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U-Pb evidence for 2.15 Ga orogenic event in the Archean Kaapvaal and Pilbara cratons

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ANALYTICAL METHODS AND DATA ASSESSMENT

Polished thin sections from the four samples were prepared and examined for the presence of monazite using optical and scanning electron microscopes. Monazite crystals were identified and removed for SHRIMP analysis by drilling ~3 mm-diameter plugs from the polished thin sections, and casting the plugs into 25 mm-diameter resin mounts.

Monazite U-Pb analyses were conducted using the sensitive high-resolution ion microprobe (SHRIMP II) instruments in the John de Laeter Centre at Curtin University in Perth, Australia. SHRIMP analyses followed established procedures for small-spot, *in situ* analysis of monazite extracted from polished thin sections (Fletcher et al., 2010). Data were obtained from two analytical sessions using SHRIMP operating parameters listed in Table DR1. Number of scans per analysis was increased to 7–8 to compensate the reduction in primary beam intensity. The Pb/U and U concentration reference standard French and secondary standards z2908 and z2234 were contained on separate mounts that were cleaned and Au-coated together with the sample mounts, and analyzed concurrently with unknown monazite. Z2908 monazite was also used as a $^{207}\text{Pb}/^{206}\text{Pb}$ monitor. Throughout the analytical sessions, the interpolated analyses from z2908 produced pooled $^{207}\text{Pb}/^{206}\text{Pb}$ ages within uncertainty of the published reference value (1796 ± 2 Ma). However, corrections for IMF were applied to all analyses, particularly when the yielded z2908 ages show relatively large deviation from the reference value (Table DR1).

Common-Pb corrections were applied to all analyses using contemporaneous isotopic compositions determined according to the model of Stacey and Kramers (1975). Monazite data were reduced using Squid-2 software (Ludwig, 2009) and corrected for matrix effects in U/Pb and Th/Pb following procedures detailed by Fletcher et al. (2010). Concordia plots were prepared with Isoplot-3 (Ludwig, 2008). Individual analyses are quoted at 1σ uncertainty, whereas weighted mean ages are reported at 95% confidence level.

RESULTS

Sample 110315-45A (drill-hole GKP01, depth interval 640.09–20 m); SHRIMP mount BR15-11

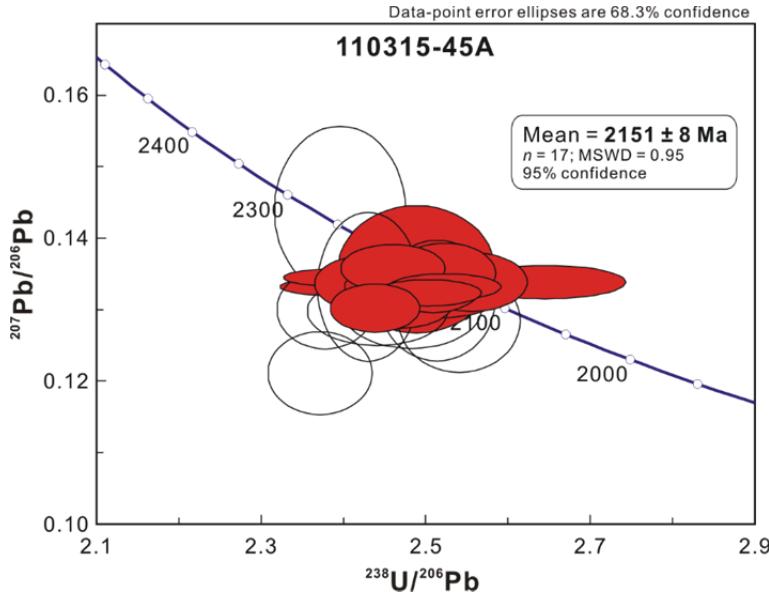


Figure DR1 Concordia plot for U-Pb analyses of monazite from sample 110315-45A. Unfilled ellipses represent discordant and/or high common Pb analyses that were disregarded in age calculation.

