

169089: granophyric syenogranite, Horse Well

Location and sampling

EDMUND (SF 50-14), MAROONAH (2051) MGA Zone 50,
354260E 7431450N

Sampled on 3 September 2001

The sample was taken from a buried jointed block located within a rubbly outcrop 20 m east of the access track, 3 km north of Horse Well.

Tectonic unit/relations

The sample is from a pale pinkish-grey, even- and fine-grained, granophyric syenogranite, of the Gascoyne Complex, that has intruded the Yilgatherra Formation of the Bangemall Supergroup (Martin et al., 2000). The syenogranite has been intruded by numerous granophyric veins. The sample was collected to provide a minimum age for the base of the Edmund Group.

Petrographic description

The principal minerals in this sample are orthoclase (60 vol.%), quartz (30–35 vol.%), and plagioclase (5 vol.%), with minor epidote (trace), chlorite with or without smectite (trace), titanite (trace), limonite (partly after pyrite; trace), apatite (trace), and fluorite (trace). The sample is a massive, microgranophyric syenogranite, and most of the rock is composed of fine granophyric intergrowths of quartz and clouded orthoclase up to 1.5 mm long, with minor granular quartz. Plagioclase is scattered, and is mostly less than 1 mm in grain size. Small aggregates of epidote and clay (chlorite with or without smectite) are disseminated, and there is a large block of limonite, 2 × 1.5 mm in size, possibly after pyrite. Small shreds of chlorite could have replaced biotite. Equally sparse leucoxene is disseminated, as well as trace titanite and rare apatite. Trace fluorite occurs in some chlorite-rich areas. The bulk composition indicates a syenogranite, as a granophyre typical of calcalkaline, rather than tholeiitic, suites.

Zircon morphology

The zircons isolated from this sample are colourless or pale pinkish-brown, dark brown, and black, generally between 40 × 80 µm and 80 × 150 µm in size, and subhedral, rounded or irregular in shape, or are irregular fragments. Many are structureless but a minority have faint internal zonation or contain subhedral structureless cores and weakly zoned rims. Cathodoluminescence images of representative zircons are given in Figure 1.

Analytical details

This sample was analysed on 28 and 30 July 2002. The counter deadtime during both analysis sessions was 24 ns. During the first analysis session, two analyses of the CZ3 standard indicated a Pb*/U calibration uncertainty of 0.046% (1σ). A calibration uncertainty of 1.0% (1σ) was applied to analyses of unknowns obtained during this analysis session. Analyses 1.1 to 7.1 were obtained during the first analysis session. During the second analysis session, five analyses of the CZ3 standard indicated a Pb*/U calibration uncertainty of 2.36% (1σ). Common-Pb corrections were applied assuming Broken Hill common-Pb isotopic compositions for all analyses.

Results

Nineteen analyses were obtained from ten zircons. Results are given in Table 1 and shown on a concordia plot in Figure 2.

