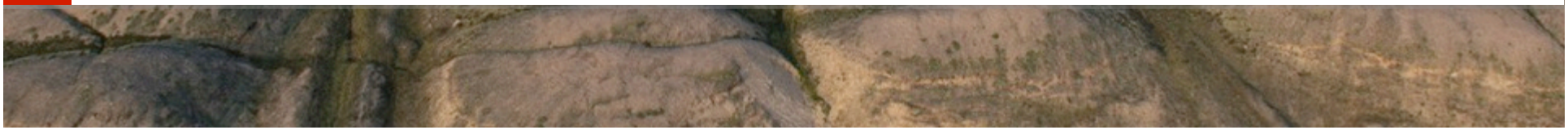
Baffinland

Western Science

Ongoing Research, Mary River Area, Nunavut

2015 Nunavut Mining Symposium

Hey, J., Duke, N., Moser, D., Samiei, A.



Cockburn River – Rowley River Direct Shipping Iron Ore Prospects

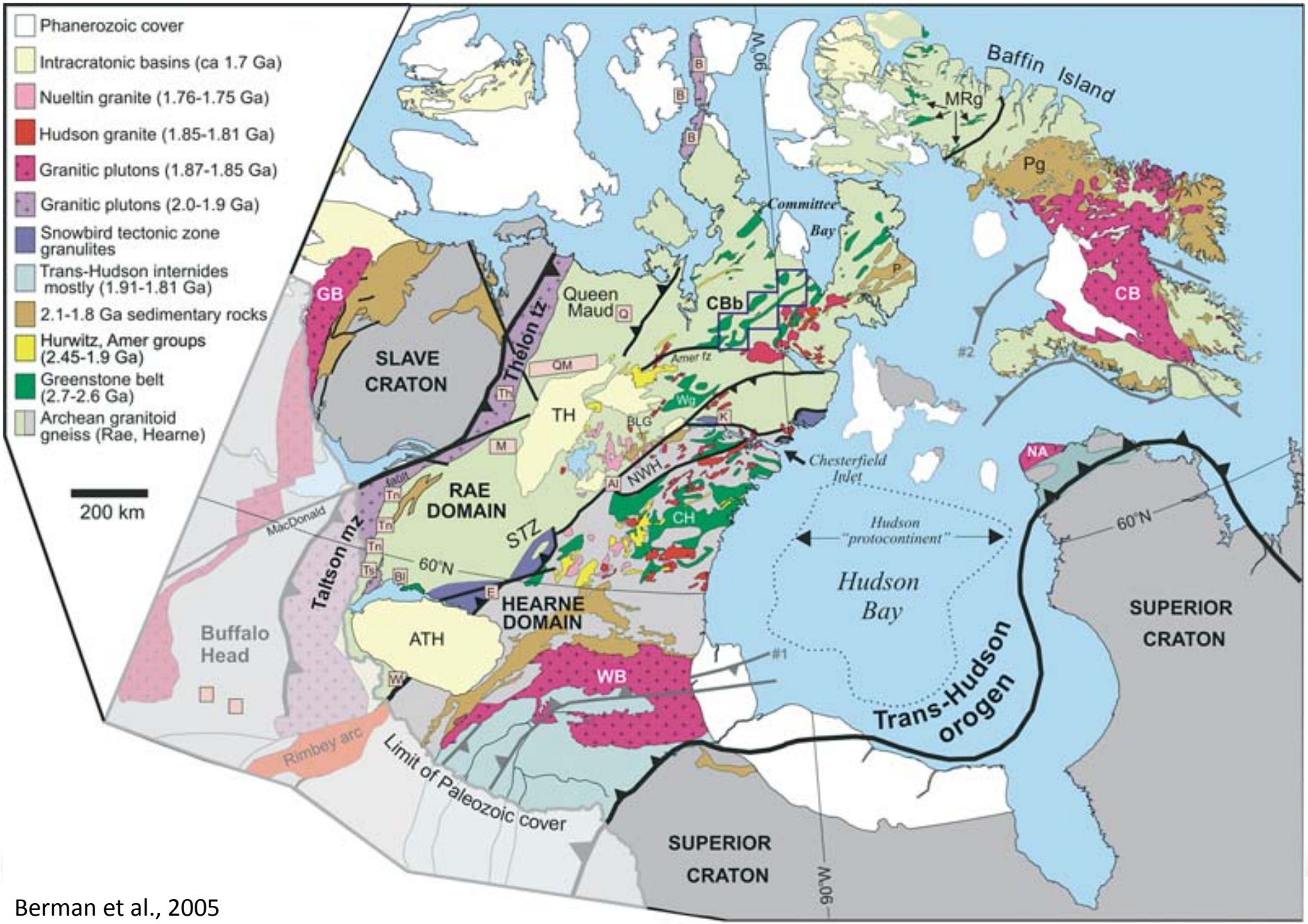
- Location and regional geology
- Prospect geology
  - Structure
  - Stratigraphy
- Geochemistry
- Ongoing and Future Work


Location
& Regional Geology


ARCTIC BAY
NANISIVIK MINE
POND INLET
MILNE PORT
MINE SITE
STEENSBY PORT
BAFFIN BAY
CLYDE RIVER
AGU BAY
STEENSBY INLET
SIORARSUK PENINSULA
TALOYOAK
GJOA HAVEN
IGLOOLIK
ROWLEY ISLAND
BAFFIN ISLAND
KUGAARUK
GARRY BAY
HALL BEACH
PILING BAY
QIKIQTARJUAQ
PRINCE CHARLES ISLAND
CAPE JERMAIN
MELVILLE PENINSULA
FOXE BASIN
PANGNIRTUNG
REPULSE BAY
BAKER LAKE
SOUTH HAMPTON ISLAND
CAPE DORSET
IQALUIT
CORAL HARBOUR
CHESTERFIELD INLET
RANKIN INLET
KIMMIRUT
LABRADOR SEA
WHALE COVE
HUDSON BAY
HUDSON STRAIT
ARVIAT

Regional Geotectonic Setting

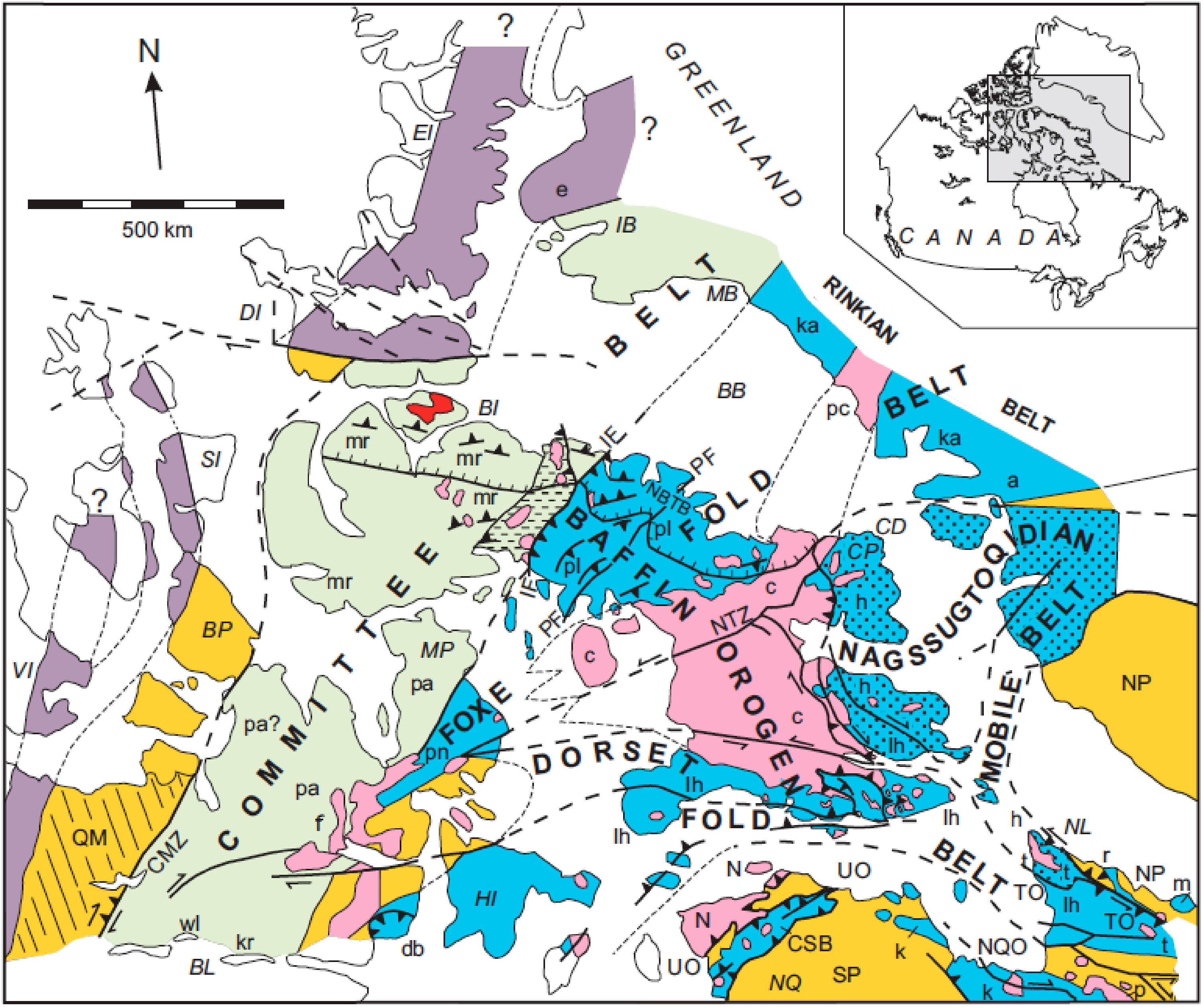
- Northwestern Churchill Province
  - Noearchean Hearne craton
  - Mesoarchean Rae craton
    - Bound to the north by Paleoproterozoic Thelon Tectonic Zone and Archean Queen Maud Block
    - Bound to the south by Paleoproterozoic Baffin Orogen



Berman et al., 2005

Regional Geotectonic Setting

- Baffin orogen represents northeastern portion of the Transhudson orogeny
  - Sutured the Superior Province with the Churchill Province
- Deepest crustal exposure → Dexterity Granulite Belt
  - Bounds the Foxe fold and thrust belt
  - Immediately footwall to the Isortoq Fault Zone



Jackson and Berman, 2000

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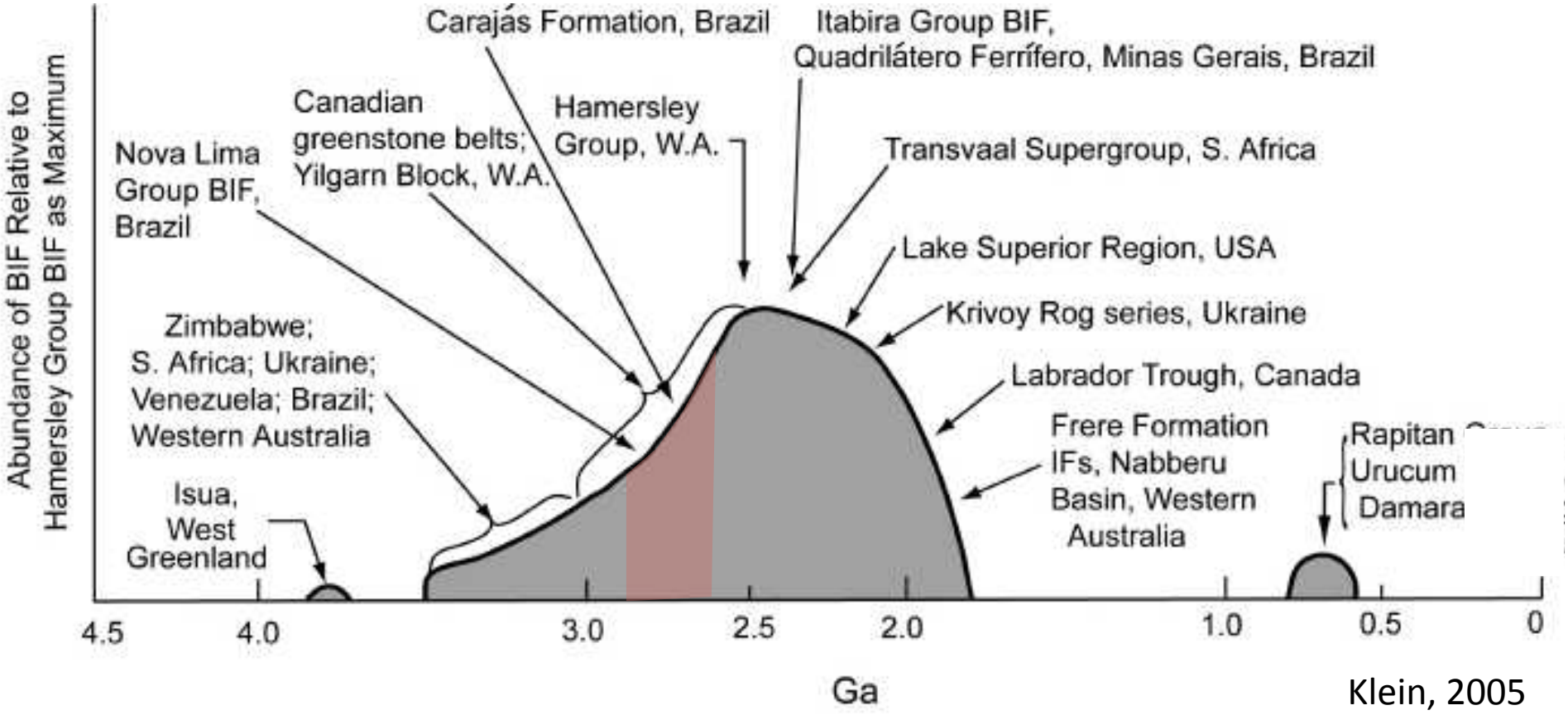
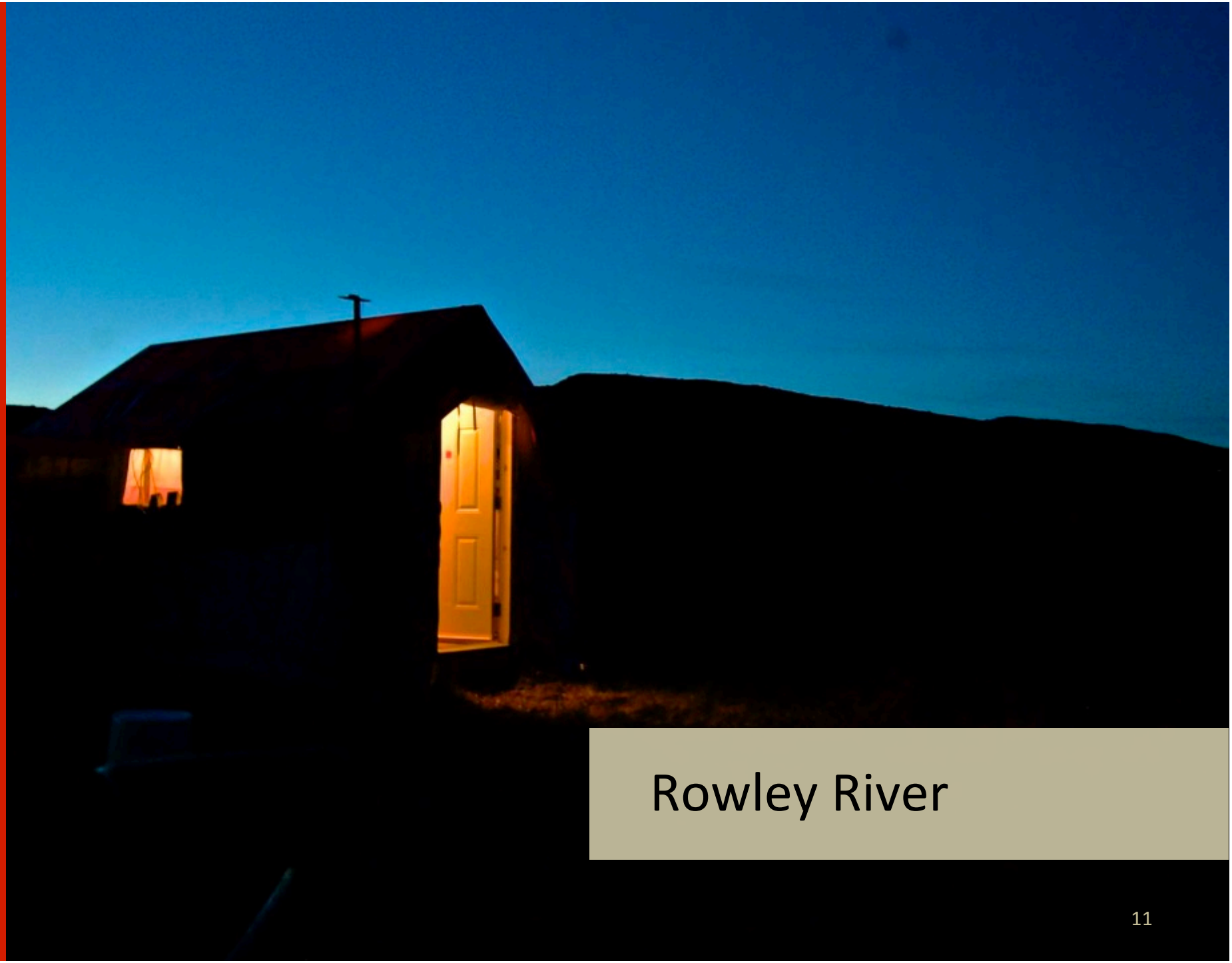
Tectonic Framework of North Baffin

