

Evidence for intrusion-related, precious metal mineralization in the Northeastern Mount Peyton Intrusive Suite: regional implications



Outline

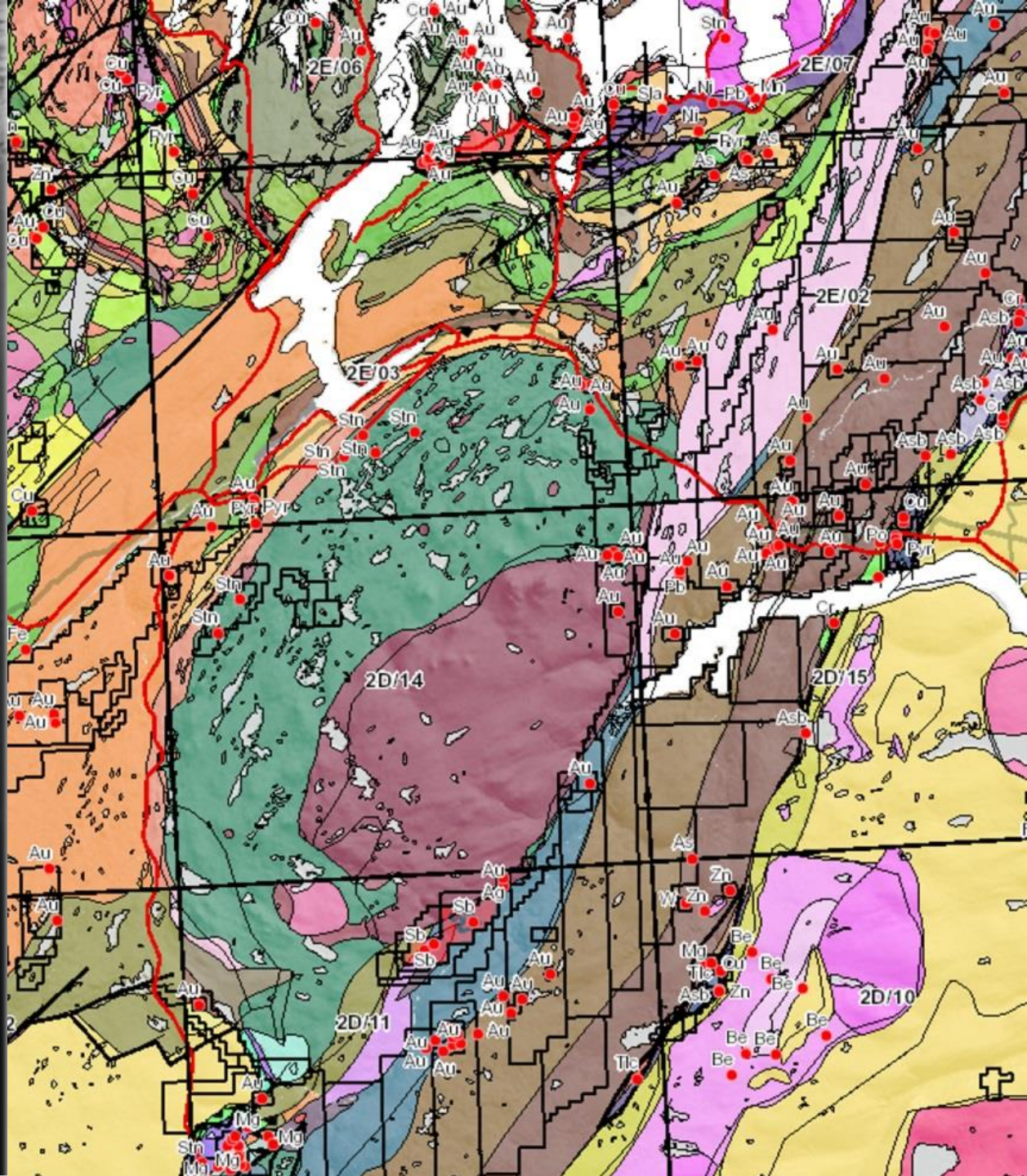
- Brief summary of historical work in the study area
- Summary of the geology of the 2 main locations and a few others
- New, U-Pb geochronology
- Geochemistry of intrusive rocks of the Mount Peyton Intrusive suite mineralized and unmineralized
- Metal associations and tenors, regional and economic implications, future work on Dog Bay Line