Interpretation

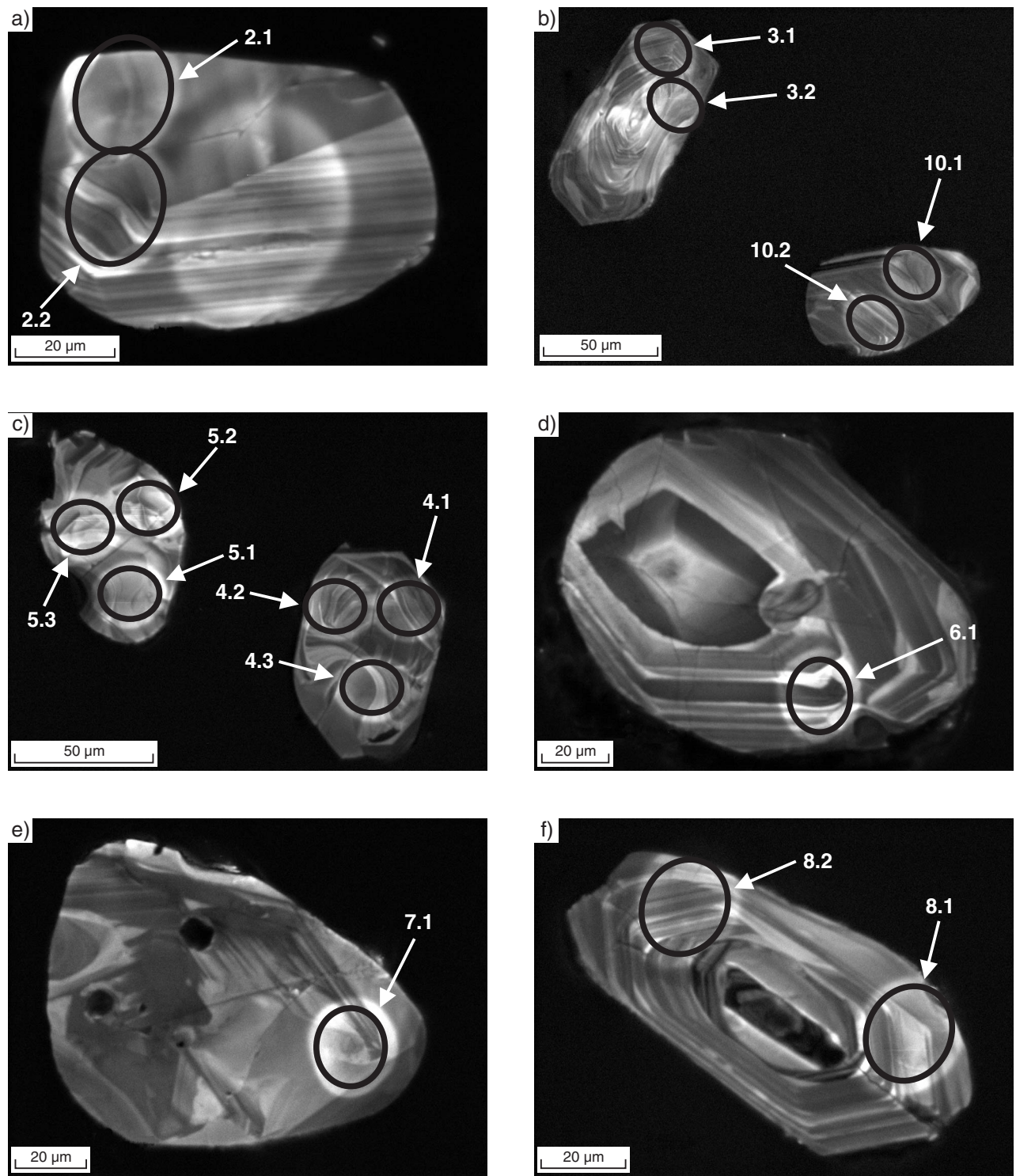
Most analyses are concordant to slightly discordant, with the discordance patterns consistent with a single recent episode of radiogenic-Pb loss. Seventeen concordant or near-concordant analyses of eight zircons have ²⁰⁷Pb/²⁰⁶Pb ratios defining a single population and indicating a weighted mean date of 1778 ± 11 Ma (chi-squared = 0.38). Concordant analyses 6.1 and 7.1 indicated significantly older ²⁰⁷Pb/²⁰⁶Pb dates than the main population.

The date of 1778 ± 11 Ma indicated by the weighted mean ²⁰⁷Pb/²⁰⁶Pb ratio of 17 concordant or near-concordant analyses of eight zircons is interpreted to indicate the age of igneous crystallization of the granophyric syenogranite. The significantly older ²⁰⁷Pb/²⁰⁶Pb dates indicated by the remaining analyses are interpreted to be of xenocryst zircons.

Recommended reference for this publication:

NELSON, D. R., 2004, 169089: granophyric syenogranite, Horse Well; Geochronology dataset 118; in Compilation of geochronology data, June 2006 update: Western Australia Geological Survey.

