Sample 5 of 20: 100594

Person submitting samples: Dave Kelsey
Affiliation: Geological Survey of Western Australia
Project Title: Tectonism and Exhumation of the Paterson Orogen and East Pilbara Craton margin
Sample Number(s) (including IGSN if one exists): 100594
Mineral separation required? Yes or No: yes
Date submitted:

GEOGRAPHIC AREA/ PROVINCE/ BASIN : Gregory Range (Pilbara Craton)	
1:250k SHEET NAME: Nullagine	**NUMBER:** SF51-05
1:100k SHEET NAME: Pearana	**NUMBER:** 3154
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94) GDA94	
ZONE: 51	
EASTING: *333499.25*	**NORTHING:** *7593100.10*
LATITUDE: *-21.75792000*	**LONGITUDE:** *121.38982000*

STRATIGRAPHIC UNIT FORMAL NAME *: Gregory Range Suite
STRATIGRAPHIC UNIT INFORMAL NAME:
LITHOLOGY: hornblende–biotite syenogranite

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 $^{40}Ar/^{39}Ar$ analysis will address?
What is the cooling/exhumation age from this sample?

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:
Hornblende

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

Sample Information

Location description (e.g. a sample of x was collected from y, z km from abc town):
WAROX database (field observations) site *GSD100594*.

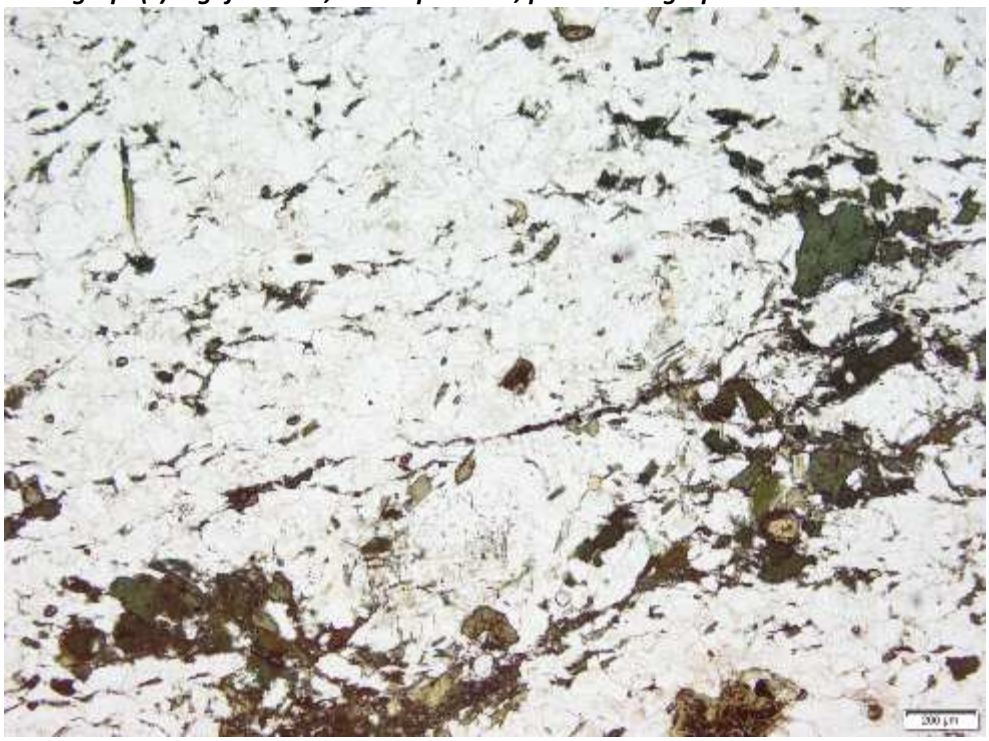
Lithological characteristics (rock description):
Protomylonitic hornblende–biotite syenogranite. Titanite and ilmenite bearing. Coronas of each mineral on each other. Some hornblende is coarse-grained and anhedrally-shaped but most is tiny and poorly shaped. The gneissic fabric is defined by oriented aggregates of hornblende.

