

National Argon Map: an AuScope Initiative

⁴⁰Ar/³⁹Ar Geochronology Laboratory Sample Submission Form

This form must be completed and returned to Marnie Forster (Marnie.Forster@anu.edu.au) before any work can be commenced in the Argon Laboratories.

Person submitting samples: Anthony Reid
Affiliation: Senior Principal Geoscientist, Geological Survey of South Australia
Project Title: Dating of mineralisation-related alteration in the Olympic Cu-Au Province, Gawler Craton
Sample Number(s) (including IGSN if one exists): 2131370
Mineral separation required? Yes or No: Y
Date submitted: 20/03/2020

GEOGRAPHIC AREA/ PROVINCE/ BASIN : Gawler Craton	
1:250k SHEET NAME: SH5306 COOBER PEDY	NUMBER:
1:100k SHEET NAME: 5839 Coober Pedy	NUMBER:
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94) GDA2020	
ZONE: 53	
EASTING: 491100.83	NORTHING: 6750371.5
LATITUDE: -29.3758253	LONGITUDE: 134.908299

STRATIGRAPHIC UNIT FORMAL NAME *: Mount Woods Complex
STRATIGRAPHIC UNIT INFORMAL NAME: NA
LITHOLOGY: foliated quartzo-feldspathic gneiss

DRILLHOLE ID (if applicable): KD005
PROSPECT (if applicable):
DEPTH FROM (metres): 130.5
DEPTH TO (metres): 131.9

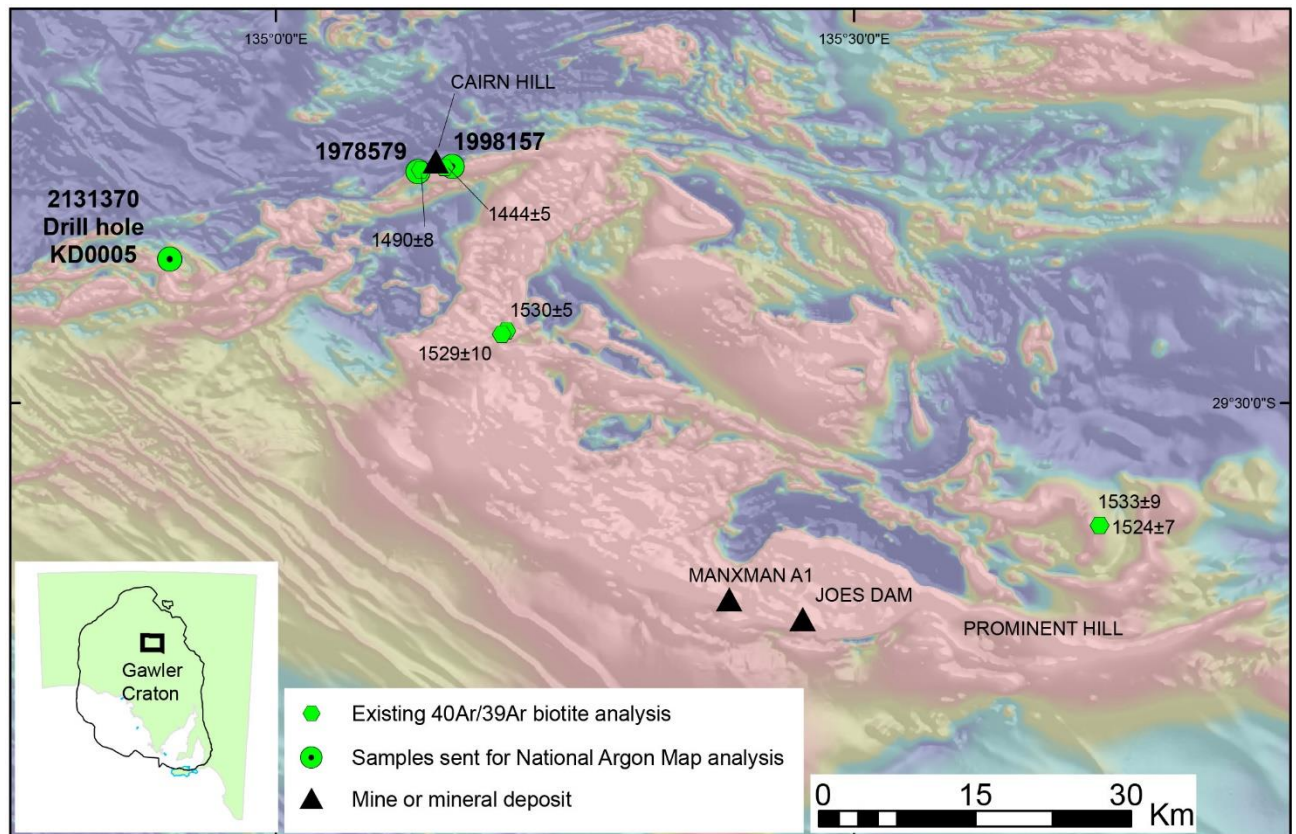
* Stratigraphic Unit names can be searched and checked within the Australian Stratigraphic Units Database via the following link: <https://asud.ga.gov.au/>

