SUPPLEMENTARY MATERIALS

Appendix A. Geographic coordinates and location maps for the measured stratigraphic sections of the Chinle Formation at the Petrified Forest National Park and vicinity.

Table DR1. Geographic coordinates for the base of the measured stratigraphic sections.

Figure DR1. Location maps for the measured stratigraphic sections shown in Figures 3A-F. Refer to Figure 2 for locations within the Petrified Forest National Park.

Appendix B. Sample characteristics, analytical techniques and tabulated U-Pb data for the analyzed zircon from the tuffaceous rocks of the Chinle Formation.

Table DR2. U-Pb data for analyzed zircon from the tuffaceous rocks of the Chinle Formation.

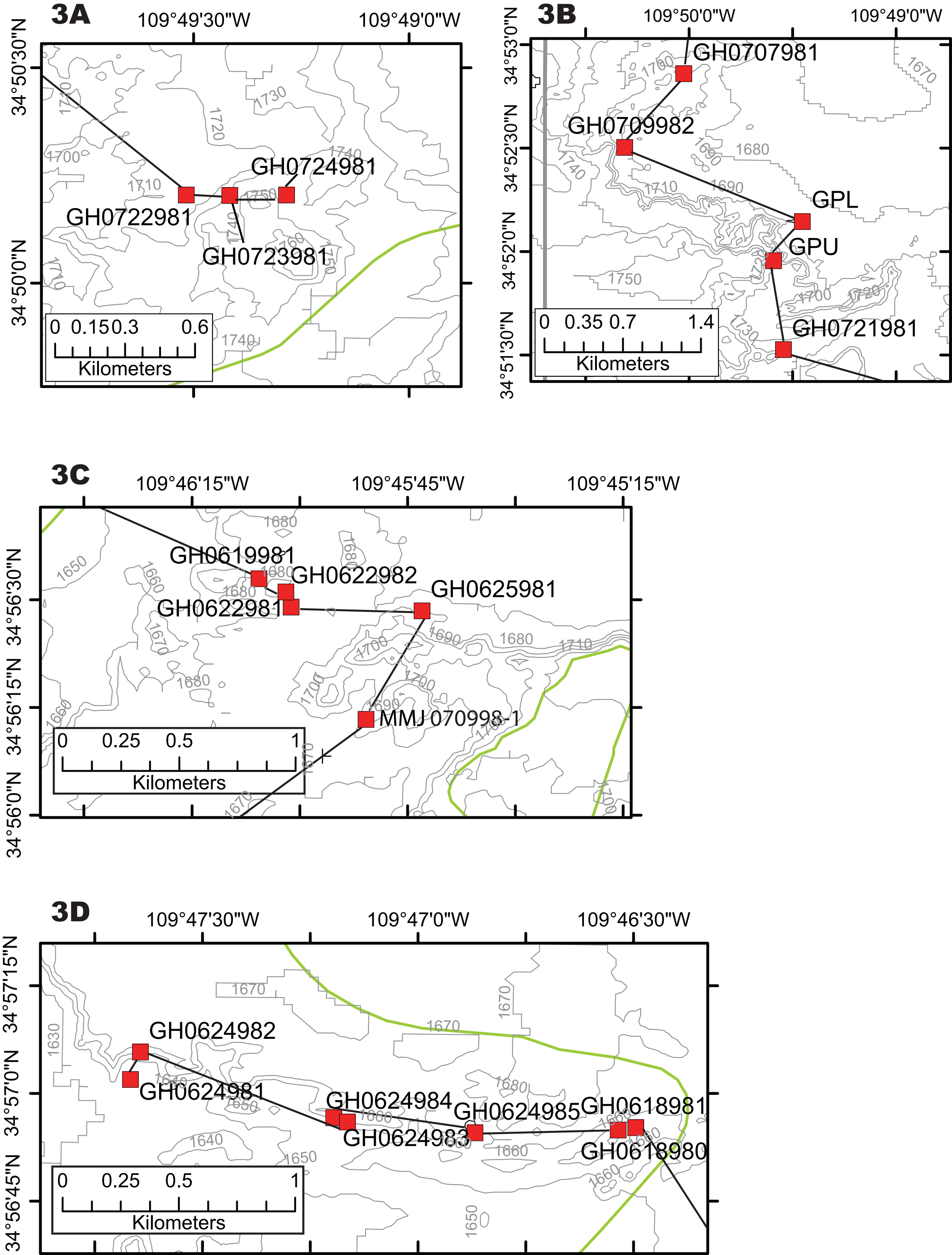
Figure DR2. Photomicrographs of a variety of zircon grains recovered from a single sample of the Black Forest Bed (sample BFB). Bottom left image illustrates the type of zircon targeted for U-Pb analyses of this study.

Figure DR3. Photomicrograph of sample SS-28 in plane- (A) and crossed-polarized (B) illuminations showing quartz shards (qtz), a feldspar lath (fsp), kaolinite pseudomorphs (klt) and a lithic fragment (lth) in a fine-grained kaolinitic matrix. Note the embayed rim of the quartz fragment on the lower left. The rock fabric shows no evidence of significant reworking of volcanic material after deposition.

APPENDIX A. Geographic coordinates and location maps for the measured stratigraphic sections of the Chinle Formation at the Petrified Forest National Park and vicinity.

