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Are granites and granulites consanguineous?

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Figure DR1. Sample locations.

Table DR1. Sample coordinates.

Figure DR2. Outcrop photographs. A. Migmatite comprising an orthopyroxene–garnet granulite with both concordant garnet-bearing and discordant garnet±orthopyroxene± biotite-bearing leucosomes (from east-southeast of Bobbili). B. Interlayered sillimanite–garnet granulite and garnet-bearing leucogranite (from west of Chintapalle).

GEOCHRONOLOGY – Analytical protocols

Figure DR3. Concordia plots for zircon and monazite from the migmatitic orthopyroxene–garnet granulite (09-52) and a concordant leucosome (10-61), and zircon age data for two sillimanite–garnet granulites (10-67 and 10-94) and associated granites (10-66 and 10-93).

Figure DR4. Chondrite-normalized REE plots for zircons from the dated granulites and granites. The REE plots are color coded continuously for age; the ages on the color scale are reference points along that scale.

Figure DR5. Representative CL images of zircon and BSE images of monazite from the dated granulites and granites.

Figure DR6. Oxide and trace element plots for granulites and granites from the Eastern Ghats Province.

Table DR2. Zircon and monazite U-Pb data.

Table DR3. Rare earth element data for zircon.

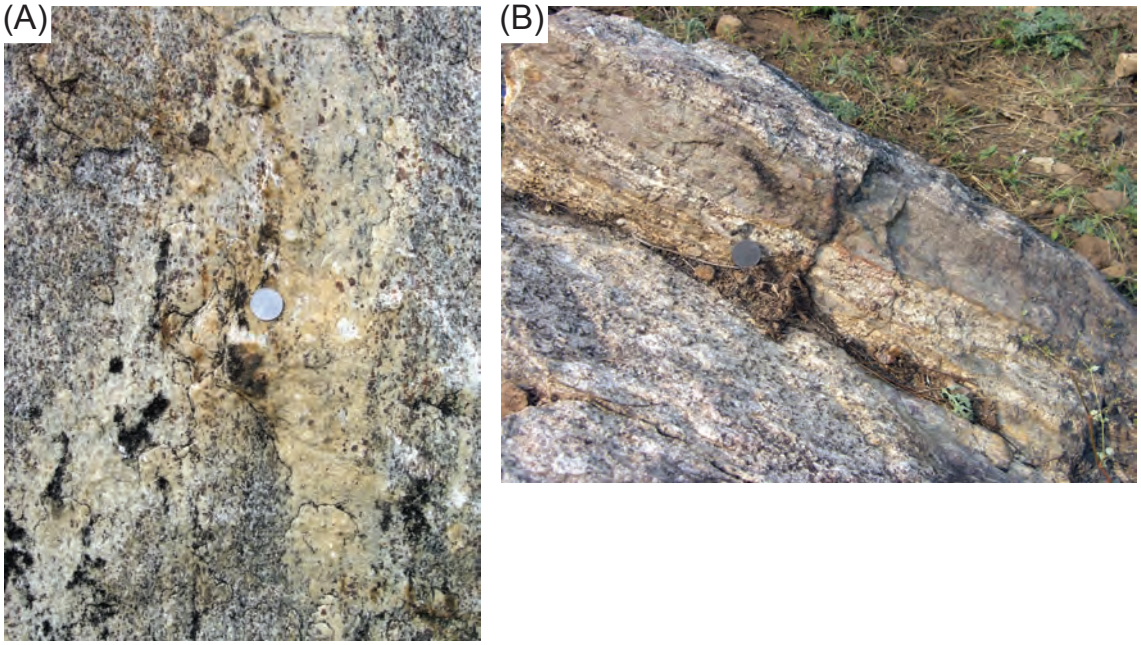
Table DR4. Whole-rock compositions and Sr–Nd isotope data.

Figure DR1. Sample locations

Table DR1. Sample coordinates

Rock type	Sample number	Latitude	Longitude
granite	09-19	18° 3'11.80"N	82°33'10.70"E
granite	09-35	18°16'15.40"N	82°56'56.90"E
granite	10-66	18°34'35.90"N	83°17'12.50"E
granite	10-90	17°57'8.60"N	82°23'18.50"E
granite	10-92	17°51'36.90"N	82°20'6.90"E
granite	10-93	17°51'36.90"N	82°20'6.90"E
leucosome	10-60	18°23'4.30"N	83°26'28.70"E
leucosome	10-61	18°23'4.30"N	83°26'28.70"E
opx–g granulite	09-01	18° 2'10.40"N	82°33'38.70"E
opx–g granulite	09-34	18°16'15.40"N	82°56'56.90"E
opx–g granulite	09-52	18°23'4.30"N	83°26'28.70"E
osm granulite	09-02	18° 3'15.80"N	82°33'23.50"E
osm granulite	09-04	18° 3'15.80"N	82°33'23.50"E
sill–g granulite	10-65	18°34'31.70"N	83°19'15.90"E
sill–g granulite	10-67	18°34'37.50"N	83°17'11.30"E
sill–g granulite	10-88	17°57'9.40"N	82°23'13.50"E
sill–g granulite	10-91	17°51'36.90"N	82°20'6.90"E
sill–g granulite	10-94	17°51'33.50"N	82°20'8.30"E

Figure DR2



GEOCHRONOLOGY

Analytical protocols

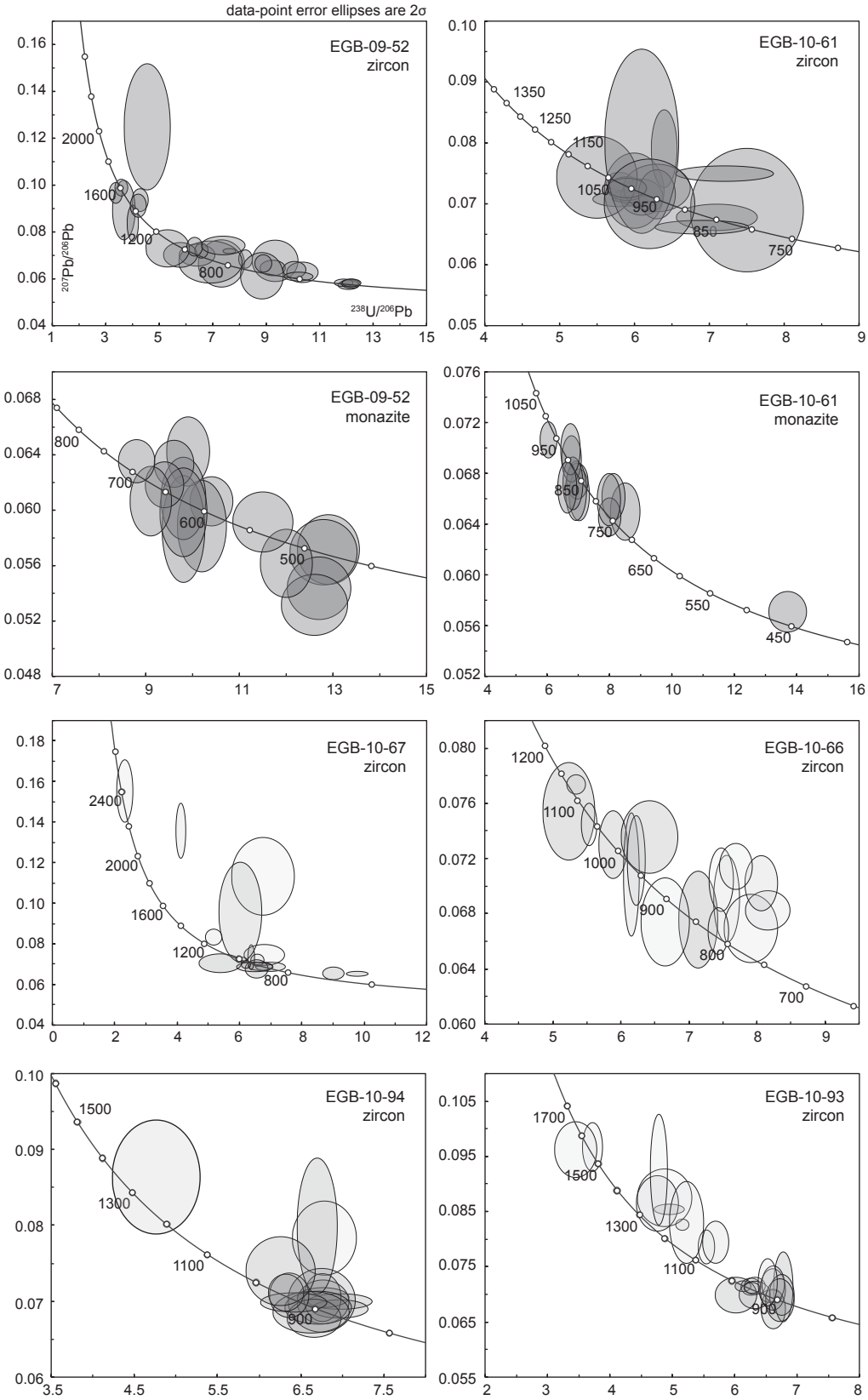
Zircon and monazite were analyzed at Curtin University using the SHRIMP II in the John de Laeter Centre for Mass Spectrometry and the ASI RESolution M-50 193 nm excimer laser with an Agilent 7700 mass spectrometer in the LAICP-MS facility, following the protocol of Taylor et al. (2014). The laser spots were located directly on top of the shallow SHRIMP spots.

Zircon in the granulites generally has oscillatory-zoned cores, which yield dates older than 1100 Ma, with steep normalized REE patterns; the cores are interpreted to be detrital. Zircon rims yield dates of 1000–900 Ma (09-52) or close to 900 Ma (10-67, -94), with scattered dates down to c. 500 Ma; the rims have flat normalized HREE patterns consistent with growth in the presence of garnet. Zircon from the leucosome and the two granites generally yield a spread of dates within the range 1300–800 Ma, with dates from cores being older than 1000 Ma, and populations at 1000–950 Ma (10-61) and c. 960 and c. 910 Ma (10-93). Normalized REE patterns from cores are always steep, but although those from rims generally have flat HREE, indicating equilibrium with garnet, a few do not. Monazite dates from 09–52 cluster around 700–600 Ma and c. 500 Ma, whereas monazite dates from the leucosome cluster at 950–850 Ma, with smaller clusters at c. 750 and c. 620 Ma. The textures in the monazite suggest fluid-mediated coupled dissolution–reprecipitation affecting Grenville-age grains. The youngest ages reflect the variable effects of the Gondwana-wide Pan-African event.

REFERENCE CITED

Taylor, R.J.M, Clark, C., Fitzsimons, I.C.W., Santosh, M., Hand, M., Evans, N., and McDonald, B., 2014, Post-peak, fluid mediated modification of granulite facies zircon and monazite in the Trivandrum Block, southern India: Contributions to Mineralogy and Petrology, 168, paper 1044.

