

## 207503: metamonzogranite, northeast of Mount Day

(Southern Cross Domain, Youanmi Terrane, Yilgarn Craton)

### Location and sampling

LAKE JOHNSTON (SI 51-1), JOHNSTON (3033)  
MGA Zone 51, 267827E 6452926N

Sampled on 24 October 2009

This sample was collected from a pavement outcrop, about 21 km northwest of Ant Rock, 18.4 km west of McDermid Rock, and 12.1 km north-northeast of Mount Day.

### Tectonic unit/relations

The unit sampled is a metamonzogranite on the eastern margin of the Lake Johnston greenstone belt in the Southern Cross Domain of the Youanmi Terrane (Romano, 2012a,b, 2014, 2015). A metamonzogranite, sampled about 11.4 km to the southwest, yielded an igneous crystallization age of  $2662 \pm 14$  Ma (GSWA 199047, Wingate et al., 2017a). A monzogranite, sampled about 10.8 km to the northwest, yielded an igneous crystallization age of  $2680 \pm 6$  Ma (GSWA 207530, Wingate et al., 2017b).

### Petrographic description

The sample is an equigranular biotite metamonzogranite, consisting of about 35% quartz, 30% plagioclase, 25% K-feldspar, 3% biotite, and accessory iron-titanium oxide minerals and chlorite. Quartz is fine to medium grained, and up to 3 mm in size. Plagioclase (andesine,  $An_{31}$ ) is anhedral, fine- to medium-grained, about 0.5 – 1.5 mm in size, weakly clouded and rarely albite twinned. Some plagioclase displays compositional zonation, with saussurite-clouded cores surrounded by transparent albite rims. K-feldspar is mainly microcline, fine grained, and 0.2 – 1.0 mm in size. Biotite is aligned and defines a weak gneissosity.

### Zircon morphology

Zircons isolated from this sample are pale brown to dark brown or opaque, and subhedral to euhedral. The crystals are up to 300  $\mu$ m long, and elongate, with aspect ratios up to 6:1. In cathodoluminescence (CL) images, some zircons exhibit concentric zoning, and most crystals are dominated by high-uranium, metamict zones, or display mottled textures and appear to be completely metamict. A CL image of representative zircons is shown in Figure 1.

### Analytical details

This sample was analysed on 29–30 April 2013, using SHRIMP-A. Fourteen analyses of the BR266 standard were obtained from the session. Significant drift of standard  $^{238}\text{U}/^{206}\text{Pb}^*$  dates during the session was addressed by fitting a LOWESS curve, (Cleveland, 1979) with a smoothing window of 14 analyses, implemented using the program Isoplot 2.50 (Ludwig, 2009; Wingate and Lu, 2018). During the session, 14 standard analyses indicated an external spot-to spot (reproducibility) uncertainty of 0.50% ( $1\sigma$ ). Isotopic mass fractionation of  $^{207}\text{Pb}/^{206}\text{Pb}$  ratios during the session was corrected by reference to the OGC1 standard; measured ratios were increased by 0.42%. 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

Fourteen analyses were obtained from 13 zircons. Results are listed in Table 1, and shown in a concordia diagrams (Fig. 2).

### Interpretation

The analyses are concordant to strongly discordant (Fig. 2). Nine analyses are >5% discordant. The dates obtained from these nine analyses (Group D; Table 1) are unreliable, and are considered not to be geologically significant. The remaining five analyses form one group, based on their  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  ratios.

Group X comprises five analyses of five zircons (Table 1), which yield  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  dates of 2926–2750 Ma. The three oldest analyses yield a weighted mean  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  date of  $2908 \pm 38$  Ma (MSWD = 1.3). The youngest analysis yields a  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  date of  $2750 \pm 14$  Ma ( $1\sigma$ ).

The dates of 2926–2750 Ma for the five analyses in Group X are tentatively interpreted as the ages of inherited components.

The date of  $2750 \pm 14$  Ma ( $1\sigma$ ) for the youngest analysis in Group X is tentatively interpreted as a maximum age for igneous crystallization of the monzogranite. Alternatively, the date of  $2908 \pm 38$  Ma for the three oldest analyses in Group X could represent the igneous crystallization age of the monzogranite, and the two younger analyses could reflect loss of radiogenic Pb.