Newfoundland
Labrador

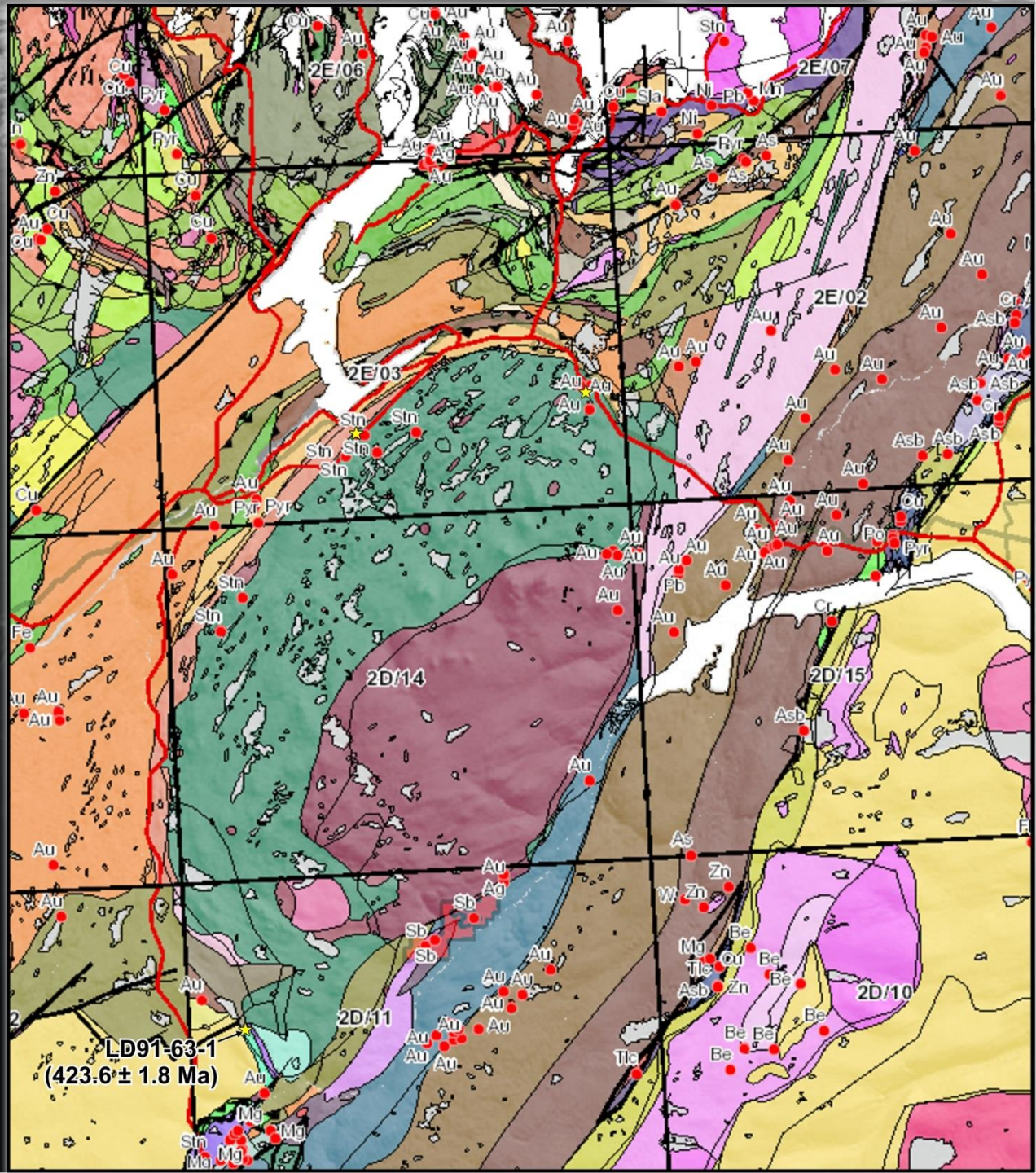
Natural Resources

Geological Survey

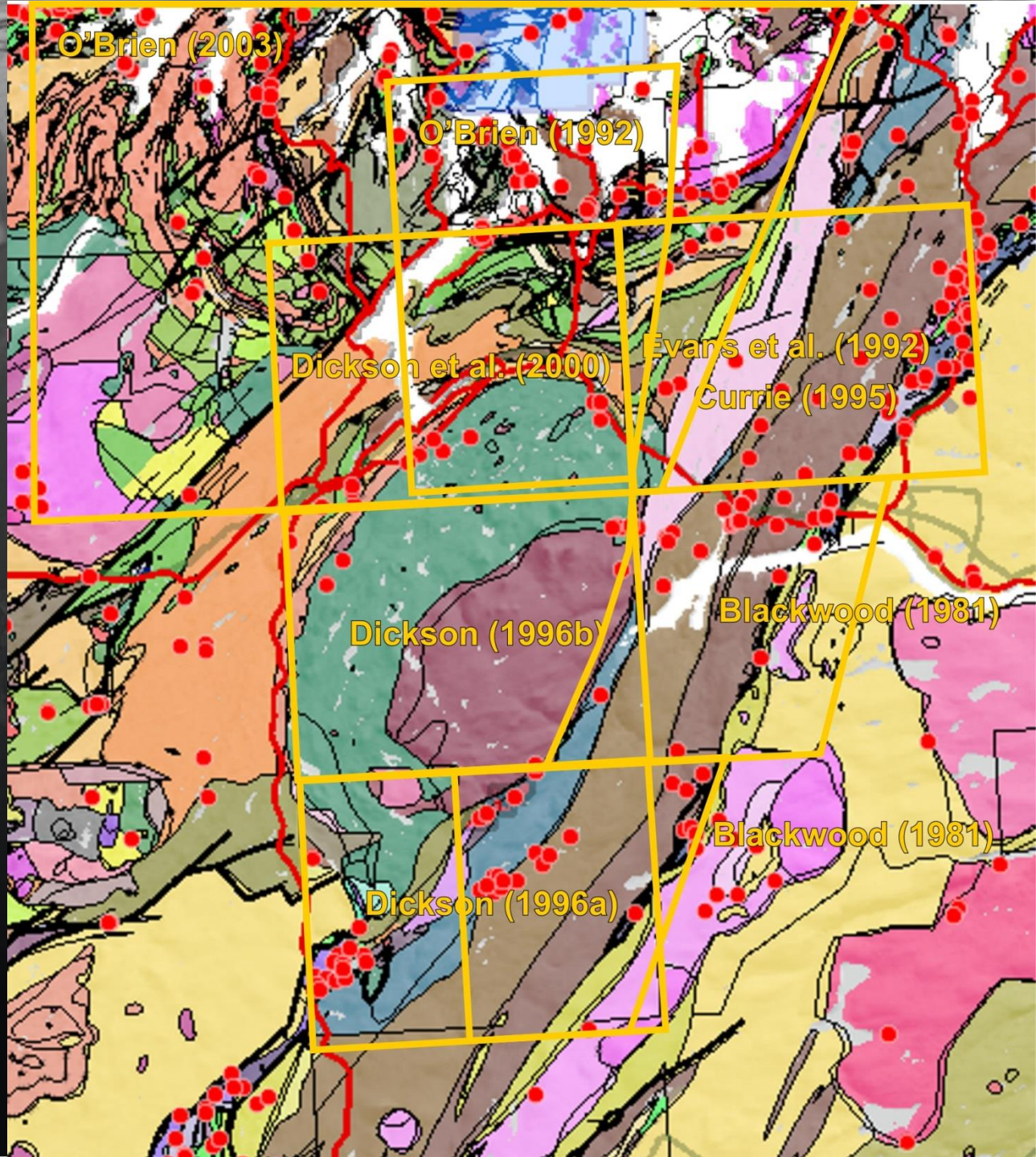
Regional geology, claims and mineral occurrences



Regional geology and mineral occurrences,
and map unit/boundary issues



Regional geology and previous mapping



History of mineral-exploration-research

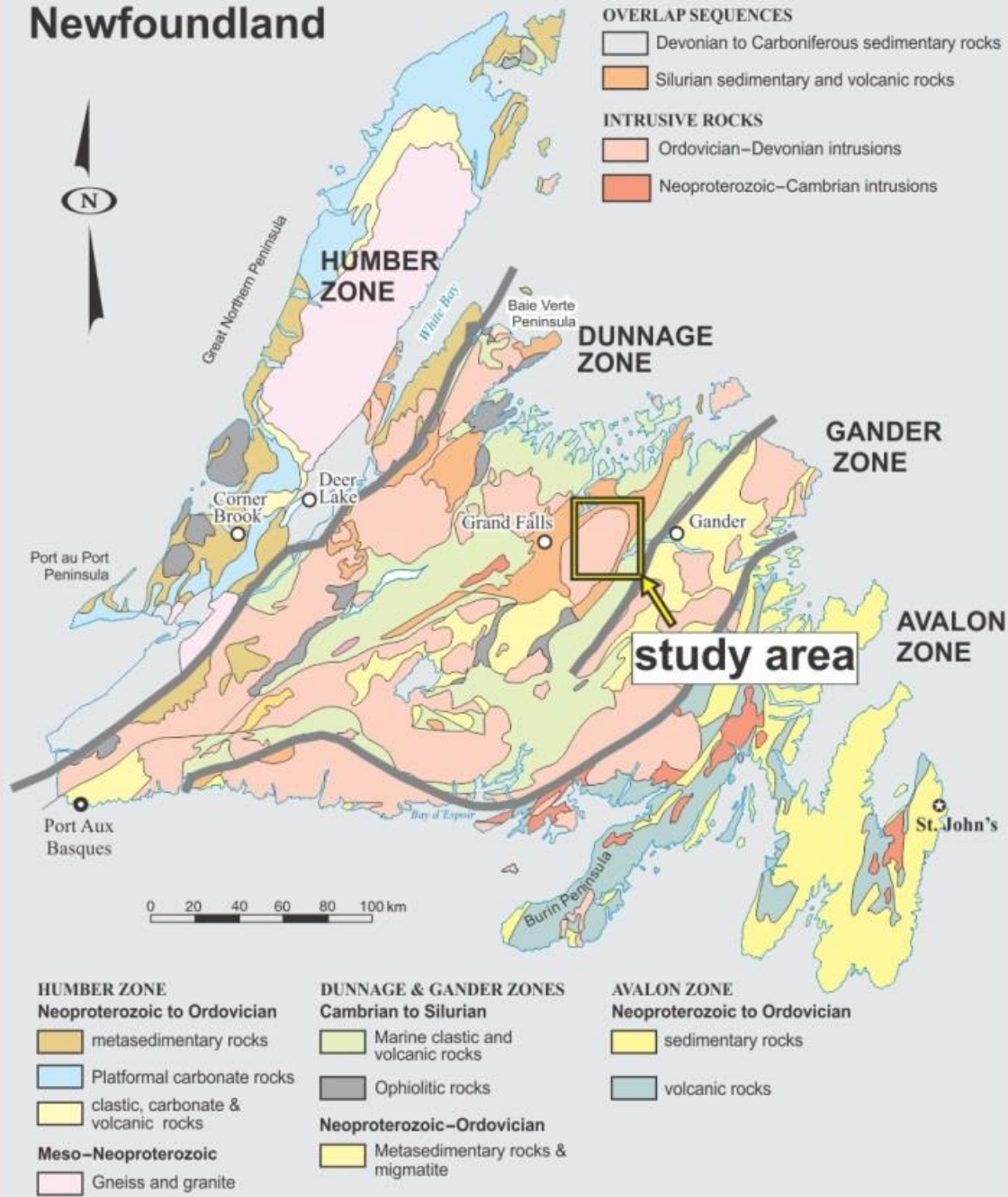
- Regional mapping GSC surveys of 1960's and 70's (Williams, 1962; Anderson & Williams, 1972)
- All early work prior to the 1980's focused on base metals, Cr and Asbestos in ophiolitic rocks of the Gander River complex
- 1:50,000-scale GSNL mapping (Blackwood (1981; 1982: Evans et al. 1992: Dickson, 1996a & b; Dickson et al. 2000)
- Exploration for gold started in late 1980's accompanying a higher price for gold and positive market conditions
- Late 1980's led to discovery of many new gold, silver and antimony occurrences