Dating Objective

What is the geological question ⁴⁰Ar/³⁹Ar analysis will address?

The sample from drill hole KDD005 is an example of the regional host rock in the vicinity of the Cairn Hill mine and will enable the further characterisation of the cooling history of the region that can be compared with the analysis of hornblende from the Cairn Hill mine also submitted as part of the NAM project.

These new samples compliment two samples of biotite analysed by Fraser et al. (2012) which are in the vicinity of the Cairn Hill mine, and yielded ages of 1490 ± 8 Ma (sample 2007371062, Biotite gneiss CD93 2 175.7–176.0m) and 1444 ± 5 Ma (sample 2007371063, Granitic gneiss, DD86EN33 85.1–85.3m). In addition, there are also four samples of biotite analysed by Forbes et al. (2012) from elsewhere in the Mt Woods region. These ages are older than the biotite dated by Fraser et al. (2012). This suggests that movement along some of the major shear zones in the region, evident in the magnetic intensity image, could be responsible for the younger ages for the biotite in the vicinity of Cairn Hill.



Location map of samples submitted for this National Argon Map application. Note the samples of biotite in the vicinity of Cairn Hill Mine are from Fraser et al. (2012); other samples are those of Forbes et al. (2012).

What type of age(s) are expected? (e.g. magmatic crystallisation, metamorphism, fluid alteration/mineralisation, cooling, shearing etc):

Cooling age

Mineral target(s) for dating:

Biotite, K-feldspar

Estimated $^{40}\text{Ar}/^{39}\text{Ar}$ age (e.g. Cenozoic, Mesozoic, Paleozoic, Proterozoic, Archean – provide estimated numerical age range if possible):

Mesoproterozoic

Sample Information

Location description (e.g. a sample of x was collected from y, z km from abc town):

Biotite gneiss. Foliated medium-grained gneiss.

Lithological characteristics (rock description):

Sample 2131370 is a biotite-bearing granitic gneiss. The sample is from the upper portion of drill hole KDD005, located to the west of Cairn Hill (Garsed et al., 2006). The drill hole intersected dark grey to black, and pink mafic and felsic gneisses in the upper part of the hole, with the lower unit (from about 250m) being dominated by pale grey quartz rich garnet gneiss. From around 230m to 252m is a dark grey to green,

overprinting pyroxene-amphibole alteration. There is only minor sulphide mineralisation present in this hole.

Further samples could be taken from the amphibole alteration in this hole, or from others in the KDD series (Kangaroo Dam) pending results from the current round of analysis.