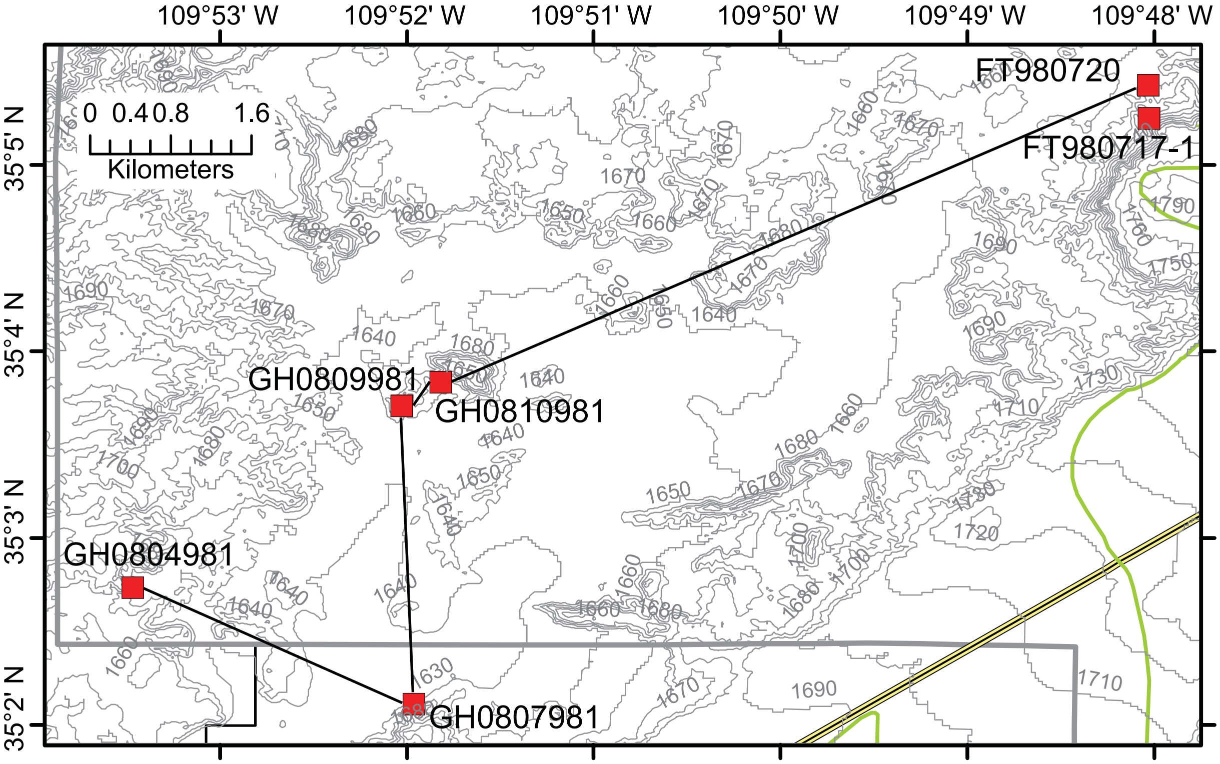
TABLE DR1.
Geographic coordinates for the base of the measured stratigraphic sections.

Section	Longitude	Latitude
GH0624982	W109.79406	N34.95161
GH0624981	W109.79444	N34.95055
GH0624984	W109.78605	N34.94890
GH0624985	W109.78112	N34.94848
GH0618980	W109.77557	N34.94860
GH0618981	W109.77489	N34.94869
GH0619981	W109.76822	N34.94249
GH0622981	W109.76698	N34.94141
GH0622982	W109.76718	N34.94198
GH0625981	W109.76193	N34.94126
GH0707981	W109.83374	N34.88101
GH0709982	W109.83851	N34.87509
GH0721981	W109.82573	N34.85877
GH0722981	W109.82528	N34.83674
GH0723981	W109.82359	N34.83672
GH0724981	W109.82140	N34.83674
GH0804981	W109.89109	N35.04565
GH0807981	W109.86598	N35.03524
GH0809981	W109.86707	N35.06183
GH0810981	W109.86360	N35.06397
FT980720-1	W109.80108	N35.09043
FT980717-1	W109.80093	N35.08733
GH0818981	W109.81397	N35.14579
GH0818982	W109.81256	N35.14807
GH0819981	W109.82136	N35.15393
GH0819982	W109.81078	N35.15618
GH0819982	W109.81101	N35.15702
GH0820981	W109.81013	N35.15938
GPU	W109.82651	N34.86595
GPL	W109.82419	N34.86910
MMJ070998-1	W109.76424	N34.93704
Mesa Redondo	W109.67691	N34.66248

