Supplementary material for:

Gondwana margin evolution from zircon REE, O and Hf signatures of Western Province gneisses, Zealandia

Joe Hiess[1,2]*, Keewook Yi[1], Jon Woodhead[3], Trevor Ireland[4], Mark Rattenbury[5]

[1] Division of Earth and Environmental Sciences, Korea Basic Science Institute, South Korea

[2] School of Geography, Environment and Earth Sciences, Victoria University of Wellington, New Zealand

[3] School of Earth Sciences, University of Melbourne, Australia

[4] Research School of Earth Sciences, The Australian National University, Australia

[5] GNS Science, Lower Hutt, New Zealand

*Corresponding author: joe.hiess@vuw.ac.nz

The following documents contain:

Online resource 1

Analytical methods and the statistical treatment of data

1.1. Grain mounting and imaging

All zircon grains were previously analysed for U-Th-Pb ages using the SHRIMP reverse geometry (RG) ion microprobe at the Research School of Earth Sciences, the Australian National University and reported by Hiess *et al.* (2010). The existing 1 inch grain mounts from that study were re-cast as larger SHRIMP megamounts for this work to minimize geometric fractionation during O isotopic analysis (Ickert *et al.* 2008). Between successive ion microprobe techniques: U-Th-Pb, then REE, then $^{18}O/^{16}O$; the mounts were lightly re-polished, removing ~5 µm of zircon to expose 'fresh' surfaces for analysis, free of topography from earlier pits, or extraneous O implanted by the O^-_2 primary beam during the earlier work (Benninghoven *et al.* 1987). All grains were re-polished with a rotary polisher and 1µm diamond paste to expose crystal mid sections. Polished analytical surfaces were sequentially cleaned in an ultrasonic bath with petroleum spirit, ethanol, diluted laboratory detergent, 1 M HCl (1 × quartz distilled), and deionized (18 mega Ω) H_2O before being dried in a 60°C oven. A 100-120 Å Au or Al conductive layer was then evaporated onto the analytical surface and electronically checked for uniform and adequate conductivity before loading into the instrument. A 100 Å Au coat was used for REE analyses, and a 120 Å Al coat was used for subsequent O analyses.

Prior to U-Th-Pb analysis, the zircon had been imaged with reflected light, transmitted light and SEM cathodoluminesence spectroscopy. This allowed identification of grain cracks, mineral inclusions and 2-dimensional growth and recrystallisation textures to guide spot placement. Analyses were made within clear grains from all morphologies on the majority of growth domains from core to rim to provide a range of materials representative of each sample (Hiess *et al.* 2010). Following each ion microprobe analysis, the zircons were re-imaged with reflected light to record the precise location of the ~2 µm deep sputtered pits to assist future beam positioning. For Hf isotopic analysis by MC-ICPMS, the laser, which penetrates ~50 µm into the zircon, was subsequently centered directly over the pit formed during the previous O analysis. This method most reliably correlated the zircon REE, $\delta^{18}O$ and $\varepsilon_{Hf(T)}$ compositions with their crystallisation ages, given the limiting tradeoff between spatial resolution and analytical precision.

1.2 Rare Earth Element (REE) analysis with SHRIMP II

Zircon REE concentrations were determined using the Korea Basic Science Institute SHRIMP IIe ion microprobe following the methodology of Hoskin (1998). A 4 nA mass filtered O_2^- primary beam was focused to a ~30 μm (long axis) elliptical spot and the beam rastered for 120 seconds to clean the mount surface prior to data acquisition. The magnet was stepped through positive secondary ion peaks of ^{91}Zr, ^{139}La, ^{140}Ce, ^{141}Pr, ^{143}Nd, ^{146}Nd, ^{147}Sm, ^{149}Sm, ^{151}Eu, ^{153}Eu, ^{155}Gd, ^{157}Gd, ^{159}Tb, ^{161}Dy, ^{163}Dy, ^{165}Ho, ^{166}Er, ^{167}Er, ^{169}Tm, ^{171}Yb, ^{172}Yb, ^{175}Lu and background, with a single electron multiplier. Where possible two isotopes for a given element were measured to ensure consistency of isotopic ratios and check for the presence of any isobaric interferences, which were found to be negligible. Energy filtering was applied to reduce molecular interferences. Data from the 127 zircon sample analyses were standardized to $^{91}Zr^+$ using the reference material NIST SRM 610 and preferred values of Pearce *et al.* (1997) to provide concentration estimates in parts per million (ppm) for each element (Tables 1 and 2). Concentrations were then normalized against CI carbonaceous chondrite abundances of McDonough & Sun (1995) to profile ratios of light REE $(Sm/La)_N$, heavy REE $(Lu/Gd)_N$, as well as Ce/Ce* and Eu/Eu* anomalies in Tables 1 and 2, and Figures 7 and 10 of the main article.

1.3. Oxygen isotopic analysis with SHRIMP II multi-collector

Protocols for $^{18}O/^{16}O$ analysis generally follow those previously described in detail by Ickert *et al.* (2008) and Hiess *et al.* (2009, 2011). Zircon oxygen isotopic compositions were determined using the SHRIMP IIe multi-collector ion microprobe at the Korea Basic Science Institute over eight analytical sessions. A session for O isotopic analysis is defined as an uninterrupted period of data collection, with the same standard calibration. Sessions are separated by cold restarts, mount changes, interruptions to operation, or a major retuning of the instrument's primary or secondary beam. Instrumental conditions (Ickert *et al.* 2008) were typically set with a 3.5 nA, 15 keV Cs^+ primary beam focused to an elliptical 30 μm (long axis) spot, sampling ~2 ng of mineral per analysis. Surface charge was neutralized by a 45° incident, broadly focused, moderate energy (1.1 keV) e^- beam, delivering ~1 μA of electrons from a Kimball Physics ELG-5 electron gun at a working distance of 20 mm. The electron gun is mounted off the extraction lens housing and floated at primary column potential. The 10 kV secondary extraction yields ~320 pA of secondary current, or ~4.0 × 10^6 cps of ^{18}O and ~2.0 × 10^9 cps of ^{16}O on zircon. Isotopic ratios were produced by simultaneous measurement of $^{18}O^-$ and $^{16}O^-$ ions by dual Faraday cups with 10^{11} Ω and 10^{10} Ω resistors respectively. Background counts of ~3.5 × 10^3 cps on ^{18}O and ~1.2 × 10^4 cps on ^{16}O were measured and subtracted during setup configuration. A 150 µm source slit and 300 µm collector slits limit beam truncation to <5 %, providing a mass resolution of ~2,500 at 1 % peak height. This is sufficient to separate potential isobaric interferences on $^{18}O^-$ from $^{17}OH^-$, $^{16}OD^-$ and $^{16}OH_2^-$. A 180 second pre-sputter and secondary auto-tuning in z and y directions (horizontal and vertical along the beam line for extracted secondary ions) preceded ratio measurements. Data acquisition consisted of 1 set of 10 scans, each with 10 second integration times, leading to total count times of ~100 seconds and complete analyses within approximately 5 minutes. Within this time period within-spot (WS) precision, based on counting statistics for both samples and reference materials reached near theoretical limits of ± 0.2 to ± 0.4 ‰ (1σ). Operating conditions were held constant during a single given session.

Each reference materials and unknowns measured $^{18}O/^{16}O$ ratios, within-spot (WS) and spot-to-spot (STS) precisions are summarized in Online resource 2 and 5. Over the eight analytical sessions, 151 sample analyses were calibrated against 51, time integrated, bracketing analyses of reference material FC1: $\delta^{18}O$ = 5.34 ± 0.03‰, $^{18}O/^{16}O$ = 0.0020159 (Trail *et al.* 2007). All $^{18}O/^{16}O$ ratios are presented as $\delta^{18}O$ notation, expressed as deviations from Vienna standard mean ocean water, VSMOW: $^{18}O/^{16}O$ = 0.0020052, (Baertschi 1976) in parts per thousand. Any minor instrumental drift was corrected for using a linear fit. Electron-induced secondary ion emission, EISIE (Ickert *et al.* 2008) was monitored before and after analysis, and found to provide a systematic and insignificantly minor contribution to the total secondary signal (typically <10^6 cps of ^{16}O at analysis end). STS reproducibility of the nominally homogeneous reference material for a single session ranged from ± 0.6 ‰ to ± 0.8 ‰ (1σ; Online resource 2). This STS precision was always worse than WS precision and was subsequently considered to be the best measure of precision for any given analysis (Ickert *et al.* 2008). A mean oxygen isotopic composition was determined for each of the eight orthogneiss samples and corresponds exclusively to the grain analyses from which weighted mean age determinations were calculated in Hiess *et al.* (2010). The mean's 1σ uncertainty was calculated by summing in quadrature one standard deviation of the pooled population with the 1σ STS uncertainty quoted for that session and sample.

1.4. Hafnium isotopic analysis with LA-MC-ICPMS

Zircon hafnium isotopic compositions were determined over 10 analytical sessions using the University of Melbourne Nu Instruments Nu Plasma multi-collector ICPMS coupled to a ArF

λ = 193 nm eximer 'HelEx' laser ablation system following methods described by Woodhead *et al.* (2004). The laser was focused to a 55 or 71 µm diameter circular spot firing at 5 Hz with an energy density at the sample surface of ~5 J/cm^2. ^{171}Yb, ^{173}Yb, ^{175}Lu, ^{176}Lu, ^{176}Yb, ^{176}Hf, ^{177}Hf, ^{178}Hf, ^{179}Hf and ^{180}Hf isotopes were simultaneously measured in static-collection mode on H3 to L4 Faraday cups with 10^{11} Ω resistors. A large zircon crystal from the Monastery kimberlite was used to tune the mass spectrometer to optimum sensitivity. Analysis of a 30 second gas blank and a suite of secondary reference zircons Monastery (n = 25), BR266 (n = 34), 91500 (n = 50) and Temora-2 (n = 44) from Woodhead & Hergt (2005) was systematically performed after every 10 to 12 samples. Data was acquired in integrations over 100 seconds, but time slices were later cropped to ~55 second periods maintaining steady ^{176}Hf/^{177}Hf signals during data reduction using Iolite software version 1.04b (Paton *et al.* 2011). Amplifier gains were calibrated at the start of each day. Total Hf signal intensity ranged from 10 to 3 volts for a single analysis.

The measured ^{178}Hf/^{177}Hf, ^{176}Lu/^{177}Hf and ^{176}Hf/^{177}Hf ratios with 2se uncertainties for each of the 153 reference zircon and 185 sample zircon analyses are presented in Online resources 3 and 6 respectively. No corrections were applied to the data to normalize the measured ^{176}Hf/^{177}Hf ratios to published solution values. Mass bias was corrected using an exponential law (Russell *et al.* 1978; Chu *et al.* 2002; Woodhead *et al.* 2004) and a composition for ^{179}Hf/^{177}Hf of 0.7325 (Patchett *et al.* 1981). As a quality check of this procedure ^{178}Hf/^{177}Hf ratios for all zircon reference materials and samples are reported (n = 338). A mean value of 1.467540 ± 176 (2σ) lies within uncertainty of values published by Thirlwall & Anczkiewicz (2004). Yb and Lu mass bias factors were assumed to be identical and normalized a known ^{173}Yb/^{171}Yb ratio using an exponential correction. The intensity of the ^{176}Hf peak was accurately determined by removing isobaric interferences of ^{176}Lu and ^{176}Yb. The concentrations of Lu and Yb interferences occurring at mass 176 for each analysis are given in Online resources 3 and 6. Zircon ^{176}Lu/^{177}Hf ratios were accurately determined to enable corrections for in-growth of radiogenic ^{176}Hf and assess for elemental fractionation. Average measured ^{176}Lu/^{177}Hf ratios within reference zircon (Monastery, 0.000007 ± 6; BR266, 0.000266 ± 10; 91500, 0.000344 ± 19; Temora-2, 0.001090 ± 591) are in good agreement with the solution values reported by Woodhead & Hergt (2005) of 0.000009, 0.000217, 0.000311 and 0.001090 respectively and provide no indication of elemental bias. The range of ^{176}Lu/^{177}Hf measured in the reference zircons brackets that measured for the zircon samples. The mean ^{176}Hf/^{177}Hf ratios for the four reference zircons (Monastery: 0.282692 ±

46; BR226: 0.281617 ± 54; 91500: 0.281301 ± 65; Temora-2: 0.282648 ± 47, 2σ) all lie within uncertainty of the published solution values of Woodhead and Hergt (2005) deviating by -1.6 ± 1.6, -0.5 ± 1.9, -0.2 ± 2.3 and -1.3 ± 1.6 ε_{Hf} units respectively (2σ, Online resource 3).

For the unknown zircons, initial $^{176}Hf/^{177}Hf$ ratios for each spot were calculated using their individual SHRIMP measured $^{206}Pb/^{238}U$ or $^{207}Pb/^{206}Pb$ ages (Hiess *et al.* 2010), present day CHUR compositions of $^{176}Hf/^{177}Hf$ = 0.282785 ± 11, $^{176}Lu/^{177}Hf$ = 0.0336 ± 1 (Bouvier *et al.* 2008), and a $\lambda^{176}Lu$ decay constant of $1.867 \pm 8 \times 10^{-11}$ y^{-1} (Scherer *et al.* 2001; Söderlund *et al.* 2004). A mean hafnium isotopic composition was determined for each of the eight orthogneiss samples and corresponds exclusively to the grain analyses from which weighted mean age (Hiess *et al.* 2010) and mean oxygen isotopic determinations were calculated. The mean's 1σ uncertainty was calculated by summing in quadrature one standard deviation of the pooled population, with 1.9 ε_{Hf} units, which represents the long-term reproducibility of all four reference zircons (Monastery, BR226, 91500 and Temora-2) made during the study.

