Table DD1	Zircon chemical	ahracion I	DTTMC II_Dh	ientonic data

		Compositional Parameters Radiogenic Isotope Ratios						Isotopic Ages												
	Th	<sup>206</sup> Pb*	mol %	Pb*	Pbc	<sup>206</sup> Pb	<sup>208</sup> Ph	<sup>207</sup> Pb		<sup>207</sup> Pb		<sup>206</sup> Ph		corr.	<sup>207</sup> Pb		<sup>207</sup> Pb		<sup>206</sup> Pb	
Samp		x10 <sup>-13</sup> mol		Pbc	(pg)	<sup>204</sup> Pb	<sup>206</sup> Pb	<sup>206</sup> Pb	% err	<sup>235</sup> U	% err	<sup>238</sup> U	% err	coef.	<sup>206</sup> Pb	±	<sup>235</sup> U	±	238 <sub>U</sub>	±
(a)	(b)	(c)	(c)	(c)	(c)	(d)	(e)	(e)	(f)	(e)	(f)	(e)	(f)		(g)	(f)	(g)	(f)	(g)	(f)
z2	аптпаде к 0.665	iver intrusi 20.7388			0.91			0.0761152	0.042	1 94565	0.084	0.185393	0.045	0.967	1098 10	0.84	1096.95	0.56	1096.37	0.45
z5	0.795	15.3708		470	0.89	26480	0.241	0.0760872	0.042	1.94489	0.084	0.185388		0.974			1096.68			
z1	0.714	21.4970		415	1.38	23809		0.0760841		1.94467		0.185375	0.046				1096.61			
z6	0.624	12.4836		392	0.83	22979		0.0760958		1.94459	0.083	0.185339		0.991			1096.58			
z4 z3	0.610 0.669	11.0228 4.5808	0.9988	272 192	1.05 0.63	15998 11152		0.0761063 0.0761323		1.94483 1.94542	0.087	0.185336 0.185329	0.046	0.952	1097.87		1096.66		1096.06 1096.02	
23	0.009	4.3000	0.9903	192	0.03	11132	0.203	0.0701323	0.033			0.163329 06Pb/238U a								
FC-4b	Forest C	enter anort	hosite (E	Ouluth (	Comple	x anortho	site seri	es)								, .	-, - ( -,	,		,
z8	0.775	25.2049				50552		0.0760449	0.041	1.94440	0.084	0.185445	0.047	0.966	1096.25	0.82	1096.52	0.56	1096.65	0.47
z9	0.708	1.9147		65	0.78	3759	0.214	0.0759136	0.093	1.93976	0.140	0.185322		0.794			1094.92			
z10	0.732	8.7414	0.9986	233		13304		0.0760627		1.94330		0.185297		0.946			1096.14			
z2	0.686 0.705	30.2158 20.9839	0.9996	721 610	1.11	41626		0.0761076 0.0761032		1.94443 1.94413		0.185295 0.185277	0.046	0.968			1096.53 1096.42			
z4 z11	0.705	11.7511	0.9995	288	1.09	35079 16503		0.0761032		1.94413		0.185266		0.953			1096.42			
z3	0.637	48.5088	0.9998		0.99	74775		0.0761148		1.94431		0.185265	0.051				1096.48			
z1	0.630	18.1802	0.9994	548	0.87	32063	0.191	0.0760777	0.042	1.94321	0.084	0.185251	0.045	0.969	1097.12	0.84	1096.11	0.56	1095.60	0.46
z6	0.659	12.0405	0.9992	397	0.80	23077		0.0760863		1.94314	0.086	0.185223		0.955	1097.34				1095.45	
z5	0.467	9.6852	0.9988	256	0.95	15587	0.141	0.0761585	0.046	1.94327		0.185060	0.046		1099.24				1094.56	
FC 1	F 6-			.lth. C				->		weighted	mean 20	06Pb/238U a	ige = 10	95./I ±	0.17 (0.35	) [1.14	4] Ma (2S)	; MSW	D = 0.38	(n=8)
z21	0.347	nter anorth						o.0761142	0.040	1 94544	0.086	0 185375	0.051	0.958	1098 08	0.80	1096.87	0.58	1096 27	0.51
z23	1.362	38.6752				97907		0.0761283		1.94564		0.185360	0.050				1096.95			
z22	0.614	135.1333						0.0760948		1.94434		0.185317	0.051				1096.50			
z26	1.443	63.5688				225979		0.0761149		1.94485	0.084	0.185317		0.965	1098.09				1095.96	
z20	1.508	98.5654				228892		0.0761327		1.94529	0.093	0.185315	0.062	0.944	1098.56				1095.95	
z25 z19	0.684 0.715	41.1099 125.9011	0.9998			123514 316609	0.207 0.217	0.0761295 0.0761253		1.94493 1.94446	0.083	0.185289 0.185255	0.046	0.970 0.961	1098.48 1098.37				1095.81 1095.62	