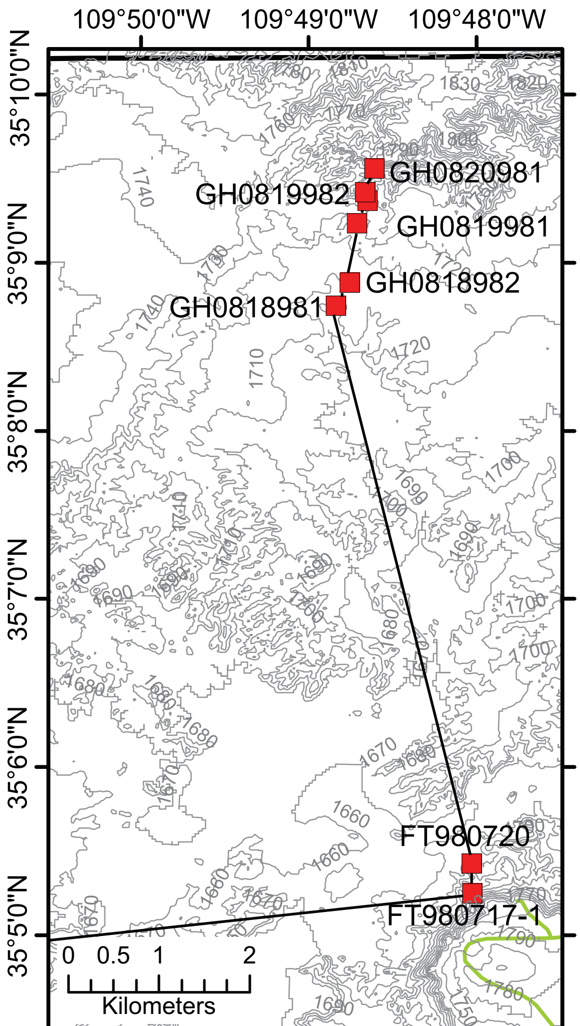


3A
109°49'30"W
109°49'0"W
34°50'30"N
34°50'0"N
GH0724981
GH0722981
GH0723981
0 0.150.3 0.6
Kilometers
1700
1710
1720
1730
1740
1750
1760
3B
109°50'0"W
109°49'0"W
34°53'0"N
34°52'30"N
34°52'0"N
34°51'30"N
GH0707981
GH0709982
GPL
GPU
GH0721981
0 0.35 0.7 1.4
Kilometers
1670
1680
1690
1700
1710
1720
1730
1740
1750
3C
109°46'15"W
109°45'45"W
109°45'15"W
34°56'30"N
34°56'15"N
34°56'0"N
GH0619981
GH0622982
GH0622981
GH0625981
MMJ 070998-1
0 0.25 0.5 1
Kilometers
1650
1660
1670
1680
1690
1700
1710
3D
109°47'30"W
109°47'0"W
109°46'30"W
34°57'15"N
34°57'0"N
34°56'45"N
GH0624982
GH0624981
GH0624984
GH0624983
GH0624985
GH0618981
GH0618980
0 0.25 0.5 1
Kilometers
1630
1640
1650
1660
1670
1680

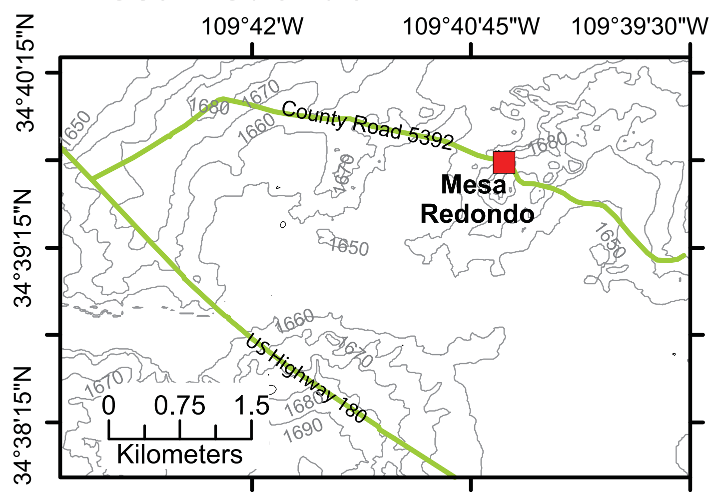
3E



3F



Mesa Redondo



APPENDIX B. Sample characteristics, analytical techniques and tabulated U-Pb data for the analyzed zircon from the tuffaceous rocks of the Chinle Formation.

U-Pb Analytical Techniques

Samples of tuffaceous sandstones and siltstones collected for zircon geochronology were generally large (~ 40 kg), except for two, SS-28 and SS-37, that were fist-sized. All samples but one (SS-28) were collected from within the Petrified Forest National Park boundaries. Samples were processed by standard methods of crushing and pulverization and heavy-mineral concentrates were obtained using magnetic as well as high-density liquid separation. Final zircon selection was carried out with the aide of a binocular microscope.

All samples contained to varying degrees mixed populations of zircon characterized by a range in grain sizes and morphology. These ranged from highly rounded and frosted, demonstrably detrital grains to prismatic or acicular zircon of probable volcanic origin (Fig. DR-1). During the course of this study, preference was given to distinct populations of prismatic/acicular zircon containing elongate glass (melt) inclusions parallel to their crystallographic “c” axis. These grains have systematically yielded the youngest dates and none has so far been measured to be older than Late Triassic. In terms of abundance of the inclusion-bearing prismatic zircon in the heavy mineral separate, the samples occur in the following order: SS-28>SBJ>TPs, GPL, CCC>KWI, BFB, GPU>SS-37. The highest abundances of the target zircon occur in rocks with the least lithological evidence of sedimentary reworking (see Fig. DR-2).