Monazite in the black shale samples forms giant skeletal crystals riddled with inclusions of other minerals. The monazite crystals typically display elongate habit, >100 µm across and up to 500 µm in length.

Combining analyses from two sessions, 25 analyses were obtained on 8 grains (Table DR2). The monazite contains low to moderate U and Th contents (70–380 ppm and 210–3600 ppm, respectively), with Th/U ratios varying between 1.2 and 32. Eight analyses record high proportions of common ^{206}Pb ($f_{206} > 1\%$) and/or large discordance (disc. >5%; see footnote in Table DR2 for definition of discordance). These analyses are considered not reliable hence excluded from age calculation. The remaining 17 analyses are concordant (disc. within $\pm 5\%$) and contain low common ^{206}Pb ($f_{206} < 1\%$). They yielded $^{207}\text{Pb}/^{206}\text{Pb}$ dates displaying good consistency and ranging from 2174 ± 27 Ma to 2101 ± 29 Ma, with a weighted mean $^{207}\text{Pb}*/^{206}\text{Pb}^*$ date of 2151 ± 8 Ma (MSWD = 0.95) (Figure DR1).

Sample 110315-49B (GKP01 636.16–25 m); SHRIMP mount BR15-14

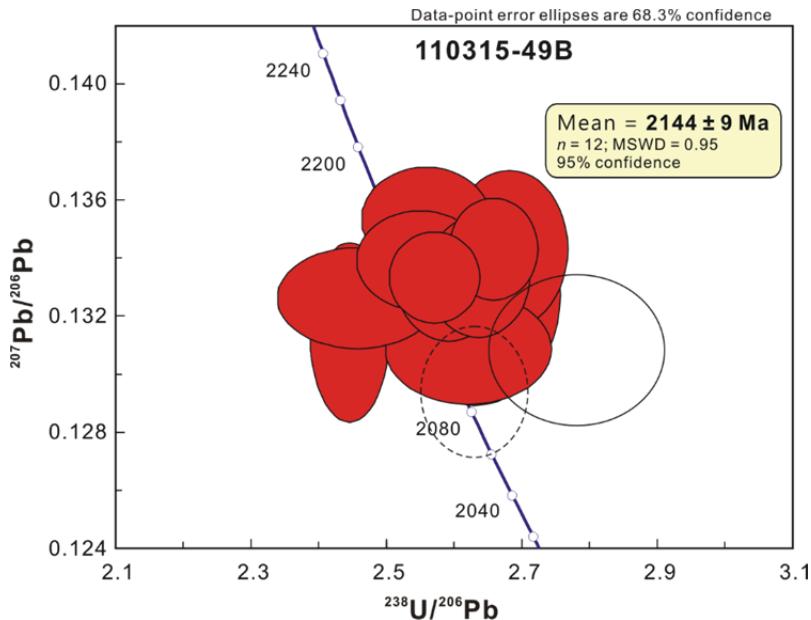


Figure DR2 Concordia plot for U-Pb analyses of monazite from sample 110315-49B. Unfilled ellipses represent discordant and/or high common Pb analyses that were disregarded in age calculation.

Fourteen analyses were performed on 5 monazite crystals. These monazite grains contain low to moderate concentrations of U (60–220 ppm, average 125 ppm), and record low common Pb ($f_{206} < 1\%$) (Table DR3). But one analysis (1514G.1-3) displays a discordance marginally exceeding the 5% cut-off. Omitting this analysis, the remaining 13 concordant analyses (disc. within $\pm 5\%$) yielded $^{207}\text{Pb}*/^{206}\text{Pb}*$ dates ranging from 2168 ± 15 Ma to 2090 ± 19 Ma (1σ), with a weighted mean date of 2141 ± 12 Ma (MSWD = 1.5). If the youngest concordant analysis (1514D.1-2) is treated as an outlier and excluded from the calculation, it returns a weighted mean $^{207}\text{Pb}*/^{206}\text{Pb}*$ date of 2144 ± 9 Ma (MSWD = 0.95, $n = 12$) (Figure DR2).