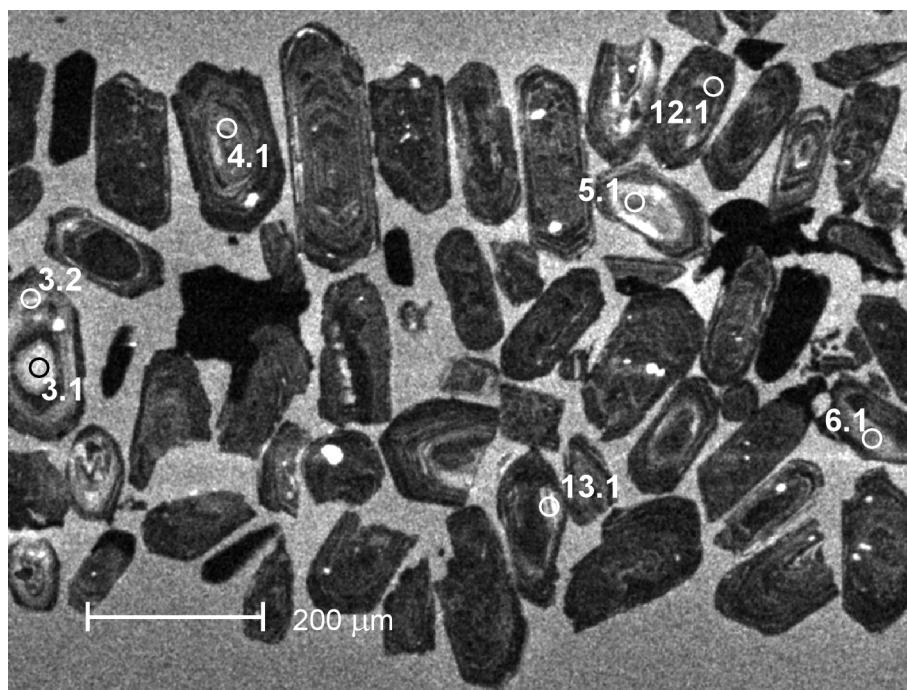


Figure 1. Cathodoluminescence image of representative zircons from sample 207503: metamonzogranite, northeast of Mount Day. Numbered circles indicate the approximate locations of analysis sites

