

# 185932: metarhyolite, Eelya Hill

*(Greensleeves Formation, Polelle Group, Murchison Supergroup,  
Murchison Domain, Youanmi Terrane, Yilgarn Craton)*

## Location and sampling

CUE (SG 50-15), REEDY (2543)  
MGA Zone 50, 616289E 6975295N

Sampled on 5 October 2007

This sample was collected from low-lying, rubbly outcrop on Nallan Station, about 29 km east-northeast of Cue, 4.6 km south of Johnson Well, and 2.9 km north-northeast of Eelya Hill.

## Tectonic unit/relations

The unit sampled is a metarhyolite assigned to the Greensleeves Formation of the 2800–2730 Ma Polelle Group. The Greensleeves Formation consists of up to 5 km of andesitic to rhyolitic volcanic and volcanoclastic rocks (Van Kranendonk et al., in review). This formation conformably overlies mafic and ultramafic rocks of the Meekatharra Formation, and is itself conformably overlain by banded iron-formation, felsic to intermediate volcanoclastic rocks, and shale of the Wilgie Mia Formation (Van Kranendonk et al., in review).

## Petrographic description

The sample is a metarhyolite, containing sparse quartz phenocrysts (~3%) up to 3 mm long, and albitized plagioclase phenocrysts (1–2%) up to 6 mm long, within a fine-grained quartzofeldspathic groundmass. Some quartz phenocrysts are recrystallized, although others are rounded or bipyramidal. Feldspar phenocrysts are less commonly recrystallized, and some are fractured and veined by quartz. Muscovite, titanite, and epidote occur within, and adjacent to, both types of phenocryst. The groundmass is a micromosaic (grain size <0.2 mm) of quartz and K-feldspar, probably microcline, with accessory muscovite, epidote, titanite, chlorite, apatite, carbonate minerals, and microcrystalline opaque oxide minerals disseminated throughout the matrix. This rock has been metamorphosed under greenschist or low amphibolite facies conditions.

## Zircon morphology

Zircons isolated from this sample are colourless to dark brown, and subhedral to euhedral. The crystals are up to 250 µm long, and equant to slightly elongate, with aspect ratios up to 4:1. In cathodoluminescence (CL) images, grains show common concentric and sector zoning. A CL image of representative zircons is shown in Figure 1.

## Analytical details

This sample was analysed on 15–16 May 2009, using SHRIMP-A. Thirteen analyses of the BR266 standard were obtained during the session, of which nine analyses indicated an external spot-to-spot (reproducibility) uncertainty of 1.58% (1σ) and a  $^{238}\text{U}/^{206}\text{Pb}^*$  calibration uncertainty of 0.54% (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

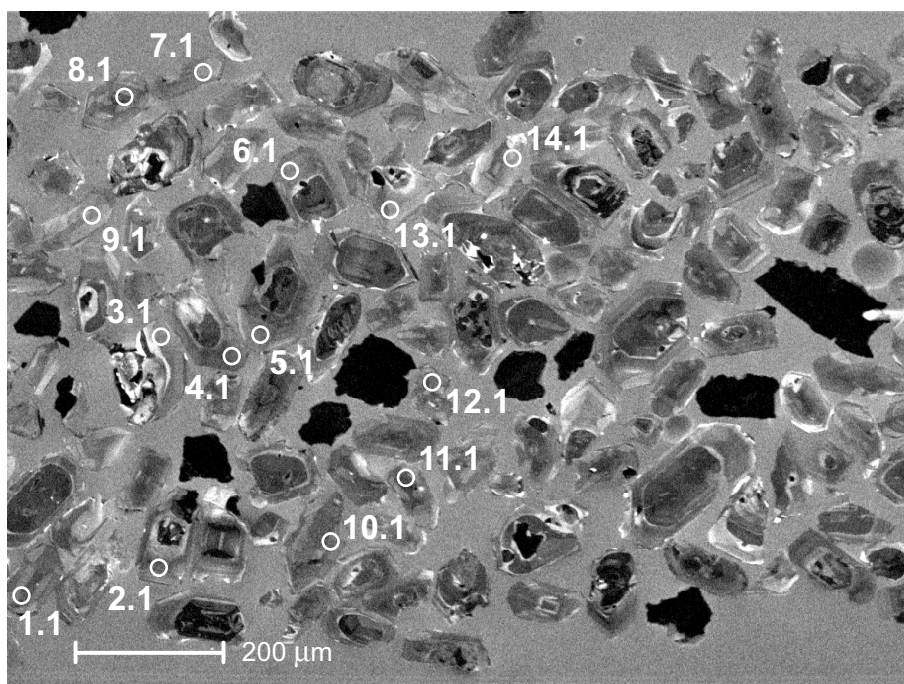
Fourteen analyses were obtained from 14 zircons. Results are listed in Table 1, and shown in a concordia diagram (Fig. 2).