REFERNCES

Baertschi, P. 1976. Absolute ^{18}O content of Standard Mean Ocean Water. *Earth and Planetary Science Letters,* **31**, 341-344.

Benninghoven, A., Rüdenauer, F. G. & Werner, H. W. 1987. *Secondary Ion Mass Spectrometry: Basic Concepts, Instrumental Aspects, Applications and Trends.* Wiley, Hoboken, N. J., p. 1227.

Bouvier, A., Vervoort, J. D. & Patchett, P. J. 2008. The Lu–Hf and Sm–Nd isotopic composition of CHUR: Constraints from unequilibrated chondrites and implications for the bulk composition of terrestrial planets. *Earth and Planetary Science Letters,* **273**, 48-57.

Chu, N.-C., Taylor, R. N., Chavagnac, V., Nesbitt, R. W., Boella, R. M., Milton, J. A., German, C. R., Bayon, G. & Burton, K. 2002. Hf isotope ratio analysis using multi-collector inductively coupled plasma mass spectrometry: an evaluation of isobaric interference corrections. *Journal of Analytical Atomic Spectrometry,* **17**, 1567-1574.

Hiess, J., Bennett, V. C., Nutman, A. P. & Williams, I. S. 2009. In situ U-Pb, O and Hf isotopic compositions of zircon and olivine from Eoarchaean rocks, West Greenland: New insights to making old crust. *Geochimica et Cosmochimica Acta,* **73**, 4489-4516.

Hiess, J., Ireland, T. & Rattenbury, M. 2010. U-Th-Pb zircon and monazite geochronology of Western Province gneissic rocks, central-south Westland, New Zealand. *New Zealand Journal of Geology and Geophysics,* **53**, 241-269.

Hiess, J., Bennett, V., Nutman, A. & Williams, I. 2011. Archaean fluid-assisted crustal cannibalism recorded by low $\delta^{18}O$ and negative $\varepsilon_{Hf(T)}$ isotopic signatures of West Greenland granite zircon. *Contributions to Mineralogy and Petrology,* **161**, 1027-1050.

Hoskin, P. W. O. 1998. Minor and trace elemental analysis of natural zircon ($ZrSiO_4$) by SIMS and laser ablation ICPMS: A consideration and comparison of two broadly competitive techniques. *Journal of Trace and Microprobe Techniques,* **16**, 301-326.

Ickert, R. B., Hiess, J., Williams, I. S., Holden, P., Ireland, T. R., Lanc, P., Schram, N., Foster, J. J. & Clement, S. W. 2008. Determining high precision, in situ, oxygen isotope ratios with a SHRIMP II: Analyses of MPI-DING silicate-glass reference materials and zircon from contrasting granites. *Chemical Geology,* **257**, 114-128.

McDonough, W. F. & Sun, S. S. 1995. The composition of the Earth. *Chemical Geology*, **120**, 223-253.

Patchett, P. J., Kouvo, O., Hedge, C. E. & Tatsumoto, M. 1981. Evolution of continental crust and mantle heterogeneity: evidence from Hf isotopes. *Contributions to Mineralogy and Petrology,* **78**, 279-297.

Paton, C., Hellstrom, J., Paul, B., Woodhead, J. & Hergt, J. 2011. Iolite: Freeware for the visualisation and processing of mass spectrometric data. *Journal of Analytical Atomic Spectrometry,* **26**, 2508-2518.

Pearce, N. J. G., Perkins, W. T., Westgate, J. A., Gorton, M. P., Jackson, S. E., Neal, C. R. & Chenery, S. P. 1997. A compilation of new and published major and trace element data for NIST SRM 610 and NIST SRM 612 glass reference materials. *Geostandards Newsletter,* **21**, 115-144.

Russell, W. A., Papanastassiou, D. A. & Tombrello, T. A. 1978. Ca isotope fractionation on the Earth and other solar system materials. *Geochimica et Cosmochimica Acta,* **42**, 1075-1090.

Scherer, E., Münker, C. & Mezger, K. 2001. Calibration of the Lutetium-Hafnium Clock. *Science,* **293**, 683-687.

Söderlund, U., Patchett, P. J., Vervoort, J. D. & Isachsen, C. E. 2004. The ^{176}Lu decay constant determined by Lu-Hf and U-Pb isotope systematics of Precambrian mafic intrusions. *Earth and Planetary Science Letters,* **219**, 311-324.

Thirlwall, M. F. & Anczkiewicz, R. 2004. Multidynamic isotope ratio analysis using MC–ICP–MS and the causes of secular drift in Hf, Nd and Pb isotope ratios. *International Journal of Mass Spectrometry,* **235**, 59-81.

Trail, D., Mojzsis, S. J., Harrison, T. M., Schmitt, A. K., Watson, E. B. & Young, E. D. 2007. Constraints on Hadean zircon protoliths from oxygen isotopes, Ti-thermometry, and rare earth elements. *Geochemistry Geophysics Geosystems,* **8, Q06014**, doi:10.1029/2006GC001449.

Woodhead, J. & Hergt, J. 2005. A Preliminary Appraisal of Seven Natural Zircon Reference Materials for *In Situ* Hf Isotope Determination. *Geostandards and Geoanalytical Research,* **29**, 183-195.

Woodhead, J., Hergt, J., Shelley, M., Eggins, S. & Kemp, R. 2004. Zircon Hf-isotope analysis with an excimer laser, depth profiling, ablation of complex geometries, and concomitant age estimation. *Chemical Geology,* **209**, 121-135.

Online resource 2
Reference material O analysis details

Spot	Session	[1] $^{18}O/^{16}O$ Meas.	WS err 1sd (‰)	[2] $\delta^{18}O_{VSMOW}$ (‰)	STS err 1sd (‰)
FC1-7.1	1	0.0020313	0.2	5.0	0.6
FC1-8.1	1	0.0020313	0.3	5.0	0.6
FC1-9.1	1	0.0020326	0.5	5.6	0.6
FC1-10.1	1	0.0020343	0.3	6.5	0.6
FC1-13.1	1	0.0020305	0.3	4.6	0.6
FC1-7.2	1	0.0020314	0.3	5.0	0.6
FC1-10.2	1	0.0020327	0.2	5.7	0.6
Mean	**n = 7**	**0.0020320**	**0.3**	**5.3**	**0.6**
FC1-3.2	2	0.0020361	0.3	5.6	0.8
FC1-14.2	2	0.0020368	0.2	6.0	0.8
FC1-14.3	2	0.0020337	0.3	4.4	0.8
Mean	**n = 3**	**0.0020355**	**0.3**	**5.3**	**0.8**
FC1-13.2	3	0.0020323	0.2	5.3	0.8
FC1-13.2	3	0.0020308	0.3	4.6	0.8
FC1-13.4	3	0.0020340	0.3	6.2	0.8
Mean	**n = 3**	**0.0020324**	**0.3**	**5.3**	**0.8**
FC1-15.1	4	0.0020353	0.2	4.6	0.7
FC1-15.2	4	0.0020379	0.2	5.9	0.7
FC1-15.3	4	0.0020361	0.4	5.0	0.7
FC1-15.4	4	0.0020379	0.2	5.9	0.7
Mean	**n = 4**	**0.0020368**	**0.3**	**5.3**	**0.7**
FC1-16.1	5	0.0020333	0.3	4.7	0.7
FC1-16.2	5	0.0020340	0.4	5.0	0.7
FC1-16.3	5	0.0020371	0.3	6.5	0.7
FC1-17.1	5	0.0020348	0.3	5.4	0.7
FC1-17.2	5	0.0020340	0.2	5.0	0.7
Mean	**n = 5**	**0.0020346**	**0.3**	**5.3**	**0.7**
FC1-18.2	6	0.0020463	0.3	5.6	0.7
FC1-18.3	6	0.0020480	0.4	6.4	0.7
FC1-19.1	6	0.0020453	0.5	5.1	0.7
FC1-19.2	6	0.0020441	0.3	4.5	0.7
FC1-20.1	6	0.0020447	0.2	4.8	0.7
FC1-20.2	6	0.0020469	0.3	5.9	0.7
FC1-20.3	6	0.0020455	0.3	5.2	0.7
Mean	**n = 7**	**0.0020458**	**0.3**	**5.3**	**0.7**
FC1-21.2	7	0.0020351	0.3	4.6	0.7
FC1-9.3	7	0.0020369	0.2	5.5	0.7
FC1-8.2	7	0.0020378	0.5	5.9	0.7
Mean	**n = 3**	**0.0020366**	**0.3**	**5.3**	**0.7**
FC1-4.1	8	0.0020370	0.3	5.3	0.6
FC1-6.1	8	0.0020351	0.2	4.3	0.6
FC1-7.1	8	0.0020384	0.4	6.0	0.6
FC1-7.2	8	0.0020365	0.2	5.0	0.6
FC1-6.2	8	0.0020387	0.4	6.1	0.6

FC1-8.1	8	0.0020375	0.3	5.5	0.6
FC1-9.1	8	0.0020373	0.2	5.4	0.6
FC1-10.1	8	0.0020363	0.3	4.9	0.6
FC1-9.2	8	0.0020368	0.2	5.2	0.6
FC1-12.1	8	0.0020365	0.4	5.0	0.6
FC1-4.3	8	0.0020353	0.2	4.4	0.6
FC1-13.1	8	0.0020373	0.5	5.4	0.6
FC1-13.2	8	0.0020361	0.3	4.8	0.6
FC1-14.1	8	0.0020357	0.4	4.6	0.6
FC1-15.1	8	0.0020387	0.4	6.1	0.6
FC1-16.1	8	0.0020390	0.3	6.3	0.6
FC1-17.1	8	0.0020390	0.4	6.3	0.6
FC1-18.1	8	0.0020381	0.3	5.8	0.6
FC1-19.1	8	0.0020364	0.3	5.0	0.6
Mean	**n = 19**	**0.0020371**	**0.3**	**5.3**	**0.6**

[1] = Measured $^{18}O/^{16}O$ corrected for background

[2] = $[^{18}O/^{16}O_{reference\ measured} / (^{18}O/^{16}O_{mean\ reference\ measured} / {}^{18}O/^{16}O_{reference\ true})$ - VSMOW] × 1000 / VSMOW

VSMOW: $^{18}O/^{16}O$ = 0.0020052 (Baertschi 1976)

Online resource 3
Reference material Hf analysis details

Spot	Session	Size (µm)	$^{178}Hf/^{177}Hf$	[1] err 2se	Lu on 176 (ppm)	err 2se	Yb on 176 (ppm)	err 2se	Total Hf (V)	err 2se	$^{176}Lu/^{177}Hf$ Meas.	[1] err 2se	$^{176}Hf/^{177}Hf$ Meas.	[1] err 2se	**[2] ε_{HF} Ref.**	**err 2se**
Monastery																
A-1.1	2	71	1.467525	91	46	1	2174	65	9.29	0.10	0.000013	0	0.282736	55	**-0.1**	**1.9**
A-2.1	2	71	1.467583	75	47	1	2151	67	9.66	0.10	0.000013	0	0.282724	40	**-0.5**	**1.4**
A-3.1	2	71	1.467545	80	45	1	2125	63	9.57	0.10	0.000013	0	0.282735	45	**-0.1**	**1.6**
A-5.1	2	71	1.467567	147	11	2	715	157	10.15	0.08	0.000003	0	0.282655	96	**-2.9**	**3.4**
A-7.1	2	71	1.467531	76	22	1	1177	84	8.87	0.10	0.000006	0	0.282676	52	**-2.2**	**1.8**
A-8.1	2	71	1.467585	83	20	1	1051	71	9.07	0.11	0.000006	0	0.282693	50	**-1.6**	**1.8**
A-9.1	2	71	1.467547	81	19	1	985	65	9.09	0.11	0.000005	0	0.282656	44	**-2.9**	**1.6**
C-8.1	4	55	1.467570	107	42	2	2069	128	4.88	0.06	0.000012	1	0.282685	65	**-1.9**	**2.3**
C-9.1	4	55	1.467576	97	42	2	2009	115	5.17	0.06	0.000012	1	0.282708	63	**-1.1**	**2.2**
D-4.1	5	55	1.467527	73	45	1	2166	89	6.53	0.09	0.000013	0	0.282671	46	**-2.4**	**1.6**
F-1.1	7	71	1.467631	68	17	1	884	70	9.90	0.11	0.000005	0	0.282691	39	**-1.7**	**1.4**
F-2.1	7	71	1.467672	64	11	1	749	95	10.05	0.12	0.000003	0	0.282670	45	**-2.4**	**1.6**
F-1.1	8	71	1.467648	66	20	1	977	57	9.82	0.08	0.000006	0	0.282695	39	**-1.5**	**1.4**
F-2.1	8	71	1.467673	59	21	1	1014	65	10.07	0.13	0.000006	0	0.282703	39	**-1.2**	**1.4**
F-4.1	8	71	1.467586	69	21	1	1063	76	8.49	0.08	0.000006	0	0.282697	43	**-1.5**	**1.5**
G-1.1	9	71	1.467662	64	22	1	1144	75	9.92	0.11	0.000006	0	0.282690	41	**-1.7**	**1.5**
G-2.1	9	71	1.467672	66	23	1	1144	67	10.06	0.10	0.000007	0	0.282697	40	**-1.5**	**1.4**
G-3.1	9	71	1.467680	61	22	1	1116	62	10.12	0.12	0.000006	0	0.282693	37	**-1.6**	**1.3**
G-4.1	9	71	1.467648	65	21	1	1104	75	9.15	0.12	0.000006	0	0.282714	43	**-0.9**	**1.5**
G-5.1	9	71	1.467633	55	21	1	1138	88	9.33	0.11	0.000006	0	0.282666	44	**-2.5**	**1.6**
G-6.1	9	71	1.467665	67	22	1	1066	66	9.33	0.11	0.000006	0	0.282707	39	**-1.1**	**1.4**
H-1.1	10	71	1.467727	71	20	1	1154	124	8.41	0.10	0.000006	0	0.282675	52	**-2.2**	**1.9**
H-2.1	10	71	1.467710	62	21	1	1064	84	8.57	0.09	0.000006	0	0.282718	43	**-0.7**	**1.5**
H-3.1	10	71	1.467604	77	21	1	1055	71	8.54	0.10	0.000006	0	0.282660	54	**-2.8**	**1.9**
H-4.1	10	71	1.467624	61	21	1	1055	79	8.44	0.10	0.000006	0	0.282692	39	**-1.6**	**1.4**
Mean ± 2sd n = 25											**0.000007**	**6**	**0.282692**	**46**	**-1.6**	**1.6**
Woodhead and Hergt (2005) solution mean ± 2σ											**0.000009**		**0.282738**	**8**		
Woodhead and Hergt (2005) laser ablation mean ± 2σ													**0.282739**	**26**		
266																
T-1.1	1	71	1.467380	89	803	2	33103	128	5.93	0.07	0.000234	0	0.281616	52	**-0.5**	**1.9**