- Affected by three Archean crust building events
  - 3.0 – 2.8 Ga, overprinted Mesoarchean basement
  - 2.76 – 2.63 Ga, deposition of supracrustals
    - MRG, WLG & PAG
  - 2.55 – 2.5 Ga, cryptic high-grade event
  - 1.9 – 1.8 Ga, Baffin orogen
    - Three stages

Iron formations through time

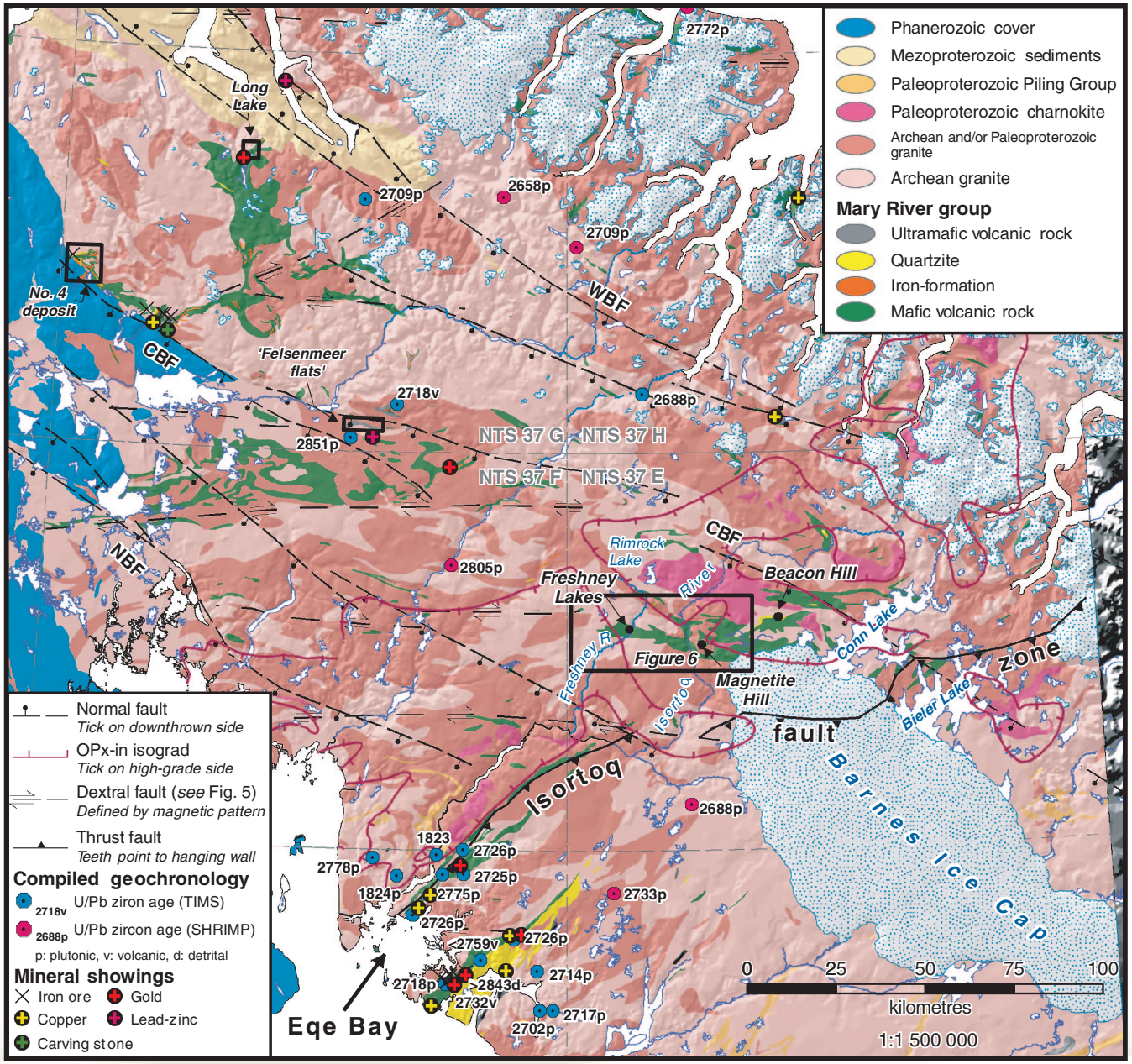


Klein, 2005



Rowley River

Setting



Johns and Young, 2006

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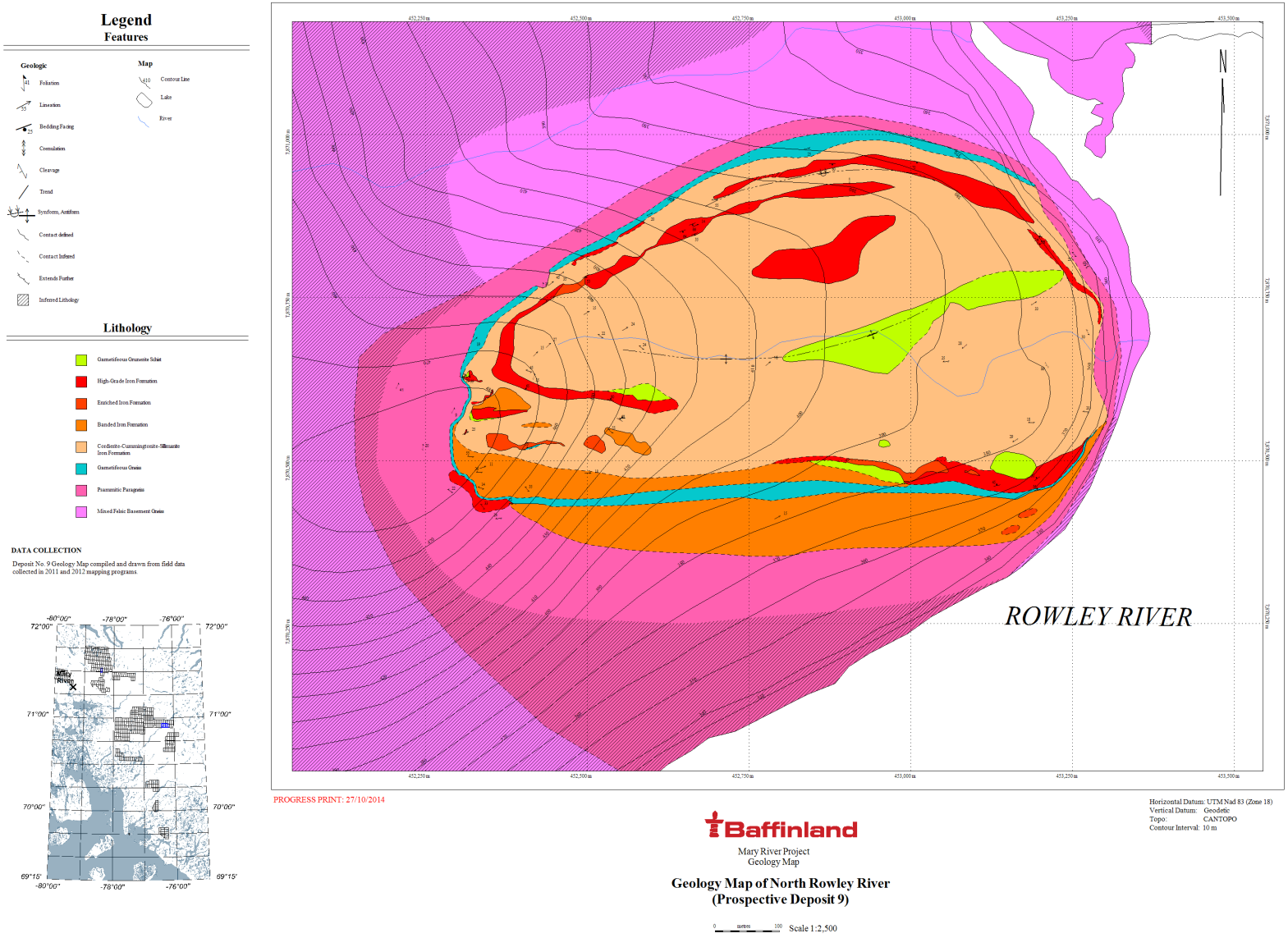
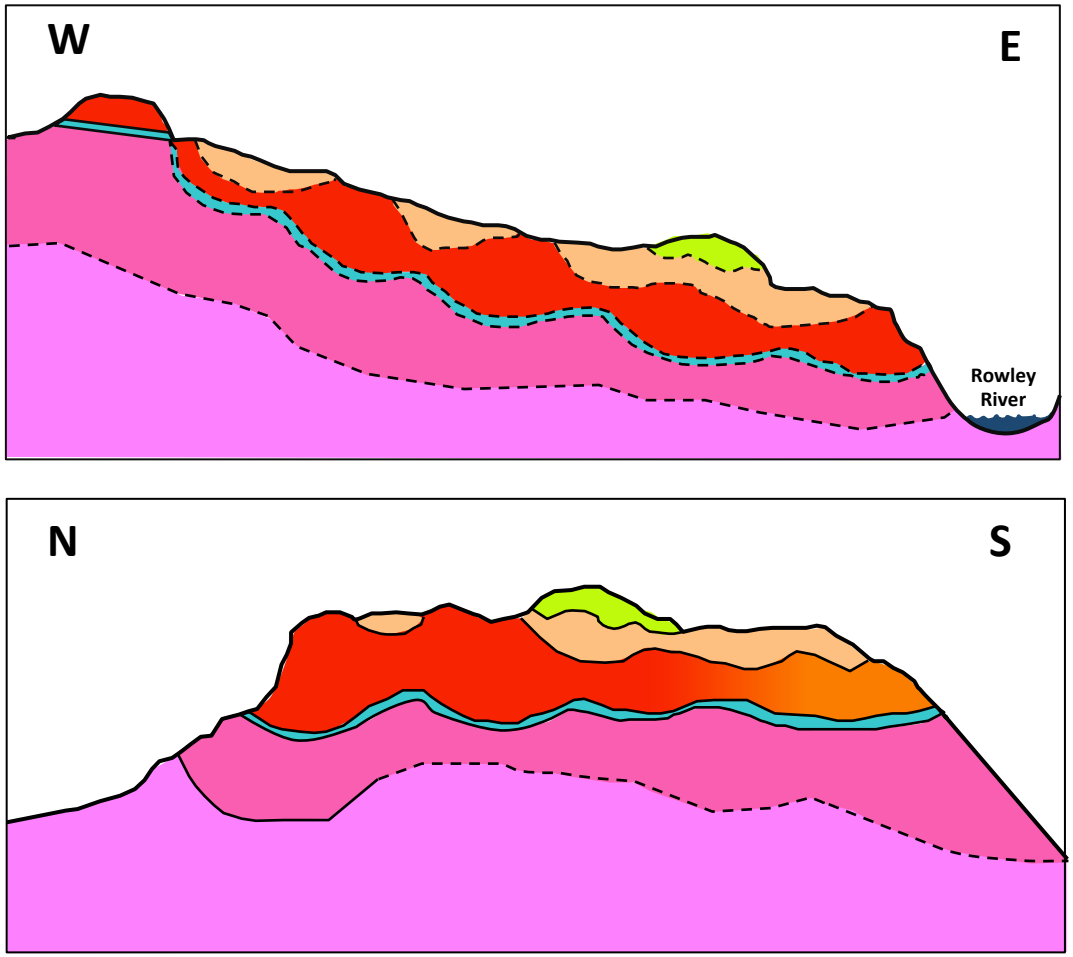
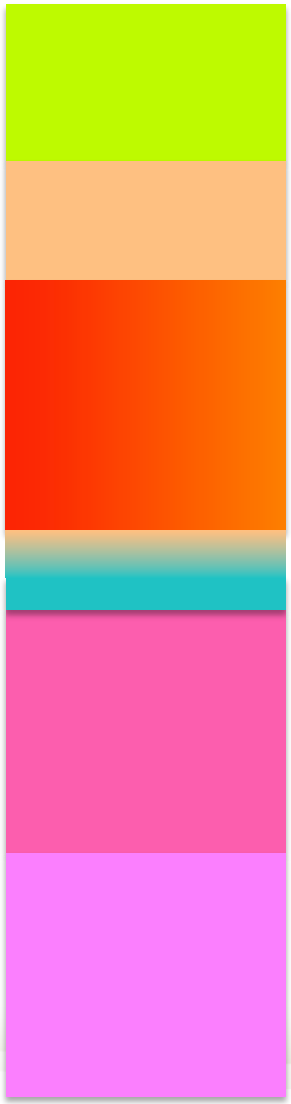
Rowley River



Rowley River



Rowley River Stratigraphy



Garnet Grunerite amphibolite

Cordierite-cummingtonite-sillimanite IFM

HG & conventional BIF; grades laterally

Garnetiferous straight gneiss/migmatite

K-spar metasomatized straight gneiss

Mixed mafic-felsic basement gneiss

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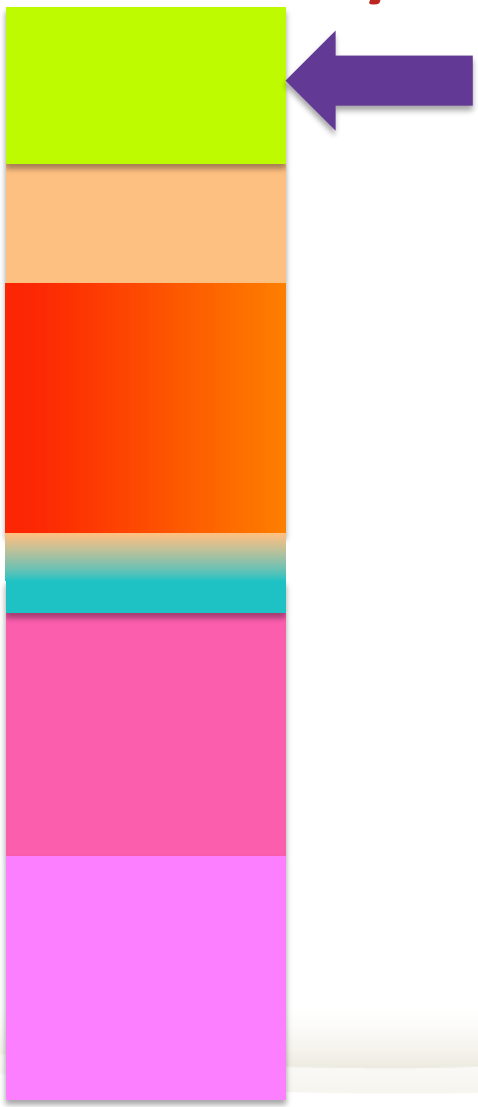
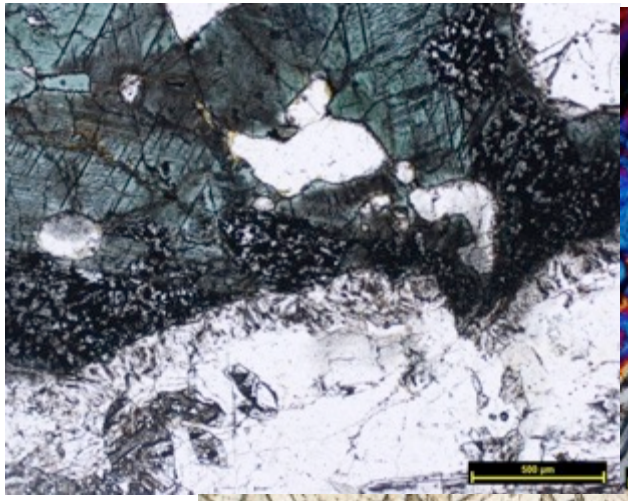
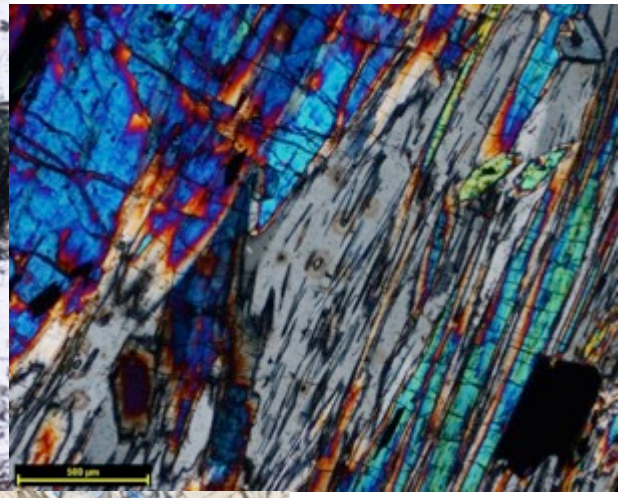
Rowley River Stratigraphy