Data obtained: 30/07/2002; Data released: 06/12/2004



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Figure 1. Cathodoluminescence images of representative zircons from sample 169089: granophyric syenogranite, Horse Well

Table 1. Ion microprobe analytical results for sample 169089: granophyric syenogranite, Horse Well

Grain spot	U (ppm)	Th (ppm)	Pb (ppm)	f206%	$^{207}\text{Pb}/^{206}\text{Pb}$	$\pm 1\sigma$	$^{208}\text{Pb}/^{206}\text{Pb}$	$\pm 1\sigma$	$^{206}\text{Pb}/^{238}\text{U}$	$\pm 1\sigma$	$^{207}\text{Pb}/^{235}\text{U}$	$\pm 1\sigma$	% concordance	$^{207}\text{Pb}/^{206}\text{Pb}$ Age	$\pm 1\sigma$
1.1	509	906	210	1.193	0.10846	0.00171	0.49046	0.00450	0.2901	0.0032	4.338	0.088	93	1 774	29
2.1	198	487	101	1.510	0.10644	0.00280	0.69055	0.00821	0.3178	0.0038	4.664	0.141	102	1 739	48
3.1	428	132	139	0.296	0.10999	0.00148	0.08943	0.00277	0.3113	0.0034	4.721	0.087	97	1 799	24
4.1	290	157	100	0.227	0.10941	0.00113	0.15228	0.00220	0.3135	0.0033	4.729	0.074	98	1 790	19
5.1	121	39	41	0.459	0.11037	0.00215	0.09807	0.00434	0.3225	0.0036	4.908	0.116	100	1 805	35
6.1	448	329	192	0.068	0.12184	0.00065	0.21343	0.00127	0.3711	0.0038	6.235	0.076	103	1 983	10
7.1	209	96	129	0.198	0.19148	0.00111	0.12623	0.00164	0.5436	0.0059	14.352	0.186	102	2 755	10
8.1	306	255	109	0.551	0.10905	0.00114	0.23479	0.00254	0.3040	0.0072	4.571	0.124	96	1 784	19
9.1	253	107	86	0.443	0.10908	0.00128	0.10788	0.00254	0.3195	0.0076	4.805	0.134	100	1 784	21
10.1	445	128	141	0.285	0.10894	0.00085	0.07681	0.00149	0.3076	0.0073	4.621	0.120	97	1 782	14
5.2	105	129	42	0.954	0.10896	0.00236	0.31326	0.00560	0.3172	0.0077	4.766	0.164	100	1 782	40
4.2	241	146	79	0.430	0.10857	0.00122	0.17309	0.00252	0.2934	0.0070	4.391	0.121	93	1 776	21
10.2	384	256	138	0.359	0.10803	0.00093	0.19234	0.00194	0.3168	0.0075	4.718	0.124	100	1 766	16
3.2	221	67	73	0.603	0.10861	0.00161	0.07663	0.00315	0.3164	0.0076	4.738	0.141	100	1 776	27
8.2	405	358	148	0.450	0.10837	0.00096	0.25205	0.00217	0.3069	0.0073	4.586	0.121	97	1 772	16
4.3	249	71	80	0.220	0.10984	0.00108	0.08629	0.00183	0.3097	0.0074	4.691	0.126	97	1 797	18
5.2	101	90	38	0.774	0.10845	0.00286	0.25265	0.00654	0.3144	0.0077	4.702	0.179	99	1 774	48
2.2	160	293	73	0.463	0.10903	0.00159	0.53727	0.00473	0.3154	0.0076	4.742	0.140	99	1 783	27
9.2	414	155	136	0.384	0.10742	0.00091	0.10431	0.00171	0.3107	0.0074	4.602	0.121	99	1 756	15