z27	0.713				0.89	96360	0.217	0.0761233		1.94490	0.083	0.185254	0.049	0.968	1098.82				1095.62	
z18	1.414	46.2410				91792	0.428	0.0761037		1.94366			0.048				1096.26			
z24	1.439	92.3175	0.9999	6768	0.43	331313	0.436	0.0761075							1097.90				1095.35	
										weighted r	nean 20	6Pb/238U ag	e = 109	5.81 ± (	0.16 (0.34)	[1.14	] Ma (2s);	MSWE	) = 1.44 (	n=10)
		intrusion (																		
z4 z6a	0.681 0.649	16.1663 30.1146			1.25 0.86	19772 53261		0.0760969 0.0760783		1.94481 1.94407	0.085	0.185357 0.185332		0.966			1096.66 1096.40			
z6b	0.841	24.9060	0.9997		0.85	44740		0.0760783		1.94407		0.185332		0.942	1097.13		1096.40			
z5	0.652	4.7525	0.9983	186	0.67	10867		0.0760617		1.94340	0.090	0.185308	0.046	0.942	1096.70				1095.91	
z3	0.576	6.7271	0.9982	178	0.97	10592		0.0761041		1.94433	0.091	0.185294		0.928			1096.49			
z1	0.523	5.9782	0.9981	159	0.96	9575	0.158	0.0761187	0.054	1.94367		0.185195					1096.26			
HCT	Houghtalir	ng Creek tr	octolita (	Boayor	Bay C	omnley)				weighted	mean 20	06Pb/238U a	ige = 10	95.89 ±	0.19 (0.36	b) [1.1:	5] Ma (2s)	; MSW	D = 1.59	(n=6)
z7	0.765				2.12	8437	0.232	0.0761478	0.055	1.94513	0.094	0.185263	0.046	0.920	1098.96	1.10	1096.77	0.63	1095.66	0.47
z6	0.666	4.7620	0.9968		1.24	5877	0.202	0.0760881	0.067	1.94350		0.185254	0.051				1096.21			
z1	0.396	3.7022	0.9945	54	1.68	3382	0.120	0.0760085		1.94086		0.185196	0.060				1095.30			
z10	0.719	3.5063	0.9965	94	1.00	5380	0.218	0.0761151		1.94320		0.185159		0.865			1096.10			
z4 z9	1.566 1.053	1.3175 4.8694	0.9876	31 173	1.36	1502 9209	0.474	0.0760216 0.0760857		1.93975 1.94068	0.256	0.185058 0.184991	0.083	0.671			1094.91 1095.23			
z12	1.398	4.7973	0.9977	167	0.89	8245	0.424	0.0760778	0.057	1.93986		0.184932		0.902			1093.23			
z11	0.687	2.1862	0.9947	61	0.95	3536	0.208	0.0760543	0.096	1.93912		0.184918	0.056				1094.69			
z14	0.404	1.0610	0.9951	61	0.43	3817			0.086	1.93884		0.184895	0.202				1094.60			
z8	2.079	1.5846	0.9926	57 39	0.97	2508	0.630	0.0761335		1.94009			0.191		1098.58		1095.03			
z5	1.078	2.7707	0.9909	39	2.08	2053	0.327	0.0760109	0.152	1.93692 weighted		0.184814 06Pb/238U a			0.26 (0.40		1093.94			
WLFG	Wilson L	ake ferroga	abbro (Be	eaver B	ay Con	nplex)				.reigineu	cuii Zl	J J J Z J J J J	.gc - 10	JJ17 ±	5.20 (0.40	,, [1.1	oj ina (25)	۷۱ د ۱۰۰۰	S - 1.13	(+)
z2	1.225	3.6441	0.9967			5701		0.0759668									1092.63			
z9	1.236	1.2015	0.9806	18	1.96	958		0.0760828				0.184555					1093.63			
z16 z26	1.209	0.7717 1.3194	0.9872 0.9923	28 45	0.82	1452 2401		0.0759981 0.0759428		1.93352 1.93161		0.184521 0.184473					1092.76 1092.10			
z19	2.350	0.3987	0.9923	15	0.83	652		0.0759428		1.93313			0.155				1092.10			
z27	2.410	0.7114	0.9816	24	1.10	1010	0.730	0.0760187		1.92711	0.351	0.183859		0.666	1095.56	5.80	1090.54	2.35	1088.02	1.10
z28	1.613	0.4676	0.9820	21	0.71	1031	0.489	0.0758794		1.92047		0.183562					1088.23			
z18	1.210	0.2411	0.9586	8	0.86	450	0.367	0.0756855	0.693			0.183513					1086.35			
										weighted	mean 20	06Pb/238U a	iye = 10	91.03 ±	U.35 (U.46	) [1.1a	oj ™a (2s)	; MSW	0.74 = טי	(n=5)

<sup>(</sup>a) 21, 22 etc. are labels for single zircon fragments annealed and chemically abraded after Mattinson (2005); bold indicates analyses used in weighted mean calculations.