Mineral-exploration-research continued

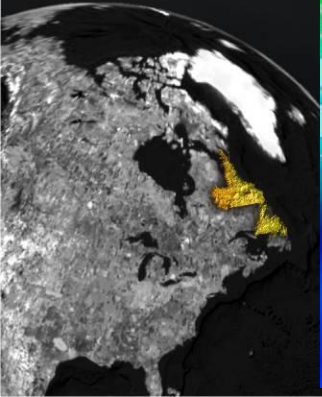
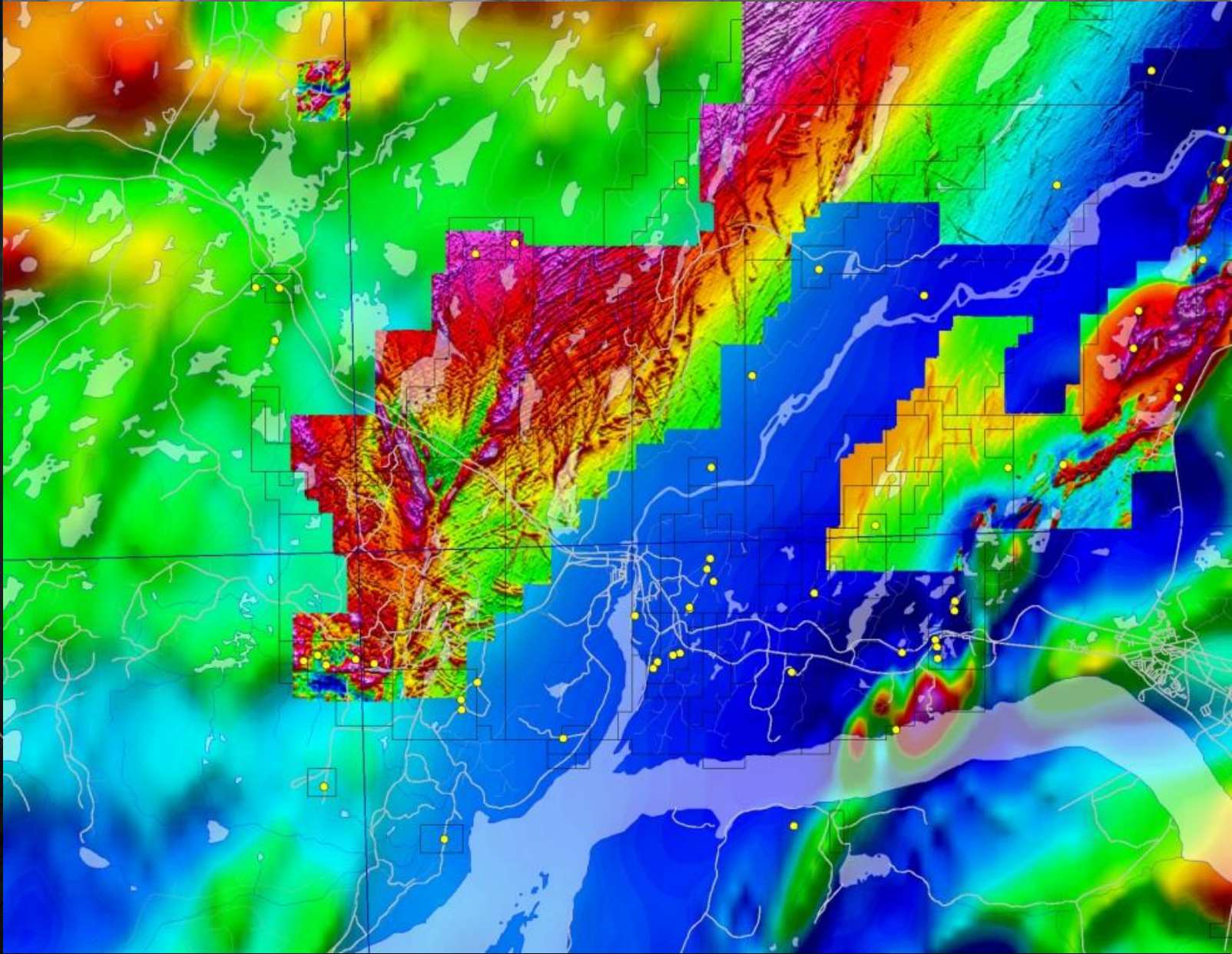
- Including the BeaverBrook Sb mine in 1989
- Salmon River mineralization discovered 1989-90 by Noranda Exploration (Tallman, 1990)
- Slip showing discovered 1993 (Forex Resources: J. Clarke, pers. comm., 2016)
- Late 1990's and 2000's increased exploration interest from Altius Minerals, Rubicon Minerals and numerous others.
- detailed aeromagnetic surveys flow over parts of NE MPIS and Indian Islands Group
- More showings discovered since 2005 including Cherry Hill, Contact, O'Reilly, Yellow Fox, Clarks brook East and West.

Location of the study area

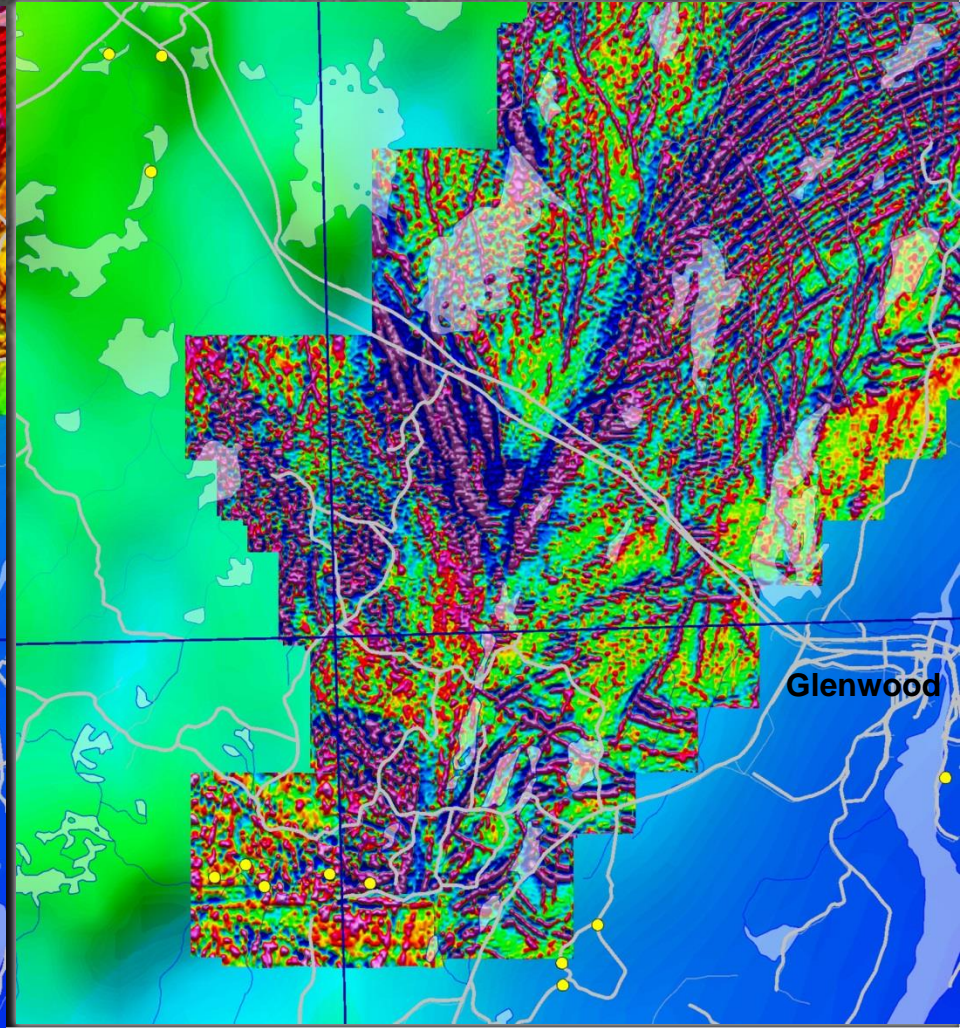
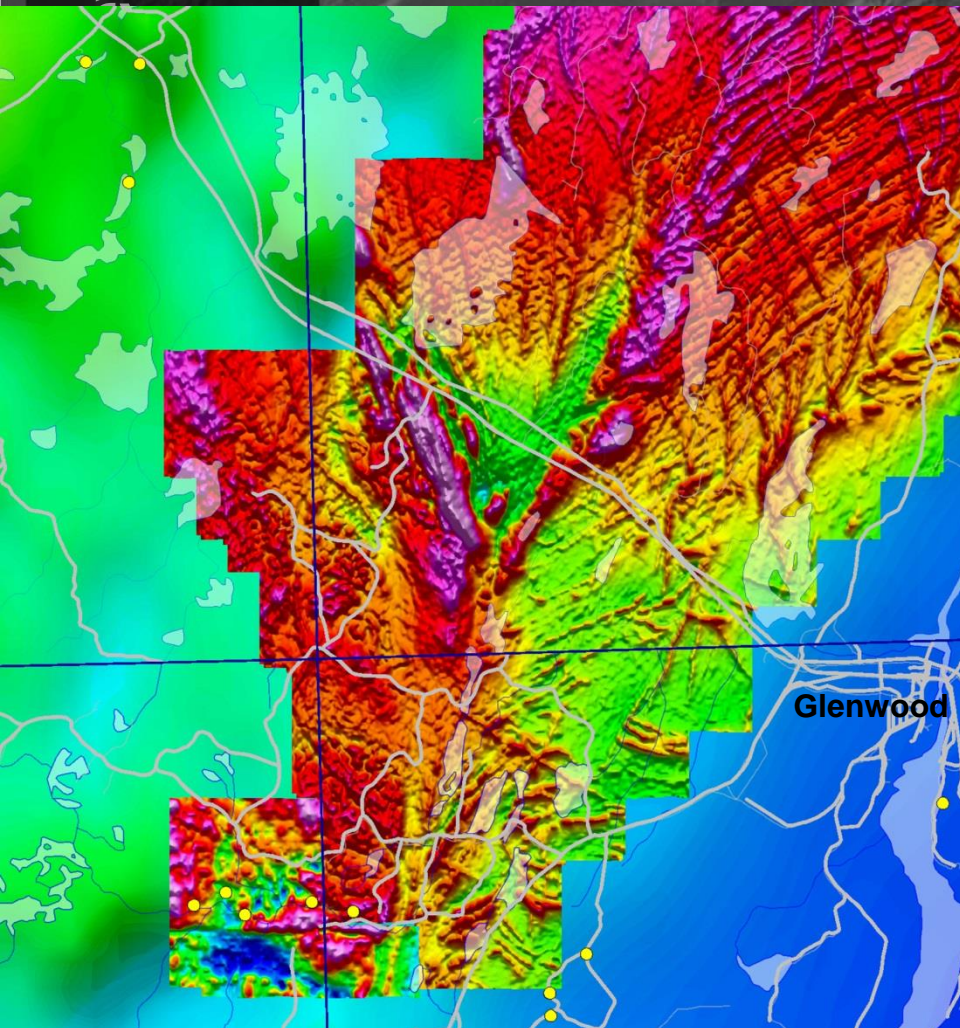
The Island of Newfoundland