T-2.1	1	71	1.467463	90	803	1	32692	148	6.06	0.06	0.000234	0	0.281581	53	**-1.7**	**1.9**
T-3.1	1	71	1.467462	88	802	1	32860	154	6.24	0.05	0.000234	0	0.281600	60	**-1.1**	**2.1**
T-4.1	1	71	1.467510	77	811	1	32769	117	6.59	0.07	0.000236	0	0.281590	48	**-1.4**	**1.7**
T-5.1	1	71	1.467475	84	804	1	32221	116	6.50	0.08	0.000234	0	0.281614	51	**-0.6**	**1.8**
T-6.1	1	71	1.467418	74	803	1	31956	138	6.36	0.06	0.000234	0	0.281598	51	**-1.1**	**1.8**
T-7.1	1	71	1.467494	72	808	1	32283	115	6.58	0.08	0.000235	0	0.281680	47	**1.8**	**1.7**
A-1.1	2	71	1.467606	90	777	2	31174	121	5.68	0.07	0.000226	0	0.281650	60	**0.7**	**2.1**
A-2.1	2	71	1.467518	109	773	2	30673	178	5.89	0.03	0.000225	1	0.281619	61	**-0.4**	**2.2**
A-3.1	2	71	1.467448	100	770	2	30735	212	5.59	0.04	0.000224	1	0.281598	60	**-1.1**	**2.1**
A-4.1	2	71	1.467481	88	771	2	31139	221	5.64	0.04	0.000224	1	0.281593	57	**-1.3**	**2.0**
A-5.1	2	71	1.467513	91	782	1	30749	117	6.21	0.07	0.000228	0	0.281615	54	**-0.5**	**1.9**
B-1.1	3	55	1.467519	118	760	3	29454	246	3.49	0.03	0.000221	1	0.281615	93	**-0.5**	**3.3**
B-2.1	3	55	1.467524	116	758	2	29358	251	3.49	0.03	0.000220	1	0.281574	83	**-2.0**	**2.9**
B-3.1	3	55	1.467478	123	761	2	29493	241	3.46	0.03	0.000221	1	0.281614	85	**-0.6**	**3.0**
B-4.1	3	55	1.467578	117	764	3	29587	215	3.53	0.05	0.000222	1	0.281614	86	**-0.6**	**3.1**
B-5.1	3	55	1.467598	122	760	3	29247	206	3.44	0.04	0.000221	1	0.281604	89	**-0.9**	**3.2**
C-1.1	4	55	1.467558	104	760	2	29103	222	3.46	0.03	0.000220	1	0.281611	77	**-0.7**	**2.7**
C-2.1	4	55	1.467502	114	766	3	29370	211	3.26	0.03	0.000222	1	0.281578	77	**-1.8**	**2.7**
C-3.1	4	55	1.467562	116	764	2	29041	207	3.48	0.05	0.000221	1	0.281614	78	**-0.6**	**2.8**
C-4.1	4	55	1.467566	125	768	2	29364	209	3.54	0.05	0.000223	1	0.281609	86	**-0.7**	**3.0**
C-5.1	4	55	1.467597	121	763	3	29045	205	3.49	0.04	0.000221	1	0.281617	84	**-0.5**	**3.0**
D-1.1	5	55	1.467449	84	782	2	30807	169	4.39	0.06	0.000227	1	0.281608	57	**-0.8**	**2.0**
D-2.1	5	55	1.467548	88	787	2	30976	177	4.30	0.06	0.000229	1	0.281612	57	**-0.6**	**2.0**
D-6.1	5	55	1.467488	97	777	2	30960	210	3.93	0.05	0.000226	1	0.281594	65	**-1.3**	**2.3**
D-8.1	5	55	1.467538	100	775	2	30142	202	4.01	0.04	0.000225	1	0.281609	67	**-0.7**	**2.4**
E-1.1	6	55	1.467584	93	769	2	29953	205	3.92	0.05	0.000224	1	0.281603	71	**-1.0**	**2.5**
E-2.1	6	55	1.467600	99	773	2	29897	190	3.94	0.06	0.000225	1	0.281624	71	**-0.2**	**2.5**
E-3.1	6	55	1.467646	93	771	2	29843	201	4.04	0.06	0.000224	1	0.281687	68	**2.0**	**2.4**
F-1.1	7	71	1.467562	73	779	2	31138	138	5.96	0.07	0.000227	1	0.281658	49	**1.0**	**1.8**
F-2.1	7	71	1.467606	73	776	1	30096	106	6.70	0.11	0.000225	0	0.281641	42	**0.4**	**1.5**
F-1.1	8	71	1.467625	75	775	2	31348	128	5.82	0.05	0.000226	0	0.281644	49	**0.5**	**1.7**
F-2.1	8	71	1.467686	85	778	1	31286	117	5.90	0.07	0.000226	0	0.281644	55	**0.5**	**1.9**
F-3.1	8	71	1.467632	67	770	1	30125	138	6.49	0.07	0.000224	0	0.281656	43	**0.9**	**1.5**
Mean ± 2sd n = 34											**0.000226**	**10**	**0.281617**	**54**	**-0.5**	**1.9**
Woodhead and Hergt (2005) solution mean ± 2σ											**0.000217**		**0.281630**	**10**		
Woodhead and Hergt (2005) laser ablation mean ± 2σ													**0.281624**	**24**		

91500

T-1.1	1	71	1.467478	92	1221	3	45802	133	4.65	0.05	0.000361	1	0.282324	69	**0.6**	**2.4**

T-2.1	1	71	1.467468	96	1213	2	46001	208	4.49	0.05	0.000359	1	0.282323	66	**0.6**	**2.3**
T-3.1	1	71	1.467475	106	1218	3	46361	236	4.47	0.04	0.000361	1	0.282344	82	**1.3**	**2.9**
T-4.1	1	71	1.467457	99	1210	3	46556	257	4.35	0.03	0.000359	1	0.282360	68	**1.9**	**2.4**
T-5.1	1	71	1.467588	107	1206	3	46389	225	4.20	0.05	0.000357	1	0.282360	75	**1.9**	**2.7**
T-6.1	1	71	1.467370	105	1230	3	47315	205	4.10	0.05	0.000365	1	0.282311	74	**0.2**	**2.6**
T-7.1	1	71	1.467478	112	1217	2	46479	204	4.27	0.04	0.000361	1	0.282293	84	**-0.5**	**3.0**
T-8.1	1	71	1.467515	103	1207	2	45757	208	4.40	0.04	0.000358	1	0.282356	74	**1.8**	**2.6**
T-9.1	1	71	1.467550	125	1215	3	44597	184	3.30	0.03	0.000359	1	0.282338	94	**1.1**	**3.3**
A-1.1	2	71	1.467468	119	1171	3	42882	164	4.14	0.04	0.000346	1	0.282242	83	**-2.3**	**2.9**
A-2.1	2	71	1.467584	112	1149	2	42655	211	4.06	0.03	0.000339	1	0.282256	73	**-1.8**	**2.6**
A-3.1	2	71	1.467557	110	1152	3	43141	274	4.06	0.03	0.000340	1	0.282257	78	**-1.7**	**2.7**
A-4.1	2	71	1.467543	121	1194	4	43778	192	4.18	0.05	0.000353	1	0.282278	73	**-1.0**	**2.6**
A-5.1	2	71	1.467530	113	1193	3	43785	264	4.12	0.05	0.000353	1	0.282293	72	**-0.5**	**2.6**
B-1.1	3	55	1.467543	156	1162	3	41384	283	2.64	0.04	0.000343	1	0.282247	113	**-2.1**	**4.0**
B-2.1	3	55	1.467562	147	1156	3	41227	300	2.56	0.03	0.000341	1	0.282300	109	**-0.2**	**3.8**
B-3.1	3	55	1.467458	134	1153	4	41057	277	2.56	0.03	0.000340	1	0.282266	104	**-1.4**	**3.7**
B-4.1	3	55	1.467552	141	1152	4	41004	257	2.55	0.03	0.000340	1	0.282260	102	**-1.6**	**3.6**
C-1.1	4	55	1.467606	127	1146	4	40779	257	2.61	0.04	0.000338	1	0.282306	101	**0.0**	**3.6**
C-2.1	4	55	1.467640	120	1136	3	40528	239	2.63	0.04	0.000335	1	0.282317	95	**0.4**	**3.4**
C-3.1	4	55	1.467563	131	1142	3	40387	253	2.56	0.04	0.000336	1	0.282286	96	**-0.7**	**3.4**
C-4.1	4	55	1.467629	136	1133	4	40237	273	2.57	0.04	0.000333	1	0.282336	101	**1.1**	**3.6**
C-5.1	4	55	1.467659	154	1160	3	41407	294	2.55	0.04	0.000342	1	0.282315	117	**0.3**	**4.1**
D-1.1	5	55	1.467446	117	1182	3	43008	235	3.15	0.05	0.000349	1	0.282312	79	**0.2**	**2.8**
D-2.1	5	55	1.467548	111	1170	3	42410	220	3.12	0.05	0.000345	1	0.282307	71	**0.0**	**2.5**
D-4.1	5	55	1.467516	120	1180	3	43626	239	2.96	0.04	0.000349	1	0.282258	83	**-1.7**	**2.9**
D-6.1	5	55	1.467554	116	1160	3	42158	267	2.97	0.04	0.000342	1	0.282265	86	**-1.5**	**3.1**
D-7.1	5	55	1.467493	108	1179	4	42615	247	2.96	0.04	0.000348	1	0.282276	76	**-1.1**	**2.7**
D-8.1	5	55	1.467494	116	1179	3	42982	240	2.93	0.05	0.000348	1	0.282273	86	**-1.2**	**3.1**
E-1.1	6	55	1.467455	135	1104	3	39987	229	2.88	0.04	0.000325	1	0.282291	94	**-0.5**	**3.3**
E-2.1	6	55	1.467655	119	1099	3	39641	248	2.91	0.04	0.000323	1	0.282365	88	**2.1**	**3.1**
E-3.1	6	55	1.467490	138	1098	3	39814	264	2.91	0.03	0.000323	1	0.282320	105	**0.5**	**3.7**
F-1.1	7	71	1.467642	88	1157	2	42729	179	4.74	0.05	0.000342	1	0.282286	57	**-0.7**	**2.0**
F-1.1	7	71	1.467528	98	1164	3	41164	170	3.36	0.02	0.000343	1	0.282368	74	**2.2**	**2.6**
F-2.1	7	71	1.467652	77	1157	2	42845	180	4.70	0.06	0.000342	1	0.282305	56	**0.0**	**2.0**
F-1.1	8	71	1.467674	85	1139	2	42501	181	4.45	0.07	0.000336	1	0.282300	52	**-0.2**	**1.9**
F-2.1	8	71	1.467637	94	1158	2	43173	176	4.55	0.06	0.000342	1	0.282331	60	**0.9**	**2.1**
F-3.1	8	71	1.467597	84	1168	2	43897	208	4.45	0.04	0.000345	1	0.282301	58	**-0.2**	**2.1**
F-4.1	8	71	1.467595	89	1151	2	43343	184	4.40	0.05	0.000340	1	0.282327	64	**0.8**	**2.3**
G-1.1	9	71	1.467707	100	1151	2	43618	191	4.49	0.04	0.000340	1	0.282303	69	**-0.1**	**2.5**