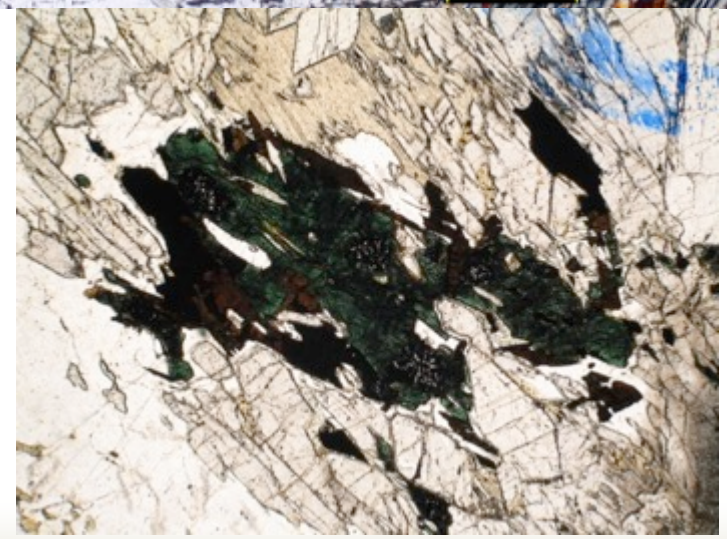
Garnet grunerite amphibolite

Rowley River Stratigraphy

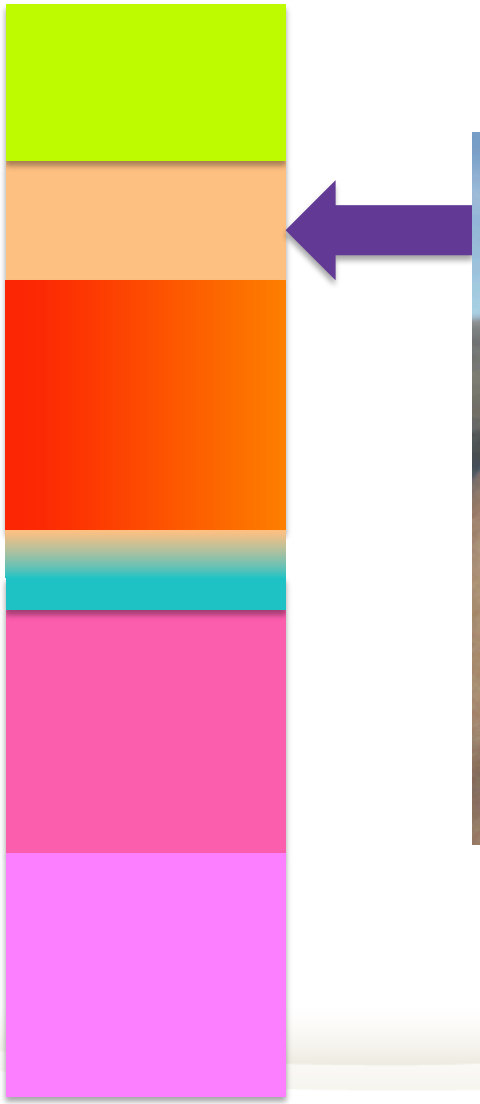




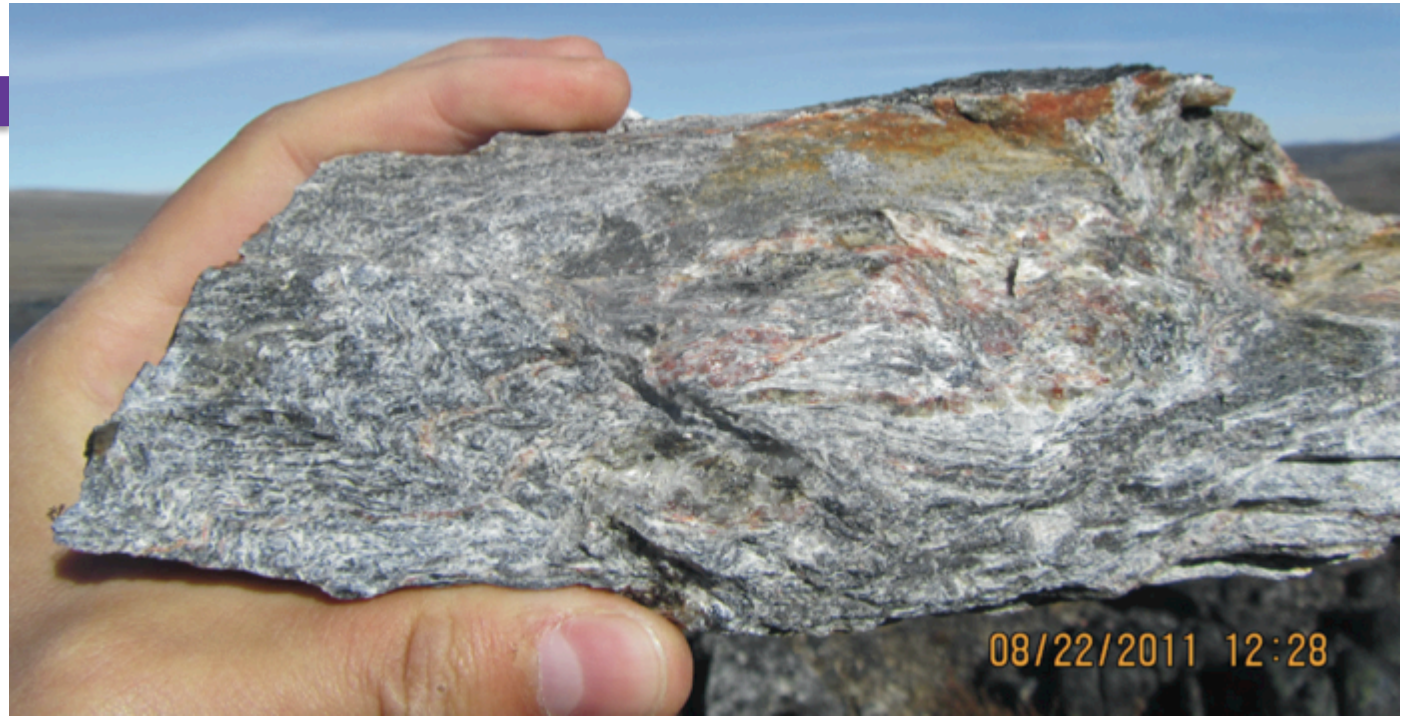




Rowley River Stratigraphy



Cordierite-cummingtonite-sillimanite IFM



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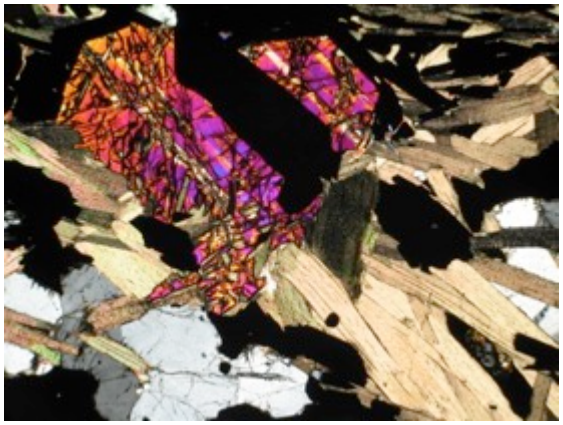
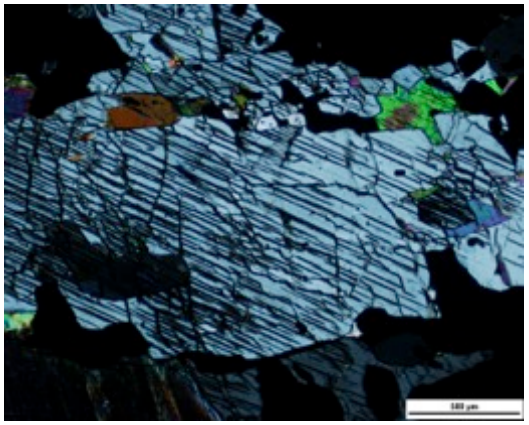
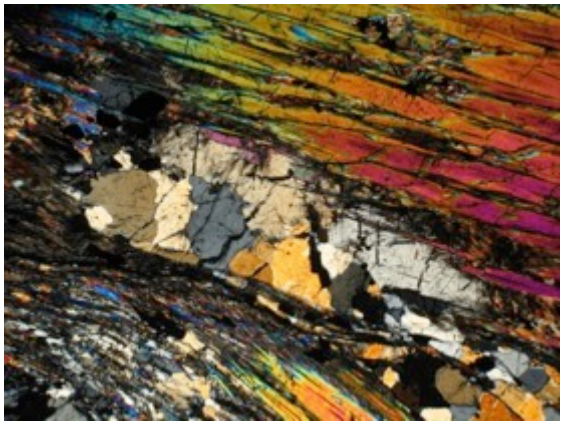
Rowley River Stratigraphy



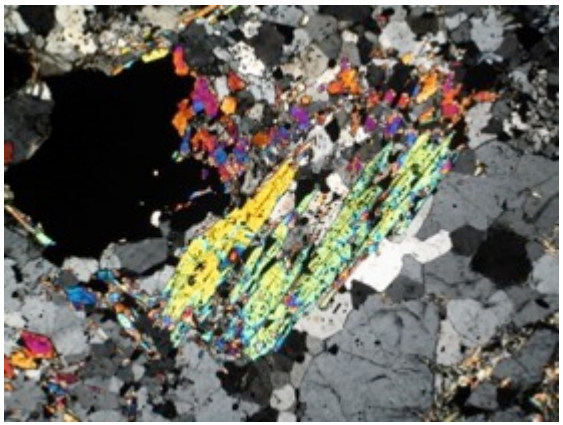
Corundum, green biotite, quartz &magnetite



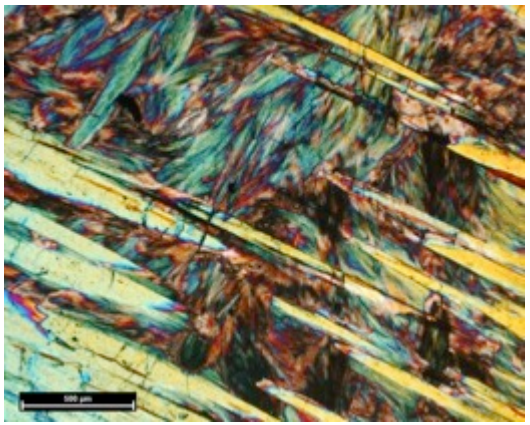
Orthopyroxene



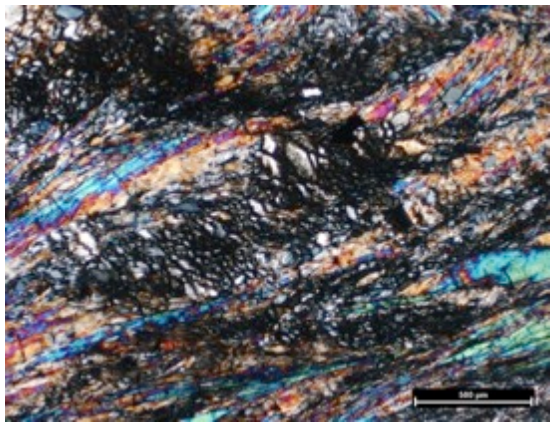
Sillimanite, quartz &mica



Andalusite, sillimanite, cordierite & magnetite



Sillimanite lathes, cummingtonite & grunerite



Sillimanite cummingtonite, grunerite & cordierite

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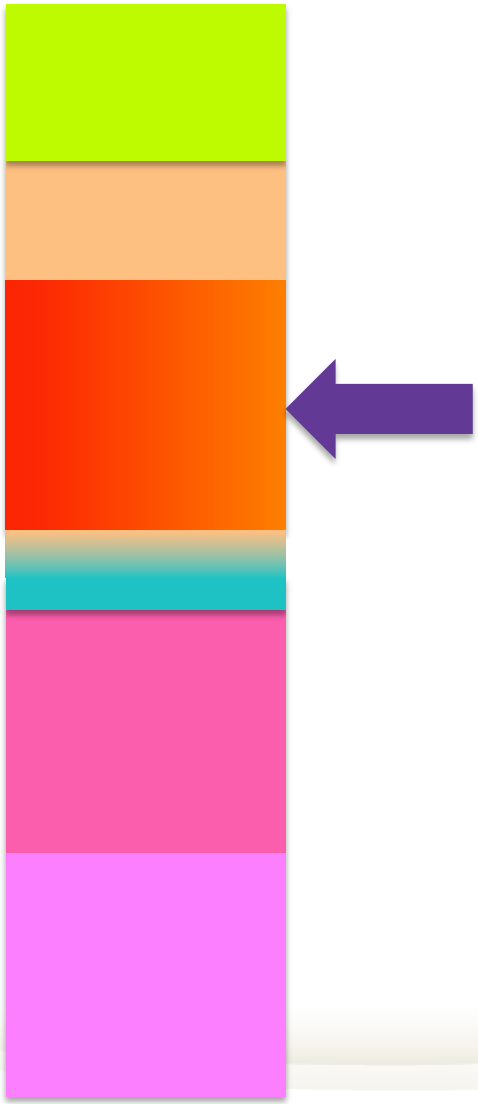
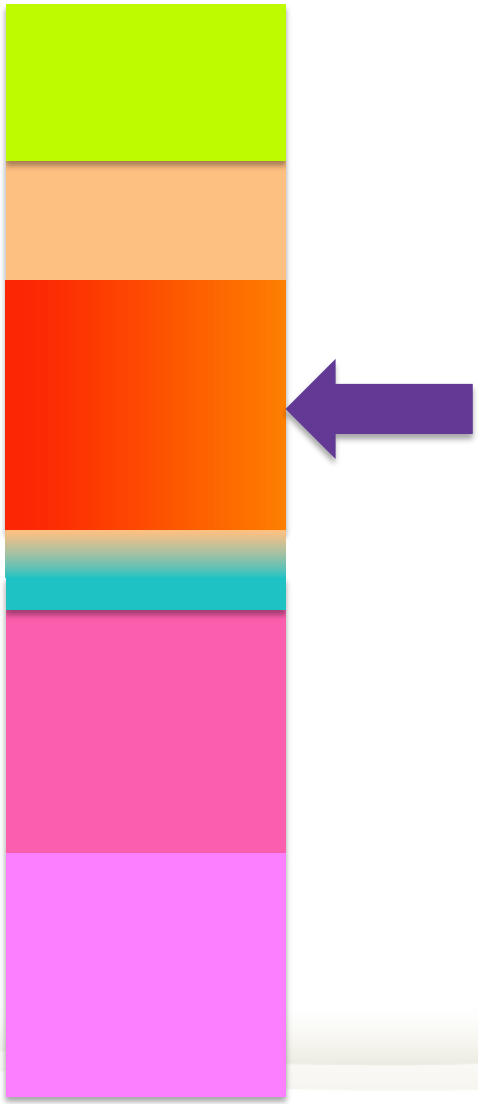
Rowley River Stratigraphy



High-grade iron ore

Baffinland

Rowley River Stratigraphy



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Baffinland

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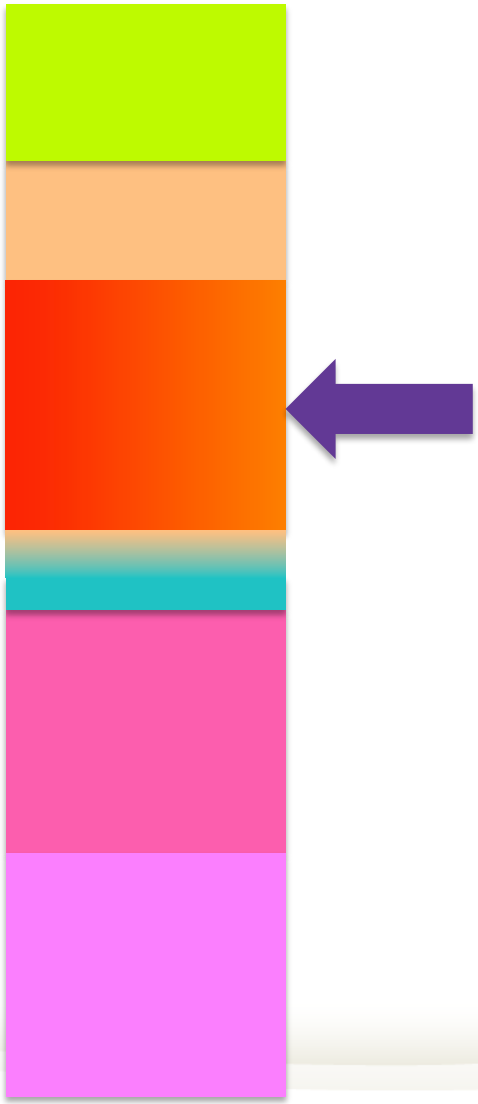

