

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): GSD
Mineral separation required? Yes or No: Yes
Date submitted:

GEOGRAPHIC AREA/ PROVINCE/ BASIN : Sydney Basin	
1:250k SHEET NAME: Sydney	NUMBER: SI/56-5
1:100k SHEET NAME:	NUMBER:
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94)	
ZONE: 56 H	
EASTING: 331691	NORTHING: 6251062
LATITUDE:	LONGITUDE: 151.180385573

STRATIGRAPHIC UNIT FORMAL NAME *: This basaltic dyke intrudes the Hawkesbury Sandstone
STRATIGRAPHIC UNIT INFORMAL NAME: Great Sydney Dyke
LITHOLOGY: Basalt

DRILLHOLE ID (if applicable):
PROSPECT (if applicable):
DEPTH FROM (metres):
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 the dyke and to check how it compares to a previously obtained K-Ar age. On a broader scale, how this age related to other dated dykes/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 separate if possible, if not then wholerock.

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

Previous K-Ar dating of plagioclase extracted from this dyke gave an age of 163.02 Ma

Sample Information

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

Sample was collected from an outcrop at White Bay, Glebe Island, Sydney.

Lithological characteristics (rock description):

A relatively fresh olivine micro-phenocrystic basalt (sample described in Offler et al., 2019).

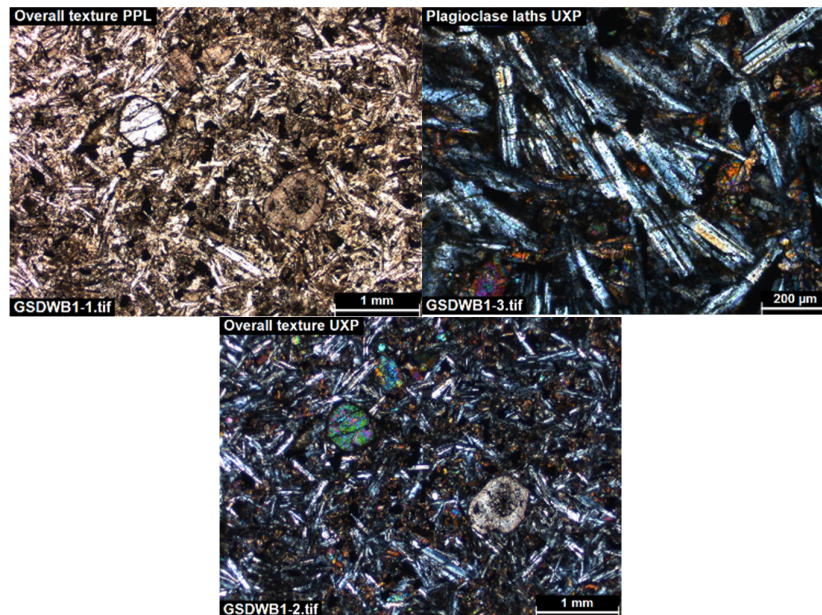
Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):

The dyke intrudes the Hawkesbury Sandstone.

Thin section description (if available):

In thin-section, this is a subporphyritic olivine micro-phenocrystic basalt.

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.