

National Argon Map: an AuScope initiative

Data Acquisition Project Proposal

This form should be completed and returned to Geoff Fraser (Geoff.Fraser@ga.gov.au) for consideration by the National Argon Map Oversight Panel

Project Proponent

Name: <i>Eleanor Nebel</i>
Affiliation and position: <i>School of Earth Sciences, Univ. of Melbourne, PhD student</i>
Collaborators: <i>Dr Roland Maas (UMelb), Sr. Ashleigh Hood (UMelb), Dr Hilke Dalstra (Rio Tinto, Perth)</i>
Project Title: <i>Neoproterozoic granites near Winu Cu-Au deposit</i>
Geographic Region: <i>northern Western Australia</i>
Geological Province or Tectonic Unit: <i>Neoproterozoic Yeneena Basin, Paterson Province</i>

How will these samples benefit the National Argon Map?

Provide a succinct answer to this question, see the suggestions in the Guidelines and Criteria on the next page.

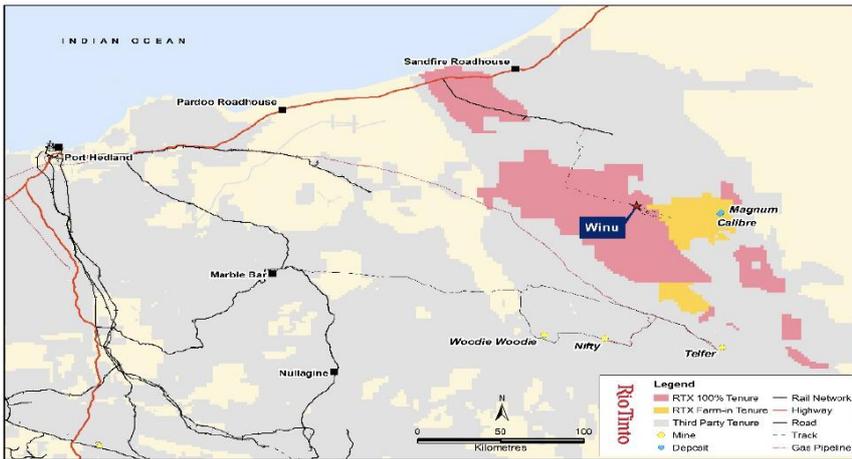
Neoproterozoic granites in the NW Paterson Province, known near Telfer and also below Winu, represent a major magmatic flare-up potentially related to world-class mineralization. ArAr dating of granitic mica in abundant drillcore from Winu will help establish a detailed chronology of granitic magmatism in this poorly exposed terrane

Brief Project Description:

Approximately 500 word maximum. Include what geological process/problem will be addressed, and how new $^{40}\text{Ar}/^{39}\text{Ar}$ data from the specific samples to be dated will contribute. Please include reference to pre-existing geochronological constraints, if any exist. Please include a simple location map which showing the spatial distribution of samples in their geological context (with scale).

Granitic rocks recovered during drilling at Winu*, a large vein-hosted Cu (+Au) deposit in folded Neoproterozoic metasediments located ca. 100 km NW of the Telfer Cu-Au mine (see map), provides a large and varied set of fresh samples of regional Neoproterozoic felsic magmatism. The granites are most likely related to regional Neoproterozoic suites of differentiated I-type granites (Czarnota et al., 2009, GA Record 2009/16) although results from Winu indicate S-type compositions appear to be present also. Preliminary results suggest ages similar to those reported for granites near Telfer (660-640 Ma, e.g. Maidment, 2010 GA Prof Opinion 2010/05; Schindler et al., 2016 Econ Geol 111). The ArAr dating proposed here will provide high-precision cooling ages (expected to approximate emplacement) which will be used to establish the detailed chronology of this magmatism and its relationship to mineralisation at Winu, Telfer and other mineralisations in the Yeneena Basin.