Figure DR3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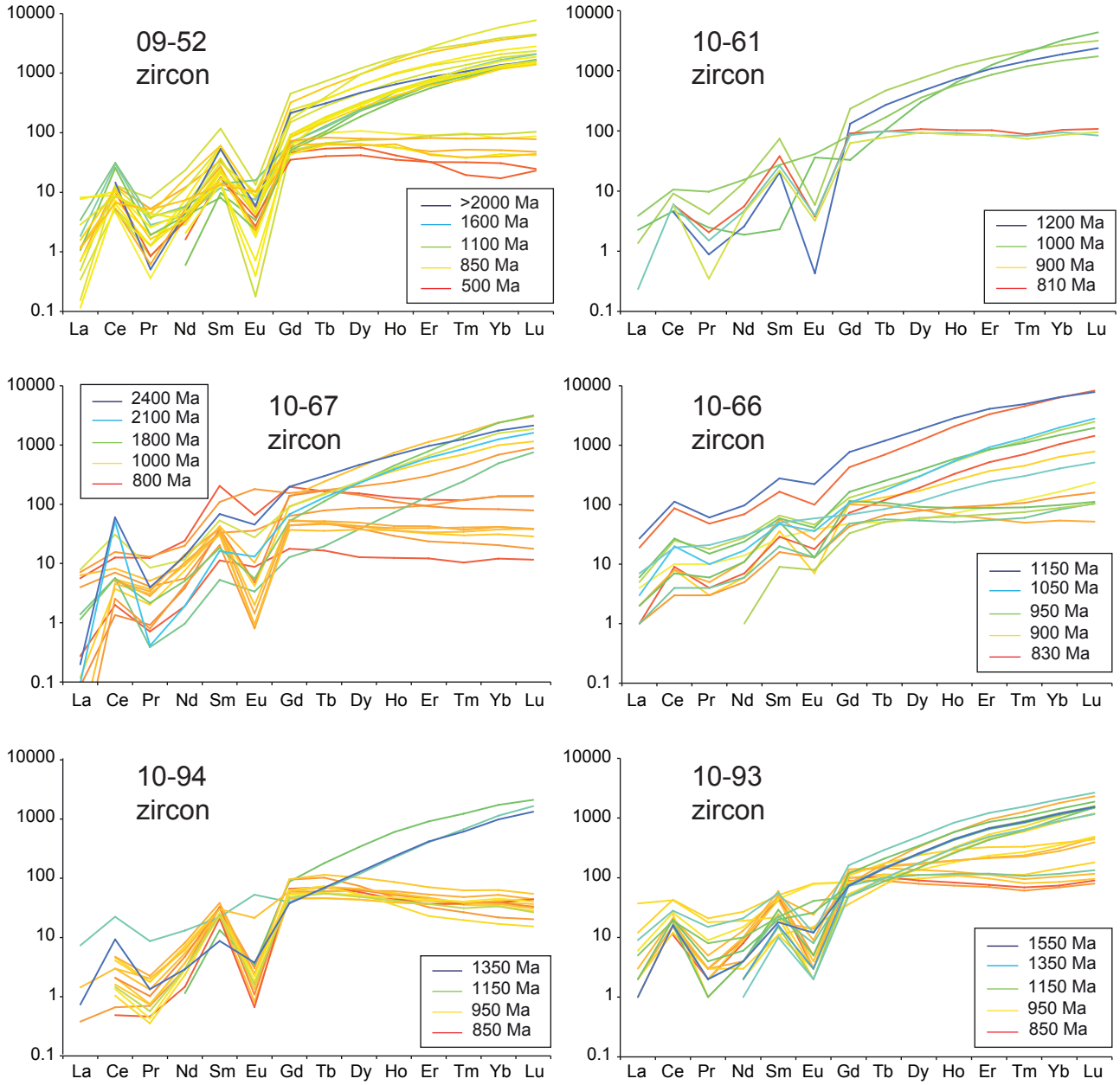
zircon
EGB-10-61
zircon
EGB-09-52
monazite
EGB-10-61
monazite
EGB-10-67
zircon
EGB-10-66
zircon
EGB-10-94
zircon
EGB-10-93
zircon
$^{207}Pb/^{206}Pb$
$^{238}U/^{206}Pb$

Figure DR4


09-52
zircon
>2000 Ma
1600 Ma
1100 Ma
850 Ma
500 Ma
10-61
zircon
1200 Ma
1000 Ma
900 Ma
810 Ma
10-67
zircon
2400 Ma
2100 Ma
1800 Ma
1000 Ma
800 Ma
10-66
zircon
1150 Ma
1050 Ma
950 Ma
900 Ma
830 Ma
10-94
zircon
1350 Ma
1150 Ma
950 Ma
850 Ma
10-93
zircon
1550 Ma
1350 Ma
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950 Ma
850 Ma
10000
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0.1
La Ce Pr Nd Sm Eu Gd Tb Dy Ho Er Tm Yb Lu

Figure DR5

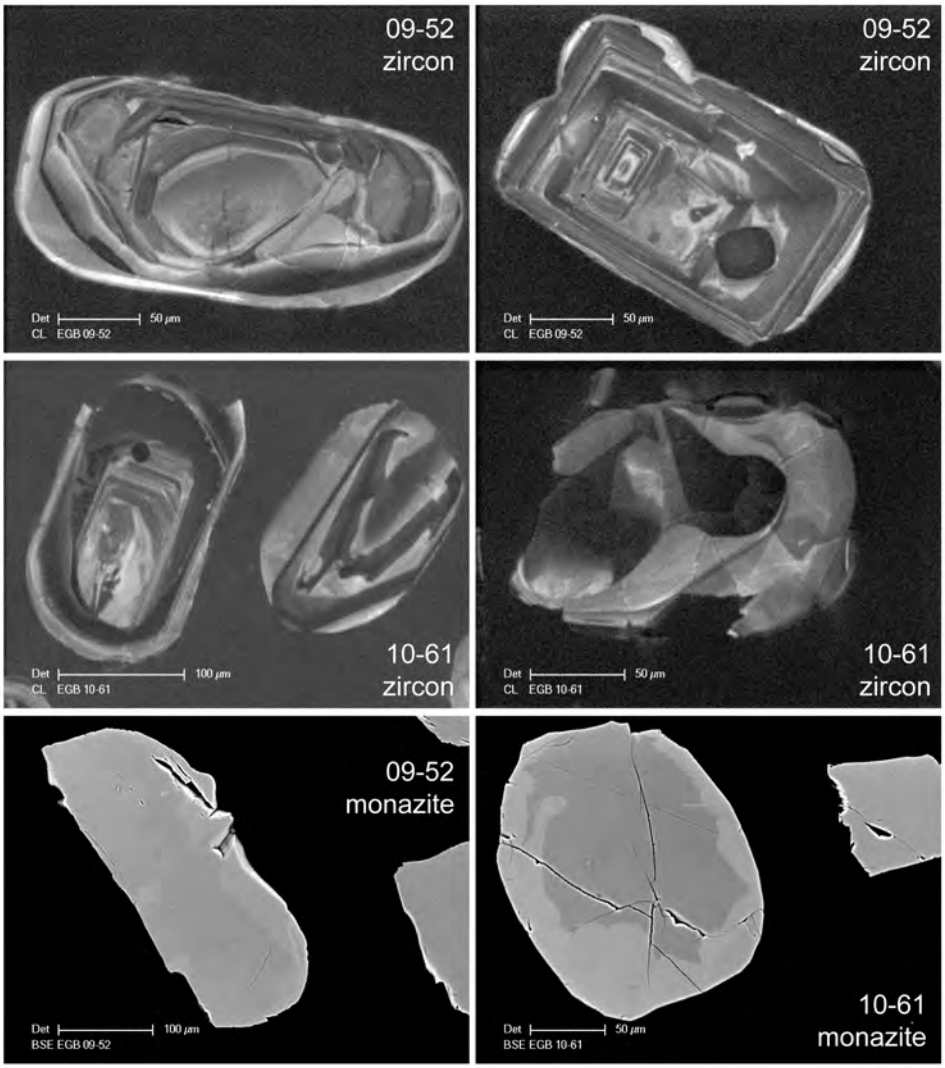
09-52
zircon
Det
50 μm
CL EGB 09-52
09-52
zircon
Det
50 μm
CL EGB 09-52
10-61
zircon
Det
100 μm
CL EGB 10-61
10-61
zircon
Det
50 μm
CL EGB 10-61
09-52
monazite
Det
100 μm
BSE EGB 09-52
10-61
monazite
Det
50 μm
BSE EGB 10-61

Figure DR5 (cont.)