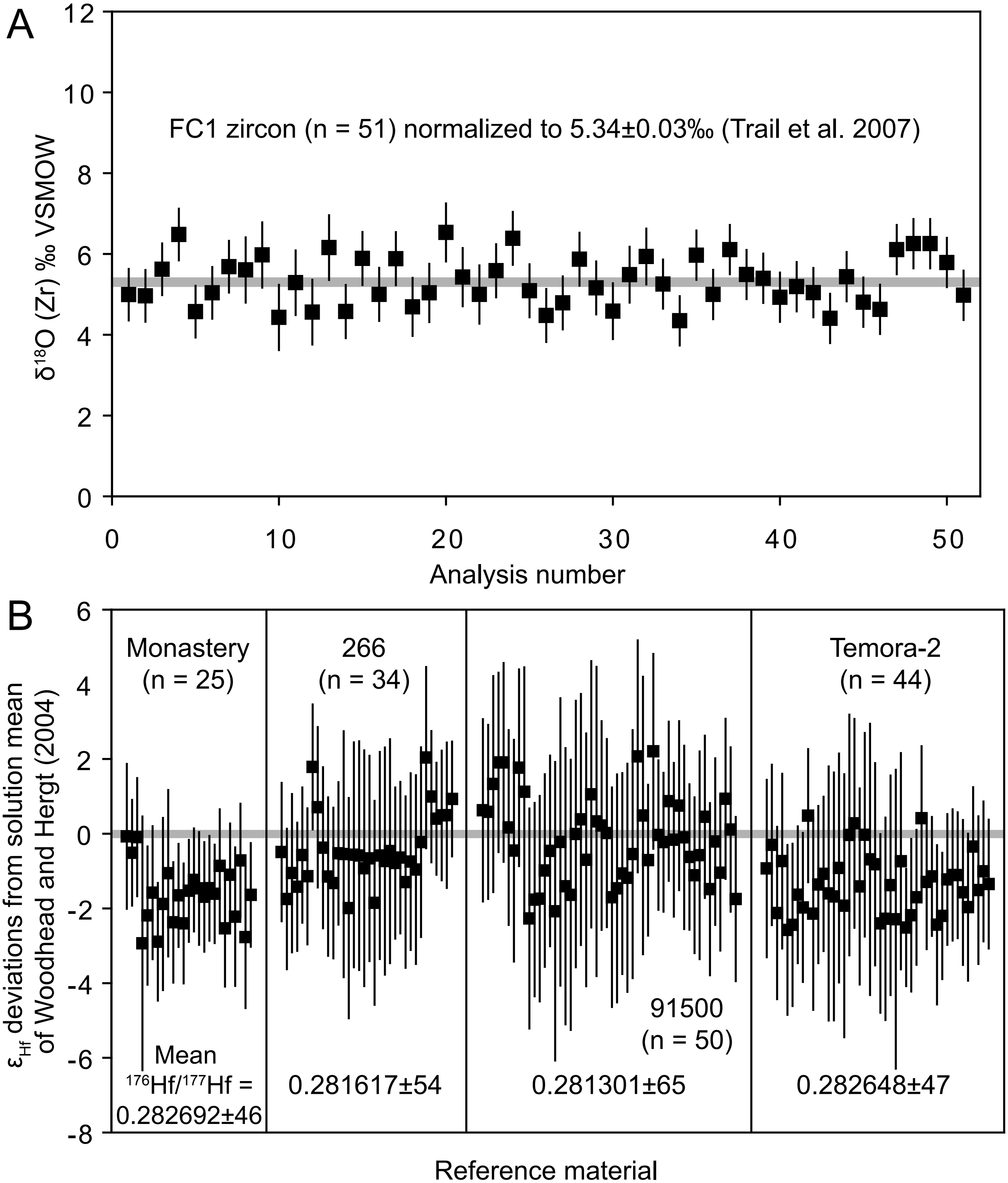
G-2.1	9	71	1.467683	85	1155	2	43619	216	4.60	0.04	0.000341	1	0.282288	55	**-0.6**	**1.9**
G-3.1	9	71	1.467602	86	1149	2	43161	210	4.68	0.04	0.000339	1	0.282275	59	**-1.1**	**2.1**
G-4.1	9	71	1.467633	115	1153	2	43449	211	4.14	0.04	0.000341	1	0.282290	78	**-0.6**	**2.8**
G-5.1	9	71	1.467641	84	1163	2	43895	210	4.06	0.03	0.000344	1	0.282319	61	**0.5**	**2.2**
G-6.1	9	71	1.467673	86	1147	2	43160	202	4.07	0.05	0.000339	1	0.282264	65	**-1.5**	**2.3**
H-1.1	10	71	1.467696	84	1149	3	42128	220	4.07	0.05	0.000339	1	0.282300	63	**-0.2**	**2.2**
H-2.1	10	71	1.467674	86	1145	3	42061	149	4.10	0.06	0.000338	1	0.282277	59	**-1.0**	**2.1**
H-3.1	10	71	1.467606	87	1153	3	42001	259	4.07	0.04	0.000340	1	0.282332	61	**0.9**	**2.1**
H-4.1	10	71	1.467718	82	1145	2	42750	196	4.06	0.05	0.000338	1	0.282309	62	**0.1**	**2.2**
H-5.1	10	71	1.467733	88	1141	3	42088	166	3.97	0.06	0.000336	1	0.282257	62	**-1.7**	**2.2**
Mean ± 2sd n = 50											**0.000344**	**19**	**0.282301**	**65**	**-0.2**	**2.3**
Woodhead and Hergt (2005) solution mean ± 2σ											**0.000311**		**0.282306**	**8**		
Woodhead and Hergt (2005) laser ablation mean ± 2σ													**0.282296**	**28**		
Temora-2																
T-1.1	1	71	1.467375	116	3707	11	154122	827	5.10	0.04	0.001246	2	0.282660	67	**-0.9**	**2.4**
T-2.1	1	71	1.467418	91	5162	5	204217	463	5.88	0.05	0.001845	1	0.282678	61	**-0.3**	**2.1**
T-3.1	1	71	1.467357	86	3719	12	147544	653	5.77	0.05	0.001239	3	0.282626	65	**-2.1**	**2.3**
T-4.1	1	71	1.467342	100	3898	2	148631	887	5.19	0.07	0.001301	1	0.282665	66	**-0.7**	**2.3**
T-5.1	1	71	1.467398	100	3681	7	142372	633	6.08	0.08	0.001217	3	0.282613	64	**-2.6**	**2.3**
T-7.1	1	71	1.467390	86	3067	22	119084	343	5.47	0.02	0.000987	7	0.282617	61	**-2.4**	**2.2**
T-8.1	1	71	1.467427	83	2298	5	81488	163	6.51	0.04	0.000708	2	0.282640	52	**-1.6**	**1.8**
T-9.1	1	71	1.467453	80	2274	7	83184	615	6.01	0.03	0.000703	3	0.282630	56	**-2.0**	**2.0**
T-10.1	1	71	1.467421	81	4140	8	157159	616	6.73	0.08	0.001396	4	0.282700	50	**0.5**	**1.8**
A-1.1	2	71	1.467428	108	3443	6	131074	1502	4.79	0.04	0.001129	4	0.282626	73	**-2.1**	**2.6**
A-2.1	2	71	1.467535	96	1852	2	65730	257	6.43	0.06	0.000561	1	0.282648	59	**-1.4**	**2.1**
A-5.1	2	71	1.467597	80	2839	36	100243	1707	6.20	0.06	0.000896	13	0.282656	58	**-1.1**	**2.1**
B-1.1	3	55	1.467523	150	3863	6	140669	994	2.97	0.03	0.001276	1	0.282641	96	**-1.6**	**3.4**
B-2.1	3	55	1.467515	137	3519	8	125030	1222	2.98	0.03	0.001141	4	0.282639	94	**-1.7**	**3.3**
B-4.1	3	55	1.467467	123	3641	8	137097	648	3.39	0.04	0.001195	2	0.282660	87	**-0.9**	**3.1**
B-5.1	3	55	1.467496	134	2762	15	95071	342	3.17	0.03	0.000865	4	0.282632	100	**-1.9**	**3.5**
C-1.1	4	55	1.467514	117	2215	34	78823	644	3.02	0.02	0.000682	11	0.282685	91	**0.0**	**3.2**
C-2.1	4	55	1.467614	114	2151	4	73749	412	3.45	0.04	0.000658	1	0.282694	79	**0.3**	**2.8**
C-3.1	4	55	1.467617	109	2383	24	83342	1098	3.51	0.05	0.000737	8	0.282646	74	**-1.4**	**2.6**
C-4.1	4	55	1.467508	110	4245	3	149236	526	3.71	0.05	0.001419	1	0.282685	77	**0.0**	**2.7**
C-5.1	4	55	1.467453	127	4342	42	163722	739	3.07	0.03	0.001476	16	0.282667	103	**-0.7**	**3.6**
D-3.1	5	55	1.467500	104	3876	54	129690	1380	4.18	0.05	0.001263	20	0.282663	77	**-0.8**	**2.7**
D-4.1	5	55	1.467427	96	2681	5	99703	593	4.38	0.06	0.000844	2	0.282618	68	**-2.4**	**2.4**
D-7.1	5	55	1.467517	101	3205	24	110064	1419	4.11	0.05	0.001022	9	0.282622	77	**-2.3**	**2.7**

E-1.1	6	55	1.467509	124	3120	18	105043	1332	3.44	0.03	0.000991	7	0.282647	83	**-1.4**	**2.9**
E-2.1	6	55	1.467416	148	3433	36	134604	513	3.08	0.03	0.001126	12	0.282621	113	**-2.3**	**4.0**
E-3.1	6	55	1.467488	102	4222	11	162785	790	3.60	0.04	0.001432	3	0.282665	82	**-0.7**	**2.9**
F-1.1	7	71	1.467538	69	3896	7	144995	723	6.64	0.05	0.001292	3	0.282615	44	**-2.5**	**1.6**
F-2.1	7	71	1.467488	84	4080	18	143418	863	5.82	0.08	0.001353	5	0.282624	58	**-2.2**	**2.0**
F-1.1	8	71	1.467566	70	1973	3	74046	559	6.00	0.05	0.000604	1	0.282638	51	**-1.7**	**1.8**
F-2.1	8	71	1.467603	82	3263	4	116168	576	6.62	0.10	0.001048	2	0.282698	55	**0.4**	**1.9**
F-3.1	8	71	1.467638	76	2263	4	80792	389	6.57	0.06	0.000697	1	0.282650	51	**-1.3**	**1.8**
F-4.1	8	71	1.467527	71	2895	6	105825	703	6.36	0.07	0.000918	3	0.282654	45	**-1.1**	**1.6**
G-1.1	9	71	1.467582	90	3811	12	143979	758	5.44	0.08	0.001266	4	0.282617	60	**-2.4**	**2.1**
G-2.1	9	71	1.467563	73	3349	3	128734	559	6.45	0.06	0.001091	1	0.282624	48	**-2.2**	**1.7**
G-3.1	9	71	1.467590	79	3895	6	155366	791	6.27	0.07	0.001310	3	0.282651	49	**-1.2**	**1.8**
G-4.1	9	71	1.467633	72	3705	6	138004	374	6.40	0.07	0.001219	2	0.282655	50	**-1.1**	**1.8**
G-5.1	9	71	1.467676	70	3827	7	131946	998	6.37	0.08	0.001252	4	0.282655	48	**-1.1**	**1.7**
G-6.1	9	71	1.467643	77	2798	4	103670	528	6.44	0.07	0.000885	2	0.282642	55	**-1.6**	**1.9**
H-1.1	10	71	1.467613	80	4239	3	158494	698	5.12	0.07	0.001431	1	0.282630	56	**-2.0**	**2.0**
H-2.1	10	71	1.467669	67	3178	3	112959	454	5.57	0.04	0.001016	1	0.282676	45	**-0.3**	**1.6**
H-3.1	10	71	1.467616	70	3761	14	129370	167	6.05	0.07	0.001226	5	0.282643	56	**-1.5**	**2.0**
H-4.1	10	71	1.467622	76	4385	13	150674	1375	5.80	0.06	0.001468	7	0.282658	53	**-1.0**	**1.9**
H-5.1	10	71	1.467626	69	1739	3	62846	170	5.86	0.06	0.000526	1	0.282648	49	**-1.3**	**1.7**
Mean ± 2sd n = 44											**0.001090**	**591**	**0.282648**	**47**	-1.3	1.6
Woodhead and Hergt (2005) solution mean ± 2σ											**0.001090**		**0.282686**	**8**		
Woodhead and Hergt (2005) laser ablation mean ± 2σ													**0.282680**	**22**		

[1] = × 10^{-6}

[2] = $({}^{176}Hf/{}^{177}Hf_{Measured} / {}^{176}Hf/{}^{177}Hf_{Reference\ solution\ mean} - 1) \times 10000$

Online resource 4
Reference material O and Hf analysis



Online resource 5
Sample O analysis details

Spot	[1] Age (Ma)	err 1sd	Session	[2] $^{18}O/^{16}O$ Meas.	WS err 1sd (‰)	[3] $\delta^{18}O_{VSMOW}$ (‰)	STS err 1sd (‰)

Mikonui River paragneiss A546 (43.03058°S, 170.89978°E, 329m)

[1] $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age: n = 30; $\delta^{18}O_{VSMOW}$: n = 19

Spot	Age (Ma)	err 1sd	Session	$^{18}O/^{16}O$ Meas.	WS err 1sd (‰)	$\delta^{18}O_{VSMOW}$ (‰)	STS err 1sd (‰)
1.1	375.7	8.1	8	0.0020484	0.3	10.9	0.6
2.1	585.8	12.5	8	0.0020459	0.3	9.7	0.6
3.1	1054.0	19.9	8	0.0020404	0.3	7.0	0.6
4.1	357.2	9.3	8	0.0020488	0.3	11.1	0.6
5.1	1283.0	17.6	8	0.0020418	0.2	7.6	0.6
6.1	514.3	14.6	8	0.0020414	0.2	7.5	0.6
7.1	603.6	13.4	8	0.0020419	0.1	7.7	0.6
9.1	586.9	20.7	8	0.0020475	0.3	10.5	0.6
10.1	400.7	8.8	8	0.0020459	0.3	9.7	0.6
11.1	1165.1	50.0	8	0.0020361	0.3	4.8	0.6
12.1	313.2	7.1	8	0.0020443	0.2	8.9	0.6
14.1	773.8	16.7	8	0.0020455	0.4	9.5	0.6
15.1	835.0	101.6	8	0.0020439	0.3	8.7	0.6
16.1	1045.9	51.4	8	0.0020391	0.2	6.3	0.6
17.1	388.7	8.7	8	0.0020419	0.1	7.7	0.6
18.1	738.0	213.0	8	0.0020369	0.3	5.2	0.6
19.1	512.2	11.3	8	0.0020431	0.4	8.3	0.6
20.1	1029.0	81.6	8	0.0020391	0.3	6.3	0.6
21.1	589.9	12.6	8	0.0020355	0.4	4.5	0.6

Clarke River paragneiss A550 (42.39943°S, 171.87749°E, 302m)

