

## 242435.1: metamonzogranite, Damperwah Hills

(*Tuckanarra Suite; Youanmi Terrane, Yilgarn Craton*)

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### Location and sampling

PERENJORI SH50-06, ROTHSAY 2239

Warox Site TJIROT190057

Zone 50, MGA 464772E 6753221N

Sampled on 15 May 2019

This sample was collected from an outcrop on the Rothsay Road, about 9.2 km southwest of Damperwah Hills, 1.8 km east of the vermin proof fence, and 1.6 km northeast of the junction between the Rothsay Road and the Warriedar Copper Mine Road.

### Geological context

The unit sampled is a metamonzogranite of the Tuckanarra Suite of the Yilgarn Craton. The Tuckanarra Suite consists of foliated and magmatically layered rocks ranging from granodiorite to monzogranite (Zibra, 2019). Components of this suite lie within, and adjacent to, large-scale shear zones. The maximum age of the Tuckanarra Suite is defined by Van Kranendonk et al. (2013) based on the  $2697 \pm 9$  Ma crystallization age of a fine-grained metatonalite dated by Wang (1998). The minimum age of the suite is defined by the crystallization age of  $2657 \pm 9$  Ma obtained from the youngest phase of the Cundimurra Monzogranite.

### Petrographic description

The sample is an equigranular, fine-grained metamonzogranite, consisting of about 35% K-feldspar, 30–35% plagioclase, 25–30% quartz, 3% biotite, 1% altered magnetite and accessory zircon. K-feldspar occurs as xenoblastic, equant and uncommon tabular grains to 1.5 mm long; the grains are strained and exhibit microcline twinning with a few untwinned grains showing perthitic composition. Plagioclase occurs as mainly equant, and xenoblastic grains to 2 mm in size with many grains being untwinned. Minor myrmekite lobes to 0.2 mm in size occur at some boundaries between K-feldspar and plagioclase. Quartz occurs as mostly equant or irregular xenoblastic grains to 1.5 mm in size and has lobate boundaries with other quartz and feldspar. Some quartz also occurs as inclusions ( $<0.1 - 0.2$  mm in diameter) within feldspar. Biotite forms xenoblastic grains  $<1$  mm in size without alignment. Xenoblastic magnetite to 0.5 mm in diameter has been replaced by hematite. The texture of this sample suggests all the minerals have recrystallized, characterized by low strain and triple point junctions. There is no development of foliation or compositional banding. Metamorphic grade is inferred to be possibly upper amphibolite facies.

### Zircon morphology

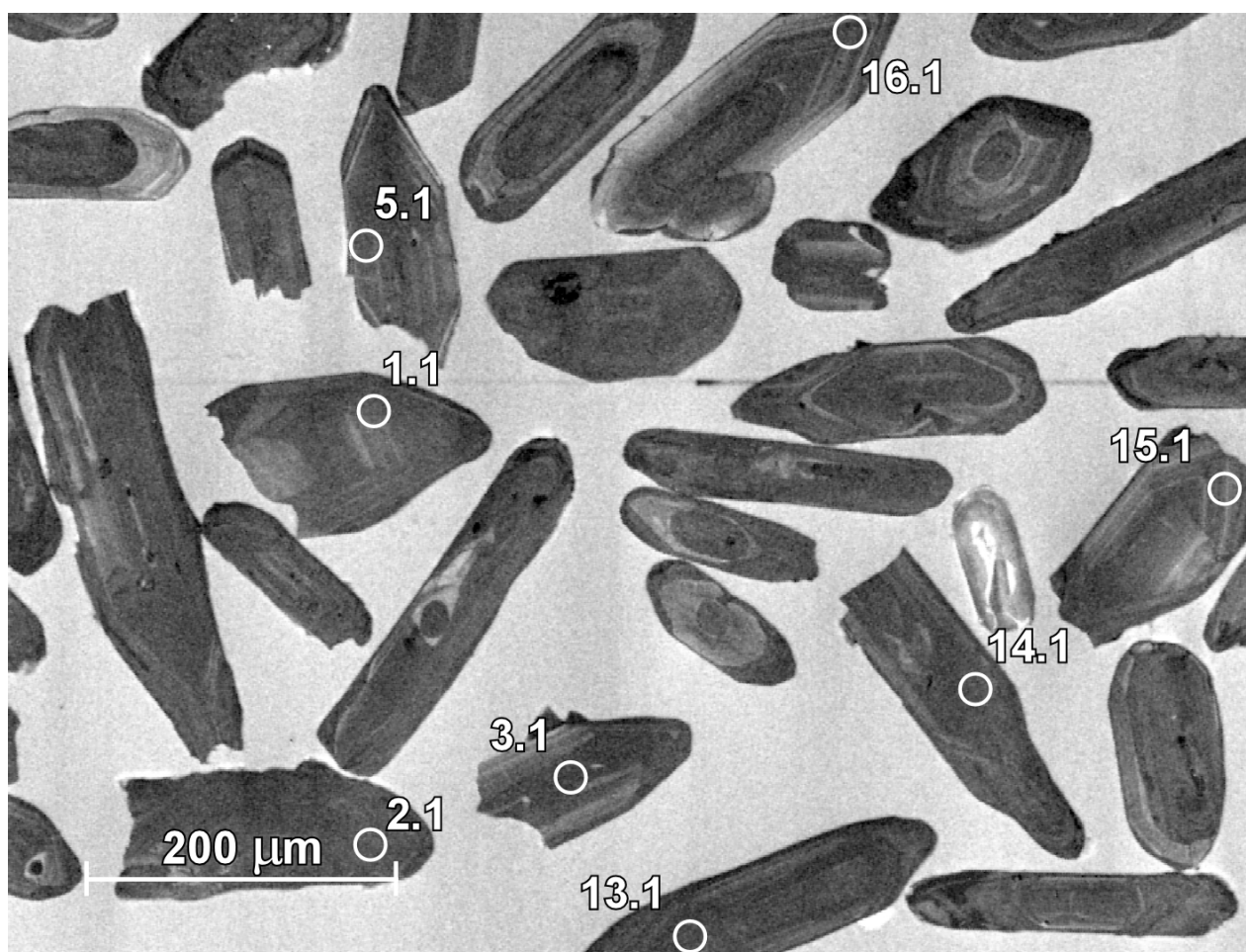
Zircons isolated from this sample are pale brown to dark brown and anhedral to subhedral. The crystals are up to 470  $\mu\text{m}$  long, and mostly elongate, with aspect ratios up to 8:1. In cathodoluminescence (CL) images, concentric zoning is ubiquitous. A CL image of representative zircons is shown in Figure 1.