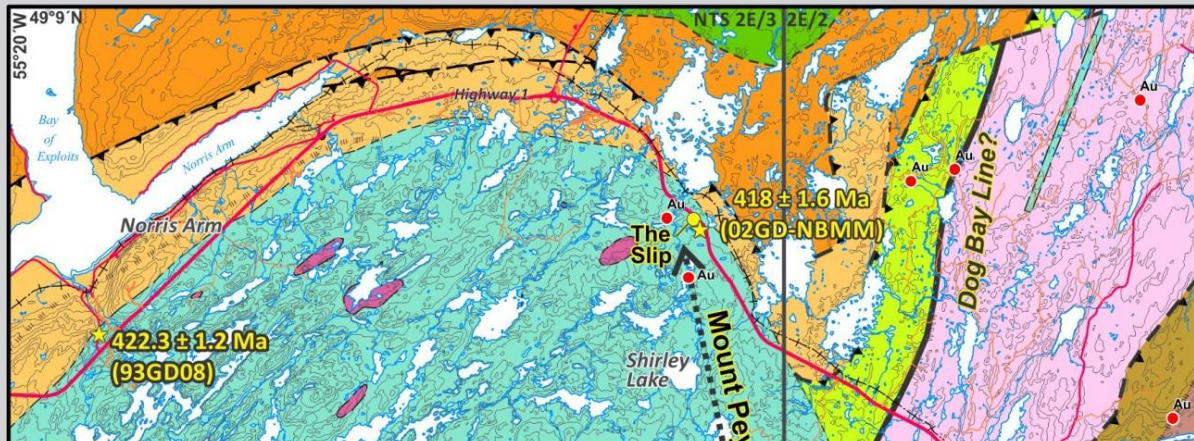
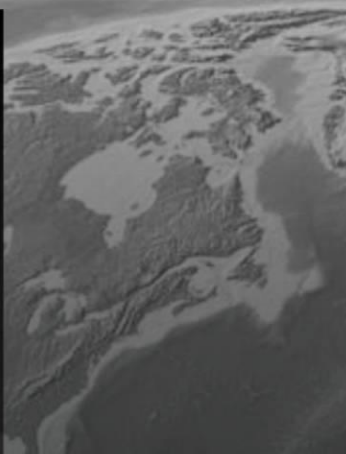


Airborne magnetics detail and regional



Industry detailed aeromagnetic surveys on regional 800m line spacing (GSC)





Silurian-Early Devonian

- Indian Islands Group (& Ten Mile Lake Fm.)
- Botwood Group (Wigwam Formation)
- Botwood Group (Laurenceton Formation)
- Badger Group (undivided)

- Mount Peyton Intrusive suite (monzogranite)
- Mount Peyton Intrusive suite (gabbro-diorite)

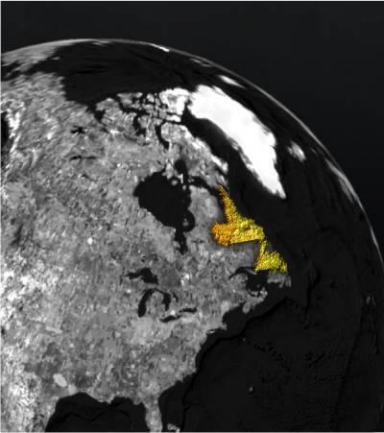
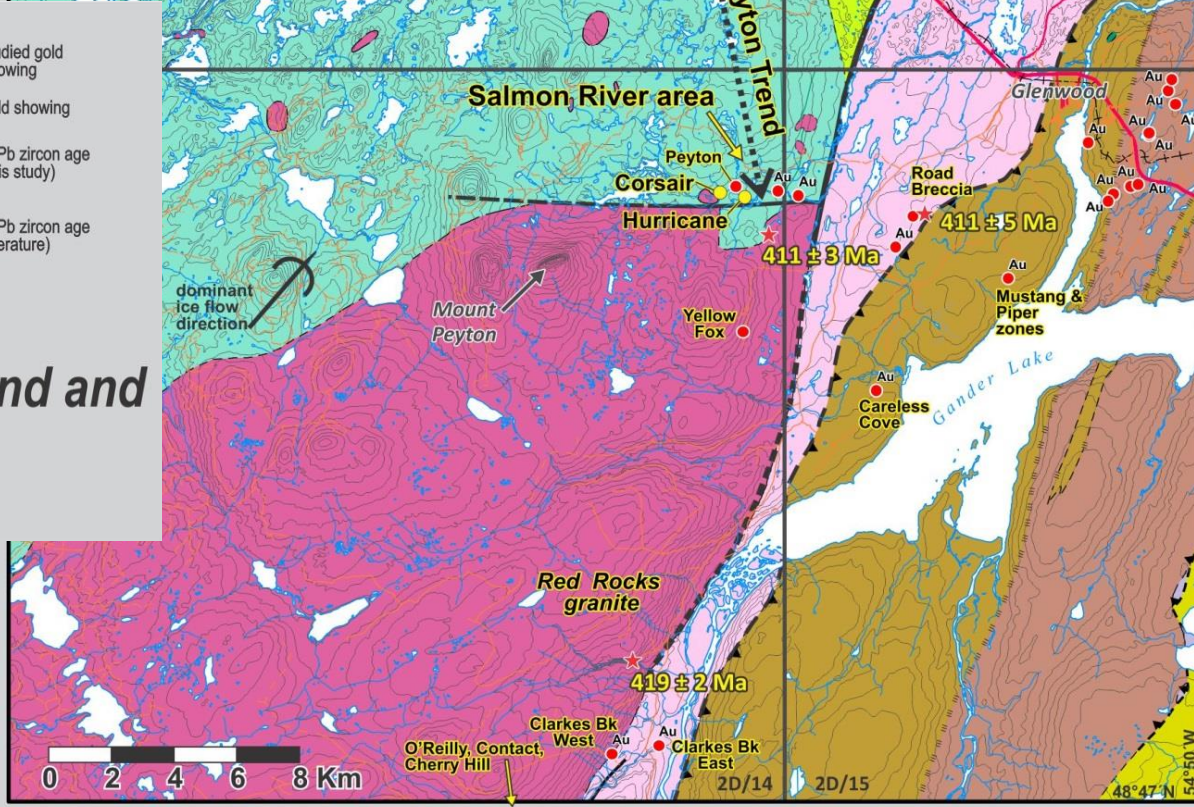
- Corsair studied gold showing
- Au gold showing
- 418 ± 1.6 Ma U-Pb zircon age (this study)
- 419 ± 2 Ma U-Pb zircon age (literature)

Cambro-Ordovician

- Davidsville Group (Outflow Formation)
- Davidsville Group (Hunts Cove Fm.)
- Exploits Group (undivided)
- Gander River Complex (undivided)
- Gander Group belt (undivided)

- road
- woods road
- normal fault
- thrust fault (approximate)
- geological contact (approximate)