To minimize the effects of Pb-loss in zircon resulting in anomalously young dates, grains were pre-treated using the chemical abrasion or CA-TIMS technique of Mattinson (2005). This technique allows preferential dissolution of high-U domains in zircon crystals that are most susceptible to radiation damage and Pb-loss. Annealing took place inside a furnace at 900°C for 60 hours. The annealed grains were subsequently loaded into 200µl FEP Teflon® microcapsules and leached in 29M HF within high-pressure Parr® vessels at 210°C for 12-14 hours (see exceptions below). The partially dissolved sample was then transferred into 3ml Savillex® FEP beakers, fluxed successively with 4N HNO_3 and 6N HCl over a hot plate and inside an ultrasonic bath, and rinsed with several milliliters of ultra-pure water in between. Thoroughly rinsed zircon grains were loaded back into their microcapsules, spiked with a mixed ^{205}Pb-^{233}U-^{235}U tracer solution (EARTHTIME ET535 spike) and dissolved completely in 29M HF at 210°C for 48 hours.

Preliminary analyses from samples TPs (z1, z2, z3, z4), SBJ (z1, z2) and CCC (z1, z2) were pre-treated by chemical abrasion, but the temperature of acid leaching was ~180°C rather than 210°C. Two of these analyses (z2 and z3) from sample TPs yielded distinctly younger dates than the rest of the analyses from this sample, evidently because of residual Pb loss. Subsequent analyses with the CA-TIMS schedule described above appear to have overcome the insufficient pre-treatment problem by producing consistent and older dates.

Dissolved Pb and U were chemically separated using a miniaturized HCl-based ion-exchange chemistry procedure modified after Krogh (1973), using 50 µl columns of

AG1x8 anion-exchange resin. Both Pb and U were loaded with a silica gel - H_3PO_4 emitter solution (Gerstenberger and Haase, 1997) on single degassed Re filaments and their isotopic compositions were measured on the VG Sector 54 multi-collector thermal ionization mass spectrometer at MIT. Lead isotopic measurements were made in a peak-hopping mode by ion counting using a Daly photomultiplier detector with a ^{206}Pb ion beam intensity of 1.0 to 2.5 x 10^{-14} Amps usually maintained in the course of data acquisition. Uranium isotopes were measured as oxide ions on three Faraday detectors in a static mode with an average $^{235}U^{16}O_2^+$ ion-beam intensity of 8.0 x 10^{-13} Amps.

U-Pb Data Reduction and Age Calculation

Measured isotopic ratios were corrected for mass-dependant isotope fractionation in the mass spectrometer, as well as for U and Pb contributions from the spike and laboratory blanks. Pb/U ratios were also corrected for initial Th/U disequilibrium in magma. Data reduction and error propagation was carried out using applications Tripoli and U-Pb_Redux developed as part of the EARTHTIME initiative (Bowring et al., 2008; McLean et al., 2008). In general, $^{206}Pb/^{238}U$ dates are considered the most precise and accurate and not subject to probable inaccuracies in the ^{235}U decay constant (Mattinson, 2000; Schoene et al., 2006; Mattinson, 2010), that affects the $^{207}Pb/^{235}U$ or $^{207}Pb/^{206}Pb$ dates. Our calculated weighted mean $^{206}Pb/^{238}U$ dates are derived from coherent clusters of the youngest zircon analyses in each sample. Calculated U-Pb dates are reported at 95% confidence level (Table 1 and Figure 5). Uncertainties in U-Pb dates are reported as ±X/Y/Z, where X is the internal (analytical) uncertainty in the absence of all external errors, Y incorporates the U-Pb tracer calibration error and Z includes the latter as well as the decay constant errors of Jaffey et al. (1971). The external uncertainties must be taken into account if the results are to be compared with U-Pb dates obtained in other laboratories with different tracers or ones derived from other isotopic chronometers (e.g., ^{40}Ar-^{39}Ar). However, for establishing a high-resolution chronology based on the results of this study alone, only the analytical uncertainties (X) are used.

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TABLE DR2

U-Pb data for analyzed zircon from the tuffaceous rocks of the Chinle Formation.