[1] $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age: n = 30; $\delta^{18}O_{VSMOW}$: n = 23

Spot	Age (Ma)	err 1sd	Session	$^{18}O/^{16}O$ Meas.	WS err 1sd (‰)	$\delta^{18}O_{VSMOW}$ (‰)	STS err 1sd (‰)
1.1	1064.7	9.5	5	0.0020416	0.4	8.8	0.7
2.1	1051.3	29.4	5	0.0020368	0.2	6.4	0.7
3.1	778.6	16.6	5	0.0020381	0.2	7.1	0.7
4.1	541.8	12.1	5	0.0020453	0.3	10.6	0.7
5.1	644.0	14.4	5	0.0020404	0.3	8.2	0.7
6.1	573.5	13.2	5	0.0020482	0.3	12.0	0.7
7.1	1440.3	13.3	5	0.0020413	0.3	8.6	0.7
8.1	726.9	15.6	5	0.0020441	0.3	10.0	0.7
9.1	360.9	8.1	5	0.0020495	0.4	12.7	0.7
10.1	481.6	10.5	5	0.0020398	0.3	7.9	0.7
12.1	918.2	81.2	5	0.0020396	0.4	7.8	0.7
13.1	785.1	10.9	5	0.0020385	0.2	7.3	0.7
14.1	977.5	39.1	5	0.0020384	0.2	7.2	0.7
15.1	685.7	9.3	5	0.0020400	0.2	8.0	0.7
16.1	1041.7	51.3	5	0.0020293	0.3	2.7	0.7
17.1	1793.9	16.7	5	0.0020374	0.1	6.7	0.7
18.1	355.7	5.0	5	0.0020451	0.2	10.5	0.7
19.1	583.6	8.2	5	0.0020321	0.3	4.1	0.7
20.1	653.7	11.3	5	0.0020346	0.3	5.3	0.7
21.1	569.6	8.4	5	0.0020485	0.5	12.2	0.7
22.1	453.0	11.0	5	0.0020356	0.3	5.8	0.7
23.1	484.2	7.0	5	0.0020416	0.3	8.8	0.7
25.1	656.7	10.8	5	0.0020395	0.3	7.7	0.7

Crooked River paragneiss A552 (42.65130°S, 171.61800°E, 174m)

[1] $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age: n = 34; $\delta^{18}O_{VSMOW}$: n = 23

1.1	495.1	11.1	6	0.0020521	0.3	8.4	0.7
2.1	2987.0	13.2	6	0.0020448	0.6	4.8	0.7
3.1	364.6	8.0	6	0.0020497	0.3	7.2	0.7
4.1	3348.0	46.9	6	0.0020395	0.3	2.2	0.7
5.1B	1518.7	140.1	6	0.0020388	0.3	1.9	0.7
6.1	431.7	9.4	6	0.0020508	0.2	7.8	0.7
7.1	560.4	12.0	6	0.0020504	0.3	7.6	0.7
8.1	361.9	9.4	6	0.0020544	0.3	9.5	0.7
9.1	1039.0	18.3	6	0.0020527	0.5	8.7	0.7
11.1	339.6	5.0	6	0.0020380	0.4	1.5	0.7
12.1	2458.4	27.7	6	0.0020410	0.4	3.0	0.7
13.1	717.4	148.9	6	0.0020473	0.2	6.1	0.7
14.1	476.2	8.0	6	0.0020488	0.5	6.8	0.7
15.1	1912.4	9.4	6	0.0020482	0.4	6.5	0.7
16.1	976.2	40.6	6	0.0020476	0.3	6.2	0.7
17.1	546.5	9.0	6	0.0020432	0.3	4.0	0.7
18.1	1015.1	88.9	6	0.0020477	0.2	6.2	0.7
19.1	528.7	15.2	6	0.0020431	0.3	4.0	0.7
20.1	1658.7	26.1	6	0.0020490	0.2	6.9	0.7
22.1	559.0	7.7	6	0.0020479	0.3	6.4	0.7
23.1	628.9	18.6	6	0.0020409	0.3	2.9	0.7
24.1	348.9	6.1	6	0.0020512	0.3	8.0	0.7
25.1	732.8	21.8	6	0.0020422	0.3	3.6	0.7

Crooked River paragneiss A553 (42.64860°S, 171.61440°E, 171m)

[1] $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age: n = 30; $\delta^{18}O_{VSMOW}$: n = 11

1.1	249.2	6.6	7	0.0020411	0.3	7.6	0.7
5.1	109.0	2.6	7	0.0020473	0.3	10.6	0.7
6.1	116.0	1.8	7	0.0020458	0.3	9.9	0.7
7.1	710.3	9.8	7	0.0020421	0.3	8.0	0.7
8.1	120.1	2.5	7	0.0020451	0.3	9.5	0.7
15.1	125.2	1.8	7	0.0020439	0.3	8.9	0.7
16.1	534.8	8.7	7	0.0020489	0.4	11.4	0.7
17.1	568.0	10.7	7	0.0020401	0.3	7.0	0.7
18.1	2101.9	44.1	7	0.0020387	0.2	6.4	0.7
21.1	354.0	8.4	7	0.0020394	0.2	6.7	0.7
23.1	116.4	2.0	7	0.0020454	0.3	9.7	0.7

Solitude Creek orthogneiss A548 (42.99129°S, 170.94165°E, 470m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 114.5 ± 2.0 Ma (95% c.l.), n = 11/15, MSWD = 1.2

[4] Mean $\delta^{18}O$ = 6.2 ± 0.7 ‰ (1sd), n = 5/6

1.1	**116.9**	**2.3**	8	0.0020388	0.3	**6.1**	**0.6**
2.1	106.8	2.0	8	0.0020388	0.3	6.2	0.6
3.1	**116.3**	**2.2**	8	0.0020401	0.3	**6.8**	**0.6**
4.1	**117.4**	**2.3**	8	0.0020391	0.2	**6.3**	**0.6**
6.1	**110.3**	**2.1**	8	0.0020386	0.3	**6.0**	**0.6**
7.1	**116.2**	**2.2**	8	0.0020382	0.3	**5.9**	**0.6**

Clarke River orthogneiss A549 (42.39921°S, 171.85563°E, 253m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 378.1 ± 6.8 Ma (95% c.l.), n = 13/16, MSWD = 1.2

[4] Mean $\delta^{18}O$ = 8.1 ± 1.3 ‰ (1sd), n = 8/11

1.1	**378.9**	**8.8**	1	0.0020381	0.3	**8.4**	**0.6**
2.1	**392.9**	**8.6**	1	0.0020407	0.2	**9.6**	**0.6**
3.1	**369.0**	**8.6**	1	0.0020400	0.2	**9.3**	**0.6**
4.1	**372.9**	**8.7**	1	0.0020351	0.2	**6.9**	**0.6**
5.1	**384.0**	**8.7**	1	0.0020364	0.3	**7.5**	**0.6**
6.1	**372.7**	**8.2**	1	0.0020357	0.3	**7.2**	**0.6**

7.1	343.7	8.5	1	0.0020406	0.4	9.6	0.6
8.1	**356.4**	**8.4**	1	0.0020353	0.3	**7.0**	**0.6**
9.1	455.0	9.9	1	0.0020397	0.3	9.2	0.6
10.1	467.7	10.1	1	0.0020329	0.2	5.8	0.6
11.1	**389.6**	**8.3**	1	0.0020387	0.3	**8.7**	**0.6**

Mt Elliot orthogneiss A551 (42.52570°S, 171.82040°E, 200m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 127.0 ± 6.9 Ma (95% c.l.), n = 7/15, MSWD = 5.1

[4] Mean $\delta^{18}O$ = 5.8 ± 0.9 ‰ (1sd), n = 2/6

1.1	358.6	7.9	2	0.0020444	0.4	9.7	0.8
2.1	**137.6**	**3.0**	2	0.0020370	0.2	**6.0**	**0.8**
3.1	496.2	11.2	2	0.0020373	0.3	6.2	0.8
5.1	327.4	7.2	2	0.0020415	0.3	8.3	0.8
7.1	147.6	3.2	2	0.0020373	0.2	6.2	0.8
9.1	**132.3**	**2.9**	2	0.0020359	0.3	**5.5**	**0.8**

Hokitika Gorge orthogneiss A554 (42.95660°S, 171.01540°E, 78m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 116.0 ± 2.3 Ma (95% c.l.), n = 14/15, MSWD = 1.8

[4] Mean $\delta^{18}O$ = 8.5 ± 0.9 ‰ (1sd), n = 5/6

3.1	**114.2**	**2.5**	3	0.0020389	0.2	**8.6**	**0.8**
5.1	370.0	7.9	3	0.0020398	0.2	9.0	0.8
7.1	**114.6**	**2.6**	3	0.0020387	0.2	**8.5**	**0.8**
8.1	**115.3**	**2.5**	3	0.0020397	0.2	**9.0**	**0.8**
9.1	**114.9**	**2.5**	3	0.0020385	0.4	**8.3**	**0.8**
10.1	**120.4**	**2.6**	3	0.0020378	0.2	**8.0**	**0.8**

Mikonui River orthogneiss A555 (43.03090°S, 170.89150°E, 300m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 114.2 ± 2.4 Ma (95% c.l.), n = 11/13, MSWD = 1.4

[4] Mean $\delta^{18}O$ = 6.0 ± 0.8 ‰ (1sd), n = 9/10

1.1	**111.9**	**2.6**	4	0.0020388	0.3	**6.3**	**0.7**
2.1	312.0	7.0	4	0.0020394	0.2	6.6	0.7
3.1	**110.4**	**2.5**	4	0.0020381	0.4	**6.0**	**0.7**
4.1	**112.8**	**2.6**	4	0.0020393	0.3	**6.6**	**0.7**
5.1	**121.6**	**2.8**	4	0.0020376	0.1	**5.7**	**0.7**
6.1	**112.7**	**2.5**	4	0.0020371	0.4	**5.5**	**0.7**
7.1	**115.6**	**2.7**	4	0.0020380	0.2	**5.9**	**0.7**
8.1	**113.3**	**2.7**	4	0.0020389	0.3	**6.4**	**0.7**
A-2.1	**114.7**	**3.5**	4	0.0020374	0.3	**5.6**	**0.7**
A-4.1	**112.3**	**3.5**	4	0.0020388	0.4	**6.3**	**0.7**

Tuke River orthogneiss A556 (43.02700°S, 170.87450°E, 155m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 370.6 ± 9.9 Ma (95% c.l.), n = 12/15, MSWD = 3.7

[4] Mean $\delta^{18}O$ = 9.0 ± 0.9 ‰ (1sd), n = 8/9

1.1	**381.4**	**7.4**	8	0.0020444	0.3	**8.9**	**0.6**
2.1	**375.4**	**6.9**	8	0.0020454	0.4	**9.4**	**0.6**
3.1	**379.1**	**6.9**	8	0.0020421	0.4	**7.8**	**0.6**
4.1	**377.5**	**7.6**	8	0.0020441	0.2	**8.8**	**0.6**
5.1	**360.8**	**6.5**	8	0.0020445	0.2	**9.0**	**0.6**
6.1	**353.2**	**6.4**	8	0.0020456	0.3	**9.5**	**0.6**
7.1	**350.9**	**6.4**	8	0.0020438	0.2	**8.6**	**0.6**
9.1	454.7	8.4	8	0.0020391	0.1	6.3	0.6
10.1	**389.1**	**7.2**	8	0.0020466	0.4	**10.0**	**0.6**

Bonar Creek orthogneiss A557 (43.08450°S, 170.63910°E, 450m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 386.5 ± 7.5 Ma (95% c.l.), n = 13/15, MSWD = 1.6

[4] Mean $\delta^{18}O$ = 7.8 ± 0.8 ‰ (1sd), n = 8/9

1.1	**391.5**	**8.6**	8	0.0020423	0.2	**7.9**	**0.6**
2.1	502.8	10.8	8	0.0020443	0.4	8.9	0.6
3.1	**366.2**	**8.1**	8	0.0020400	0.3	**6.7**	**0.6**
4.1	**390.9**	**8.6**	8	0.0020408	0.3	**7.2**	**0.6**
5.1	**398.2**	**9.4**	8	0.0020431	0.3	**8.3**	**0.6**
6.1	**392.9**	**8.4**	8	0.0020418	0.4	**7.6**	**0.6**
8.1	**384.4**	**8.3**	8	0.0020421	0.3	**7.8**	**0.6**
9.1	**381.3**	**8.3**	8	0.0020427	0.5	**8.1**	**0.6**
10.1	**383.1**	**8.3**	8	0.0020436	0.2	**8.5**	**0.6**

Whataroa Quarry orthogneiss A558 (43.28460°S, 170.36140°E, 125m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 90.0 ± 1.9 Ma (95% c.l.), n = 14/18, MSWD = 1.2

[4] Mean $\delta^{18}O$ = 6.5 ± 0.7 ‰ (1sd), n = 14/18

1.1	85.4	1.6	8	0.0020383	0.3	5.9	0.6
3.1	**94.1**	**1.8**	8	0.0020395	0.2	**6.5**	**0.6**
4.1	393.7	12.0	8	0.0020430	0.6	8.2	0.6
11.1	**89.5**	**3.1**	8	0.0020390	0.2	**6.2**	**0.6**
12.1	**88.2**	**3.8**	8	0.0020389	0.3	**6.2**	**0.6**
13.1	**96.7**	**3.2**	8	0.0020390	0.3	**6.3**	**0.6**
14.1	**96.8**	**3.4**	8	0.0020407	0.2	**7.1**	**0.6**
15.1	**88.4**	**2.6**	8	0.0020382	0.3	**5.8**	**0.6**
16.1	101.3	3.1	8	0.0020379	0.1	5.7	0.6
17.1	**91.1**	**3.3**	8	0.0020403	0.2	**6.9**	**0.6**
18.1	**91.9**	**3.4**	8	0.0020405	0.2	**7.0**	**0.6**
19.1	**94.9**	**3.0**	8	0.0020393	0.2	**6.4**	**0.6**
20.1	**93.9**	**2.8**	8	0.0020402	0.2	**6.9**	**0.6**
A-1.1	**86.5**	**2.7**	8	0.0020404	0.5	**6.9**	**0.6**
A-2.1	**91.5**	**2.7**	8	0.0020400	0.4	**6.7**	**0.6**
A-3.1	**88.7**	**3.2**	8	0.0020380	0.2	**5.8**	**0.6**
A-4.1	**93.0**	**2.8**	8	0.0020396	0.3	**6.6**	**0.6**
A-5.1	516.5	15.1	8	0.0020417	0.2	7.6	0.6