(b) Model Th/U ratio iteratively calculated from the radiogenic 208Pb/206Pb ratio and 206Pb/238U age.

(c) Pb\* and Pbc represent radiogenic and common Pb, respectively; mol % <sup>206</sup>Pb\* with respect to radiogenic, blank and initial common Pb.

(d) Measured ratio corrected for spike and fractionation only. Fractionation estimated at 0.18 (Daly) or 0.10 (Faraday) ± 0.02 %/a.m.u. based on analysis of NBS-981 & 982.

(e) Corrected for fractionation, spike, and common Pb; all common Pb was assumed to be procedural blank: 206Pb/204Pb = 18.60 ± 0.72%; 207Pb/204Pb = 15.69 ± 0.62%; 208Pb/204Pb = 38.51 ± 0.74% (all uncertainties 1-sigma). Isotope dilution measurements made with the ET535 spike (Condon et al., 2015).

(f) Errors are 2-sigma, propagated using the algorithms of Schmitz and Schoene (2007).

(g) Calculations are based on the decay constants of Jaffey et al. (1971). All ratios and ages corrected for initial 230Th/238U disequilibrium with Th/U [magma] = 3. Uncertainties for single grain dates, that are propagated into the weighted means, are based upon nonsystematic analytical errors, including counting statistics, instrumental fractionation

