

National Argon Map: an AuScope Initiative

$^{40}\text{Ar}/^{39}\text{Ar}$ 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: Ian T Graham
Affiliation: UNSW Sydney
Project Title: Age of basaltic intrusions within the Sydney Basin, NSW
Sample Number(s) (including IGSN if one exists): S2323Dol
Mineral separation required? Yes or No: Yes
Date submitted:

GEOGRAPHIC AREA/ PROVINCE/ BASIN : Sydney Basin	
1:250k SHEET NAME: Wollongong	NUMBER: SI/56-9
1:100k SHEET NAME:	NUMBER:
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94)	
ZONE: 56 H	
EASTING: 298637	NORTHING: 6187798
LATITUDE: -34.431702740	LONGITUDE: 150.808560834

STRATIGRAPHIC UNIT FORMAL NAME *: Illawarra Coal Measures
STRATIGRAPHIC UNIT INFORMAL NAME:
LITHOLOGY: Dolerite

DRILLHOLE ID (if applicable): S2323
PROSPECT (if applicable): Dendrobium
DEPTH FROM (metres): 397.38
DEPTH TO (metres):

* 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 $^{40}\text{Ar}/^{39}\text{Ar}$ analysis will address?

The magmatic age of crystallisation of dolerite sill and how this compares to a cross-cutting basaltic dyke (sample S2323Bas) and other dated dyke/sills within the Sydney Basin.

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

Magmatic crystallisation

Mineral target(s) for dating:

Plagioclase separates if possible.

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

Curtin University of Technology recently dated similar dolerite sills from this region giving ages of ~ 200 Ma.

Sample Information

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

This dolerite was sampled from an exploratory drillcore close to the Dendrobium mine, west of Wollongong.

Lithological characteristics (rock description):

A massive and relatively unaltered micro-dolerite

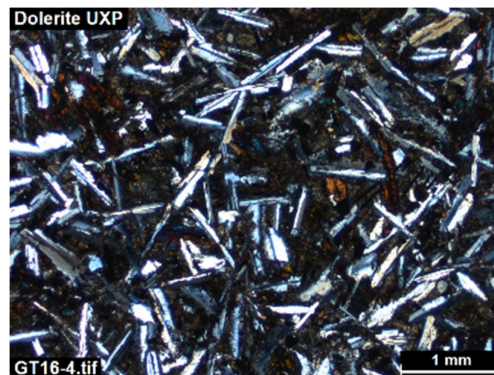
Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):

This sill intrudes the Illawarra Coal Measures (Late Permian) but is itself intruded by a later basaltic dyke.

Thin section description (if available):

In thin-section, this is an ophitic textured olivine micro-dolerite.

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



Relevant bibliographic references:

Johnson, R.W., Knutson, J., and Taylor, S.R. (eds) (1989). *Intraplate volcanism in eastern Australia and New Zealand*. Cambridge University press.

Och, D.J., Offler, R., Zwingmann, H., Braybrooke, J. and Graham, I.T., 2009. Timing of brittle faulting and thermal events, Sydney region: association with the early stages of extension of East Gondwana. *Australian Journal of Earth Sciences*, 56(7), pp. 873-887.

Offler, R., Zwingmann, H., Foden, J., Sutherland, F.L., and Graham, I.T., 2019. Age and composition of dykes emplaced before and during the opening of the Tasman Sea – source implications. *Australian Journal of Earth Sciences* 66 (8): 1129-1144.

Rickwood, P. C. (1985). Igneous intrusives in the Greater Sydney Region. In P. J. N. Pells (Ed.), *Engineering geology of the Sydney Basin* (pp. 215–307). Rotterdam, Netherlands: Balkema

Wellman, P., and McDougall, I., 1974a. Cainozoic igneous activity in eastern Australia. *Tectonophysics* 23: 49-65.

Wellman, P., and McDougall, I., 1974b. Potassium-argon ages on the Cainozoic volcanic rocks of New South Wales. *Journal of the Geological Society of Australia*, 21: 247-272.