

160221: tuffaceous rhyolite, Shark Well

Location and sampling

MARBLE BAR (SF 50-8), MARBLE BAR (2855) MGA Zone 50, 774470E 7623650N

Sampled on 10 October 2000.

The sample was taken from a boulder within a gully located 75 m south of a gorge on Glen Herring Creek, and 5.7 km on a bearing of 152° from Shark Well.

Tectonic unit/relations

This sample is a medium grey, altered rhyolite containing angular lithic fragments up to 1 cm long, from near the stratigraphic top of the Panorama Formation, Warrawoona Group, East Pilbara Granite–Greenstone Terrane (Hickman and Van Kranendonk, in prep.).

Petrographic description

This is a porphyritic, pale siliceous rock with some lithic fragments visible in hand specimen. In thin section, the rock is composed of fragments from 0.5 to 10 mm in diameter. Most fragments are of porphyritic volcanic rock with albite- to sericite-altered plagioclase phenocrysts, commonly rectangular in outline, with patches of quartz in some altered phenocrysts up to 2 mm long. Clay, quartz and leucoxene aggregates have also replaced mafic (?hornblende) phenocrysts to 2 mm long, and one fragment has rounded quartz phenocrysts to 1.5 mm long. The groundmass consists of granular quartz, clouded by sericite, with minor leucoxene and rare microphenocrysts of apatite. There are large fragments composed of quartz- and sericite-altered, glassy and lithic shards and fragments to 1.5 mm in diameter, each fragment rimmed by leucoxene. There is an abundant matrix largely consisting of chalcedony, but with areas of sericite or of microsparry quartz. This is a lapilli tuff with acid volcanic lava and vitric tuff fragments, in a chalcedony-rich matrix.

Zircon morphology

The zircons isolated from this sample are typically dark brown or black, between 60 × 85 µm and 100 × 200 µm in size and are equant to slightly elongate and euhedral, or irregular in shape. Most grains have remnant internal zonation and mineral inclusions, and many are metamict.

Analytical details

This sample was analysed on 30 June 2001. The counter deadtime during the analysis session was 32 ns. Ten analyses of the CZ3 standard obtained during the analysis session indicated a Pb*/U calibration error of 1.52 (1σ%). Common-Pb corrections were applied assuming Broken Hill common-Pb isotopic compositions for all analyses.

Results

Twenty-two analyses were obtained from 22 zircons. Results are given in Table 26 and shown on a concordia plot in Figure 39.

Table 26. Ion microprobe analytical results for sample 160221: tuffaceous rhyolite, Shark Well

<i>Grain .spot</i>	<i>U (ppm)</i>	<i>Th (ppm)</i>	<i>Pb (ppm)</i>	<i>f206%</i>	<i>²⁰⁷Pb/²⁰⁶Pb</i>	<i>±1σ</i>	<i>²⁰⁸Pb/²⁰⁶Pb</i>	<i>±1σ</i>	<i>²⁰⁶Pb/²³⁸U</i>	<i>±1σ</i>	<i>²⁰⁷Pb/²³⁵U</i>	<i>±1σ</i>	<i>% concordance</i>	<i>²⁰⁷Pb/²⁰⁶Pb age</i>	<i>±1σ</i>
1.1	50	45	47	0.945	0.29285	0.00214	0.23022	0.00361	0.6970	0.0119	28.145	0.547	99	3 433	11
2.1	79	79	73	0.442	0.29259	0.00144	0.25824	0.00227	0.6836	0.0112	27.578	0.487	98	3 431	8
3.1	154	135	139	0.966	0.28941	0.00117	0.21934	0.00195	0.6754	0.0107	26.952	0.455	97	3 414	6
4.1	187	134	165	0.172	0.29220	0.00085	0.18435	0.00103	0.6920	0.0109	27.878	0.456	99	3 429	5
5.1	98	77	88	0.433	0.29121	0.00126	0.20610	0.00180	0.6935	0.0112	27.846	0.479	99	3 424	7
6.1	168	171	157	0.554	0.29423	0.00101	0.27046	0.00160	0.6834	0.0108	27.723	0.459	98	3 440	5
7.1	192	129	167	0.493	0.29219	0.00094	0.17658	0.00133	0.6787	0.0107	27.342	0.449	97	3 429	5
8.1	90	62	78	0.735	0.29244	0.00139	0.18638	0.00213	0.6689	0.0108	26.973	0.468	96	3 431	7
9.1	105	80	94	1.044	0.29314	0.00143	0.19719	0.00236	0.6741	0.0108	27.245	0.473	97	3 434	8
10.1	127	147	119	0.365	0.29243	0.00111	0.31036	0.00174	0.6731	0.0107	27.138	0.457	97	3 431	6
11.1	156	126	140	0.418	0.29230	0.00102	0.21234	0.00145	0.6848	0.0108	27.601	0.457	98	3 430	5
12.1	106	79	95	0.388	0.29102	0.00120	0.19075	0.00169	0.6908	0.0111	27.720	0.472	99	3 423	6
13.1	165	129	146	0.250	0.29411	0.00093	0.20714	0.00122	0.6769	0.0106	27.448	0.451	97	3 439	5
14.1	193	128	167	0.133	0.29328	0.00081	0.17357	0.00092	0.6834	0.0107	27.635	0.448	98	3 435	4
15.1	138	127	126	0.545	0.29024	0.00109	0.24016	0.00169	0.6847	0.0109	27.401	0.459	98	3 419	6
16.1	158	105	137	0.553	0.29291	0.00104	0.17853	0.00151	0.6737	0.0106	27.207	0.451	97	3 433	6
17.1	116	95	104	0.352	0.29006	0.00119	0.20315	0.00169	0.6872	0.0110	27.485	0.468	99	3 418	6
18.1	77	67	72	0.330	0.29835	0.00141	0.21760	0.00193	0.7021	0.0115	28.882	0.509	99	3 462	7
19.1	128	92	95	1.804	0.28984	0.00157	0.20011	0.00285	0.5515	0.0087	22.041	0.382	83	3 417	8
20.1	146	91	125	0.930	0.29365	0.00123	0.16790	0.00197	0.6629	0.0105	26.840	0.453	95	3 437	6
21.1	68	56	62	0.458	0.29874	0.00153	0.21545	0.00217	0.6919	0.0115	28.500	0.511	98	3 464	8
22.1	138	192	140	0.152	0.30010	0.00101	0.36286	0.00158	0.7095	0.0113	29.356	0.489	100	3 471	5

