0.6	16.9
Tem2_9	18-Aug-12	0.282693	0.000016	1.467268	0.000033	1.886807	0.000059	0.001201	0.000003	0.03432	0.00013	417	-3.3	5.7	0.6	20.3
Tem2_10	18-Aug-12	0.282707	0.000024	1.467248	0.000053	1.886784	0.000088	0.001117	0.000006	0.03268	0.00003	417	-2.8	6.2	0.9	10.7
Tem2_11	18-Aug-12	0.282684	0.000018	1.467251	0.000034	1.886751	0.000050	0.002427	0.000055	0.07663	0.00220	417	-3.6	5.1	0.6	17.9
Tem2_12	18-Aug-12	0.282679	0.000015	1.467232	0.000040	1.886773	0.000065	0.001469	0.000002	0.04176	0.00024	417	-3.8	5.1	0.5	19.7
Tem2_13	18-Aug-12	0.282697	0.000015	1.467248	0.000035	1.886837	0.000060	0.001395	0.000002	0.04124	0.00008	417	-3.1	5.8	0.5	19.1
Tem2_14	18-Aug-12	0.282680	0.000017	1.467272	0.000029	1.886826	0.000055	0.000428	0.000002	0.01175	0.00007	417	-3.7	5.5	0.6	21.3
Tem2_15	18-Aug-12	0.282672	0.000016	1.467251	0.000033	1.886819	0.000064	0.000742	0.000002	0.02031	0.00008	417	-4.0	5.1	0.6	19.6
Tem2_16	18-Aug-12	0.282679	0.000016	1.467259	0.000029	1.886807	0.000056	0.001140	0.000019	0.02901	0.00044	417	-3.7	5.2	0.6	20.2
Tem2_17	18-Aug-12	0.282691	0.000015	1.467245	0.000037	1.886797	0.000065	0.000790	0.000012	0.02162	0.00040	417	-3.3	5.8	0.5	19.3
Tem2_18	18-Aug-12	0.282700	0.000027	1.467242	0.000070	1.886810	0.000111	0.001151	0.000004	0.03554	0.00033	417	-3.0	6.0	0.9	10.5
Tem2_19	18-Aug-12	0.282684	0.000020	1.467227	0.000037	1.886724	0.000073	0.000675	0.000002	0.01815	0.00003	417	-3.6	5.5	0.7	11.4
Tem2_20	18-Aug-12	0.282679	0.000014	1.467253	0.000030	1.886778	0.000068	0.000653	0.000017	0.01731	0.00038	417	-3.7	5.4	0.5	20.0
Tem2_21	18-Aug-12	0.282679	0.000012	1.467241	0.000025	1.886802	0.000053	0.000912	0.000003	0.02371	0.00002	417	-3.8	5.3	0.4	23.0
Tem2_22	18-Aug-12	0.282682	0.000020	1.467262	0.000038	1.886885	0.000086	0.001033	0.000028	0.02618	0.00080	417	-3.7	5.4	0.7	10.9
Tem2_23	18-Aug-12	0.282677	0.000021	1.467247	0.000040	1.886839	0.000069	0.000704	0.000009	0.01962	0.00022	417	-3.8	5.3	0.7	10.7
Tem2_24	18-Aug-12	0.282664	0.000023	1.467281	0.000043	1.886855	0.000080	0.001577	0.000010	0.04349	0.00015	417	-4.3	4.6	0.8	11.4

Table A-11: Standard data for Hf isotope analyses by LAMCICPMS at UWA

Sample error includes stds

	$^{176}Hf/^{177}Hf$	2σ	$^{178}Hf/^{177}Hf$	2σ	$^{176}Lu/^{177}Hf$	2σ	$^{176}Yb/^{177}Hf$	2σ	Total Hf (V)
FC1_2	0.282192	±.000017	1.467208	±0.000030	0.001014	±0.000003	0.036060	±0.000252	22.3
FC1_3	0.282191	±.000024	1.467211	±0.000035	0.001370	±0.000001	0.051951	±0.000962	23.5
FC1_4	0.282193	±.000018	1.467215	±0.000028	0.000781	±0.000002	0.028622	±0.000384	24.8
FC1_5	0.282190	±.000018	1.467219	±0.000027	0.001017	±0.000012	0.036936	±0.000232	23.4
FC1_6	0.282187	±.000016	1.467204	±0.000025	0.000788	±0.000007	0.028335	±0.000231	23.2
FC1_7	0.282196	±.000016	1.467228	±0.000027	0.001244	±0.000001	0.046196	±0.000345	22.4
FC1_8	0.282204	±.000019	1.467194	±0.000026	0.001606	±0.000009	0.058477	±0.000187	22.2
FC1_9	0.282168	±.000015	1.467220	±0.000027	0.001040	±0.000003	0.037698	±0.000226	22.3
FC1_10	0.282198	±.000019	1.467202	±0.000023	0.001420	±0.000003	0.052116	±0.000458	20.8
FC1_11	0.282183	±.000017	1.467202	±0.000025	0.001068	±0.000001	0.039432	±0.000297	23.2
syntest_3	0.282094	±.000028	1.467207	±0.000026	0.011030	±0.000010	0.287781	±0.006625	22.4
Syntest_2	0.282113	±.000032	1.467201	±0.000023	0.013384	±0.000016	0.332247	±0.002105	27.9
syntest_1	0.282124	±.000032	1.467216	±0.000023	0.010980	±0.000029	0.326140	±0.004664	24.3
synzrc_1	0.282107	±.000025	1.467190	±0.000021	0.012007	±0.000002	0.315077	±0.006552	28.9
MTZ_1	0.282480	±.000009	1.467234	±0.000044	0.000016	±0.000000	0.000597	±0.000010	24.9
MTZ_2	0.282487	±.000013	1.467215	±0.000022	0.000018	±0.000000	0.000635	±0.000008	24.8
MTZ_3	0.282490	±.000012	1.467196	±0.000023	0.000020	±0.000000	0.000703	±0.000011	24.9
MTZ_4	0.282495	±.000011	1.467212	±0.000022	0.000010	±0.000000	0.000381	±0.000012	22.5
MTZ_5	0.282486	±.000011	1.467218	±0.000026	0.000009	±0.000000	0.000327	±0.000008	24.5
MTZ_6	0.282483	±.000012	1.467206	±0.000024	0.000008	±0.000000	0.000269	±0.000007	24.7
MTZ_7	0.282483	±.000012	1.467232	±0.000021	0.000007	±0.000000	0.000260	±0.000007	24.4
MTZ_8	0.282480	±.000011	1.467221	±0.000025	0.000007	±0.000000	0.000261	±0.000007	24.2
MTZ_9	0.282485	±.000012	1.467211	±0.000023	0.000020	±0.000000	0.000633	±0.000009	21.3
MTZ_10	0.282485	±.000012	1.467217	±0.000030	0.000018	±0.000000	0.000551	±0.000007	21.2
MTZ_11	0.282480	±.000011	1.467215	±0.000033	0.000016	±0.000000	0.000503	±0.000008	21.8
MTZ_12	0.282491	±.000014	1.467221	±0.000023	0.000019	±0.000000	0.000565	±0.000007	21.7