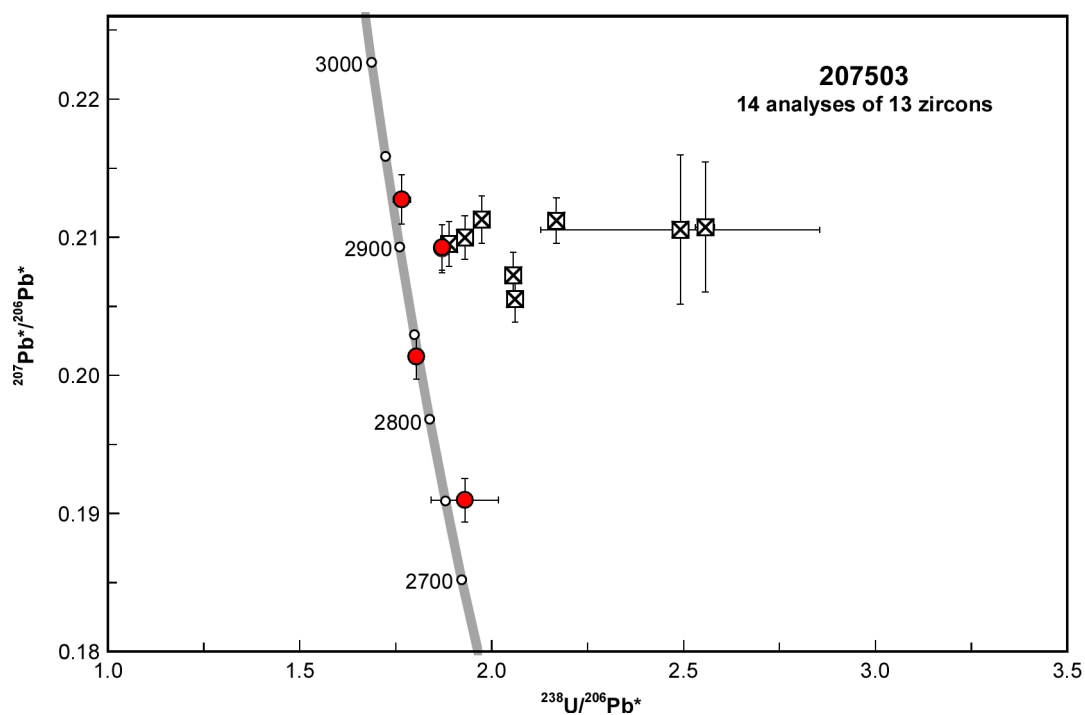


Figure 2. U-Pb analytical data for sample 207503: metamonzogranite, northeast of Mount Day. Red circles indicate Group X (xenocrystic zircon); crossed squares indicate Group D (discordance >5%)

Table 1. Ion microprobe analytical results for zircons from sample 207503: metamonzon granite, northeast of Mount Day

Group ID	Spot no.	Grain. spot	<sup>238</sup> U (ppm)	<sup>232</sup> Th (ppm)	<sup>232</sup> Th/ <sup>238</sup> U	f <sup>204</sup> (%)	<sup>238</sup> U/ <sup>206</sup> Pb ± 1σ	<sup>207</sup> Pb/ <sup>206</sup> Pb ± 1σ	<sup>238</sup> U/ <sup>206</sup> Pb* ± 1σ	<sup>207</sup> Pb*/ <sup>206</sup> Pb* ± 1σ	<sup>238</sup> U/ <sup>206</sup> Pb* date (Ma) ±1σ	<sup>207</sup> Pb*/ <sup>206</sup> Pb* date (Ma) ±1σ	Disc. (%)						
X	11	10.1	180	22	0.13	0.217	1.926	0.088	0.19291	0.00155	1.930	0.088	0.19097	0.00159	2691	104	2750	14	2.2
X	7	7.1	114	60	0.54	0.000	1.804	0.020	0.20135	0.00163	1.804	0.020	0.20135	0.00163	2843	25	2837	13	-0.2
X	14	13.1	122	59	0.51	0.428	1.863	0.020	0.21300	0.00162	1.871	0.020	0.20918	0.00174	2761	24	2899	13	4.8
X	6	6.1	137	74	0.56	0.094	1.869	0.019	0.21010	0.00161	1.871	0.019	0.20926	0.00163	2761	23	2900	13	4.8
X	3	3.1	74	35	0.49	0.070	1.764	0.023	0.21336	0.00178	1.766	0.023	0.21273	0.00180	2893	30	2926	14	1.1
D	10	3.2	1262	322	0.26	0.482	8.184	0.050	0.12441	0.00141	8.224	0.051	0.12017	0.00149	740	4	1959	22	62.2
D	2	2.1	169	78	0.48	0.479	2.051	0.018	0.20978	0.00156	2.061	0.018	0.20550	0.00166	2550	19	2870	13	11.2
D	1	1.1	135	173	1.32	0.140	2.053	0.020	0.20850	0.00161	2.056	0.020	0.20725	0.00164	2555	21	2884	13	11.4
D	5	5.1	128	125	1.01	0.094	1.887	0.019	0.21034	0.00161	1.889	0.019	0.20950	0.00163	2739	23	2902	13	5.6
D	4	4.1	214	142	0.68	0.374	1.923	0.016	0.21330	0.00152	1.930	0.016	0.20997	0.00158	2691	19	2905	12	7.4
D	8	8.1	307	484	1.63	0.696	2.475	0.361	0.21676	0.00482	2.492	0.364	0.21055	0.00541	2175	308	2910	42	25.3
D	13	12.1	158	80	0.52	0.375	2.548	0.025	0.21408	0.00465	2.557	0.025	0.21073	0.00471	2128	18	2911	36	26.9
D	12	11.1	209	133	0.66	0.670	2.154	0.019	0.21718	0.00154	2.169	0.019	0.21120	0.00166	2444	18	2915	13	16.1
D	9	9.1	161	23	0.15	0.308	1.968	0.020	0.21402	0.00162	1.974	0.020	0.21128	0.00171	2642	22	2915	13	9.4

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## Recommended reference for this publication

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Data released: 11 May 2018