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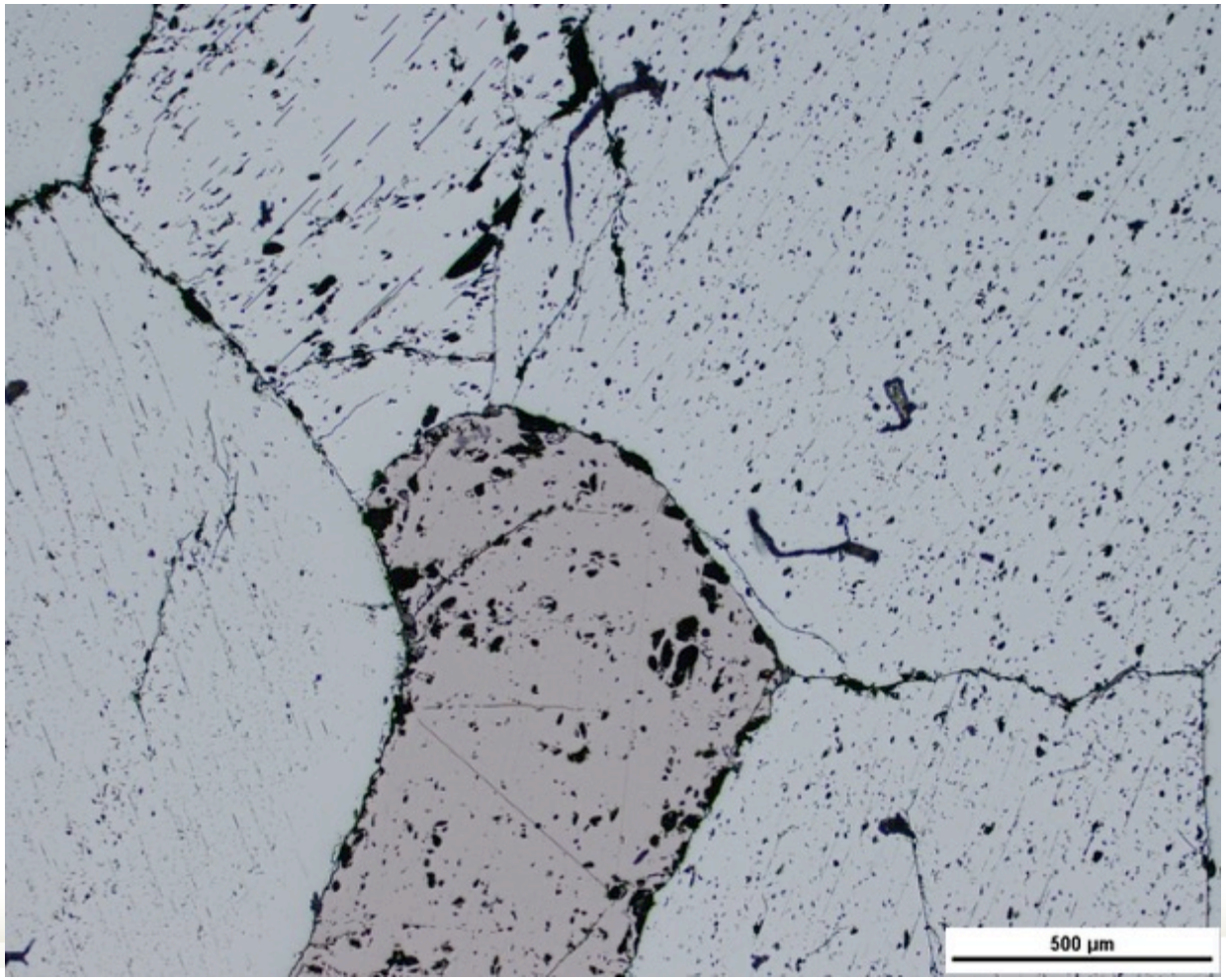

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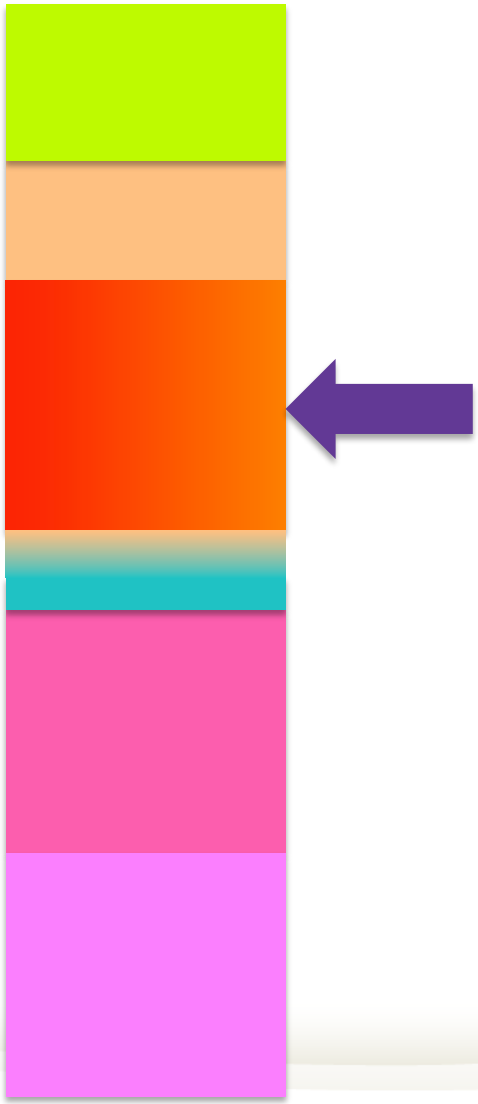
Rowley River Stratigraphy



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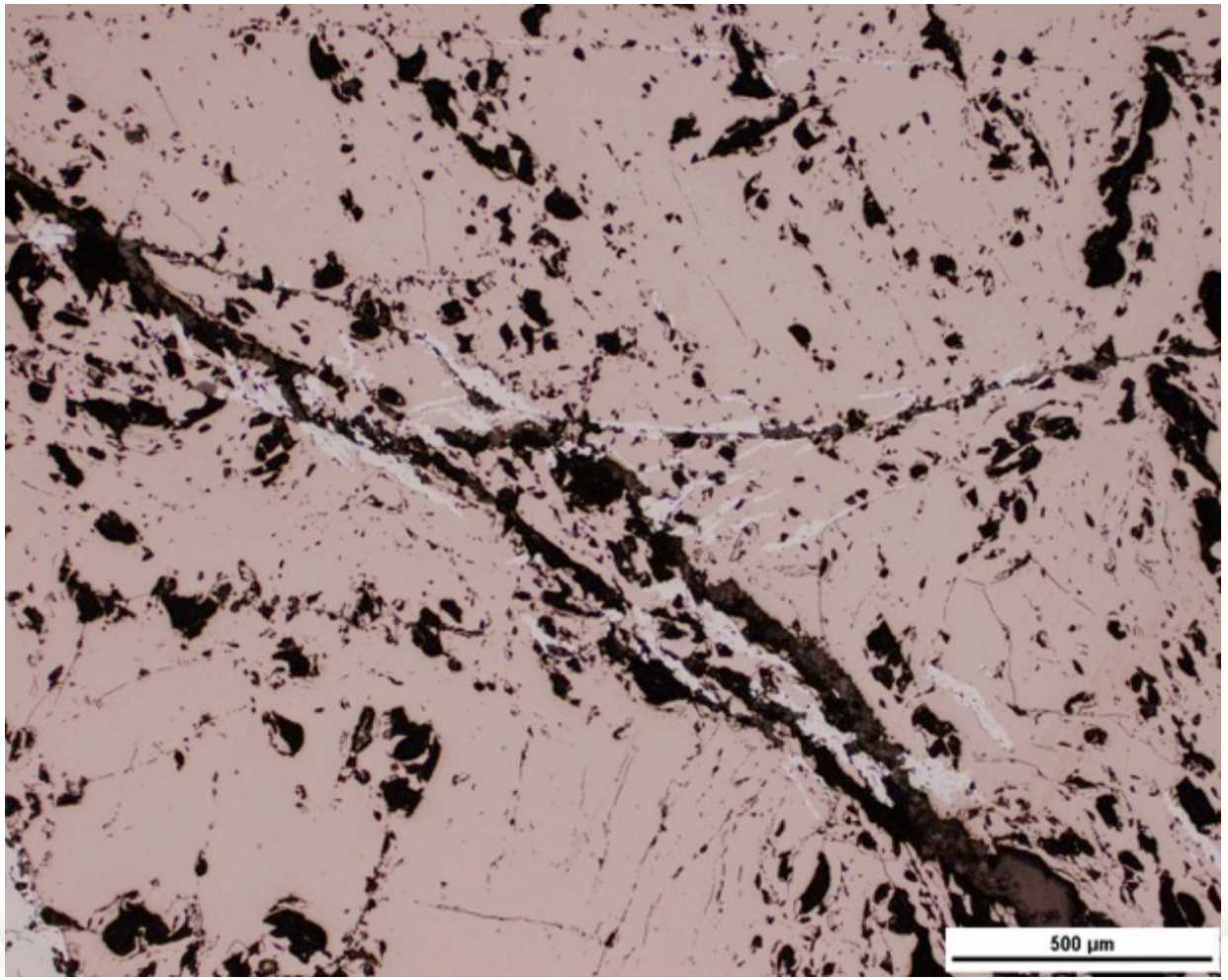

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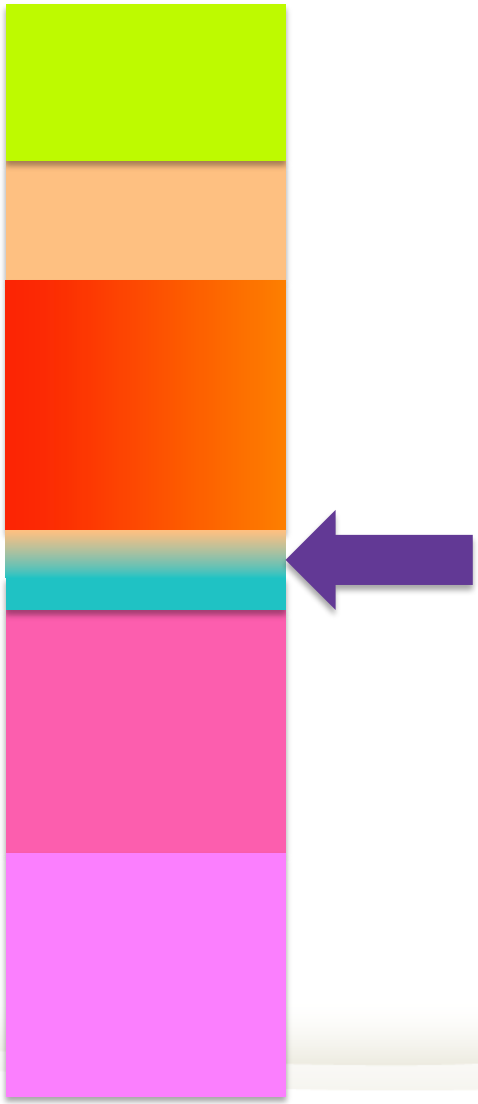
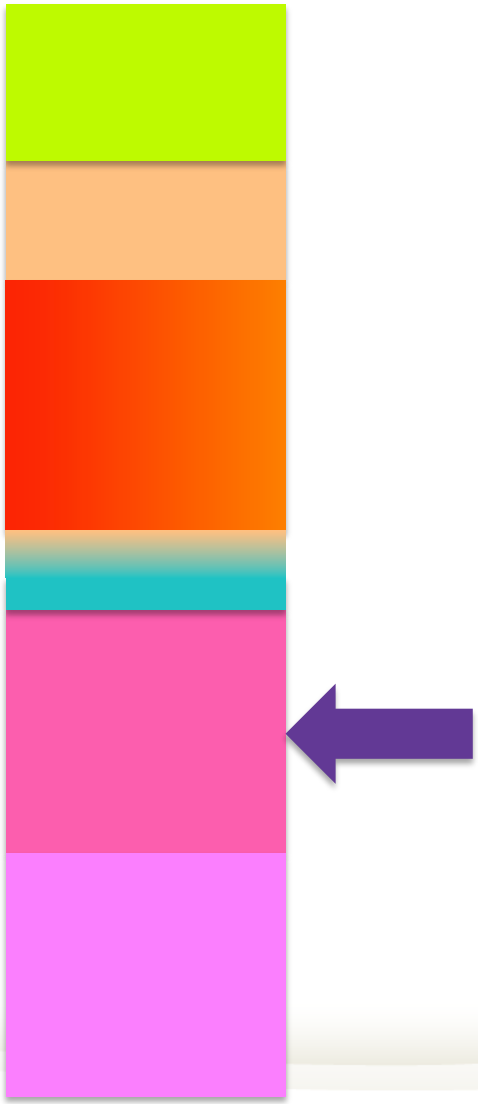
Rowley River Stratigraphy