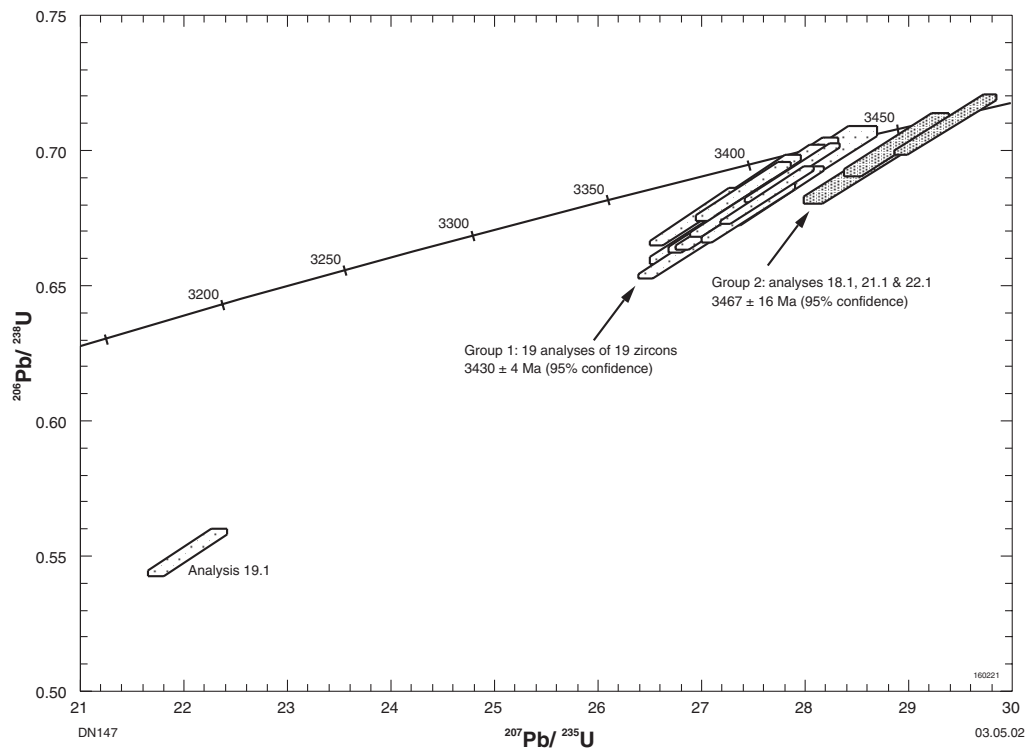


Figure 39. Concordia plot for sample 160221: tuffaceous rhyolite, Shark Well

Interpretation

The analyses are concordant to highly discordant, with the discordance pattern consistent with a single recent episode of radiogenic-Pb loss. On the basis of their $^{207}\text{Pb}/^{206}\text{Pb}$ ratios, all analyses may be assigned to one of two groups. Nineteen concordant and highly discordant analyses of 19 zircons, assigned to Group 1, have $^{207}\text{Pb}/^{206}\text{Pb}$ ratios defining a single population and indicating a weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ date of 3430 ± 4 Ma (chi-squared = 1.50). Concordant analyses 18.1, 21.1 and 22.1, assigned to Group 2, have $^{207}\text{Pb}/^{206}\text{Pb}$ ratios defining a single population and indicating a weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ date of 3467 ± 16 Ma (chi-squared = 0.44).

The date of 3430 ± 4 Ma indicated by the weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ ratio of the 19 concordant and highly discordant analyses of Group 1 is interpreted as the age of igneous crystallization of the rhyolite. Concordant analyses 18.1, 21.1 and 22.1 of Group 2 are interpreted to be of xenocryst zircons.

STRATIGRAPHIC REFERENCE:

HICKMAN, A. H., and VAN KRANENDONK, M. J., in prep., Marble Bar, W.A. Sheet 2855: Western Australia Geological Survey, 1:100 000 Geological Series.

Recommended reference for this publication:

NELSON, D. R., 2002, 160221: tuffaceous rhyolite, Shark Well; in Compilation of geochronology data, 2001: Western Australia Geological Survey, Record 2002/2, p. 106–108.

OR

NELSON, D. R., 2002, 160221: tuffaceous rhyolite, Shark Well; Geochronology dataset 238; in Compilation of geochronology data, June 2006 update: Western Australia Geological Survey.

Data obtained: 30/06/2001; Data released: 26/06/2002