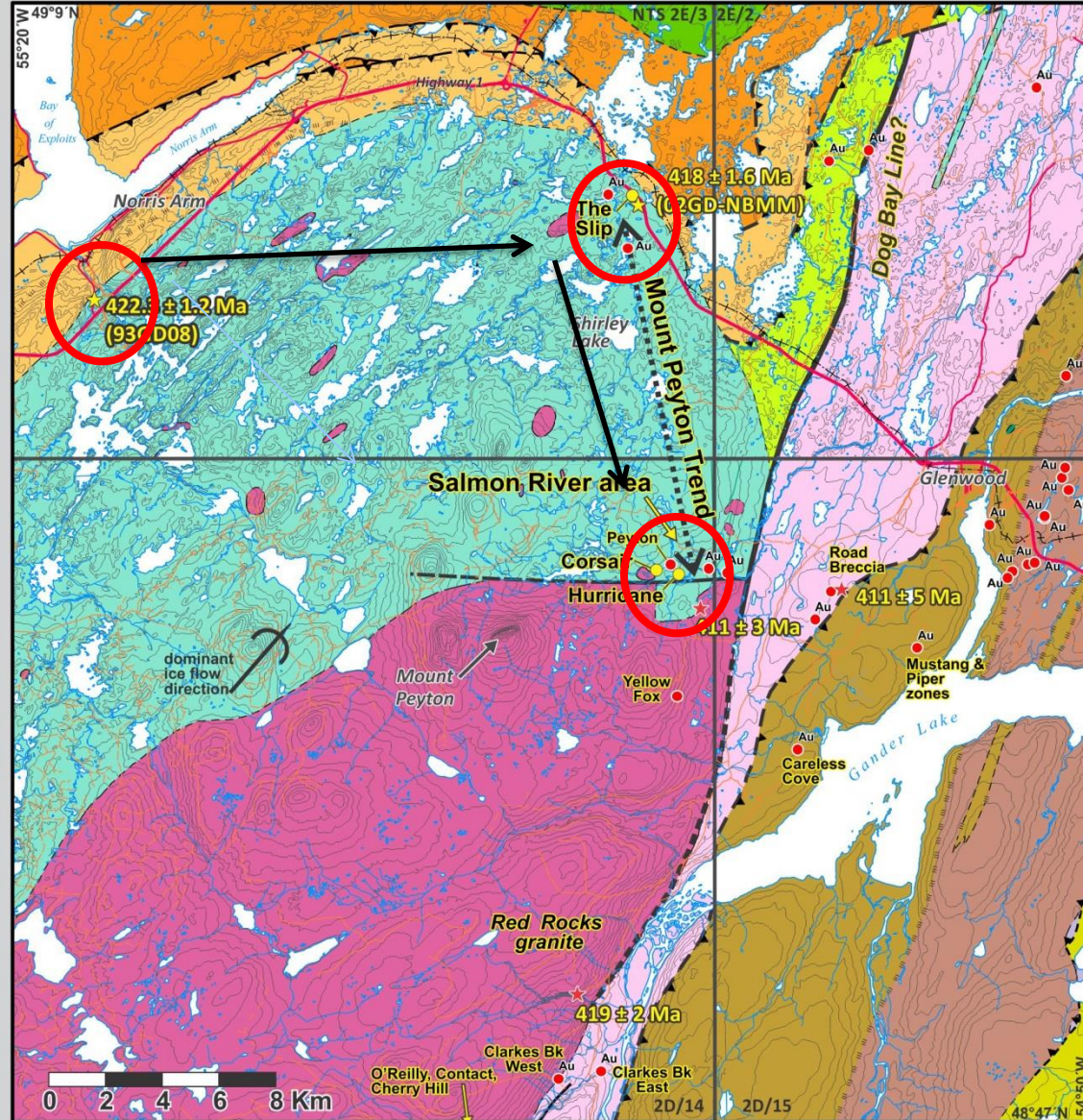
Legend and Key



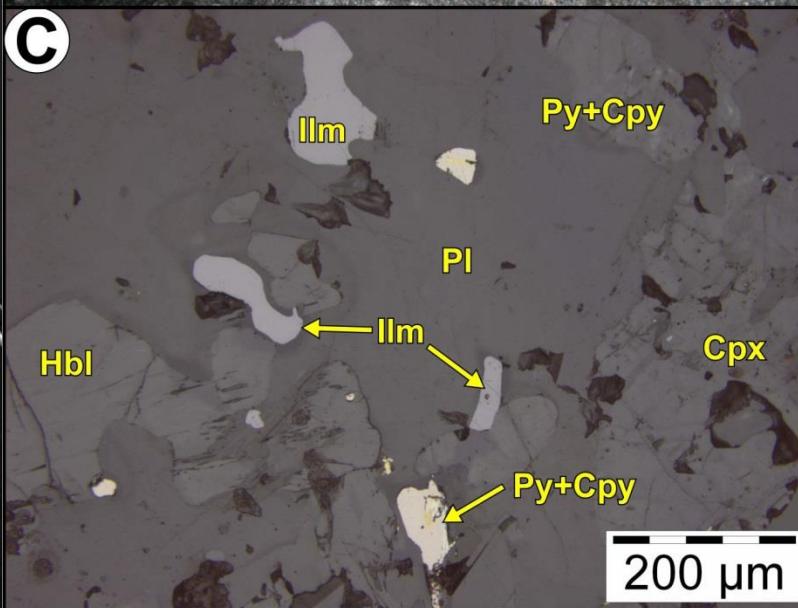
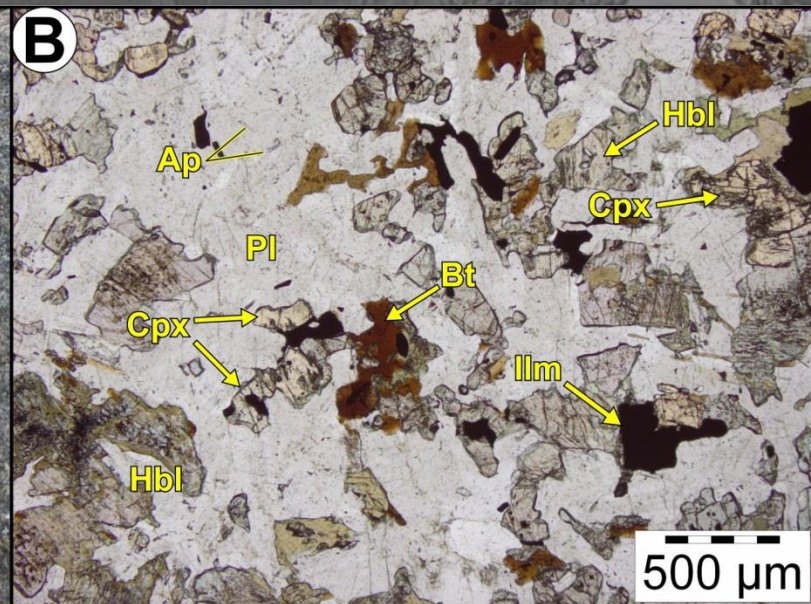
NE MPIS (2D/14, D/15, 2E/3, E/4)

northwest to southeast

Geological Survey



Norris Arm gabbro



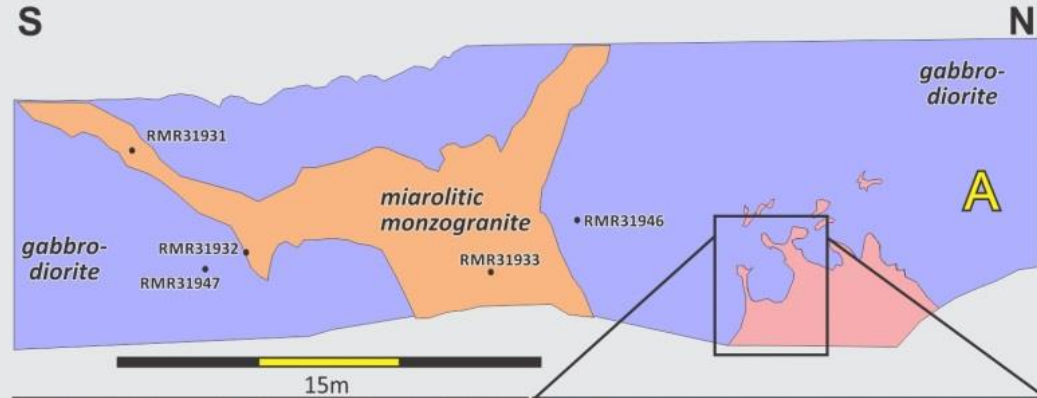
Norris Arm Gabbro
(422.3 ± 1.2 Ma) Norris
Arm, western access
road

The Slip showing: Neyles Brook quarry

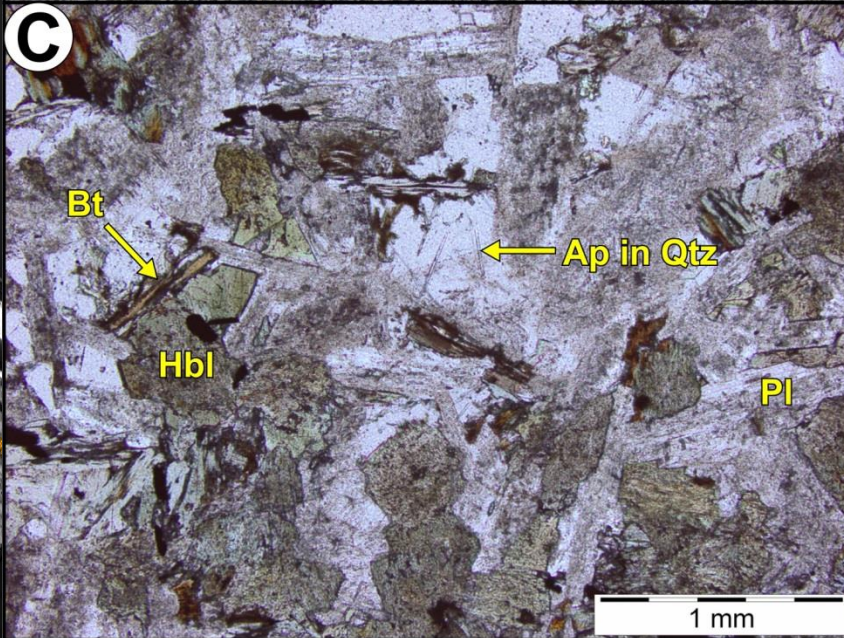
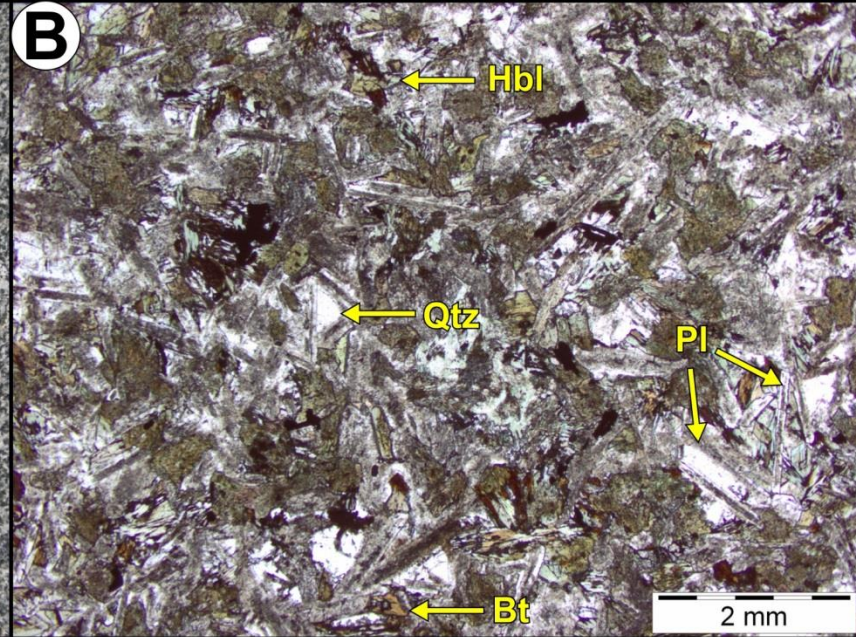