Garnetiferous straight gneiss/migmatite

Baffinland

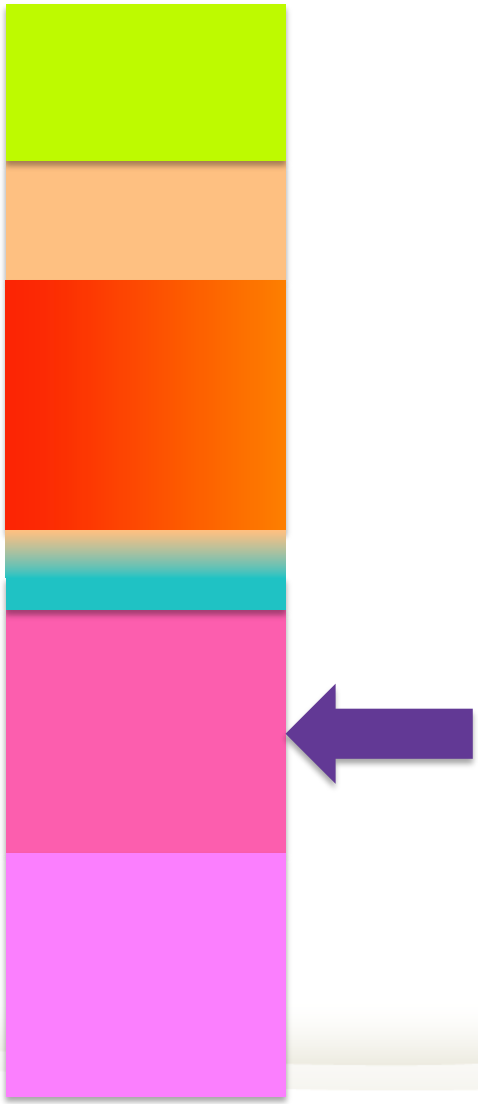
Rowley River Stratigraphy

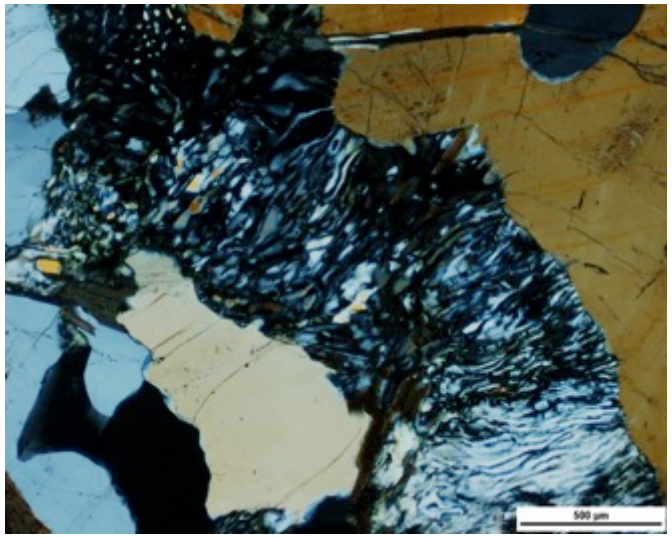


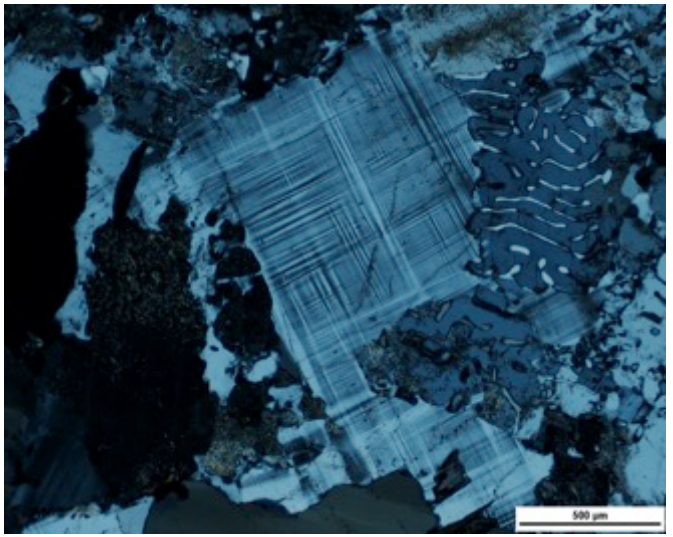
K-spar metasomatized straight gneiss

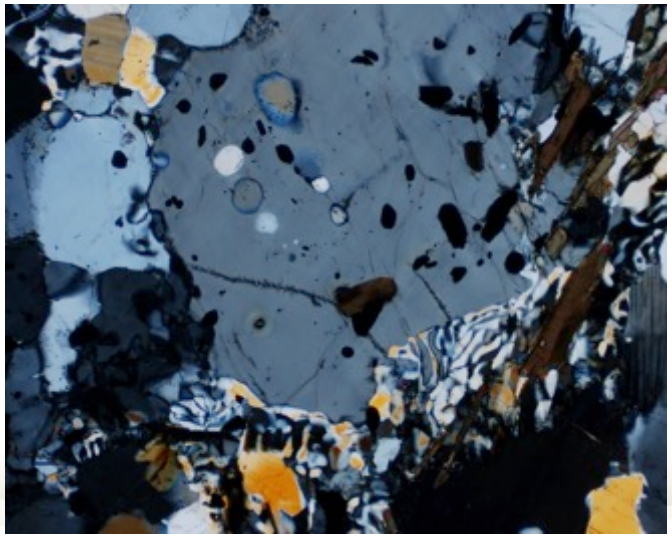
Baffinland

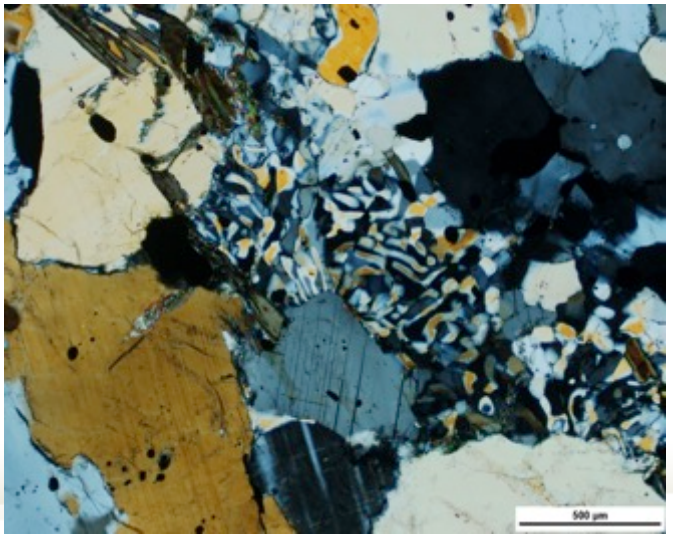
Rowley River Stratigraphy









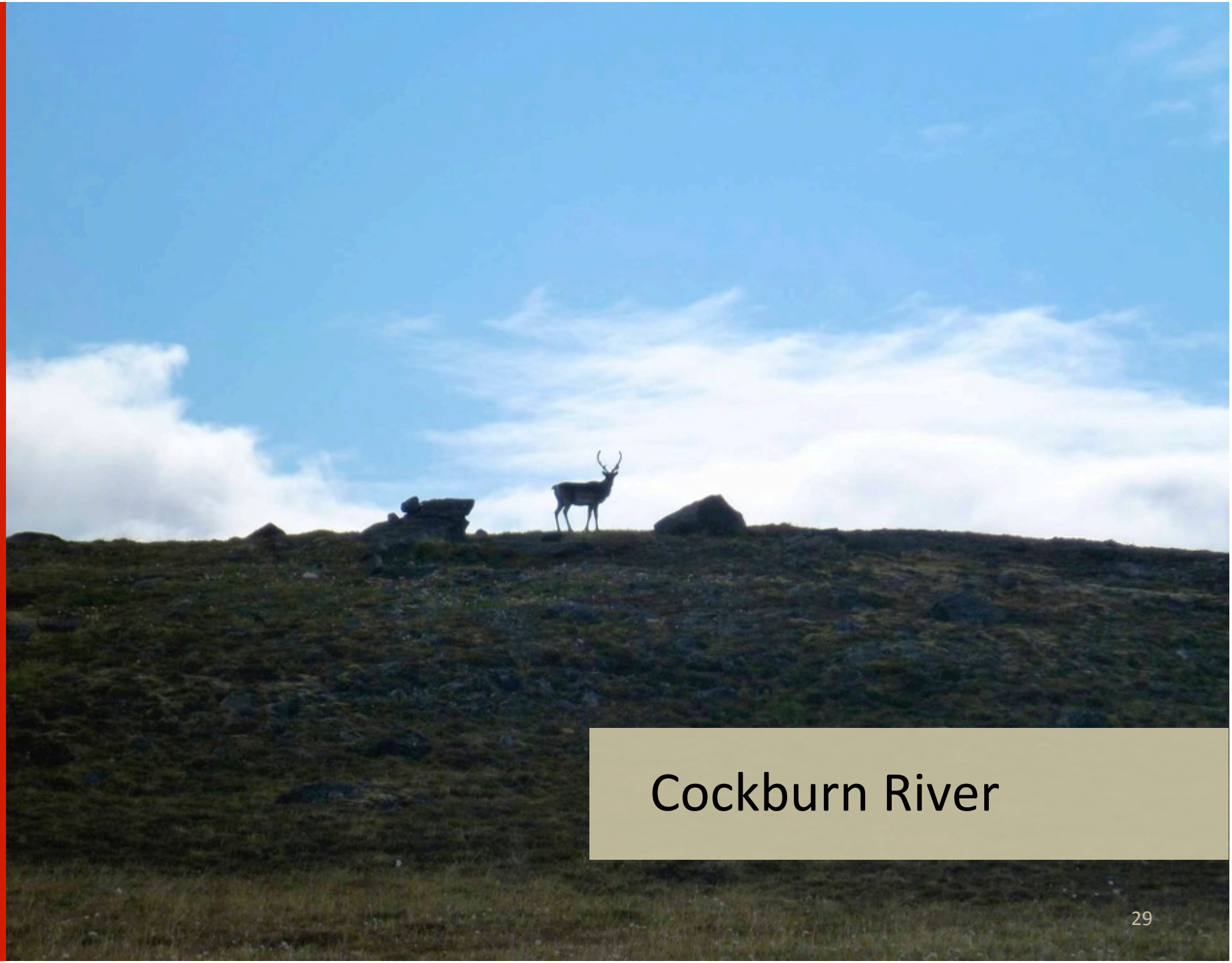


Baffinland

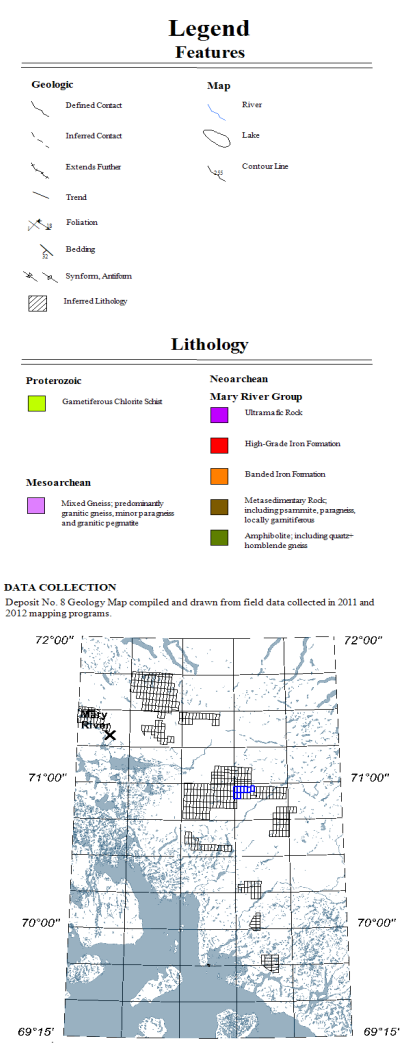
Rowley River Stratigraphy

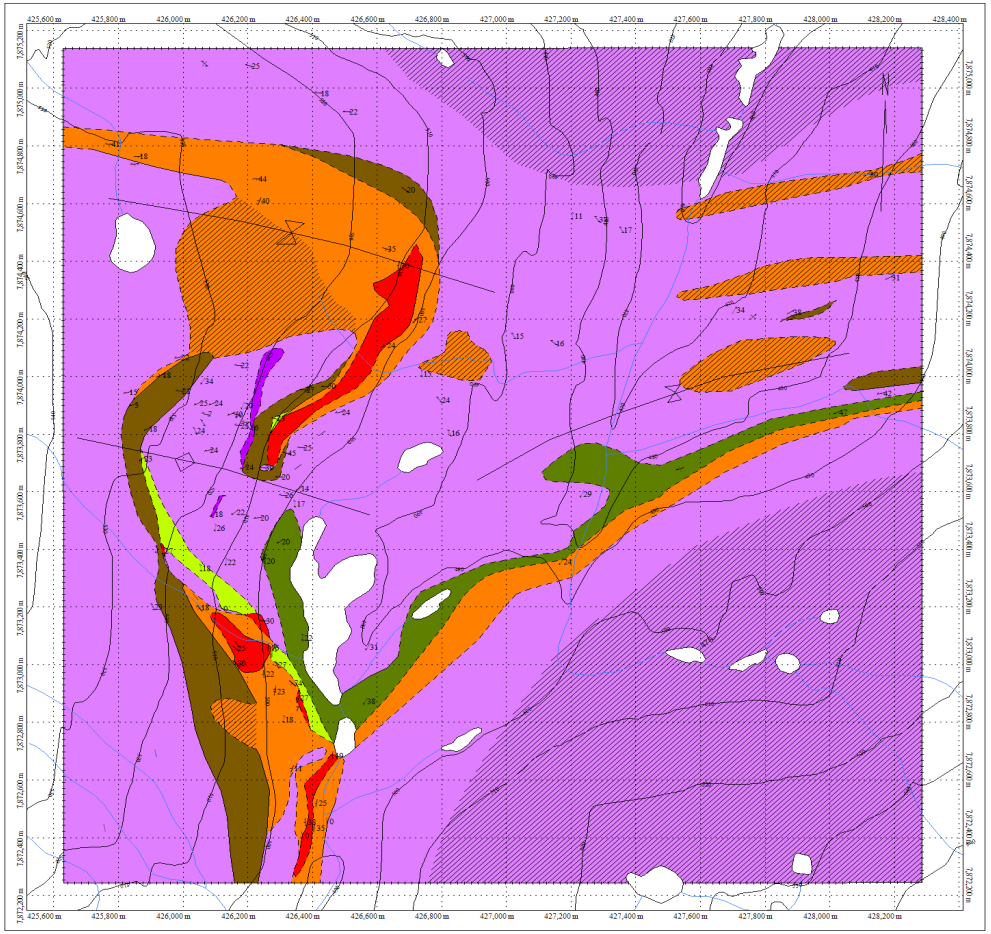
Mixed mafic-felsic basement gneiss

Baffinland

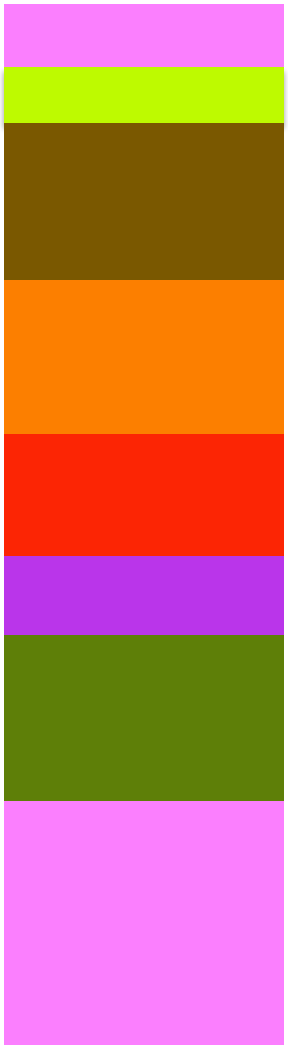

Cockburn River

Cockburn River





Cockburn River



K-metasomatized parageniss

Garnet chlorite schist

Psammitic wacke, locally garnetiferous

BIF

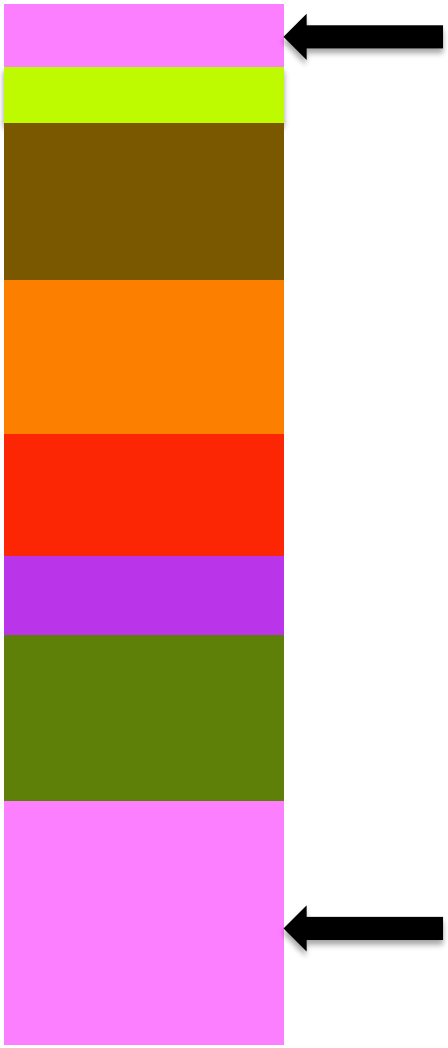
High-grade martite ore

Ultramafic rock

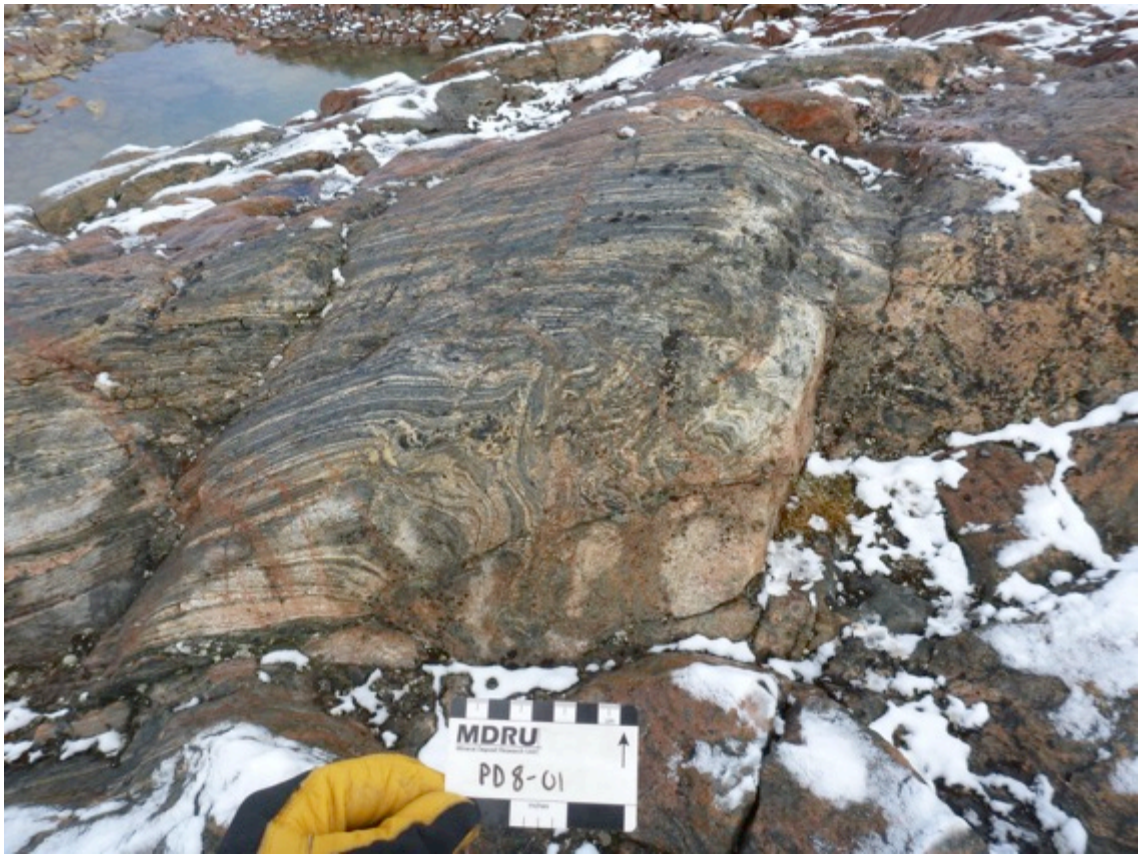
Amphibolite, including quartz-horneblend gneiss

