

Trayler, R.B., Schmitz, M.D., Cuitiño, J.I., Kohn, M.J., Bargo, M.S., Kay, R.F., Strömberg, C.A.E., and Vizcaíno, S.F., 2019, An improved approach to age-modeling in deep time: Implications for the Santa Cruz Formation, Argentina: GSA Bulletin, <https://doi.org/10.1130/B35203.1>.

## Data Repository

Figure DR1. Example comparison between age-depth models generated using Bchron and our modified model for a the Glendalough lake core dataset (Haslett and Parnell, 2008; Haslett et al., 2006). Both models were run for 10,000 iterations with the initial 5,000 discarded to allow a burn-in period. Bchron was run without radiocarbon calibration (i.e. normally distributed likelihood inputs).

Figure DR2. Superimposed trace plots of each model parameter from 500 independent simulations for the Santa Cruz Formation dataset. the initial 5,000 iterations for each model were discarded to allow a burn-in period (shaded grey area).

Figure DR3. Superimposed kernel density estimates of the posterior distribution for each model parameter from 500 independent simulations for the Santa Cruz Formation dataset.

Figure DR4. Results of a leave-one-out sensitivity test using the Santa Cruz Formation dataset. For each sample, each age determination was excluded, and an age-depth model was calculated using the remaining dataset. Grey probability distributions are kernel density estimates of the posterior and error bars are the 95% HDI of each model run. The shaded grey area and dashed line indicate the median and 95% HDI of the full Santa Cruz formation dataset (Fig. 5B; Table 2).

## APPENDIX 1: EXAMPLE CODE

Example R script to generate an age depth model for using tables **DR1** and **DR2**.

```
## Note that the library can be installed directly from the github link provided
library(modifiedBChron)
dates <- read.csv("~/tableA2.csv")
means <- read.csv('~/tableA1.csv')
##-----
## generate the age model using the full PDF
model <- ageModel(ages = dates$age,
                    ageSds = dates$ageSds,
                    positions = dates$position,
                    positionThicknesses = dates$thickness,
                    ids = dates$ids,
                    distTypes = dates$distType,
                    predictPositions = seq(min(dates$position),
                                           max(dates$position),
                                           length = 500),
                    MC = 100000,
                    burn = 5000,
                    truncateUp = 16)

##-----
## generate the age model using the weighted means PDF
meanModel <- ageModel(ages = means$age,
                      ageSds = means$ageSds,
                      positions = means$position,
                      positionThicknesses = means$thickness,
                      ids = means$ids,
                      predictPositions = seq(min(dates$position),
                                             max(dates$position),
                                             length = 500),
                      distTypes = means$distType,
                      MC = 100000,
                      burn = 5000,
                      truncateUp = 16)

##-----
## plot the model results
modelPlot(meanModel)
modelPlot(model)
```

TABLE DR1. INPUT FILE FOR THE SUMMED PROBABILITY DISTRIBUTION MODEL

ids	age	ageSds	position	thickness	distType
CV-13	17.634	0.016	48.25	3.125	G
CV-13	17.629	0.025	48.25	3.125	G
CV-13	17.603	0.029	48.25	3.125	G
CV-13	17.599	0.019	48.25	3.125	G
CV-13	17.592	0.020	48.25	3.125	G
<sup>1</sup> CO	17.119	0.113	84.5	2.5	G
<sup>1</sup> CO	17.119	0.113	84.5	2.5	G
<sup>1</sup> CO	17.180	0.133	84.5	2.5	G
<sup>1</sup> CO	17.240	0.103	84.5	2.5	G
<sup>1</sup> CO	17.351	0.104	84.5	2.5	G
<sup>1</sup> CO	17.401	0.123	84.5	2.5	G
<sup>1</sup> CO	17.431	0.113	84.5	2.5	G
<sup>1</sup> CO	17.492	0.123	84.5	2.5	G
<sup>1</sup> CO	17.613	0.133	84.5	2.5	G
KARG-15-09	17.028	0.032	151.5	1.8	G
KARG-15-09	16.997	0.023	151.5	1.8	G
KARG-15-01	16.854	0.012	161	0	G
KARG-15-01	16.850	0.014	161	0	G
KARG-15-01	16.849	0.016	161	0	G
KARG-15-01	16.846	0.021	161	0	G
KARG-15-01	16.836	0.015	161	0	G
Toba Blanca	16.883	0.018	175	0	G
Toba Blanca	16.859	0.038	175	0	G
Toba Blanca	16.823	0.030	175	0	G
CV-10	16.877	0.029	179	0	G
CV-10	16.833	0.025	179	0	G
CV-10	16.760	0.034	179	0	G
CV-10	16.751	0.057	179	0	G
<sup>1</sup> CO3	16.397	0.088	193.5	1.5	G
<sup>1</sup> CO3	16.468	0.098	193.5	1.5	G
<sup>1</sup> CO3	16.601	0.086	193.5	1.5	G
<sup>1</sup> CO3	16.644	0.081	193.5	1.5	G
<sup>1</sup> CO3	16.656	0.083	193.5	1.5	G
<sup>1</sup> CO3	16.667	0.113	193.5	1.5	G
<sup>1</sup> CO3	16.678	0.079	193.5	1.5	G
<sup>1</sup> CO3	16.685	0.082	193.5	1.5	G

Notes: Tracer and decay constant uncertainties were propagated onto individual zircon grain ages to allow direct comparison to  $^{40}\text{Ar}/^{39}\text{Ar}$  ages included in the model. See Appendix 1 for more details. <sup>1</sup>Data for individual  $^{40}\text{Ar}/^{39}\text{Ar}$  laser fusion analyses from Perkins et al. (2012) provided by Matthew Heizler at the New Mexico Geochronological Research Laboratory (personal communication).

TABLE DR2. INPUT FILE FOR THE WEIGHTED MEAN MODEL

ids	age	ageSds	position	thickness	distType
CV-13	17.615	0.013	48.25	3.125	G
*CO	17.31	0.056	84.5	2.5	G
KARG-15-09	17.006	0.02	151.5	1.8	G
KARG-15-01	16.85	0.011	161	0	G
Toba Blanca	16.868	0.016	175	0	G
CV-10	16.825	0.018	179	0	G
*CO3	16.605	0.031	193.5	1.5	G

Notes: Weighed mean ages recalculated from individual laser fusion analyses of Perkins et al. (2012) provided by Matthew Heizler at the New Mexico Geochronological Research Laboratory (personal communication).

**APPENDIX 2: ZIRCON LA-ICPMS AND CA-ID-TIMS ISOTOPIC DATA**

TABLE DR3. ZIRCON LA-ICPMS CONCENTRATIONS

Analysis	P	Ti	Y	Nb	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Th	U
<b>KARG-15-01</b>																						
51																						
51	263	5.71	766	1.53		15.42	0.03	0.74	1.81	0.88	14.4	5.12	68.26	25.43	123	32.55	374	50.24	8036	0.83	161	172
52	536	5.12	2187	7.25		25.84	0.04	0.83	3.97	1.23	27.6	12.55	173.54	74.61	352	97.61	1127	151.65	8964	2.16	276	425
53	777	7.29	3305	5.06	0.01	37.44	0.22	6.04	13.86	5.34	68.9	24.34	304.68	114.66	507	127.89	1384	176.3	7574	1.55	706	540
54	212	6.55	816	0.44		8.41	0.08	1.71	3.88	1.71	21.3	6.56	76.73	29.68	127	33.26	362	45.68	7454	0.32	67	62
55	494	8.24	2838	2.43	0.03	19.65	0.81	14.59	24.98	8.68	86.9	26.56	279.77	94.1	407	106.49	1214	162.49	7017	0.83	531	343
56	266	3.74	904	1.22		9.26	0.05	0.84	3.42	0.77	17.8	6.65	79.14	31.05	140	39.17	439	58.75	8518	0.82	96	130
57	247	2.75	994	3.76		19.26	0.02	0.88	2.09	0.37	14.6	5.61	83.68	34.79	157	46.2	535	68.1	9631	2.31	266	471
58	289	9.39	1824	1.46	0.07	17.49	0.31	4.84	9.38	4.57	51.9	16.92	192.73	69.8	280	68.5	732	91.44	7428	0.62	166	122
59	768	6.17	2928	11.13		23.49	0.05	1.41	4.39	0.63	34.4	16.61	226.58	98.59	465	127.12	1472	199.14	9631	3.81	352	677
60	300	4.05	1170	1.21		10.71	0.07	2.6	4.32	1.49	26.2	8.05	106.71	40.35	189	48.58	558	74.7	8935	0.63	124	156
61	259	2.83	1406	2.17	0.08	17.64	0.05	1.39	2.97	0.6	24	8.83	120.94	47.65	217	55.84	560	92.8	12213	1.13	361	298
62	850	4.19	3477	9.45		24.19	0.07	1.53	4.13	0.9	42.9	18.72	267.92	112.9	550	138.95	1448	236.17	12043	3.91	496	668
63	486	3.08	1730	1.7		12.17	0.01	1.12	4.36	1.04	28	10.42	145.05	58.74	275	70.03	727	120.22	11738	0.88	228	258
64	536	5.93	2708	3.1		26.22	0.08	3.57	7.13	2.54	47.1	17.82	220.96	91.63	422	103.76	1054	177.51	9659	1.3	728	406
65	342	7.14	2324	1.71	0.02	19.74	0.19	5.54	9.03	3.2	59.4	18.51	218.55	80.05	357	85.82	852	130.5	9616	0.64	237	165
66	440	3.73	1698	5.17		20.98	0.06	1.3	3.09	0.51	25.3	9.1	136.97	56.48	267	69.71	746	114.54	11441	2.48	503	534
67	784	3.22	2791	6.67		19.1	0.02	1.06	5.27	0.7	36.2	16.46	227.94	94.42	437	108.04	1126	170.61	12107	3.15	715	825
68	742	2.04	2110	4.2	0.03	18.33	0.04	1.01	3.14	0.45	26.3	11.27	159.76	69.2	341	90.93	991	156.94	11166	2.1	418	617
69	544	3.92	2151	2.17	0.04	21.28	0.18	3.18	8.12	2.79	37.4	14.46	183.23	70.58	331	84.51	887	133.8	9911	1.06	364	290
70	604	5.96	2428	5.46		27.94	0.06	1.36	4.52	1.73	38.9	15.04	204.63	82.97	391	100.62	1076	164.24	9311	2	327	368
71	3866	6.36	2492	6.57	63.61	142.38	16.63	86.41	23.99	1.14	55	18.29	217.89	84.75	384	98.27	1014	148.28	11229	2.78	733	832
73	584	4.84	2237	2.88	0.12	17.32	0.12	3.03	7.16	1.71	40.6	14.76	194.19	74.46	353	89.91	976	138.73	9902	1.32	286	334
74	401	4.51	1255	1.79		10.09	0.06	1.06	3.37	1.14	20.3	7.98	103.88	42.23	202	54.03	590	87.32	9470	1.01	140	191
75	391	9.3	2335	3.2		26.2	0.18	2.37	8.01	2.84	45.3	16.06	210.88	80.47	363	93.98	988	140.37	8033	1.31	318	263
76	484	6	1688	1.53	1.38	19.58	0.48	4.75	8.18	3.24	42.1	13.68	165.09	59.76	267	66.07	748	98.29	7422	0.61	271	244
77	455	6.89	527	1.22	2.13	11.69	0.59	2.58	1.19	0.52	8.4	3.01	43.32	17.06	80	23.92	299	42.77	9085	0.81	61	94
79	1062	3.05	2956	8.64		14.7	0.04	0.79	5.85	0.75	35.1	15.8	231.67	98.38	475	131.58	1540	191.43	9281	2.97	290	628
80	846	4.22	2194	2.43	0.07	16.97	0.1	1.98	5.65	1.64	35.9	13.65	187.62	72.65	338	93.55	1064	137.72	8249	1.18	255	367
81	818	4.02	2335	3.79	0.12	16.28	0.04	0.81	4.12	0.98	34.8	13.3	194.54	78.38	364	100.54	1128	147.38	9489	1.52	243	435
82	911	3.64	2397	4.65	0.07	10.78	0.05	0.86	3.7	0.52	27.4	12.82	190.63	81.48	392	107.8	1214	159.94	9567	1.93	227	489
83	880	4.76	3039	3.71	0.04	21.83	0.11	2.95	8.61	2.6	47.4	19.49	249.12	102.47	472	123.3	1321	195.62	9162	1.51	485	468
84	618	8.96	4953	3.94	0.1	57.73	0.99	18.63	36.1	11.59	148.3	44.41	510.32	175.52	715	166.1	1588	229.85	8298	1.09	941	383
85	232	8.39	826	1.59		18.85	0.67	10.25	14.14	5.87	39.6	9.09	86.24	27.29	114	27.58	282	44.64	10968	0.57	187	188
86	818	3.05	3179	9.51		15.01	0.01	0.81	3.81	0.4	34.1	15.8	234.83	100.39	504	130.54	1366	229.02	13712	3.72	306	557
87	687	3.61	2215	2		12.21	0.04	1	3.74	1.07	31.6	11.97	169.21	71.62	347	85.68	891	152.04	11359	1.1	223	280
88	502	7.27	2122	2.29	0.08	23.38	0.07	2.38	4.74	2.21	35	13.46	173.6	71.66	332	80.77	838	142.22	8887	0.78	323	218
89	529	4.4	1685	1.81		11.95	0.08	1.53	4.27	0.9	27.5	9.47	137.53	55.66	261	69.52	717	113.42	10727	0.9	208	245
90	1014	3.95	3213	7.33	0.55	24.94	0.09	3.45	6.99	1.07	44.6	18.72	253.59	106.42	520	130.58	1389	217.31	11107	2.72	591	687
<b>KAN-1</b>																						
132	283	1.9	1126	3.77		15.37		0.62	2.8	0.35	16.8	7.79	93.55	38.83	187	52.83	603	79.99	9099	2.49	402	607
133	199	7.91	618	0.52		4.72	0.05	0.72	1.79	0.76	8.5	3.09	46.81	20.64	99	29.75	383	51.37	7475	0.29	19	35
134	145	3.85	451	0.48		6.83	0.05	1.16	2.48	0.9	9.7	3.18	42.64	16.1	79	22.19	269	42.11	9198	0.3	85	118
135	363	12.39	3024	2.5	0.05	22.12	0.3	7.7	14.84	4.9	75.8	25.88	302.02	111.36	468	119.18	1283	156.77	7729	1.17	396	328
136	205	4.25	702	1.25		7.41	0.02	0.67	1.94	1.17	12.7	4.53	58.26	22.66	105	30.06	359	50.41	9374	0.66	101	249
137	353	1.59	961	1.99		10.1		0.56	2.22	0.19	11.6	5.54	79.31	33.14	163	45.09	546	73.5	8830	1.24	167	339
138	222	4.97	606	1.33		6.91	0.03	0.6	0.95	0.59	7.6	3.47	44.76	19.87	100	28.88	367	57.86	8331	0.6	80	128
139	265	4.84	841	2.06	0.03	12.23	0.09	1.58	2.62	1.39	16.1	5.7	76.2	27.34	138	36.99	466	65.8	9070	0.95	159	227
140	308	2.3	1511	5.61		28.51	0.02	0.72	3.28	0.58	22.9	9.53	130.82	52.31	241	67.56	767	98.73	9774	3.25	688	855
141	307	1.97	1349	6.07		21.96		0.84	2.94	0.3	17.8	7.67	110.48	45.19	225	61.07	733	98.14	9488	3.07	482	674
142	220	7.74	717	0.91		5.41	0.01	0.49	1.65	0.56	11.4	3.69	56.23	23.49	121	36.39	455	68.66	7759	0.55	33	66
143	227	12.38	578</																			