Table A-12: Standard data for Hf isotope analyses by LAMCICPMS at Bristol

		$^{176}Hf/^{177}Hf$	2σ	$^{178}Hf/^{177}Hf$	2σ	$^{176}Lu/^{177}Hf$	2σ	$^{176}Yb/^{177}Hf$	2σ	Total Hf (V)	Age	εHf (t)	± 2 se
91500_1	25/05/2006	0.282304	0.000034	1.467249	0.000044	0.000275	0.000000	0.01113	0.00005	7.4	1065	6.3	1.1
91500_2	25/05/2006	0.282314	0.000029	1.467196	0.000040	0.000313	0.000000	0.00931	0.00008	9.2	1065	6.6	0.9
91500_1	26-May-06	0.282331	0.000031	1.467252	0.000052	0.000276	0.000000	0.00801	0.00005	7.0	1065	7.3	1.0
91500_2	26-May-06	0.282283	0.000031	1.467222	0.000047	0.000275	0.000000	0.00796	0.00003	6.9	1065	5.6	1.0
91500_3	26-May-06	0.282335	0.000027	1.467200	0.000034	0.000306	0.000001	0.01104	0.00007	9.4	1065	7.4	0.8
91500_4	26-May-06	0.282317	0.000027	1.467254	0.000039	0.000306	0.000000	0.01114	0.00008	8.9	1065	6.7	0.8
91500-1	30-Aug-07	0.282299	0.000035	1.467256	0.000073	0.000326	0.000001	0.01213	0.00006	9.8	1065	6.1	1.1
91500-2	30-Aug-07	0.282317	0.000033	1.467198	0.000050	0.000331	0.000000	0.01232	0.00006	11.0	1065	6.7	1.0
91500-3	30-Aug-07	0.282297	0.000024	1.467230	0.000042	0.000343	0.000001	0.01265	0.00014	10.4	1065	6.0	0.7
91500-4	30-Aug-07	0.282324	0.000026	1.467289	0.000039	0.000349	0.000001	0.01304	0.00012	10.7	1065	7.0	0.8
91500-5	30-Aug-07	0.282326	0.000031	1.467254	0.000036	0.000339	0.000001	0.01276	0.00007	10.7	1065	7.1	1.0
91500-6	30-Aug-07	0.282284	0.000025	1.467234	0.000046	0.000342	0.000001	0.01277	0.00013	10.4	1065	5.6	0.7
91500-1	31-Aug-07	0.282306	0.000027	1.467266	0.000039	0.000503	0.000048	0.01678	0.00076	11.8	1065	6.2	0.8
91500-2	31-Aug-07	0.282302	0.000029	1.467256	0.000030	0.000410	0.000001	0.01448	0.00016	12.4	1065	6.1	0.9
91500-1	29-2-07	0.282316	0.000026	1.467252	0.000041	0.000315	0.000000	0.00964	0.00014	11.1	1065	6.7	0.8
91500-2	29-2-07	0.282323	0.000027	1.467256	0.000032	0.000316	0.000000	0.00983	0.00013	11.8	1065	6.9	0.8
91500-3	29-2-07	0.282333	0.000024	1.467286	0.000033	0.000314	0.000001	0.00930	0.00012	11.8	1065	7.3	0.7
average ± 2SD		**0.282312**	**0.000032**									**6.6**	**1.1**
Tem2_2	25/05/2006	0.282672	0.000028	1.467214	0.000030	0.001208	0.000025	0.044265	0.00111	12.7	417	4.6	0.9
Tem2_3	25/05/2006	0.282691	0.000029	1.467198	0.000038	0.001231	0.000003	0.046926	0.00013	11.7	417	5.3	0.9
Tem2_4	25/05/2006	0.282676	0.000032	1.467233	0.000037	0.001608	0.000027	0.064409	0.00093	11.0	417	4.6	1.0
Tem2_5	25/05/2006	0.282704	0.000035	1.467213	0.000043	0.002021	0.000074	0.084411	0.00263	8.9	417	5.5	1.1
Tem2_6	25/05/2006	0.282683	0.000024	1.467234	0.000034	0.001298	0.000023	0.046008	0.00140	11.3	417	5.0	0.7
Tem2_7	25/05/2006	0.282662	0.000021	1.467221	0.000032	0.001032	0.000028	0.035718	0.00101	14.5	417	4.3	0.6
Tem2_8	25/05/2006	0.282668	0.000025	1.467245	0.000034	0.001112	0.000034	0.039744	0.00105	13.3	417	4.5	0.7
Tem2_9	25/05/2006	0.282668	0.000025	1.467245	0.000034	0.001112	0.000034	0.039744	0.00105	13.3	417	4.5	0.7
Tem2_10	25/05/2006	0.282671	0.000034	1.467188	0.000043	0.001511	0.000018	0.058615	0.00088	8.9	417	4.5	1.1
Tem2_11	25/05/2006	0.282677	0.000025	1.467211	0.000029	0.001341	0.000019	0.049896	0.00104	15.8	417	4.7	0.7
Tem2_12	25/05/2006	0.282686	0.000027	1.467233	0.000028	0.000985	0.000025	0.039202	0.00098	14.3	417	5.2	0.8
Tem2_13	25/05/2006	0.282662	0.000026	1.467231	0.000032	0.001164	0.000009	0.044322	0.00016	15.1	417	4.3	0.8
Tem2_14	25/05/2006	0.282693	0.000030	1.467265	0.000035	0.001553	0.000014	0.061604	0.00114	14.0	417	5.3	0.9

