

198209: felsic schist, Two Mile Well

(Yaloginda Formation, Norie Group, Murchison Supergroup,
Murchison Domain, Youanmi Terrane, Yilgarn Craton)

Location and sampling

KIRKALOCKA (SH 50-3), CHALLA (2541)
MGA Zone 50, 620825E 6855437N

Sampled on 5 June 2010

This sample was collected from a 20 m high ridge on Meeline Station, about 5.7 km southeast of Seven Mile Well, 5.2 km east-northeast of Diorite Well, and 1.6 km north of Two Mile Well.

Tectonic unit/relations

The unit sampled is a felsic schist assigned to the 2815–2800 Ma Yaloginda Formation of the Norie Group (Van Kranendonk et al., 2013). The Yaloginda Formation consists of felsic metavolcanic and metavolcaniclastic rocks, banded iron-formation, and local quartzite, widely intruded by layered gabbroic to peridotitic sills. The Yaloginda Formation overlies tholeiitic and komatiitic metabasalt of the Murrouli Basalt, and is overlain by quartzite and metamorphosed iron-formation of the Coodardy Formation at the base of the Polelle Group (Van Kranendonk et al., 2013). The felsic schist at this location occurs as a 50 m long, 10 m wide lens surrounded by foliated metamonzogranite of the Mount Kenneth Suite (Ivanic et al., 2012), a sample of which was collected 16 m to the northeast and yielded a crystallization age of 2809 ± 2 Ma (GSWA 198210; Wingate et al., 2015). The schist and metamonzogranite may have been juxtaposed during high-strain deformation along the Challa Shear Zone (Ivanic, 2012).

Petrographic description

The sample is a fine-grained, quartzofeldspathic schist, composed of about 75–80% quartz, 13–15% plagioclase, 3–5% magnetite, 1% biotite, and accessory muscovite–sericite and zircon. The matrix of this rock is a weakly foliated quartz–albite–biotite–magnetite intergrowth with an average grain size <0.4 mm. This intergrowth is dominated by anhedral, elongate, and strained quartz. Albite in the matrix is anhedral, and difficult to distinguish from quartz. Albite also occurs as phenocrysts up to 4 mm long; these crystals typically contain rounded quartz inclusions and exhibit very minor local alteration to pale, very fine grained sericite. Magnetite occurs as euhedral

crystals up to 0.2 mm across, in some cases arranged parallel to the foliation defined by grain elongation in the quartz-rich matrix. Small crystals of brown to olive-green biotite and less common muscovite are scattered through the matrix, and show no preferred orientation.

Zircon morphology

Zircons isolated from this sample are colourless to dark brown, and mainly euhedral. The crystals are up to 300 μm long, and equant to elongate, with aspect ratios up to 6:1. In cathodoluminescence (CL) images, concentric zoning is ubiquitous. A CL image of representative zircons is shown in Figure 1.

Analytical details

This sample was analysed on 13–14 April 2012, using SHRIMP-B. Eleven analyses of the BR266 standard were obtained during the session, of which 10 analyses indicated an external spot-to-spot (reproducibility) uncertainty of 0.50% (1σ) and a $^{238}\text{U}/^{206}\text{Pb}^*$ calibration uncertainty of 0.16% (1σ). Calibration uncertainties are included in the errors of $^{238}\text{U}/^{206}\text{Pb}^*$ ratios and dates listed in Table 1. Common-Pb corrections were applied to all analyses using contemporaneous isotopic compositions determined according to the model of Stacey and Kramers (1975).

Results

Nineteen analyses were obtained from 19 zircons. Results are listed in Table 1, and shown in a concordia diagram (Fig. 2).

Interpretation

The analyses are concordant to slightly discordant (Fig. 2), and form a single group, based on their $^{207}\text{Pb}^*/^{206}\text{Pb}^*$ ratios.

Group I comprises 19 analyses (Table 1), which yield a weighted mean $^{207}\text{Pb}^*/^{206}\text{Pb}^*$ date of 2813 ± 5 Ma (MSWD = 1.1).

The date of 2813 ± 5 Ma for the 19 analyses in Group I is interpreted as the magmatic crystallization age of the felsic volcanic protolith of the schist.