150	173	8.39	1077	0.5	5.62	0.05	1.27	3.81	1.37	21.2	7.46	96.16	37	172	47.96	578	76.37	7833	0.28	35	52	
151	257	1.76	1509	1.82	16.76	0.03	1.86	5.07	0.62	27.7	10.96	135.84	53.04	245	65.31	768	94.81	8697	1.43	337	469	
152	319	7.58	1803	1.53	11.17	0.31	5.41	12.53	4.54	53.6	17.06	190.18	64.49	284	72.74	836	102.18	6669	0.63	129	122	
153	205	5.11	552	1.6	0	7.42	0.68	1.47	0.61	5.8	2.97	43.52	18.37	91	27.69	376	52.59	7563	0.55	66	124	
154	531	6.51	2149	6.35	0.56	32.81	0.19	3.01	7.66	2.44	43.2	16.05	199.95	77.61	353	95.81	1127	139.68	6841	2.38	1299	1106
155	245	18.78	1004	1.71	9.39	0.05	1.31	2.88	1.27	17.3	7.02	91.65	34.04	156	43.23	509	64.47	7359	0.75	81	105	
156	177	4.44	420	1.48	8.91	0.41	1.08	0.81	7.5	2.54	33.96	13.85	66	19.94	261	38.1	7567	0.87	128	235		
157	259	2.27	966	3.72	16.56	0.54	1.99	0.36	13.8	5.48	78.36	32.09	159	45.45	521	66.8	8590	1.72	360	526		
158	237	2.58	780	1.03	8.75	0.03	0.93	2.16	0.59	13.2	5.22	65.74	26.56	121	34.22	432	56.65	7978	0.54	129	181	
159	276	8.08	752	0.82	5.12	0.16	1.49	3.34	1.32	18.1	5.36	73.18	24.88	116	32.53	389	51	7307	0.42	42	61	
160	260	3.74	1026	4.29	17.05	0.05	0.84	2.06	1.29	17.7	6.25	88.86	35.65	159	47.4	618	74.31	9185	1.76	195	367	
161	256	7.92	984	1.13	0.05	7.12	0.08	2.47	5.71	1.9	25.6	8.08	102.55	34.51	150	42.72	501	61.42	7776	0.49	74	79
162	238	6.39	683	1.8	6.42	0.07	0.44	3.3	0.88	12.6	4.54	59.31	23.15	109	29.78	363	47.8	8138	0.98	48	92	
163	243	8.5	788	1.11	6.68	0.02	1.75	4.27	1.51	15.5	5.96	73.24	27.21	121	33.68	392	52.38	7732	0.49	47	62	
164	198	10.04	771	0.9	6.83	0.05	1.6	3.48	1.29	17.1	5.51	74.06	26.95	117	30.85	332	42.43	7547	0.47	25	38	
165	350	3.27	1280	2.06	0.03	13.77	0.08	2.22	5.08	1.19	25	8.48	115.32	43.93	203	55.08	647	88.26	8452	0.99	348	333
166	668	3.33	2650	9.13	0.44	45.06	0.16	2.03	6.46	0.69	42.3	16.16	231.17	93.36	431	117.42	1285	177.2	9724	3.67	907	1002
167	333	12.07	1871	2.43	13.6	0.04	2.13	5.97	2.81	40	14.35	176.77	65.18	291	73.94	814	111.4	7718	0.77	170	137	
168	258	3.03	1066	3.41	14.24	0.01	0.49	1.73	0.49	14.7	6.12	84.86	35.87	180	49.83	578	84.74	10027	1.67	254	357	
169	226	10.34	724	1.55	5.72	0.04	0.32	2.1	0.67	9.4	4.46	58.31	24.14	117	32.88	366	57.96	9266	0.59	42	59	
170	244	4.28	870	1.9	14.2	0.1	1.56	2.42	1.03	14.7	5.25	69.77	28.6	139	39.26	456	76.62	11293	1.09	255	338	

### CV-13

171	800	12.45	7863	17.02	0.11	145.51	0.85	17.89	42	14.58	228.8	76.91	873.47	295.21	1166	265.59	2627	320.99	8856	3.4	3667	1417
172	126	4.11	212	0.21	3.12	0.18	0.54	0.32	2.9	1.05	16.47	6.78	34	11.05	130	21.47	9942	0.21	26	43		
173	297	4.28	828	0.76	0.07	5.89	0.06	1.02	3.69	0.81	13.1	5.57	76.32	28.07	135	37.82	407	55.67	9316	0.4	47	72
174	213	1.78	659	2.75	6.47	0.22	1.04	0.41	9.2	3.88	56.79	22.9	113	31.74	385	49.97	10721	2	73	221		
175	260	8.25	782	1.13	7.99	0.09	0.48	2.1	0.88	12.1	4.44	60.54	26.44	130	37.55	461	68.53	7898	0.48	49	60	
176	337	4.61	1443	9.03	10.33	0.03	0.78	3.58	0.67	21.3	9.14	126.77	52.33	245	65.76	740	98.34	10419	4.01	249	677	
177	356	6.4	1272	4	0.24	12.16	0.08	0.94	2.85	1.21	20	7.63	110.32	44.32	212	58.94	691	89.76	9806	1.8	199	386
178	216	7.58	634	0.87	6.44	0.07	1.7	3.12	1.13	14.3	4.88	62.3	22.5	98	26.82	303	42.2	8582	0.48	83	107	
179	377	12.37	1765	1.89	17.48	0.15	2.17	4.8	2.57	28.9	11.49	156.99	61.17	284	81.51	961	130.71	7366	0.78	171	182	
180	276	3.18	1241	2.17	11	0.07	1.91	5.15	1.35	28.2	9.26	116.56	44.51	196	53.85	619	78.81	9639	1.62	206	362	
181	194	5.57	912	0.59	4.8	0.04	1.41	3.08	1.09	18	6.12	79.65	30.15	141	39.81	483	64.58	8056	0.31	60	87	
182	129	5.14	452	0.4	4.8	0.01	1.49	2.44	1.12	11	3.62	39.69	14.98	70	20.89	268	36.8	8074	0.06	30	35	
183	177	10.76	1240	0.5	5.99	0.13	2.54	5.57	1.29	30.6	10.8	128.27	48.14	189	46.64	504	60.28	7820	0.42	118	137	
184	267	10.15	841	1.6	11.05	0.05	1.07	3.64	0.62	16.8	5.77	82.09	29.81	135	35.09	409	47.91	8291	0.82	109	156	
185	161	5.42	343	0.64	9.58	0.02	0.54	1.32	0.37	6.2	2.35	27.64	11.01	57	16.5	218	29.36	9184	0.69	90	164	
186	166	6.71	496	0.49	0.03	5.47	0.1	1.53	1.68	0.87	9.9	3.07	38.85	15.75	79	24.01	322	45.02	7328	0.36	35	45
187	551	5.95	3073	6.9	39.14	0.16	3.98	9.7	3.64	59.9	23.15	291.11	111.34	483	124.97	1357	171.91	9489	1.88	806	669	
188	399	3.48	1304	2.54	0.05	8.62	0.1	1.59	5.38	1.03	28.7	8.94	119.47	46.88	207	56.63	640	78.21	10075	1.45	136	333
189	208	3.98	548	1.03	0	5.8	0.1	0.62	1.29	0.92	9.5	3.65	44.67	18	96	26.57	347	47.69	9142	0.6	120	232
190	342	4.99	2169	4.71	13.95	0.12	2.58	7.43	1.18	49.1	17.95	225.53	85.83	357	84.23	895	103.94	7984	2.1	487	575	
191	1013	11.98	7154	17.58	71.71	0.49	12.11	29.98	9.84	171.2	59.32	731.32	260.1	1080	267.06	2859	342.38	7182	3.54	2120	1573	
192	205	3.2	794	3.68	10.97	0.03	0.53	1.6	0.54	10.2	5.06	64.07	25.39	132	37.82	470	63.58	9637	2.05	133	300	
193	301	4.95	1285	4.7	9.43	0.04	0.99	3.38	0.65	18	6.71	100.09	42.44	220	63.57	762	104.97	8244	1.57	107	221	
194	272	2.68	1068	6.42	15.74	0.03	0.7	1.86	0.8	16.3	6.74	92.48	37.19	179	50.3	576	74.58	10030	3.44	303	590	
195	247	6.93	657	2.72	0.1	5.06	0.05	0.9	2.28	0.71	10.2	3.87	52.47	21.58	106	34.12	451	66.13	9728	1.69	109	515
196	295	7.34	955	2.96	0.67	14.04	0.32	3.2	5.46	1.55	22.3	7.18	85.72	32.23	153	43.74	516	69.12	9296	1.48	245	402
197	357	4.35	1827	7.44	19.8	0.02	1.93	6.07	1.64	33.3	12.48	161.11	64.09	301	78.64	907	122.66	10617	3.4	379	525	
198	252	3.92	925	3.81	14.84	0.07	0.75	1.85	0.73	12.4	4.94	76.31	30.64	149	42.91	523	80.35	11003	2.41	234	393	
199	355	3.82	1474	5.73	13.63	0.03	0.92	2.03	0.85	19.5	8.56	122.81	51.06	246	68.43	777	116.78	11751	3.27	238	480	
200	319	3.47	1248	5.84	16.32	0.05	0.91	3.2	0.91	19.6	8.19	102.76	41.57	207	55.88	623	91.6	11207	2.83	344	521	

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201	248	5.33	736	2.05	6.07	0	0.48	1.79	0.65	12.8	4.67	65.47	25.08	124	33.76	386	54.79	9403	

210	232	14.21	1566	1.11	0.21	6.36	0.13	2.34	4.47	1.65	30.3	11.95	146.8	56.59	248	59.15	591	92.62	10702	0.48	46	47
212	269	2.71	1290	4.08		21.7	0.03	1.25	3.12	0.43	18.3	7.68	104.61	43.16	212	55.89	597	96.51	12054	2.52	466	531
213	192	9.51	527	0.64		4.72	0.04	0.67	2.53	0.64	12	4.57	50.1	18.52	83	20.57	206	32.29	9466	0.31	14	21
214	282	7.85	1307	1.43		11.63	0.08	1.09	3.72	1.16	24.5	8.88	116.84	45.57	216	57.52	629	84.19	9327	0.81	151	149
215	275	5.49	918	0.92		7.95	0.01	0.82	2.7	1.1	18.6	7.14	89.09	33.56	140	36.57	390	54.33	9177	0.29	50	65
216	353	5.11	1058	3.39		15.08	0.07	0.78	2.54	0.97	15.2	6.11	86.28	34.53	178	50.23	613	90.06	12014	1.6	219	473
217	205	3.11	462	0.68	0.01	6.58	0.03	0.82	2.48	1.27	12.5	3.64	45.12	16.76	70	19.62	231	34.78	9206	0.37	32	61
218	242	8.52	1048	2.15		8.85	0.05	1.32	4.15	1.37	17.5	6.59	90.16	36.72	177	49.58	562	81.48	8326	0.91	65	100
219	271	10.8	1224	2.63	0.03	9.86	0.11	1.22	3.04	1.05	20.9	7.65	104.26	42.72	199	56.02	648	92.49	8072	1.1	83	114
220	179	7	348	0.53		4.3		0.22	1.08	0.34	6	2.3	29.19	12.04	56	16.39	205	31.81	8547	0.29	41	65
222	285	8.6	1710	1.63		11.75	0.3	4.97	10.11	4.39	47	15.67	179.88	62.18	263	68.4	755	98.59	7746	0.62	129	113
225	291	8.82	1182	1.25		7.34	0.06	2.29	4.15	1.46	21.2	8.05	106.34	40.03	195	51.42	570	91.27	9365	0.47	78	83
226	276	8.38	1726	0.89		5.99	0.13	3.05	6.94	2.47	41	14.7	180.31	66.44	280	66.13	644	94.13	9635	0.68	52	52
228	354	7.37	2245	1.96	0.26	18.7	0.34	6.68	11.64	3.11	50.4	18.71	210.16	76.4	352	86.95	921	145.3	11691	0.83	345	232
229	309	9.85	1315	0.69		6.04	0.04	1.44	5.63	1.16	28.1	10.54	130.38	48.15	206	47.06	459	67.69	11788	0.66	91	94
230	431	6.4	2839	2.15		25.16	0.34	7.12	15.45	3.89	70.8	23.46	265.42	99.82	448	110.7	1156	197.87	12104	0.94	738	406
231	246	3.3	1037	2.17	0.17	3.45	0.18	3	4.43	0.92	29	8.45	96.08	33.57	148	40.91	433	75.69	12479	1.25	166	394
232	230	5.72	947	1.95		8.28	0.01	0.91	2.41	1.2	15.4	6.08	77.49	31.04	152	38.65	422	76.77	12122	0.86	79	104
233	152	7.29	574	1.01		5.92		0.87	2.24	0.6	10.4	3.73	45.35	18.43	89	23.44	262	47.37	11234	0.46	31	46
234	327	7.11	3097	2.27		24.42	0.29	7.06	14.73	3.58	67.8	24.4	270.24	103.46	467	114.81	1209	211.69	12027	0.89	642	353
235	208	11.91	1075	1.37		8.6	0.04	1.28	4.14	1.11	19.6	6.34	87.12	36.37	169	41.33	419	73.95	9646	0.66	41	49
236	256	9.15	2017	1.09		6.71	0.08	2.66	6.55	1.95	42.1	15.42	193.41	73.12	327	75.88	718	118.09	10403	0.47	58	54
237	262	3.05	1190	3.23		16.75	0.04	0.41	2.48	0.17	14.4	6.57	94.38	40.85	199	53.21	564	99.76	12306	1.95	318	389
238	586	4.66	2250	4.39	1.19	13.38	0.46	4.5	4.63	1.01	34.5	13.83	185.57	75.11	374	99.78	1022	173.94	12858	2.94	361	548
239	195	3.86	1026	2.17	0.07	4.63	0.07	1.66	5.4	1.01	27.5	9.46	103.8	33.87	138	32.24	323	51.83	13376	1.49	216	536
240	1586	15.2	1446	1.2	15.67	41.24	5.97	40.31	12.47	1.48	35.6	11.1	136.12	51.42	234	55.04	541	82.99	10446	0.66	114	133
241	725	8.97	1010	2.16	3.01	15.4	0.92	5.65	4.59	1.15	18	6.38	78.43	34.46	164	43.95	491	80.41	10369	0.93	64	86
242	315	12.79	1350	1.41	0.05	12.84	0.05	2	5.03	0.58	28.8	10.3	120.24	48.68	212	50.66	506	74.53	11494	0.98	291	249

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243	308	4.55	1530	1.6	0.59	3.82	0.45	3.78	5.77	0.21	38.4	14.12	166.74	60.59	252	60.2	640	71.58	7896	0.97	135	235
244	229	4.72	1022	0.64		6.57	0.11	2.02	4.61	1.13	21	8.2	99.07	36.82	170	44.79	522	67.42	7811	0.36	76	100
245	410	4.31	1259	4.33	1.75	19.86	0.55	5.66	4.04	0.93	25.4	9.67	121.67	47.48	211	55.21	589	69.53	8306	1.73	132	212
246	328	10.88	2263	15.97	0.17	68.21	0.14	3.08	9.93	4.67	55.3	18.26	219.63	79.89	361	96.65	1100	137.78	8309	4.36	1201	1046
247	190	5.21	477	1.26		6.29	0.05	0.48	1.47	0.69	6.7	2.78	37.32	15.65	83	24.8	320	49.1	7745	0.62	75	136
248	229	5.97	865	1.6		7.69	0.02	0.67	2.4	0.38	11.9	4.97	71.21	28.02	141	41.77	511	67.96	8870	1.07	95	183
249	257	7.48	823	0.47		7.09	0.03	1.01	1.61	0.69	14.4	5.28	73.41	30.21	137	37.92	432	56.97	7857	0.26	40	56
250	422	7.13	2401	9.9	0.77	21.74	0.23	2.85	5.18	2.03	36.8	13.43	182.12	77.99	378	104.33	1090	199.81	11030	3.13	230	274
251	264	6.78	2374	2.01		14.76	0.11	3.26	7.47	2.05	55.8	18.41	228.43	86.41	386	90.86	872	146.46	12127	0.72	298	189
252	475	8.19	2737	2.78		12.92	0.1	3.31	9.53	3.03	53.8	18.82	239.35	93.85	430	105.66	1058	184.26	9920	1.22	375	375
253	235	14.1	919	1.01	0.03	11.2	0.03	0.82	2.33	0.75	17.1	6.08	83.41	33.58	148	35.51	342	57.06	11690	0.49	122	98
254	232	7.36	1460	0.62		8.12	0.16	3.67	5.87	1.24	36.4	10.95	134.9	51.87	224	55.15	535	91.14	11474	0.5	120	90
255	187	5.23	1293	0.8		9.09	0.09	2.78	4.79	1.15	29.4	8.78	111.31	42.8	205	51.04	489	92.33	12402	0.34	168	125
256	252	7.63	1148	2.42		13.58	0.03	1.28	2.78	1	21.1	8.47	105.43	40.71	187	46.64	460	72.35	11473	0.98	124	125
257	249	7.28	1279	1.8		5.52	0.08	2.16	3.91	1.85	24.2	8.85	104.96	42.49	196	50.32	537	96.16	9208	0.79	167	217
258	287	5.94	969	2.14	0.37	4.66	0.13	1.51	3.55	0.41	16.5	6.48	80.31	31.44	151	39.31	422	69.91	11509	1.37	124	234
259	210	8.05	1568	0.41		7.83	0.09	2.69	6.29	1.6	37.5	12.84	148.61	54.86	248	59.2	584	91.3	11308	0.32	101	81
260	2261	4.56	1594	2.02	16.04	40.3	3.73	15.38	6.22	2.17	27.4	9.97	129.22	54.22	256	70.08	759	138.02	11116	1	373	330
261	303	9.18	1704	0.82		9.2	0.1	2.35	6.47	1.77	37.9	12.88	159.42	60.06	268	63.64	636	98.18	10528	0.63	111	90
262	338	8.61	1254	1.13		4.23	0.14	2.44	6.04	0.48	33.6	10.76	129.54	47.25	207	46.55	481	67.53	12851	0.74	106	177
263	359	11.23	1455	1.67		4.46	0.14	2.62	5.7	1.68	27.7	10.05	137.56	52.52	233	58.77	622	94.58	10394	0.94	87	114
264	305	6.58	1912	3.13		21.55	0.09	1.86	4.12	2.24	24.9	10.65	148.69	61.77	314	87.83	1011	178.53	10195	1.31	494	519
265	216	2.95	844	1.63		14.14	0.05	1.08	1.8	0.92	13.3	4.84	62.31	26.77	140	38.69	468	85.06	11834	0.75		