Sample 110315-57B (GKP01, 495.75–.89 m); SHRIMP mount BR15-12

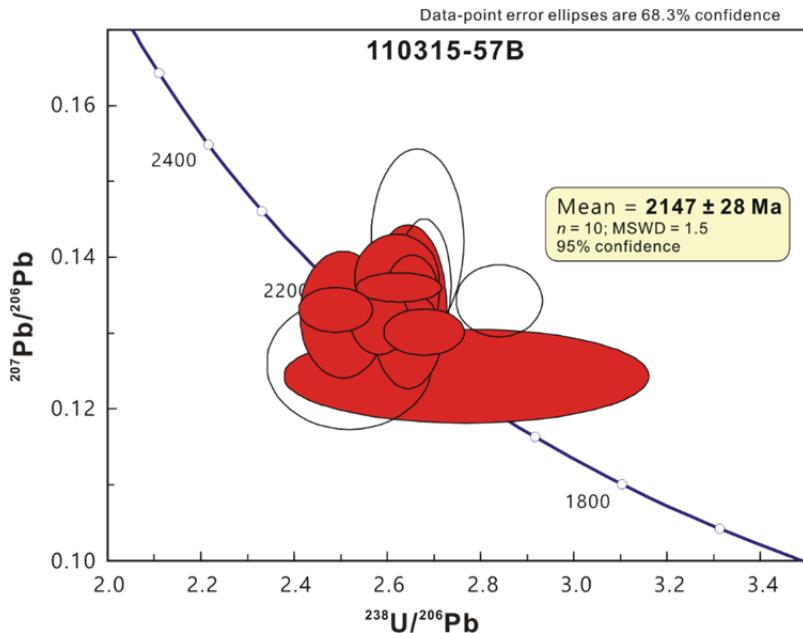


Figure DR3 Concordia plot for U-Pb analyses of monazite from sample 110315-57B. Unfilled ellipses represent discordant and/or high common Pb analyses that were disregarded in age calculation.

Monazite from this sample has low U concentrations, most grains between 50 and 100 ppm, with Th/U ratio between 2.5 and 140 (Table DR4). A total of 14 analyses were acquired on 8 grains. Ten analyses yielded concordant results, although many of them record high proportions of common ^{206}Pb ($f_{206} > 1\%$) as a consequence of U depletion in the analyzed grains. The other four analyses are $> 5\%$ discordant, and are disregarded in age determination. The 10 concordant analyses (disc. within $\pm 5\%$) yielded $^{207}\text{Pb}*/^{206}\text{Pb}*$ dates ranging from 2194 ± 48 Ma to 2019 ± 58 Ma (1σ), with a weighted mean at 2147 ± 28 Ma (MSWD = 1.5) (Figure DR3).