Tem2_15	25/05/2006	0.282689	0.000025	1.467237	0.000038	0.000543	0.000003	0.020507	0.00025	14.8	417	5.4	0.8
Tem2_16	25/05/2006	0.282676	0.000032	1.467243	0.000045	0.001320	0.000062	0.050951	0.00122	13.7	417	4.7	1.0
Tem2_17	25/05/2006	0.282681	0.000027	1.467242	0.000036	0.001076	0.000042	0.043063	0.00205	13.7	417	4.9	0.8
Tem2_18	25/05/2006	0.282688	0.000029	1.467207	0.000039	0.001337	0.000044	0.041471	0.00127	13.2	417	5.1	0.9
Tem2_19	25/05/2006	0.282683	0.000023	1.467217	0.000032	0.000689	0.000004	0.019842	0.00019	13.8	417	5.1	0.7
Tem2_20	25/05/2006	0.282676	0.000028	1.467228	0.000038	0.001462	0.000009	0.046928	0.00046	13.8	417	4.7	0.8
Tem2_21	25/05/2006	0.282697	0.000027	1.467233	0.000029	0.001120	0.000008	0.035261	0.00017	14.8	417	5.5	0.8
Tem2_22	25/05/2006	0.282682	0.000024	1.467204	0.000030	0.001124	0.000008	0.034688	0.00021	14.6	417	5.0	0.7
Tem2_23	25/05/2006	0.282685	0.000025	1.467248	0.000035	0.001127	0.000025	0.034609	0.00065	14.9	417	5.1	0.7
Tem2_24	25/05/2006	0.282692	0.000026	1.467213	0.000036	0.001022	0.000001	0.032135	0.00023	12.8	417	5.4	0.8
Tem2_25	25/05/2006	0.282670	0.000025	1.467217	0.000033	0.001065	0.000010	0.033104	0.00014	13.8	417	4.6	0.7
Tem2_1	26-May-06	0.282675	0.000030	1.467212	0.000038	0.000654	0.000012	0.017783	0.00033	9.1	417	4.9	0.9
Tem2_2	26-May-06	0.282669	0.000027	1.467207	0.000042	0.000545	0.000001	0.015100	0.00007	9.5	417	4.7	0.8
Tem2_3	26-May-06	0.282682	0.000027	1.467249	0.000037	0.000530	0.000003	0.013964	0.00005	9.4	417	5.1	0.8
Tem2_5	26-May-06	0.282697	0.000037	1.467179	0.000054	0.001158	0.000032	0.032342	0.00076	8.3	417	5.5	1.2
Tem2_6	26-May-06	0.282667	0.000026	1.467235	0.000043	0.001055	0.000028	0.027301	0.00043	8.9	417	4.5	0.8
Tem2_7	26-May-06	0.282655	0.000038	1.467244	0.000047	0.001413	0.000013	0.038807	0.00041	7.1	417	3.9	1.3
Tem2_8	26-May-06	0.282678	0.000029	1.467222	0.000036	0.001379	0.000031	0.053934	0.00100	11.9	417	4.8	0.9
Tem2_9	26-May-06	0.282705	0.000028	1.467224	0.000038	0.001412	0.000008	0.054955	0.00080	12.7	417	5.7	0.8
Tem2_10	26-May-06	0.282704	0.000037	1.467216	0.000046	0.000613	0.000016	0.021769	0.00034	9.8	417	5.9	1.2
Tem2_11	26-May-06	0.282673	0.000025	1.467199	0.000039	0.001352	0.000041	0.049360	0.00060	12.2	417	4.6	0.7
Tem2_12	26-May-06	0.282683	0.000024	1.467189	0.000036	0.000670	0.000015	0.022410	0.00052	13.7	417	5.2	0.7
Tem2_13	26-May-06	0.282690	0.000025	1.467249	0.000030	0.001047	0.000061	0.035812	0.00210	12.4	417	5.3	0.7
Tem2_15	26-May-06	0.282679	0.000021	1.467201	0.000034	0.001031	0.000006	0.032902	0.00014	16.3	417	4.9	0.6
Tem2_16	26-May-06	0.282678	0.000022	1.467205	0.000030	0.001046	0.000064	0.037207	0.00221	15.0	417	4.9	0.6
Tem2_17	26-May-06	0.282686	0.000023	1.467219	0.000027	0.001236	0.000043	0.045702	0.00127	15.9	417	5.1	0.6
Tem2_18	26-May-06	0.282699	0.000024	1.467221	0.000036	0.001281	0.000011	0.048258	0.00082	13.2	417	5.5	0.7
Tem2_19	26-May-06	0.282678	0.000025	1.467225	0.000036	0.000963	0.000007	0.032357	0.00029	15.2	417	4.9	0.8
tem-1	29-2-07	0.282688	0.000026	1.467246	0.000032	0.001139	0.000024	0.038305	0.00088	13.8	417	5.2	0.8
tem-2	29-2-07	0.282683	0.000025	1.467245	0.000035	0.000875	0.000016	0.029522	0.00065	15.9	417	5.1	0.7
tem-3	29-2-07	0.282696	0.000023	1.467231	0.000029	0.000932	0.000022	0.032894	0.00086	16.4	417	5.5	0.6
tem-4	29-2-07	0.282681	0.000023	1.467243	0.000039	0.000996	0.000029	0.034992	0.00112	15.9	417	5.0	0.6
tem-5	29-2-07	0.282689	0.000032	1.467216	0.000050	0.001328	0.000012	0.048427	0.00151	16.7	417	5.2	1.0
tem-6	29-2-07	0.282688	0.000023	1.467223	0.000034	0.000783	0.000006	0.024998	0.00017	16.7	417	5.3	0.6
tem-7	29-2-07	0.282709	0.000025	1.467245	0.000037	0.001454	0.000023	0.046789	0.00101	16.3	417	5.8	0.7
tem-8	29-2-07	0.282674	0.000028	1.467234	0.000037	0.001134	0.000065	0.036081	0.00201	14.9	417	4.7	0.9
tem-9	29-2-07	0.282675	0.000024	1.467264	0.000029	0.001066	0.000003	0.035673	0.00045	16.8	417	4.8	0.7