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277	275	4.17	1777	1.5	0.01	3.7	0.46	7.21	11.38	3.00	53.5	17.11	203.86	68.07	274	64.72	654	73.32	7126	0.79	20	41	
278	458	4	1850	2.48	0.6	12.23	0.5	5.28	9.05	1.86	50.1	15.59	196.86	68.26	299	74.87	799	102.96	9408	1.34	268	349	
279	290	6.18	2206	3.29		13.91	0.46	9.07	15.27	1.32	76.6	20.75	249.23	88.67	365	90.13	1000	105.75	8391	0.87	274	261	
280	471	7.27	2336	2.03		18.13	0.21	5.78	12.01	4.99	62.7	20.14	249.39	86.54	377	92.62	1004	122.53	7938	0.67	244	238	
282	396	3.76	1476	5.21		10.91	0.05	1.04	3.57	0.71	21.4	9.02	123.39	52.19	245	66.85	783	105.62	9278	2.28	191	412	
283	188	6.79	631	1.01		8.65	0.02	0.4	1.38	0.78	11.3	3.63	50.04	20.29	103	29.4	385	56.33	8979	0.72	82	106	
286	415	4.57	1822	4.06		23.99	0.1	1.23	5.58	2.17	34.4	12.01	158.58	61.13	291	78.28	928	129.01	9851	1.97	442	654	
287	329	3.74	1239	3.89		9.44	0.03	0.18	3.93	0.71	17.9	8.39	108.42	44.34	209	58.26	643	83.59	10067	2.21	205	409	
288	772	3.5	2517	6.2		19.02	0.08	1.16	4.98	0.67	37.4	15.39	210.46	85.58	424	113.06	1277	170.84	9600	2.97	323	539	
289	246	5.28	962	1.87	0.01	11.31	0.04	1.06	2.64	1.18	15.9	5.53	80.87	32.89	156	46.07	592	89.2	9136	0.98	204	279	
290	358	7.25	2052	1.06	0.42	10.16	0.27	3.41	6.55	2.07	43	14.61	197.18	73.03	325	77	853	107.64	8446	0.69	174	171	
291	218	5.46	1277	5.36		26.11	0.07	1.08	2.45	1.33	20	6.82	99.28	42.45	211	59.69	726	112.76	9015	1.94	560	580	
292	528	3.99	1641	1.67		11.08	0.08	1.76	4.87	2.06	36.2	11.77	144.33	56.53	245	64.75	711	95.93	9098	0.95	209	352	
293	277	5.96	1297	2.8	0.03	20.08	0.14	1.49	3.6	1.06	21.8	8.11	106.89	44.96	214	58.51	684	101.35	10515	1.45	480	367	
294	493	6.39	2624	3.14	0.03	28.65	0.17	4.26	10.47	3.2	59.4	20.58	253.66	96.94	421	106.36	1125	148.06	8645	0.96	481	343	
295	275	5.48	1483	1.43	0.05	9.22	0.12	3.64	6.49	1.67	32.9	11.64	145.6	54.12	237	60.46	642	84.5	9083	0.97	192	226	
296	1993	8.33	2283	1.43	27.72	63.22	8.32	40.25	16.99	2.65	61.5	18.16	233.17	83.9	354	88	910	122.36	9680	0.79	283	228	
297	391	4.13	1520	3.67		10.1	0.04	1.56	4.14	0.54	24.2	9.85	133.39	55.23	250	65.57	711	98.59	10554	1.97	224	365	
298	328	1.82	1853	11.34	0.07	3.49	0.08	0.62	2.63	0.05	23.3	10.97	166.7	67.09	319	80.17	847	107.86	12517	8.7	410	1220	
299	255	4.19	1126	2.9		15.26	0.04	1.03	2.92	0.96	18.8	6.26	89.9	36.66	185	50.21	594	93.47	9909	1.03	241	338	
300	2672	3.35	2731	10.67		19.48	77.01	11.39	79.95	29.97	0.66	81.5	24.05	291.79	103.85	448	103.96	1007	126.36	11968	4.33	445	722

**Toba  
Blanca**

301	840	3.27	3211	8.73		17.19	0.06	0.85	6.28	0.54	42.5	19.36	271.01	114.13	528	139.92	1495	218.52	12565	4.05	432	724
302	352	6.23	1743	3.53	0.02	19.18	0.04	1.12	3.13	1.01	28.6	10.4	143.56	59.22	293	76.07	839	131.41	10200	1.59	255	255
303	230	12.2	870	0.8		6.6	0.04	0.59	2.13	0.39	16.6	6.23	79.8	30.72	132	32.81	322	48.53	10740	0.69	85	93
304	271	3.23	1320	2.43	0.02	13.86	0.05	1.3	2.5	0.4	23.5	7.87	115.72	46.7	219	58.69	610	98.94	11823	1.63	295	349
305	1331	6.01	1745	2.4	8.97	26.67	2.16	11.87	5.9	1.44	34.5	10.81	147.2	60.43	283	72.4	771	121.96	10169	0.96	291	341
306	308	5.44	2334	8.98		37.34	0.04	3.03	8.38	4.51	52.8	16.57	216.61	80.12	351	90.39	973	163.06	12177	2.84	778	693
308	294	13.83	1450	0.88		8.59	0.08	3.24	5.99	1.21	34.2	10.68	141.7	52.44	214	50.99	499	72.98	11122	0.63	111	102
309	232	15.61	911	0.9		5.57	0.07	1.29	4.43	0.6	21.2	7.16	86.57	33.65	141	33.22	324	44.65	11195	0.57	85	79
310	351	4.36	1230	2.9		6.66	0.05	0.41	2.18	0.32	17.6	7.41	104.76	43.5	211	52.9	572	91.32	11681	1.56	159	303
311	346	5.01	1861	4.89		14.04	0.01	1.57	4.25	1.37	32.1	12.99	163.93	62.72	302	74.67	787	122.95	11273	1.96	338	427
312	629	5.38	3202	7		24.51	0.07	4.43	10.57	2.43	65.8	23.4	301.66	115.78	499	119.48	1211	182.75	10947	2.32	835	779
313	833	2.87	3431	8.23		16.72	0.05	1.43	6.08	0.71	45	18.82	281.34	117.22	578	142.3	1473	238.47	13024	4.18	392	628
314	2813	5.52	1730	4.9	49.16	99.26	12.77	69.86	19.36	1.9	42.4	12.46	159.57	62.76	281	70.68	725	110.54	12510	2.51	449	454
316	326	6.09	2183	1.84	0.11	8.82	0.29	4.77	8.68	2.15	47.1	16.35	201.6	78.95	343	84.17	825	132.91	10658	1.13	244	263
317	913	4.61	4059	11.07	0.08	24.84	0.08	2.39	6.72	0.99	50.4	22.81	324.9	138.55	685	172.72	1761	293.13	12878	4.32	631	790
318	935	3.28	4135	10.92		15.55	0.04	1.52	5.93	0.92	45.3	20.53	325.67	140.9	690	177.06	1848	313.44	13776	3.61	357	635
319	175	9.59	1301	1.17	0.05	4.78	0.38	4.67	8.66	3.22	35.6	11.07	127.1	45.47	202	49.67	507	87.61	8113	1.03	131	113
320	549	9.5	4014	3.36	0.33	34.12	0.45	9.39	17.21	7.44	94.3	30.59	359.58	138.63	646	153.62	1508	263.18	8460	0.97	718	361
321	523	7.26	1006	1.55	1.92	17.3	0.45	4.26	2.86	0.84	16.2	5.94	78.66	33.45	164	44.88	489	86.26	12066	0.83	190	160
322	898	7.18	4371	6.89	0.08	22.01	0.41	8.8	17.4	7.06	94.6	31.23	389.48	152.64	672	165.2	1644	271.13	13140	2.44	563	518
323	219	3.68	1158	1.94		9.09	0.37	2.23	0.41	18.6	7	98.49	41.34	202	51.25	524	88.02	13792	1.08	154	213	
324	394	4.96	2237	2.25		23.53	0.24	5.24	8.95	2.68	52.8	15.37	213.04	81.51	365	90.72	905	145.79	12274	0.89	551	290
325	713	5.77	3512	9.2	0.25	24.31	0.14	1.59	6.08	0.88	50.4	21.27	299.69	128.95	609	154.94	1572	264.47	14362	4.62	622	782
326	1005	4.68	4220	7.16	0.27	19.99	0.17	2.51	8.09	1.12	58.5	25.14	357.98	151.11	712	179.04	1792	302.35	13844	3.11	658	796
327	566	11.06	3135	2.43	1.6	35.91	0.91	9.03	13.88	3.62	74	26.18	317.61	116.76	504	117.8	1115	171.92	11149	1.35	452	221
328	607	3.74	1544	4.09	3.85	23.27	0.69	7.41	3.87	0.7	28.1	10.22	134.55	54.38	266	68.97	738	122.57	12533	2.38	755	604
330	262	10.06	1356	2.22		12.37	0.05	1.14	2.54	0.97	20.2	7.16	104.37	44.43	229	63.47	728	130.71	10652	0.98	102	110
331	605	3.3	2285	3.78	0.02	17.71	0.04	1.71	4.48	1.29	37.4	14.13	197.25	79.58	389	99.76	1021	170.17	12485	1.61	338	388
332	438	12.75	2111	2.84	0.12	22.25	0.13	1.85	6.13	2.1	36.4	13.71	188.83	74.63	354	85.39	883					

341	289	15.56	992	0.79		8.3	0.08	1.15	3.75	0.72	21.4	8.64	101.11	38.86	169	41.26	453	59.37	9299	0.5	72	79
343	707	8.52	1976	4.35	2.03	30.89	0.76	5.36	7.1	2.75	39.7	13.78	187.85	73.77	346	91.21	1074	128.42	7638	1.53	221	247
345	147	9.86	646	0.28		2.17	0.05	1.87	4.88	1.51	19.1	6.29	72.3	25.34	105	28.13	316	35.88	6716	0.23	51	71
346	118	3.35	216	0.5		3.86		0.28	0.44	0.27	3.8	1.38	18.91	7.75	37	11.18	148	20.36	9635	0.28	30	68
347	1148	12.04	6577	10.59	0.48	96.2	3.56	61.72	88.95	28.2	290.1	79.66	814.45	257.57	965	241.28	2624	291.15	7351	2.22	1673	794
349	244	5.59	774	0.68	0.04	6.76	0.03	0.76	2.34	0.82	14.1	5.87	75.52	27.95	129	33.91	400	49.45	8123	0.19	18	46
350	210	4.46	591	3.91	0.06	13.85	0.03	0.8	2.54	0.95	12.9	4.63	52.45	20.67	93	27.65	359	49.66	8408	2.25	210	399
351	508	9.68	2075	2.67	0	22.69	0.14	2.81	7.95	3.27	45.2	17.25	218.08	79.33	353	90.45	1059	121.77	7387	1	163	190
352	317	5.45	808	1.5	0.94	9.66	0.31	2.04	2.38	0.48	12.3	4.64	70.77	28.4	137	41.14	508	62.27	9150	1	84	172
353	548	7.84	2549	2.19		28.81	0.38	7.49	15.37	6.11	68.1	21.7	255.48	93.83	411	109.47	1256	159.84	7329	0.51	338	394
355	309	11.02	1124	3.57	0.07	45.18	0.17	2.67	6.91	1.18	33.4	10.01	123.2	43.18	180	46.56	524	56.33	8915	2.18	603	485
356	721	6.28	3339	7.6		24.32	0.16	4.97	14.91	5.32	75.1	26.12	336.94	122.9	548	144.09	1629	194.55	8753	1.94	706	752
358	556	20.82	1481	0.77	2.06	15.99	0.79	10.84	13.49	3.91	52.3	15.76	171.81	59.75	242	57.98	611	65.01	8066	0.29	138	101
359	300	18.09	1892	1.03	0.05	19.62	0.42	7.56	15.97	4.98	74.4	21.62	219.74	77.79	295	72.91	748	80.55	7744	0.51	209	141
360	222	6.7	891	0.55		7.39	0.12	2.02	3.78	1.1	20.1	7.14	87.17	32.22	145	39.83	457	56.7	8721	0.38	86	94
361	286	18.53	1958	1.18	0.03	17.63	0.28	6.99	14.53	4	67.7	19.16	217.54	75.49	311	74.59	765	89.18	8028	0.33	217	144
362	275	17.97	1980	0.78	0.01	17.78	0.31	8.33	16.19	4.79	71.4	20.92	242.38	77.95	304	72.11	741	87.54	7968	0.32	192	129
363	296	19.05	1955	0.96	0.26	16.97	0.43	7.26	13.77	4.36	67.2	19.83	224.29	73.66	292	71.22	740	85.15	7604	0.47	183	124
365	336	18.13	2719	1.52	0.07	23.3	0.45	9.56	18.44	6.55	101.5	29.22	309.81	105.61	428	99.06	1005	121.91	8574	0.53	299	176
366	487	6.68	2261	3.61		32.9	0.2	3.01	9.13	1.77	55	18.19	226.85	84	363	89.39	924	120.28	10170	1.35	404	376
367	270	18.47	2383	1.02	0.02	19.3	0.42	7.9	16.18	5.25	79.3	23.07	267.42	90.99	377	85.93	826	113.42	9716	0.62	239	139
368	300	21.52	2412	0.88	0.06	17.12	0.38	9.9	18.13	5.84	84.1	23.86	265.08	87.99	354	83.84	754	104.77	9479	0.36	208	111
369	311	19.94	1411	0.97		12.69	0.12	2.77	4.3	1.66	32.7	10.2	129.65	49.3	225	55.31	553	87.13	10158	0.56	121	102
371	247	18.83	2314	0.67	0.01	12.99	0.34	7.3	13.4	4.25	67.6	20.12	250.35	87.37	363	80.01	742	115.79	10548	0.39	190	103
372	384	6.13	981	1.15	2.11	11.93	0.61	3.28	3.29	0.92	18	6.21	84.19	33.43	167	44.22	506	89.67	11965	0.79	100	88
374	212	213.36	842	1.27	3.44	14.73	0.9	5.65	4.29	1.45	21.9	6.97	81.5	30.91	131	30.17	301	46.49	8111	0.44	67	49
375	253	13.77	1460	0.42		12.38	0.19	5.32	8.95	2.53	43.1	13.59	149.35	55.54	224	51.79	502	68.15	9595	0.28	123	84

Notes: Ablation using a 213 nm wavelength laser, spot size of 25 microns, repetition rate of 10 Hz, and fluence of ~5 J/cm<sup>2</sup>. Trace element concentrations in ppm, calculated using the mean count rate method, internal standardization to <sup>29</sup>Si, and calibration to NIST 610 and 612 glass standards.

