

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: Dave Kelsey
Affiliation: The Geological Survey of Western Australia
Project Title:
Sample Number(s) (including IGSN if one exists): 109759
Mineral separation required? Yes or No: Yes
Date submitted: 17 th May 2021

GEOGRAPHIC AREA/ PROVINCE/ BASIN : Paterson Orogen	
1:250k SHEET NAME: Nullagine	NUMBER: SF51-05
1:100k SHEET NAME: Braeside	NUMBER: 3155
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94) GPS GDA94	
ZONE: 51	
EASTING: 311599	NORTHING: 7657801
LATITUDE: -21.17144	LONGITUDE: 121.18536

STRATIGRAPHIC UNIT FORMAL NAME *: Gregory Range Suite, A-GR-mg
STRATIGRAPHIC UNIT INFORMAL NAME:
LITHOLOGY: Hornblende-bearing granitic gneiss

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?

What is the cooling/exhumation age from this sample? We are seeking to address whether the cooling age is related to the initiation or inversion of the Neoproterozoic Yeneena Basin, as the Gregory Range has many NNW-trending faults that are likely to be basin-bounding faults active at the time of Yeneena Basin initiation and/or inversion.

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

Cooling/exhumation.

Mineral target(s) for dating:

K-feldspar and possibly hornblende, if hornblende allows.

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

Mid- to Late-Neoproterozoic, possibly between 850 and 650 Ma, constrained by the likely c. 830 Ma age of metagabbros and c. 650 Ma age of granitic intrusions in the Paterson Orogen area.

Sample Information

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

WAROX database (field observations) site GSD109759, about 330 km southeast of Port Hedland in Western Australia.

Lithological characteristics (rock description): Fresh, pink, leucocratic granitic gneiss consisting of quartz, plagioclase, K-feldspar and low abundance of biotite and hornblende. Hornblende and biotite occur in aggregates and define the gneissic foliation. Very similar to previously proposed sample 232630, in which case it is a medium-grained quartz syenite of the Gregory Range suite.

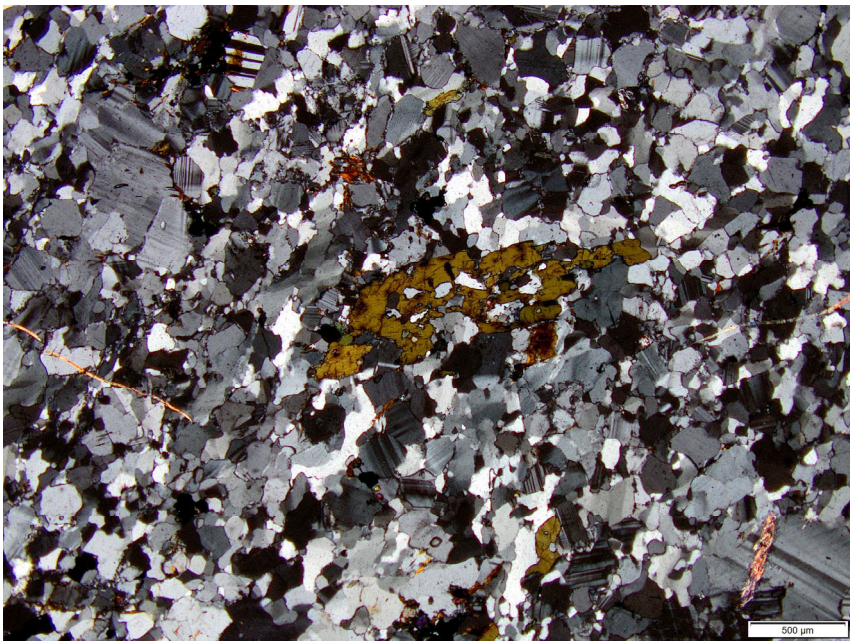
Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):