tem-10	29-2-07	0.282692	0.000027	1.467236	0.000032	0.000967	0.000032	0.030069	0.00117	15.2	417	5.4	0.8
tem-11	29-2-07	0.282700	0.000028	1.467252	0.000044	0.000889	0.000006	0.025143	0.00012	16.2	417	5.7	0.8
tem-12	29-2-07	0.282689	0.000020	1.467237	0.000036	0.000777	0.000005	0.022213	0.00020	16.2	417	5.3	0.5
tem-13	29-2-07	0.282688	0.000024	1.467226	0.000033	0.000667	0.000021	0.019129	0.00070	17.2	417	5.3	0.7
tem-14	29-2-07	0.282682	0.000024	1.467235	0.000033	0.000810	0.000004	0.022671	0.00020	17.4	417	5.1	0.7
tem-15	29-2-07	0.282690	0.000026	1.467236	0.000035	0.001277	0.000012	0.041209	0.00053	16.3	417	5.2	0.8
tem-16	29-2-07	0.282688	0.000037	1.467201	0.000055	0.001298	0.000041	0.041488	0.00189	14.0	417	5.2	1.2
tem-17	29-2-07	0.282683	0.000027	1.467247	0.000040	0.001439	0.000074	0.041928	0.00158	14.5	417	4.9	0.8
tem-18	29-2-07	0.282679	0.000021	1.467261	0.000037	0.000749	0.000021	0.022046	0.00074	15.5	417	5.0	0.6
tem-19	29-2-07	0.282711	0.000026	1.467232	0.000032	0.001250	0.000018	0.040985	0.00085	15.4	417	6.0	0.8
tem-20	29-2-07	0.282693	0.000023	1.467238	0.000028	0.001197	0.000008	0.039275	0.00048	15.9	417	5.3	0.6
tem-21	29-2-07	0.282693	0.000021	1.467224	0.000029	0.001172	0.000019	0.038885	0.00092	16.3	417	5.4	0.6
tem-22	29-2-07	0.282694	0.000025	1.467254	0.000035	0.000979	0.000047	0.030062	0.00182	16.5	417	5.4	0.7
tem-24	29-2-07	0.282686	0.000022	1.467244	0.000034	0.000691	0.000013	0.021047	0.00047	17.2	417	5.2	0.6
tem-25	29-2-07	0.282699	0.000025	1.467277	0.000034	0.000678	0.000024	0.020747	0.00102	15.7	417	5.7	0.7
tem-26	29-2-07	0.282693	0.000025	1.467240	0.000031	0.000853	0.000037	0.026976	0.00149	16.2	417	5.4	0.7
tem-27	29-2-07	0.282679	0.000029	1.467266	0.000041	0.001092	0.000014	0.034067	0.00024	13.4	417	4.9	0.9
tem-1	31-Aug-07	0.282734	0.000028	1.467231	0.000028	0.001174	0.000013	0.043000	0.00069	13.6	417	6.8	0.8
tem-2	31-Aug-07	0.282683	0.000028	1.467240	0.000036	0.001409	0.000007	0.049090	0.00046	18.1	417	4.9	0.9
tem-3	31-Aug-07	0.282696	0.000028	1.467260	0.000032	0.001407	0.000004	0.049276	0.00044	16.7	417	5.4	0.8
tem-4	31-Aug-07	0.282694	0.000025	1.467224	0.000032	0.001647	0.000043	0.058661	0.00108	19.3	417	5.3	0.7
tem-5	31-Aug-07	0.282683	0.000026	1.467211	0.000035	0.000934	0.000008	0.029371	0.00056	17.3	417	5.1	0.8
tem-6	31-Aug-07	0.282684	0.000022	1.467237	0.000030	0.001035	0.000055	0.032630	0.00099	17.7	417	5.1	0.6
tem-7	31-Aug-07	0.282692	0.000023	1.467227	0.000031	0.001265	0.000006	0.044927	0.00074	19.2	417	5.3	0.7
tem-8	31-Aug-07	0.282694	0.000024	1.467269	0.000035	0.001254	0.000028	0.044848	0.00052	16.9	417	5.4	0.7
tem-9	31-Aug-07	0.282676	0.000022	1.467234	0.000027	0.000847	0.000018	0.027614	0.00030	18.0	417	4.8	0.6
average ± 2SD		**0.282685**	**0.000025**									**5.1**	**0.9**
QGNG_1	30-Aug-07	0.281602	0.000025	1.467208	0.000031	0.00063	0.000002	0.02503	0.00016	16.3	1851	-1.2	0.7
QGNG_2	30-Aug-07	0.281627	0.000024	1.467224	0.000034	0.00096	0.000007	0.03875	0.00061	17.1	1851	-0.7	0.7
QGNG_3	30-Aug-07	0.281622	0.000028	1.467240	0.000025	0.00098	0.000002	0.03990	0.00040	14.6	1851	-0.9	0.8
QGNG_4	30-Aug-07	0.281608	0.000021	1.467254	0.000029	0.00116	0.000014	0.04450	0.00080	22.6	1851	-1.6	0.5
QGNG-1*	31-Aug-07	0.281607	0.000021	1.467265	0.000024	0.000937	0.000009	0.036877	0.00044	20.8	1851	-1.4	0.6
QGNG-2*	31-Aug-07	0.281603	0.000019	1.467228	0.000027	0.000771	0.000006	0.028416	0.00034	26.7	1851	-1.3	0.5
QGNG-3*	31-Aug-07	0.281618	0.000026	1.467249	0.000033	0.000955	0.000007	0.038184	0.00046	17.4	1851	-1.0	0.8
QGNG-1	31-Aug-07	0.281617	0.000026	1.467237	0.000033	0.000962	0.000005	0.039086	0.00052	17.1	1851	-1.1	0.8