Sample 100315-19A, B, C (GKF01 1404.47–.73 m); SHRIMP mounts BR15-12 and BR15-14

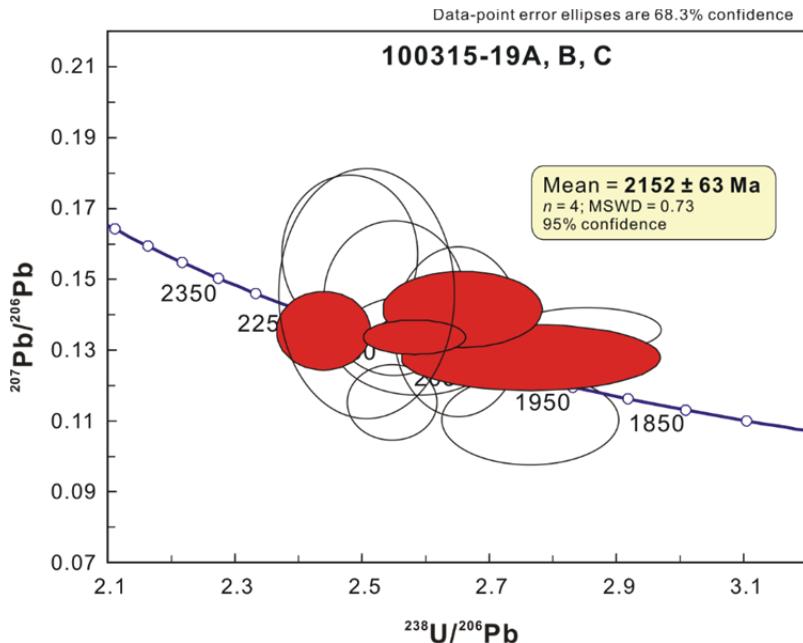


Figure DR4 Concordia plot for U-Pb analyses of monazite from sample 100315-19A, B, C. Unfilled ellipses represent discordant and/or high common Pb analyses that were disregarded in age calculation.

Monazite grains from this sample are characterized by very low U (average 35 ppm) and relatively high Th (average 3360 ppm), resulting in high Th/U ratios (most >100). A total of 12 spot analyses were performed (Table DR5). As a consequence of low U concentration in these monazite grains, all analyses record high common Pb ($f_{206} > 1\%$), and the majority display large discordance (>5%) with poor precision in $^{207}\text{Pb}^*/^{206}\text{Pb}^*$ ratios and dates. Applying a less rigorous screening, i.e., expanding the cutoff values of f_{206} and discordance to 5% and 10%, respectively, 8 of the analyses are disregarded. The remaining 4 analyses yielded a weighted mean $^{207}\text{Pb}^*/^{206}\text{Pb}^*$ date of 2152 ± 63 Ma (MSWD = 0.73) (Figure DR4), taken as a preliminary approximation of the monazite growth age.

Table DR1. SHRIMP operating parameters for monazite analytical sessions

Session	Date	SHRIMP Mount ID	Kohler aperture (μm)	Spot (approx.) (μm)	O_2^- primary (nA)	Mass Resolution M/ ΔM (1%)	Number of scans	Number of Pb/U standards (BR266)	Pb/U external precision (1σ , %)	IMF monitor (z2908)	IMF correction
1	09/10/2015	BR15-11	30	10	-0.3	5100	8	6/7	1.00	1803 ± 10 Ma ($n = 4$)	Yes
2	01/03/2019	BR15-11 BR15-12 BR15-14	50	12	-0.5	5180	7	15/16	1.00	1795 ± 8 Ma ($n = 7$)	Yes

Table DR2. SHRIMP U-Pb data for monazite in sample 110315-45A (GKP01, 640.09–.20 m), Griqualand West, South Africa