TABLE DR4. ZIRCON LA-ICPMS U-Pb GEOCHRONOLOGY

Composition				Corrected isotope ratios										Apparent ages (Ma)									
Analysis	U (ppm)	Th (ppm)	Pb (ppm)	Th U	$^{206}\text{Pb}$ / $^{204}\text{Pb}$	$^{207}\text{Pb}$ / $^{235}\text{U}$	$\pm 2\sigma$ (%)	$^{206}\text{Pb}$ / $^{238}\text{U}$	$\pm 2\sigma$ (%)	error corr.	$^{238}\text{U}$ / $^{206}\text{Pb}$	$\pm 2\sigma$ (%)	$^{207}\text{Pb}$ / $^{206}\text{Pb}$	$\pm 2\sigma$ (%)	$^{207}\text{Pb}$ / $^{206}\text{Pb}$	$\pm 2\sigma$ (%)	$^{207}\text{Pb}$ / $^{235}\text{U}$	$\pm 2\sigma$ (abs)	$^{206}\text{Pb}/^{238}\text{U}$	$\pm 2\sigma$ (abs)	%		
<b>KARG-15-01</b>																							
51	172	161	1	0.94	55.4	0.017	26	0.0025	8.5	0.33	395.8	8.5	0.0492	24.6	155	575	17.2	4.4	16.3	1.4	90		
52	425	276	1	0.65	407.8	0.017	20.6	0.0028	7.8	0.38	356.8	7.8	0.0446	19.1	-80	467	17.3	3.5	18	1.4	123		
53	540	706	2	1.31	53	0.018	15.7	0.0029	7.2	0.46	346.64	7.2	0.0447	14	-74	342	17.9	2.8	18.6	1.3	125		
54	62	67	0	1.08	53.5	0.058	95.1	0.0028	9.7	0.1	354.16	9.7	0.1477	94.6	2319	1623	56.8	52.5	18.2	1.8	99		
55	343	531	1	1.55	129.5	0.009	49.9	0.0026	6.8	0.14	383.44	6.8	0.0255	49.4	-1692	1719	9.3	4.6	16.8	1.1	101		
56	130	96	0	0.74	58.6	0.025	32.5	0.0027	10.3	0.32	376.29	10.3	0.0691	30.8	902	636	25.4	8.2	17.1	1.8	98		
57	471	266	1	0.57	38.7	0.014	20.3	0.0024	8.2	0.4	412.73	8.2	0.0412	18.6	-277	472	13.9	2.8	15.6	1.3	106		
58	122	166	1	1.36	10.8	0.039	33.8	0.0029	5.8	0.17	346.59	5.8	0.0982	33.4	1590	623	38.9	12.9	18.6	1.1	99		
59	677	352	2	0.52	219.2	0.019	10.5	0.0027	4.7	0.45	372.46	4.7	0.0526	9.3	314	213	19.6	2	17.3	0.8	94		
60	156	124	1	0.79	32.8	0.061	262	0.0026	6.4	0.02	380.4	6.4	0.1675	261.9	2533	4394	59.9	152.3	16.9	1.1	99		
61	298	361	1	1.21	126.1	0.012	27.1	0.0027	4.8	0.18	369.95	4.8	0.0328	26.6	-892	771	12.3	3.3	17.4	0.8	102		
62	668	496	2	0.74	63.8	0.019	12	0.0027	5.9	0.49	364.69	5.9	0.0507	10.4	229	241	19.3	2.3	17.7	1	92		
63	258	228	1	0.89	24.1	0.011	67.6	0.0025	7	0.1	394.85	7	0.0318	67.2	-981	1984	11.2	7.5	16.3	1.1	102		
64	406	728	2	1.79	21.2	0.013	28.6	0.0026	6.4	0.22	387.05	6.4	0.0377	27.9	-505	743	13.6	3.9	16.6	1.1	103		
65	165	237	1	1.44	11.9	0.015	35	0.0029	5.3	0.15	345.06	5.3	0.0371	34.6	-547	930	15	5.2	18.7	1	103		
66	534	503	2	0.94	237.9	0.02	14.4	0.0028	6.8	0.47	353.81	6.8	0.0501	12.7	201	294	19.6	2.8	18.2	1.2	91		
67	825	715	3	0.87	103.7	0.019	11.7	0.0027	3.9	0.33	368.9	3.9	0.0498	11	188	257	18.7	2.2	17.5	0.7	91		
68	617	418	2	0.68	92.8	0.019	9.6	0.0026	4	0.41	389.96	4	0.0525	8.8	308	200	18.7	1.8	16.5	0.7	95		
69	290	364	1	1.25	28.6	0.016	26.5	0.0026	6.1	0.23	391.34	6.1	0.0452	25.7	-44	626	16	4.2	16.5	1	137		
70	368	327	1	0.89	58.3	0.016	23.3	0.0029	5	0.21	346.16	5	0.0395	22.7	-385	591	15.8	3.7	18.6	0.9	105		
71	832	733	3	0.88	67.8	0.028	12.6	0.0028	3.6	0.28	357.36	3.6	0.0718	12.1	981	246	27.8	3.4	18	0.6	98		
73	334	286	1	0.86	89.8	0.019	18.5	0.0026	4.5	0.24	387	4.5	0.0546	18	396	403	19.6	3.6	16.6	0.8	96		
74	191	140	1	0.73	11.4	0.018	36.7	0.0028	6.6	0.18	352.24	6.6	0.0467	36.1	32	865	18.4	6.7	18.3	1.2	42		
75	263	318	1	1.21	224.5	0.012	30	0.0025	5.1	0.17	392.66	5.1	0.0348	29.6	-727	826	12.3	3.7	16.4	0.8	102		
76	244	271	1	1.11	432	0.021	65.7	0.0025	7.7	0.12	404.73	7.7	0.0619	65.3	670	1396	21.2	13.8	15.9	1.2	98		
77	94	61	2	0.65	88.2	0.102	18.4	0.0154	5.7	0.31	64.96	5.7	0.0482	17.5	107	414	98.8	17.4	98.5	5.6	8		
79	628	290	2	0.46	102.7	0.012	23.5	0.0027	5.6	0.24	365.07	5.6	0.0331	22.8	-868	657	12.6	2.9	17.6	1	102		
80	367	255	1	0.7	39.2	0.017	24.9	0.0027	5.3	0.21	368.98	5.3	0.0454	24.4	-37	591	17.1	4.2	17.4	0.9	148		
81	435	243	2	0.56	23.7	0.015	18.5	0.0029	5.3	0.29	346.74	5.3	0.0366	17.7	-584	480	14.7	2.7	18.6	1	103		
82	489	227	2	0.46	38.2	0.022	11.8	0.0027	5	0.42	372.74	5	0.06	10.7	603	231	22.3	2.6	17.3	0.9	97		
83	468	485	2	1.04	47	0.02	15.6	0.0025	5.7	0.37	394.02	5.7	0.0563	14.5	464	321	19.8	3.1	16.3	0.9	96		
84	383	941	2	2.46	29.8	0.014	26.6	0.0025	5.3	0.2	395	5.3	0.0388	26.1	-427	683	13.7	3.6	16.3	0.9	104		
85	188	187	1	1	114.2	0.019	27.1	0.0027	7	0.26	368.5	7	0.05	26.2	196	609	18.8	5.1	17.5	1.2	91		
86	557	306	2	0.55	44.5	0.01	39.5	0.0027	4.5	0.11	364.51	4.5	0.0262	39.2	-1590	1331	10	3.9	17.7	0.8	101		
87	280	223	1	0.79	125.9	0.015	25.6	0.0025	7.2	0.28	392.61	7.2	0.0423	24.6	-208	618	15	3.8	16.4	1.2	108		
88	218	323	1	1.48	426.8	0.015	64.2	0.0026	8.6	0.13	388.14	8.6	0.041	63.6	-287	1622	14.7	9.4	16.6	1.4	106		
89	245	208	1	0.85	9.8	0.023	68.5	0.0026	12.1	0.18	380.46	12.1	0.0624	67.4	689	1438	22.7	15.4	16.9	2	98		
90	687	591	2	0.86	35	0.017	14.5	0.0026	4.6	0.32	391.21	4.6	0.0495	13.8	171	322	17.6	2.5	16.5	0.8	90		
<b>KAN1</b>																							
132	607	402	2	0.66	249.5	0.019	11	0.0027	4.5	0.4	377.18	4.5	0.051	10.1	241	233	18.8	2.1	17.1	0.8	93		
133	35	19	1	0.55	92.6	0.095	23.1	0.0161	7.5	0.32	62.27	7.5	0.0428	21.8	-177	544	92	20.3	102.7	7.6	158		
134	118	85	2	0.72	38.6	0.102	12.4	0.0149	4.2	0.34	67.01	4.2	0.0497	11.6	181	271	98.9	11.6	95.5	4	47		
135	328	396	6	1.21	212.7	0.087	7.8	0.0125	3.8	0.48	80.28	3.8	0.0508	6.9	231	159	84.9	6.4	79.8	3	65		
136	249	101	1	0.4	40.4	0.021	19.5	0.004	4.8	0.24	251.24	4.8	0.0378	18.9	-496	502	20.9	4	25.6	1.2	105		
137	339	167	1	0.49	177.4	0.018	17.9	0.0027	6.1	0.34	375.64	6.1	0.0501	16.8	198	391	18.5	3.3	17.1	1	91		
138	128	80	3	0.63	83.5	0.127	12.6	0.0196	4.4	0.35	51.04	4.4	0.0471	11.7	56	280	121.7	14.4	125.1	5.5	-123		
139	227	159	2	0.7	254.5	0.031	17.8	0.0065	5.3	0.3	154.57	5.3	0.0352	17	-690	470	31.4	5.5	41.6	2.2	106		
140	855	688	3	0.8	646.8	0.018	13.2	0.0026	5.1	0.39	382.84	5.1	0.0495	12.1	170	283	17.9	2.3	16.8	0.9	90		
141	674	482	2	0.72	118.5	0.014	16.4	0.0026	5.5	0.33	380.75	5.5	0.0389	15.4	-420	404	14.2	2.3	16.9	0.9	104		
142	66	33	1	0.49	25.2	0.109	17.7	0.0168	5	0.28	59.7	5	0.047	16.9	49	404	104.6	17.6	107.1	5.4	-120		
143	106	99	2	0.93	27.3	0.076	23.2																

153	124	66	2	0.53	79.2	0.106	11.9	0.0155	3.3	0.27	64.59	3.3	0.0496	11.4	179	267	102.3	11.6	99	3.2	45
154	1106	1299	4	1.18	168.4	0.017	13.3	0.0024	4.2	0.31	408.85	4.2	0.0518	12.7	276	290	17.6	2.3	15.7	0.7	94
155	105	81	0	0.77	34.5	0.011	62.6	0.0027	7.5	0.12	375.38	7.5	0.0292	62.1	-1246	1946	10.8	6.7	17.2	1.3	101
156	235	128	4	0.54	273.9	0.088	6.7	0.0135	3	0.44	74.18	3	0.0473	6	63	144	85.5	5.5	86.3	2.6	-38
157	526	360	2	0.68	88.7	0.018	17.4	0.0028	2.9	0.17	354.6	2.9	0.0459	17.2	-7	414	18	3.1	18.2	0.5	375
158	181	129	1	0.71	17.7	0.024	30	0.0028	6.2	0.21	359.62	6.2	0.0624	29.4	686	627	24	7.1	17.9	1.1	97
159	61	42	0	0.69	9.6	0.027	116.6	0.0029	10.7	0.09	345.57	10.7	0.0669	116.1	835	2418	26.8	30.8	18.6	2	98
160	367	195	7	0.53	75.2	0.098	12.4	0.0146	6.7	0.54	68.38	6.7	0.0487	10.5	135	246	95.2	11.3	93.6	6.2	31
161	79	74	0	0.94	18.4	-0.036	131.8	0.0024	11.9	0.09	416.71	11.9	-0.1084	131.2	0	#DIV/0!	-37.1	-49.8	15.5	1.8	0
162	92	48	0	0.52	13.5	0.191	636.9	0.0027	11.7	0.02	367.96	11.7	0.5096	636.8	4269	9372	177.4	1036.9	17.5	2	100
163	62	47	0	0.76	84	0.018	133.1	0.0032	12.4	0.09	312.47	12.4	0.0404	132.5	-328	3407	17.9	23.6	20.6	2.5	106
164	38	25	0	0.65	1.1	0.13	270.6	0.0026	14.6	0.05	391.96	14.6	0.3686	270.2	3786	4095	123.8	315.4	16.4	2.4	100
165	333	348	2	1.05	81.9	0.016	35.1	0.0035	8.3	0.24	284.75	8.3	0.0325	34.1	-918	992	15.9	5.5	22.6	1.9	102
166	1002	907	3	0.91	61.3	0.019	14.8	0.0026	3.9	0.26	387.06	3.9	0.0534	14.2	345	322	19.1	2.8	16.6	0.6	95
167	137	170	0	1.24	15.7	0.021	51.8	0.0026	12.7	0.25	378.81	12.7	0.0571	50.2	495	1107	20.9	10.7	17	2.2	97
168	357	254	1	0.71	234	0.013	35.7	0.0027	6	0.17	374.49	6	0.0359	35.2	-641	964	13.3	4.7	17.2	1	103
169	59	42	0	0.71	9.4	0.301	541.7	0.0033	14.4	0.03	301.03	14.4	0.6577	541.5	4641	7816	267.4	1273.4	21.4	3.1	100
170	338	255	5	0.75	56.3	0.078	10.5	0.0127	5.4	0.51	78.56	5.4	0.0444	9	-86	220	76.3	7.7	81.5	4.4	195

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171	1417	3667	7	2.59	402.1	0.019	7.9	0.0026	2.7	0.33	378.09	2.7	0.0521	7.5	288	170	19.1	1.5	17	0.5	94
172	43	26	1	0.61	20.2	0.092	44.8	0.0148	7.1	0.16	67.68	7.1	0.0451	44.2	-48	1076	89.3	38.3	94.5	6.7	297
173	72	47	0	0.65	37.1	0.057	249.1	0.0028	11.5	0.05	361.64	11.5	0.1503	248.8	2350	4253	56.6	137.1	17.8	2	99
174	221	73	1	0.33	128.8	0.022	94.1	0.003	6.8	0.07	337.29	6.8	0.053	93.8	331	2128	21.8	20.3	19.1	1.3	94
175	60	49	1	0.82	40.3	0.102	20	0.0142	7.3	0.36	70.41	7.3	0.052	18.7	287	427	98.5	18.8	90.9	6.6	68
176	677	249	9	0.37	262.5	0.1	29.1	0.0115	27.6	0.95	87.24	27.6	0.0633	9.2	717	195	96.8	26.9	73.5	20.2	90
177	386	199	1	0.52	108.7	0.017	22.7	0.0029	6.2	0.27	346.04	6.2	0.0436	21.8	-132	539	17.5	3.9	18.6	1.2	114
178	107	83	0	0.77	20.6	0.02	32.2	0.0029	8	0.25	339.7	8	0.0489	31.1	144	731	20	6.4	18.9	1.5	87
179	182	171	1	0.94	19.1	0.014	43.1	0.0033	7.3	0.17	299.34	7.3	0.0308	42.5	-1075	1281	14.3	6.1	21.5	1.6	102
180	362	206	1	0.57	162.7	0.018	20.3	0.003	6.5	0.32	330.08	6.5	0.0432	19.3	-157	479	18.2	3.7	19.5	1.3	112
181	87	60	0	0.69	6.7	0.047	141.2	0.0032	11	0.08	317.07	11	0.1078	140.8	1762	2573	46.5	64.2	20.3	2.2	99
182	35	30	1	0.86	9.9	0.081	36.2	0.015	7.4	0.2	66.7	7.4	0.0392	35.4	-401	923	79.2	27.5	95.9	7	124
183	137	118	1	0.86	71	0.016	70.1	0.003	6.3	0.09	333.92	6.3	0.0399	69.8	-358	1805	16.6	11.5	19.3	1.2	105
184	156	109	1	0.7	81.4	0.063	360.8	0.003	8.2	0.02	330.81	8.2	0.1515	360.8	2362	6158	62.2	217.6	19.5	1.6	99
185	164	90	9	0.55	410.7	0.329	8	0.0465	5.5	0.69	21.49	5.5	0.0513	5.8	252	134	288.7	20.1	293.2	15.8	-16
186	45	35	1	0.77	27	0.104	19.3	0.0146	6.6	0.34	68.31	6.6	0.0513	18.2	256	418	100.1	18.4	93.7	6.1	63
187	669	806	3	1.2	35.2	0.015	16.5	0.0026	3.9	0.23	384.92	3.9	0.042	16.1	-224	404	15.2	2.5	16.7	0.7	107
188	333	136	19	0.41	2495.5	0.491	38.7	0.0447	38.3	0.99	22.36	38.3	0.0796	4.9	1186	97	405.4	129.2	282.1	105.8	76
189	232	120	1	0.52	20.7	0.009	114.8	0.0026	8.9	0.08	391.29	8.9	0.0256	114.4	-1673	3963	9.1	10.4	16.5	1.5	101
190	575	487	2	0.85	134.4	0.02	9.9	0.003	5.7	0.57	332.55	5.7	0.0488	8.1	137	191	20.3	2	19.4	1.1	86
191	1573	2120	7	1.35	116.7	0.017	7.9	0.0029	5.3	0.67	349.21	5.3	0.0434	5.8	-143	144	17.3	1.3	18.4	1	113
192	300	133	1	0.44	26.6	0.014	30.5	0.0028	4.4	0.14	361.04	4.4	0.0379	30.2	-494	803	14.6	4.4	17.8	0.8	104
193	221	107	1	0.48	135.6	0.034	135.8	0.0029	5.4	0.04	345.51	5.4	0.0855	135.7	1326	2627	34.1	45.5	18.6	1	99
194	590	303	2	0.51	312.9	0.018	18.3	0.0027	4.7	0.26	365.2	4.7	0.0484	17.7	119	416	18.4	3.3	17.6	0.8	85
195	515	109	8	0.21	836.3	0.114	18.2	0.0151	17.3	0.95	66.04	17.3	0.0546	5.9	395	133	109.6	18.9	96.9	16.6	75
196	402	245	4	0.61	70.3	0.067	19.1	0.009	17.2	0.9	110.88	17.2	0.0541	8.2	373	186	66.1	12.2	57.9	9.9	84
197	525	379	2	0.72	210.1	0.018	14.6	0.0027	7.2	0.49	370.14	7.2	0.0478	12.7	90	300	17.9	2.6	17.4	1.2	81
198	393	234	1	0.6	43.5	0.016	25.8	0.0028	5.8	0.23	362.11	5.8	0.0431	25.1	-160	624	16.5	4.2	17.8	1	111
199	480	238	2	0.5	32.7	0.017	22.9	0.0029	7.1	0.31	347.43	7.1	0.0426	21.8	-189	544	17	3.9	18.5	1.3	110
200	521	344	2	0.66	87	0.015	23.5	0.0027	5.1	0.21	368.55	5.1	0.0408	23	-299	588	15.4	3.6	17.5	0.9	106