QGNG-2	31-Aug-07	0.281602	0.000020	1.467240	0.000029	0.000643	0.000002	0.025339	0.00022	17.4	1851	-1.2	0.5
QGNG-3	31-Aug-07	0.281610	0.000021	1.467276	0.000025	0.000621	0.000001	0.024341	0.00007	19.1	1851	-0.9	0.6
QGNG-4	31-Aug-07	0.281617	0.000024	1.467228	0.000029	0.001090	0.000005	0.043421	0.00037	18.5	1851	-1.2	0.7
QGNG-5	31-Aug-07	0.281598	0.000022	1.467232	0.000033	0.000849	0.000011	0.034279	0.00054	19.6	1851	-1.6	0.6
average ± 2SD		**0.281611**	**0.000018**									**-1.2**	**0.6**
FC1_1	25/05/2006	0.282174	0.000023	1.467241	0.000034	0.000942	0.000005	0.037402	0.00043	15.8	1099	2.0	0.7
FC1_2	25/05/2006	0.282190	0.000033	1.467255	0.000034	0.001587	0.000006	0.064342	0.00038	10.8	1099	2.1	1.1
FC1_3	25/05/2006	0.282142	0.000028	1.467208	0.000037	0.001420	0.000018	0.057131	0.00028	13.4	1099	0.5	0.9
FC1_1	26-May-06	0.282184	0.000022	1.467240	0.000028	0.001161	0.000004	0.044898	0.00044	18.8	1099	2.2	0.6
FC1-1	29-2-07	0.282163	0.000024	1.467226	0.000031	0.001406	0.000022	0.046641	0.00085	19.6	1099	1.2	0.7
FC1-2	29-2-07	0.282169	0.000021	1.467249	0.000024	0.000732	0.000002	0.026148	0.00011	22.0	1099	1.9	0.6
FC1-3	29-2-07	0.282190	0.000022	1.467253	0.000027	0.001190	0.000011	0.039463	0.00030	22.4	1099	2.4	0.6
FC1_4	29-2-07	0.282181	0.000025	1.467257	0.000029	0.000985	0.000012	0.036599	0.00050	17.4	1099	2.2	0.7
FC1_1	30-Aug-07	0.282192	0.000020	1.467228	0.000038	0.00107	0.000011	0.04447	0.00091	17.4	1099	2.5	0.5
FC1_2	30-Aug-07	0.282183	0.000025	1.467232	0.000032	0.00097	0.000011	0.03936	0.00078	14.9	1099	2.3	0.7
FC1_3	30-Aug-07	0.282188	0.000029	1.467248	0.000034	0.00146	0.000010	0.05924	0.00061	17.4	1099	2.1	0.9
FC1_4	30-Aug-07	0.282193	0.000026	1.467249	0.000034	0.00145	0.000011	0.05863	0.00044	18.9	1099	2.3	0.8
FC1-1	31-Aug-07	0.282183	0.000031	1.467208	0.000037	0.001101	0.000016	0.048381	0.00035	15.1	1099	2.2	1.0
FC1-2	31-Aug-07	0.282181	0.000025	1.467278	0.000022	0.000999	0.000004	0.042953	0.00031	16.3	1099	2.2	0.7
FC1-3	31-Aug-07	0.282193	0.000025	1.467254	0.000024	0.001283	0.000003	0.051168	0.00076	18.2	1099	2.4	0.7
FC1-4	31-Aug-07	0.282177	0.000025	1.467211	0.000029	0.001275	0.000004	0.050714	0.00082	19.4	1099	1.8	0.7
FC1-5	31-Aug-07	0.282185	0.000025	1.467235	0.000038	0.001368	0.000006	0.054057	0.00074	17.8	1099	2.0	0.7
FC1-6	31-Aug-07	0.282199	0.000026	1.467214	0.000023	0.002494	0.000021	0.100257	0.00184	18.5	1099	1.7	0.8
FC1-7	31-Aug-07	0.282217	0.000027	1.467222	0.000028	0.002516	0.000008	0.101899	0.00128	18.8	1099	2.4	0.8
FC1-8	31-Aug-07	0.282209	0.000026	1.467213	0.000031	0.002477	0.000009	0.101014	0.00214	18.3	1099	2.1	0.8
FC1-9	31-Aug-07	0.282202	0.000025	1.467255	0.000027	0.002672	0.000046	0.106199	0.00342	18.9	1099	1.7	0.7
FC1-10	31-Aug-07	0.282188	0.000023	1.467245	0.000032	0.002292	0.000107	0.086167	0.00299	17.8	1099	1.5	0.6
FC1-11	31-Aug-07	0.282171	0.000022	1.467237	0.000030	0.000979	0.000069	0.038844	0.00331	19.3	1099	1.9	0.6
FC1-12	31-Aug-07	0.282171	0.000023	1.467258	0.000030	0.001215	0.000007	0.048699	0.00074	21.6	1099	1.7	0.6
FC1-13	31-Aug-07	0.282180	0.000026	1.467258	0.000040	0.001400	0.000057	0.055575	0.00142	18.6	1099	1.9	0.8
FC1-14	31-Aug-07	0.282197	0.000021	1.467203	0.000028	0.001307	0.000005	0.053358	0.00061	20.1	1099	2.5	0.6
FC1-15	31-Aug-07	0.282201	0.000023	1.467227	0.000023	0.001295	0.000004	0.052912	0.00061	21.4	1099	2.7	0.6
FC1-16	31-Aug-07	0.282163	0.000020	1.467251	0.000027	0.000844	0.000024	0.033883	0.00124	21.9	1099	1.7	0.5
FC1-17	31-Aug-07	0.282193	0.000026	1.467248	0.000029	0.002542	0.000005	0.094190	0.00059	19.1	1099	1.5	0.8
FC1-18	31-Aug-07	0.282231	0.000025	1.467250	0.000027	0.002592	0.000003	0.097290	0.00091	19.2	1099	2.8	0.7

FC1-23	31-Aug-07	0.282172	0.000024	1.467231	0.000036	0.000676	0.000006	0.024886	0.00046	23.0	1099	2.1	0.7
FC1-24	31-Aug-07	0.282169	0.000024	1.467241	0.000032	0.001325	0.000030	0.047208	0.00113	21.4	1099	1.5	0.7
FC1-25	31-Aug-07	0.282168	0.000022	1.467220	0.000026	0.001181	0.000039	0.043239	0.00126	29.6	1099	1.6	0.6
FC1-26	31-Aug-07	0.282159	0.000025	1.467243	0.000042	0.000781	0.000024	0.030303	0.00122	17.3	1099	1.6	0.7
FC1-27	31-Aug-07	0.282183	0.000024	1.467258	0.000027	0.001382	0.000026	0.055867	0.00121	17.7	1099	2.0	0.7
average ± 2SD		**0.282184**	**0.000034**									**2.0**	**0.9**