### Analytical details

This sample was analysed on 15–16 October 2021, using SHRIMP-B. Ten analyses of the M257 standard obtained during the session indicated an external spot-to-spot (reproducibility) uncertainty of 0.50% ( $1\sigma$ ) and a  $^{238}\text{U}/^{206}\text{Pb}^*$  calibration uncertainty of 0.28% ( $1\sigma$ ). Calibration uncertainties are included in the errors of  $^{238}\text{U}/^{206}\text{Pb}^*$  ratios and dates listed in Table 1 (provided in the Links section). Common-Pb corrections were applied to all analyses using contemporaneous isotopic compositions determined according to the model of Stacey and Kramers (1975).

### Results

Sixteen analyses were obtained from 16 zircons. Results are listed in Table 1 and shown in a concordia diagram (Fig. 2).



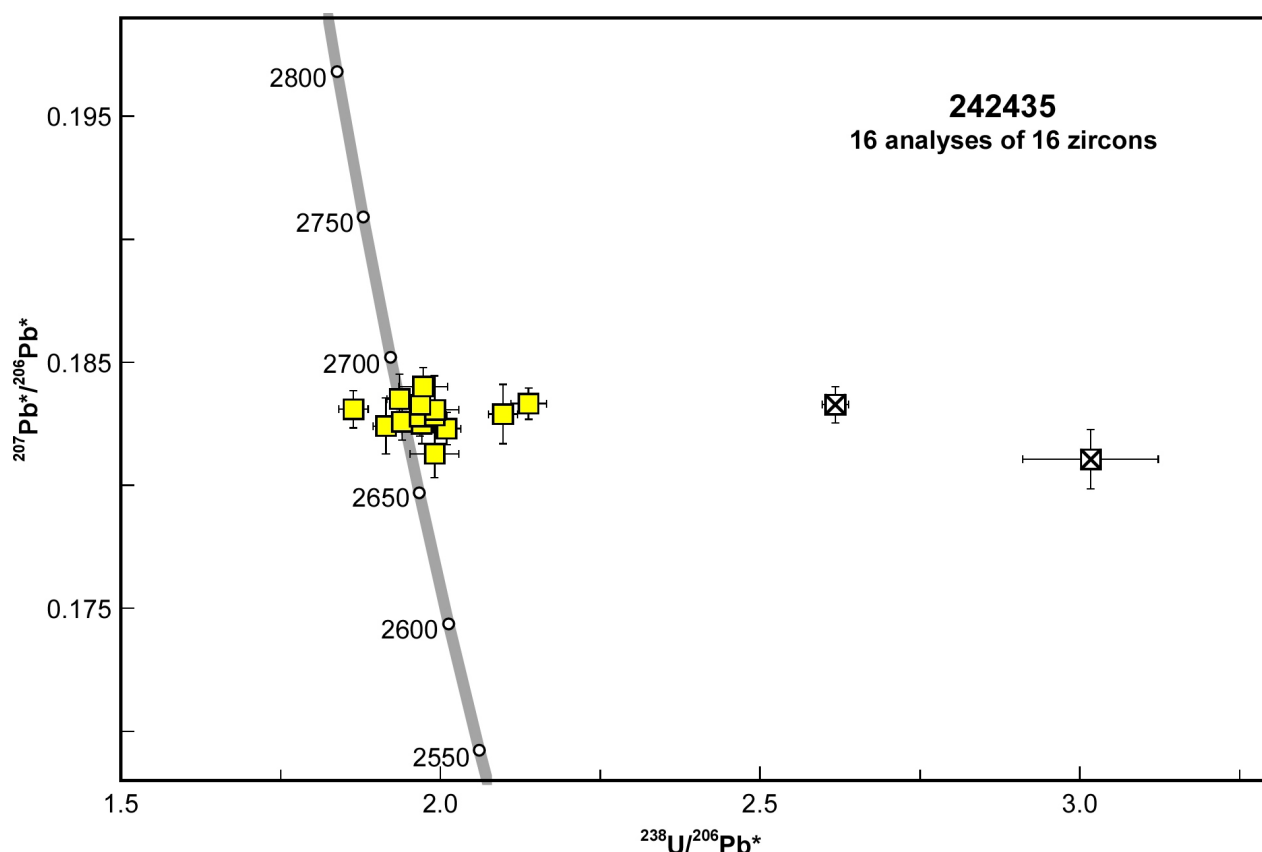
**Figure 1.** Cathodoluminescence image of representative zircons from sample 242435: metamonzogranite, Damperwah Hills. Numbered circles indicate the approximate locations of analysis sites