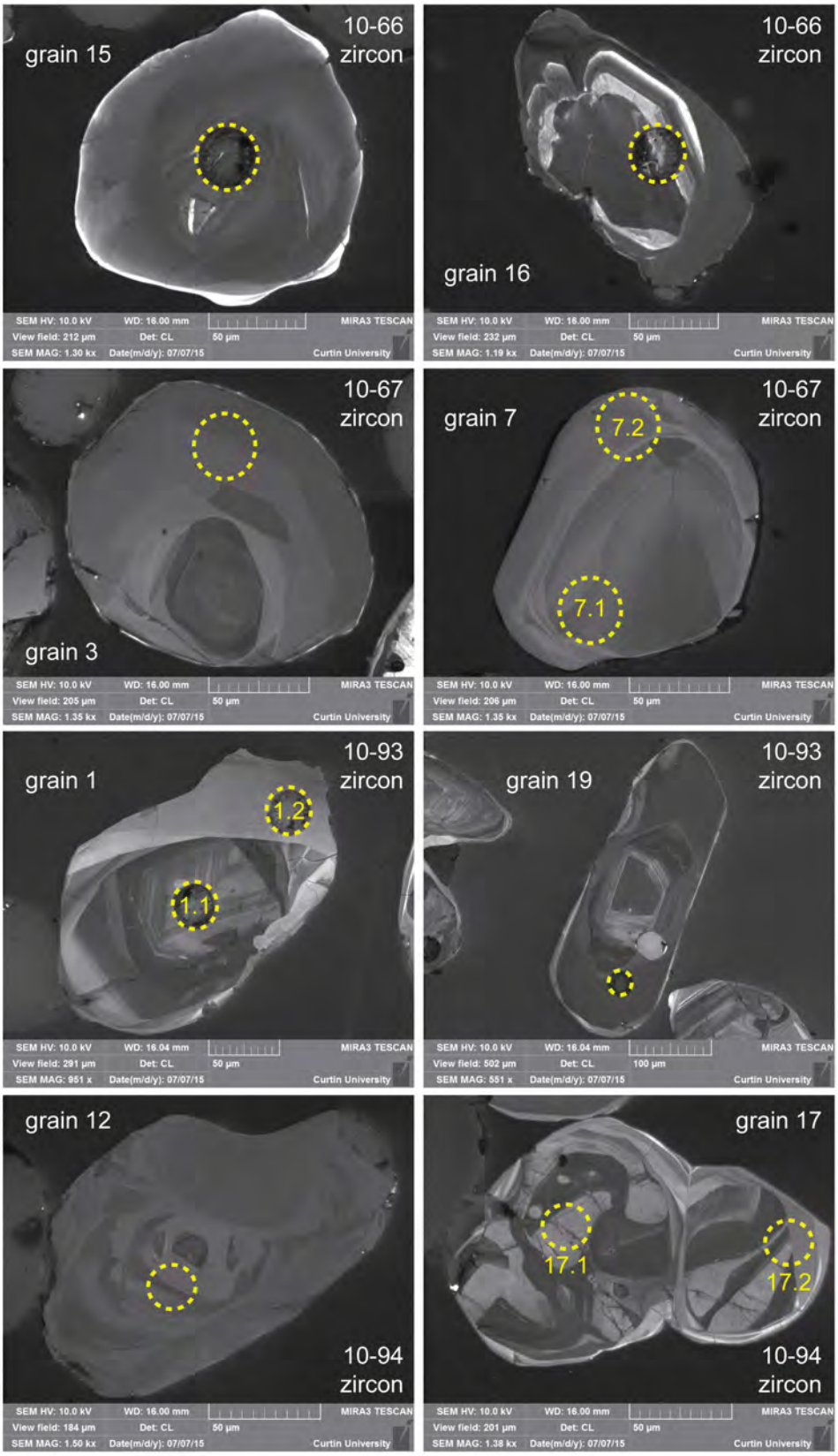

Figure DR6

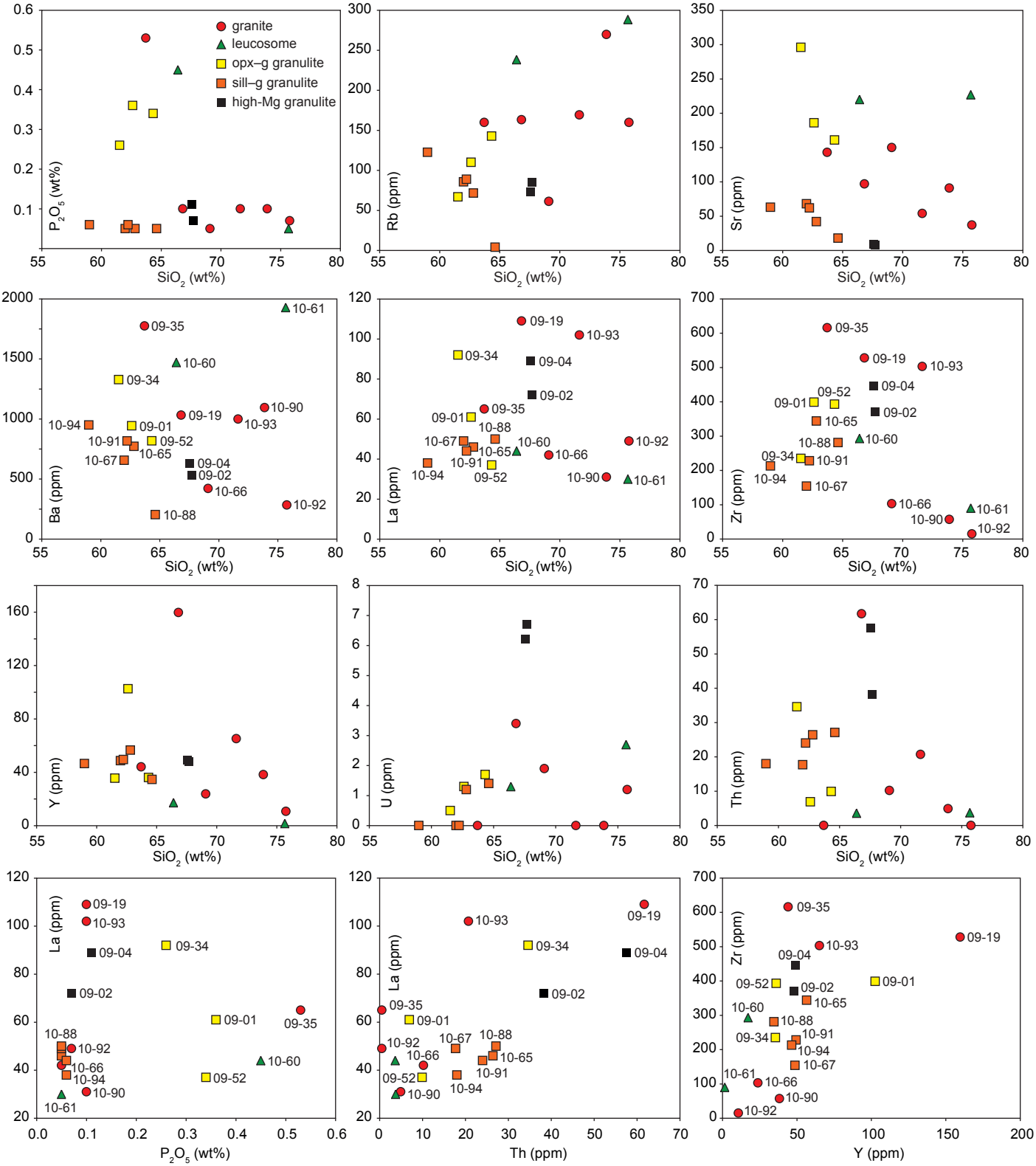
granite
leucosome
opx–g granulite
sill–g granulite
high-Mg granulite
P2O5 (wt%)
Rb (ppm)
Sr (ppm)
Ba (ppm)
La (ppm)
Zr (ppm)
Y (ppm)
U (ppm)
Th (ppm)
SiO2 (wt%)
P2O5 (wt%)
Th (ppm)
Y (ppm)

Table DR2. Zircon and monazite U–Pb data

Spot	U (ppm)	Th (ppm)	$^{232}Th/^{238}U$	±σ (%)	$f^{204}Pb$	$^{207}Pb^{*}/^{235}U$	±σ (%)	$^{238}U/^{206}Pb^{*}$	±σ (%)	$^{207}Pb^{*}/^{206}Pb^{*}$	±σ (%)	$^{207}Pb^{*}/^{235}U$		$^{206}Pb^{*}/^{238}U$		$^{207}Pb^{*}/^{206}Pb^{*}$		Disc. (%)	Disc. (%)	Err corr
												Date (Ma)	±1σ	Date (Ma)	±1σ	Date (Ma)	±1σ	$^{207}Pb^{*}/^{235}U$		
Sample 09-52: zircon																				
0952-2.1	181	151	0.86	0.37	0.203	1.247	7.870	7.338	4.808	0.066	6.231	822	65	824	37	818	130	0	-1	0.611
0952-1.1	156	92	0.61	0.44	0.000	0.996	6.520	9.337	3.741	0.067	5.340	702	46	656	23	851	111	7	24	0.574
0952-3.1	314	239	0.79	0.30	0.048	3.000	3.583	4.293	2.888	0.093	2.120	1408	50	1350	35	1496	40	4	11	0.806
0952-4.1	475	248	0.54	0.27	-0.067	3.765	11.726	4.566	7.729	0.125	8.819	1585	186	1277	90	2024	156	24	41	0.659
0952-4.2	488	69	0.15	0.77	0.069	1.141	2.671	8.238	1.269	0.068	2.351	773	21	739	9	874	49	5	16	0.475
0952-5.1	227	175	0.80	0.35	0.000	1.501	5.047	6.420	4.246	0.070	2.729	931	47	933	37	925	56	0	-1	0.841
0952-6.1	139	87	0.64	0.48	0.622	1.333	8.882	6.924	6.994	0.067	5.473	860	76	870	57	836	114	-1	-4	0.788
0952-7.1	400	140	0.36	0.97	0.000	0.960	2.948	9.250	2.081	0.064	2.088	683	20	662	13	755	44	3	13	0.706
0952-7.2	208	175	0.87	0.35	-0.130	0.951	7.541	8.852	3.676	0.061	6.584	679	51	690	24	642	142	-2	-8	0.487
0952-8.1	134	137	1.06	0.28	0.192	1.664	5.441	5.797	4.479	0.070	3.089	995	54	1026	42	927	63	-3	-12	0.823
0952-9.1	685	213	0.32	0.40	0.079	1.294	1.380	7.630	1.257	0.072	0.569	843	12	794	9	975	12	6	20	0.911
0952-9.2	360	292	0.84	0.17	0.392	0.833	3.685	10.362	2.307	0.063	2.874	615	23	594	13	694	61	4	15	0.626
0952-10.1	333	227	0.71	0.19	0.008	3.333	7.471	3.686	4.694	0.089	5.812	1489	111	1547	65	1406	111	-4	-11	0.628
0952-10.2	742	271	0.38	1.39	0.094	2.857	4.327	4.030	2.124	0.084	3.771	1371	59	1429	27	1281	73	-4	-13	0.491
0952-12.1	221	127	0.59	0.38	0.000	1.886	7.698	5.320	6.260	0.073	4.481	1076	83	1110	64	1007	91	-3	-11	0.813
0952-12.2	372	174	0.48	0.20	0.137	0.651	1.878	12.089	1.318	0.057	1.338	509	10	512	6	496	29	-1	-3	0.702
0952-13.1	521	526	1.04	0.14	0.019	1.502	2.347	6.591	1.511	0.072	1.796	931	22	911	13	980	37	2	8	0.644
0952-14.1	346	165	0.49	0.21	0.048	0.872	2.829	10.068	1.737	0.064	2.233	636	18	610	10	730	47	4	17	0.614
0952-14.2	470	224	0.49	0.18	0.066	0.658	1.533	12.132	1.125	0.058	1.041	513	8	511	6	525	23	1	3	0.734
0952-15.1	489	308	0.65	0.19	0.043	3.924	3.511	3.389	2.977	0.096	1.861	1619	57	1667	44	1556	35	-3	-8	0.848
0952-15.2	202	163	0.84	0.24	0.061	1.378	5.037	7.402	4.544	0.074	2.173	880	44	817	35	1041	44	8	23	0.902
0952-16.1	454	233	0.53	0.96	0.023	1.601	2.905	6.334	1.904	0.074	2.194	970	28	945	17	1028	44	3	9	0.656
0952-17.1	353	183	0.54	0.21	-0.031	0.673	1.639	11.908	1.190	0.058	1.128	522	9	520	6	533	25	0	3	0.726
0952-18.1	390	216	0.57	0.32	0.040	1.027	2.703	8.903	1.419	0.066	2.300	718	19	686	9	817	48	5	17	0.525
0952-18.2	334	206	0.64	0.21	0.099	0.654	1.801	12.175	1.172	0.058	1.367	511	9	509	6	519	30	0	2	0.651
0952-11.3	351	121	0.36	0.47	0.137	0.820	2.508	10.220	2.154	0.061	1.285	608	15	602	12	631	28	1	5	0.859
0952-11.4	400	253	0.65	0.19	0.057	0.655	1.637	12.212	1.156	0.058	1.159	512	8	507	6	531	25	1	5	0.706
0952-19.1	246	585	2.45	0.74	0.096	3.791	3.070	3.590	2.686	0.099	1.487	1591	49	1584	38	1600	28	0	1	0.875
0952-20.1	436	384	0.91	1.48	0.074	2.970	3.684	4.224	2.935	0.091	2.226	1400	52	1370	36	1446	42	2	6	0.797
Sample 10-61: zircon																				
1061-1.1	398	647	1.68	0.53	0.100	1.670	1.400	5.900	1.200	0.071	0.600	996	±14	1012	±12	960	±13	-2	-6	0.900
1061-2.1	293	223	0.79	0.18	--	1.690	2.600	5.800	2.500	0.071	0.700	1004	±26	1028	±24	950	±14	-2	-9	1.000
1061-3.1	1795	401	0.23	0.19	--	1.740	1.500	5.800	1.300	0.074	0.800	1025	±16	1022	±13	1031	±15	0	1	0.900
1061-4.1	746	83	0.12	2.34	0.080	1.600	1.900	6.100	1.800	0.070	0.500	972	±19	986	±17	940	±10	-1	-5	1.000
1061-5.2	515	230	0.46	0.16	0.060	1.650	4.400	6.000	2.700	0.072	3.500	988	±44	988	±25	989	±72	0	0	0.600
1061-6.1	1366	34	0.03	0.33	0.010	1.620	2.000	6.000	2.000	0.071	0.300	976	±20	989	±18	949	±6	-1	-4	1.000
1061-7.1	1002	69	0.07	0.75	0.340	1.610	2.500	6.100	1.900	0.071	1.700	972	±25	979	±17	957	±34	-1	-3	0.800
1061-8.1	2195	59	0.03	0.25	0.020	1.710	2.100	5.900	1.800	0.072	1.100	1011	±22	1017	±17	997	±22	-1	-2	0.900
1061-9.1	481	73	0.16	0.25	0.030	1.710	3.500	6.400	1.100	0.079	3.300	1014	±35	942	±10	1173	±65	8	21	0.300
1061-10.1	1085	161	0.15	0.92	0.770	1.580	3.700	6.300	2.900	0.073	2.200	961	±35	944	±26	1000	±46	2	6	0.800
1061-10.2	238	121	0.53	0.22	--	1.880	5.400	5.500	4.000	0.074	3.700	1073	±58	1085	±40	1049	±74	-1	-4	0.700
1061-11.1	508	329	0.67	0.19	0.040	1.310	3.400	7.100	3.100	0.068	1.300	851	±29	848	±25	860	±27	0	1	0.900
1061-12.1	313	123	0.41	0.80	0.080	1.270	7.200	7.500	4.100	0.069	6.000	831	±60	806	±31	897	±123	3	11	0.600
1061-13.1	539	671	1.29	0.47	0.560	1.570	2.800	6.300	1.600	0.072	2.300	959	±27	953	±14	973	±48	1	2	0.600
1061-14.1	654	185	0.29	1.25	0.020	1.700	2.000	5.900	1.800	0.073	0.900	1010	±20	1014	±16	1000	±18	0	-2	0.900
1061-15.1	1499	250	0.17	0.31	0.180	1.810	8.300	6.100	3.300	0.080	7.700	1049	±87	977	±30	1203	±151	7	20	0.400
1061-15.2	355	275	0.80	0.28	0.030	1.330	3.700	6.900	3.700	0.066	0.700	857	±32	875	±30	810	±15	-2	-9	1.000
1061-16.1	345	267	0.80	0.18	0.030	1.440	3.700	7.200	3.700	0.075	0.700	907	±34	843	±29	1065	±14	8	22	1.000
1061-17.1	366	228	0.64	0.43	0.040	1.550	5.900	6.200	4.000	0.070	4.300	950	±56	960	±35	925	±89	-1	-4	0.700