Analysis No.	U (ppm)	Th (ppm)	Th/U	f_{206} (%)	Total ratios				^{204}Pb corrected ratios				Ages (Ma)				Disc. (%)
					$\frac{^{238}\text{U}}{^{206}\text{Pb}}$	±	$\frac{^{207}\text{Pb}}{^{206}\text{Pb}}$	±	$\frac{^{238}\text{U}}{^{206}\text{Pb}^*}$	±	$\frac{^{207}\text{Pb}^*}{^{206}\text{Pb}^*}$	±	$\frac{^{238}\text{U}}{^{206}\text{Pb}^*}$	±	$\frac{^{207}\text{Pb}^*}{^{206}\text{Pb}^*}$	±	
					*		*		*		*		*		*		*
<i>Main population (2151 ± 8 Ma, n = 17, MSWD = 0.95)</i>																	
1511F.1-2	106	1223	12	0.13	2.48	0.04	0.1376	0.0019	2.46	0.04	0.1358	0.0021	2199	32	2174	27	-1
1511A.1-4	152	742	5	-0.01	2.52	0.06	0.1356	0.0009	2.49	0.06	0.1356	0.0059	2178	46	2172	76	0
1511I.1-3	376	484	1	0.02	2.54	0.06	0.1358	0.0007	2.52	0.06	0.1355	0.0007	2156	41	2170	9	1
1511D.1-1	147	896	6	0.80	2.53	0.04	0.1428	0.0017	2.52	0.04	0.1351	0.0027	2152	29	2165	34	1
1511H.1-3	271	487	2	0.06	2.42	0.05	0.1351	0.0007	2.40	0.05	0.1345	0.0008	2244	39	2158	10	-4
1511A.1-5	147	1064	7	0.04	2.55	0.06	0.1345	0.0015	2.52	0.06	0.1341	0.0015	2156	46	2153	20	0
1511A.1-6	120	1375	11	0.41	2.67	0.07	0.1376	0.0011	2.64	0.06	0.1339	0.0015	2068	44	2150	19	4
1511I.1-2	112	219	2	0.47	2.57	0.04	0.1386	0.0020	2.56	0.04	0.1338	0.0026	2129	31	2149	34	1
1511A.1-2	151	1092	7	0.75	2.51	0.04	0.1410	0.0017	2.51	0.04	0.1337	0.0026	2163	30	2147	34	-1
1511G.1-1	99	3074	31	0.41	2.44	0.04	0.1378	0.0019	2.43	0.04	0.1336	0.0025	2224	32	2146	33	-4
1511A.1-3	123	512	4	0.09	2.50	0.05	0.1342	0.0014	2.47	0.05	0.1334	0.0014	2191	34	2143	19	-2
1511H.1-4	248	1862	8	0.16	2.44	0.07	0.1347	0.0008	2.42	0.07	0.1332	0.0009	2228	51	2141	11	-4
1511I.1-4	104	633	6	0.16	2.55	0.04	0.1347	0.0010	2.52	0.04	0.1332	0.0012	2152	32	2141	15	-1
1511H.1-5	170	2140	13	0.21	2.52	0.04	0.1342	0.0010	2.50	0.04	0.1323	0.0011	2168	31	2129	15	-2
1511I.1-1	140	1354	10	0.32	2.52	0.06	0.1358	0.0018	2.51	0.06	0.1323	0.0022	2164	44	2129	30	-2
1511H.1-1	120	1518	13	0.35	2.48	0.04	0.1349	0.0018	2.47	0.04	0.1311	0.0023	2191	32	2113	31	-4
1511B.1-2	234	473	2	0.62	2.45	0.04	0.1363	0.0015	2.44	0.04	0.1303	0.0021	2216	28	2101	29	-5
<i>Rejected, $f_{206} > 1\%$ and/or disc. > 5%</i>																	
1511G.1-2	123	3569	29	0.51	2.39	0.04	0.1352	0.0033	2.38	0.04	0.1301	0.0036	2263	31	2099	49	-8
1511A.1-1	155	1598	10	1.11	2.44	0.06	0.1403	0.0018	2.44	0.06	0.1299	0.0031	2214	43	2096	42	-6
1511F.1-1	78	1259	16	1.14	2.54	0.05	0.1391	0.0035	2.54	0.05	0.1284	0.0047	2140	35	2077	64	-3
1511H.1-2	121	728	6	1.65	2.46	0.06	0.1453	0.0018	2.48	0.06	0.1301	0.0036	2182	42	2099	48	-4
1511B.1-1	139	1327	10	1.67	2.36	0.04	0.1363	0.0019	2.37	0.04	0.1211	0.0038	2269	34	1973	56	-15
1511C.1-1	128	1077	8	2.00	2.41	0.04	0.1515	0.0055	2.43	0.04	0.1332	0.0069	2222	32	2140	91	-4
1511D.1-2	98	1804	18	2.69	2.47	0.04	0.1556	0.0033	2.51	0.05	0.1313	0.0056	2159	34	2115	74	-2
1511C.1-2	79	2504	32	4.24	2.32	0.05	0.1821	0.0028	2.40	0.05	0.1439	0.0078	2249	42	2274	93	1

Pb* indicate radiogenic Pb

f_{206} is the proportion of common (unradiogenic) Pb in ^{206}Pb , determined using the measured $^{204}\text{Pb}/^{206}\text{Pb}$ and a common Pb composition from the Stacey and Kramers (1975) model at the approximate age of the sample.

$^{238}\text{U}/^{206}\text{Pb}^*$ and $^{207}\text{Pb}^*/^{206}\text{Pb}^*$ ratios and dates have been corrected for common Pb.