* <https://www.riotinto.com/en/news/releases/2020/Rio-Tinto-reveals-maiden-Resource-at-Winu-and-new-discovery>



Location map for Winu prospect, Yeneena Basin, NW Paterson Province, WA (source: see website given above)

Approximate number of samples proposed for $^{40}\text{Ar}/^{39}\text{Ar}$ analyses:

10

Lithologies and minerals proposed for $^{40}\text{Ar}/^{39}\text{Ar}$ analyses:

Biotite \pm hornblende from several examples of unexposed Neoproterozoic granite drilled at Winu

Do you have a preferred ^{40}Ar - ^{39}Ar laboratory? (ANU, Curtin, UQ, UMelb):

If so, why you prefer this laboratory (e.g. student affiliation, ongoing relationship, sample type etc):

UMelb

E Nebel is a UniMelb PhD student; R Maas and A Hood, EN's university-based PhD supervisors, are both at UMelb. The leader of the UMelb lab, David Phillips, had a look at this proposal and confirmed our samples could be included in their next irradiation run and measured before the mid-2021 time limit for the NAM.

Roland Maas, UMelb, 18 Nov 2020

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Guidelines and Criteria

Project Proposals for funding support as part of the AuScope National Argon Map initiative will be assessed on the following criteria.

Australian: Samples must come from Australia (this may include Australian offshore regions)

Non-confidential: $^{40}\text{Ar}/^{39}\text{Ar}$ data must be made publicly-available (ie non-confidential)

Impact: to what extent new $^{40}\text{Ar}/^{39}\text{Ar}$ data from the proposed samples will contribute to geographic data coverage, or address key geological questions

Feasibility: whether the nature of the work is tractable via $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology and the scale of the proposal is realistic within the time frame of the National Argon Map initiative (January 2020 – June 2021)?

Appropriate sample material: whether the proposed samples are (i) appropriate for $^{40}\text{Ar}/^{39}\text{Ar}$ analyses, and (ii) available within the time-frames of the National Argon Map initiative?

Oversight Panel

Dr Geoff Fraser, Geoscience Australia

Professor Zheng-Xiang Li,

Dr Anthony Reid, Geological Survey of South Australia

Peter Rea, MIM/Glencore

Dr Catherine Spaggiari, Geological Survey of Western Australia

Dr David Giles, MinEx CRC

Dr Marnie Forster (observer role as Project Coordinator)

Expectations

AuScope funding will cover the costs of sample irradiation and isotopic analyses.

Project Proponents will be responsible for:

- Provision of appropriate sample material. This includes mineral separation, which can be arranged at the relevant $^{40}\text{Ar}/^{39}\text{Ar}$ laboratories (in many cases this is preferred), but costs of mineral separation will be borne by the project proponent. The relevant laboratory reserves the right not to analyse material if it is deemed unsuitable for $^{40}\text{Ar}/^{39}\text{Ar}$ analysis.
- Provision of appropriate sample information. A sample submission template will be provided. Information in these sample submission sheets will form the basis of data delivery/publication, and the oversight committee or relevant laboratory reserves the right not to proceed with analyses unless and until appropriate sample details are provided. This includes description and geological context for each sample.
- Leading the preparation of reports and/or publications to deliver $^{40}\text{Ar}/^{39}\text{Ar}$ results into the public domain within the duration of the National Argon Map initiative (January 2020 – June 2021).
- Project Proponents will be expected to communicate directly with the relevant $^{40}\text{Ar}/^{39}\text{Ar}$ laboratory once a project has been accepted by the Oversight Committee, in order to clarify project expectations, arrange sample delivery, discuss results, collaborate on reporting and data delivery etc.

Participating Ar Laboratories will be responsible for:

- Providing advice to project proponents regarding suitable sample material and feasibility of proposed work
- Irradiation of sample material
- $^{40}\text{Ar}/^{39}\text{Ar}$ isotopic analyses
- Delivery of data tables, and analytical metadata to project proponents

Queries regarding possible projects as part of the National Argon Map initiative can be directed to Marnie Forster (Marnie.Forster@anu.edu.au) or Geoff Fraser (Geoff.Fraser@ga.gov.au)