Ion microprobe U–Pb data. Disc (%) is the age discordance as defined = 100×(1−[($^{206}Pb^{*}/^{238}U$ date)−($^{207}Pb^{*}/^{206}Pb^{*}$ date)]/($^{207}Pb^{*}/^{206}Pb^{*}$ date)).

Disc (%) for $^{207}Pb^{*}/^{235}U$ is the age discordance as defined = 100×[($^{207}Pb^{*}/^{235}U$ date)−($^{206}Pb^{*}/^{238}U$ date)]/($^{206}Pb^{*}/^{238}U$ date)

All errors are at the 1σ level; $f^{204}Pb$ is the percentage of common ^{206}Pb, estimated from the measured ^{204}Pb.

Table DR2 (cont). Zircon and monazite U–Pb data

Sample 10-66: zircon

Spot	204Pb /206Pb	±%	% $206Pb_c$	ppm U	ppm Th	4-corr ppm $206Pb^*$	232Th /238U	±%	(1) 206Pb /238U Age	(1) 207Pb /206Pb Age	(1) 208Pb /232Th Age	% Dis-cor-dant	(1) 238U /$206Pb^*$	±%	(1) $207Pb^*$ /$206Pb^*$	±%	(1) $207Pb^*$ /235U	±%	(1) $206Pb^*$ /238U	±%	err corr
1066-1.1	7.7E-6	95	0.01	574	6	65	0.01	2.95	803 ±8	900 ±38	919 ±80	+12	7.5	1.0	0.0691	1.9	1.26	2.1	0.133	1.0	0.5
1066-1.2	1.3E-5	58	0.02	804	336	97	0.43	0.59	847 ±13	855 ±44	792 ±20	+1	7.1	1.6	0.0675	2.1	1.31	2.7	0.140	1.6	0.6
1066-2.1	3.1E-5	27	0.05	1270	1825	205	1.48	0.19	1110 ±11	1129 ±7	1090 ±12	+2	5.3	1.1	0.0773	0.4	2.00	1.1	0.188	1.1	0.9
1066-5.1	1.6E-4	18	0.28	704	484	81	0.71	0.41	811 ±8	941 ±27	908 ±17	+15	7.5	1.0	0.0704	1.3	1.30	1.7	0.134	1.0	0.6
1066-7.1	1.6E-4	15	0.29	1300	317	141	0.25	3.05	769 ±15	835 ±31	777 ±36	+8	7.9	2.0	0.0669	1.5	1.17	2.5	0.127	2.0	0.8
1066-8.1	1.1E-4	26	0.20	376	399	59	1.09	0.19	1073 ±8	1053 ±17	1061 ±18	-2	5.5	0.9	0.0744	0.8	1.86	1.2	0.181	0.9	0.7
1066-9.1	1.4E-4	25	0.25	470	118	54	0.26	0.29	815 ±6	829 ±21	807 ±25	+2	7.4	0.8	0.0667	1.0	1.24	1.3	0.135	0.8	0.6
1066-13.1	2.9E-5	41	0.05	670	584	98	0.90	2.46	1014 ±14	1013 ±28	1022 ±33	-0	5.9	1.5	0.0730	1.4	1.71	2.0	0.170	1.5	0.7
1066-15.1	2.0E-5	50	0.04	706	25	99	0.04	1.79	973 ±7	952 ±52	814 ±56	-2	6.1	0.8	0.0708	2.6	1.59	2.7	0.163	0.8	0.3
1066-16.1	1.2E-4	27	0.22	357	151	49	0.44	1.49	962 ±8	981 ±37	979 ±21	+2	6.2	0.9	0.0718	1.8	1.59	2.0	0.161	0.9	0.4
1066-17.1	3.7E-5	31	0.07	753	290	124	0.40	0.43	1131 ±31	1078 ±38	963 ±52	-5	5.2	3.0	0.0754	1.9	1.99	3.5	0.192	3.0	0.8
1066-18.1	5.0E-4	9	0.90	823	370	110	0.46	1.30	935 ±23	1028 ±29	877 ±34	+10	6.4	2.6	0.0735	1.5	1.58	3.0	0.156	2.6	0.9
1066-19.1	6.7E-5	35	0.12	509	517	54	1.05	0.32	747 ±12	875 ±18	761 ±16	+16	8.1	1.6	0.0682	0.9	1.16	1.8	0.123	1.6	0.9
1066-20.1	2.1E-4	16	0.37	1436	459	153	0.33	1.52	755 ±9	934 ±24	998 ±25	+20	8.1	1.2	0.0702	1.2	1.20	1.7	0.124	1.2	0.7
1066-21.1	7.4E-5	25	0.13	866	120	97	0.14	0.65	789 ±10	968 ±19	739 ±27	+20	7.7	1.3	0.0714	0.9	1.28	1.6	0.130	1.3	0.8
1066-21.2	6.5E-5	32	0.12	544	14	70	0.03	0.75	905 ±18	850 ±40	766 ±91	-7	6.6	2.2	0.0674	1.9	1.40	2.9	0.151	2.2	0.8

Errors are 1-sigma; Pb_c and Pb^* indicate the common and radiogenic portions, respectively.

Error in Standard calibration was 0.27% (not included in above errors but required when comparing data from different mounts).

(1) Common Pb corrected using measured 204Pb.

(1) Common Pb corrected using measured 204Pb.