Table A-13: Hf isotope data (LAMCICPMS) at JCU & UWA

Sample	Anal. facility	Location	$^{176}Hf/^{177}Hf$	2σ	$^{178}Hf/^{177}Hf$	2σ	$^{180}Hf/^{177}Hf$	2σ	$^{176}Lu/^{177}Hf$	2σ	$^{176}Yb/^{177}Hf$	2σ	Total Hf (V)	Age (Ma)	εHf(t)	± 2 se
TKSS3_1	JCU	Leucosome	0.28319	0.00002	1.46728	0.00003	1.88682	0.00005	0.00061	0.00003	0.01561	0.00084	25.2	19	14.7	0.7
TKSS3_2rim	JCU	Leucosome	0.28313	0.00002	1.46725	0.00003	1.88683	0.00006	0.00046	0.00001	0.01185	0.00013	27.4	19	12.8	0.6
TKSS3_2core	JCU	Leucosome	0.28327	0.00002	1.46728	0.00003	1.88681	0.00005	0.00047	0.00001	0.01155	0.00020	25.6	19	17.4	0.7
TKSS3_3	JCU	Leucosome	0.28311	0.00002	1.46726	0.00002	1.88688	0.00006	0.00082	0.00002	0.02231	0.00064	28.1	19	11.8	0.6
TKSS3_4	JCU	Leucosome	0.28314	0.00002	1.46726	0.00002	1.88682	0.00005	0.00057	0.00001	0.01515	0.00030	27.4	19	13.1	0.6
TKSS3_5_O1	JCU	Leucosome	0.28313	0.00002	1.46724	0.00003	1.88681	0.00005	0.00055	0.00001	0.01396	0.00032	26.0	19	12.7	0.7
TKSS3_5_O3	JCU	Leucosome	0.28316	0.00002	1.46725	0.00003	1.88684	0.00006	0.00070	0.00002	0.01870	0.00073	28.1	19	13.6	0.6
TKSS3_6	JCU	Leucosome	0.28314	0.00002	1.46724	0.00003	1.88679	0.00005	0.00065	0.00002	0.01709	0.00052	27.1	19	13.0	0.6
TKSS3_7rim	JCU	Leucosome	0.28319	0.00002	1.46726	0.00002	1.88681	0.00005	0.00052	0.00001	0.01306	0.00014	26.8	19	14.8	0.7
TKSS3_7	JCU	Leucosome	0.28323	0.00002	1.46726	0.00003	1.88679	0.00005	0.00088	0.00001	0.02363	0.00038	31.1	19	16.1	0.6
TKSS3_8	JCU	Leucosome	0.28315	0.00002	1.46727	0.00003	1.88681	0.00005	0.00051	0.00000	0.01314	0.00011	26.8	19	13.4	0.6
TKSS3_9core	JCU	Leucosome	0.28315	0.00002	1.46725	0.00002	1.88686	0.00005	0.00051	0.00001	0.01282	0.00018	25.9	19	13.3	0.6
TKSS3_9rim	JCU	Leucosome	0.28312	0.00002	1.46728	0.00003	1.88681	0.00005	0.00073	0.00001	0.01846	0.00017	26.7	19	12.2	0.7
TKSS3_14	JCU	Leucosome	0.28314	0.00002	1.46724	0.00003	1.88686	0.00005	0.00050	0.00001	0.01355	0.00018	26.7	19	13.1	0.7
TKSS3_15core	JCU	Leucosome	0.28317	0.00002	1.46726	0.00003	1.88678	0.00006	0.00110	0.00001	0.03106	0.00039	28.0	19	14.0	0.7
TKSS3_50core	JCU	Leucosome	0.28326	0.00002	1.46725	0.00003	1.88679	0.00006	0.00058	0.00001	0.01460	0.00020	24.3	19	17.2	0.6
TKSS3_50rim	JCU	Leucosome	0.28312	0.00002	1.46728	0.00002	1.88685	0.00005	0.00064	0.00002	0.01613	0.00041	3.6	19	12.3	0.7
SS3_leuco11	UWA	Leucosome	0.28319	0.00002	1.46720	0.00003			0.00066	0.00001	0.02042	0.00069	21.7	19	14.7	0.5
SS3_leuco10	UWA	Leucosome	0.28316	0.00002	1.46721	0.00003			0.00075	0.00001	0.02275	0.00010	21.8	19	13.6	0.6
SS3_leuco9	UWA	Leucosome	0.28306	0.00002	1.46720	0.00003			0.00199	0.00002	0.06327	0.00153	22.0	19	10.1	0.6
SS3_leuco8	UWA	Leucosome	0.28307	0.00001	1.46721	0.00003			0.00113	0.00001	0.03292	0.00049	26.8	19	10.6	0.5
SS3_leuco7	UWA	Leucosome	0.28317	0.00002	1.46720	0.00003			0.00110	0.00002	0.03474	0.00022	22.1	19	14.0	0.6
SS3_leuco6	UWA	Leucosome	0.28306	0.00002	1.46720	0.00003			0.00156	0.00005	0.05017	0.00117	24.1	19	10.2	0.6
SS3_leuco5	UWA	Leucosome	0.28316	0.00002	1.46720	0.00003			0.00045	0.00001	0.01331	0.00016	21.4	19	13.8	0.5
SS3_leuco4	UWA	Leucosome	0.28306	0.00002	1.46721	0.00002			0.00170	0.00000	0.05511	0.00030	24.3	19	10.3	0.6
SS3_leuco3	UWA	Leucosome	0.28316	0.00002	1.46720	0.00002			0.00053	0.00001	0.01642	0.00029	21.7	19	13.8	0.7
SS3_leuco2	UWA	Leucosome	0.28316	0.00002	1.46721	0.00003			0.00058	0.00001	0.01842	0.00043	21.3	19	13.7	0.6
SS3_leuco1	UWA	Leucosome	0.28326	0.00002	1.46720	0.00003			0.00084	0.00000	0.02407	0.00040	18.9	19	17.2	0.6
SS3_dk5	UWA	Mesosome	0.28337	0.00002	1.46725	0.00004			0.00038	0.00001	0.01006	0.00039	8.3	19	21.1	0.7
SS3_dk4	UWA	Mesosome	0.28319	0.00002	1.46720	0.00004			0.00084	0.00002	0.02595	0.00035	9.7	19	14.6	0.8
SS3_dk3	UWA	Mesosome	0.28336	0.00002	1.46718	0.00004			0.00047	0.00000	0.01222	0.00016	9.1	19	20.8	0.8
SS3_dk2	UWA	Mesosome	0.28318	0.00002	1.46720	0.00003			0.00077	0.00001	0.02319	0.00023	13.7	19	14.3	0.7
SS3_dk1	UWA	Mesosome	0.28335	0.00002	1.46718	0.00003			0.00038	0.00001	0.01040	0.00039	9.0	19	20.5	0.9
MG1_2	JCU	Leucosome	0.28302	0.00002	1.46724	0.00003	1.88683	0.00005	0.00087	0.00001	0.01913	0.00028	24.6	19	8.8	0.7
MG1_3	JCU	Leucosome	0.28306	0.00002	1.46727	0.00003	1.88682	0.00004	0.00106	0.00001	0.02566	0.00016	25.0	19	10.0	0.7
MG1_10	JCU	Leucosome	0.28305	0.00002	1.46726	0.00003	1.88681	0.00005	0.00110	0.00000	0.02596	0.00004	26.2	19	9.9	0.6
MG1_10b	JCU	Leucosome	0.28303	0.00002	1.46725	0.00003	1.88682	0.00004	0.00084	0.00000	0.01826	0.00002	26.3	19	9.1	0.7

MG1_O1	JCU	Leucosome	0.28304	0.00002	1.46723	0.00003	1.88680	0.00004	0.00068	0.00001	0.01615	0.00017	25.1	19	9.3	0.7
MG1_O3	JCU	Leucosome	0.28303	0.00002	1.46724	0.00002	1.88681	0.00006	0.00071	0.00001	0.01666	0.00025	26.8	19	9.2	0.6
MG1_O5	JCU	Leucosome	0.28305	0.00002	1.46724	0.00003	1.88680	0.00005	0.00071	0.00001	0.01741	0.00020	31.3	19	9.6	0.7
MG1_O6	JCU	Leucosome	0.28303	0.00002	1.46726	0.00003	1.88684	0.00005	0.00090	0.00000	0.02207	0.00007	26.7	19	9.1	0.7
MG1_O8	JCU	Leucosome	0.28303	0.00002	1.46726	0.00003	1.88682	0.00005	0.00096	0.00000	0.02480	0.00014	25.7	19	9.1	0.6
MG1_O10_2	JCU	Leucosome	0.28304	0.00002	1.46724	0.00006	1.88685	0.00006	0.00052	0.00000	0.01288	0.00005	22.0	19	9.4	0.6
MG1_O10	JCU	Leucosome	0.28302	0.00002	1.46723	0.00003	1.88683	0.00006	0.00067	0.00000	0.01747	0.00012	21.5	19	8.7	0.7
MG1_leuco3	UWA	Leucosome	0.28305	0.00002	1.46722	0.00003			0.00064	0.00001	0.01837	0.00054	23.4	19	9.8	0.6
MG1_leuco2	UWA	Leucosome	0.28304	0.00002	1.46721	0.00002			0.00074	0.00001	0.02064	0.00021	22.2	19	9.5	0.6
MG1_Leuco1	UWA	Leucosome	0.28304	0.00002	1.46721	0.00003			0.00083	0.00001	0.02333	0.00029	21.5	19	9.5	0.5
MG1_dk5	UWA	Mesosome	0.28322	0.00001	1.46723	0.00003			0.00046	0.00000	0.01433	0.00032	17.2	19	15.8	0.5
MG1_dk4	UWA	Mesosome	0.28315	0.00002	1.46719	0.00003			0.00140	0.00008	0.03690	0.00192	16.9	19	13.2	0.7
MG1_dk3rim	UWA	Mesosome	0.28325	0.00002	1.46722	0.00003			0.00043	0.00000	0.01289	0.00012	18.1	19	16.8	0.6
MG1_dk3	UWA	Mesosome	0.28330	0.00002	1.46720	0.00003			0.00057	0.00001	0.01562	0.00049	14.4	19	18.5	0.7
MG1_dk2rim	UWA	Mesosome	0.28322	0.00002	1.46721	0.00003			0.00055	0.00000	0.01753	0.00029	18.1	19	15.9	0.6
MG1_dark2	UWA	Mesosome	0.28320	0.00002	1.46723	0.00003			0.00127	0.00003	0.03393	0.00037	17.9	19	15.2	0.6
MG1_dk1rim	UWA	Mesosome	0.28325	0.00002	1.46722	0.00002			0.00052	0.00000	0.01486	0.00028	16.0	19	16.9	0.7
MG1_dk1	UWA	Mesosome	0.28320	0.00002	1.46720	0.00003			0.00107	0.00005	0.02872	0.00090	21.7	19	15.3	0.6
HD1-22	UWA		0.28294	0.00006	1.46723	0.00006			0.00136	0.00004	0.04393	0.00112	6.0	19	5.9	2.1
HD1-50	JCU		0.28295	0.00003	1.46724	0.00006			0.00108	0.00002	0.03013	0.00046	5.5	19	6.4	1.2
HD1-51	UWA		0.28287	0.00003	1.46720	0.00006			0.00115	0.00003	0.03399	0.00055	6.3	19	3.3	1.1
HD1-52	UWA		0.28295	0.00004	1.46723	0.00007			0.00122	0.00002	0.03770	0.00090	5.4	19	6.1	1.4