Disc. is apparent discordance, as $100 \left(t[^{207}\text{Pb}^*/^{206}\text{Pb}^*] - t[^{238}\text{U}/^{206}\text{Pb}^*] \right) / t[^{207}\text{Pb}^*/^{206}\text{Pb}^*]$.

Analyses are sorted by descending $t[^{207}\text{Pb}^*/^{206}\text{Pb}^*]$ except for those excluded in age calculation due to large discordance (and/or high common Pb).

Same footnotes apply to Tables DR3–5

Table DR3. SHRIMP U-Pb data for monazite in sample 110315-49B (GKP01, 636.16–25 m), Griqualand West, South Africa

Analysis No.	U (ppm)	Th (ppm)	Th/U	f_{206} (%)	Total ratios				^{204}Pb corrected ratios				Ages (Ma)				Disc. (%)
					$\frac{^{238}\text{U}}{^{206}\text{Pb}}$	±	$\frac{^{207}\text{Pb}}{^{206}\text{Pb}}$	±	$\frac{^{238}\text{U}}{^{206}\text{Pb}^*}$	±	$\frac{^{207}\text{Pb}^*}{^{206}\text{Pb}^*}$	±	$\frac{^{238}\text{U}}{^{206}\text{Pb}^*}$	±	$\frac{^{207}\text{Pb}^*}{^{206}\text{Pb}^*}$	±	
<i>Main group (2141 ± 12 Ma, n = 13, MSWD = 1.5)</i>																	
1514H.1-3	118	1879	16	0.04	2.59	0.06	0.1358	0.0011	2.56	0.06	0.1353	0.0011	2127	44	2168	15	2
1514H.1-1	87	2309	27	0.23	2.65	0.08	0.1364	0.0012	2.62	0.08	0.1343	0.0014	2083	53	2155	19	3
1514G.1-2	123	1553	13	0.16	2.68	0.04	0.1358	0.0010	2.66	0.04	0.1343	0.0011	2059	29	2155	14	4
1514A.1-1	68	1733	26	0.22	2.71	0.06	0.1363	0.0015	2.68	0.06	0.1343	0.0018	2043	37	2155	23	5
1514G.1-1	110	1230	11	0.05	2.58	0.06	0.1344	0.0010	2.55	0.06	0.1339	0.0011	2134	44	2150	14	1
1514F.1-1	211	2007	10	0.16	2.66	0.05	0.1349	0.0013	2.63	0.05	0.1334	0.0013	2074	33	2143	17	3
1514D.1-1	144	492	3	0.08	2.64	0.08	0.1343	0.0009	2.57	0.04	0.1333	0.0010	2119	31	2142	13	1
1514H.1-2	118	747	6	0.40	2.61	0.05	0.1370	0.0011	2.59	0.05	0.1333	0.0014	2104	36	2142	18	2
1514F.1-3	96	1243	13	0.91	2.64	0.08	0.1408	0.0020	2.63	0.08	0.1327	0.0025	2077	56	2134	33	3
1514F.1-2	145	658	5	0.11	2.48	0.08	0.1337	0.0010	2.46	0.08	0.1326	0.0011	2201	59	2133	14	-3
1514D.1-3	78	1064	14	0.44	2.46	0.04	0.1354	0.0015	2.44	0.04	0.1315	0.0020	2211	29	2117	27	-4
1514A.2-1	209	2137	10	0.38	2.60	0.04	0.1341	0.0009	2.62	0.08	0.1309	0.0012	2084	55	2110	16	1
1514D.1-2	131	746	6	0.38	2.65	0.05	0.1328	0.0011	2.63	0.05	0.1294	0.0014	2079	36	2090	19	1
<i>Rejected, $f_{206} > 1\%$ and/or disc. > 5%</i>																	
1514B.1-1	18	3602	203	2.44	2.73	0.13	0.1495	0.0028	2.76	0.13	0.1279	0.0062	1990	83	2069	86	4
1514E.1-2	23	5308	228	2.65	2.40	0.05	0.1590	0.0056	2.44	0.05	0.1354	0.0074	2215	37	2170	95	-2
1514C.1-2	32	4569	144	7.01	2.43	0.08	0.1935	0.0042	2.59	0.09	0.1315	0.0095	2107	59	2118	127	1
1514B.1-2	19	4589	246	6.67	2.50	0.05	0.1941	0.0108	2.65	0.07	0.1350	0.0162	2063	45	2164	209	5
1514I.1-1	17	3761	220	5.55	2.39	0.07	0.1953	0.0132	2.51	0.09	0.1459	0.0235	2165	67	2299	277	6
1514G.1-3	83	1337	16	0.40	2.81	0.09	0.1344	0.0013	2.78	0.09	0.1308	0.0017	1981	52	2109	23	6
1514E.1-1	24	3208	135	10.03	2.32	0.06	0.2339	0.0091	2.55	0.07	0.1448	0.0147	2133	52	2286	175	7
1514I.1-2	19	3213	166	2.35	2.62	0.08	0.1625	0.0049	2.66	0.08	0.1416	0.0071	2060	55	2247	87	8
1514I.1-3	22	2409	112	3.95	2.69	0.09	0.1450	0.0041	2.76	0.09	0.1105	0.0085	1991	57	1808	139	-10
1514C.1-1	40	4117	103	2.82	2.50	0.04	0.1400	0.0018	2.55	0.05	0.1153	0.0073	2135	34	1884	114	-13