	Composition				Ratios							Age (Ma)				
Sample Fractions[†]	Pb_c[‡] (pg)	Pb^*[‡] / Pb_c	Th / U	^{206}Pb[§] / ^{204}Pb	^{208}Pb[#] / ^{206}Pb	^{206}Pb[††] / ^{238}U	err (2σ%)	^{207}Pb[††] / ^{235}U	err (2σ%)	^{207}Pb[††] / ^{206}Pb	err (2σ%)	^{206}Pb / ^{238}U	err (2σ)	^{207}Pb / ^{235}U	^{207}Pb / ^{206}Pb	corr. coef.
SS-37																
z1	0.3	19.7	0.91	1080.3	0.290	0.032806	(.07)	0.22746	(.71)	0.05029	(.68)	208.08	0.15	208.10	208.3	0.50
z2	0.3	32.4	1.04	1711.8	0.329	0.035492	(.06)	0.24945	(.44)	0.05097	(.42)	224.83	0.14	226.13	239.6	0.33
z3	0.5	6.6	1.24	350.5	0.393	0.033692	(.18)	0.23415	(2.13)	0.05040	(2.00)	213.61	0.37	213.62	213.7	0.76
z4	0.7	12.2	1.14	642.3	0.360	0.034774	(.12)	0.24631	(1.16)	0.05137	(1.08)	220.36	0.26	223.57	257.6	0.69
z5	0.5	17.4	0.94	948.1	0.297	0.033741	(.14)	0.23577	(.88)	0.05068	(.81)	213.92	0.30	214.95	226.3	0.56
z7	0.4	9.9	1.67	470.6	0.529	0.033022	(.15)	0.23002	(1.65)	0.05052	(1.56)	209.44	0.31	210.22	219.0	0.64
z8	0.6	6.3	1.65	308.2	0.522	0.032947	(.19)	0.23128	(2.54)	0.05091	(2.41)	208.96	0.39	211.25	236.8	0.69
z11	0.2	32.1	0.72	1832.1	0.227	0.032759	(.08)	0.22708	(.62)	0.05028	(.61)	**207.79**	**0.17**	207.79	207.7	0.23
z13	0.2	19.1	1.05	1014.2	0.334	0.032991	(.12)	0.23044	(.84)	0.05066	(.77)	209.24	0.24	210.56	225.3	0.58
BFB																
z2	1.4	29.5	0.71	1691.6	0.224	0.033081	(.08)	0.23037	(.46)	0.05051	(.42)	**209.80**	**0.16**	210.51	218.4	0.52
z3	0.8	28.0	0.62	1641.2	0.196	0.033160	(.07)	0.23031	(.45)	0.05037	(.43)	210.29	0.14	210.46	212.3	0.37
z4	2.8	12.8	1.64	606.9	0.520	0.033592	(.12)	0.23404	(1.18)	0.05053	(1.13)	212.99	0.24	213.53	219.5	0.53
z5	0.5	32.9	1.15	1696.2	0.364	0.033291	(.06)	0.23216	(.44)	0.05058	(.41)	211.12	0.13	211.98	221.6	0.51
z6	1.0	14.1	1.19	733.0	0.376	0.033188	(.10)	0.23121	(.97)	0.05053	(.91)	210.47	0.21	211.20	219.3	0.62
z7	1.8	8.3	1.49	412.1	0.473	0.033105	(.15)	0.23212	(1.72)	0.05085	(1.61)	**209.95**	**0.31**	211.94	234.2	0.75
z10	0.8	19.5	1.30	982.3	0.411	0.033520	(.07)	0.23350	(.69)	0.05052	(.65)	212.54	0.15	213.08	219.1	0.55
z11	0.5	16.4	1.37	816.3	0.435	0.033171	(.09)	0.23026	(.97)	0.05035	(.92)	210.36	0.19	210.41	211.0	0.50
z12	0.7	75.1	0.72	4253.3	0.230	0.033103	(.05)	0.23006	(.20)	0.05040	(.17)	**209.94**	**0.11**	210.25	213.7	0.60

z13	0.6	16.8	1.27	854.9	0.402	0.033166	(.09)	0.23110	(.84)	0.05054	(.79)	210.33	0.19	211.11	219.8	0.61
z14	0.3	53.7	1.12	2776.1	0.356	0.033204	(.09)	0.23116	(.43)	0.05049	(.39)	210.57	0.19	211.15	217.7	0.51
z15	0.2	108.2	0.62	6277.4	0.198	0.033157	(.07)	0.23056	(.26)	0.05043	(.23)	210.27	0.14	210.66	215.0	0.54
z16	0.5	49.1	0.67	2824.4	0.213	0.033115	(.07)	0.22998	(.35)	0.05037	(.34)	**210.02**	**0.15**	210.18	212.0	0.31
z17	0.5	17.6	1.30	883.9	0.413	0.033166	(.10)	0.22995	(.90)	0.05028	(.84)	210.33	0.21	210.16	208.2	0.65
z18	0.2	110.4	0.62	6412.5	0.197	0.033161	(.06)	0.23013	(.23)	0.05033	(.21)	210.30	0.12	210.31	210.4	0.43
z19	0.2	147.4	1.18	7495.6	0.372	0.033094	(.12)	0.23059	(.28)	0.05054	(.29)	**209.88**	**0.26**	210.69	219.7	0.19
KWI																
z1	0.5	44.7	1.06	2345.8	0.335	0.034406	(.07)	0.23936	(.36)	0.05046	(.33)	218.06	0.14	217.89	216.1	0.54
z2	0.7	18.3	1.03	975.3	0.327	0.033713	(.15)	0.23428	(.78)	0.05040	(.74)	**213.74**	**0.32**	213.72	213.5	0.32
z3	0.3	51.0	0.93	2750.0	0.296	0.033993	(.07)	0.23648	(.40)	0.05045	(.36)	215.49	0.16	215.53	216.0	0.55
z5	0.2	53.8	1.63	2491.8	0.517	0.033733	(.09)	0.23423	(.45)	0.05036	(.41)	**213.87**	**0.18**	213.69	211.7	0.51
z6	0.2	93.2	0.92	5037.6	0.290	0.033742	(.06)	0.23508	(.24)	0.05053	(.21)	**213.93**	**0.13**	214.39	219.5	0.57
z7	0.2	158.7	1.15	8114.4	0.364	0.033798	(.06)	0.23534	(.21)	0.05050	(.17)	214.27	0.13	214.60	218.2	0.61
z8	0.3	57.0	1.50	2711.2	0.475	0.033727	(.06)	0.23535	(.30)	0.05061	(.27)	**213.83**	**0.13**	214.61	223.1	0.60
z9	0.3	108.2	0.90	5868.9	0.285	0.033847	(.06)	0.23547	(.23)	0.05046	(.21)	214.58	0.13	214.71	216.1	0.44
GPU																
z1	0.3	44.4	1.18	2267.4	0.374	0.033603	(.07)	0.23340	(.58)	0.05037	(.56)	**213.06**	**0.14**	213.00	212.3	0.34
z2	0.2	57.1	1.06	2993.2	0.335	0.033614	(.06)	0.23341	(.35)	0.05036	(.32)	**213.13**	**0.12**	213.01	211.7	0.49
z3	0.2	44.6	1.67	2054.5	0.529	0.034190	(.08)	0.23759	(.45)	0.05040	(.42)	216.72	0.17	216.45	213.5	0.52
z4	0.3	17.7	1.17	920.5	0.369	0.033691	(.21)	0.23415	(1.56)	0.05041	(1.42)	213.61	0.45	213.62	213.7	0.70
z5	0.3	35.2	1.26	1769.4	0.399	0.033672	(.08)	0.23436	(.49)	0.05048	(.45)	213.49	0.18	213.79	217.1	0.49
z6	0.4	23.1	1.84	1038.2	0.583	0.033700	(.08)	0.23424	(.88)	0.05041	(.85)	213.67	0.16	213.70	214.0	0.44
z7	0.3	18.4	1.29	930.5	0.408	0.033588	(.09)	0.23465	(.87)	0.05067	(.84)	**212.97**	**0.19**	214.03	225.7	0.32