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201	108	43	0	0.4	6.7	0.087	266.1	0.0028	8.1	0.03	354.99	8.1	0.2237	266	3007	4273	84.6	216	18.1	1.5	99
202	75	75	0	1	12.7	0.122	308	0.003	10.7	0.03	331.09	10.7	0.2937	307.9	3437	4780	117.2	340.8	19.4	2.1	99
203	672	475	2	0.71	663.3	0.015	21.7	0.0027	5.5	0.25	366.69	5.5	0.0407	21	-308	538	15.4	3.3	17.6	1	106
204	43	42	0	0.96	8	0.114	126.1	0.0034	14.1	0.11</											

215	65	50	0	0.76	129.8	0.021	77.6	0.0027	11.8	0.15	377.14	11.8	0.0574	76.7	508	1687	21.1	16.2	17.1	2	97
216	473	219	21	0.46	15767.7	0.3	26.1	0.0382	25.1	0.96	26.15	25.1	0.057	6.9	491	152	266.8	61.2	241.9	59.7	51
217	61	32	0	0.53	34.8	0.086	217.3	0.0029	12.4	0.06	343.57	12.4	0.2147	217	2941	3506	83.9	175.1	18.7	2.3	99
218	100	65	0	0.65	31.6	0.011	88	0.0028	11.6	0.13	354.75	11.6	0.0281	87.2	-1367	2810	11	9.6	18.1	2.1	101
219	114	83	0	0.73	17.6	0.018	31.7	0.0025	7.2	0.23	399.36	7.2	0.053	30.9	327	702	18.4	5.8	16.1	1.2	95
220	65	41	1	0.63	32	0.127	12.8	0.017	5.9	0.46	58.67	5.9	0.054	11.4	370	256	121.3	14.6	108.9	6.3	71
221	113	129	0	1.14	17.8	0.024	77.7	0.0026	8.9	0.11	384.7	8.9	0.068	77.2	869	1601	24.5	18.8	16.7	1.5	98
222	83	78	1	0.93	6.8	0.053	45.8	0.004	25.9	0.57	250.13	25.9	0.0955	37.8	1538	711	52.1	23.3	25.7	6.6	98
223	52	52	0	1.01	9.5	0.155	281.7	0.0026	16.2	0.06	378.06	16.2	0.4239	281.3	3996	4206	146	383	17	2.8	100
224	232	345	1	1.49	35.4	0.021	58.4	0.0025	8.1	0.14	403.74	8.1	0.0612	57.8	647	1242	21	12.1	15.9	1.3	98
225	94	91	0	0.96	6.1	0.027	30	0.0027	13.1	0.44	367.6	13.1	0.0717	27	978	551	27	8	17.5	2.3	98
226	406	738	2	1.82	71.8	0.014	36.8	0.0025	5.4	0.15	403.93	5.4	0.0417	36.4	-244	920	14.4	5.2	15.9	0.9	107
227	394	166	6	0.42	549.1	0.085	27.7	0.0122	24.6	0.89	81.67	24.6	0.0506	12.6	224	291	83.3	22.1	78.5	19.2	65
228	104	79	0	0.76	11.3	0.022	27.2	0.0027	7.1	0.26	370.04	7.1	0.0603	26.3	616	568	22.6	6.1	17.4	1.2	97
229	46	31	0	0.68	3.6	0.06	77.8	0.0029	12.4	0.16	341.61	12.4	0.1479	76.8	2322	1317	58.9	44.5	18.8	2.3	99
230	353	642	1	1.82	68.6	0.018	20.9	0.0024	11	0.53	412.75	11	0.0534	17.7	344	402	17.9	3.7	15.6	1.7	95
231	49	41	0	0.83	2.7	0.027	77.5	0.0029	18.8	0.24	346.17	18.8	0.0673	75.1	847	1563	26.9	20.5	18.6	3.5	98
232	54	58	0	1.07	18	0.24	340	0.0027	12.7	0.04	368.68	12.7	0.6416	339.7	4605	4912	218.4	668	17.5	2.2	100
233	389	318	1	0.82	66.6	0.011	52.8	0.0026	4.3	0.08	378.4	4.3	0.0313	52.6	-1030	1571	11.5	6	17	0.7	102
234	548	361	20	0.66	300.8	0.213	18.1	0.0275	17.6	0.97	36.36	17.6	0.0563	4.4	464	97	196.5	32.3	174.9	30.3	62
235	536	216	2	0.4	40.4	0.015	18.9	0.0026	5.2	0.28	389.09	5.2	0.0425	18.1	-198	454	15.2	2.8	16.5	0.9	108
236	133	114	1	0.86	6	0.016	39.1	0.0027	9.5	0.24	370.62	9.5	0.0434	38	-144	941	16.3	6.3	17.4	1.6	112
237	86	64	0	0.74	5.4	0.018	86.4	0.0028	10.5	0.12	358.31	10.5	0.0481	85.8	103	2028	18.6	15.9	18	1.9	82
238	249	291	1	1.17	27.3	0.019	25.2	0.0028	7.9	0.31	356.32	7.9	0.0487	23.9	131	562	18.9	4.7	18.1	1.4	86

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243	235	135	7	0.57	179.4	0.149	9.8	0.023	4	0.41	43.51	4	0.0469	9	44	214	140.7	12.9	146.5	5.8	-229
244	100	76	0	0.76	24.9	0.009	116.9	0.0026	10.7	0.09	379.93	10.7	0.0249	116.4	-1767	4123	9.2	10.6	16.9	1.8	101
245	212	132	5	0.62	6840	0.146	14.3	0.0196	5.2	0.36	51.04	5.2	0.054	13.3	370	300	138.2	18.5	125.1	6.5	66
246	1046	1201	35	1.15	168.6	0.321	5.8	0.0186	4.1	0.69	53.91	4.1	0.1256	4.2	2037	74	282.9	14.4	118.5	4.8	94
247	136	75	3	0.55	198.6	0.097	12.6	0.0151	4.7	0.37	66.16	4.7	0.0466	11.7	26	280	94	11.3	96.7	4.5	-267
248	183	95	1	0.52	10.9	0.021	25.7	0.0028	7.3	0.28	362.53	7.3	0.0547	24.7	398	553	20.9	5.3	17.8	1.3	96
249	56	40	1	0.72	68.1	0.058	27.8	0.009	5.7	0.21	111.06	5.7	0.0471	27.2	54	649	57.7	15.6	57.8	3.3	-7
250	274	230	1	0.84	18.5	0.018	23	0.0026	9.1	0.4	385.88	9.1	0.0492	21.1	155	494	17.7	4	16.7	1.5	89
251	189	298	4	1.57	335.4	0.097	15.2	0.0143	3.7	0.24	69.8	3.7	0.0489	14.7	144	346	93.7	13.6	91.7	3.3	36
252	375	375	1	1	38.7	0.017	20.3	0.0026	6.6	0.32	381.8	6.6	0.0474	19.2	71	457	17.2	3.5	16.9	1.1	76
253	98	122	2	1.24	60	0.14	23.5	0.0165	5.8	0.25	60.46	5.8	0.0615	22.8	658	488	133.3	29.4	105.8	6.1	84
254	90	120	0	1.32	33	0.054	220.4	0.003	12.4	0.06	334.64	12.4	0.1312	220	2114	3858	53.4	114.7	19.2	2.4	99
255	125	168	0	1.34	41.2	0.011	72.8	0.0026	10	0.14	381.33	10	0.0296	72.1	-1206	2239	10.8	7.8	16.9	1.7	101
256	125	124	3	0.99	205.4	0.113	15.4	0.0157	5.4	0.35	63.63	5.4	0.052	14.5	285	331	108.4	15.9	100.5	5.3	65
257	217	167	1	0.77	88.8	0.017	74.5	0.0027	6.3	0.08	374.87	6.3	0.0468	74.2	41	1776	17.3	12.8	17.2	1.1	58
258	234	124	1	0.53	61.1	0.027	27.4	0.003	7	0.25	331.63	7	0.0658	26.5	799	555	27.4	7.4	19.4	1.4	98
259	81	101	0	1.24	11.4	0.065	127.9	0.0026	9.2	0.07	381.58	9.2	0.1795	127.5	2648	2116	63.8	79.1	16.9	1.6	99
260	330	373	8	1.13	845.6	0.111	8.8	0.0163	5	0.56	61.37	5	0.0492	7.2	159	169	106.5	8.9	104.2	5.1	35
261	90	111	0	1.24	18.7	0.033	55.7	0.0027	8.9	0.16	366.9	8.9	0.0888	55	1399	1054	33.3	18.3	17.5	1.6	99
262	177	106	36	0.6	1819.1	1.657	5.9	0.1612	4.5	0.75	6.2	4.5	0.0746	3.9	1057	78	992.4	37.6	963.3	40.1	9
263	114	87	0	0.76	36.6	0.014	100.7	0.0026	17.2	0.17	389.68	17.2	0.0403	99.2	-335	2553	14.4	14.4	16.5	2.8	105
264	519	494	11	0.95	13636.4	0.098	8.9	0.0153	5.1	0.57	65.29	5.1	0.0464	7.3	16	176	94.8	8.1	98	5	-514
265	290	201	8	0.69	349.9	0.143	8.7	0.0219	4.8	0.55	45.72	4.8	0.0473	7.3	65	173	135.5	11.1	139.5	6.7	-113
266	330	242	8	0.73	273.2	0.123	11.8	0.0182	1.9	0.16	54.85	1.9	0.049	11.7	147	274	117.9	13.2	116.5	2.2	21
267	197	167	1	0.85	46.6	0.01	49.9	0.0025	8.4	0.17	393.86	8.4	0.0282	49.2	-1358	1583	10	4.9	16.3	1.4	101
268	458	901	2	1.97	37.6	0.015	32.8	0.0024	11	0.33	417.76	11	0.0455	30.9	-29	749	15.1	4.9	15.4	1.7	153
269	229	352	1	1.54	10.2	0.017	35.3	0.0024	12.7	0.36	418.5	12.7	0.0506	32.9	221	762	16.8	5.9	15.4	2	93
270	246	143	16	0.58	1732	0.391	7.4	0.0526	5.5	0.73	18.99	5.5	0.0539	5	368	113	335.5	21.2	330.7	17.6	10
271	59	48	0	0.82	7.7	0.028	53.6	0.0027	11.7	0.22	366.82	11.7	0.0734	52.3	1025	1058	27.6	14.6	17.5	2.1	98
272	356	211	7	0.59	257.4	0.113	8	0.0162	4.5	0.56	61.92	4.5	0.0508	6.6	230	153	108.7	8.3	103.3	4.6	

280	238	244	1	1.03	14.3	0.015	24.6	0.0027	4.7	0.19	370.47	4.7	0.0415	24.1	-254	610	15.6	3.8	17.4	0.8	107
282	412	191	2	0.46	512.5	0.026	16.3	0.0032	4.9	0.3	308.4	4.9	0.0571	15.5	496	341	25.6	4.1	20.9	1	96
283	106	82	2	0.78	56.8	0.088	17.6	0.0152	5	0.28	65.72	5	0.0418	16.8	-236	425	85.4	14.4	97.3	4.8	141
286	654	442	13	0.68	503	0.125	5.2	0.0155	3.2	0.61	64.59	3.2	0.0587	4.1	557	89	119.9	5.9	99	3.2	82
287	409	205	1	0.5	28.8	0.019	24.6	0.0025	7.3	0.3	403.92	7.3	0.0544	23.5	386	528	18.7	4.6	15.9	1.2	96
288	539	323	2	0.6	15.5	0.02	16.5	0.0026	5.9	0.36	379.06	5.9	0.0541	15.4	374	346	19.8	3.2	17	1	95
289	279	204	6	0.73	321.8	0.118	7.7	0.0164	5	0.64	60.98	5	0.0523	5.9	300	134	113.6	8.3	104.8	5.2	65
290	171	174	1	1.01	47.1	0.018	41.8	0.0028	6.1	0.15	360.37	6.1	0.0473	41.3	64	984	18.2	7.5	17.9	1.1	72
291	580	560	14	0.96	268.7	0.116	5.6	0.0171	2.8	0.49	58.65	2.8	0.0491	4.9	154	114	111	5.9	109	3	29
292	352	209	7	0.59	201.3	0.1	8.5	0.0148	4.3	0.51	67.47	4.3	0.0487	7.3	134	171	96.4	7.8	94.8	4.1	29
293	367	480	9	1.31	268.6	0.117	7.4	0.0157	3.4	0.46	63.54	3.4	0.0539	6.6	369	148	112.4	7.9	100.7	3.4	73
294	343	481	1	1.4	421.8	0.014	25.2	0.0027	7.7	0.3	367.1	7.7	0.0382	24	-474	635	14.5	3.6	17.5	1.3	104
295	226	192	1	0.85	76.3	0.027	15.1	0.0027	6.1	0.41	364.94	6.1	0.0719	13.8	983	280	27.2	4	17.6	1.1	98
296	228	283	1	1.25	8	0.024	36.8	0.0027	6	0.16	372.1	6	0.065	36.4	773	765	24.1	8.8	17.3	1	98
297	365	224	1	0.61	56.7	0.016	21.3	0.0024	5.4	0.25	409.58	5.4	0.0471	20.6	53	491	16	3.4	15.7	0.8	70
298	1220	410	37	0.34	534.2	0.216	5.4	0.0245	3.4	0.63	40.8	3.4	0.0638	4.2	735	88	198.2	9.7	156.1	5.3	79
299	338	241	5	0.71	127.5	0.085	8.9	0.0122	3.6	0.4	81.93	3.6	0.0505	8.1	216	189	82.8	7.1	78.2	2.8	64
300	722	445	20	0.62	387.3	0.158	7.2	0.022	4.2	0.58	45.52	4.2	0.0523	5.8	298	132	149.3	10	140.1	5.8	53