K-metasomatized parageniss

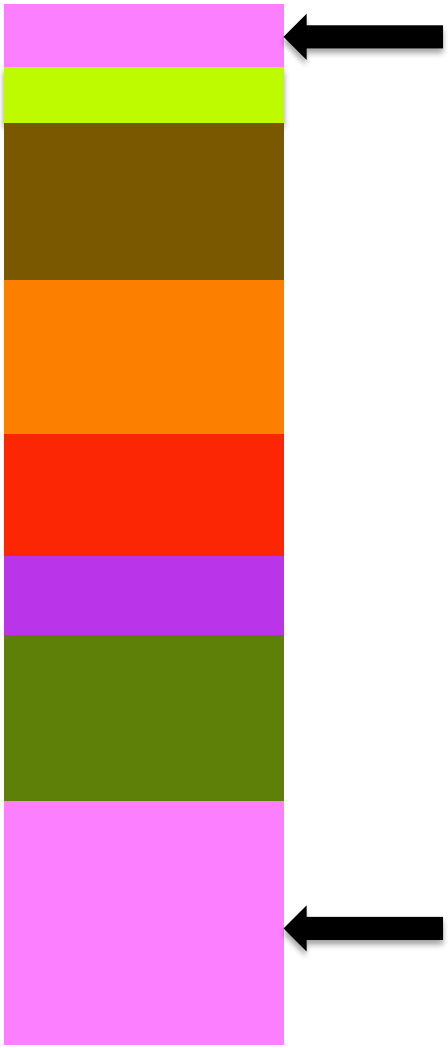
Cockburn River



K-metasomatized paragneiss



Cockburn River



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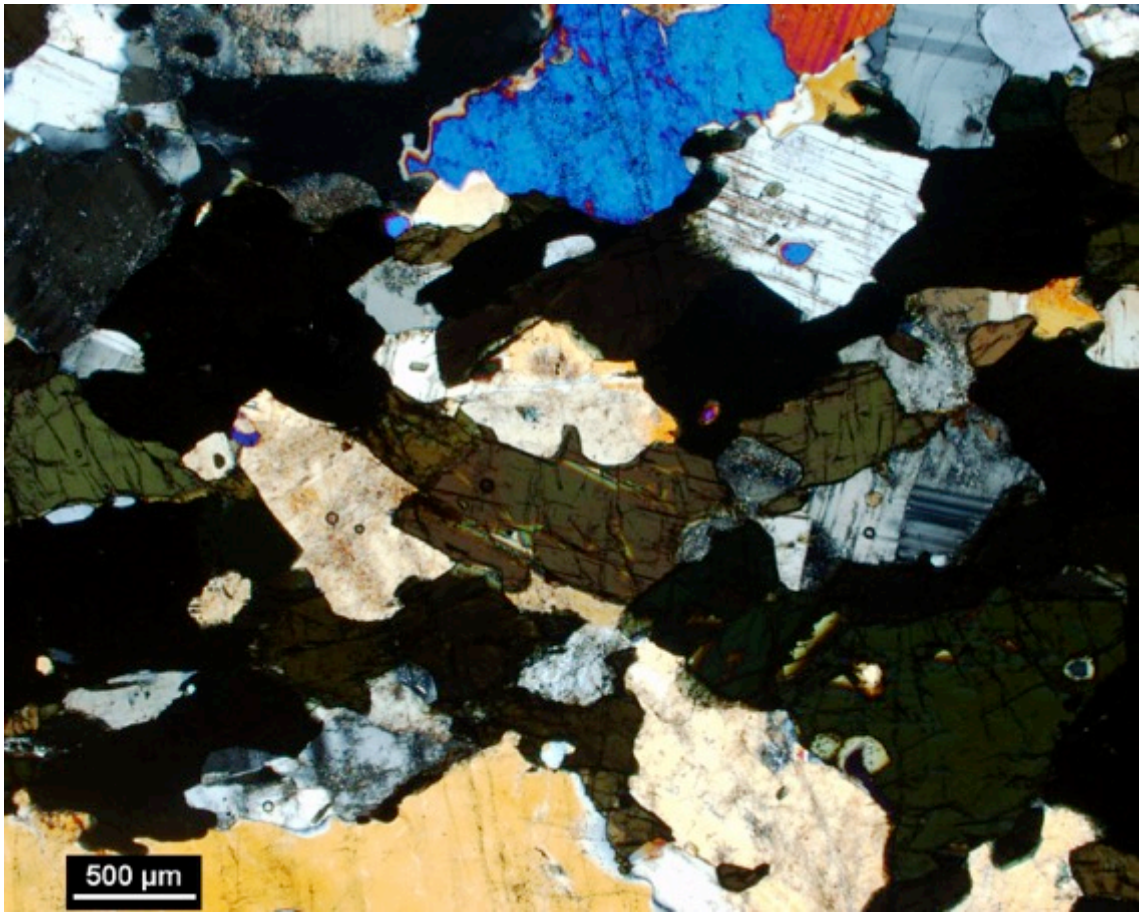
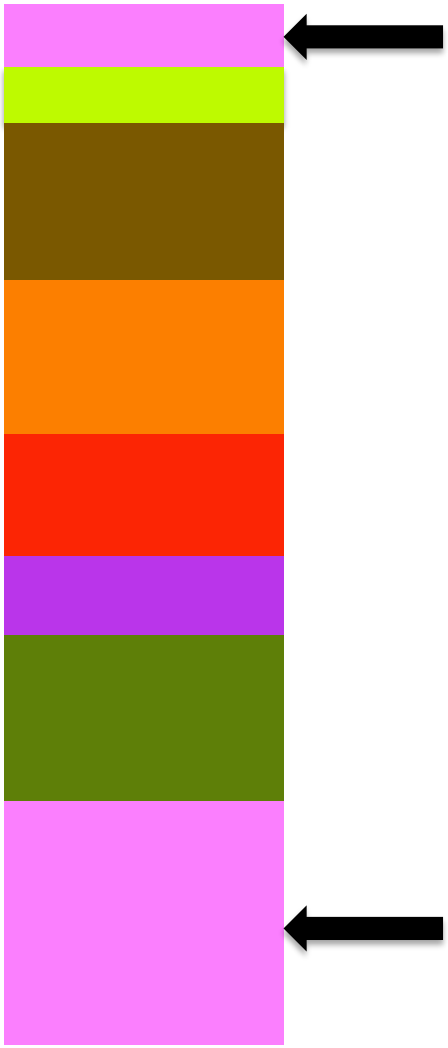
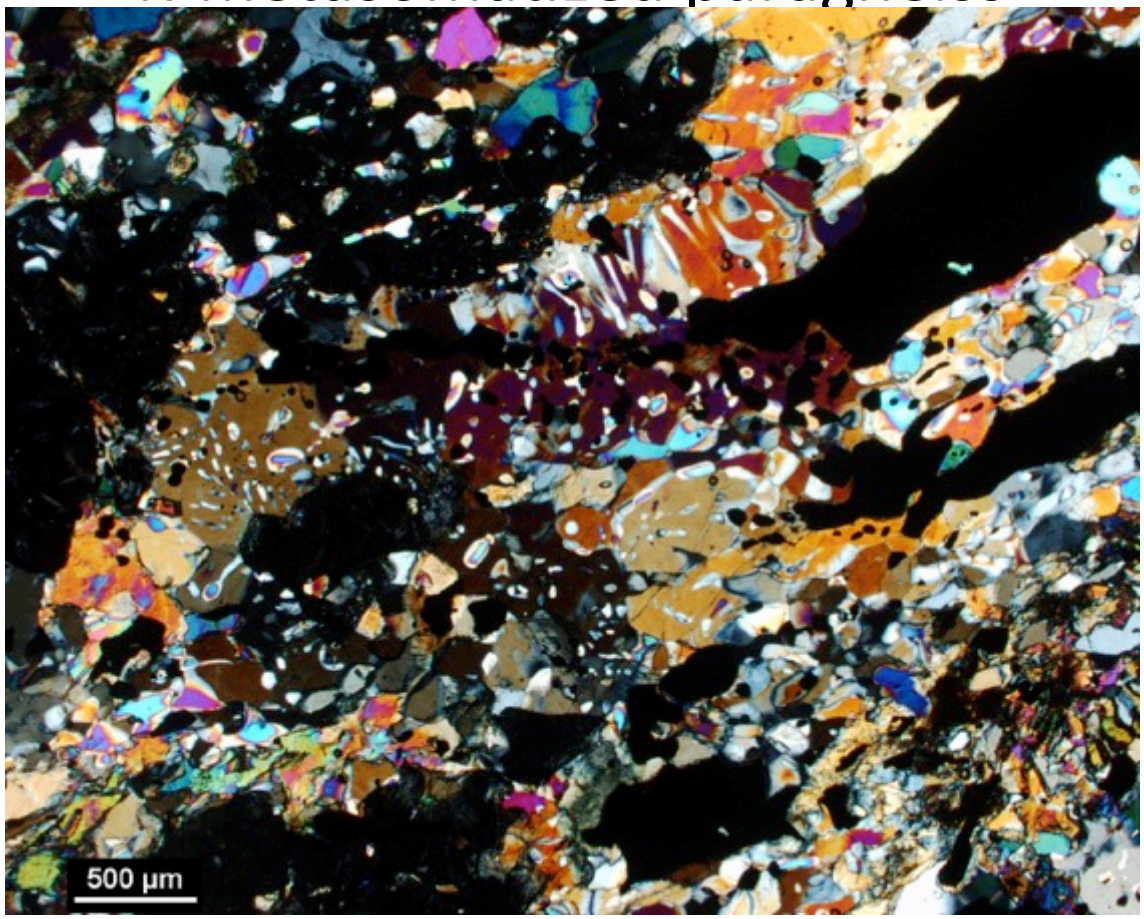


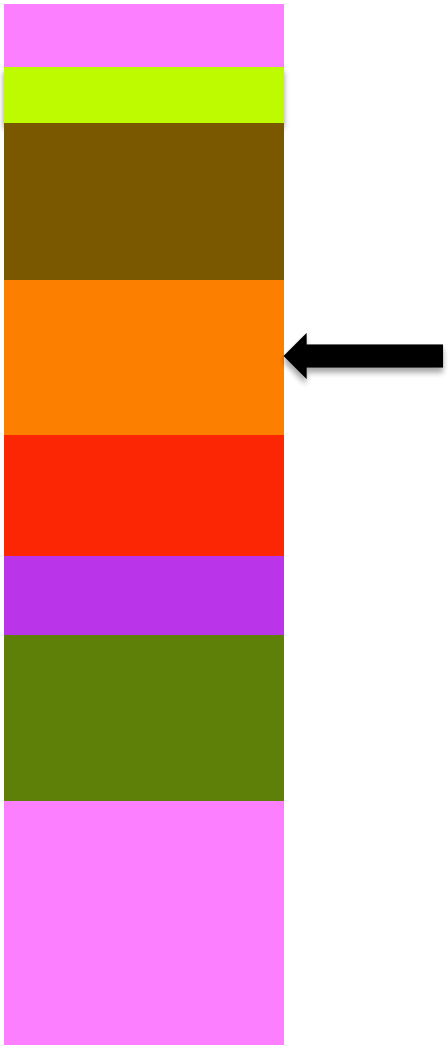
Cockburn River



K-metasomatized paragneiss



Cockburn River



BIF

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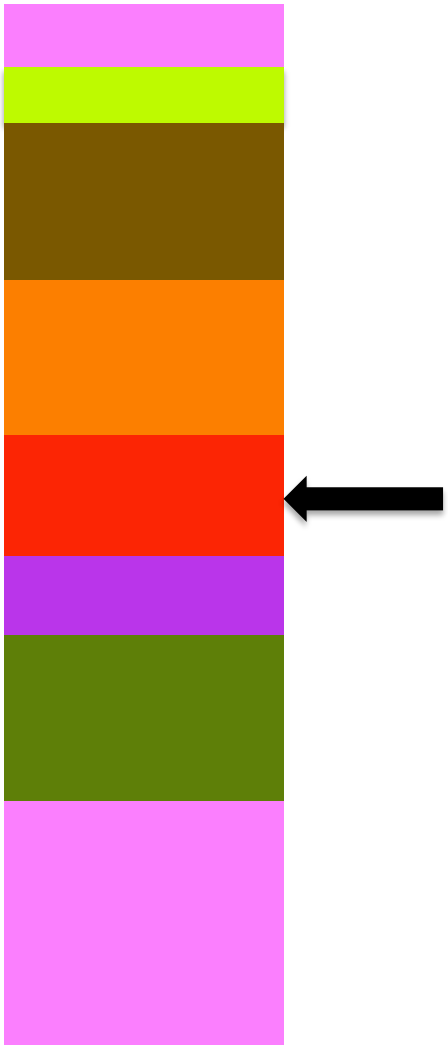
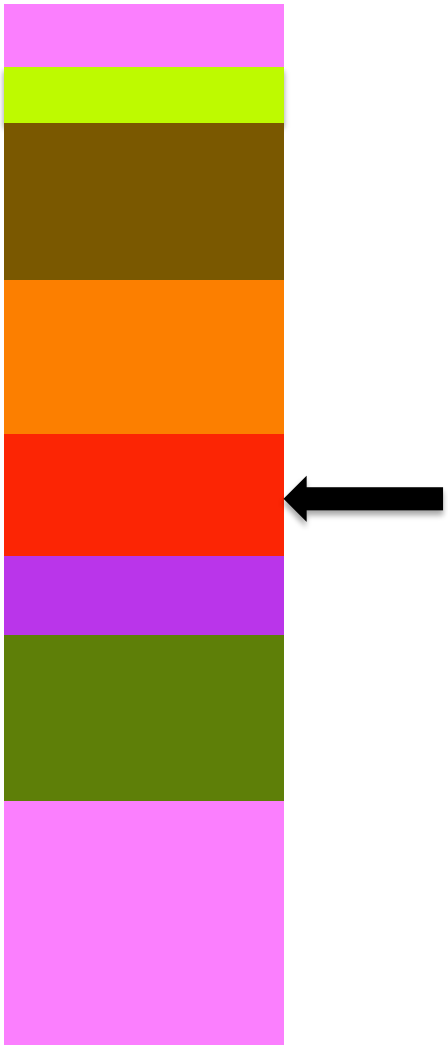
Cockburn River