Sample 10-67: zircon

Spot	204Pb /206Pb	±%	% $206Pb_c$	ppm U	ppm Th	4-corr ppm $206Pb^*$	232Th /238U	±%	(1) 206Pb /238U Age	(1) 207Pb /206Pb Age	% Dis-cor-dant	(1) 238U /$206Pb^*$	±%	(1) $207Pb^*$ /$206Pb^*$	±%	(1) $207Pb^*$ /235U	±%	(1) $206Pb^*$ /238U	±%	err corr
1067-12.1	-2.5E-5	38	--	1365	27	120	0.02	0.42	629 ±9	782 ±17	+20	9.75	1.5	0.0652	0.8	0.92	1.7	0.103	1.5	0.9
1067-19.1	-4.8E-6	100	--	1039	22	99	0.02	0.50	680 ±10	787 ±40	+14	8.99	1.5	0.0654	1.9	1.00	2.4	0.111	1.5	0.6
1067-10.1	3.7E-5	26	0.07	1409	29	173	0.02	0.39	863 ±23	889 ±27	+3	6.98	2.8	0.0687	1.3	1.36	3.1	0.143	2.8	0.9
1067-18.1	-1.2E-5	100	--	301	95	38	0.33	1.39	888 ±33	1055 ±56	+17	6.77	4.0	0.0745	2.8	1.52	4.9	0.148	4.0	0.8
1067-16.1	1.5E-5	50	0.03	872	73	111	0.09	1.63	893 ±51	1850 ±124	+55	6.73	6.1	0.1131	6.9	2.32	9.2	0.149	6.1	0.7
1067-8.1	-1.4E-5	50	--	988	12	128	0.01	1.27	903 ±20	895 ±25	-1	6.65	2.4	0.0689	1.2	1.43	2.7	0.150	2.4	0.9
1067-17.1	1.3E-5	71	0.02	533	232	70	0.45	1.45	916 ±11	982 ±33	+7	6.55	1.3	0.0719	1.6	1.51	2.1	0.153	1.3	0.6
1067-7.1	4.6E-5	33	0.08	700	88	92	0.13	1.40	919 ±20	855 ±57	-8	6.53	2.3	0.0676	2.7	1.43	3.6	0.153	2.3	0.7
1067-5.1	1.2E-4	38	0.22	191	192	25	1.04	0.40	927 ±32	886 ±29	-5	6.47	3.7	0.0686	1.4	1.46	3.9	0.155	3.7	0.9
1067-4.1	2.8E-5	71	0.05	240	225	32	0.97	0.24	942 ±6	1026 ±68	+9	6.36	0.7	0.0734	3.4	1.59	3.4	0.157	0.7	0.2
1067-7.2	4.6E-5	50	0.08	279	173	39	0.64	0.51	967 ±9	916 ±19	-6	6.18	0.9	0.0696	0.9	1.55	1.3	0.162	0.9	0.7
1067-9.1	3.0E-5	45	0.05	502	173	71	0.36	0.50	981 ±7	991 ±13	+1	6.08	0.8	0.0722	0.6	1.64	1.0	0.164	0.8	0.8
1067-15.1	1.5E-5	58	0.03	529	113	76	0.22	0.92	993 ±43	1539 ±197	+38	6.00	4.7	0.0955	10.5	2.19	11.5	0.167	4.7	0.4
1067-3.1	----	---	--	294	173	47	0.61	0.45	1102 ±52	940 ±55	-19	5.37	5.1	0.0704	2.7	1.81	5.8	0.186	5.1	0.9
1067-13.1	5.7E-5	20	0.10	1382	353	230	0.26	0.65	1143 ±23	1275 ±37	+11	5.15	2.2	0.0832	1.9	2.23	2.9	0.194	2.2	0.8
1067-20.1	3.4E-5	45	0.06	303	231	63	0.78	0.72	1405 ±20	2170 ±71	+39	4.11	1.5	0.1354	4.1	4.55	4.3	0.244	1.5	0.4
1067-1.1	6.0E-5	35	0.11	149	198	55	1.37	1.02	2320 ±87	2401 ±69	+4	2.31	4.5	0.1549	4.0	9.25	6.0	0.433	4.5	0.7

Errors are 1-sigma; Pb_c and Pb^* indicate the common and radiogenic portions, respectively.

Error in Standard calibration was 0.44% (not included in above errors but required when comparing data from different mounts).

(1) Common Pb corrected using measured 204Pb.

(2) Common Pb corrected by assuming 206Pb/238U-207Pb/235U age-concordance

(3) Common Pb corrected by assuming 206Pb/238U-208Pb/232Th age-concordance

Sample 10-93: zircon

Spot	204Pb /206Pb	±%	% $206Pb_c$	ppm U	ppm Th	4-corr ppm $206Pb^*$	232Th /238U	±%	(1) 206Pb /238U Age	(1) 207Pb /206Pb Age	(1) 208Pb /232Th Age	% Dis-cor-dant	(1) 238U /206Pb*	±%	(1) 207Pb* /206Pb*	±%	(1) 207Pb* /235U	±%	(1) 206Pb* /238U	±%	err corr
1093-1.1	9.4E-5	30	0.17	287	162	66	0.58	0.31	1540 ±25	1557 ±35	1435 ±38	+1	3.71	1.8	0.0965	1.9	3.59	2.6	0.270	1.8	0.7
1093-1.2	2.7E-4	30	0.47	179	54	23	0.31	0.49	907 ±10	848 ±45	815 ±34	-7	6.62	1.2	0.0673	2.2	1.40	2.5	0.151	1.2	0.5
1093-2.1	2.2E-4	16	0.39	840	108	115	0.13	0.32	955 ±9	967 ±18	970 ±38	+1	6.26	1.0	0.0713	0.9	1.57	1.4	0.160	1.0	0.8
1093-3.1	-4.2E-6	100	--	762	127	132	0.17	0.30	1187 ±22	1323 ±9	1160 ±44	+11	4.95	2.0	0.0853	0.4	2.38	2.1	0.202	2.0	1.0
1093-5.1	1.7E-3	7	3.08	522	263	66	0.52	0.24	887 ±8	966 ±74	907 ±37	+9	6.78	0.9	0.0713	3.6	1.45	3.7	0.147	0.9	0.2
1093-6.1	6.5E-5	24	0.12	783	584	130	0.77	0.17	1143 ±9	1258 ±10	1117 ±11	+10	5.15	0.8	0.0825	0.5	2.21	1.0	0.194	0.8	0.9
1093-7.1	4.3E-5	35	0.08	721	125	98	0.18	0.30	946 ±10	972 ±18	923 ±26	+3	6.32	1.1	0.0715	0.9	1.56	1.4	0.158	1.1	0.8
1093-8.1	1.7E-4	25	0.31	262	136	46	0.54	0.32	1204 ±40	1368 ±47	1174 ±50	+13	4.87	3.6	0.0874	2.4	2.47	4.4	0.205	3.6	0.8
1093-9.1	1.8E-4	22	0.32	237	141	59	0.62	0.33	1646 ±58	1549 ±40	1534 ±74	-7	3.44	4.0	0.0960	2.1	3.85	4.5	0.291	4.0	0.9
1093-10.1	7.3E-4	11	1.31	529	106	82	0.21	0.37	1069 ±10	1160 ±32	1265 ±59	+9	5.54	1.0	0.0785	1.6	1.95	1.9	0.180	1.0	0.5
1093-11.1	2.9E-5	41	0.05	781	718	109	0.95	0.16	974 ±8	969 ±11	936 ±9	-1	6.13	0.8	0.0714	0.6	1.61	1.0	0.163	0.8	0.8
1093-12.1	1.8E-4	29	0.33	251	108	34	0.45	0.36	946 ±14	924 ±30	902 ±23	-3	6.33	1.6	0.0699	1.4	1.52	2.2	0.158	1.6	0.7
1093-13.1	7.0E-5	27	0.12	765	315	100	0.42	0.20	911 ±9	917 ±13	885 ±12	+1	6.59	1.1	0.0696	0.7	1.46	1.2	0.152	1.1	0.9
1093-15.1	7.2E-5	35	0.13	312	218	56	0.72	1.06	1231 ±33	1346 ±46	1151 ±36	+9	4.75	2.9	0.0864	2.4	2.51	3.7	0.210	2.9	0.8
1093-16.1	1.1E-4	35	0.19	267	63	38	0.24	0.43	991 ±21	923 ±39	904 ±38	-8	6.02	2.3	0.0698	1.9	1.60	3.0	0.166	2.3	0.8
1093-16.2	2.6E-4	33	0.46	152	81	20	0.55	0.43	908 ±11	953 ±44	920 ±25	+5	6.61	1.3	0.0708	2.2	1.48	2.5	0.151	1.3	0.5
1093-17.1	1.3E-3	16	2.26	306	181	50	0.61	0.29	1129 ±22	1267 ±71	1079 ±55	+12	5.23	2.1	0.0829	3.6	2.19	4.2	0.191	2.1	0.5
1093-18.1	4.3E-4	19	0.76	266	152	35	0.59	0.31	907 ±9	982 ±38	843 ±24	+8	6.62	1.1	0.0719	1.8	1.50	2.2	0.151	1.1	0.5
1093-18.2	1.6E-4	38	0.28	171	58	22	0.35	0.46	890 ±10	924 ±44	839 ±33	+4	6.75	1.2	0.0699	2.2	1.43	2.5	0.148	1.2	0.5
1093-19.1	2.5E-5	45	0.04	779	283	107	0.37	0.34	953 ±7	961 ±12	907 ±11	+1	6.28	0.8	0.0711	0.6	1.56	1.0	0.159	0.8	0.8
1093-20.1	1.0E-4	35	0.19	214	123	39	0.59	0.62	1225 ±13	1476 ±83	1203 ±22	+19	4.78	1.2	0.0924	4.4	2.67	4.6	0.209	1.2	0.3
1093-22.1	9.2E-5	30	0.16	385	97	58	0.26	0.35	1043 ±15	1182 ±39	883 ±28	+13	5.69	1.5	0.0794	2.0	1.92	2.5	0.176	1.5	0.6
1093-25.1	2.1E-4	41	0.37	121	67	15	0.57	0.48	894 ±12	896 ±47	840 ±25	+0	6.73	1.4	0.0689	2.3	1.41	2.7	0.149	1.4	0.5
1093-27.1	3.3E-5	58	0.06	406	213	53	0.54	0.27	919 ±8	990 ±49	918 ±14	+8	6.53	1.0	0.0722	2.4	1.52	2.6	0.153	1.0	0.4

Errors are 1-sigma; Pb_c and Pb^* indicate the common and radiogenic portions, respectively.
Error in Standard calibration was 0.24% (not included in above errors but required when comparing data from different mounts).
(1) Common Pb corrected using measured 204Pb.