#### Toba Blanca

301	724	432	2	0.6	396.1	0.017	11	0.0026	4.6	0.41	382.6	4.6	0.0483	10	115	237	17.5	1.9	16.8	0.8	85
302	255	255	1	1	42.2	0.015	26.1	0.0027	5.6	0.21	373.37	5.6	0.0414	25.5	-265	647	15.4	4	17.2	1	107
303	93	85	0	0.91	5.2	0.016	63.1	0.0027	11.1	0.18	372.67	11.1	0.0434	62.1	-143	1539	16.2	10.1	17.3	1.9	112
304	349	295	1	0.85	21.6	0.016	28.4	0.0027	7	0.25	366.71	7	0.0414	27.5	-263	698	15.7	4.4	17.6	1.2	107
305	341	291	1	0.85	75.5	0.019	30.2	0.0029	10.8	0.36	341.95	10.8	0.0463	28.2	15	677	18.8	5.6	18.8	2	-25
306	693	778	15	1.12	3780.7	0.104	8	0.0158	4.7	0.58	63.39	4.7	0.0479	6.5	95	154	100.7	7.7	100.9	4.7	-6
308	102	111	0	1.09	57.3	0.014	81.5	0.0026	7.2	0.09	390.18	7.2	0.0407	81.2	-306	2077	14.5	11.7	16.5	1.2	105
309	79	85	0	1.08	20.4	0.312	1814.8	0.0028	11.4	0.01	354.85	11.4	0.802	1814.8	4925	25843	275.4	4378	18.1	2.1	100
310	303	159	2	0.52	138	0.03	20.1	0.0043	14.5	0.72	234.73	14.5	0.0506	14	222	324	29.7	5.9	27.4	4	88
311	427	338	1	0.79	37.6	0.016	18	0.0025	5.5	0.3	403.63	5.5	0.0463	17.2	15	413	15.9	2.9	16	0.9	-5
312	779	835	3	1.07	34.4	0.02	11.9	0.0027	7.8	0.65	370.92	7.8	0.0533	9	340	203	19.9	2.3	17.4	1.3	95
313	628	392	2	0.62	208.5	0.017	15.8	0.0027	3.7	0.23	375.27	3.7	0.0474	15.3	69	365	17.5	2.7	17.2	0.6	75
314	454	449	2	0.99	54.1	0.022	11.7	0.0027	4.3	0.36	364.77	4.3	0.0583	10.9	539	239	22.1	2.6	17.6	0.8	97
316	263	244	1	0.93	17.5	0.03	42.1	0.0026	6.3	0.15	380.54	6.3	0.0824	41.6	1255	814	29.9	12.4	16.9	1.1	99
317	790	631	3	0.8	159.9	0.018	12.6	0.0026	4.8	0.38	385.53	4.8	0.0512	11.6	248	267	18.4	2.3	16.7	0.8	93
318	635	357	2	0.56	184.9	0.015	16.3	0.0025	5.7	0.35	394.51	5.7	0.0437	15.3	-129	377	15.4	2.5	16.3	0.9	113
319	113	131	0	1.16	7.3	0.026	39.3	0.0028	8.4	0.21	352.95	8.4	0.0661	38.4	809	803	25.9	10	18.2	1.5	98
320	361	718	1	1.99	26.7	0.014	23.5	0.0026	7.4	0.31	388.34	7.4	0.0383	22.3	-468	590	13.7	3.2	16.6	1.2	104
321	160	190	3	1.18	62.8	0.117	15.7	0.0144	4.2	0.27	69.4	4.2	0.0589	15.2	564	330	112.4	16.8	92.2	3.9	84
322	518	563	2	1.09	535.6	0.03	25.5	0.0029	5.1	0.2	342.78	5.1	0.0757	25	1087	500	30.5	7.6	18.8	1	98
323	213	154	1	0.72	783.8	0.015	34.7	0.0027	5.6	0.16	365.54	5.6	0.041	34.2	-285	873	15.6	5.4	17.6	1	106
324	290	551	4	1.9	37.3	0.244	21	0.0049	13.2	0.63	205.18	13.2	0.3632	16.4	3763	248	221.8	41.9	31.3	4.1	99
325	782	622	3	0.79	120.6	0.017	13.3	0.0026	4.3	0.32	385.9	4.3	0.0479	12.5	95	297	17.2	2.3	16.7	0.7	82
326	796	658	3	0.83	73.2	0.015	11.3	0.0026	4.3	0.37	379.04	4.3	0.0408	10.5	-299	268	15	1.7	17	0.7	106
327	221	452	1	2.04	97.5	0.028	60	0.003	9.2	0.15	331.91	9.2	0.0677	59.2	860	1229	28.2	16.7	19.4	1.8	98
328	604	755	2	1.25	98.3	0.018	19.5	0.0027	3.3	0.17	367.68	3.3	0.0475	19.2	73	456	17.9	3.5	17.5	0.6	76
330	110	102	2	0.93	92	0.123	14.3	0.0158	6.1	0.42	63.43	6.1	0.0568	12.9	484	286	118.2	16	100.8	6.1	79
331	388	338	1	0.87	17.3	0.011	39.1	0.0026	5.8	0.15	382.78	5.8	0.0316	38.7	-1004	1147	11.5	4.5	16.8	1	102
332	169	241	1	1.42	91.7	0.027	98.4	0.0027	10.1	0.1	374.71	10.1	0.0744	97.9	1053	1971	27.4	26.6	17.2	1.7	98
333	332	198	1	0.6	18.8	0.04	17.3	0.0029	5.3	0.31	349.62	5.3	0.1018	16.4	1657	304	40	6.8	18.4	1	99

#### KARG-15-12

335	84	57	2	0.68	152.1	0.099	14.8	0.0154	5.4	0.36	64.75	5.4	0.0466	13.8	28	330	96	13.5	98.8	5.3	-251
336	69	34	0	0.48	11	0.251	770.6	0.0026	10.5	0.01	377.67	10.5	0.6867	770.6	4703	11087	227.1	1568.4	17	1.8	100
337	126	84	0	0.67	9.2	0.02	28.8	0.0025	10	0.35	393.2	10	0.0574	27.1	508	595	20.2	5.8	16.4	1.6	97
338	150	84	1	0.56	1713.9	0.021	47.2	0.0026	6.1	0.13	377.64	6.1	0.0576	46.8	514	1029	21.1	9.9	17	1</	

351	190	163	1	0.86	32.3	0.014	28	0.0029	6.2	0.22	342.11	6.2	0.0356	27.4	-659	753	14.5	4	18.8	1.2	103
352	172	84	1	0.49	7.5	0.012	22.8	0.0029	8	0.35	350.32	8	0.0299	21.4	-1165	659	11.9	2.7	18.4	1.5	102
353	394	338	5	0.86	65.7	0.209	15.2	0.0043	9.1	0.59	235.22	9.1	0.3567	12.2	3736	186	192.8	26.8	27.3	2.5	99
355	485	603	31	1.24	1496.3	0.291	4.5	0.0414	3.1	0.68	24.18	3.1	0.051	3.3	239	76	259	10.4	261.2	8	-9
356	752	706	3	0.94	171	0.017	20	0.0026	8.5	0.43	387.61	8.5	0.049	18	146	423	17.5	3.5	16.6	1.4	89
358	101	138	0	1.36	7.2	0.056	292.4	0.0024	13.3	0.05	422.26	13.3	0.1726	292.1	2584	4877	55.7	158.5	15.2	2	99
359	141	209	1	1.48	7.9	0.04	138.4	0.0023	9.8	0.07	440.6	9.8	0.1288	138	2081	2430	40.1	54.4	14.6	1.4	99
360	94	86	0	0.92	35.3	0.096	292.3	0.0028	6.1	0.02	356.19	6.1	0.2472	292.3	3167	4633	92.8	259.3	18.1	1.1	99
361	144	217	1	1.51	55.9	0.022	45.1	0.0026	9.9	0.22	390.37	9.9	0.062	44	675	940	22	9.8	16.5	1.6	98
362	129	192	1	1.49	9.7	0.019	130	0.0025	10.1	0.08	394.53	10.1	0.0534	129.6	345	2932	18.8	24.2	16.3	1.7	95
363	124	183	1	1.48	16.5	0.022	75.6	0.0027	8	0.11	374.12	8	0.0598	75.2	597	1629	22.1	16.6	17.2	1.4	97
365	176	299	1	1.7	80.7	0.021	71.7	0.0027	7.8	0.11	368.33	7.8	0.056	71.3	452	1583	21.1	15	17.5	1.4	96
366	376	404	1	1.08	178	0.017	19.5	0.0026	5.6	0.29	390.34	5.6	0.0493	18.7	162	437	17.5	3.4	16.5	0.9	90
367	139	239	1	1.71	7.6	0.017	72.1	0.0027	7.6	0.11	365.13	7.6	0.0446	71.7	-77	1754	17	12.1	17.6	1.3	123
368	111	208	0	1.88	19.3	0.018	60.5	0.0028	11	0.18	362.53	11	0.0473	59.5	64	1418	18.1	10.9	17.8	1.9	72
369	102	121	0	1.19	11.7	0.068	209.3	0.0025	9.1	0.04	395.68	9.1	0.1961	209.1	2794	3422	67.1	135.9	16.3	1.5	99
371	103	190	0	1.84	4.9	0.033	70.1	0.0027	18.2	0.26	370.85	18.2	0.09	67.7	1425	1292	33.4	23	17.4	3.2	99
372	88	100	2	1.14	290.7	0.101	12.5	0.0158	4.2	0.34	63.37	4.2	0.0464	11.7	19	282	97.7	11.6	100.9	4.2	-440
374	49	67	2	1.35	544.1	1.082	26	0.0134	21.6	0.83	74.6	21.6	0.5853	14.4	4472	210	744.5	137	85.8	18.4	98
375	84	123	0	1.46	8	0.018	73.2	0.0026	9.5	0.13	379.52	9.5	0.0504	72.6	215	1682	18.4	13.4	17	1.6	92

Notes: Isotope ratios and ages are reported without initial common Pb correction; gas blank-corrected mass 204 signals were generally irresolvable from zero. Isotope ratio and apparent age errors do NOT include systematic calibration errors of 0.19% for the  $^{207}\text{Pb}/^{206}\text{Pb}$  ratio, and 0.63% for the  $^{206}\text{Pb}/^{238}\text{U}$  ratio (1s). Trace element concentrations in ppm, calculated using the mean count rate method, internal standardization to 29Si, and calibration to NIST 610 and 612 glass standards. Ablation using a 213 nm wavelength laser, spot size of 25 microns, repetition rate of 10 Hz, and fluence of ~5 J/cm<sup>2</sup>. % disc. = relative discordance calculated as  $100 \times (1 - (\frac{^{206}\text{Pb}}{^{207}\text{Pb}}/\frac{^{206}\text{Pb}}{^{238}\text{U}})_{\text{date}})$

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TABLE DR5. ZIRCON CA-ID-TIMS U-Pb ISOTOPIC DATA

Sample ID	Compositional Parameters						Radiogenic Isotope Ratios						Isotopic Ages							
	Th	$^{206}\text{Pb}^*$	mol %	Pb*	Pb <sub>c</sub>	$^{206}\text{Pb}$	$^{207}\text{Pb}$	%	$^{207}\text{Pb}$	$^{206}\text{Pb}$	%	corr.	$^{207}\text{Pb}$	$\pm$	$^{207}\text{Pb}$	$\pm$	$^{208}\text{Pb}$	$\pm$		
	U	( $\times 10^{-13}$ mol)	(c)	(c)	(c)	(d)	(e)	(f)	(e)	(e)	(f)	coef.	$^{206}\text{Pb}$	(g)	(g)	(g)	(f)	(f)		
<b>KARG-15-01</b>																				
z3	0.646	0.291	0.98	13.48	0.56	799	0.208	0.0465	0.52	0.01678	0.575	0.00262	0.086	0.702	22.5	12.5	16.89	0.096	16.854	0.015
z2	0.6	0.233	0.94	5.15	1.16	324	0.193	0.0465	0.8	0.0168	0.873	0.00262	0.116	0.644	25.7	19.3	16.91	0.146	16.85	0.019
z4	0.988	0.119	0.95	6.07	0.55	341	0.318	0.0464	1.33	0.01673	1.427	0.00262	0.148	0.719	17.1	31.9	16.85	0.238	16.849	0.025
z1	0.975	0.059	0.92	3.84	0.43	223	0.314	0.0459	2.51	0.01655	2.652	0.00262	0.224	0.69	-9.6	60.4	16.66	0.438	16.846	0.038
z5	0.961	0.124	0.96	7.36	0.47	411	0.31	0.0462	1.27	0.01666	1.366	0.00262	0.139	0.733	8.3	30.5	16.78	0.227	16.836	0.023
<b>KAN 1</b>																				
z7	0.477	0.193	0.65	0.55	8.6	53	0.154	0.046	4.04	0.01716	4.178	0.0027	0.664	0.28	-1	97.2	17.28	0.716	17.408	0.115
z2	0.514	0.622	0.97	8.81	1.77	554	0.166	0.0463	0.36	0.01696	0.408	0.00266	0.084	0.684	13.9	8.6	17.08	0.069	17.102	0.014
z3	0.593	0.306	0.95	6.09	1.28	380	0.191	0.0467	0.71	0.01707	0.772	0.00265	0.114	0.607	32.6	17	17.19	0.132	17.076	0.02
z4	0.517	0.521	0.99	20.96	0.62	1278	0.167	0.0465	0.32	0.01699	0.364	0.00265	0.08	0.647	22.3	7.6	17.11	0.062	17.068	0.014
z8	0.568	0.231	0.99	26.17	0.22	1562	0.183	0.0467	0.36	0.01705	0.414	0.00265	0.076	0.758	31.8	8.6	17.17	0.07	17.061	0.013
z1	0.645	0.256	0.91	3.36	1.97	216	0.208	0.0468	0.89	0.01708	0.965	0.00264	0.135	0.579	41	21.3	17.19	0.164	17.022	0.023
z14	0.571	0.038	0.91	3.23	0.3	209	0.184	0.0453	4.22	0.01648	4.427	0.00264	0.331	0.661	-41.8	102.2	16.6	0.729	17.001	0.056
z12	0.69	0.087	0.97	9.04	0.25	535	0.222	0.0467	1.14	0.017	1.219	0.00264	0.132	0.673	35.8	27.1	17.12	0.207	16.985	0.022
z9	0.712	0.025	0.82	1.49	0.45	103	0.23	0.0483	11.3	0.01757	11.58	0.00264	0.569	0.511	115.7	265.9	17.68	2.03	16.971	0.096
z6	0.582	0.062	0.89	2.47	0.63	164	0.188	0.0452	3.37	0.01643	3.553	0.00263	0.322	0.607	-42.6	81.6	16.55	0.583	16.96	0.055
z11	0.495	0.017	0.86	1.88	0.23	131	0.16	0.0473	17.99	0.01712	18.119	0.00263	0.51	0.268	63	427.4	17.23	3.096	16.907	0.086
<b>CV-13</b>																				
z2	0.628	0.037	0.83	1.57	0.61	110	0.202	0.0463	6.82	0.01756	7.056	0.00275	0.416	0.581	11.1	163.7	17.68	1.237	17.728	0.074
z3	0.456	0.153	0.94	4.82	0.78	313	0.147	0.047	1.13	0.01784	1.213	0.00275	0.135	0.669	51.7	26.9	17.96	0.216	17.708	0.024
z4	0.521	0.062	0.91	2.9	0.53	192	0.168	0.0462	2.81	0.0175	2.981	0.00275	0.248	0.693	6.2	67.6	17.61	0.52	17.695	0.044
z1	1.117	0.24	0.98	14.76	0.47	779	0.36	0.0463	0.71	0.01753	0.769	0.00275	0.118	0.591	12.3	17	17.65	0.134	17.685	0.021
z10	0.463	0.069	0.97	8.39	0.2	527	0.149	0.0469	1.53	0.01769	1.629	0.00274	0.135	0.726	41.6	36.6	17.81	0.288	17.634	0.024
z8	0.663	0.133	0.96	6.72	0.52	405	0.214	0.046	3.13	0.01737	3.315	0.00274	0.261	0.748	-2.8	75.2	17.48	0.575	17.629	0.046
z9	0.518	0.032	0.91	3.06	0.26	201	0.167	0.0459	5.19	0.01729	5.466	0.00273	0.31	0.893	-9.4	125	17.41	0.943	17.603	0.055
z13	0.662	0.055	0.97	8.65	0.17	516	0.213	0.0461	2.03	0.01736	2.142	0.00273	0.179	0.686	0.6	48.7	17.48	0.371	17.599	0.031
z7	0.436	0.05	0.95	6.05	0.2	388	0.141	0.0452	1.94	0.01704	2.066	0.00273	0.201	0.641	-44.1	47.1	17.15	0.351	17.592	0.035
<b>KARG-15-08</b>																				
z4	0.489	0.01	0.74	0.85	0.3	69	0.158	0.0495	33.8	0.01814	34.013	0.00266	0.909	0.245	171.2	787.3	18.26	6.155	17.118	0.155
z9	0.667	0.113	0.97	11.07	0.27	655	0.215	0.047	1.05	0.01716	1.123	0.00265	0.127	0.637	50.2	25	17.28	0.192	17.04	0.022
z11	0.518	0.128	0.93	4.25	0.75	274	0.167	0.0452	3.37	0.0165	3.56	0.00265	0.228	0.842	-43.5	81.7	16.61	0.587	17.032	0.039
z3	0.889	0.006	0.73	0.88	0.19	66	0.287	0.0493	77.15	0.01799	77.349	0.00264	1.319	0.161	163.6	1800.1	18.1	13.877	17.024	0.224
z13	0.621	0.152	0.98	13.27	0.29	791	0.2	0.0462	0.66	0.01683	0.721	0.00264	0.09	0.727	6.3	15.9	16.94	0.121	17.02	0.015
z17	0.618	0.094	0.93	4.45	0.54	278	0.2	0.0476	1.84	0.01732	1.969	0.00264	0.181	0.754	77.4	43.5	17.44	0.341	17.009	0.031
z16	0.843	0.014	0.87	2.13	0.17	135	0.272	0.045	13.13	0.01637	13.337	0.00264	0.523	0.409	-56.9	319.3	16.48	2.18	16.989	0.089
z10	0.767	0.045	0.85	1.84	0.65	122	0.247	0.0431	17.28	0.01566	17.551	0.00264	0.584	0.471	-163.2	428.9	15.78	2.747	16.972	0.099
z8	0.696	0.033	0.92	3.58	0.24	222	0.224	0.0464	3.54	0.01685	3.695	0.00264	0.244	0.646	16	84.9	16.96	0.621	16.969	0.041
z15	1.24	0.054	0.93	5.1	0.31	274	0.4	0.0459	3.64	0.01664	3.84	0.00263	0.241	0.872	-9.6	87.6	16.76	0.638	16.942	0.041
z19	0.769	0.058	0.92	3.52	0.44	216	0.248	0.0452	2.49	0.01637	2.661	0.00263	0.242	0.721	-46.9	60.5	16.49	0.435	16.929	0.041
z7	0.577	0.018	0.88	2.17	0.21	146	0.186	0.0425	10.27	0.01541	10.542	0.00263	0.516	0.536	-196	256.6	15.53	1.624	16.922	0.087
<b>KARG-15-09</b>																				
z6	0.497	0.026	0.87	2.03	0.31	140.2	0.16	0.0476	9.34	0.01793	9.798	0.00273	0.617	0.749	78.7	221.4	18.04	1.752	17.588	0.108
z5	0.723	0.026	0.81	1.35	0.51	94.8	0.23	0.0478	10.4	0.01784	10.677	0.00271	0.568	0.499	87	246.2	17.96	1.901	17.447	0.099
z15	0.693	0.015	0.8	1.26	0.32	89.4	0.22	0.055	25.55	0.0202	25.801	0.00266	0.871	0.306	413.7	569.9	20.31	5.187	17.137	0.149
z16	0.637	0.045	0.92	3.84	0.31	240.3	0.21	0.0478	5.24	0.01745	5.399	0.00265	0.36	0.469	91.4	123.9	17.56	0.94	17.028	0.061
z2	0.519	0.052	0.92	3.68	0.35	238.1	0.17	0.0469	3	0.01707	3.168	0.00264	0.238	0.713	43.8	71.6	17.19	0.54	16.997	0.04
<b>CV-10</b>																				
z9	0.542	0.024	0.82	1.37	0.44	99	0.175	0.0496	9.02	0.02186	9.273	0.0032	0.546	0.481	176.1	210	21.95	2.014	20.572	0.112
z11	0.527	0.023	0.92	3.43	0.17	222	0.17	0.049	6.09	0.0177	6.22	0.00262	0.32	0.422	146	142.5	17.81	1.098	16.877	0.054
z1	0.508	0.059	0.9	2.77	0.53	185	0.164	0.0456	3.51	0.01644	3.699	0.00261	0.276	0.702	-23.7	84.8	16.56	0.607	16.833	0.046
z7	0.644	0.044	0.85	1.75	0.64	120	0.208	0.0431	6.64	0.01548	6.915	0.0026	0.388	0.712	-160.3	164.8	15.6	1.07	16.76	0.065