## Interpretation

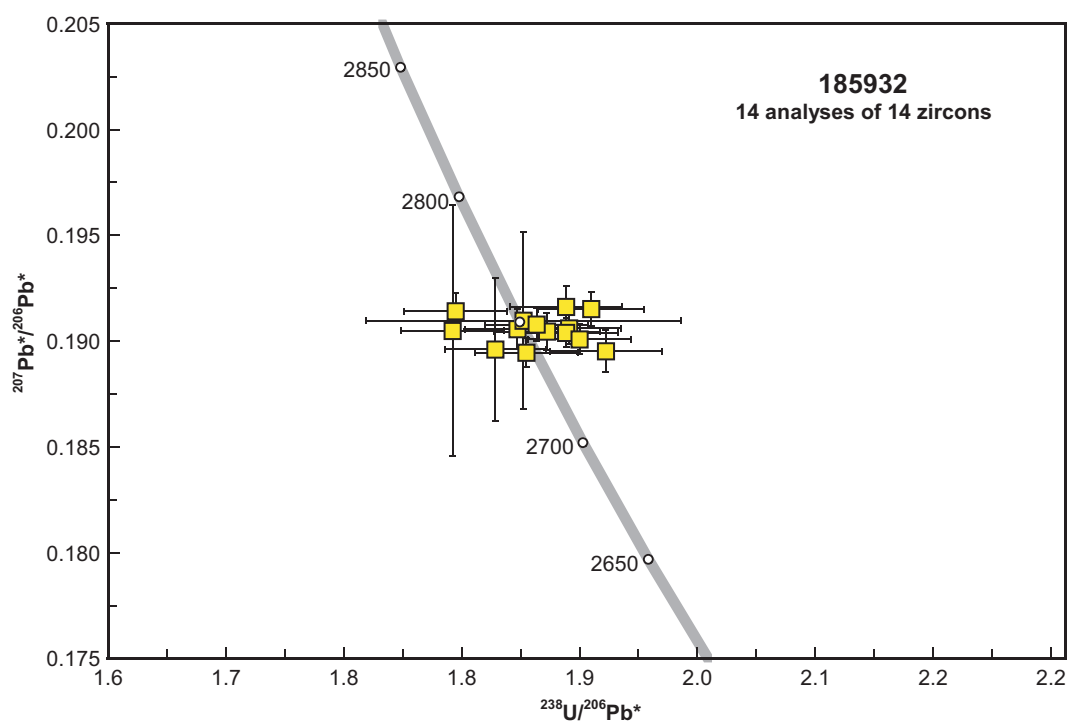
The analyses are concordant to very slightly discordant (Fig. 2), and form a single group, based on their  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  ratios.

Group I comprises 14 analyses (Table 1), which yield a concordia age of  $2746 \pm 4$  Ma (MSWD = 0.71).

The date of  $2746 \pm 4$  Ma for the 14 analyses in Group I is interpreted as the magmatic crystallization age of the rhyolite.



**Figure 1.** Cathodoluminescence image of representative zircons from sample 185932: metarhyolite, Eelya Hill. Numbered circles indicate the approximate locations of analysis sites.



**Figure 2.** U-Pb analytical data for sample 185932: metarhyolite, Eelya Hill. Yellow squares indicate Group I (magmatic zircons).