The Slip: Neyles Brook Quarry

- 5 distinct
- 1) gabbro
- 2) granop
- 3) granoc
- 4) miarol
- 5) young lamprop



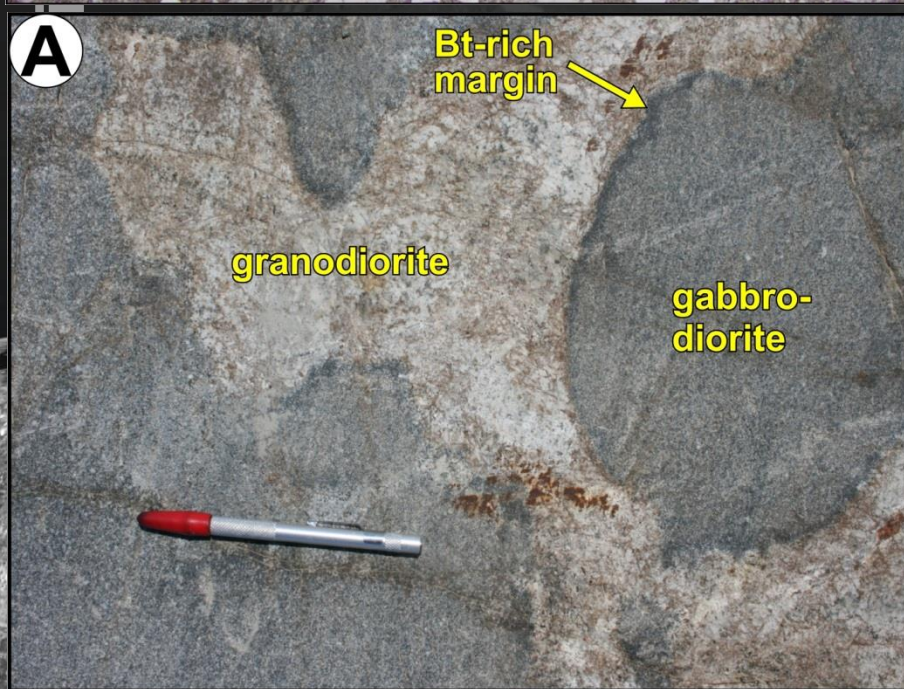
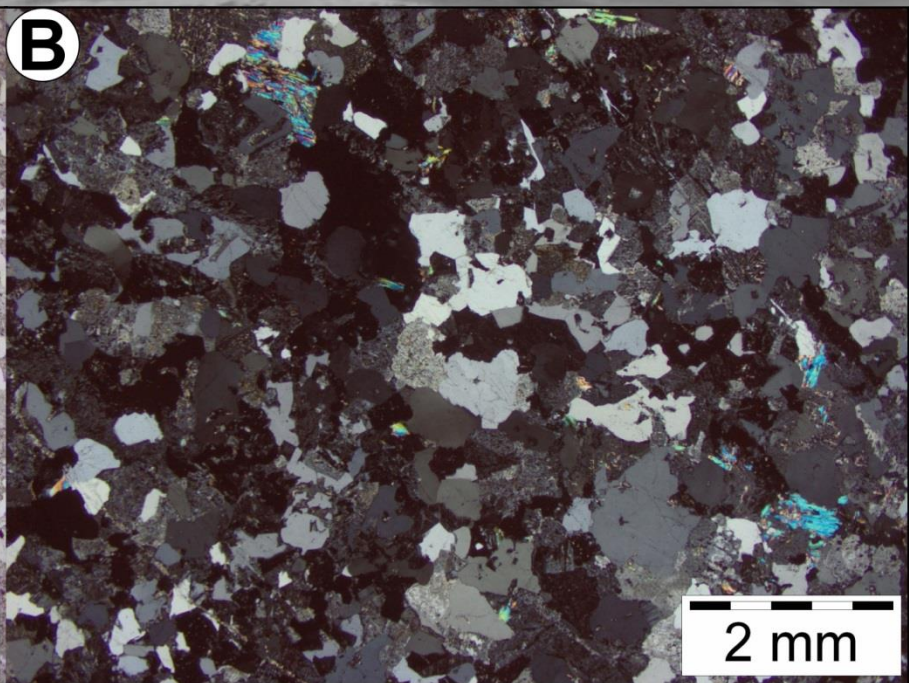
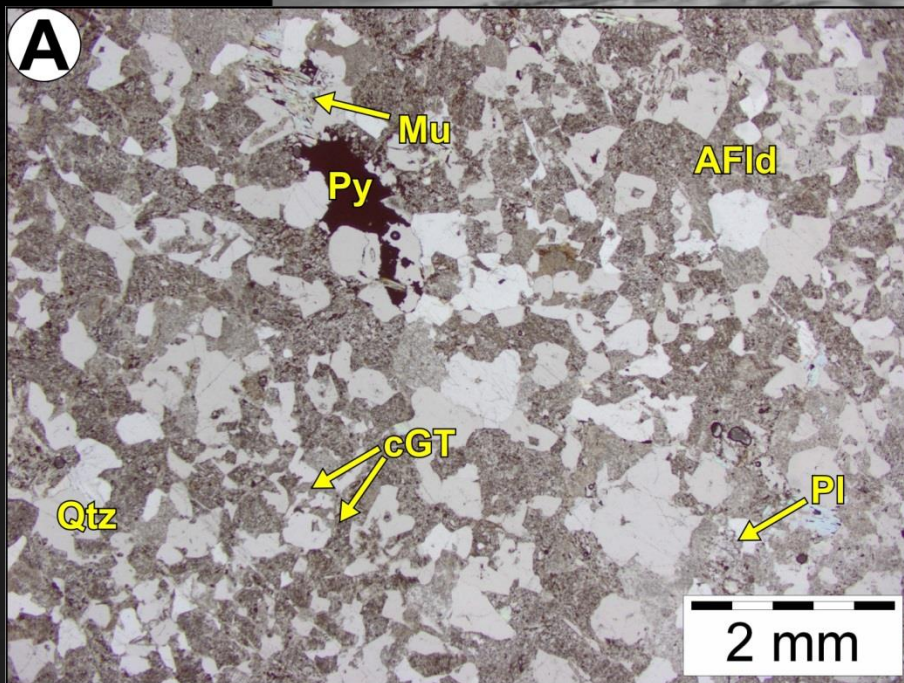
The Slip showing: continued



The Slip gabbro-diorite

5 cm thick irregular granodiorite dyke, penetrating and interfingering with gabbro-diorite. Note pegmatitic cavity on right.





