

144224: dacite porphyry, Mount Wangee

Location and sampling

ROEBOURNE (SF 50-3)

117°11'23"E 20°43'07"S

Sampled during October 1996

The sampling site is 2.9 km west-northwest of Mount Wangee, and 7 km northeast of Roebourne. The porphyry outcrops on the western shore of an island, and was collected from a low outcrop about 2 m above the high tide mark.

Tectonic unit/relations

The sample is from a sill within, or at the stratigraphic top of, spinifex-textured komatiite of the Ruth Well Formation. The intrusive nature of the porphyry is indicated by xenolithic rafts of ultramafic rock in places. The minimum thickness of the sill is about 10 m.

Petrographic description

The dominant mineral present in this sample is plagioclase, with abundant quartz and amphibole, minor K-feldspar, sericite/clay, epidote and chlorite and accessory biotite, leucoxene and calcite. This sample consists mainly of a felsic matrix of plagioclase intergrown with lesser amounts of K-feldspar and quartz, through which larger plagioclase phenocrysts and a small number of quartz phenocrysts are disseminated. The matrix exhibits a finely granular texture, locally with a vague micropoikilitic character. Moderate amounts of a pleochroic green amphibole, and lesser amounts of biotite and pleochroic green chlorite, occur within the matrix. The plagioclase shows some alteration to turbid, finely granular epidote and very finely divided sericite/clay. Traces of calcite were also noted as finely disseminated grains. Leucoxene forms turbid, disseminated aggregates. Minor biotite was noted as vague remnants within some chlorite flakes. This is a volcanic or shallow intrusive rock with a dacitic, or possibly rhyodacitic, composition showing alteration of plagioclase to sericite/clay and epidote and of original mafic minerals to a pleochroic green amphibole and chlorite. The amphibole, in particular, could be a product of low to medium grade metamorphism but the rock shows no textural evidence of metamorphism.

Zircon morphology

The zircons isolated from this sample are commonly dark brown to black, euhedral with sharp to slightly rounded terminations, and between $40 \times 100 \mu\text{m}$ and $80 \times 350 \mu\text{m}$ in size. Many grains are structureless, although grains displaying remnant internal zonation are also common. Many are black and metamict. A minority of grains have small irregular-shaped cores, or fluid and mineral inclusions.

Analytical details

This sample was analysed on 4 and 9 October 1998. The counter deadtime during both analysis sessions was 32 ns. Fourteen analyses of the CZ3 standard were obtained during the first analysis session and indicated a Pb^*/U calibration error of 3.34 (1 σ %). Analyses 1.1 to 8.1 were obtained

Table 40. Ion microprobe analytical results for sample 144224: dacite porphyry, Mount Wangee