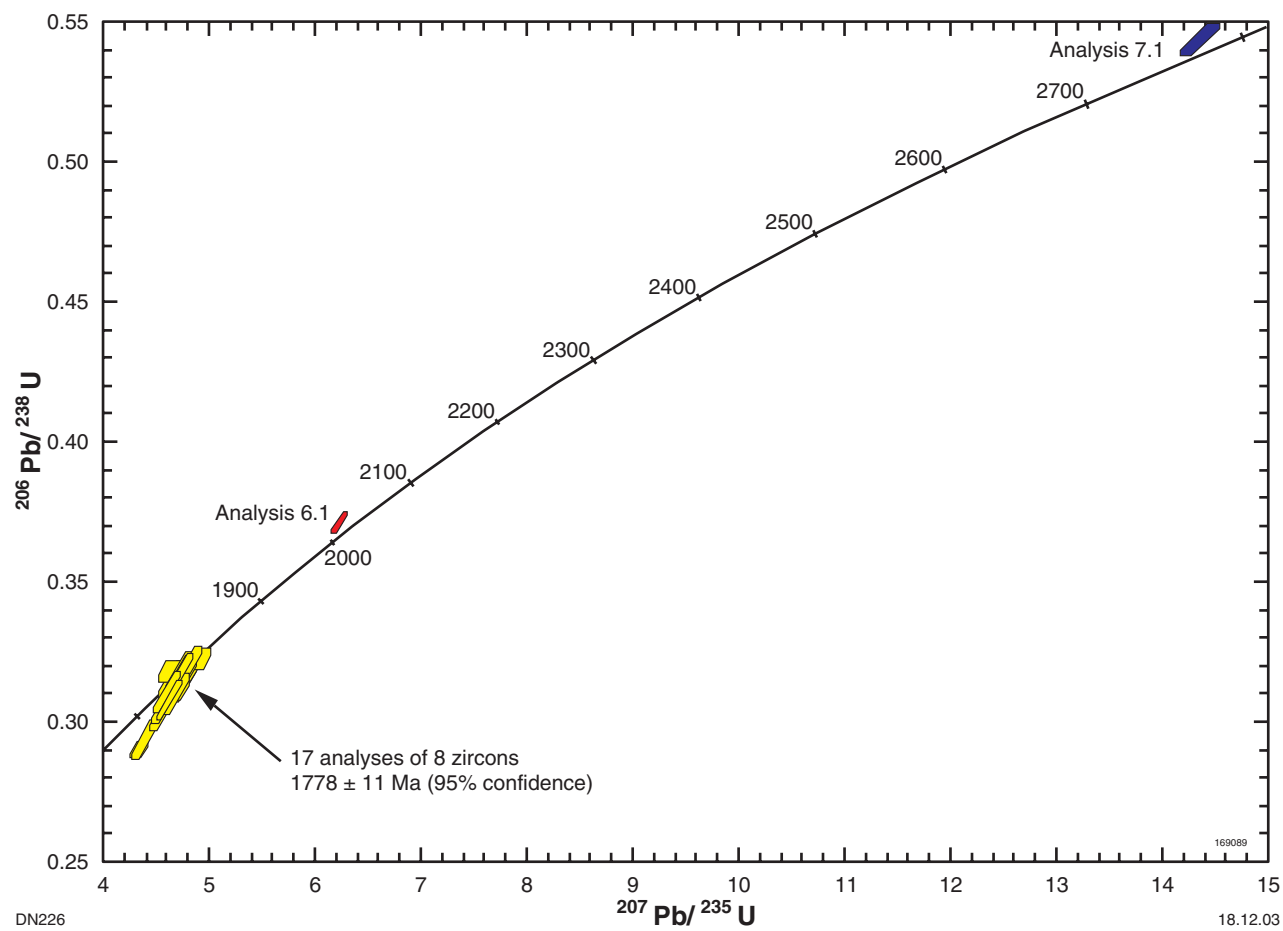


Figure 2. Concordia plot for sample 169089: granophyric syenogranite, Horse Well