s

Sample 10-94: zircon

Spot	204Pb /206Pb	±%	% $206Pb_c$	ppm U	ppm Th	4-corr ppm $206Pb^*$	232Th /238U	±%	(1) 206Pb /238U Age	(1) 207Pb /206Pb Age	% Dis-cor-dant	(1) 238U /206Pb*	±%	(1) 207Pb* /206Pb*	±%	(1) 207Pb* /235U	±%	(1) 206Pb* /238U	±%	err corr
1094-6.1	6.3E-6	100	0.01	496	100	61	0.21	0.67	865 ±18	927 ±12	+7	6.96	2.2	0.0699	0.6	1.38	2.3	0.144	2.2	1.0
1094-11.1	4.2E-5	41	0.07	511	71	63	0.14	0.49	865 ±16	898 ±15	+4	6.96	2.0	0.0690	0.7	1.37	2.1	0.144	2.0	0.9
1094-3.1	6.6E-5	41	0.12	333	186	42	0.58	0.91	888 ±19	1154 ±50	+25	6.78	2.3	0.0783	2.5	1.59	3.4	0.148	2.3	0.7
1094-5.1	7.5E-6	100	0.01	446	116	57	0.27	0.24	889 ±15	942 ±15	+6	6.76	1.9	0.0705	0.7	1.44	2.0	0.148	1.9	0.9
1094-9.1	5.1E-5	35	0.09	559	154	71	0.28	1.28	890 ±16	925 ±34	+4	6.76	1.9	0.0699	1.7	1.43	2.5	0.148	1.9	0.7
1094-16.1	2.3E-5	50	0.04	569	161	72	0.29	0.48	891 ±11	942 ±37	+6	6.75	1.3	0.0705	1.8	1.44	2.3	0.148	1.3	0.6
1094-1.1A	7.6E-6	100	0.01	466	100	59	0.22	0.54	891 ±20	931 ±50	+5	6.74	2.4	0.0701	2.4	1.43	3.5	0.148	2.4	0.7
1094-7.1	-3.5E-5	45	--	525	137	67	0.27	0.23	897 ±20	902 ±27	+1	6.70	2.4	0.0691	1.3	1.42	2.7	0.149	2.4	0.9
1094-17.1	6.8E-4	16	1.21	292	129	37	0.46	0.86	898 ±13	1193 ±90	+26	6.69	1.5	0.0798	4.6	1.65	4.8	0.149	1.5	0.3
1094-2.1	1.9E-4	28	0.33	230	59	30	0.27	0.82	903 ±17	860 ±31	-5	6.65	2.0	0.0677	1.5	1.40	2.5	0.150	2.0	0.8
1094-14.1	2.0E-5	58	0.03	518	127	67	0.25	1.00	907 ±24	885 ±34	-3	6.62	2.8	0.0685	1.6	1.43	3.3	0.151	2.8	0.9
1094-4.1	5.7E-5	33	0.10	530	110	71	0.22	0.49	935 ±22	923 ±15	-1	6.41	2.5	0.0698	0.7	1.50	2.7	0.156	2.5	1.0
1094-12.1	2.1E-5	58	0.04	492	83	67	0.17	1.48	942 ±13	951 ±34	+1	6.35	1.5	0.0708	1.7	1.54	2.3	0.157	1.5	0.7
1094-8.1	1.2E-4	26	0.21	463	86	63	0.19	1.15	948 ±12	961 ±28	+1	6.31	1.4	0.0711	1.4	1.55	1.9	0.158	1.4	0.7
1094-15.1	2.2E-5	58	0.04	456	88	63	0.20	0.80	956 ±24	1039 ±51	+9	6.25	2.7	0.0739	2.5	1.63	3.7	0.160	2.7	0.7
1094-17.2	3.5E-5	45	0.06	362	251	65	0.72	0.95	1231 ±51	1345 ±68	+9	4.75	4.5	0.0863	3.5	2.50	5.8	0.210	4.5	0.8

Errors are 1-sigma; Pb_c and Pb^* indicate the common and radiogenic portions, respectively.
Error in Standard calibration was 0.44% (not included in above errors but required when comparing data from different mounts).
(1) Common Pb corrected using measured 204Pb.
(2) Common Pb corrected by assuming 206Pb/238U-207Pb/235U age-concordance
(3) Common Pb corrected by assuming 206Pb/238U-208Pb/232Th age-concordance

Table DR2 (cont). Zircon and monazite U–Pb data

Spot	total ^{206}Pb (cts/s)	$^{232}Th/^{238}U$	±%	$^{206}Pb/^{238}U$ Date (Ma)	±1σ	$^{207}Pb/^{206}Pb$ Date (Ma)	±1σ	$^{207}Pb/^{235}U$ Date (Ma)	±1σ	Disc. (%)	$^{238}U/^{206}Pb$	±%	$^{207}Pb/^{206}Pb$	±%	$^{207}Pb^*/^{235}U$	±%	$^{206}Pb^*/^{238}U$	±%	Err corr
Sample 09-52: monazite																			
0952-7.2	370	83	3.1	482	11	494	158	484	41	0	12.9	2.1	0.0571	1.8	0.61	8.4	0.0776	2.3	0.3
0952-1.2	396	104	3.2	484	12	488	114	485	31	0	12.8	2.3	0.0569	1.7	0.61	6.3	0.0780	2.4	0.4
0952-6.2	407	101	3.1	489	11	382	137	471	35	-4	12.7	2.2	0.0543	1.7	0.59	7.4	0.0789	2.3	0.3
0952-6.1	393	99	3.1	492	12	331	120	465	30	-6	12.6	2.3	0.0531	1.7	0.58	6.5	0.0794	2.4	0.4
0952-7.1	367	71	2.9	515	10	455	97	504	26	-2	12.0	1.9	0.0561	1.8	0.64	5.1	0.0832	2.0	0.4
0952-8.2	476	70	3.1	540	12	572	70	546	23	1	11.5	2.3	0.0591	1.5	0.71	4.1	0.0873	2.3	0.6
0952-5.1	721	24	2.8	591	10	625	45	598	17	1	10.4	1.8	0.0606	1.2	0.80	2.8	0.0960	1.9	0.7
0952-2.2	208	170	3.0	605	13	561	114	596	38	-2	10.2	2.1	0.0588	2.3	0.80	6.3	0.0985	2.2	0.3
0952-5.2	497	43	4.6	623	12	747	79	650	28	4	9.9	1.9	0.0642	1.6	0.90	4.4	0.1014	1.9	0.4
0952-2.1	399	61	2.9	629	12	552	93	612	30	-3	9.8	1.9	0.0586	2.7	0.83	4.9	0.1025	2.0	0.4
0952-1.1	268	106	3.0	628	13	633	90	629	31	0	9.8	2.0	0.0608	2.0	0.86	4.9	0.1022	2.1	0.4
0952-4.1	1175	17	2.8	637	11	720	30	656	15	3	9.6	1.8	0.0633	1.1	0.91	2.3	0.1039	1.8	0.8
0952-4.2	226	148	3.0	624	14	595	156	618	53	-1	9.8	2.1	0.0598	2.2	0.84	8.6	0.1016	2.3	0.3
0952-3.1	964	19	2.8	653	11	668	33	656	16	1	9.4	1.8	0.0618	1.1	0.91	2.4	0.1066	1.8	0.8
0952-3.2	358	102	2.9	669	13	625	85	659	31	-1	9.1	2.0	0.0606	1.7	0.91	4.7	0.1093	2.0	0.4
0952-8.1	1023	30	2.8	697	12	724	32	704	17	1	8.8	1.8	0.0635	1.0	1.00	2.4	0.1142	1.8	0.8
Sample 10-61: monazite																			
1061-3.2	884	54	2.7	454	8	494	73	461	19	1	13.7	1.8	0.0571	1.1	0.57	4.0	0.0730	1.8	0.5
1061-1.2	502	119	3.2	718	16	773	73	731	32	2	8.5	2.3	0.0650	1.4	1.05	4.4	0.1177	2.3	0.5
1061-5.1	777	46	2.9	749	13	810	42	765	21	2	8.1	1.9	0.0661	1.1	1.12	2.8	0.1232	1.9	0.7
1061-2.1	1158	22	2.8	760	13	759	26	760	17	0	8.0	1.8	0.0645	0.9	1.11	2.2	0.1251	1.8	0.8
1061-3.1	611	111	2.9	761	14	803	67	772	31	1	8.0	1.9	0.0659	1.3	1.14	4.0	0.1254	1.9	0.5
1061-1.1	634	52	3.1	858	16	815	44	846	24	-1	7.0	1.9	0.0663	1.3	1.30	2.9	0.1423	1.9	0.7
1061-6.2	1369	37	3.4	865	16	849	32	861	22	-1	7.0	2.0	0.0673	0.9	1.33	2.6	0.1436	2.0	0.8
1061-2.2	485	96	3.0	870	16	825	61	857	32	-1	6.9	2.0	0.0666	1.4	1.33	3.7	0.1445	2.0	0.5
1061-4.2	832	97	2.8	887	16	902	52	891	29	0	6.8	1.9	0.0691	1.1	1.41	3.3	0.1475	1.9	0.6
1061-7.2	603	142	3.0	881	16	843	75	871	38	-1	6.8	1.9	0.0672	1.3	1.36	4.4	0.1465	2.0	0.4
1061-5.2	688	109	2.8	892	16	924	62	901	34	1	6.7	1.9	0.0699	1.2	1.43	3.7	0.1484	1.9	0.5
1061-4.1	641	122	2.8	904	17	833	59	884	32	-2	6.6	1.9	0.0669	1.2	1.39	3.6	0.1506	1.9	0.5
1061-6.1	1433	25	2.8	987	17	946	22	974	21	-1	6.0	1.8	0.0706	0.8	1.61	2.1	0.1654	1.8	0.9

Table DR3. Rare earth element data for zircon

Sample 09-52

Setting	Core				Rim 1				Rim 2		
Analysis	2.1	9.1	14.1	16.1	1.1	7.2	11.1	15.2	12.2	14.2	18.2
ppm											
La	0.12	2.85	1.19	0.49	0.00	0.00	0.70	0.00	0.07	0.00	0.00
Ce	6.40	8.67	8.45	13.08	4.69	5.22	12.95	5.26	8.41	7.63	10.18
Pr	1.27	3.93	4.38	7.97	0.36	0.62	5.27	0.83	0.24	0.00	0.85
Nd	7.52	5.24	17.24	23.65	3.91	5.33	12.11	3.69	1.83	1.61	3.34
Sm	55.74	31.27	60.50	117.61	25.36	27.19	33.99	14.07	9.93	17.95	17.27
Eu	4.29	10.18	8.04	13.39	1.75	2.29	5.54	0.18	1.82	2.68	3.75
Gd	204.48	169.38	320.45	452.19	64.09	73.25	48.32	50.36	23.40	45.78	35.10
Tb	366.39	396.69	578.51	732.78	98.90	82.64	63.91	66.94	35.26	54.27	40.50
Dy	627.52	960.03	960.03	1203.13	107.54	79.52	64.69	74.99	37.91	56.45	42.03
Ho	1007.19	1708.63	1546.76	1857.91	96.76	77.70	56.29	77.88	34.17	41.73	35.07
Er	1396.48	2762.74	2234.11	2536.19	89.36	81.81	48.46	89.55	26.81	32.10	32.22
Tm	1896.69	4173.55	2900.83	3074.38	97.93	79.34	52.07	94.21	22.73	31.82	19.42
Yb	2424.62	5969.23	3606.15	3901.54	79.38	81.23	51.08	94.77	33.60	30.77	17.17
Lu	2806.58	7736.63	4329.22	4469.14	87.24	77.78	47.74	103.29	25.10	24.69	23.05