The Slip showing: continued Miarolitic monzogranite

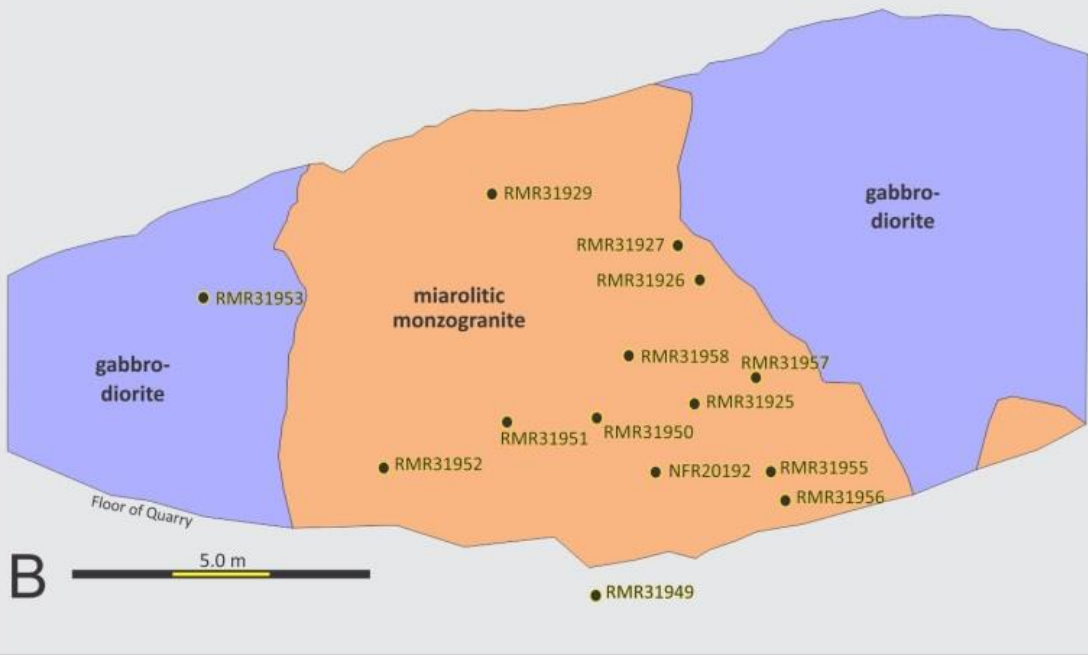


SE

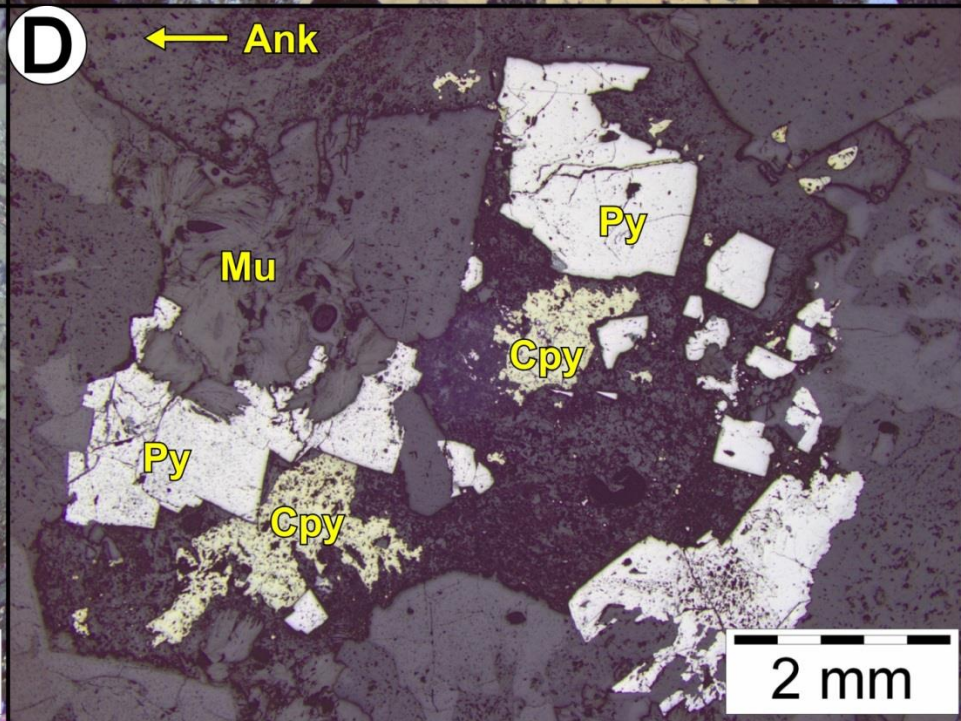
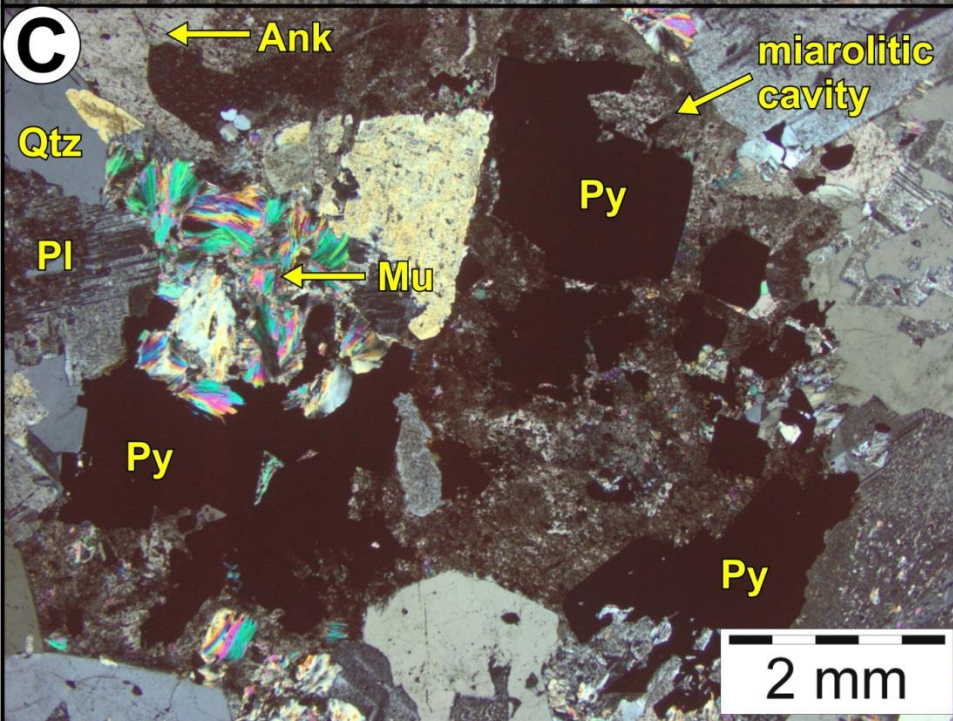
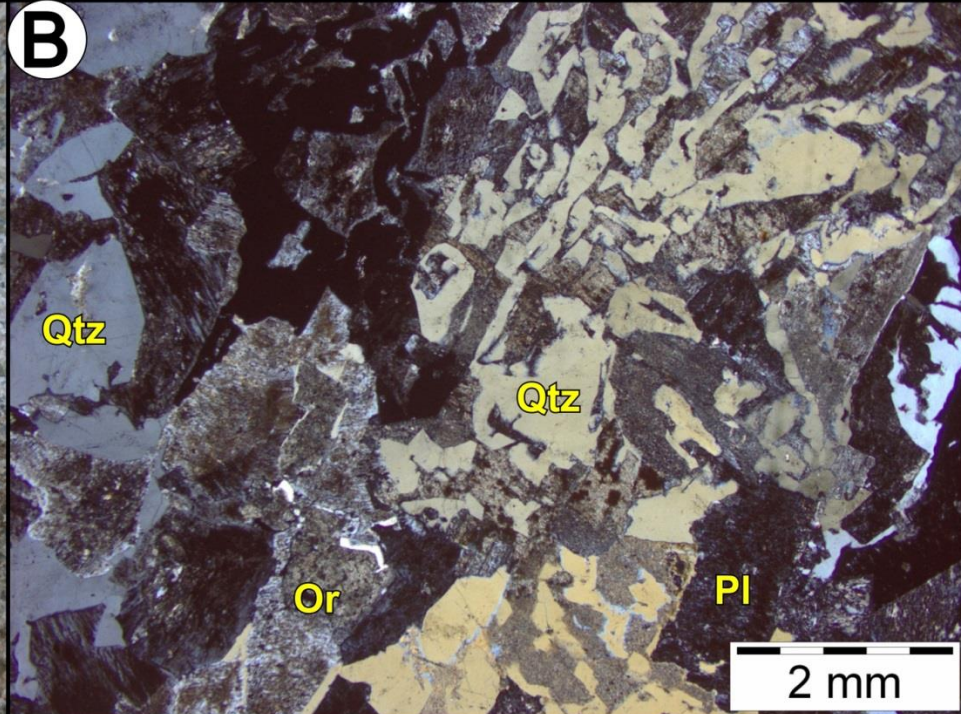
NW