[1] = $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age from Hiess et al. (2010)
[2] = Measured $^{18}O/^{16}O$ corrected for background
[3] = $[^{18}O/^{16}O_{sample} / (^{18}O/^{16}O_{mean\ reference\ measured} / {}^{18}O/^{16}O_{reference\ true}) - VSMOW] \times 1000 / VSMOW$
VSMOW: $^{18}O/^{16}O$ = 0.0020052 (Baertschi 1976)
[4] = Mean $\delta^{18}O$ calculated from spots in bold used to define weighted mean ages in Hiess et al. (2010)

Online resource 6
Sample Hf analysis details

Spot	[1] Age (Ma)	err 1sd	Session	Size (µm)	$^{178}Hf/^{177}Hf$	[2] err 2se	Lu on 176 (ppm)	err 2se	Yb on 176 (ppm)	err 2se	Total Hf (V)	err 2se	$^{176}Lu/^{177}Hf$ Meas.	[2] err 2se	$^{176}Hf/^{177}Hf$ Meas.	[2] err 2se	$^{176}Hf/^{177}Hf$ Initial	$^{176}Hf/^{177}Hf$ Initial $_{CHUR}$	[3] ε_{HF} Initial	err 2se
Mikonui River paragneiss A546 (43.03058°S, 170.89978°E, 329m)																				
[1] $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age: n = 30; $\varepsilon_{Hf(T)}$: n = 19																				
1.1	375.7	8.1	7	71	1.467481	75	85	2	4226	93	6.87	0.08	0.000024	0	0.282179	48	0.282178	0.282548	-13.1	1.7
2.1	585.8	12.5	7	71	1.467628	98	925	69	39206	2964	8.80	0.13	0.000274	21	0.282320	67	0.282317	0.282416	-3.5	2.4
3.1	1054.0	19.9	7	71	1.467506	72	2617	14	109633	1518	7.05	0.06	0.000834	6	0.282360	48	0.282344	0.282117	8.0	1.7
4.1	357.2	9.3	7	71	1.467509	75	1476	15	61276	1129	7.50	0.08	0.000445	5	0.282318	49	0.282315	0.282560	-8.7	1.7
5.1	1283.0	17.6	7	71	1.467613	76	834	19	32896	885	7.84	0.09	0.000243	6	0.282101	50	0.282095	0.281970	4.4	1.8
6.1	514.3	14.6	7	71	1.467505	79	1913	31	73959	516	6.69	0.06	0.000584	10	0.282144	51	0.282138	0.282461	-11.4	1.8
7.1	603.6	13.4	7	71	1.467465	76	272	3	12309	96	7.81	0.05	0.000078	1	0.282231	45	0.282230	0.282404	-6.2	1.6
9.1	586.9	20.7	7	71	1.467488	64	2838	11	112024	1139	8.23	0.06	0.000905	5	0.282321	43	0.282311	0.282415	-3.7	1.5
10.1	400.7	8.8	7	71	1.467697	119	2180	45	79969	2942	6.13	0.18	0.000675	16	0.282412	75	0.282407	0.282533	-4.4	2.7
11.1	1165.1	50.0	7	71	1.467779	88	1562	24	53914	241	6.96	0.22	0.000466	7	0.282348	54	0.282338	0.282046	10.3	1.9
12.1	313.2	7.1	7	71	1.467502	66	437	5	18273	215	8.23	0.06	0.000126	1	0.282298	42	0.282297	0.282588	-10.3	1.5
14.1	773.8	16.7	7	71	1.467552	70	688	45	26992	1967	8.02	0.06	0.000200	13	0.282342	43	0.282339	0.282296	1.5	1.5
15.1	835.0	101.6	7	71	1.467542	67	1226	37	46509	1558	7.48	0.05	0.000361	11	0.282328	46	0.282322	0.282257	2.3	1.6
16.1	1045.9	51.4	7	71	1.467495	75	2094	38	77621	1877	6.17	0.04	0.000644	13	0.282283	47	0.282270	0.282122	5.2	1.6
17.1	388.7	8.7	7	71	1.467580	82	488	16	21273	613	8.62	0.04	0.000141	5	0.282236	47	0.282235	0.282540	-10.8	1.7
18.1	738.0	213.0	7	71	1.467387	106	2300	11	86832	705	5.67	0.05	0.000713	4	0.282195	72	0.282185	0.282319	-4.7	2.5
19.1	512.2	11.3	7	71	1.467821	89	2096	47	69764	2525	7.20	0.24	0.000641	16	0.282404	53	0.282397	0.282462	-2.3	1.9
20.1	1029.0	81.6	7	71	1.467595	63	454	30	17914	1229	8.64	0.07	0.000133	9	0.282218	38	0.282215	0.282133	2.9	1.4
21.1	589.9	12.6	7	71	1.467581	69	2089	52	76278	2333	8.27	0.04	0.000639	17	0.281702	50	0.281695	0.282413	-25.4	1.8
Clarke River paragneiss A550 (42.39943°S, 171.87749°E, 302m)																				
[1] $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age: n = 30; $\varepsilon_{Hf(T)}$: n = 23																				
1.1	1064.7	9.5	2	71	1.467503	93	2355	156	85548	6112	6.48	0.03	0.000758	55	0.282372	60	0.282357	0.282110	8.7	2.1
2.1	1051.3	29.4	2	71	1.467445	84	1934	27	73926	456	7.71	0.02	0.000591	9	0.282243	51	0.282231	0.282119	4.0	1.8
3.1	778.6	16.6	2	71	1.467445	84	2970	43	120996	1421	7.97	0.04	0.000959	16	0.282367	57	0.282353	0.282293	2.1	2.0
4.1	541.8	12.1	2	71	1.467401	84	1128	28	40026	821	7.75	0.02	0.000332	9	0.282293	53	0.282290	0.282443	-5.4	1.9
5.1	644.0	14.4	2	71	1.467448	85	1331	8	43438	98	7.64	0.04	0.000393	2	0.282177	51	0.282172	0.282379	-7.3	1.8
6.1	573.5	13.2	2	71	1.467490	80	133	1	6623	81	7.94	0.04	0.000038	0	0.282287	44	0.282286	0.282423	-4.9	1.6
7.1	1440.3	13.3	2	71	1.467351	140	2461	27	95544	715	6.09	0.04	0.000769	9	0.281960	87	0.281939	0.281869	2.5	3.1
8.1	726.9	15.6	2	71	1.467364	107	1577	18	69563	941	8.38	0.06	0.000479	6	0.282173	55	0.282166	0.282326	-5.7	1.9

9.1	360.9	8.1	3	55	1.467452	150	462	40	19477	1406	4.94	0.02	0.000133	12	0.282283	87	0.282282	0.282558	-9.8	3.1
10.1	481.6	10.5	3	55	1.467598	104	3229	35	113836	1954	4.11	0.03	0.001035	14	0.282424	76	0.282415	0.282482	-2.4	2.7
12.1	918.2	81.2	2	71	1.467423	106	2076	39	89109	1739	6.94	0.08	0.000645	13	0.282159	56	0.282147	0.282204	-2.0	2.0
13.1	785.1	10.9	2	71	1.467466	85	3309	15	135746	925	6.78	0.06	0.001083	4	0.282231	57	0.282215	0.282289	-2.6	2.0
14.1	977.5	39.1	2	71	1.467404	95	1453	3	50816	455	7.84	0.07	0.000433	1	0.282115	53	0.282107	0.282166	-2.1	1.9
15.1	685.7	9.3	3	55	1.467489	94	3062	61	110962	3159	4.65	0.02	0.000970	24	0.282344	61	0.282332	0.282352	-0.7	2.2
16.1	1041.7	51.3	3	55	1.467473	115	2639	12	95722	496	4.38	0.03	0.000825	4	0.282250	73	0.282233	0.282125	3.8	2.6
17.1	1793.9	16.7	3	55	1.467466	170	4151	62	160706	339	4.27	0.04	0.001400	22	0.281680	127	0.281632	0.281641	-0.3	4.5
18.1	355.7	5.0	2	71	1.467444	92	2910	12	110350	306	6.83	0.05	0.000926	3	0.282214	56	0.282208	0.282561	-12.5	2.0
19.1	583.6	8.2	2	71	1.467471	76	4333	10	164076	1240	8.16	0.03	0.001475	4	0.282307	48	0.282290	0.282417	-4.5	1.7
20.1	653.7	11.3	3	55	1.467560	105	572	13	21296	364	4.38	0.05	0.000166	4	0.282474	72	0.282472	0.282372	3.5	2.6
21.1	569.6	8.4	2	71	1.467435	106	417	4	18647	309	6.44	0.03	0.000120	1	0.282328	60	0.282327	0.282426	-3.5	2.1
22.1	453.0	11.0	3	55	1.467583	113	2456	8	88575	506	4.61	0.04	0.000762	3	0.282453	76	0.282446	0.282500	-1.9	2.7
23.1	484.2	7.0	2	71	1.467482	92	1557	7	64634	679	6.19	0.02	0.000471	3	0.282403	60	0.282398	0.282480	-2.9	2.1
25.1	656.7	10.8	2	71	1.467483	86	2115	51	76874	1311	8.89	0.02	0.000650	17	0.282303	51	0.282295	0.282370	-2.7	1.8

Crooked River paragneiss A552 (42.65130°S, 171.61800°E, 174m)

[1] $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age: n = 34; $\varepsilon_{Hf(T)}$: n = 23

1.1	495.1	11.1	2	71	1.467573	97	2066	28	77946	736	7.40	0.04	0.000635	9	0.282434	63	0.282428	0.282473	-1.6	2.2
2.1	2987.0	13.2	2	71	1.467471	104	3714	13	138063	1100	5.20	0.01	0.001216	5	0.280945	68	0.280875	0.280858	0.6	2.4
3.1	364.6	8.0	3	55	1.467441	134	1427	42	56778	1989	3.90	0.04	0.000430	13	0.282399	91	0.282396	0.282555	-5.6	3.2
4.1	3348.0	46.9	2	71	1.467482	76	1711	56	65451	2154	8.27	0.03	0.000521	18	0.280355	46	0.280321	0.280618	-10.6	1.7
5.1B	1518.7	140.1	2	71	1.467501	102	2683	11	101525	829	6.74	0.02	0.000844	4	0.282127	66	0.282103	0.281819	10.1	2.3
6.1	431.7	9.4	3	55	1.467457	140	2838	24	119635	918	3.18	0.02	0.000911	8	0.282383	96	0.282376	0.282513	-4.9	3.4
7.1	560.4	12.0	3	55	1.467363	136	3813	26	152457	823	3.79	0.02	0.001274	10	0.282377	98	0.282364	0.282432	-2.4	3.5
8.1	361.9	9.4	2	71	1.467488	83	3315	102	135473	3918	7.31	0.07	0.001093	39	0.282308	54	0.282300	0.282557	-9.1	1.9
9.1	1039.0	18.3	2	71	1.467487	86	3586	80	147887	3905	8.46	0.04	0.001201	32	0.282248	53	0.282225	0.282127	3.5	1.9
11.1	339.6	5.0	2	71	1.467542	99	722	16	28737	881	6.68	0.05	0.000210	5	0.282467	66	0.282465	0.282571	-3.7	2.3
12.1	2458.4	27.7	3	55	1.467410	157	1489	6	63423	892	3.64	0.05	0.000448	2	0.281534	109	0.281513	0.281207	10.9	3.9
13.1	717.4	148.9	2	71	1.467522	94	2401	17	100815	399	6.81	0.02	0.000756	6	0.282307	62	0.282297	0.282332	-1.3	2.2
14.1	476.2	8.0	3	55	1.467532	150	2537	10	100125	531	3.21	0.02	0.000798	3	0.282231	99	0.282224	0.282485	-9.2	3.5
15.1	1912.4	9.4	3	55	1.467580	131	1872	118	76463	5424	4.21	0.04	0.000588	40	0.281564	83	0.281543	0.281564	-0.7	2.9
16.1	976.2	40.6	3	55	1.467418	169	2318	5	93922	659	3.26	0.03	0.000725	1	0.282110	115	0.282097	0.282167	-2.5	4.1
17.1	546.5	9.0	3	55	1.467548	114	1368	26	49368	650	4.45	0.04	0.000407	8	0.282282	74	0.282278	0.282440	-5.7	2.6
18.1	1015.1	88.9	2	71	1.467497	80	3014	30	122359	1835	8.24	0.03	0.000969	12	0.282286	54	0.282267	0.282142	4.4	1.9
19.1	528.7	15.2	2	71	1.467502	78	266	4	12764	133	9.05	0.06	0.000076	1	0.282304	46	0.282304	0.282452	-5.2	1.6
20.1	1658.7	26.1	3	55	1.467604	114	1711	4	65367	341	3.55	0.02	0.000516	1	0.281766	77	0.281749	0.281728	0.8	2.7
22.1	559.0	7.7	2	71	1.467496	97	4512	30	155470	215	8.62	0.04	0.001518	10	0.282338	59	0.282322	0.282433	-3.9	2.1
23.1	628.9	18.6	2	71	1.467465	77	2429	5	95527	494	9.26	0.03	0.000760	2	0.282237	42	0.282228	0.282388	-5.7	1.5
24.1	348.9	6.1	2	71	1.467541	84	2532	16	93812	314	8.25	0.07	0.000790	5	0.282322	52	0.282317	0.282565	-8.8	1.8