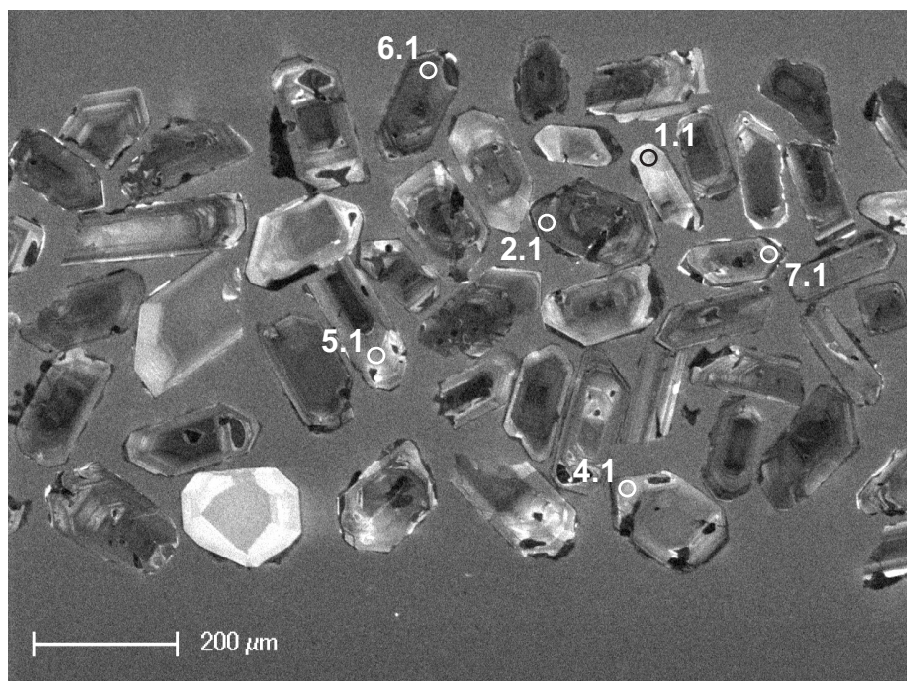


Figure 1. Cathodoluminescence image of representative zircons from sample 198209: felsic schist, Two Mile Well. Numbered circles indicate the approximate locations of analysis sites.

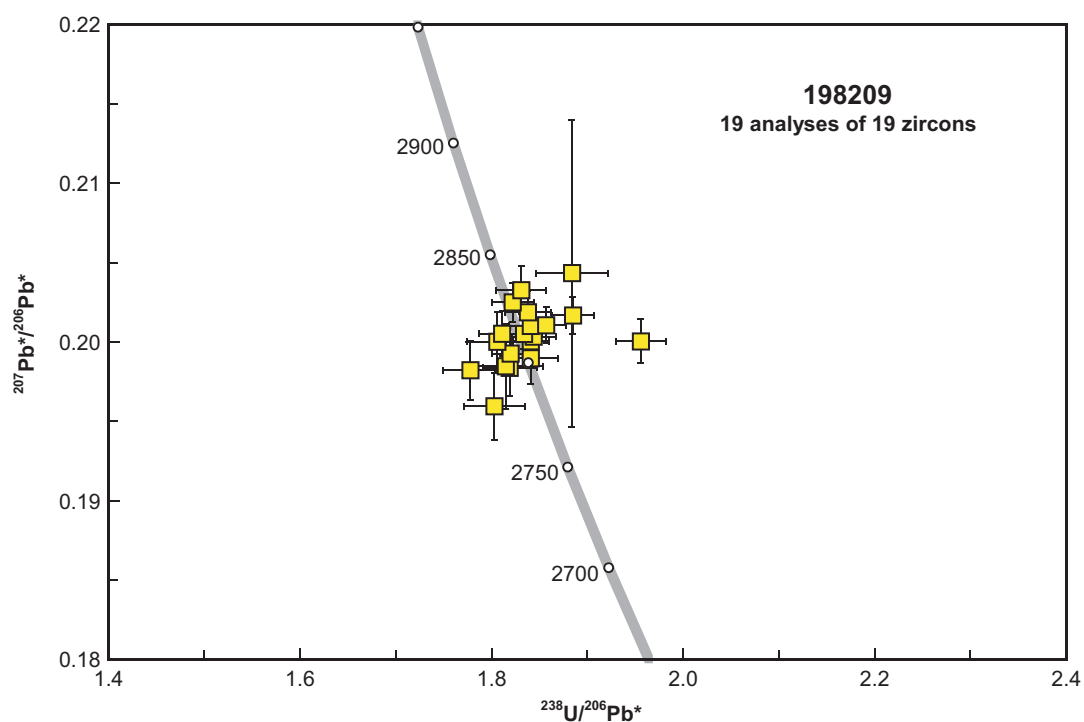


Figure 2. U-Pb analytical data for sample 198209: felsic schist, Two Mile Well. Yellow squares indicate Group I (magmatic zircons).