z8	0.2	38.7	1.32	1919.6	0.418	0.033626	(.09)	0.23470	(.65)	0.05062	(.61)	**213.20**	**0.19**	214.07	223.6	0.52
z9	0.2	31.3	1.36	1543.7	0.429	0.033791	(.20)	0.23675	(.75)	0.05082	(.66)	214.23	0.42	215.76	232.5	0.53
z10	0.3	19.7	1.51	948.9	0.478	0.035038	(.11)	0.24646	(.87)	0.05102	(.82)	222.00	0.24	223.70	241.6	0.52
z11	0.3	17.8	0.90	981.0	0.285	0.034763	(.12)	0.24418	(.87)	0.05094	(.82)	220.29	0.26	221.84	238.3	0.45
z12	0.2	50.0	1.25	2515.3	0.395	0.033634	(.08)	0.23507	(.53)	0.05069	(.52)	**213.25**	**0.16**	214.37	226.7	0.25
GPL																
z1	0.4	13.6	1.02	734.8	0.322	0.034424	(.12)	0.23954	(1.04)	0.05047	(.98)	**218.17**	**0.25**	218.05	216.7	0.61
z2	0.4	39.0	0.55	2319.9	0.174	0.034379	(.07)	0.23956	(.45)	0.05054	(.45)	**217.90**	**0.15**	218.06	219.8	0.17
z3	0.3	35.2	1.12	1826.0	0.353	0.034409	(.07)	0.24038	(.43)	0.05067	(.40)	**218.08**	**0.16**	218.73	225.7	0.47
z4	0.3	4.1	1.29	221.3	0.407	0.034727	(.31)	0.24420	(3.94)	0.05100	(3.73)	220.06	0.68	221.85	240.8	0.69
z5	0.3	64.5	0.88	3517.7	0.279	0.034713	(.06)	0.24249	(.34)	0.05066	(.30)	219.98	0.14	220.46	225.5	0.65
z6	0.2	18.7	1.23	955.4	0.391	0.034728	(.11)	0.24246	(1.18)	0.05064	(1.13)	220.07	0.24	220.43	224.3	0.46
z7	0.2	24.1	1.09	1262.0	0.346	0.034397	(.09)	0.23981	(.85)	0.05057	(.82)	**218.01**	**0.19**	218.27	221.1	0.46
z9	0.2	39.5	0.74	2237.8	0.235	0.034979	(.07)	0.24514	(.49)	0.05083	(.46)	221.64	0.16	222.62	233.0	0.51
CCC																
z1	1.3	51.0	0.81	2835.1	0.258	0.034509	(.07)	0.24058	(.28)	0.05056	(.25)	218.71	0.14	218.89	220.9	0.51
z2	0.6	60.5	1.16	3100.9	0.366	0.034351	(.06)	0.23954	(.26)	0.05057	(.23)	**217.72**	**0.13**	218.04	221.5	0.58
z4	0.8	14.6	1.32	736.6	0.417	0.034716	(.10)	0.24273	(.96)	0.05071	(.91)	220.00	0.22	220.65	227.7	0.54
z5	0.7	22.3	1.17	1150.8	0.371	0.034626	(.07)	0.24199	(.64)	0.05069	(.62)	219.44	0.15	220.05	226.6	0.39
z6	0.5	25.2	1.07	1328.9	0.338	0.034795	(.08)	0.24357	(.56)	0.05077	(.52)	220.49	0.18	221.34	230.4	0.57
z7	0.6	17.2	1.43	845.8	0.453	0.034994	(.11)	0.24540	(.87)	0.05086	(.81)	221.73	0.23	222.83	234.5	0.59
z8	0.6	60.4	0.97	3231.8	0.306	0.034440	(.06)	0.24018	(.26)	0.05058	(.23)	218.28	0.13	218.57	221.7	0.58
z9	0.5	10.5	1.26	541.2	0.400	0.034771	(.12)	0.24635	(1.28)	0.05138	(1.20)	220.34	0.26	223.60	258.1	0.63
z10	0.2	81.7	1.30	4047.7	0.412	0.034443	(.05)	0.24047	(.24)	0.05063	(.22)	218.30	0.11	218.80	224.2	0.34