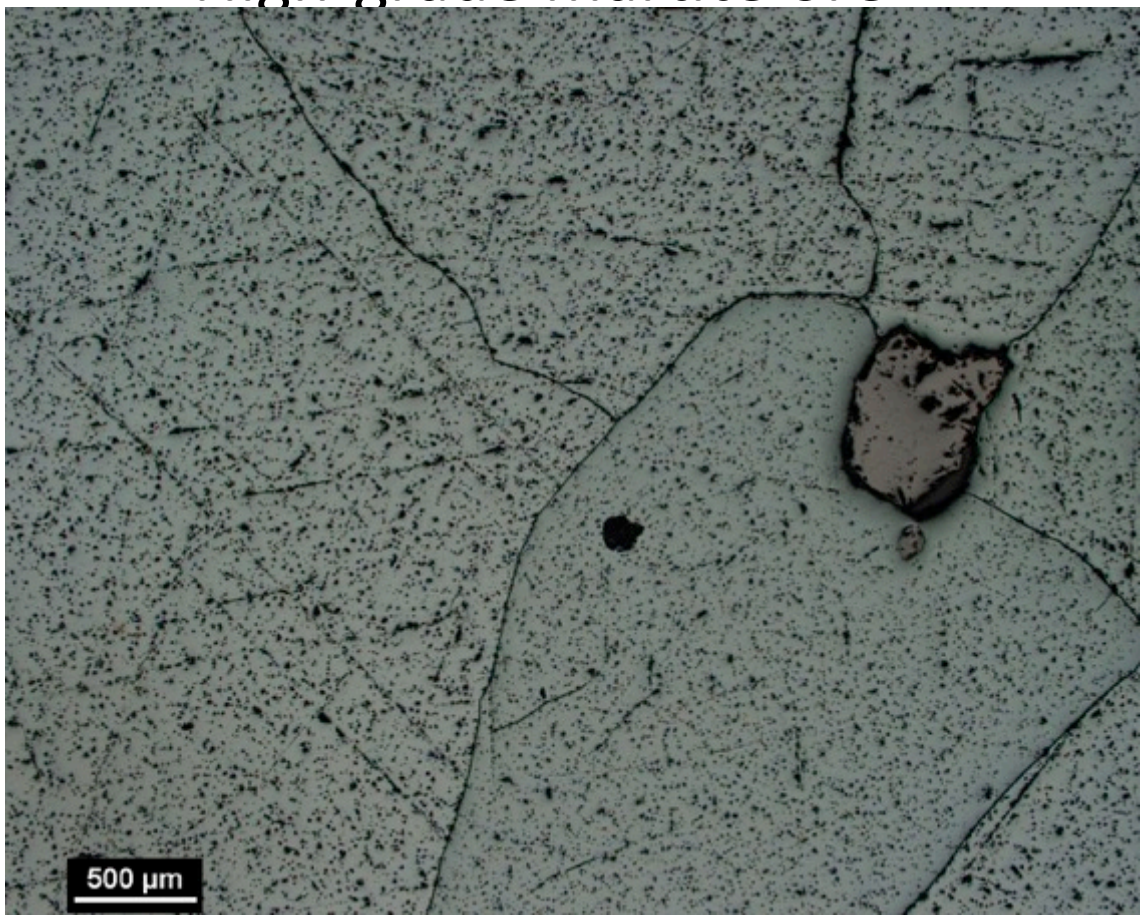
High-grade martite ore

Baffinland

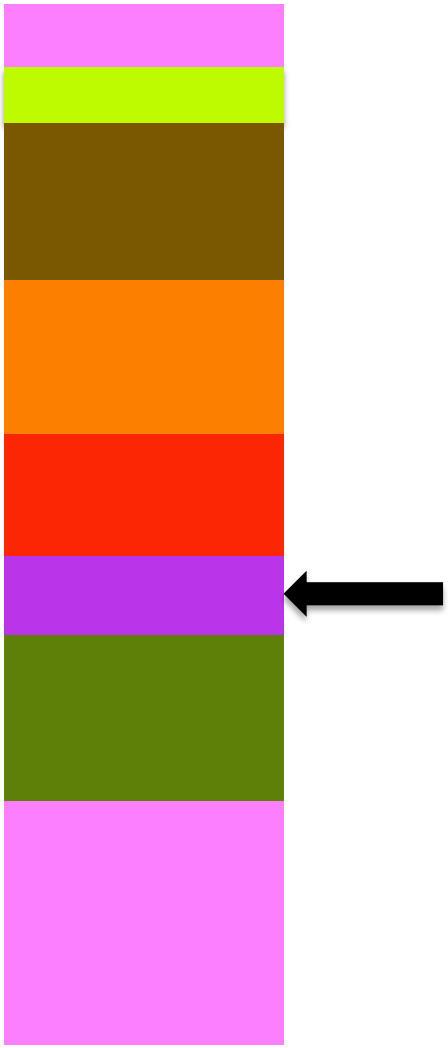
Cockburn River



High-grade martite ore



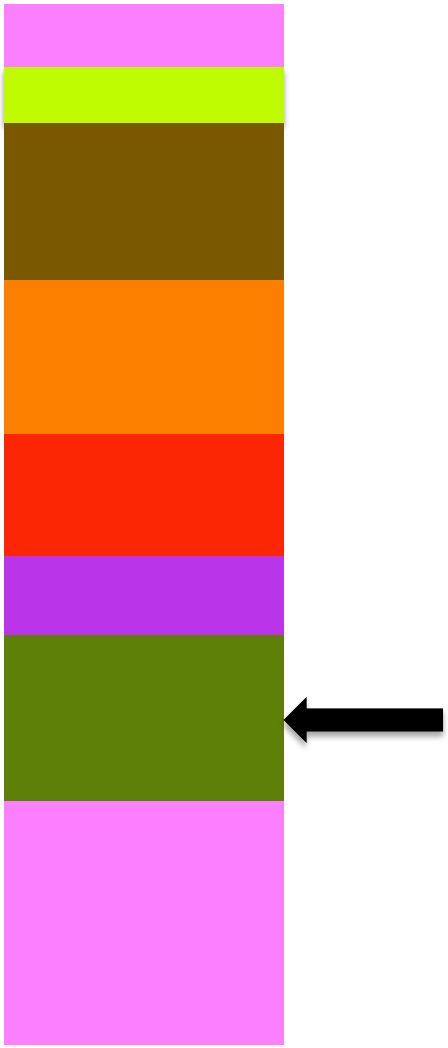
Cockburn River



Ultramafics

Baffinland

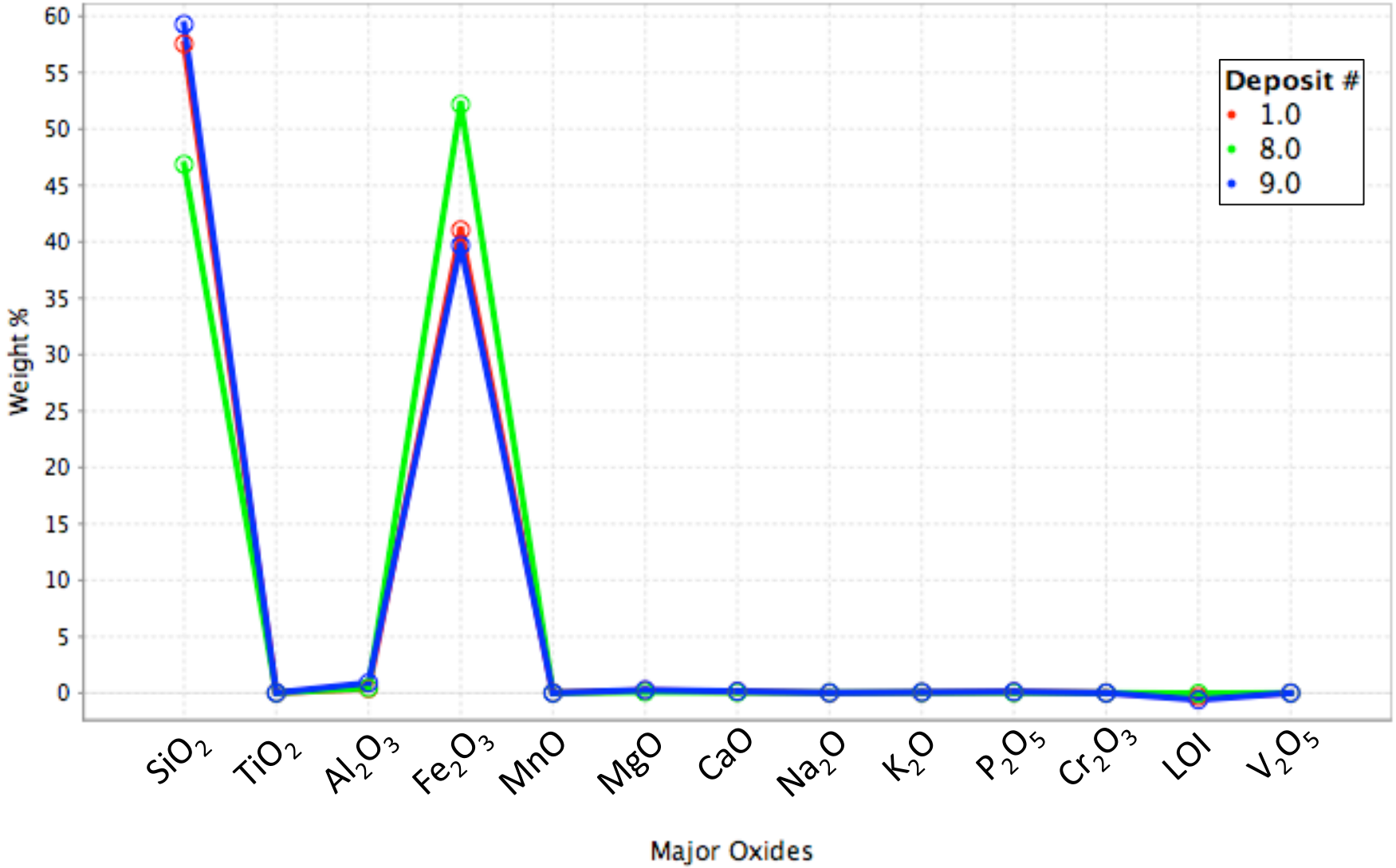
Cockburn River



Quartz-horneblend gneiss

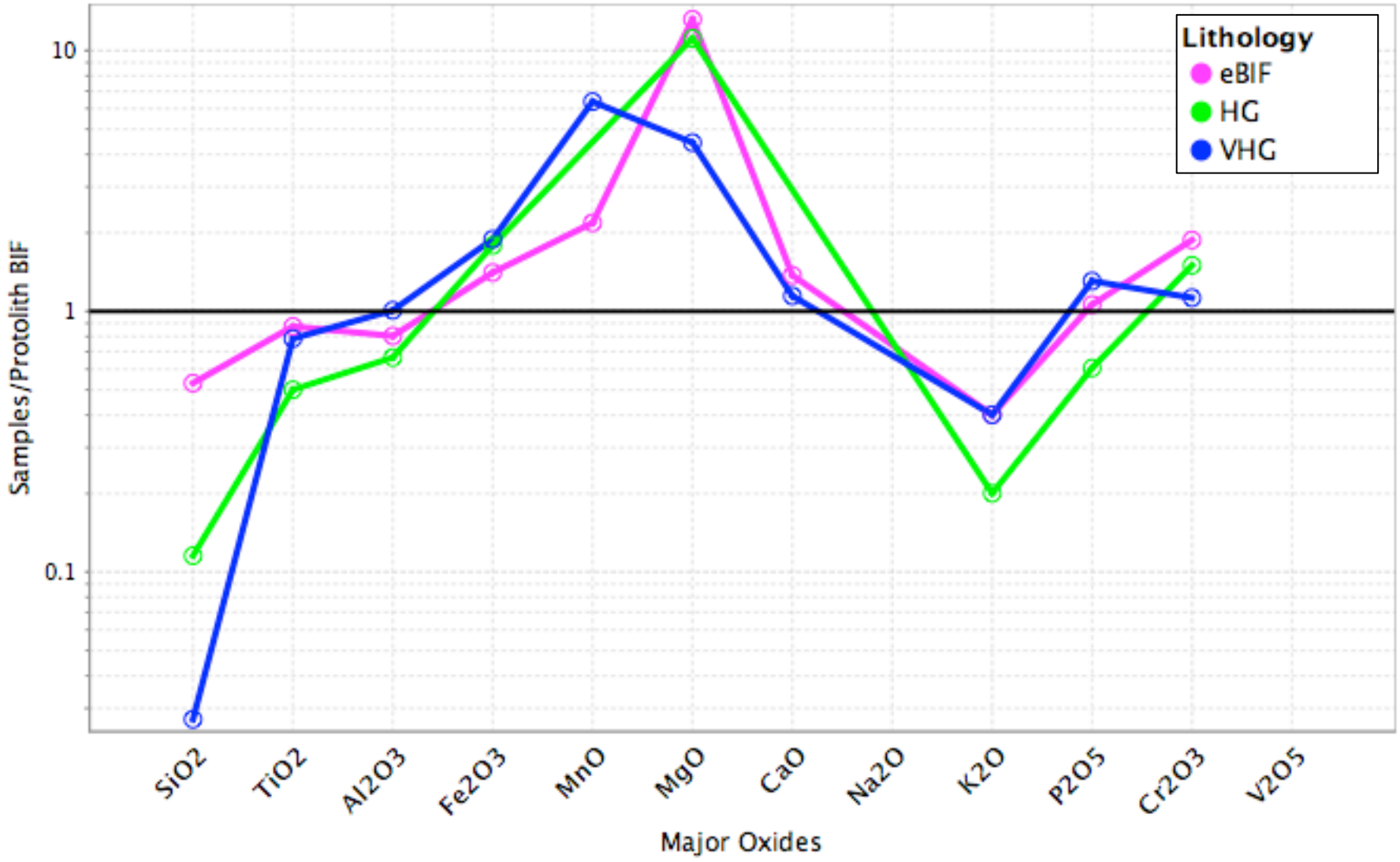
Iron Ore Geochemistry

Major Oxides in BIF



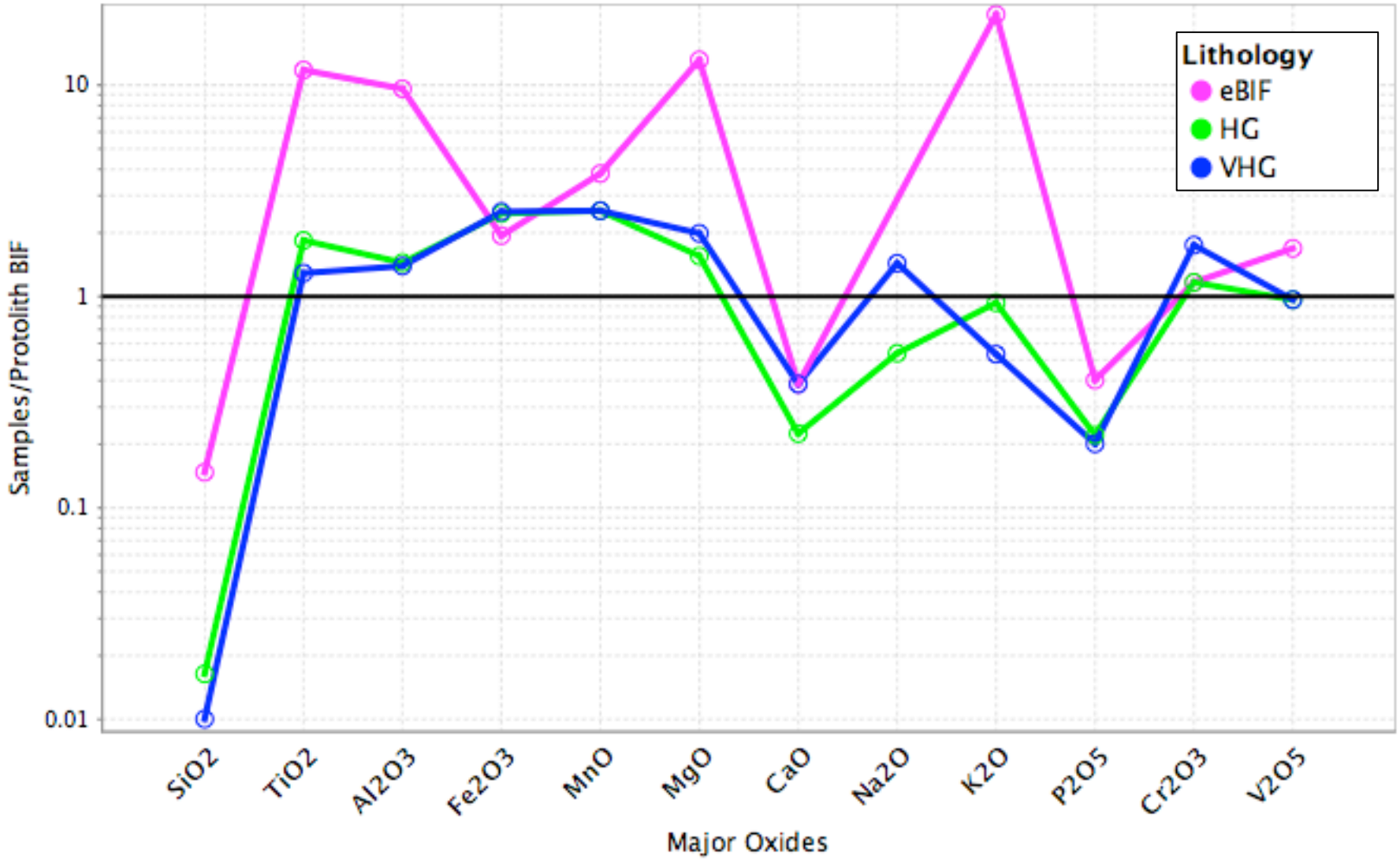
Baffinland

Cockburn River Normalization



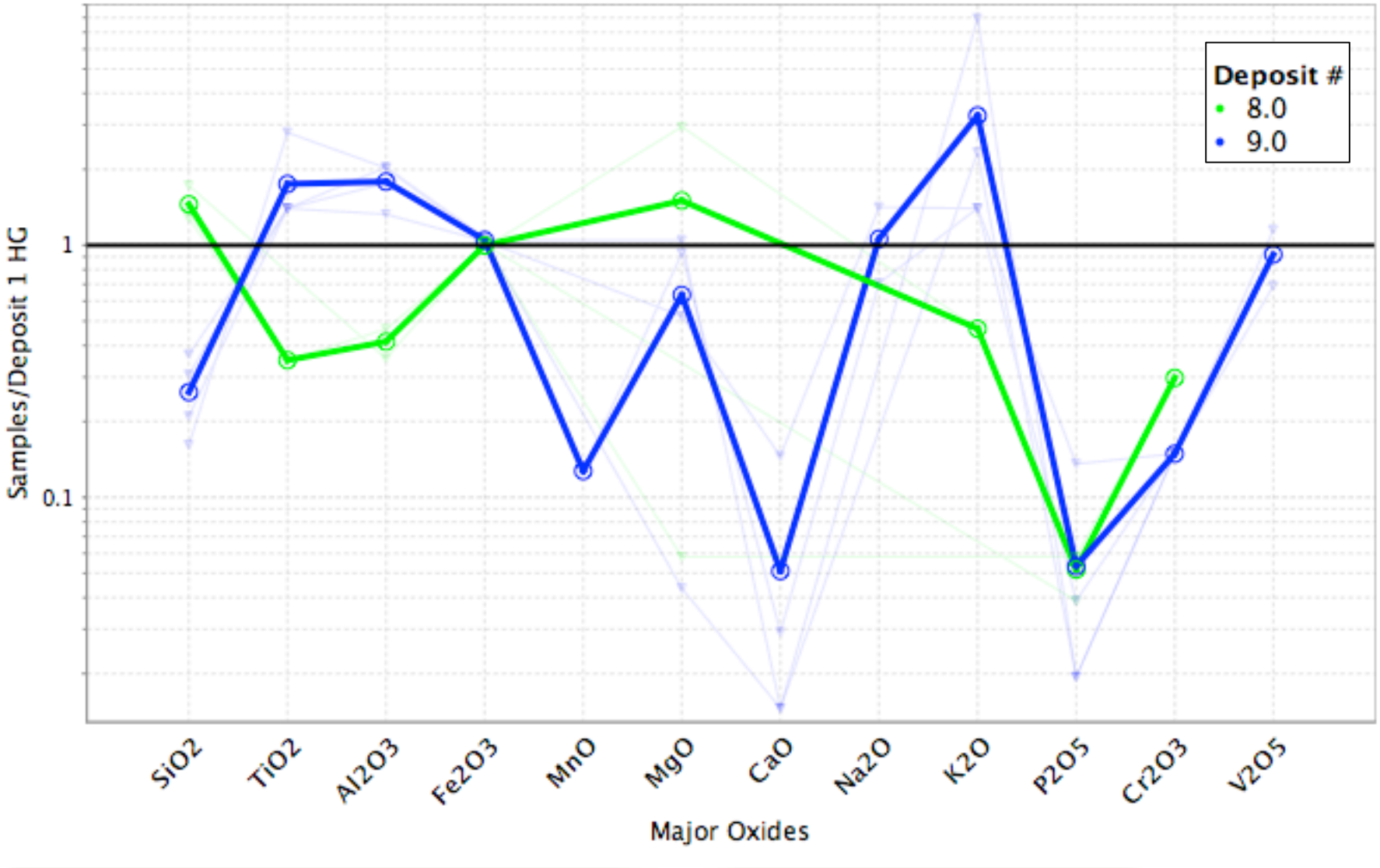
Baffinland

Rowley River Normalization



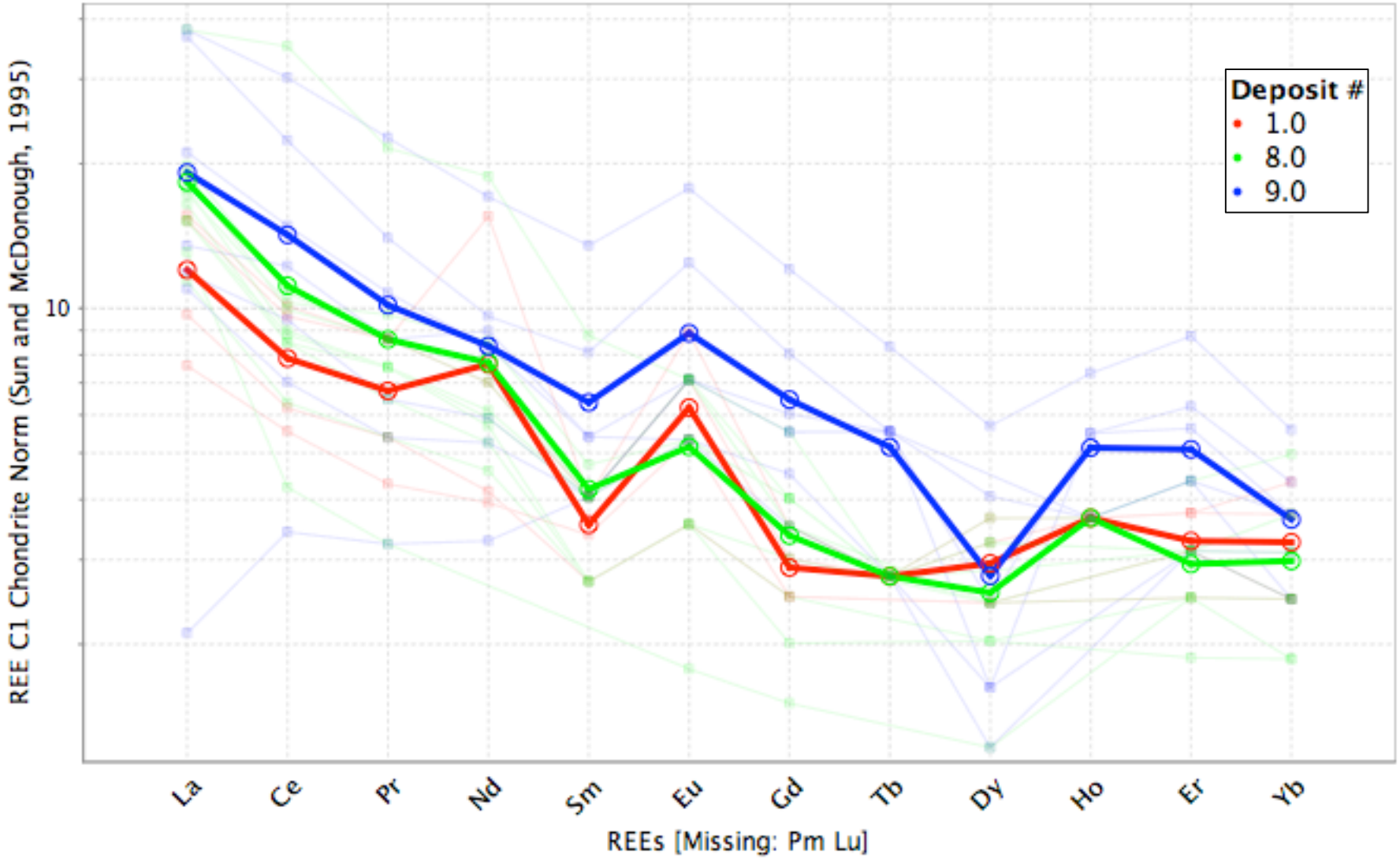
Baffinland

Major Oxide Normalization



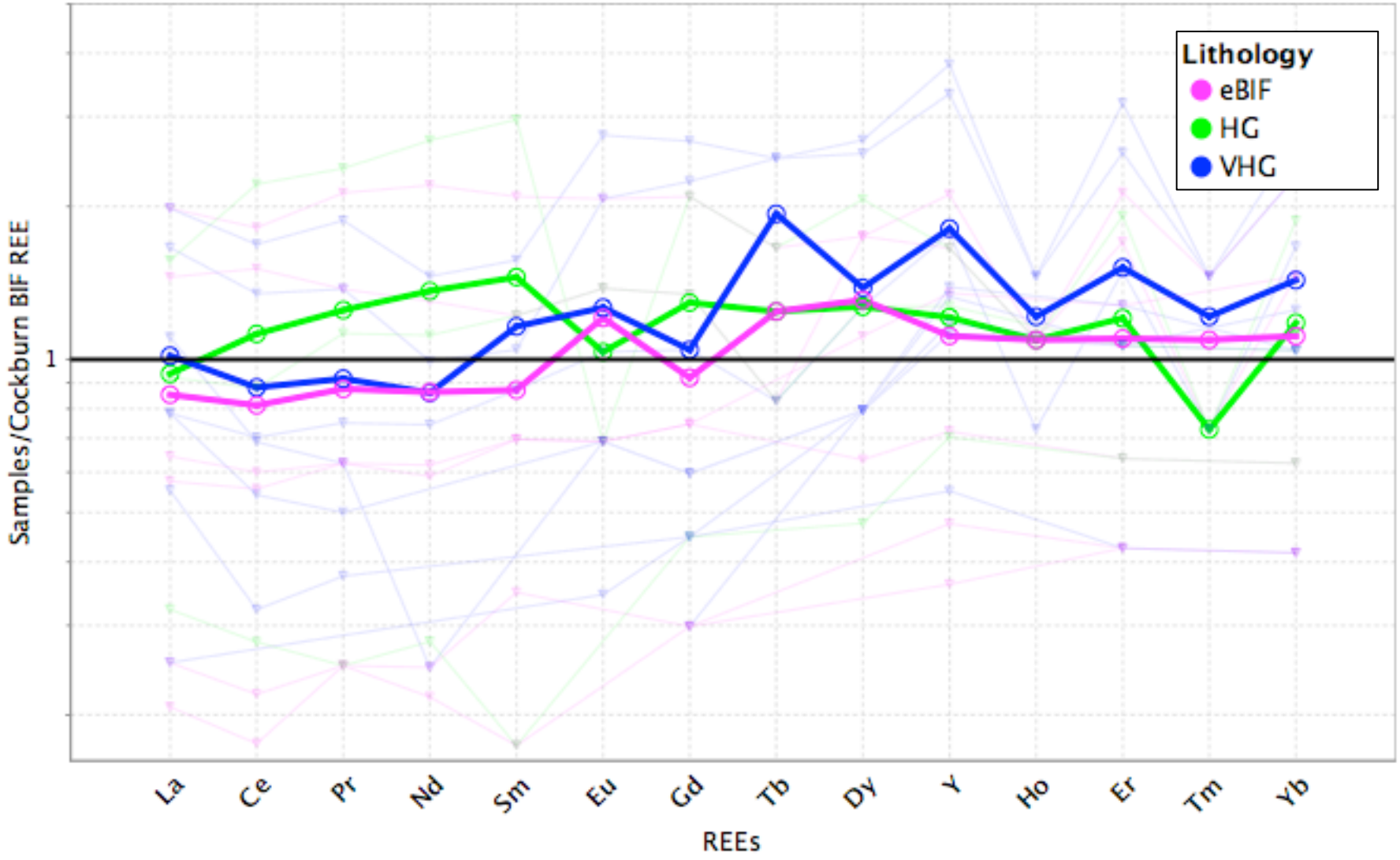
Baffinland