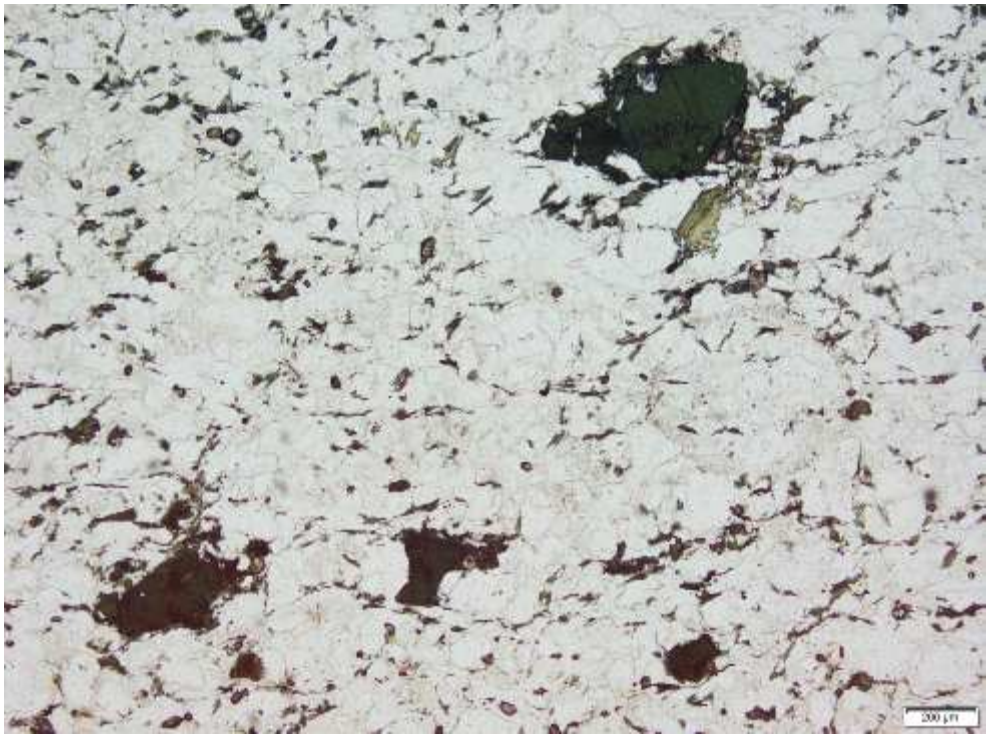
Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):
Magmatic or extrusive age is 2763—2757 Ma. Cooling/exhumation age is expected to be Neoproterozoic, corresponding to the Miles (c. 810 – 650 Ma) or Paterson (c. 550 Ma) Orogenies.

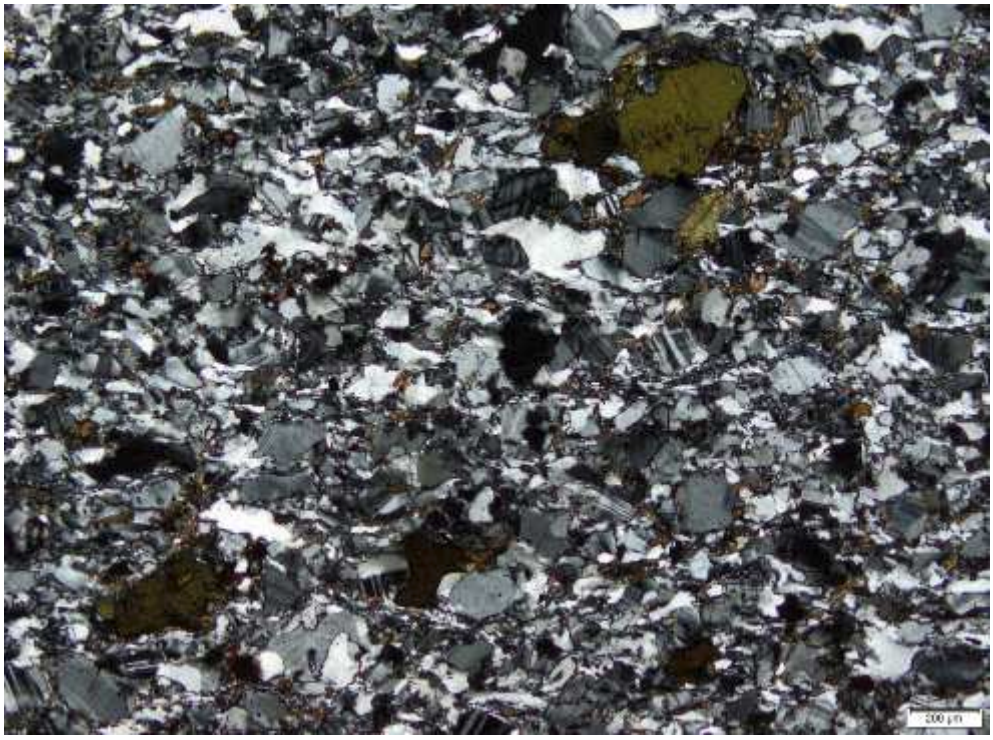
Thin section description (if available):

The rock is overall fine-grained and consists of plagioclase, microcline K-feldspar, quartz, hornblende, ilmenite, titanite and rarer biotite. Hornblende occurs dispersed throughout the sample and is mostly very fine-grained and single grains. However, coarser-grained hornblende porphyroclasts and aggregates occur and these would be the target grains for Ar–Ar work. These hornblende aggregates are overall elongate to define fabric, but individual grains in the aggregates are anhedrally shaped. Porphyroclasts of plagioclase ~3–6 mm diameter are rare. Whereas the rock is overall fine-grained, there are thin foliae of even finer-grained, recrystallised (grain size reduced) quartz and feldspar and hornblende anastomosing pervasively through the sample. In PPL photos hornblende helps to define these foliae. The rock grain shape texture is seriate–interlobate.

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.