

# 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](mailto:Marnie.Forster@anu.edu.au)) before any work can be commenced in the Argon Laboratories.

<b>Person submitting samples:</b> Ian T Graham
<b>Affiliation:</b> UNSW Sydney
<b>Project Title:</b> Age of basaltic intrusions within the Sydney Basin, NSW
<b>Sample Number(s) (including IGSN if one exists):</b> S2323Bas
<b>Mineral separation required? Yes or No: Yes, if possible</b>
<b>Date submitted:</b>

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

<b>STRATIGRAPHIC UNIT FORMAL NAME *:</b> Illawarra Coal Measures
<b>STRATIGRAPHIC UNIT INFORMAL NAME:</b>
<b>LITHOLOGY:</b> Basalt

<b>DRILLHOLE ID (if applicable):</b> S2323
<b>PROSPECT (if applicable):</b> Dendrobium
<b>DEPTH FROM (metres):</b> 397.38
<b>DEPTH TO (metres):</b> 397.58

\* 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 and how this compares to the Ar-Ar age of the host dolerite (S2323Dol sample in this study). In addition, how does this age compare 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.

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

The host dolerite intrudes the Permian Illawarra Coal Measures and similar dolerite sills in this region have recently been dated at ~ 200 Ma at Curtin University of Technology.

## Sample Information

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

The drillcore samples a basaltic dyke which intrudes a dolerite sill which itself intrudes the Illawarra Coal Measures. From an exploratory drillhole near the Dendrobium mine, west of Wollongong.

*Lithological characteristics (rock description):*

A fresh and glassy strongly porphyritic plagioclase-olivine phyric basalt.

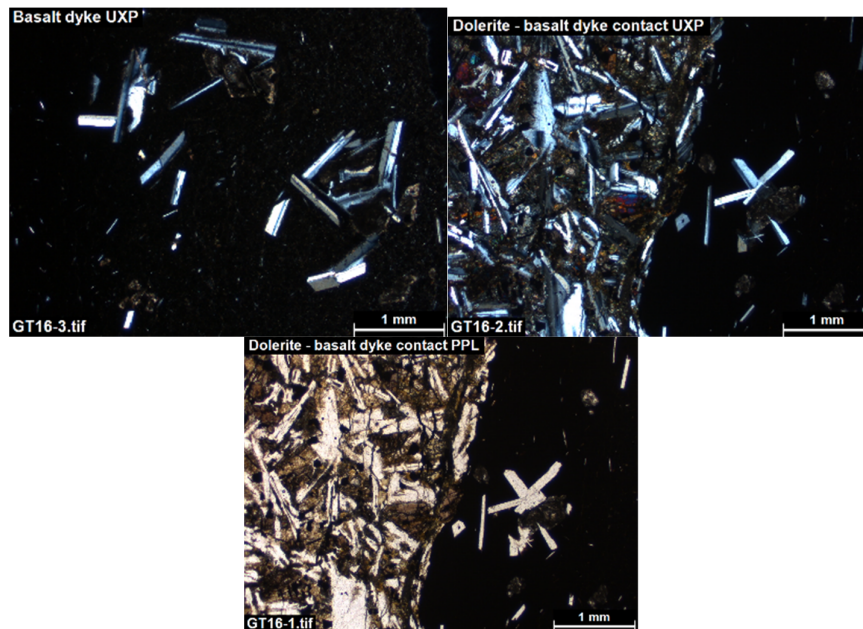
*Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):*

Dyke intrudes a dolerite sill which itself intrudes the Illawarra Coal Measures (Late Permian)

*Thin section description (if available):*

A strongly porphyritic Plag-Cpx-Ol phenocrystic basalt with a very fine-grained aphanitic groundmass.

*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.**