Rare Earth Elements in BIF



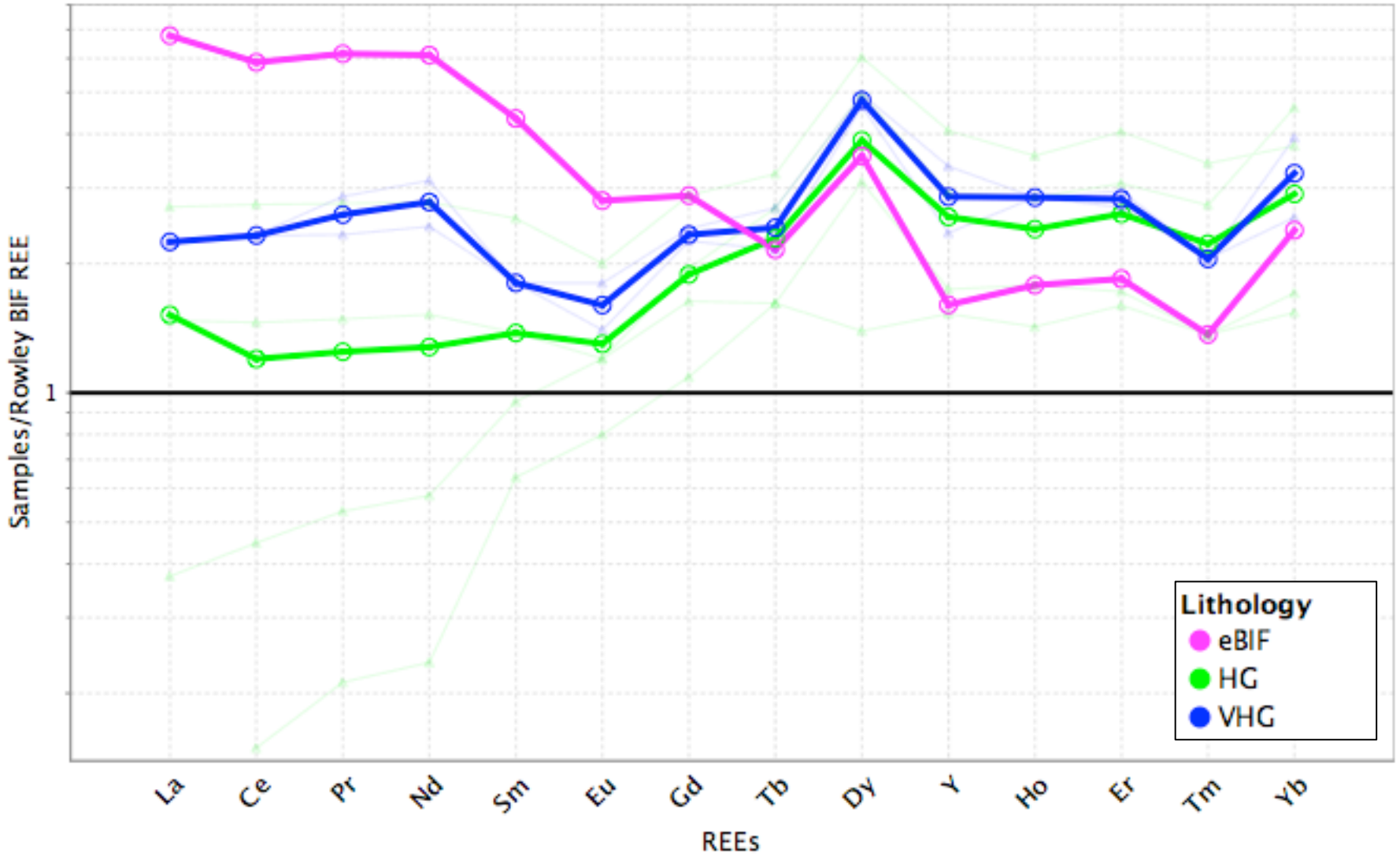
Baffinland

Cockburn River REEs



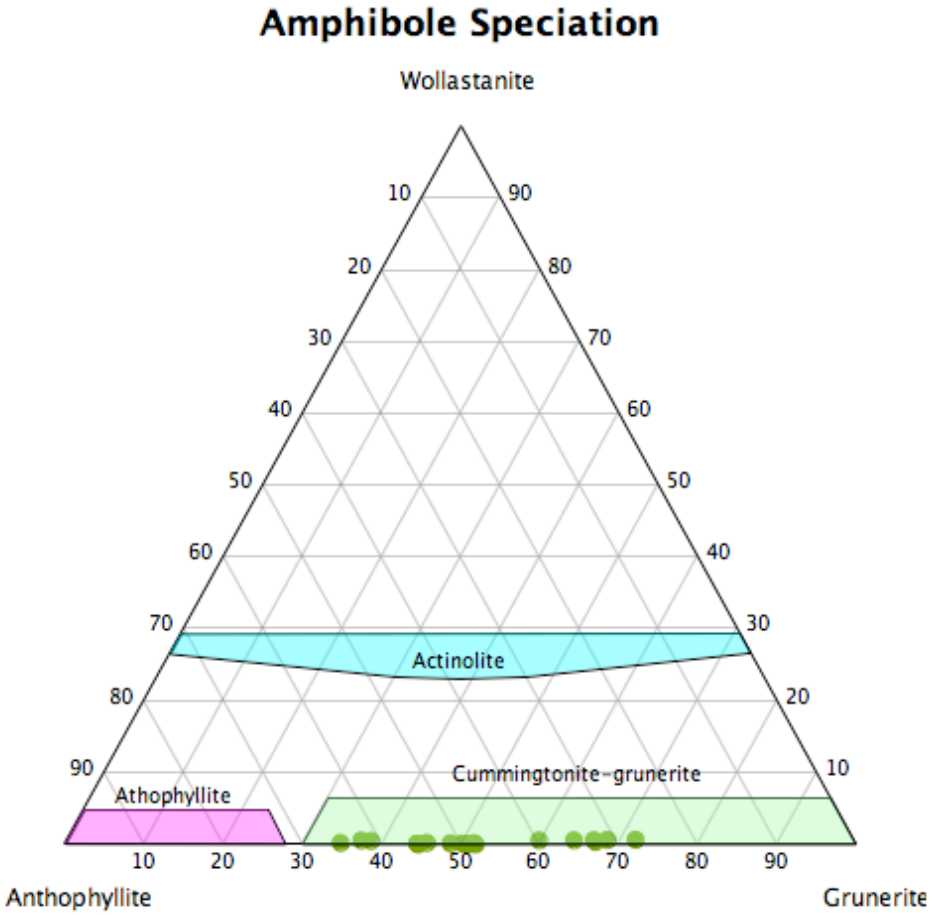
Baffinland

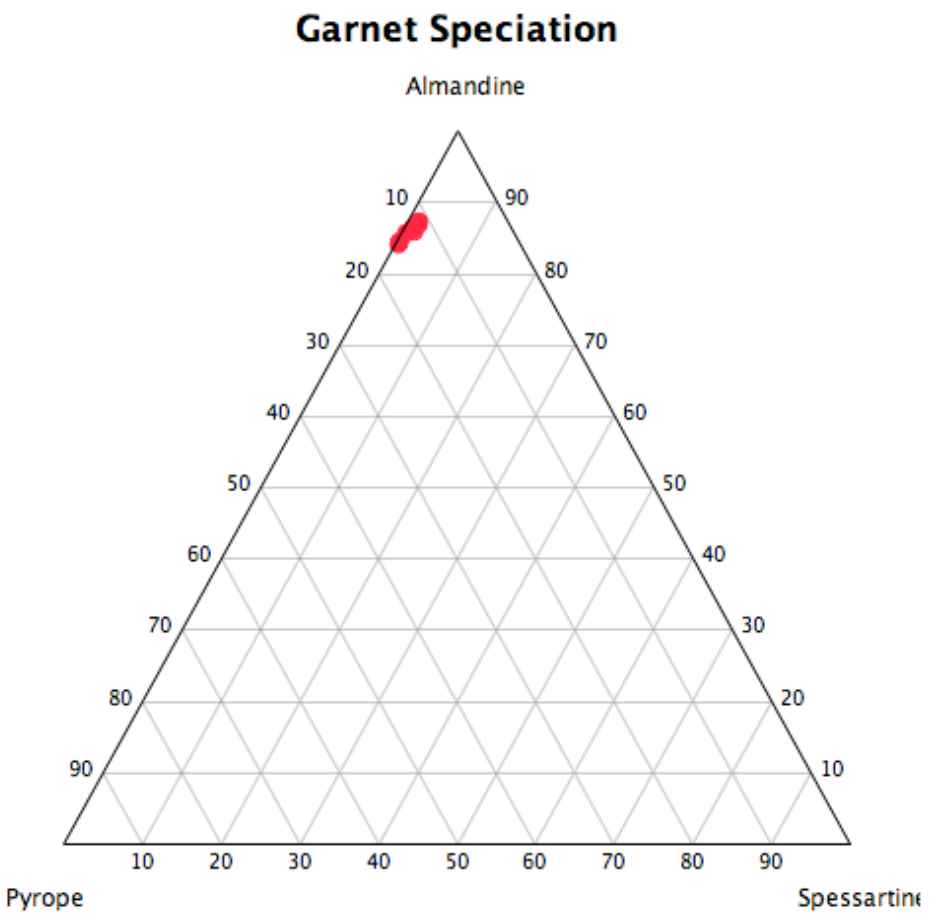
Rowley River REEs



Baffinland

Select Mineral Speciation





Baffinland


Ongoing
& Future Work

2015

- **Spring 2015**
- Geochronology course at UWO
- Petrographic analysis and data interpretation from 2014 field season
- **Summer 2015**
- Fieldwork with Baffinland
- Writing
- **Fall 2015**
- P/T Diagram construction
- Mass balance determinations
- Writing

2016/2017

- **Spring 2016**
- Geochronology
- Writing
- **Summer 2016**
- Fieldwork with Baffinland
- Writing
- **Fall 2016/Winter 2017**
- Finish writing
- Defense


Questions?