

Sample 3 of 20: 114074

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): 114074
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: Braeside	NUMBER: 3155
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94) GDA94	
ZONE: 51	
EASTING: 320100	NORTHING: 7658500
LATITUDE: -21.16598000	LONGITUDE: 121.26728000

STRATIGRAPHIC UNIT FORMAL NAME *: Fortescue Group, Hardey Formation
STRATIGRAPHIC UNIT INFORMAL NAME:
LITHOLOGY: muscovite-bearing quartzite

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:

Muscovite

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

Sample Information

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

WAROX database (field observations) site IRW114074. Warroo Hill Trig point.

Lithological characteristics (rock description):

Proto-mylonitic/high-strain shear fabric defined by muscovite and recrystallised quartz.

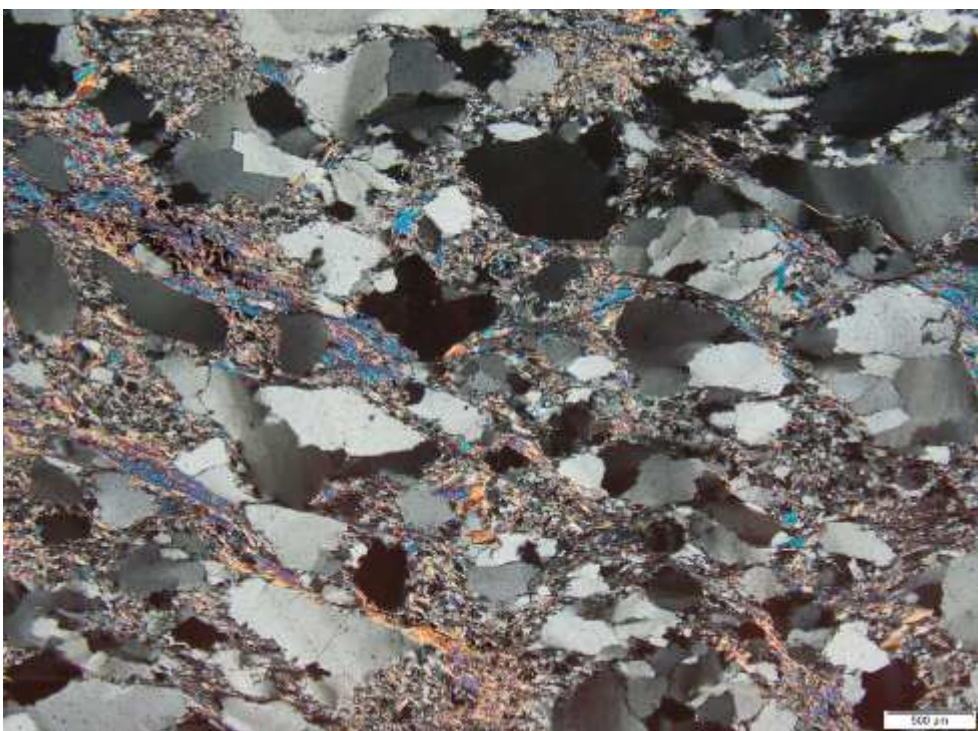
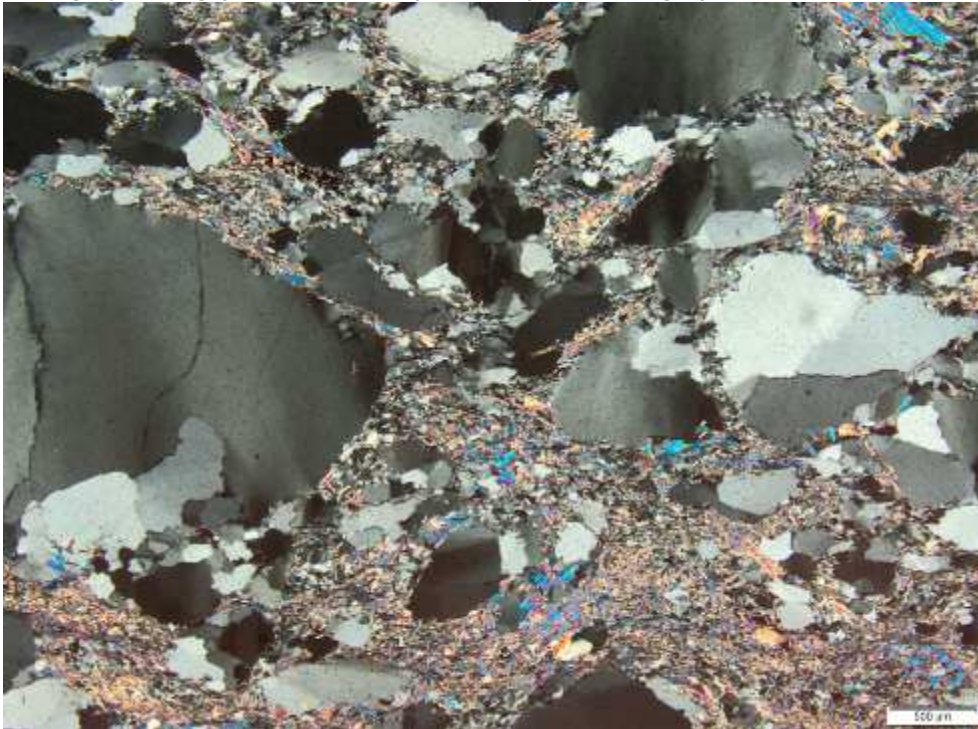
Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):

Hardey Formation has age constraints of 27636—2749 Ma (magmatic ages for felsic volcanic rocks). 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 sample is characterised by muscovite and quartz. Quartz occurs as strongly deformed (elongate) porphyroclasts that feature well-developed internal subgrains. These porphyroclasts are wrapped by a much finer-grained assemblage of muscovite (usually aggregates/foliae) and recrystallised quartz. The finer-grained muscovite and quartz define a strong but anastomosing fabric (sinistral shear with respect to cut of thin section). Rare sub-rounded 'porphyroclastic aggregates' of fine-grained and more altered ?feldspar occur. Quartz has a serrate-interlobate texture and shows evidence of dynamic recrystallization.

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.