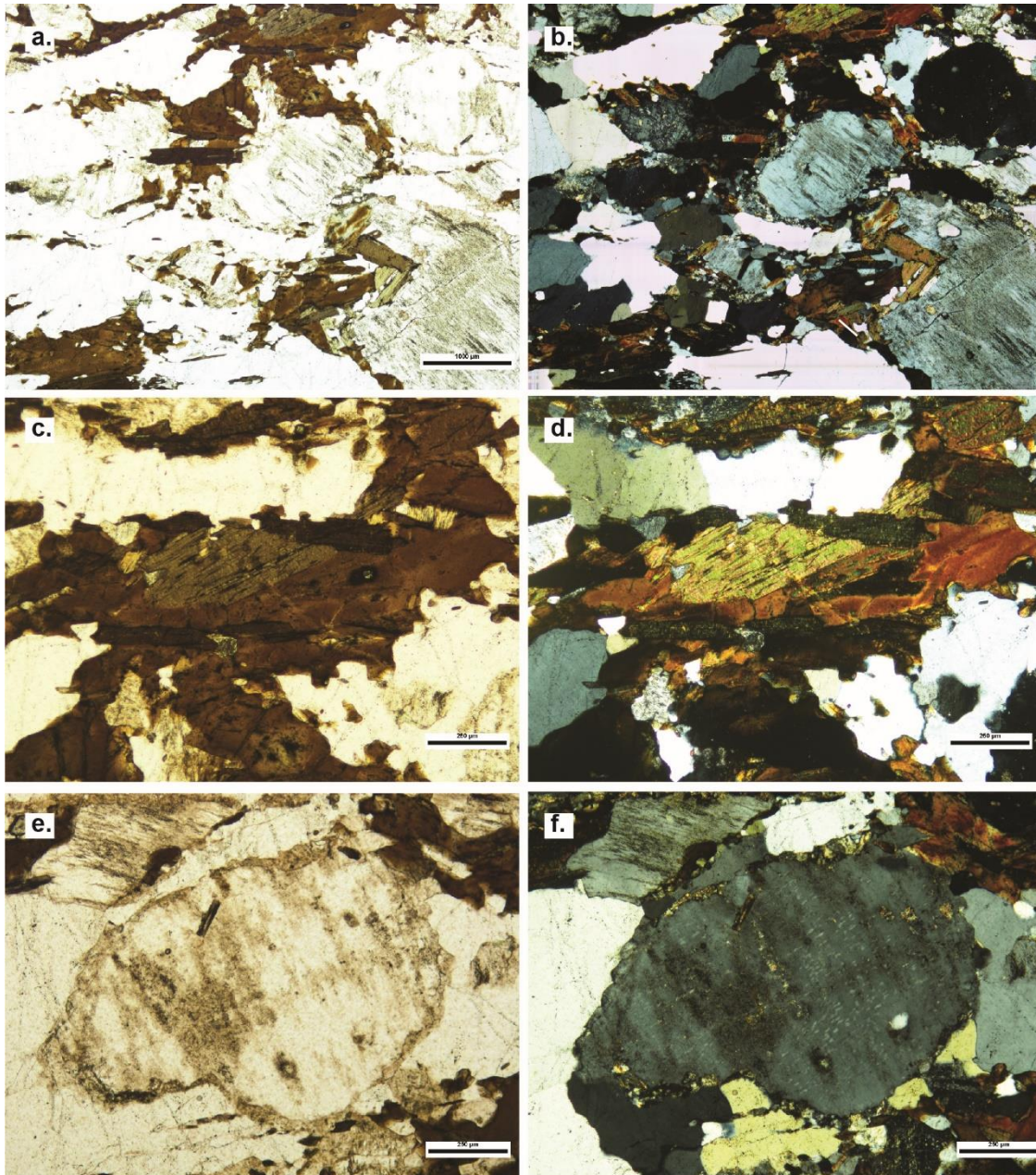
Photograph of sample 2131370.

Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):

This granite protolith has not been dated via U-Pb methods.

Thin section description (if available):

Photograph(s) e.g. field site, hand-specimen, photomicrograph:



Photomicrographs of sample 2131370. Plain polarised light on left. Cross polars on right. **A-B**, general overview of texture of the sample. Foliation defined by biotite alignment and with dynamica recrystallisation of quartz around feldspar grains and aggregates. **C-D**. Detail of biotite. **E-F**. detail of feldspar with minor perthitic exsolution features and weak undulose extinction suggesting the feldspar has been deformed to some degree.

Relevant bibliographic references:

Garsed, I.R.;Manzi, B.;Purvis, A.C. Unlocking South Australia's Mineral and Energy Potential - A Plan for Accelerating Exploration. Theme 2 (drilling partnerships with PIRSA and industry) : Year 2 partnership no. 35, Mount Woods Inlier, Kangaroo Dam platinoid metals mineral prospect. Project final report. *South Australia. Department of Primary Industries and Resources. Open file Envelope 03445.*

[https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/ENV11161.p
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