## Interpretation

The analyses are concordant to strongly discordant (Fig. 2). Two analyses are >8% discordant. The dates obtained from these two analyses (Group D; Table 1) are unreliable and are considered not to be geologically significant. The remaining 14 analyses form a single group, based on their  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  ratios.

Group I comprises 14 analyses (Table 1), which yield a weighted mean  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  date of  $2679 \pm 4$  Ma (MSWD = 0.57).

The date of  $2679 \pm 4$  Ma for the 14 analyses in Group I is interpreted as the igneous crystallization age of the monzogranite.



**Figure 2.** U–Pb analytical data for zircons from sample 242435: metamonzogranite, Damperwah Hills. Yellow squares indicate Group I (magmatic zircons); crossed squares indicate Group D (discordance >8%)

## Links

Table 1. Ion microprobe analytical results for zircons from sample 242435: metamonzogranite, Damperwah Hills:

[242435.1.Table1.xls](#)

SHRIMP spot images: [242435\\_spots.pdf](#)

Introduction to geochronology information: [Intro\\_2023.pdf](#)

## 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 2013, Long-lived, autochthonous development of the Archean Murchison Domain, and implications for Yilgarn Craton tectonics: Precambrian Research, v. 229, p. 49–92.
- Wang, Q 1998, Geochronology of the granite-greenstone terranes in the Murchison and Southern Cross Provinces of the Yilgarn Craton, Western Australia: Australian National University, Canberra, PhD thesis (unpublished), 186p.
- Zibra, I 2019, Tuckanarra Suite (A-TU-mg); Geological Survey of Western Australia; WA Geology Online, Explanatory Notes extract, <[www.dmp.wa.gov.au/ens](http://www.dmp.wa.gov.au/ens)>.

## Recommended reference for this publication

Romano, SS, Lu, Y, Fielding, IOH, Wingate, MTD and Ivanic, TJ 2023, 242435.1: metamonzogranite, Damperwah Hills; Geochronology Record 1917: Geological Survey of Western Australia, WA Geology Online, Explanatory Notes extract viewed 11 October 2023. <[www.dmp.wa.gov.au/geochron](http://www.dmp.wa.gov.au/geochron)>

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Grid references in this publication refer to the Geocentric Datum of Australia 2020 (GDA20). All locations are quoted to at least the nearest 100 m.

Capitalized names in text refer to standard 1:100 000 map sheets, unless otherwise indicated.

WAROX is GSWA's field observation and sample database. WAROX site IDs have the format 'ABCXXXnnnnnnSS', where ABC = geologist username, XXX = project or map code, nnnnnn = 6-digit site number, and SS = optional alphabetic suffix (maximum 2 characters).

Isotope and element analyses are routinely conducted using the GeoHistory laser ablation ICP-MS and Sensitive High-Resolution Ion Microprobe (SHRIMP) facilities at the John de Laeter Centre (JdLC), Curtin University, with the financial support of the Australian Research Council and AuScope National Collaborative Research Infrastructure Strategy (NCRIS), and the Microscopy Australia laser ablation ICP-MS facility at the Centre for Microscopy, Characterisation & Analysis (CMCA), The University of Western Australia (UWA). The TESCAN Integrated Mineral Analyser (TIMA) instrument was funded by a grant from the Australian Research Council (LE140100150) and is operated by the JdLC with the support of the Geological Survey of Western Australia, UWA and Murdoch University. Mineral analyses are routinely obtained using the electron probe microanalyser (EPMA) facilities at the CMCA at UWA, at Adelaide Microscopy at the University of Adelaide and the Central Science Laboratory at the University of Tasmania.

Digital data related to WA Geology Online, including geochronology and digital geology, are available online at the Department's [Data and Software Centre](#) and may be viewed in map context at [GeoVIEW.WA](#). For further information about this Geochronology Record, please contact [geochronology@dmirs.wa.gov.au](mailto:geochronology@dmirs.wa.gov.au) and quote the geochronology record and/or the sample number.

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