Table DR3 (cont). Rare earth element data for zircon

Sample 10-61

Setting	Core			Rim			
Analysis	1.1	2.1	9.1	10.2	15.2	16.1	17.1
ppm							
La	1.36	36.22	0.00	0.00	0.07	0.23	0.00
Ce	9.08	41.45	4.48	4.03	5.94	6.00	5.74
Pr	4.15	33.67	0.89	0.67	2.07	1.50	0.35
Nd	13.93	22.77	2.59	1.57	5.57	4.66	4.42
Sm	74.10	78.18	20.39	17.68	38.07	26.51	21.75
Eu	5.89	3.75	0.43	1.13	3.75	3.93	3.21
Gd	233.98	197.36	132.25	57.99	91.56	84.94	62.56
Tb	471.07	399.45	269.97	81.82	98.90	99.45	78.51
Dy	749.90	679.85	456.12	73.34	107.54	91.88	93.94
Ho	1187.05	1062.95	732.01	63.49	102.52	91.73	86.33
Er	1642.54	1510.38	1091.25	53.49	103.21	84.33	85.78
Tm	2177.69	1971.07	1458.68	66.12	87.60	83.47	73.55
Yb	2713.85	2566.15	1895.38	61.54	104.62	94.77	85.54
Lu	3168.72	2987.65	2386.83	58.02	107.82	83.95	95.06

Table DR3 (cont). Rare earth element data for zircon

Sample 10-66

Analysis	1066-1.1	1066-1.2	1066-2.1	1066-5.1	1066-7.1	1066-8.1	1066-9.1	1066-13.1	1066-15.1	1066-16.1	1066-17.1	1066-18.1	1066-19.1	1066-20.1	1066-21.1	1066-21.2
ppm																
La	4	2	27	5	19	7	1	2	0	6	3	1	2	159	35	1
Ce	10	8	113	25	87	19	9	7	1	27	20	4	8	354	86	3
Pr	10	5	61	18	48	21	4	6	0	15	10	4	3	403	98	3
Nd	14	11	97	28	69	30	7	11	1	24	17	6	6	530	140	5
Sm	28	57	278	66	165	50	29	51	9	59	47	20	36	865	287	16
Eu	38	26	221	46	100	59	18	13	8	41	36	13	7	1184	411	13
Gd	48	101	767	131	426	68	73	115	33	164	107	48	104	980	402	43
Tb	51	97	1178	196	692	84	119	108	51	251	174	57	133	803	517	67
Dy	56	83	1833	301	1179	113	193	92	60	378	299	54	171	695	585	79
Ho	72	67	2869	529	2078	171	330	88	63	593	544	51	255	829	678	91
Er	93	58	4094	839	3319	242	520	88	69	850	926	55	369	1114	869	97
Tm	122	50	4912	1192	4512	304	707	90	75	1092	1313	60	452	1448	1028	107
Yb	165	54	6429	1783	6342	408	1044	99	88	1478	1984	83	640	2118	1391	136
Lu	238	52	7812	2484	8260	512	1436	112	103	1948	2816	105	784	3076	1628	160
Hf	128155	124757	100485	110583	113883	131845	86311	124563	140485	115631	121262	128932	106990	142913	130971	136893
Eu*	1.01	0.76	0.88	0.85	0.83	1	0.75	0.59	0.75	0.81	0.84	0.75	0.47	1.04	1.03	0.78
Yb/Gd	3	0	7	11	12	5	12	1	2	7	15	1	5	2	3	3

Table DR3 (cont). Rare earth element data for zircon

Sample 10-67

Analysis	1067-12.1	1067-19.1	1067-10.1	1067-18.1	1067-16.1	1067-8.1	1067-17.1	1067-7.1	1067-5.1	1067-4.1	1067-7.2	1067-9.1	1067-15.1	1067-3.1	1067-13.1	1067-20.1	1067-1.1
ppm																	
La	5.6	0.3	4.0	0.1	1.4	7.1	6.3	0.1	0.0	0.0	0.0	0.0	1.1	0.0	7.8	0.1	0.2
Ce	12.6	2.0	7.0	3.7	5.7	15.7	8.2	1.3	2.5	5.4	5.4	4.6	5.6	5.0	30.8	51.4	60.5
Pr	12.5	0.7	4.1	2.0	0.4	13.0	5.1	0.9	0.8	3.7	2.8	3.1	2.2	3.4	8.5	0.4	3.9
Nd	24.1	1.9	5.6	7.6	1.0	19.9	9.2	3.8	4.3	13.2	10.4	9.4	5.1	14.2	11.6	1.9	13.5
Sm	204.1	11.3	33.1	35.3	5.3	109.5	42.6	38.5	20.4	40.3	33.0	30.5	18.2	38.2	53.4	16.1	68.2
Eu	65.5	8.8	35.7	4.2	3.4	180.4	10.3	4.8	0.8	2.0	0.9	0.9	5.6	1.4	27.5	13.0	45.5
Gd	197.0	17.8	63.3	92.5	12.8	154.3	132.2	139.2	44.1	54.7	43.8	36.9	51.7	51.7	90.5	67.3	197.0
Tb	166.1	16.6	78.9	152.8	19.6	172.5	241.7	168.6	47.8	48.9	46.5	35.5	112.2	51.7	146.7	130.3	298.9
Dy	152.0	12.8	86.2	236.6	37.8	199.6	422.8	142.7	39.1	43.0	42.2	37.3	234.6	48.9	239.8	226.4	460.6
Ho	129.5	12.5	87.1	363.6	72.2	236.4	741.8	111.3	29.3	35.8	39.5	36.3	447.3	42.9	408.7	387.5	672.7
Er	119.4	12.2	95.6	523.8	136.9	301.3	1131.3	92.3	23.6	32.1	39.5	33.5	785.6	42.6	660.0	608.1	962.5
Tm	117.2	10.4	118.8	692.0	245.2	432.0	1596.0	84.0	22.2	29.8	40.6	34.4	1400.0	37.1	1032.0	860.0	1252.0
Yb	136.6	12.1	136.0	993.8	490.7	683.2	2391.3	82.5	20.4	31.2	41.4	37.7	2366.5	41.4	1577.6	1242.9	1751.6
Lu	137.6	11.6	136.4	1148.0	748.0	884.0	3008.0	78.4	17.8	28.8	38.0	38.4	3152.0	38.7	1860.0	1604.0	2124.0
Hf	121650.5	126990.3	141747.6	125048.5	119029.1	122912.6	113786.4	141941.7	137864.1	142815.5	150194.2	154854.4	141844.7	151650.5	115436.9	110097.1	92427.2
Eu*	0.8	0.8	0.9	0.4	0.6	1.1	0.5	0.4	-0.1	0.2	0.0	0.0	0.5	0.1	0.8	0.7	0.8
Yb/Gd	0.6	0.6	1.7	8.7	31.1	3.6	14.6	0.5	0.4	0.5	0.8	0.8	37.0	0.6	14.1	14.9	7.2

Table DR3 (cont). Rare earth element data for zircon

Sample 10-93

Analysis	1093-1.1	1093-1.2	1093-2.1	1093-3.1	1093-5.1	1093-6.1	1093-7.1	1093-8.1	1093-9.1	1093-10.1	1093-11.1	1093-12.1	1093-13.1	1093-15.1	1093-16.1	1093-16.2	1093-17.1	1093-18.1	1093-18.2	1093-19.1	1093-20.1	1093-22.1	1093-25.1	1093-27.1
ppm																								
La	667	0	2	0	12	0	37	0	1	0	0	3	2	9	0	0	2	0	1	0	0	5	0	6
Ce	625	11	12	17	43	16	42	9	16	14	39	21	16	28	18	15	20	9	16	24	13	19	15	26
Pr	559	2	3	2	21	1	18	0	2	0	18	5	3	15	3	2	4	0	3	1	0	8	3	9
Nd	556	8	3	4	27	4	19	1	4	2	65	13	4	21	10	9	6	2	9	4	2	10	9	15
Sm	432	45	11	23	51	29	22	10	18	15	284	48	18	55	60	42	20	11	50	25	16	22	47	44
Eu	20	3	15	8	80	5	2	2	12	2	26	24	14	12	3	4	26	3	9	3	3	41	5	78
Gd	236	100	36	73	85	117	53	49	73	75	505	125	79	161	138	100	75	53	123	109	75	48	89	83
Tb	206	103	76	99	92	207	97	97	140	146	458	156	170	289	145	114	142	96	154	173	145	86	89	105
Dy	283	90	147	111	97	342	175	176	257	254	374	175	328	488	136	112	247	176	167	239	250	146	79	135
Ho	460	83	269	116	107	582	321	313	441	445	323	195	583	833	126	110	428	311	193	295	443	259	74	182
Er	685	76	441	117	114	858	531	488	671	684	281	213	946	1219	112	97	651	478	219	327	669	430	70	235
Tm	888	69	595	107	112	1069	729	643	862	888	238	226	1268	1552	95	81	830	639	236	330	860	622	61	269
Yb	1220	74	865	116	143	1433	1100	889	1188	1211	249	280	1791	2056	105	85	1135	892	312	384	1176	979	69	352
Lu	1552	90	1191	134	180	1880	1604	1170	1534	1566	270	390	2316	2660	116	96	1473	1158	469	436	1530	1500	80	488
Hf	116602	129320	120971	136408	137670	112621	123981	112621	110583	116408	137767	132330	129223	112913	145049	143689	104563	112816	123981	140388	112816	132913	135534	121262
Eu*	0.52	0.27	0.91	0.55	1.05	0.38	0.2	0.17	0.69	0.26	0.55	0.73	0.72	0.54	0.26	0.31	0.89	0.39	0.52	0.27	0.28	1.07	0.36	1.06
Yb/Gd	4	1	19	1	1	10	17	15	13	13	0	2	18	10	1	1	12	14	2	3	13	17	1	3