<i>Grain</i> <i>.spot</i>	<i>U</i> (ppm)	<i>Th</i> (ppm)	<i>Pb</i> (ppm)	<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>%</i> <i>concordance</i>	<i>²⁰⁷Pb/²⁰⁶Pb</i> <i>Age</i>	<i>±1σ</i>
1.1	431	250	297	0.034	0.22618	0.00047	0.15465	0.00053	0.5792	0.0194	18.064	0.610	97	3025	3
2.1	226	108	145	0.060	0.22325	0.00068	0.12649	0.00074	0.5501	0.0185	16.934	0.577	94	3004	5
3.1	220	132	157	0.050	0.22606	0.00068	0.16043	0.00080	0.5980	0.0201	18.640	0.635	100	3024	5
4.1	603	283	419	0.020	0.22492	0.00039	0.12665	0.00039	0.5961	0.0199	18.486	0.623	100	3016	3
5.1	190	129	136	0.049	0.22674	0.00072	0.18149	0.00092	0.5871	0.0197	18.354	0.626	98	3029	5
6.1	334	220	235	0.027	0.22493	0.00052	0.17517	0.00063	0.5851	0.0196	18.146	0.614	98	3016	4
7.1	291	197	199	0.066	0.22377	0.00059	0.17987	0.00075	0.5636	0.0189	17.390	0.590	96	3008	4
8.1	141	64	95	0.083	0.22715	0.00090	0.12303	0.00109	0.5804	0.0195	18.178	0.624	97	3032	6
9.1	268	137	191	0.039	0.22522	0.00063	0.13902	0.00070	0.6049	0.0140	18.784	0.444	101	3018	5
10.1	264	177	191	0.003	0.22457	0.00063	0.18195	0.00075	0.5972	0.0138	18.491	0.437	100	3014	4
11.1	336	167	218	0.125	0.22050	0.00061	0.13424	0.00074	0.5528	0.0128	16.808	0.396	95	2984	4
12.1	213	116	153	0.029	0.22698	0.00067	0.14658	0.00076	0.6078	0.0141	19.023	0.451	101	3031	5
13.1	379	200	259	0.065	0.22439	0.00054	0.14389	0.00062	0.5790	0.0133	17.913	0.420	98	3012	4
14.1	173	109	123	0.082	0.22471	0.00078	0.16947	0.00101	0.5932	0.0138	18.379	0.439	100	3015	6
15.1	245	133	175	0.031	0.22665	0.00067	0.14714	0.00076	0.6030	0.0139	18.842	0.446	100	3029	5
16.1	320	178	225	0.025	0.22450	0.00056	0.15490	0.00064	0.5907	0.0136	18.285	0.430	99	3013	4
17.1	520	384	384	0.006	0.22599	0.00044	0.20159	0.00055	0.5997	0.0138	18.686	0.436	100	3024	3
18.1	308	138	212	0.060	0.22490	0.00057	0.12077	0.00059	0.5922	0.0137	18.363	0.432	99	3016	4
19.1	155	78	106	0.036	0.22477	0.00079	0.12338	0.00079	0.5876	0.0136	18.211	0.435	99	3015	6
20.1	313	134	215	0.040	0.22647	0.00055	0.11640	0.00056	0.5937	0.0137	18.540	0.435	99	3027	4
21.1	187	93	130	0.065	0.22690	0.00073	0.13617	0.00083	0.5931	0.0137	18.554	0.441	99	3030	5
22.1	342	105	228	0.031	0.22541	0.00052	0.08237	0.00045	0.5917	0.0136	18.389	0.431	99	3020	4
23.1	359	101	252	0.058	0.22899	0.00052	0.07748	0.00046	0.6241	0.0144	19.704	0.462	103	3045	4
24.1	234	159	173	0.083	0.22531	0.00065	0.18422	0.00083	0.6089	0.0141	18.915	0.448	102	3019	5
25.1	185	88	129	0.106	0.22591	0.00071	0.12839	0.00083	0.5960	0.0138	18.565	0.441	100	3023	5
26.1	98	49	69	0.120	0.22553	0.00104	0.13255	0.00129	0.6044	0.0141	18.796	0.458	101	3021	7

during the first analysis session. During the second analysis session, six analyses of the CZ3 standard indicated a Pb^*/U calibration error of 2.29 (1 σ %). Common-Pb corrections were applied assuming Broken Hill common-Pb isotopic compositions for all analyses.

Results

Twenty-six analyses were obtained from 26 zircons. Results are given in Table 40 and shown on a concordia plot in Figure 41.

Interpretation

Most analyses are concordant or slightly discordant. Twenty-two analyses of 22 zircons have $^{207}Pb/^{206}Pb$ ratios defining a single population and indicating a weighted mean date of 3021 ± 3 Ma (chi-squared = 1.91). This is interpreted as the time of igneous crystallization of the dacite porphyry. Analysis 23.1 indicated a higher $^{207}Pb/^{206}Pb$ ratio and this analysis site may have gained some radiogenic Pb. Alternatively, this analysis may be of a xenocryst zircon. Slightly discordant analyses 2.1, 7.1 and 11.1 are interpreted to be of sites that have lost some radiogenic Pb.