## KARG-15-12

<b>z8</b>	0.791	0.03	0.83	1.63	0.5	109.1	0.255	0.0445	7.31	0.01736	7.62	0.00283	0.503	0.642	-83.9	178.6	17.47	1.32	18.217	0.092
<b>z6</b>	<b>0.293</b>	<b>0.016</b>	<b>0.69</b>	<b>0.64</b>	<b>0.57</b>	<b>59.1</b>	<b>0.094</b>	<b>0.0427</b>	<b>16.12</b>	<b>0.01543</b>	<b>16.642</b>	<b>0.00262</b>	<b>0.98</b>	<b>0.548</b>	<b>-186.2</b>	<b>401.7</b>	<b>15.55</b>	<b>2.567</b>	<b>16.878</b>	<b>0.165</b>
<b>z7</b>	<b>0.309</b>	<b>0.02</b>	<b>0.7</b>	<b>0.68</b>	<b>0.69</b>	<b>61</b>	<b>0.1</b>	<b>0.0438</b>	<b>15.05</b>	<b>0.01577</b>	<b>15.559</b>	<b>0.00261</b>	<b>0.952</b>	<b>0.55</b>	<b>-122.8</b>	<b>370.5</b>	<b>15.89</b>	<b>2.453</b>	<b>16.819</b>	<b>0.16</b>
<b>z3</b>	<b>0.452</b>	<b>0.052</b>	<b>0.78</b>	<b>1.03</b>	<b>1.23</b>	<b>80.7</b>	<b>0.146</b>	<b>0.0473</b>	<b>7.15</b>	<b>0.01705</b>	<b>7.625</b>	<b>0.00261</b>	<b>0.665</b>	<b>0.737</b>	<b>66.7</b>	<b>169.7</b>	<b>17.16</b>	<b>1.298</b>	<b>16.813</b>	<b>0.112</b>
<b>z4</b>	<b>0.321</b>	<b>0.033</b>	<b>0.79</b>	<b>1.09</b>	<b>0.73</b>	<b>86.6</b>	<b>0.104</b>	<b>0.0465</b>	<b>7.93</b>	<b>0.01675</b>	<b>8.297</b>	<b>0.00261</b>	<b>0.598</b>	<b>0.64</b>	<b>26.2</b>	<b>189.6</b>	<b>16.86</b>	<b>1.388</b>	<b>16.798</b>	<b>0.1</b>
<b>z1</b>	<b>0.471</b>	<b>0.028</b>	<b>0.58</b>	<b>0.41</b>	<b>1.7</b>	<b>43.1</b>	<b>0.152</b>	<b>0.0465</b>	<b>17.37</b>	<b>0.0167</b>	<b>18.459</b>	<b>0.0026</b>	<b>1.568</b>	<b>0.715</b>	<b>23.9</b>	<b>415.7</b>	<b>16.82</b>	<b>3.079</b>	<b>16.771</b>	<b>0.263</b>
<b>z2</b>	<b>0.414</b>	<b>0.05</b>	<b>0.84</b>	<b>1.5</b>	<b>0.81</b>	<b>110.8</b>	<b>0.134</b>	<b>0.0418</b>	<b>5.6</b>	<b>0.01499</b>	<b>5.932</b>	<b>0.0026</b>	<b>0.448</b>	<b>0.749</b>	<b>-236.4</b>	<b>141</b>	<b>15.11</b>	<b>0.89</b>	<b>16.735</b>	<b>0.075</b>

## ET100

100-1a	0.069	2.246	0.998	106	0.47	7247	0.022	0.0480	0.091	0.10373	0.152	0.01568	0.074	0.899	98.8	2.2	100.21	0.14	100.27	0.07
100-1b	0.069	1.972	0.997	93	0.47	6354	0.022	0.0480	0.105	0.10369	0.164	0.01565	0.080	0.852	101.3	2.5	100.17	0.16	100.13	0.08
100-2a	0.068	1.461	0.994	46	0.71	3111	0.022	0.0480	0.200	0.10359	0.269	0.01565	0.135	0.697	99.5	4.7	100.09	0.26	100.11	0.13
100-2b	0.069	1.625	0.995	53	0.68	3600	0.022	0.0480	0.165	0.10355	0.218	0.01565	0.090	0.723	98.7	3.9	100.04	0.21	100.10	0.09
100-4a	0.069	1.612	0.998	130	0.27	8830	0.022	0.0480	0.106	0.10367	0.168	0.01565	0.083	0.861	101.5	2.5	100.16	0.16	100.10	0.08
100-5a	0.069	1.446	0.998	132	0.24	8997	0.022	0.0480	0.101	0.10367	0.160	0.01565	0.079	0.860	101.0	2.4	100.16	0.15	100.13	0.08
100-5b	0.069	1.362	0.998	110	0.27	7476	0.022	0.0481	0.109	0.10381	0.163	0.01566	0.075	0.840	102.4	2.6	100.29	0.16	100.20	0.07
100-6a	0.069	1.672	0.997	104	0.36	7060	0.022	0.0481	0.095	0.10381	0.158	0.01566	0.077	0.901	102.4	2.3	100.28	0.15	100.20	0.08
100-6b	0.069	1.505	0.997	91	0.36	6220	0.022	0.0480	0.107	0.10362	0.165	0.01566	0.077	0.862	98.5	2.5	100.11	0.16	100.18	0.08
100-8a	0.069	1.410	0.996	67	0.47	4555	0.022	0.0480	0.121	0.10365	0.182	0.01566	0.083	0.841	99.9	2.9	100.14	0.17	100.15	0.08
100-8b	0.069	1.411	0.997	97	0.32	6585	0.022	0.0480	0.106	0.10370	0.162	0.01565	0.071	0.877	101.4	2.5	100.18	0.15	100.13	0.07
1000-9b	0.069	1.316	0.997	91	0.32	6195	0.022	0.0480	0.108	0.10372	0.166	0.01566	0.076	0.863	100.6	2.5	100.20	0.16	100.19	0.08

Notes: Bold analyses were included in weighted mean calculations.

(a) z1, z2 etc. are labels for zircon (z); zircon fragments annealed and chemically abraded after Mattinson (2005). Italicized analyses were included in weighted mean calculations.

(b) Model Th/U ratio calculated from radiogenic  $^{206}\text{Pb}/^{206}\text{Pb}$  ratio and  $^{207}\text{Pb}/^{235}\text{U}$  date.

(c) Pb\* and Pbc are radiogenic and common Pb, respectively. mol %  $^{206}\text{Pb}^*$  is with respect to radiogenic and blank Pb.

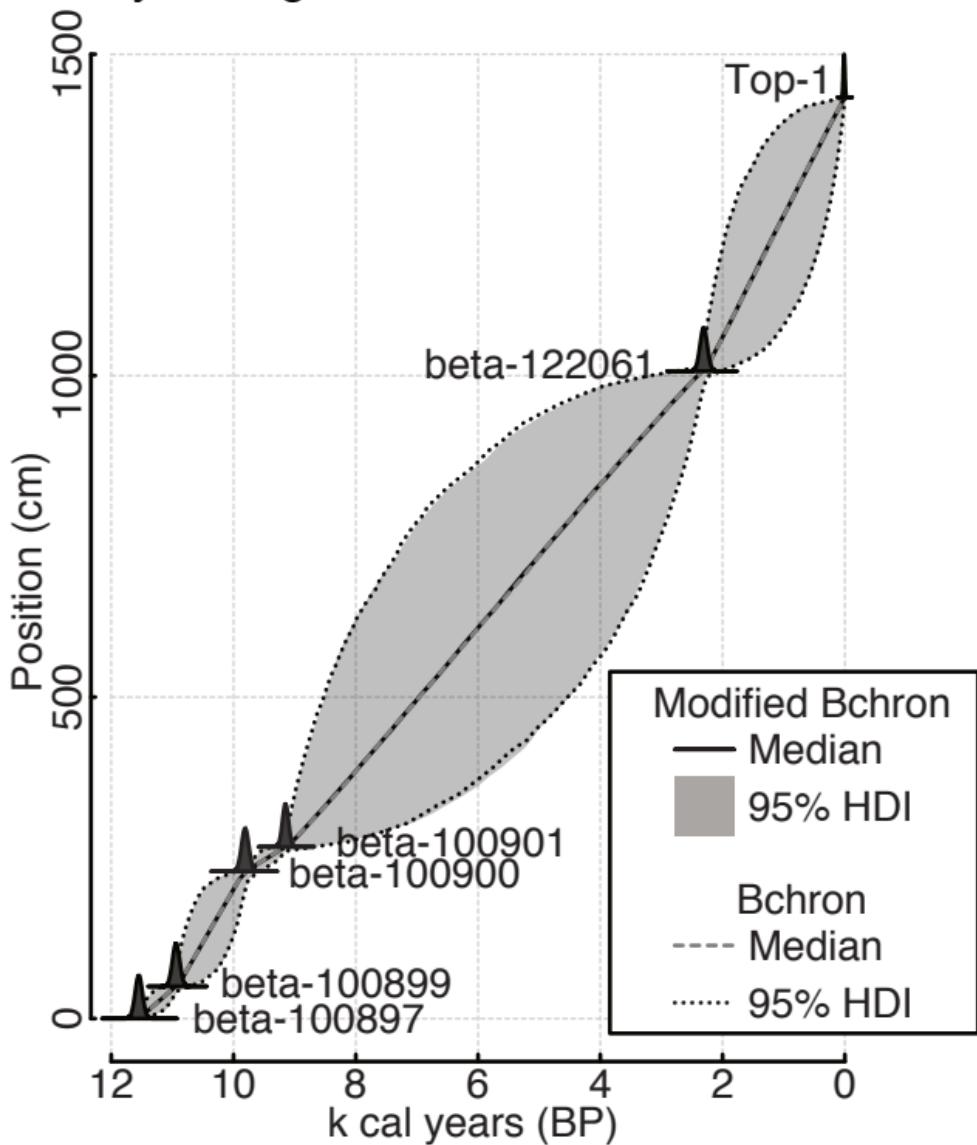
(d) Measured ratio corrected for spike and fractionation only. Most samples are spiked with the ET2535 tracer, with internal Pb and U fractionation correction using the measured  $^{202}\text{Pb}/^{205}\text{Pb}$  and  $^{233}\text{U}/^{235}\text{U}$ . Samples indicated by \* are spiked with the ET535 tracer, with an external Pb fractionation correction of  $0.17 \pm 0.02$  (1-sigma) /amu (atomic mass unit), based on analysis of NBS-981 and NBS-982.

(e) Corrected for fractionation, spike, common Pb, and initial disequilibrium in  $^{230}\text{Th}/^{238}\text{U}$ . Up to 0.5 pg of common Pb is assigned to procedural blank with composition of  $^{206}\text{Pb}/^{204}\text{Pb} = 18.042 \pm 0.61\%$ ;  $^{207}\text{Pb}/^{204}\text{Pb} = 15.537 \pm 0.52\%$ ;  $^{208}\text{Pb}/^{204}\text{Pb} = 37.686 \pm 0.63\%$  (1-sigma). Excess over blank was assigned to initial common Pb, using the Stacey and Kramers (1975) two-stage Pb isotope evolution model at 17 Ma.