Table DR3 (cont). Rare earth element data for zircon

Sample 10-94

Analysis	1094-6.1	1094-11.1	1094-3.1	1094-5.1	1094-9.1	1094-16.1	1094-1.1A	1094-7.1	1094-17.1	1094-2.1	1094-14.1	1094-4.1	1094-12.1	1094-8.1	1094-15.1	1094-17.2
ppm																
La	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	7.3	0.0	0.0	1.4	0.0	0.0	0.0	0.7
Ce	2.1	0.7	13.7	4.6	3.0	4.1	1.6	4.7	22.3	0.5	2.1	3.0	1.0	1.3	1.5	9.3
Pr	0.8	0.7	0.0	1.8	1.3	1.8	0.7	2.2	8.7	0.5	1.0	2.0	0.4	0.4	0.6	1.3
Nd	3.7	2.9	1.1	6.4	5.4	7.2	3.7	8.1	13.1	1.5	4.7	6.2	2.3	2.8	3.0	2.9
Sm	24.5	32.2	13.3	31.1	24.4	32.0	33.3	38.4	22.0	21.0	32.6	30.1	25.7	23.0	24.3	8.7
Eu	1.4	3.1	3.5	1.8	0.8	2.4	2.4	2.4	52.7	0.7	1.1	21.4	2.3	1.8	1.6	3.8
Gd	53.5	95.0	87.9	45.2	45.7	55.4	96.0	59.3	39.6	66.3	63.7	59.8	63.4	52.7	47.6	37.7
Tb	55.8	102.2	179.7	46.0	46.3	59.2	114.7	60.8	66.1	70.6	70.3	72.5	73.3	55.8	55.3	69.2
Dy	51.9	74.4	338.2	43.5	43.7	61.6	102.4	62.0	117.5	58.5	63.8	66.7	54.0	50.9	48.5	127.2
Ho	45.1	47.5	601.8	39.3	39.0	56.7	86.7	60.9	222.0	45.1	52.5	54.7	35.6	47.1	42.4	234.5
Er	41.4	32.4	912.5	36.8	36.9	46.7	70.9	53.3	406.3	36.9	45.1	46.9	23.1	43.7	36.8	419.4
Tm	38.0	26.6	1236.0	37.6	37.2	35.5	62.4	48.2	670.4	37.2	37.8	38.4	19.6	40.4	31.4	616.0
Yb	39.8	21.9	1739.1	42.2	36.7	34.0	63.4	52.5	1143.5	39.1	39.5	36.8	16.9	45.3	33.7	987.6
Lu	36.7	20.3	2104.0	44.8	33.7	28.0	54.8	44.3	1652.0	44.0	32.9	31.1	15.4	40.2	26.8	1328.0
Hf	140873.8	143980.6	104563.1	139708.7	139223.3	150970.9	140291.3	142038.8	158543.7	143786.4	148252.4	142815.5	142330.1	141553.4	130873.8	118932.0
Eu*	0.1	0.3	0.4	0.2	-0.1	0.2	0.2	0.2	1.2	-0.1	0.0	0.8	0.2	0.2	0.1	0.5
Yb/Gd	0.6	0.2	16.0	0.8	0.6	0.5	0.5	0.7	23.3	0.5	0.5	0.5	0.2	0.7	0.6	21.2

Table DR4. Whole-rock compositions and Sr–Nd isotope data

Rock type	granite						leucosome		opx–g granulite			high-Mg granulite		sill–g granulite				
Sample	09-19	09-35	10-66	10-90	10-92	10-93	10-60	10-61	09-01	09-34	09-52	09-02	09-04	10-65	10-67	10-88	10-91	10-94
XRF (wt%)																		
SiO_2	66.81	63.71	69.09	73.88	75.76	71.63	66.40	75.67	62.62	61.52	64.33	67.69	67.56	62.81	61.99	64.62	62.23	58.99
TiO_2	0.99	1.69	0.73	0.10	0.04	0.56	1.26	0.18	1.41	0.82	1.56	0.73	0.93	1.35	1.05	1.24	1.05	1.11
Al_2O_3	14.32	14.73	15.73	14.23	13.69	13.02	14.60	12.83	15.60	16.73	14.50	14.41	13.68	20.44	17.95	19.51	21.28	23.49
Fe_2O_3	3.46	3.39	1.21	0.26	0.07	1.87	1.04	0.09	3.24	2.01	1.68	1.97	1.78	6.70	3.89	5.61	2.98	3.88
FeO	3.46	3.48	3.05	1.04	0.15	3.65	3.93	0.37	5.47	5.08	6.51	2.62	4.24	3.32	6.85	2.60	5.78	5.39
MnO	0.08	0.13	0.12	0.03	0.01	0.12	0.10	0.02	0.15	0.07	0.17	0.05	0.06	0.14	0.51	0.09	0.17	0.20
MgO	2.88	1.15	1.99	0.20	0.04	0.30	1.22	0.21	1.99	2.55	2.08	9.13	8.03	0.73	2.89	0.93	1.90	1.97
CaO	1.32	3.29	3.54	0.98	1.02	1.90	2.96	1.23	4.38	4.06	4.02	0.11	0.17	0.21	0.60	0.17	0.52	0.20
Na_2O	1.48	1.69	3.05	2.13	3.02	1.48	1.26	1.06	1.76	2.52	1.22	0.33	0.44	0.08	0.58	0.00	0.40	0.50
K_2O	4.65	5.91	1.11	7.14	5.78	4.70	6.00	7.65	2.83	3.23	3.02	2.02	2.03	1.81	2.51	0.01	2.62	3.08
P_2O_5	0.10	0.53	0.05	0.10	0.07	0.10	0.45	0.05	0.36	0.26	0.34	0.07	0.11	0.05	0.05	0.05	0.06	0.06
LOI	0.78	0.74	0.75	0.35	0.56	0.47	0.73	0.75	0.71	1.52	0.87	0.89	0.96	2.21	1.27	5.39	0.81	0.96
Total	100.33	100.44	100.42	100.44	100.21	99.80	99.95	100.11	100.52	100.37	100.30	100.02	99.99	99.85	100.14	100.22	99.80	99.83
XRF (ppm)																		
Rb	163.3	159.9	61.3	269.7	159.9	169.2	238.3	288.4	110.0	66.8	142.8	84.8	72.8	71.6	85.6	4.0	88.9	122.5
Sr	97	143	150	91	37	54	220	227	186	296	161	8	9	42	68	18	62	63
Y	159.7	44.1	23.8	38.3	10.7	65.2	17.2	1.6	102.6	35.6	36.1	47.9	49	56.6	48.7	34.6	49.5	46.5
Zr	528	616	103	57	15	503	293	90	399	235	393	370	445	344	154	281	228	213
V	53	69	83	6	10	23	72	10	105	110	107	37	46	182	164	162	163	174
Ni	25	23	30	18	17	18	11	3	15	35	15	9	8	26	16	30	41	40
Cr	25	29	95	21	9	10	35	13	66	60	41	13	5	142	25	107	95	120
Nb	23.3	39.0	11.8	2.2	<1	26.1	26.5	2.4	23.7	5.9	26.3	17.8	22.6	17.2	13.1	19.8	16.8	17.2
Ga	17.4	18.0	23.3	13.9	16.2	18.4	19.2	13.9	23.3	20.2	22.4	18.4	18.4	26.9	24.0	29.5	28.1	32.4
Cu	9	10	6	<1	<1	<1	34	9	44	39	50	7	10	7	32	6	7	9
Zn	50	77	68	9	7	51	90	21	116	43	127	36	45	70	85	52	79	79
Co	60	46	58	36	38	51	47	42	58	50	56	30	54	62	72	47	74	72
Ba	1032	1775	421	1095	284	999	1471	1928	943	1328	818	534	630	772	656	203	817	950
La	109	65	42	31	49	102	44	30	61	92	37	72	89	46	49	50	44	38
Ce	258	178	91	55	78	217	121	34	163	248	108	213	261	109	97	93	92	89
U	3.4	<0.5	1.9	<0.5	1.2	<0.5	1.3	2.7	1.3	0.5	1.7	6.7	6.2	1.2	<0.5	1.4	<0.5	<0.5
Th	61.7	<0.5	10.2	4.9	<0.5	20.7	3.6	3.7	6.9	34.6	9.9	38.2	57.5	26.4	17.7	27.1	24.0	18.0
Sc	13	14	8	3	1	10	7	1	14	18	14	9	11	25	17	24	17	16
Pb	40	20	12	45	52	35	22	31	20	23	17	<2	2	32	15	<1	19	15
TIMS																		
Nd (ppm)	152.68	85.20	39.55	16.31	17.53	85.10	49.80	8.61	64.00	111.44	42.70	103.47	129.90	53.36	33.00	56.15	50.31	57.11
Sm (ppm)	28.68	15.37	6.58	3.36	1.74	14.12	8.74	1.02	11.04	17.08	7.95	19.10	23.83	10.12	7.85	9.80	9.40	9.87
$^{143}Nd/^{144}Nd$	0.511445	0.511588	0.511588	0.511617	0.511089	0.511367	0.511517	0.511320	0.511591	0.511224	0.511527	0.511437	0.511437	0.511692	0.511661	0.511558	0.511605	0.511574
± 2σ	0.000088	0.000079	0.000074	0.000082	0.000092	0.000074	0.000073	0.000089	0.000096	0.000080	0.000084	0.000083	0.000081	0.000077	0.000097	0.000086	0.000086	0.000073
Sm/Nd	0.1878	0.1804	0.1664	0.2057	0.0995	0.1659	0.1755	0.1185	0.1725	0.1532	0.1862	0.1846	0.1834	0.1897	0.2379	0.1745	0.1868	0.1728
$^{147}Sm/^{144}Nd$	0.1136	0.1091	0.1007	0.1245	0.0602	0.1004	0.1062	0.0717	0.1043	0.0927	0.1126	0.1117	0.1110	0.1147	0.1439	0.1055	0.1130	0.1045
$T_{DM(1000\ Ma)}$	2.34	2.05	1.91	2.33	1.90	2.18	2.09	1.81	1.97	2.22	2.20	2.31	2.29	2.01	2.82	2.03	2.10	1.99
$\varepsilon Nd_{(1000\ Ma)}$	-12.7	-9.3	-8.2	-10.7	-12.8	-12.5	-10.3	-9.7	-8.6	-14.3	-10.9	-12.6	-12.5	-8.0	-12.3	-9.4	-9.5	-9.0
Sr (ppm)	97.0	143.0	150.0	91.0	37.0	54.0	220.0	227.0	186.0	296.0	161.0	8.0	9.0	42.0	68.0	18.0	62.0	63.0
Rb (ppm)	163.3	159.9	61.3	269.7	159.9	169.2	238.3	288.4	110.0	66.8	142.8	84.8	72.8	71.6	85.6	4.0	88.9	122.5
$^{87}Sr/^{86}Sr$	0.890932	0.777615	0.739742	0.933182	1.075986	1.101205	0.776987	0.783281	0.750875	0.753992	0.769527	1.853551	1.416198	0.835816	0.816889	0.735292	0.812306	0.848038
± 2σ	0.000130	0.000121	0.000125	0.000133	0.000173	0.000121	0.000134	0.000148	0.000119	0.000146	0.000132	0.000156	0.000122	0.000130	0.000156	0.000147	0.000136	0.000160
$^{87}Rb/^{86}Sr$	4.9581	3.2573	1.1861	8.7640	12.9540	9.4145	3.1552	3.7030	1.7183	0.6559	2.5817	34.1063	25.0253	4.9941	3.6810	0.6447	4.1910	5.7030
$^{87}Sr/^{86}Sr_{(1000\ Ma)}$	0.820024	0.731031	0.722779	0.807845	0.890726	0.966565	0.731864	0.730323	0.726301	0.744612	0.732605	1.365787	1.058304	0.764393	0.764246	0.726072	0.752369	0.766478