z11	0.4	20.1	1.18	1036.4	0.374	0.034698	(.14)	0.24054	(.80)	0.05028	(.73)	219.88	0.30	218.86	207.9	0.54
z12	0.3	72.9	0.66	4200.7	0.208	0.034354	(.06)	0.23920	(.27)	0.05050	(.24)	**217.74**	**0.13**	217.77	218.0	0.60
SBJ																
z1	0.5	49.0	0.71	2793.2	0.225	0.034741	(.08)	0.24265	(.30)	0.05066	(.27)	220.15	0.17	220.58	225.2	0.48
z2	0.7	31.1	0.99	1663.2	0.313	0.034681	(.06)	0.24238	(.42)	0.05069	(.39)	219.78	0.14	220.37	226.7	0.52
z3	0.7	35.4	0.98	1893.7	0.311	0.034607	(.08)	0.24158	(.38)	0.05063	(.36)	**219.32**	**0.16**	219.71	224.0	0.40
z4	1.2	9.1	1.56	444.1	0.494	0.034762	(.17)	0.24586	(1.58)	0.05129	(1.50)	220.28	0.36	223.20	254.1	0.56
z5	1.2	17.1	0.68	993.5	0.214	0.034624	(.08)	0.24270	(.69)	0.05084	(.64)	**219.43**	**0.17**	220.63	233.5	0.63
z8	4.0	4.1	1.07	232.6	0.339	0.034626	(.21)	0.24416	(2.86)	0.05114	(2.71)	**219.44**	**0.46**	221.82	247.2	0.75
z9	2.8	8.2	1.26	425.0	0.399	0.034611	(.13)	0.24154	(1.61)	0.05062	(1.52)	**219.34**	**0.29**	219.68	223.3	0.68
z10	0.8	21.0	1.16	1086.9	0.369	0.034582	(.09)	0.24091	(.65)	0.05052	(.60)	**219.16**	**0.19**	219.16	219.2	0.56
z11	0.4	24.0	1.20	1226.6	0.380	0.034605	(.08)	0.24152	(.66)	0.05062	(.61)	**219.30**	**0.17**	219.66	223.5	0.66
TPs																
z1	0.5	14.7	1.12	771.4	0.355	0.035188	(.10)	0.24593	(.94)	0.05069	(.88)	**222.94**	**0.21**	223.26	226.7	0.65
z2	0.5	9.4	1.77	440.1	0.560	0.034972	(.15)	0.24392	(1.69)	0.05059	(1.61)	221.59	0.34	221.63	222.0	0.60
z3	0.5	29.2	1.14	1510.7	0.359	0.034669	(.07)	0.24285	(.49)	0.05080	(.45)	219.70	0.14	220.75	231.9	0.62
z4	0.6	48.5	0.98	2590.8	0.310	0.035224	(.07)	0.24632	(.33)	0.05072	(.31)	**223.16**	**0.14**	223.58	228.0	0.31
z5	0.5	47.2	1.07	2469.6	0.340	0.035211	(.06)	0.24584	(.30)	0.05064	(.28)	**223.08**	**0.12**	223.19	224.4	0.57
z7	0.2	42.3	1.32	2096.7	0.417	0.035214	(.07)	0.24534	(.42)	0.05053	(.39)	**223.10**	**0.15**	222.78	219.4	0.55
z8	1.9	8.4	1.34	427.9	0.425	0.035200	(.12)	0.24779	(1.53)	0.05106	(1.44)	**223.01**	**0.27**	224.78	243.4	0.70
z9	0.4	27.3	1.34	1353.0	0.426	0.035193	(.07)	0.24655	(.50)	0.05081	(.46)	**222.97**	**0.15**	223.77	232.2	0.60
z10	0.3	54.9	0.94	2959.7	0.297	0.035182	(.07)	0.24553	(.34)	0.05062	(.30)	**222.90**	**0.14**	222.94	223.4	0.58
SS-28																
z1	0.4	21.8	1.67	1014.1	0.528	0.035570	(.11)	0.25055	(.67)	0.05109	(.64)	**225.31**	**0.24**	227.02	244.8	0.37

z2	0.4	19.6	1.81	888.9	0.573	0.035554	(.09)	0.24887	(.75)	0.05077	(.70)	**225.22**	**0.20**	225.66	230.3	0.52
z4	0.5	43.1	1.74	1960.6	0.551	0.035545	(.07)	0.24912	(.35)	0.05083	(.33)	**225.16**	**0.16**	225.86	233.1	0.36
z5	0.5	31.5	2.14	1332.7	0.676	0.035529	(.09)	0.24891	(.51)	0.05081	(.48)	**225.06**	**0.19**	225.69	232.3	0.46
z6	0.2	20.4	1.83	921.3	0.581	0.035572	(.09)	0.24864	(.71)	0.05070	(.67)	**225.33**	**0.21**	225.47	227.0	0.48
z7	0.2	34.2	1.87	1517.1	0.592	0.035537	(.08)	0.24872	(.47)	0.05076	(.44)	**225.11**	**0.18**	225.53	229.9	0.40

Notes: Corr. coef. = correlation coefficient. Age calculations are based on the decay constants of Jaffey et al. (1971).