Table DR4. SHRIMP U-Pb data for monazite in sample 110315-57B (GKP01, 495.75–.87 m), Griqualand West, South Africa

Analysis No.	U (ppm)	Th (ppm)	Th/U	f_{206} (%)	Total ratios				^{204}Pb corrected ratios				Ages (Ma)				Disc. (%)
					$\frac{^{238}\text{U}}{^{206}\text{Pb}}$	±	$\frac{^{207}\text{Pb}}{^{206}\text{Pb}}$	±	$\frac{^{238}\text{U}}{^{206}\text{Pb}^*}$	±	$\frac{^{207}\text{Pb}^*}{^{206}\text{Pb}^*}$	±	$\frac{^{238}\text{U}}{^{206}\text{Pb}^*}$	±	$\frac{^{207}\text{Pb}^*}{^{206}\text{Pb}^*}$	±	
Main group (2147 ± 28 Ma, $n = 11$, MSWD = 1.5)																	
1512H.1-3	73	1124	15	2.06	2.60	0.06	0.1557	0.0026	2.62	0.06	0.1374	0.0038	2085	41	2194	48	5
1512D.1-1	97	257	3	0.12	2.65	0.06	0.1372	0.0011	2.62	0.06	0.1360	0.0012	2082	41	2177	15	4
1512F.1-4	93	796	9	3.31	2.60	0.03	0.1642	0.0013	2.65	0.04	0.1349	0.0036	2062	25	2163	46	5
1512H.1-1	48	878	18	3.87	2.58	0.05	0.1677	0.0055	2.64	0.05	0.1334	0.0072	2068	37	2144	95	4
1512D.1-4	121	1251	10	0.64	2.50	0.05	0.1388	0.0016	2.49	0.05	0.1330	0.0019	2178	39	2138	25	-2
1512D.1-2	79	226	3	1.56	2.49	0.06	0.1462	0.0029	2.50	0.06	0.1324	0.0055	2165	45	2130	73	-2
1512A.1-1	81	1608	20	1.54	2.61	0.05	0.1454	0.0012	2.62	0.05	0.1318	0.0026	2082	37	2122	34	2
1512F.1-1	55	805	15	0.45	2.60	0.04	0.1358	0.0028	2.58	0.04	0.1318	0.0031	2110	29	2122	41	1
1512D.1-3	78	388	5	0.84	2.70	0.06	0.1376	0.0013	2.68	0.06	0.1302	0.0020	2045	37	2100	27	3
1512G.1-1	26	3543	137	1.44	2.76	0.26	0.1371	0.0022	2.77	0.26	0.1243	0.0041	1988	162	2019	58	2
<i>Rejected, disc. >5%</i>																	
1512F.1-2	48	385	8	3.11	2.47	0.12	0.1534	0.0042	2.52	0.12	0.1259	0.0058	2156	86	2042	81	-6
1512H.1-4	94	1134	12	1.63	2.66	0.04	0.1508	0.0046	2.68	0.04	0.1363	0.0058	2045	25	2181	74	6
1512F.1-3	65	3264	51	4.04	2.59	0.06	0.1780	0.0066	2.66	0.07	0.1420	0.0082	2055	44	2252	99	9
1512H.1-2	81	1119	14	1.26	2.84	0.06	0.1455	0.0022	2.84	0.06	0.1343	0.0031	1946	36	2155	41	10