Table 1. Ion microprobe analytical results for zircons from sample 198209: feksic schist, Two Mile Well

Group ID	Spot no.	Grain. spot	^{238}U (ppm)	^{232}Th (ppm)	$\frac{^{232}\text{Th}}{^{238}\text{U}}$	f_{204} (%)	$^{238}\text{U}/^{206}\text{Pb} \pm 1\sigma$	$^{207}\text{Pb}/^{206}\text{Pb} \pm 1\sigma$	$^{238}\text{U}/^{206}\text{Pb}^* \pm 1\sigma$	$^{207}\text{Pb}^*/^{206}\text{Pb}^* \pm 1\sigma$	$^{238}\text{U}/^{206}\text{Pb}^*$ date (Ma) $\pm 1\sigma$	$^{207}\text{Pb}^*/^{206}\text{Pb}^*$ date (Ma) $\pm 1\sigma$	Disc. (%)						
I	14	14.1	54	20	0.38	0.184	1.800	0.032	0.19600	0.00175	1.803	0.032	0.19436	0.00190	2844	41	2779	16	-2.3
I	19	19.1	65	32	0.51	0.147	1.776	0.029	0.19771	0.00157	1.778	0.029	0.19640	0.00167	2876	38	2797	14	-2.9
I	16	16.1	71	39	0.56	0.135	1.816	0.028	0.19773	0.00150	1.819	0.028	0.19653	0.00160	2825	36	2798	13	-1.0
I	8	8.1	38	16	0.43	0.226	1.811	0.039	0.19864	0.00218	1.815	0.039	0.19663	0.00240	2829	50	2798	20	-1.1
I	5	5.1	73	30	0.42	-0.025	1.841	0.028	0.19686	0.00146	1.841	0.028	0.19708	0.00148	2797	35	2802	12	0.2
I	17	17.1	183	112	0.63	0.010	1.820	0.019	0.19744	0.00094	1.820	0.019	0.19734	0.00095	2823	25	2804	8	-0.7
I	4	4.1	50	18	0.37	0.000	1.806	0.032	0.19802	0.00166	1.806	0.032	0.19802	0.00166	2840	42	2810	14	-1.1
I	6	6.1	111	47	0.44	-0.019	1.957	0.026	0.19787	0.00124	1.956	0.026	0.19803	0.00125	2662	30	2810	10	5.3
I	13	13.1	237	132	0.57	0.057	1.840	0.019	0.19856	0.00091	1.841	0.019	0.19805	0.00093	2797	23	2810	8	0.5
I	12	12.1	133	78	0.61	0.072	1.842	0.023	0.19895	0.00110	1.844	0.023	0.19831	0.00114	2793	28	2812	9	0.7
I	10	10.1	212	138	0.68	-0.009	1.834	0.019	0.19837	0.00088	1.834	0.019	0.19846	0.00088	2805	24	2814	7	0.3
I	15	15.1	105	46	0.46	0.036	1.810	0.024	0.19880	0.00124	1.811	0.024	0.19848	0.00126	2834	31	2814	10	-0.7
I	7	7.1	119	52	0.45	0.016	1.841	0.023	0.19906	0.00118	1.841	0.023	0.19892	0.00119	2796	29	2817	10	0.8
I	9	9.1	157	81	0.53	-0.025	1.858	0.021	0.19873	0.00103	1.857	0.021	0.19896	0.00104	2777	26	2818	9	1.4
I	2	2.1	152	93	0.64	-0.025	1.885	0.022	0.19928	0.00104	1.885	0.022	0.19951	0.00105	2744	26	2822	9	2.8
I	11	11.1	118	53	0.47	-0.034	1.838	0.024	0.19939	0.00120	1.838	0.024	0.19969	0.00122	2801	30	2824	10	0.8
I	18	18.1	137	77	0.58	0.000	1.822	0.022	0.20025	0.00111	1.822	0.022	0.20025	0.00111	2820	28	2828	9	0.3
I	3	3.1	90	46	0.53	-0.082	1.833	0.026	0.20021	0.00133	1.831	0.026	0.20094	0.00138	2809	33	2834	11	0.9
I	1	1.1	39	29	0.76	-0.202	1.887	0.038	0.20011	0.00867	1.884	0.038	0.20191	0.00870	2745	46	2842	70	3.4

References

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- Wingate, MTD, Kirkland, CL and Ivanic, TJ 2015, 198210: foliated metamonzogranite, Two Mile Well; Geochronology Record 1231: Geological Survey of Western Australia, 4p.

Recommended reference for this publication

Wingate, MTD, Kirkland, CL and Ivanic, TJ 2015, 198209: felsic schist, Two Mile Well; Geochronology Record 1230: Geological Survey of Western Australia, 4p.

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