Table A-14: Hf isotope data (LAMCICPMS) at Bristol

HD20		^{176}Hf/^{177}Hf	2σ	^{178}Hf/^{177}Hf	2σ	^{176}Lu/^{177}Hf	2σ	^{176}Yb/^{177}Hf	2σ	Total Hf (V)	Age (Ma)	εHf(t)	± 2 se
20_1a	25-May-06	0.283023	0.000030	1.467231	0.000037	0.00139	0.00004	0.0552	0.0018	15.0	19	8.8	1.1
20_1b	26-May-06	0.283036	0.000031	1.467240	0.000038	0.00141	0.00004	0.0571	0.0025	14.5	19	9.3	1.1
20_2	26-May-06	0.283030	0.000023	1.467219	0.000027	0.00167	0.00006	0.0662	0.0027	18.2	19	9.0	0.8
20_3	26-May-06	0.283027	0.000023	1.467216	0.000026	0.00200	0.00003	0.0765	0.0016	18.3	19	9.0	0.8
20_4	26-May-06	0.283030	0.000025	1.467188	0.000030	0.00172	0.00001	0.0644	0.0007	17.1	19	9.1	0.9
20_5	26-May-06	0.283034	0.000024	1.467238	0.000025	0.00261	0.00003	0.1007	0.0007	20.9	19	9.2	0.9
20_6	26-May-06	0.283006	0.000022	1.467235	0.000026	0.00204	0.00004	0.0774	0.0015	20.5	19	8.2	0.8
20_7	26-May-06	0.283049	0.000025	1.467232	0.000031	0.00130	0.00004	0.0494	0.0019	14.8	19	9.7	0.9
20_8	26-May-06	0.283014	0.000026	1.467228	0.000030	0.00299	0.00020	0.1131	0.0078	15.7	19	8.5	0.9
20_9	26-May-06	0.283019	0.000027	1.467222	0.000030	0.00154	0.00004	0.0544	0.0014	12.7	19	8.7	1.0
20_10	26-May-06	0.283024	0.000022	1.467241	0.000031	0.00123	0.00002	0.0419	0.0006	14.5	19	8.9	0.8
HD20-1	30-Aug-07	0.283040	0.000025	1.467243	0.000028	0.00188	0.00006	0.0756	0.0032	17.0	19	9.4	0.9
HD20-2	30-Aug-07	0.283081	0.000033	1.467236	0.000040	0.00173	0.00005	0.0689	0.0027	11.5	19	10.9	1.2
HD20-3	30-Aug-07	0.283023	0.000033	1.467221	0.000032	0.00125	0.00003	0.0475	0.0017	10.9	19	8.8	1.2
HD20-4	30-Aug-07	0.283033	0.000031	1.467242	0.000045	0.00075	0.00001	0.0273	0.0004	7.9	19	9.2	1.1
HD20-5	30-Aug-07	0.283028	0.000033	1.467223	0.000049	0.00088	0.00010	0.0334	0.0036	8.4	19	9.0	1.2
HD20-6	30-Aug-07	0.283027	0.000019	1.467222	0.000038	0.00079	0.00005	0.0285	0.0021	14.9	19	9.0	0.7
HD20-7	30-Aug-07	0.283037	0.000022	1.467249	0.000034	0.00135	0.00005	0.0519	0.0022	13.4	19	9.3	0.8
HD20-8	30-Aug-07	0.283032	0.000030	1.467235	0.000040	0.00117	0.00003	0.0432	0.0014	8.2	19	9.1	1.1
HD20-9	30-Aug-07	0.283010	0.000027	1.467208	0.000029	0.00150	0.00006	0.0585	0.0030	13.9	19	8.4	0.9
HD20-11	30-Aug-07	0.283036	0.000023	1.467242	0.000034	0.00146	0.00008	0.0567	0.0030	13.1	19	9.3	0.8
HD20-12	30-Aug-07	0.283040	0.000022	1.467234	0.000039	0.00096	0.00004	0.0360	0.0018	13.9	19	9.4	0.8
HD20-13	30-Aug-07	0.283030	0.000025	1.467225	0.000025	0.00173	0.00002	0.0689	0.0008	18.6	19	9.1	0.9
HD20-14	30-Aug-07	0.283052	0.000035	1.467281	0.000051	0.00247	0.00030	0.0987	0.0137	7.1	19	9.8	1.2
HD20-15	30-Aug-07	0.283051	0.000028	1.467265	0.000030	0.00110	0.00007	0.0425	0.0030	9.9	19	9.8	1.0
HD20-16	30-Aug-07	0.283009	0.000036	1.467237	0.000044	0.00186	0.00012	0.0724	0.0046	7.7	19	8.3	1.3
HD20-17	30-Aug-07	0.283022	0.000033	1.467241	0.000036	0.00231	0.00009	0.0910	0.0034	10.4	19	8.8	1.2
HD20-18	30-Aug-07	0.283033	0.000024	1.467248	0.000036	0.00210	0.00034	0.0824	0.0147	13.9	19	9.2	0.9
HD20-19	30-Aug-07	0.283025	0.000026	1.467231	0.000033	0.00140	0.00004	0.0550	0.0017	13.6	19	8.9	0.9
HD20-20	30-Aug-07	0.283025	0.000026	1.467231	0.000033	0.00140	0.00004	0.0550	0.0017	13.6	19	8.9	0.9
HD20-21	30-Aug-07	0.283060	0.000028	1.467240	0.000038	0.00211	0.00006	0.0788	0.0021	11.7	19	10.1	1.0
HD20-22	30-Aug-07	0.283044	0.000046	1.467247	0.000062	0.00266	0.00027	0.1056	0.0108	7.7	19	9.5	1.6
HD20-23	30-Aug-07	0.283086	0.000033	1.467251	0.000029	0.00307	0.00024	0.1254	0.0114	14.9	19	11.0	1.2
HD20-24	30-Aug-07	0.283068	0.000028	1.467238	0.000038	0.00164	0.00013	0.0650	0.0043	14.6	19	10.4	1.0