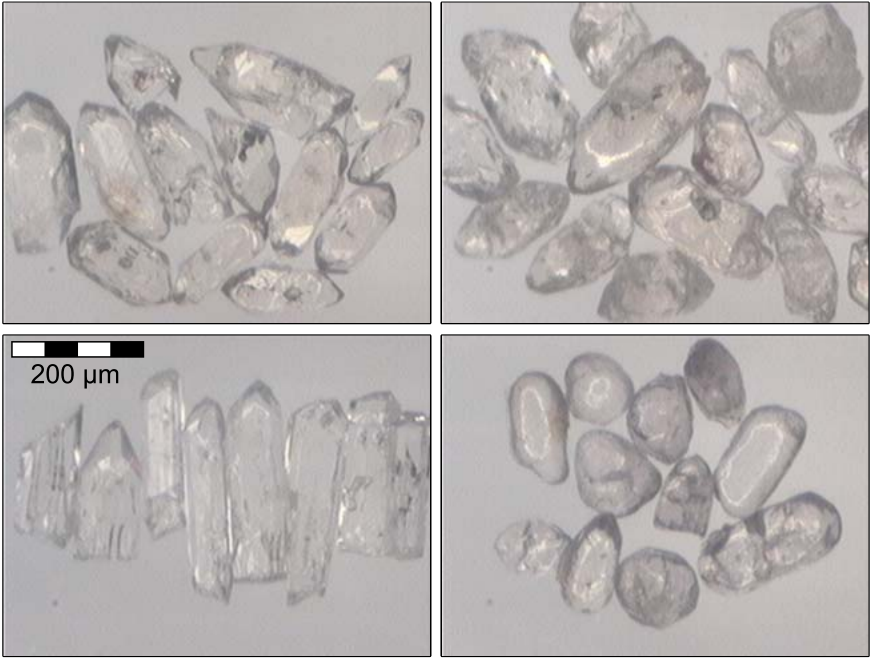
† All analyses are single zircon grains and pre-treated by the thermal annealing and acid leaching (CA-TIMS) technique. Data used in age calculations are in bold.

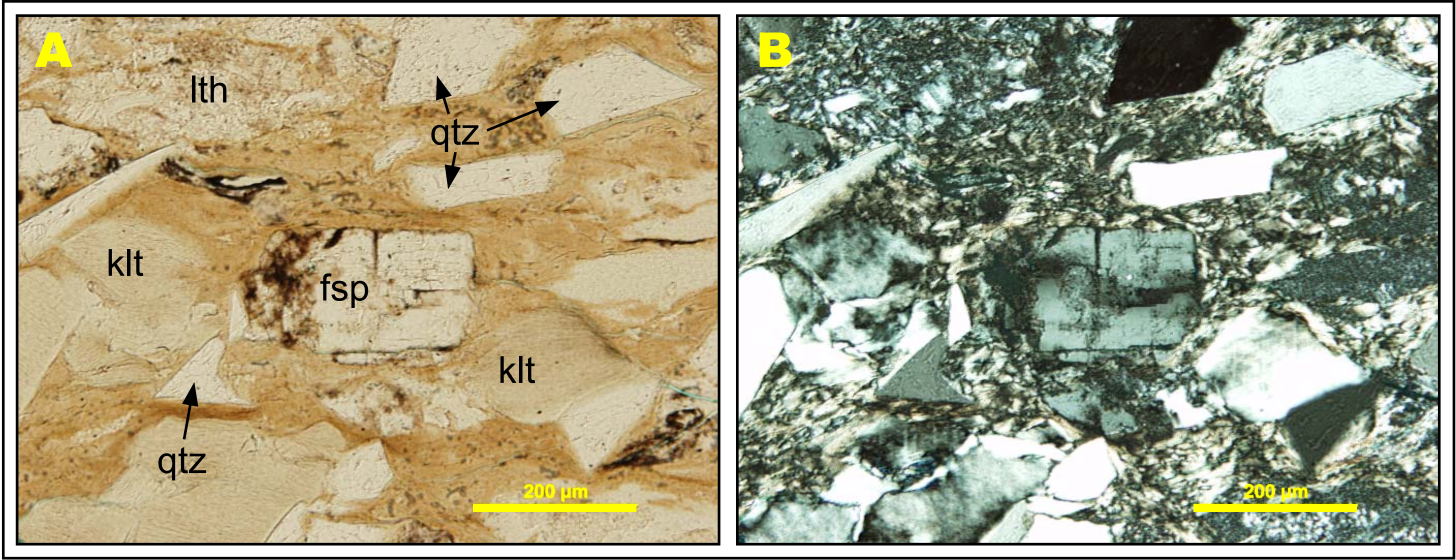
‡ Pb_c is total common Pb in analysis. Pb* is radiogenic Pb concentration.

§ Measured ratio corrected for spike and fractionation only.

\# Radiogenic Pb ratio.

†† Corrected for fractionation, spike, blank, and initial Th/U disequilibrium in magma. Mass fractionation correction of 0.25%/amu ± 0.04%/amu (atomic mass unit) was applied to single-collector Daly analyses. All common Pb is assumed to be blank. Total procedural blank was less than 0.1pg for U. Blank isotopic composition: $^{206}Pb/^{204}Pb$ = 18.27 ± 0.1, $^{207}Pb/^{204}Pb$ =15.59 ± 0.1, $^{208}Pb/^{204}Pb$ = 38.12 ± 0.1.


200 µm


A
lth
qtz
klt
fsp
klt
qtz
200 µm
B
200 µm