25.1	732.8	21.8	3	55	1.467536	134	2557	57	101592	3550	4.18	0.03	0.000811	21	0.282256	89	0.282245	0.282322	-2.7	3.2

Crooked River paragneiss A553 (42.64860°S, 171.61440°E, 171m)

[1] $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age: n = 30; $\varepsilon_{Hf(T)}$: n = 10

1.1	249.2	6.6	4	55	1.467532	114	702	99	30447	4609	4.07	0.04	0.000192	29	0.282637	76	0.282636	0.282628	0.3	2.7
5.1	109.0	2.6	4	55	1.467504	158	239	5	11551	234	4.39	0.04	0.000068	1	0.282583	110	0.282583	0.282717	-4.7	3.9
6.1	116.0	1.8	4	55	1.467577	101	377	7	17779	171	4.36	0.03	0.000108	2	0.282527	66	0.282527	0.282712	-6.6	2.4
7.1	710.3	9.8	4	55	1.467505	114	1618	21	65802	1313	3.60	0.02	0.000491	7	0.282473	84	0.282467	0.282336	4.6	3.0
14.1	1031.6	19.5	4	55	1.467464	124	2718	14	110524	440	4.09	0.03	0.000864	4	0.282175	84	0.282158	0.282132	0.9	3.0
15.1	125.2	1.8	4	55	1.467428	116	1137	99	52703	4747	4.54	0.05	0.000350	31	0.282527	72	0.282526	0.282706	-6.4	2.5
16.1	534.8	8.7	4	55	1.467447	109	3524	94	137432	4061	4.35	0.05	0.001161	36	0.282286	74	0.282274	0.282448	-6.1	2.6
17.1	568.0	10.7	4	55	1.467423	118	3653	27	118455	1233	4.15	0.05	0.001176	7	0.282225	80	0.282212	0.282427	-7.6	2.8
18.1	2101.9	44.1	3	55	1.467602	106	836	3	30423	213	4.12	0.05	0.000243	1	0.281376	72	0.281366	0.281440	-2.6	2.6
21.1	354.0	8.4	3	55	1.467540	108	3180	161	126235	6684	3.92	0.01	0.001065	59	0.282712	73	0.282705	0.282562	5.1	2.6

Waitangitaona River paragneiss A559 (43.29240°S, 170.31170°E, 96m)

[1] $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age: n = 25; $\varepsilon_{Hf(T)}$: n = 17

1.1	536.2	12.2	8	71	1.467525	78	1621	34	65639	2416	6.07	0.12	0.000493	12	0.282341	54	0.282336	0.282447	-3.9	1.9
2.1	540.0	11.8	8	71	1.467512	73	4816	19	201969	825	7.29	0.10	0.001715	6	0.282257	49	0.282239	0.282445	-7.3	1.7
3.1	500.6	10.7	8	71	1.467536	82	3941	48	161619	902	6.11	0.05	0.001335	18	0.282407	51	0.282394	0.282470	-2.7	1.8
4.1	1016.6	43.1	8	71	1.467539	74	2538	15	107214	1632	6.85	0.08	0.000807	6	0.282316	53	0.282300	0.282141	5.6	1.9
5.1	923.0	93.0	8	71	1.467562	71	1877	3	75353	612	6.56	0.06	0.000575	1	0.282356	47	0.282346	0.282201	5.1	1.7
6.1	1251.9	51.4	8	71	1.467535	77	2969	34	119513	875	6.93	0.08	0.000954	12	0.281817	47	0.281795	0.281990	-6.9	1.7
8.1	380.5	8.5	8	71	1.467494	83	3379	61	139760	2361	7.01	0.07	0.001118	22	0.282254	61	0.282246	0.282545	-10.6	2.2
9.1	491.7	10.5	8	71	1.467582	75	4613	22	183064	1002	7.32	0.07	0.001597	9	0.282327	49	0.282312	0.282475	-5.8	1.7
10.1	733.7	17.0	8	71	1.467530	73	2400	15	94670	1242	6.89	0.05	0.000752	5	0.282302	45	0.282291	0.282322	-1.1	1.6
11.1	625.8	13.5	8	71	1.467609	69	2955	31	126444	1493	7.07	0.03	0.000958	11	0.282403	51	0.282392	0.282390	0.1	1.8
12.1	468.4	10.1	8	71	1.467524	72	1856	57	68293	2698	7.77	0.05	0.000556	19	0.282338	44	0.282333	0.282490	-5.6	1.6
13.1	1011.1	16.4	8	71	1.467585	66	2570	32	99902	331	8.08	0.03	0.000808	10	0.282367	44	0.282352	0.282145	7.3	1.6
14.1	634.5	14.2	8	71	1.467555	105	2375	71	94801	3495	7.23	0.03	0.000750	25	0.282373	71	0.282364	0.282385	-0.7	2.5
15.1	1016.6	20.0	8	71	1.467614	63	3448	9	131836	507	8.66	0.06	0.001124	3	0.282367	39	0.282345	0.282141	7.2	1.4
16.1	383.1	8.3	8	71	1.467552	76	2742	38	102803	1759	6.84	0.02	0.000866	14	0.282473	49	0.282467	0.282544	-2.7	1.7
17.1	676.1	15.4	8	71	1.467577	73	1603	14	61450	898	9.06	0.05	0.000483	5	0.282436	43	0.282430	0.282358	2.5	1.5
19.1	608.4	16.4	8	71	1.467582	62	539	51	22233	2146	9.09	0.04	0.000157	15	0.282300	37	0.282298	0.282401	-3.6	1.3

Mt Elliot paragneiss A560 (42.52570°S, 171.82040°E, 200m)

[1] $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age: n = 30; $\varepsilon_{Hf(T)}$: n = 20

1.1	364.9	6.6	7	71	1.467684	72	1280	7	47924	285	8.53	0.06	0.000380	2	0.282367	43	0.282365	0.282555	-6.7	1.5
1.2	699.4	13.7	7	71	1.467589	74	2828	47	114830	2411	7.09	0.04	0.000903	17	0.282363	52	0.282351	0.282343	0.3	1.8

2.1	974.8	29.0	7	71	1.467589	77	4501	10	161015	898	8.68	0.07	0.001521	4	0.282266	46	0.282238	0.282168	2.5	1.6
3.1	2648.7	8.4	7	71	1.467633	64	2652	10	99231	272	8.08	0.07	0.000830	3	0.280988	43	0.280946	0.281082	-4.8	1.5
4.1	536.0	9.7	7	71	1.467558	64	4621	9	183748	533	10.33	0.05	0.001607	2	0.282406	42	0.282389	0.282447	-2.0	1.5
5.1	592.3	11.4	7	71	1.467592	71	525	3	21942	207	8.43	0.06	0.000152	1	0.282301	39	0.282300	0.282411	-4.0	1.4
7.1	528.2	9.6	7	71	1.467624	70	1614	27	59457	1011	9.17	0.07	0.000486	9	0.282268	39	0.282263	0.282452	-6.7	1.4
8.1	1051.1	29.7	7	71	1.467527	73	1715	6	68841	341	8.25	0.02	0.000520	2	0.281884	44	0.281873	0.282119	-8.7	1.6
9.1	446.5	8.1	7	71	1.467604	76	3299	8	125244	431	7.35	0.06	0.001069	3	0.282401	47	0.282392	0.282504	-3.9	1.7
10.1	344.2	6.2	7	71	1.467557	65	2341	18	84501	961	7.99	0.06	0.000724	6	0.282292	38	0.282287	0.282568	-10.0	1.4
11.1	600.6	10.7	7	71	1.467590	68	3343	7	122580	698	8.41	0.06	0.001079	3	0.282223	44	0.282211	0.282406	-6.9	1.5
12.1	390.7	8.1	7	71	1.467593	61	5775	16	201340	962	9.49	0.04	0.002057	8	0.282394	42	0.282379	0.282539	-5.7	1.5
13.1	688.7	12.3	7	71	1.467570	63	2349	6	98886	813	10.19	0.03	0.000738	2	0.282453	35	0.282444	0.282350	3.3	1.2
14.1	1082.7	16.3	7	71	1.467541	66	5141	44	199552	2717	6.93	0.02	0.001824	22	0.282260	47	0.282223	0.282099	4.4	1.7
15.1	530.3	10.9	7	71	1.467626	70	2804	2	90400	287	7.88	0.05	0.000873	1	0.282323	49	0.282315	0.282451	-4.8	1.7
16.1	1013.2	32.7	7	71	1.467602	84	1908	67	69301	2141	5.95	0.06	0.000582	22	0.282345	50	0.282333	0.282143	6.7	1.8
17.1	464.1	8.7	7	71	1.467508	69	2173	12	80854	281	6.50	0.03	0.000669	4	0.282281	45	0.282275	0.282493	-7.7	1.6
18.1	533.8	10.3	7	71	1.467627	73	1989	59	79441	1916	6.06	0.02	0.000611	19	0.282429	48	0.282423	0.282448	-0.9	1.7
19.1	987.0	8.3	7	71	1.467632	75	4428	44	162135	637	8.92	0.09	0.001507	16	0.282404	45	0.282376	0.282160	7.7	1.6
20.1	544.7	9.9	7	71	1.467490	69	2064	8	74148	661	7.59	0.05	0.000629	3	0.281897	46	0.281891	0.282442	-19.5	1.6

Solitude Creek orthogneiss A548 (42.99129°S, 170.94165°E, 470m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 114.5 ± 2.0 Ma (95% c.l.), n = 11/15, MSWD = 1.2

[4] Mean $\varepsilon_{Hf(T)}$ = -1.2 ± 2.1 (1sd), n = 4/5

2.1	106.8	2.0	6	55	1.467867	179	2050	17	64449	1003	6.74	0.16	0.000620	6	0.282660	107	0.282656	0.282558	3.5	3.8
3.1	**116.3**	**2.2**	6	55	1.467638	102	3243	43	104021	2036	6.42	0.07	0.001026	16	0.282537	62	0.282530	0.282569	**-1.4**	**2.2**
4.1	**117.4**	**2.3**	6	55	1.467496	104	3882	39	144788	1721	5.84	0.02	0.001288	15	0.282487	70	0.282477	0.282538	**-2.1**	**2.5**
6.1	**110.3**	**2.1**	6	55	1.467714	149	3132	38	105843	3835	5.42	0.11	0.000993	16	0.282541	110	0.282534	0.282562	**-1.0**	**3.9**
7.1	**116.2**	**2.2**	6	55	1.467609	105	3010	44	100015	2160	5.53	0.07	0.000948	16	0.282546	68	0.282539	0.282543	**-0.2**	**2.4**

Clarke River orthogneiss A549 (42.39921°S, 171.85563°E, 253m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 378.1 ± 6.8 Ma (95% c.l.), n = 13/16, MSWD = 1.2

[4] Mean $\varepsilon_{Hf(T)}$ = -9.7 ± 2.3 (1sd), n = 8/11

1.1	**378.9**	**8.8**	3	55	1.467540	130	4662	78	171481	1042	4.91	0.06	0.001601	29	0.282445	91	0.282442	0.282713	**-9.6**	**3.2**
2.1	**392.9**	**8.6**	3	55	1.467558	109	4377	139	159920	6007	4.56	0.08	0.001488	58	0.282456	76	0.282453	0.282713	**-9.2**	**2.7**
3.1	**369.0**	**8.6**	3	55	1.467605	168	2378	45	88959	846	4.91	0.06	0.000739	15	0.282468	109	0.282467	0.282712	**-8.7**	**3.9**
4.1	**372.9**	**8.7**	3	55	1.467565	115	3408	38	127442	1626	4.00	0.04	0.001109	14	0.282397	83	0.282394	0.282718	**-11.4**	**2.9**
5.1	**384.0**	**8.7**	3	55	1.467546	110	4657	12	169866	1292	4.48	0.05	0.001592	7	0.282502	79	0.282499	0.282712	**-7.5**	**2.8**
6.1	**372.7**	**8.2**	3	55	1.467429	192	4585	114	172847	3838	5.28	0.03	0.001579	47	0.282432	121	0.282429	0.282711	**-10.0**	**4.3**
7.1	343.7	8.5	3	55	1.467550	116	2792	56	102311	2524	4.18	0.05	0.000885	20	0.282384	75	0.282382	0.282716	-11.8	2.7
8.1	**356.4**	**8.4**	3	55	1.467549	120	4762	61	176998	1670	4.86	0.07	0.001647	24	0.282435	89	0.282432	0.282716	**-10.0**	**3.1**

9.1	455.0	9.9	3	55	1.467477	107	4742	32	182545	941	4.53	0.04	0.001645	12	0.282334	71	0.282331	0.282712	-13.5	2.5
10.1	467.7	10.1	3	55	1.467584	109	2076	3	72087	394	4.87	0.04	0.000633	1	0.282369	73	0.282368	0.282709	-12.1	2.6
11.1	**389.6**	**8.3**	3	55	1.467516	178	3363	76	125949	2215	4.86	0.02	0.001093	28	0.282407	132	0.282405	0.282713	**-10.9**	**4.7**

Mt Elliot orthogneiss A551 (42.52570°S, 171.82040°E, 200m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 127.0 ± 6.9 Ma (95% c.l.), n = 7/15, MSWD = 5.1