Table DR5. SHRIMP U-Pb data for monazite in sample 100315-19A, B, C (GKF01, 1404.47–.73 m), Griqualand West, South Africa

Analysis No.	U (ppm)	Th (ppm)	Th/U	f_{206} (%)	Total ratios				^{204}Pb corrected ratios				Ages (Ma)				Disc. (%)
					$\frac{^{238}\text{U}}{^{206}\text{Pb}}$	±	$\frac{^{207}\text{Pb}}{^{206}\text{Pb}}$	±	$\frac{^{238}\text{U}}{^{206}\text{Pb}^*}$	±	$\frac{^{207}\text{Pb}^*}{^{206}\text{Pb}^*}$	±	$\frac{^{238}\text{U}}{^{206}\text{Pb}^*}$	±	$\frac{^{207}\text{Pb}^*}{^{206}\text{Pb}^*}$	±	
Main group (2152 ± 63 Ma, $n = 4$, MSWD = 0.73)																	
1514I.1-2	19	3213	166	2.35	2.62	0.08	0.1625	0.0049	2.66	0.08	0.1416	0.0071	2060	55	2247	87	8
1514E.1-2	23	5308	228	2.65	2.40	0.05	0.1590	0.0056	2.44	0.05	0.1354	0.0074	2215	37	2170	95	-2
1512I.2-1	67	987	15	1.81	2.57	0.05	0.1498	0.0015	2.58	0.05	0.1337	0.0032	2110	37	2147	42	2
1514B.1-1	18	3602	203	2.44	2.73	0.13	0.1495	0.0028	2.76	0.13	0.1279	0.0062	1990	83	2069	86	4
<i>Rejected, $f_{206} > 5\%$ or disc. > 10%</i>																	
1512E.1-1	27	3626	135	6.05	2.36	0.06	0.2091	0.0104	2.48	0.07	0.1552	0.0162	2185	53	2404	178	9
1512I.1-1	109	944	9	2.53	2.81	0.08	0.1580	0.0030	2.85	0.08	0.1356	0.0040	1938	46	2172	52	11
1514C.1-2	32	4569	144	7.01	2.43	0.08	0.1935	0.0042	2.59	0.09	0.1315	0.0095	2107	59	2118	127	1
1514B.1-2	19	4589	246	6.67	2.50	0.05	0.1941	0.0108	2.65	0.07	0.1350	0.0162	2063	45	2164	209	5
1514I.1-1	17	3761	220	5.55	2.39	0.07	0.1953	0.0132	2.51	0.09	0.1459	0.0235	2165	67	2299	277	6
1514G.1-3	83	1337	16	0.40	2.81	0.09	0.1344	0.0013	2.78	0.09	0.1308	0.0017	1981	52	2109	23	6
1514E.1-1	24	3208	135	10.03	2.32	0.06	0.2339	0.0091	2.55	0.07	0.1448	0.0147	2133	52	2286	175	7
1514C.1-1	40	4117	103	2.82	2.50	0.04	0.1400	0.0018	2.55	0.05	0.1153	0.0073	2135	34	1884	114	-13
1514I.1-3	22	2409	112	3.95	2.69	0.09	0.1450	0.0041	2.76	0.09	0.1105	0.0085	1991	57	1808	139	-10

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