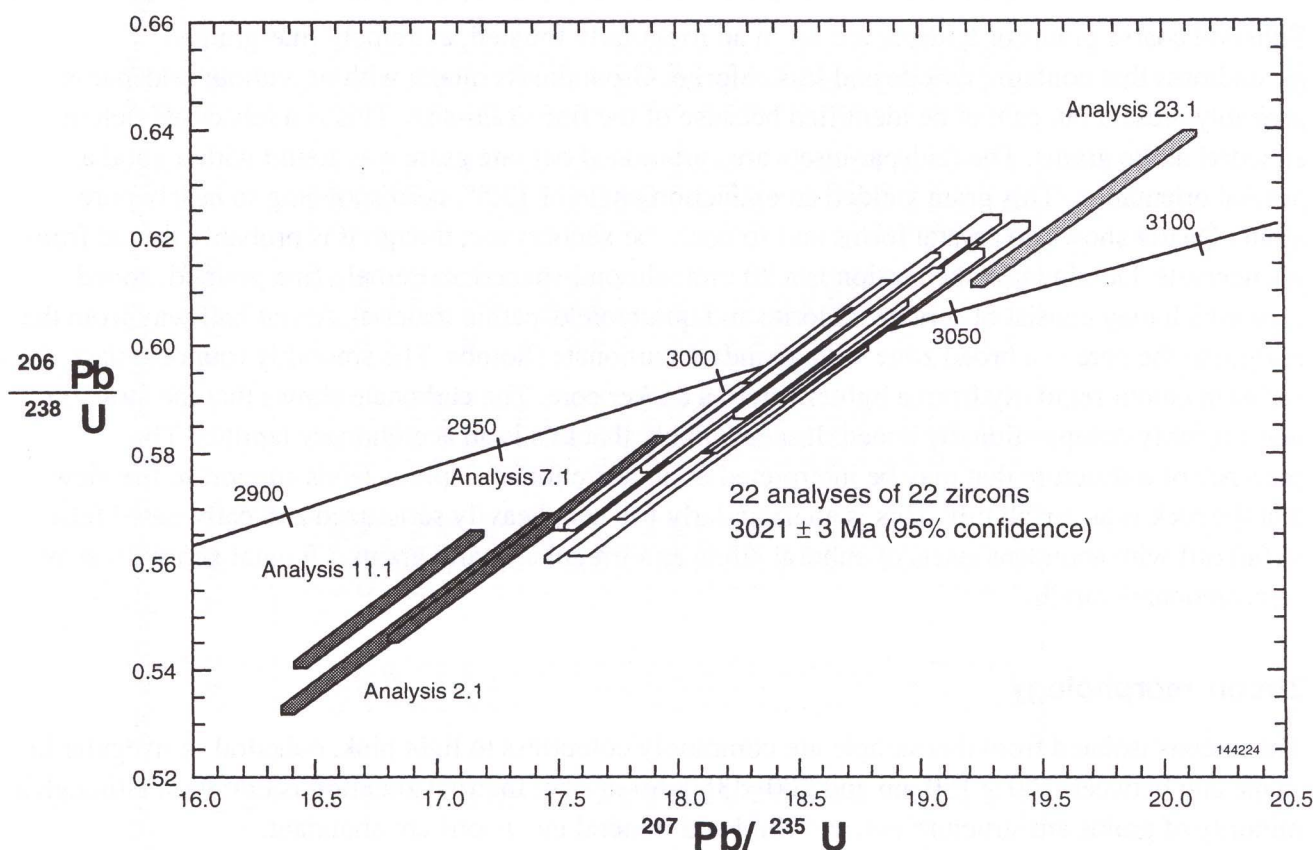


Figure 41. Concordia plot for sample 144224: dacite porphyry, Mount Wangee

STRATIGRAPHIC REFERENCE:

HICKMAN, A. H., 2002, Geology of the Roebourne 1:100 000 sheet: Western Australia Geological Survey, 1:100 000 Geological Series Explanatory Notes, 35p.

Recommended reference for this publication:

NELSON, D. R., 1999, 144224: dacite porphyry, Mount Wangee; in Compilation of geochronology data, 1998: Western Australia Geological Survey, Record 1999/2, p. 157–159.

OR

NELSON, D. R., 1999, 144224: dacite porphyry, Mount Wangee; Geochronology dataset 270; in Compilation of geochronology data, June 2006 update: Western Australia Geological Survey.

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