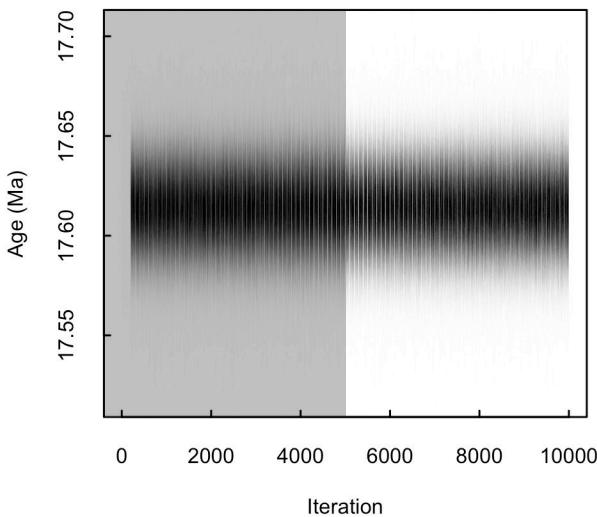
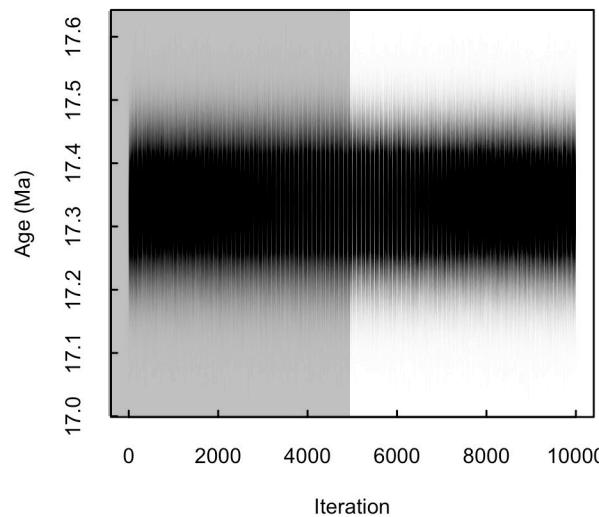
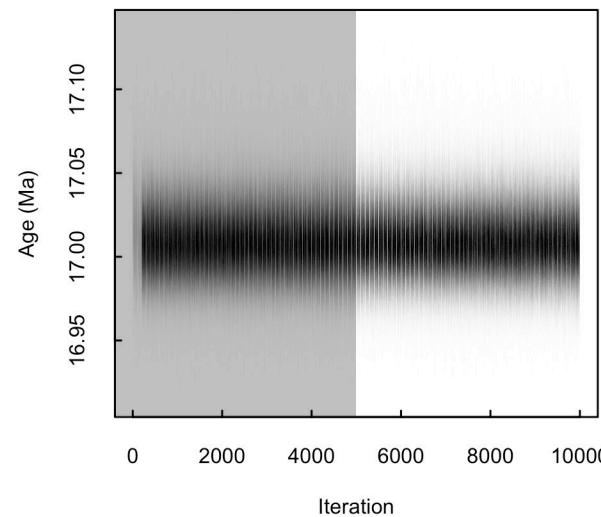
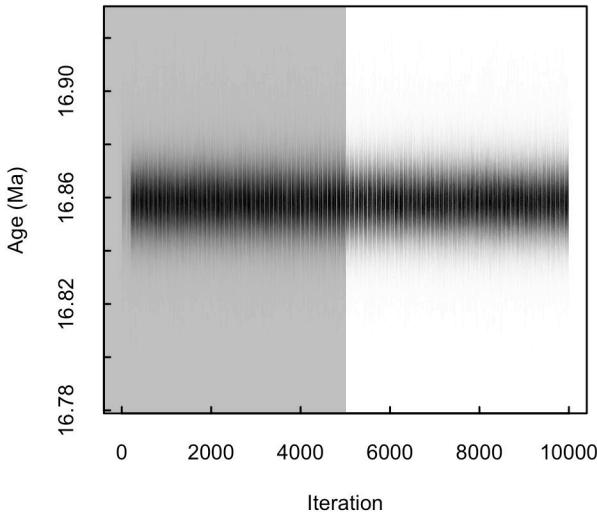
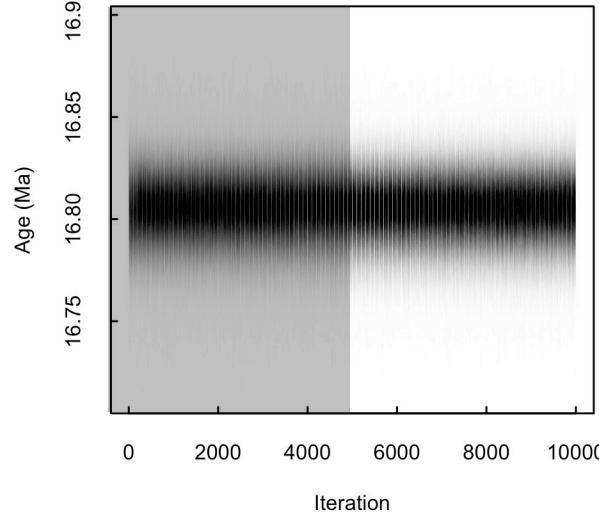
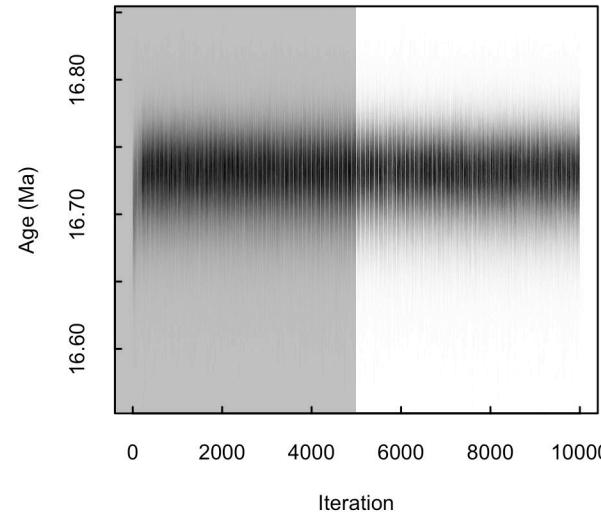
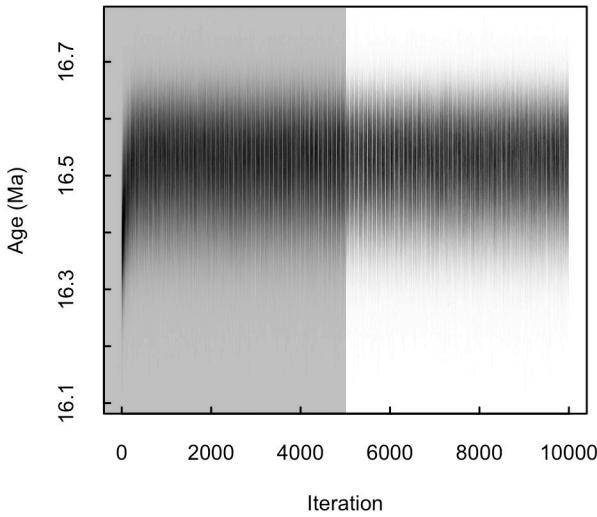
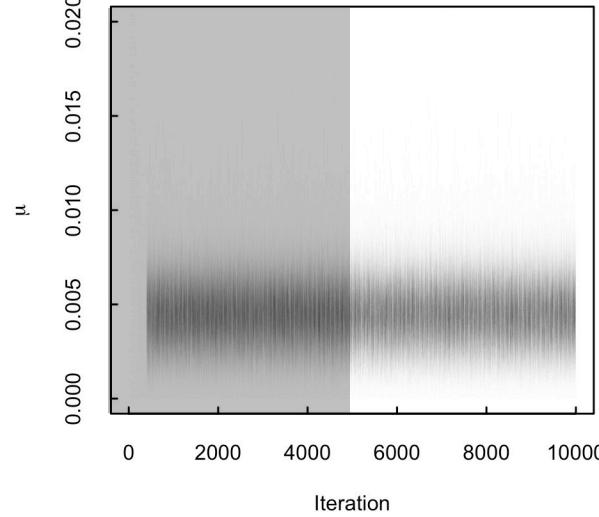
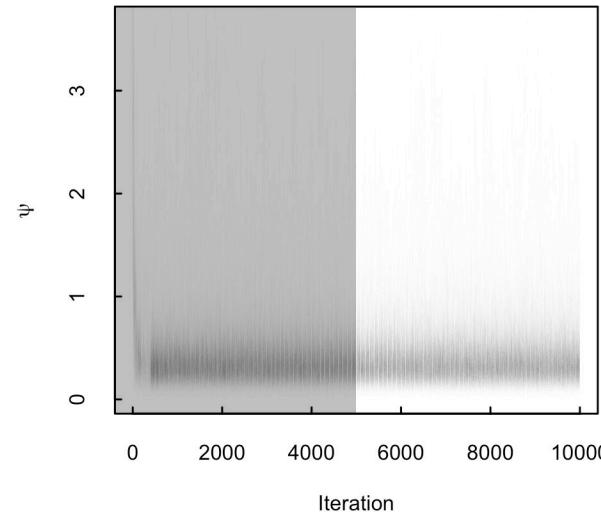
(f) Errors are 2-sigma, propagated using algorithms of Schmitz and Schoene (2007a).

(g) Calculations based on the decay constants of Jaffey et al. (1971b).  $^{206}\text{Pb}/^{238}\text{U}$  and  $^{207}\text{Pb}/^{206}\text{Pb}$  ratios and dates corrected for initial disequilibrium in  $^{230}\text{Th}/^{238}\text{U}$  using Th/U [magma] = 3.

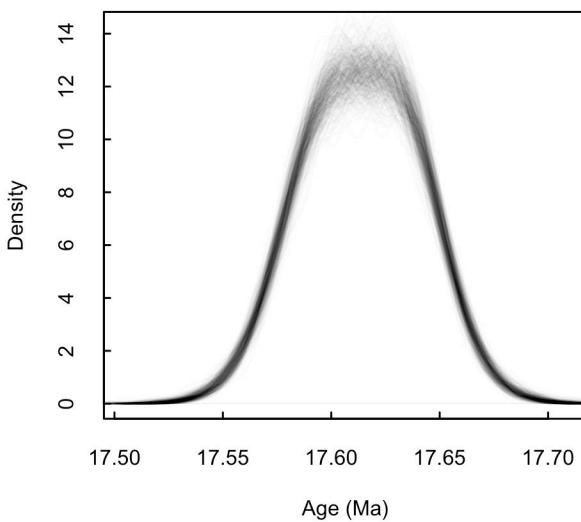
# Trayler, Figure DR1



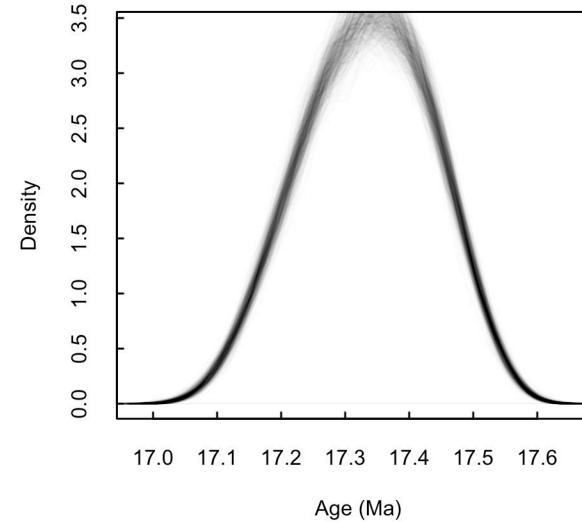
Trayler, Figure DR2

**CV13****CO****KARG-15-09****KARG-15-01****Toba Blanca****CV-10****CO3** $\mu$  $\psi$ 

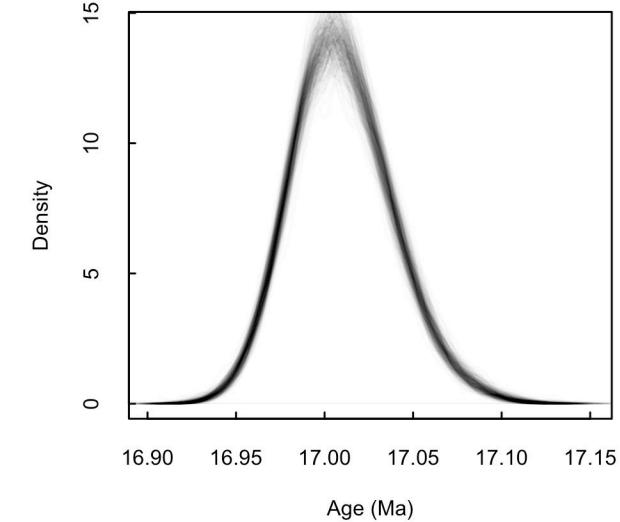
CV13



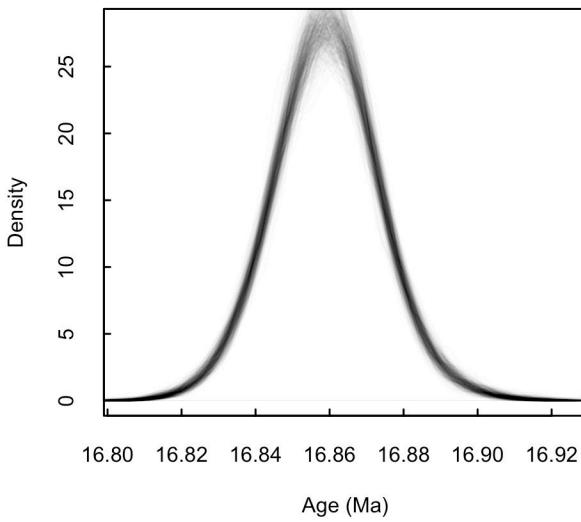
CO



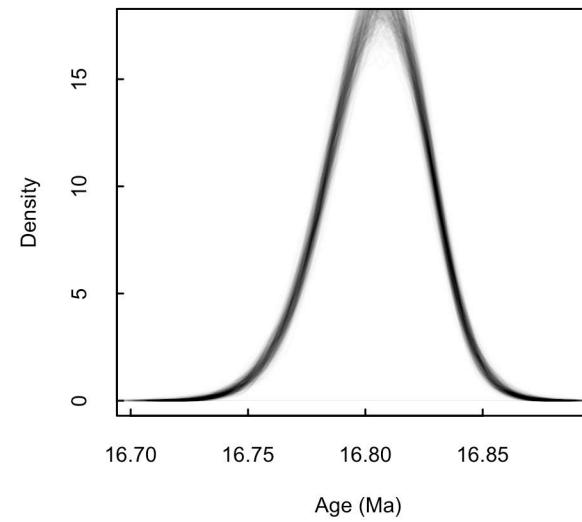
KARG-15-09



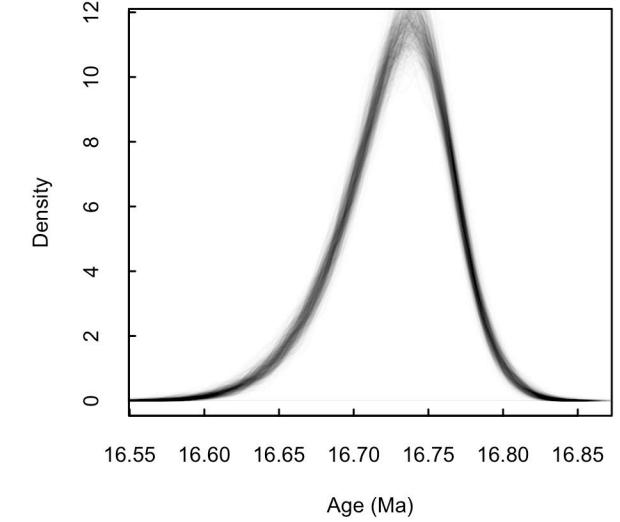
KARG-15-01



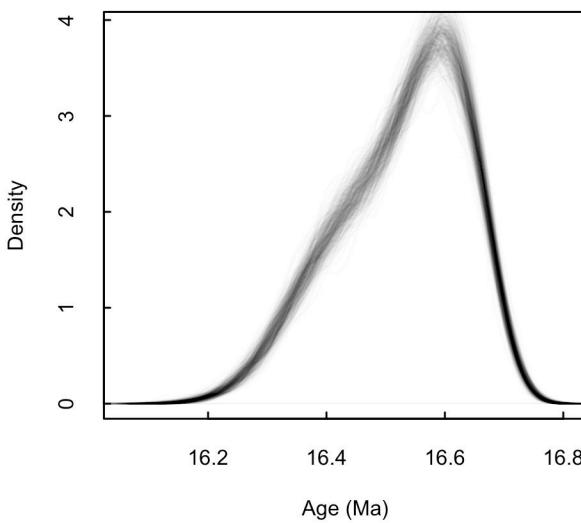
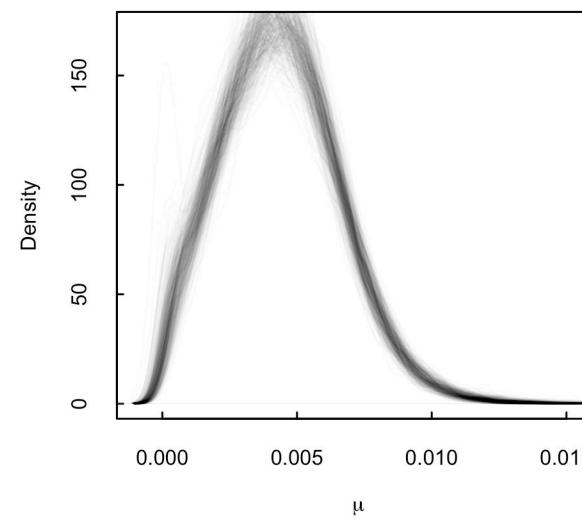
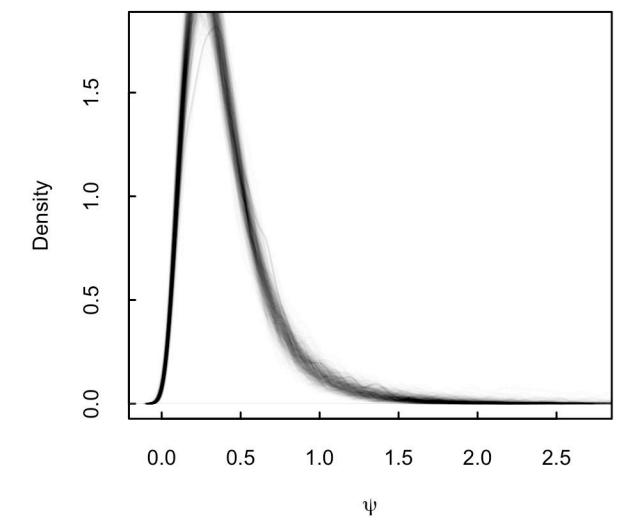
Toba Blanca



CV-10



CO3

 $\mu$  $\psi$ 

Trayler, Figure DR4