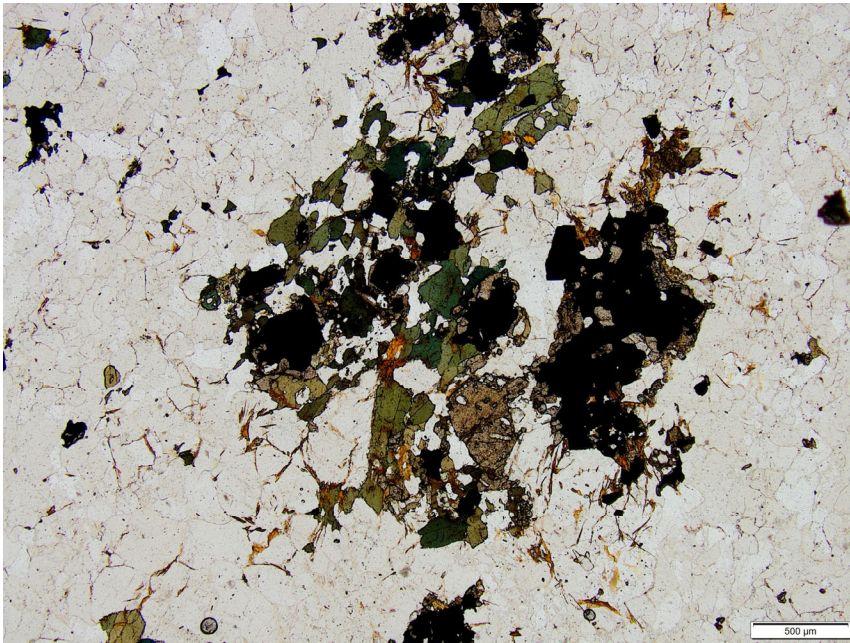
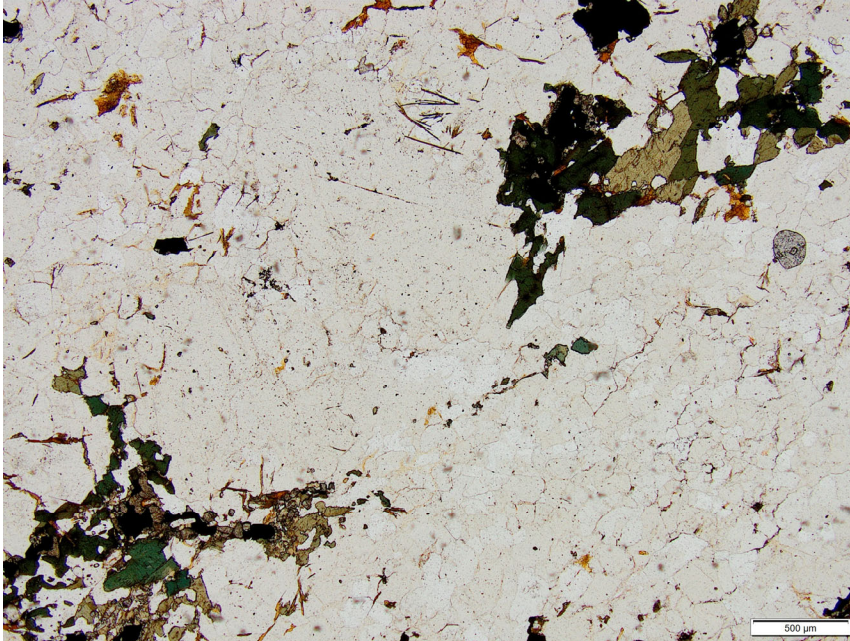
Magmatic or extrusive age is 2763—2757 Ma. Cooling/exhumation age is expected to be Neoproterozoic, corresponding to the Miles (c. 810 – 650 Ma) or Paterson (c. 550 Ma) Orogenies.

Thin section description (if available):

The rock is dominated by fine to medium-grained, inequigranular–interlobate feldspar and quartz. Twinned plagioclase is common but the pink colour of the rock suggests K-feldspar is also abundant. Hornblende occurs as rare poikiloblasts or more commonly as aggregates of small grains that are particularly concentrated where ilmenite and titanite occur. Titanite commonly occurs as coronae or partial coronae on ilmenite; however, discrete, part-euhedral grains of titanite also occur. Individual grains or grain aggregates of hornblende, titanite and ilmenite define the gneissic fabric, which at thin section scale is weak to moderate and at hand-sample scale is moderate. Feldspar is fresh and occurs as inclusion in some of the larger poikiloblastic hornblende grains. Biotite is rare and is much finer-grained than hornblende, typically defining sheafs of acicular to somewhat radiating grains.

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





Relevant bibliographic references:

Williams, IR and Trendall, AF 1996, Braeside, WA Sheet 3155: Geological Survey of Western Australia, 1:100 000 Geological Series.

Williams, IR and Hickman, AH 2007, Nullagine, WA Sheet SF 51-16 (3rd edition): Geological Survey of Western Australia, 1:250 000 Geological Series.