HD9

9_1	26-May-06	0.283089	0.000024	1.467220	0.000031	0.00107	0.00003	0.0392	0.0012	14.0	37	11.6	0.8
9_2	26-May-06	0.283054	0.000021	1.467244	0.000029	0.00078	0.00002	0.0242	0.0010	19.5	37	10.3	0.7
9_3	26-May-06	0.283012	0.000028	1.467229	0.000039	0.00076	0.00001	0.0285	0.0007	20.3	37	8.8	1.0
9_4	26-May-06	0.283104	0.000024	1.467234	0.000031	0.00101	0.00001	0.0340	0.0005	13.9	37	12.1	0.9
9_5	26-May-06	0.283090	0.000022	1.467239	0.000034	0.00099	0.00001	0.0335	0.0004	14.1	37	11.6	0.8
9_6	26-May-06	0.283001	0.000030	1.467230	0.000037	0.00082	0.00010	0.0324	0.0049	10.9	37	8.5	1.0
9_7	26-May-06	0.283000	0.000034	1.467217	0.000047	0.00141	0.00007	0.0611	0.0031	6.8	37	8.4	1.2
9_8	26-May-06	0.283000	0.000027	1.467215	0.000045	0.00086	0.00007	0.0348	0.0029	18.3	37	8.4	0.9
9_9	26-May-06	0.282994	0.000021	1.467234	0.000025	0.00073	0.00003	0.0280	0.0020	19.2	37	8.2	0.7
9_10	26-May-06	0.283104	0.000025	1.467227	0.000036	0.00102	0.00004	0.0367	0.0016	15.0	37	12.1	0.9
9_11	26-May-06	0.283014	0.000027	1.467174	0.000046	0.00060	0.00005	0.0207	0.0018	10.9	37	8.9	1.0
HD9-2	29-Feb-2007	0.283020	0.000026	1.467196	0.000040	0.00090	0.00002	0.0320	0.0014	19.8	37	9.1	0.9
HD9-3	29-Feb-2007	0.283042	0.000030	1.467224	0.000038	0.00069	0.00004	0.0218	0.0020	13.4	37	9.9	1.1
HD9-10	29-Feb-2007	0.283044	0.000024	1.467243	0.000046	0.00056	0.00008	0.0192	0.0034	13.5	37	10.0	0.8
HD9-13	29-Feb-2007	0.283015	0.000035	1.467277	0.000058	0.00115	0.00010	0.0432	0.0050	10.4	37	8.9	1.2
HD9-16	29-Feb-2007	0.283105	0.000020	1.467238	0.000034	0.00066	0.00000	0.0209	0.0002	17.6	37	12.1	0.7
HD9-18	29-Feb-2007	0.283027	0.000030	1.467258	0.000044	0.00111	0.00008	0.0421	0.0040	10.6	37	9.4	1.1
HD9-20	29-Feb-2007	0.283037	0.000025	1.467234	0.000042	0.00067	0.00008	0.0226	0.0036	13.1	37	9.7	0.9
HD9-21	29-Feb-2007	0.283062	0.000034	1.467250	0.000042	0.00154	0.00006	0.0615	0.0034	9.4	37	10.6	1.2
HD9-22	29-Feb-2007	0.283047	0.000025	1.467233	0.000030	0.00057	0.00000	0.0170	0.0004	13.9	37	10.1	0.9
HD9-23	29-Feb-2007	0.283038	0.000035	1.467221	0.000052	0.00079	0.00006	0.0277	0.0024	12.6	37	9.7	1.2
HD9-30	29-Feb-2007	0.283039	0.000025	1.467217	0.000036	0.00103	0.00014	0.0406	0.0062	15.2	37	9.8	0.9
HD9-1	31-Aug-07	0.283015	0.000024	1.467231	0.000033	0.00078	0.00006	0.0311	0.0035	17.8	37	8.9	0.9
HD9-5	31-Aug-07	0.283000	0.000037	1.467269	0.000067	0.00144	0.00003	0.0534	0.0029	8.4	37	8.4	1.3
HD9-6	31-Aug-07	0.283018	0.000032	1.467250	0.000041	0.00096	0.00008	0.0379	0.0039	11.9	37	9.0	1.1
HD9-7	31-Aug-07	0.283068	0.000027	1.467239	0.000038	0.00042	0.00004	0.0145	0.0014	11.0	37	10.8	0.9
HD9-8	31-Aug-07	0.283099	0.000029	1.467244	0.000068	0.00088	0.00004	0.0318	0.0015	11.5	37	11.9	1.0
HD9-11	31-Aug-07	0.282981	0.000031	1.467248	0.000060	0.00136	0.00014	0.0581	0.0076	10.8	37	7.7	1.1
HD9-15	31-Aug-07	0.283006	0.000023	1.467226	0.000033	0.00086	0.00003	0.0336	0.0020	21.1	37	8.6	0.8
HD9-17	31-Aug-07	0.282981	0.000034	1.467211	0.000060	0.00102	0.00005	0.0372	0.0033	10.4	37	7.7	1.2
HD9_19	31-Aug-07	0.282990	0.000025	1.467253	0.000025	0.00052	0.00002	0.0188	0.0004	13.1	37	8.1	0.9
HD9-25	31-Aug-07	0.282997	0.000032	1.467242	0.000043	0.00101	0.00003	0.0396	0.0015	10.1	37	8.3	1.1
HD9-27	31-Aug-07	0.282990	0.000025	1.467240	0.000042	0.00094	0.00007	0.0383	0.0032	10.0	37	8.1	0.9
HD9-27b	31-Aug-07	0.283007	0.000027	1.467243	0.000037	0.00039	0.00003	0.0134	0.0011	12.9	37	8.7	1.0
HD9-29	31-Aug-07	0.283053	0.000044	1.467236	0.000056	0.00067	0.00004	0.0234	0.0023	13.1	37	10.3	1.5