Table 1. Ion microprobe analytical results for zircons from sample 185932: metarhyolite, Eelya Hill

Group ID	Spot no.	Grain. spot	$^{238}\text{U}$ (ppm)	$^{232}\text{Th}$ (ppm)	$\frac{^{232}\text{Th}}{^{238}\text{U}}$	$t_{204}$ (%)	$^{238}\text{U}/^{206}\text{Pb} \pm 1\sigma$	$^{207}\text{Pb}/^{206}\text{Pb} \pm 1\sigma$	$^{238}\text{U}/^{206}\text{Pb}^* \pm 1\sigma$	$^{207}\text{Pb}^*/^{206}\text{Pb}^* \pm 1\sigma$	$^{238}\text{U}/^{206}\text{Pb}^*$ date (Ma) $\pm 1\sigma$	$^{207}\text{Pb}^*/^{206}\text{Pb}^*$ date (Ma) $\pm 1\sigma$	Disc. (%)						
I	8	8.1	193	151	0.81	-0.012	1.885	0.033	0.18934	0.00068	1.884	0.035	0.18945	0.00068	2744	62	2737	6	-0.3
I	13	13.1	109	51	0.49	0.012	1.938	0.037	0.18964	0.00097	1.938	0.038	0.18953	0.00098	2682	65	2738	8	2.0
I	2	2.1	202	135	0.69	0.031	1.862	0.032	0.18987	0.00336	1.863	0.034	0.18960	0.00336	2770	63	2739	29	-1.1
I	12	12.1	197	148	0.77	0.013	1.919	0.034	0.19021	0.00071	1.920	0.035	0.19009	0.00072	2703	62	2743	6	1.4
I	4	4.1	212	207	1.01	0.006	1.911	0.033	0.19045	0.00067	1.911	0.035	0.19040	0.00068	2713	61	2746	6	1.2
I	5	5.1	149	85	0.59	0.000	1.898	0.034	0.19045	0.00086	1.898	0.036	0.19045	0.00086	2728	64	2746	7	0.6
I	6	6.1	147	82	0.58	0.017	1.834	0.033	0.19064	0.00592	1.834	0.035	0.19049	0.00592	2805	66	2746	51	-2.1
I	1	1.1	179	104	0.60	0.036	1.913	0.033	0.19092	0.00074	1.913	0.035	0.19060	0.00076	2710	61	2747	7	1.4
I	3	3.1	115	61	0.55	0.033	1.878	0.035	0.19086	0.00092	1.878	0.036	0.19057	0.00093	2752	66	2747	8	-0.2
I	11	11.1	178	122	0.70	0.043	1.891	0.034	0.19117	0.00075	1.891	0.035	0.19079	0.00076	2736	63	2749	7	0.5
I	9	9.1	126	65	0.53	0.027	1.882	0.107	0.19121	0.00417	1.882	0.107	0.19097	0.00417	2747	193	2751	36	0.1
I	7	7.1	127	55	0.45	-0.010	1.836	0.034	0.19134	0.00086	1.836	0.035	0.19142	0.00087	2803	67	2754	7	-1.7
I	10	10.1	166	85	0.53	0.039	1.927	0.034	0.19187	0.00078	1.928	0.036	0.19152	0.00080	2693	62	2755	7	2.2
I	14	14.1	98	51	0.54	0.037	1.910	0.037	0.19196	0.00098	1.911	0.038	0.19162	0.00100	2714	67	2756	9	1.5
I	14	14.1	98	51	0.54	0.037	1.910	0.037	0.19196	0.00098	1.911	0.038	0.19162	0.00100	2714	67	2756	9	1.5

## References

Stacey, JS and Kramers, JD 1975, Approximation of terrestrial lead isotope evolution by a two-stage model: *Earth and Planetary Science Letters*, v. 26, p. 207–221.

Van Kranendonk, MJ, Ivanic, TJ, Wingate, MTD, Kirkland, CL and Wyche, S in review, Long-lived, autochthonous development of the Archean Murchison Domain, Yilgarn Craton: *Precambrian Research*.

## Recommended reference for this publication

Wingate, MTD, Kirkland, CL and Chen, SF 2012, 185932: metarhyolite, Eelya Hill; *Geochronology Record 1007*: Geological Survey of Western Australia, 4p.

Data obtained: 16 May 2009

Data released: 30 June 2012