Table DR2. Site level paleomagnetic data

site	site lat	site lon	n	$dec_{is}$	$inc_{is}$	$dec_{tc}$	$inc_{tc}$	k	$\alpha_{95}$	VGP lat	VGP lon
FC1 (AF)	47.7826	-91.3265	9	301.6	40.5	297.1	52.4	32	9.3	41.3	185.0
FC1 (thermal)	47.7826	-91.3265	9	289.7	34.4	284.1	45.1	64	6.5	28.6	187.8
FC4 (AF)	47.7625	-91.3827	7	296.0	26.8	292.6	38.3	59	7.9	30.8	177.4
HCT1 (AF)	47.6008	-91.1495	7	287.2	35.6	281.0	46.0	54	8.3	26.9	190.8
HCT1 (thermal)	47.6008	-91.1495	6	285.7	45.3	276.3	55.3	144	5.6	29.5	201.0
1 (Beck layered)	46.68	-92.24	4	279.5	47.5	287.7	64.4	51	9.8	42.0	205.2
3 (Beck layered)	46.68	-92.24	4	292.0	26.5	298.0	41.9	17	17.2	36.3	175.6
4 (Beck layered)	46.68	-92.24	3	279.5	36.0	284.5	53.0	20	18.0	33.0	193.5
5 (Beck layered)	46.68	-92.24	3	279.5	55.0	291.8	71.7	14	22.0	48.4	217.4
6 (Beck layered)	46.68	-92.24	1	280.5	32.0	285.0	48.9			31.1	189.7
7 (Beck layered)	46.68	-92.24	5	278.0	33.0	282.0	50.1	85	6.8	29.7	192.7
8 (Beck layered)	46.68	-92.24	7	290.5	43.0	301.6	58.3	345	2.8	47.5	189.4
9 (Beck layered)	46.68	-92.23	3	281.5	42.0	288.7	58.7	35	13.6	39.2	197.0
10 (Beck layered)	46.70	-92.23	3	297.5	30.5	305.6	44.9	15	21.2	43.0	172.0
11 (Beck layered)	46.70	-92.22	1	284.0	30.5	289.2	47.0	_		32.9	185.6
12 (Beck layered)	46.72	-92.21	5	284.5	36.0	291.1	52.4	43	9.6	37.1	188.9
13 (Beck layered)	46.69	-92.24	6	281.5	28.0	285.6	44.8	437	2.7	29.3	186.4
14 (Beck layered)	46.72	-92.20	7	287.0	35.0	294.1	51.1	334	2.9	38.4	185.8
15 (Beck layered)	46.73	-92.21	2	290.0	31.5	296.9	47.2			38.2	180.4
17 (Beck layered)	46.74	-92.19	3	279.5	37.0	284.7	54.0	80	9.1	33.8	194.3
19 (Beck layered)	46.75	-92.19	4	288.0	35.0	295.3	50.9	51	9.8	39.2	184.8
20 (Beck layered)	46.77	-92.15	3	282.0	33.0	287.1	49.7	444	3.8	33.0	189.1
25 (Beck layered)	46.78	-92.12	1	273.5	18.5	274.9	36.0			17.7	188.5
27 (Beck layered)	46.77	-92.15	1	310.0	40.5	324.6	51.6			59.4	162.2
30 (Beck layered)	46.77	-92.14	1	284.0	36.5	290.6	53.0			37.1	189.8
32 (Beck layered)	46.77	-92.14	1	290.0	36.0	298.2	51.6			41.5	183.5
33 (Beck layered)	46.77	-92.15	2	288.0	32.0	294.5	48.0			37.0	182.7
35 (Beck layered)	46.79	-92.23	8	290.0	23.5	294.9	39.3	194	3.6	32.9	176.1
36 (Beck layered)	46.78	-92.21	2	276.0	27.0	278.6	44.3			24.3	190.6
37 (Beck layered)	46.79	-92.25	2	273.0	29.0	275.0	46.5			23.1	194.3
92 (Beck layered)	46.81	-92.10	3	290.0	41.5	300.2	57.0	16	20.1	45.9	188.3
93 (Beck layered)	46.83	-92.18	5	284.5	24.5	288.6	41.0	151	5.1	29.4	181.7
94 (Beck layered)	46.85	-92.04	4	291.0	36.5	299.6	51.9	107	6.8	42.7	182.9
97 (Beck layered)	46.78	-92.12	2	281.0	28.5	285.0	45.4			29.2	187.2
98 (Beck layered)	46.77	-92.13	6	288.5	34.0	295.7	49.9	115	5.3	38.8	183.6
99 (Beck layered)	46.77	-92.12	3	287.0	35.0	294.1	51.1	39	13.0	38.4	185.8
103 (Beck layered)	46.75	-92.18	2	276.0	29.0	278.8	46.3			25.5	191.8
215 (Beck layered)	48.08	-90.77	2	281.0	48.0	290.2	64.7			44.4	204.8
217 (Beck layered)	46.79	-92.20	5	287.0	41.0	296.0	57.0	53	8.6	43.0	190.8
218 (Beck layered)	46.79	-92.18	6	284.5	27.5	289.2	44.0	62	7.3	31.3	183.3
219 (Beck layered)	46.79	-92.17	5	284.5	33.5	290.5	49.9	10	19.7	35.3	187.1
220 (Beck layered)	46.80	-92.15	5	284.0	30.5	289.2	47.0	291	3.7	32.9	185.6
221 (Beck layered)	46.79	-92.14	5	290.5	27.5	296.4	43.2	1433	1.7	35.8	177.6
18 (Beck anorthosite)	46.75	-92.17	7	279.0	37.5	284.1	54.5	91	5.5	33.7	195.2
21 (Beck anorthosite)	46.77	-92.15	2	290.0	42.0	300.5	57.5		1= 0	46.3	188.8
22 (Beck anorthosite)	46.78	-92.12	6	275.0	40.5	279.1	57.8	10	17.8	32.6	201.4
23 (Beck anorthosite)	46.78	-92.12	2	295.5	39.5	306.5	54.0			48.5	180.6
26 (Beck anorthosite)	46.77	-92.15	2	309.5	43.5	325.8	54.5			61.9	165.6
31 (Beck anorthosite)	46.77	-92.14	1	278.0	33.0	282.0	50.1			29.7	192.7
38 (Beck anorthosite)	46.83	-92.11	2	262.0	33.0	260.9	50.6			16.7	206.2
40 (Beck anorthosite)	46.83	-92.09	2	309.0	35.0	320.7	46.6			54.0	160.2
101 (Beck anorthosite)	46.76	-92.16	2	296.5	37.5	306.9	51.9			47.6	177.7
102 (Beck anorthosite)	46.75	-92.18	1	275.0	29.0	277.6	46.4		7.0	24.7	192.7
222 (Beck anorthosite)	46.76	-92.15	5	270.5	43.0	273.0	60.6	75	7.3	30.7	207.6

Notes: n-number of samples analyzed and included in the site mean; dec-mean declination for the site (is = insitu; tc = tilt-corrected); inc-mean inclination for the site; k-Fisher precision parameter;  $\alpha_{95}$ -95% confidence limit in degrees; VGP lat-latitude of the virtual geomagnetic pole for the site; VGP lon-longitude of the virtual geomagnetic pole for the site. Sites in **bold** were included in the calculation of the mean pole (filtered for  $\alpha_{95} < 15^{\circ}$  and so that only one site for FC1 and HCT). The resulting mean pole is: 188.7°E, 35.6°N, N=24, A<sub>95</sub>=3.1, k=92.