[4] Mean $\varepsilon_{Hf(T)}$ = 3.4 ± 2.2 (1sd), n = 2/5

1.1	358.6	7.9	3	55	1.467543	121	4914	63	187077	2241	4.89	0.07	0.001725	26	0.282567	79	0.282555	0.282541	0.5	2.8
2.1	**137.6**	**3.0**	3	55	1.467823	165	3008	53	101269	3120	5.43	0.16	0.000952	20	0.282626	94	0.282619	0.282546	**2.6**	**3.3**
3.1	496.2	11.2	3	55	1.467639	107	2189	43	84258	2243	4.47	0.04	0.000675	15	0.282606	76	0.282601	0.282538	2.2	2.7
7.1	147.6	3.2	3	55	1.467546	129	4193	27	148672	1610	5.19	0.05	0.001401	10	0.282657	90	0.282647	0.282550	3.4	3.2
9.1	**132.3**	**2.9**	3	55	1.467559	110	3369	66	122302	2183	4.83	0.05	0.001093	24	0.282688	72	0.282681	0.282561	**4.3**	**2.6**

Hokitika Gorge orthogneiss A554 (42.95660°S, 171.01540°E, 78m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 116.0 ± 2.3 Ma (95% c.l.), n = 14/15, MSWD = 1.8

[4] Mean $\varepsilon_{Hf(T)}$ = -0.5 ± 2.6 (1sd), n = 5/6

3.1	**114.2**	**2.5**	4	55	1.467550	146	3229	213	126603	10486	3.85	0.05	0.001096	88	0.282610	92	0.282602	0.282559	**1.5**	**3.3**
5.1	370.0	7.9	4	55	1.467416	138	4633	41	192473	1435	4.32	0.04	0.001630	16	0.282469	85	0.282454	0.282472	-0.6	3.0
7.1	**114.6**	**2.6**	4	55	1.467546	185	3447	49	139529	2637	5.13	0.05	0.001137	19	0.282614	109	0.282607	0.282579	**1.0**	**3.9**
8.1	**115.3**	**2.5**	4	55	1.467469	169	2556	93	102437	5218	4.43	0.06	0.000812	34	0.282531	103	0.282525	0.282531	**-0.2**	**3.6**
9.1	**114.9**	**2.5**	4	55	1.467744	136	2277	71	83619	4214	4.18	0.07	0.000707	26	0.282621	91	0.282619	0.282692	**-2.6**	**3.2**
10.1	**120.4**	**2.6**	4	55	1.467407	117	4412	23	184710	724	4.60	0.04	0.001535	7	0.282516	72	0.282505	0.282565	**-2.1**	**2.5**

Mikonui River orthogneiss A555 (43.03090°S, 170.89150°E, 300m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 114.2 ± 2.4 Ma (95% c.l.), n = 11/13, MSWD = 1.4

[4] Mean $\varepsilon_{Hf(T)}$ = -8.2 ± 2.4 (1sd), n = 7/8

1.1	**111.9**	**2.6**	4	55	1.467519	124	3310	18	122303	515	3.45	0.02	0.001071	6	0.282467	81	0.282465	0.282707	**-8.6**	**2.8**
2.1	312.0	7.0	4	55	1.467485	105	3024	48	110345	704	4.09	0.04	0.000964	16	0.282537	80	0.282535	0.282711	-6.2	2.8
3.1	**110.4**	**2.5**	4	55	1.467550	108	1360	12	47177	786	3.88	0.02	0.000404	4	0.282472	75	0.282471	0.282716	**-8.7**	**2.7**
4.1	**112.8**	**2.6**	4	55	1.467535	106	3270	32	125992	1276	3.89	0.02	0.001062	12	0.282504	71	0.282502	0.282709	**-7.3**	**2.5**
5.1	**121.6**	**2.8**	4	55	1.467580	99	1110	41	38726	1797	4.10	0.02	0.000328	13	0.282516	67	0.282515	0.282713	**-7.0**	**2.4**
7.1	**115.6**	**2.7**	4	55	1.467528	110	3047	42	104749	1064	3.77	0.02	0.000966	15	0.282379	76	0.282373	0.282552	**-6.4**	**2.7**
8.1	**113.3**	**2.7**	4	55	1.467470	112	4089	36	142387	978	3.57	0.01	0.001354	13	0.282406	74	0.282403	0.282711	**-10.9**	**2.6**
A-4.1	**112.3**	**3.5**	4	55	1.467432	137	3887	70	143950	2761	4.28	0.03	0.001291	27	0.282480	82	0.282478	0.282712	**-8.3**	**2.9**

Tuke River orthogneiss A556 (43.02700°S, 170.87450°E, 155m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 370.6 ± 9.9 Ma (95% c.l.), n = 12/15, MSWD = 3.7

[4] Mean $\varepsilon_{Hf(T)}$ = -14.4 ± 2.6 (1sd), n = 8/10

1.1	**381.4**	**7.4**	5	55	1.467505	91	2406	11	90487	270	4.93	0.06	0.000750	4	0.282313	57	0.282312	0.282713	**-14.2**	**2.0**
2.1	**375.4**	**6.9**	5	55	1.467546	102	2632	21	99249	796	4.59	0.07	0.000827	7	0.282298	70	0.282296	0.282713	**-14.7**	**2.5**
3.1	**379.1**	**6.9**	5	55	1.467501	81	2993	17	111357	312	5.44	0.06	0.000954	6	0.282337	51	0.282335	0.282714	**-13.4**	**1.8**
4.1	**377.5**	**7.6**	5	55	1.467488	95	2374	11	90012	179	4.28	0.04	0.000738	3	0.282271	64	0.282269	0.282710	**-15.6**	**2.3**
5.1	**360.8**	**6.5**	5	55	1.467619	148	3382	24	125633	1399	5.98	0.08	0.001096	9	0.282277	94	0.282274	0.282715	**-15.6**	**3.3**
6.1	**353.2**	**6.4**	5	55	1.467448	85	2625	7	99628	439	5.17	0.06	0.000825	3	0.282283	58	0.282278	0.282589	**-11.0**	**2.1**
7.1	**350.9**	**6.4**	5	55	1.467483	92	3017	5	112460	624	5.62	0.07	0.000963	2	0.282337	59	0.282335	0.282716	**-13.5**	**2.1**
8.1	2267.3	61.9	5	55	1.467471	97	2016	33	74336	1126	5.27	0.05	0.000616	11	0.282201	68	0.282200	0.282714	-18.2	2.4
9.1	454.7	8.4	5	55	1.467540	90	3384	49	127791	1544	5.17	0.06	0.001104	18	0.282297	62	0.282295	0.282709	-14.6	2.2
10.1	**389.1**	**7.2**	5	55	1.467309	101	3756	110	156637	4348	4.55	0.05	0.001274	45	0.282236	78	0.282233	0.282714	**-17.0**	**2.8**

Bonar Creek orthogneiss A557 (43.08450°S, 170.63910°E, 450m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 386.5 ± 7.5 Ma (95% c.l.), n = 13/15, MSWD = 1.6

[4] Mean $\varepsilon_{Hf(T)}$ = -6.2 ± 2.5 (1sd), n = 9/10

1.1	**391.5**	**8.6**	5	55	1.467511	100	4381	25	162782	1680	4.44	0.05	0.001488	12	0.282388	77	0.282377	0.282535	**-5.6**	**2.7**
2.1	502.8	10.8	5	55	1.467456	79	3612	29	134332	556	5.27	0.06	0.001183	10	0.282369	57	0.282360	0.282545	-6.6	2.0
3.1	**366.2**	**8.1**	5	55	1.467430	88	3763	39	140216	2041	4.47	0.04	0.001242	16	0.282420	72	0.282412	0.282545	**-4.7**	**2.6**
4.1	**390.9**	**8.6**	5	55	1.467362	123	4880	16	189679	881	5.14	0.03	0.001711	6	0.282371	81	0.282359	0.282549	**-6.7**	**2.9**
5.1	**398.2**	**9.4**	5	55	1.467549	87	3074	42	117888	1528	4.98	0.04	0.000988	16	0.282343	57	0.282335	0.282546	**-7.5**	**2.0**
6.1	**392.9**	**8.4**	5	55	1.467449	95	3203	146	120666	6258	5.70	0.04	0.001049	56	0.282435	63	0.282427	0.282547	**-4.2**	**2.2**
7.1	**408.6**	**9.1**	5	55	1.467651	128	4857	70	182271	2443	4.07	0.03	0.001692	28	0.282422	81	0.282410	0.282558	**-5.2**	**2.9**
8.1	**384.4**	**8.3**	5	55	1.467188	150	4239	172	172690	5113	5.22	0.06	0.001456	70	0.282300	129	0.282291	0.282563	**-9.6**	**4.6**
9.1	**381.3**	**8.3**	5	55	1.467384	84	4692	35	178540	2433	4.54	0.03	0.001629	17	0.282420	62	0.282409	0.282564	**-5.5**	**2.2**
10.1	**383.1**	**8.3**	5	55	1.467390	83	6059	66	236450	1456	4.87	0.06	0.001250	27	0.281196	65	0.281142	0.281332	**-6.8**	**2.3**

Whataroa Quarry orthogneiss A558 (43.28460°S, 170.36140°E, 125m)

[1] Weighted mean $^{206}Pb/^{238}U$ age = 90.0 ± 1.9 Ma (95% c.l.), n = 14/18, MSWD = 1.2

[4] Mean $\varepsilon_{Hf(T)}$ = 8.0 ± 2.4 (1sd), n = 14/18

1.1	85.4	1.6	6	55	1.467528	87	1573	23	52295	572	7.29	0.06	0.000870	7	0.282367	46	0.282351	0.282159	6.8	1.6
3.1	**94.1**	**1.8**	6	55	1.467524	90	2875	22	104435	1055	4.07	0.05	0.000909	8	0.282807	67	0.282800	0.282537	**9.3**	**2.4**
4.1	393.7	12.0	6	55	1.467461	120	2282	12	85450	403	3.86	0.02	0.000707	4	0.282396	74	0.282391	0.282538	-5.2	2.6
11.1	**89.5**	**3.1**	6	55	1.467524	92	3338	50	125116	1490	5.11	0.06	0.001083	18	0.282788	61	0.282778	0.282468	**11.0**	**2.2**
12.1	**88.2**	**3.8**	6	55	1.467488	104	2961	40	108713	1000	4.69	0.04	0.000944	14	0.282736	71	0.282730	0.282554	**6.2**	**2.5**
13.1	**96.7**	**3.2**	6	55	1.467556	103	5102	89	205181	3373	4.07	0.03	0.001840	37	0.282778	75	0.282764	0.282539	**8.0**	**2.7**
14.1	**96.8**	**3.4**	6	55	1.467506	109	2832	6	105442	336	3.96	0.04	0.000897	2	0.282747	74	0.282740	0.282534	**7.3**	**2.6**
15.1	**88.4**	**2.6**	6	55	1.467437	81	5115	8	200830	931	5.42	0.06	0.001829	4	0.282754	64	0.282740	0.282538	**7.2**	**2.3**
16.1	101.3	3.1	6	55	1.467566	81	3949	107	156888	4995	5.38	0.10	0.001349	44	0.282740	60	0.282730	0.282528	7.1	2.1
17.1	**91.1**	**3.3**	6	55	1.467533	82	2888	9	109281	201	5.24	0.06	0.000919	3	0.282753	54	0.282746	0.282543	**7.2**	**1.9**
18.1	**91.9**	**3.4**	6	55	1.467512	101	2149	12	80812	276	4.31	0.05	0.000662	4	0.282820	73	0.282816	0.282545	**9.6**	**2.6**

19.1	**94.9**	**3.0**	6	55	1.467490	95	3338	26	126343	616	4.97	0.06	0.001085	9	0.282731	69	0.282723	0.282544	**6.4**	**2.4**
20.1	**93.9**	**2.8**	6	55	1.467498	87	3238	209	122065	8982	6.16	0.04	0.001098	80	0.282811	58	0.282803	0.282542	**9.2**	**2.1**
A-1.1	**86.5**	**2.7**	6	55	1.467548	91	2755	52	95867	1394	5.60	0.08	0.000864	17	0.282975	64	0.282975	0.282785	**6.7**	**2.3**
A-2.1	**91.5**	**2.7**	6	55	1.467620	102	2616	10	98764	381	4.70	0.05	0.000823	3	0.282982	68	0.282982	0.282785	**6.9**	**2.4**
A-3.1	**88.7**	**3.2**	6	55	1.467534	96	2536	10	94529	200	5.36	0.06	0.000794	3	0.282802	65	0.282796	0.282554	**8.6**	**2.3**
A-4.1	**93.0**	**2.8**	6	55	1.467553	92	2413	13	88837	1595	4.48	0.06	0.000750	5	0.282796	66	0.282791	0.282544	**8.7**	**2.3**
A-5.1	516.5	15.1	6	55	1.467572	94	2919	16	110149	711	4.55	0.04	0.000932	6	0.282731	66	0.282724	0.282542	6.4	2.3

[1] = $^{206}Pb/^{238}U$ age or $^{207}Pb/^{206}Pb$ age from Hiess et al. (2010)

[2] = $\times 10^{-6}$

[3] = $(^{176}Hf/^{177}Hf_{Inital} / ^{176}Hf/^{177}Hf_{CHUR} - 1) \times 10000$

CHUR: $^{176}Hf/^{177}Hf = 0.282785 \pm 11$, $^{176}Lu/^{177}Hf = 0.0336 \pm 1$ (Bouvier et al. 2008)

$\lambda^{176}Lu = 1.867 \pm 8 \times 10^{-11} y^{-1}$ (Scherer et al. 2001; Söderlund et al. 2004)

Initial $^{176}Hf/^{177}Hf$ ratios for each spot calculated using their individual SHRIMP measured $^{206}Pb/^{238}U$ or $^{207}Pb/^{206}Pb$ ages from Hiess et al. (2010)

[4] = Mean $\varepsilon_{Hf(T)}$ calculated from spots in bold used to define weighted mean ages in Hiess et al. (2010)