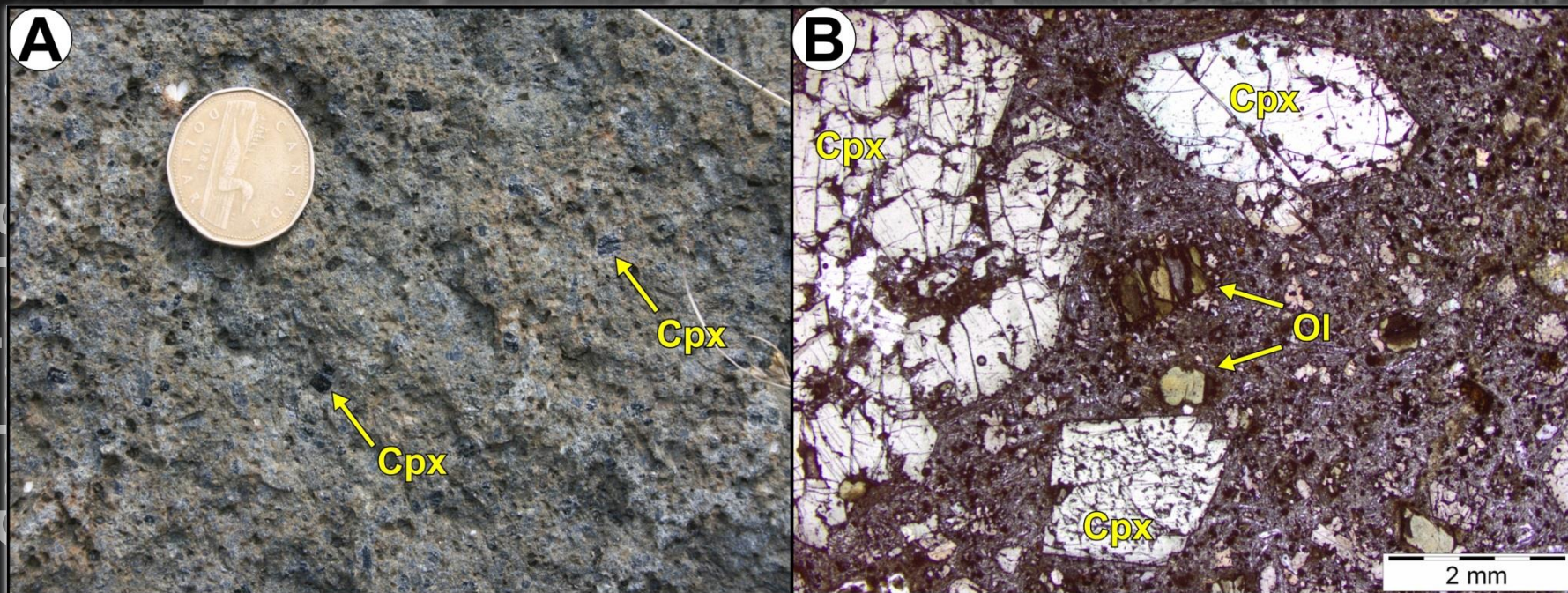
A

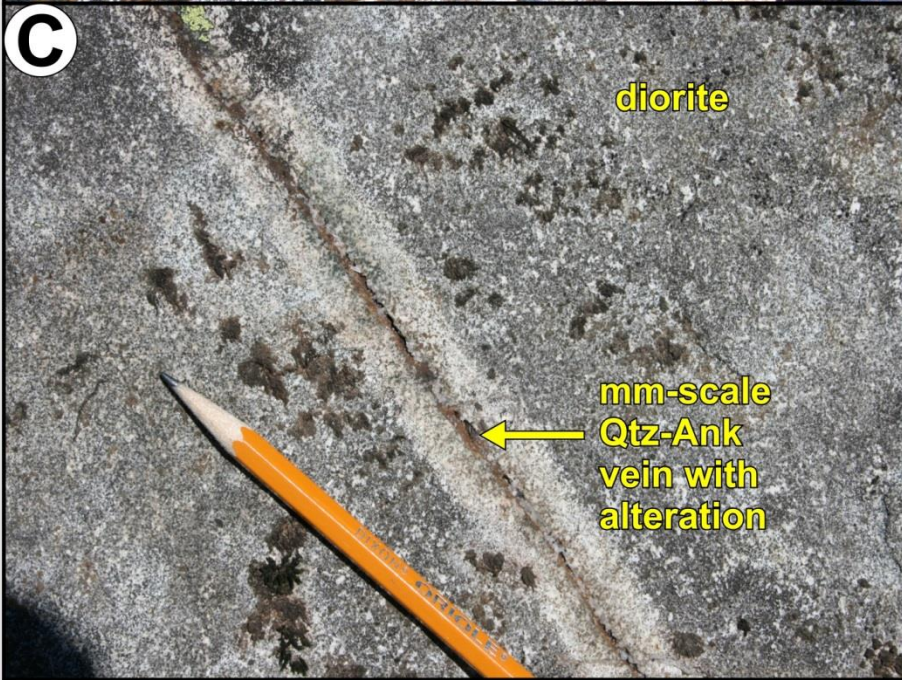
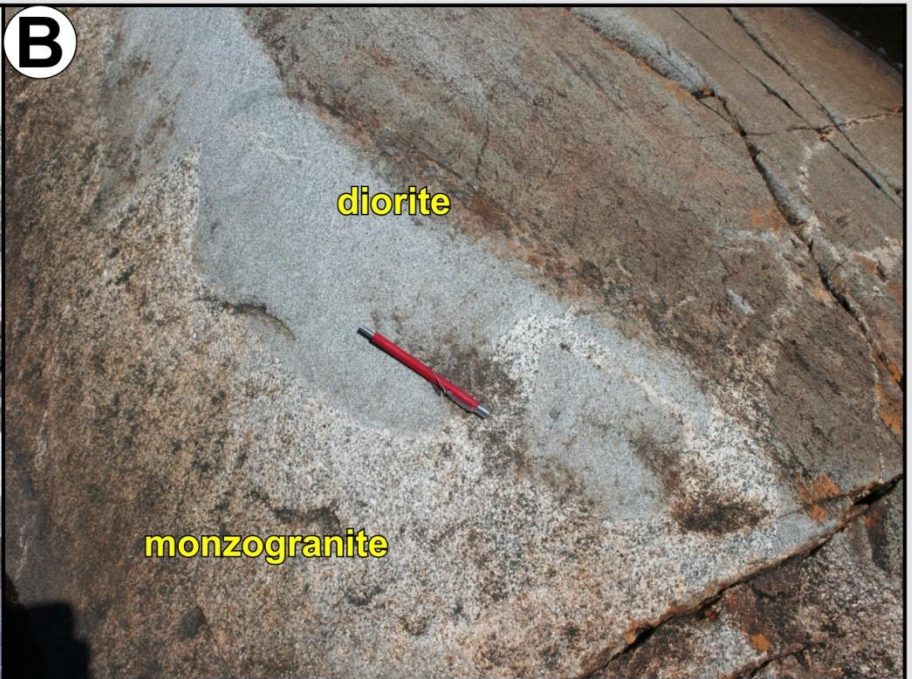


B



Jurassic lamprophyre dyke





Hurricane-Corsair zones: Salmon River

Salmon River mineralization in core

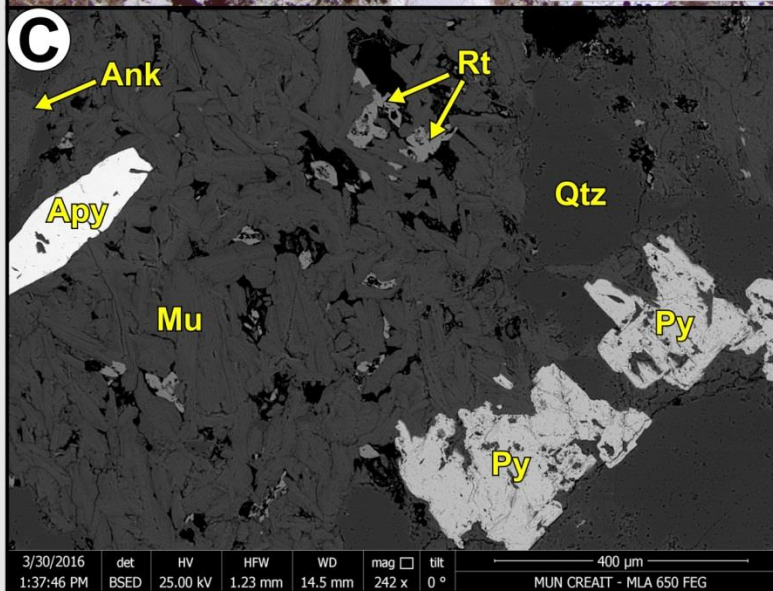
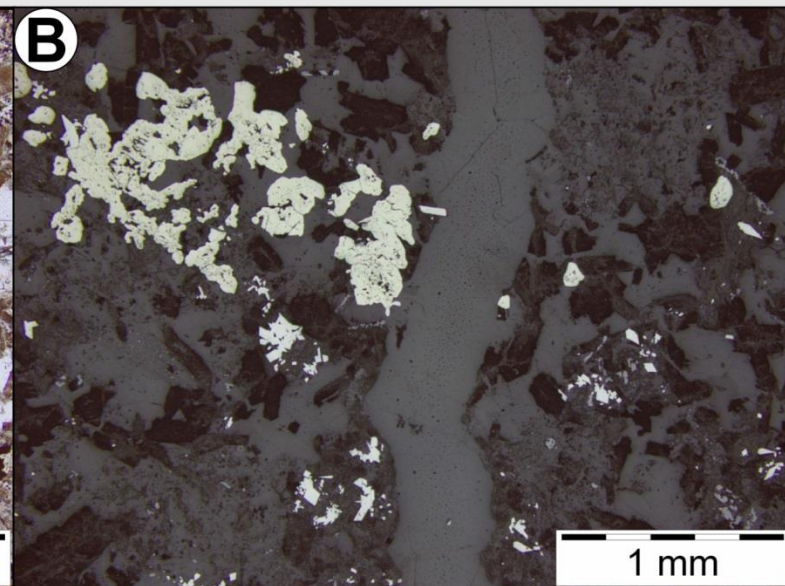
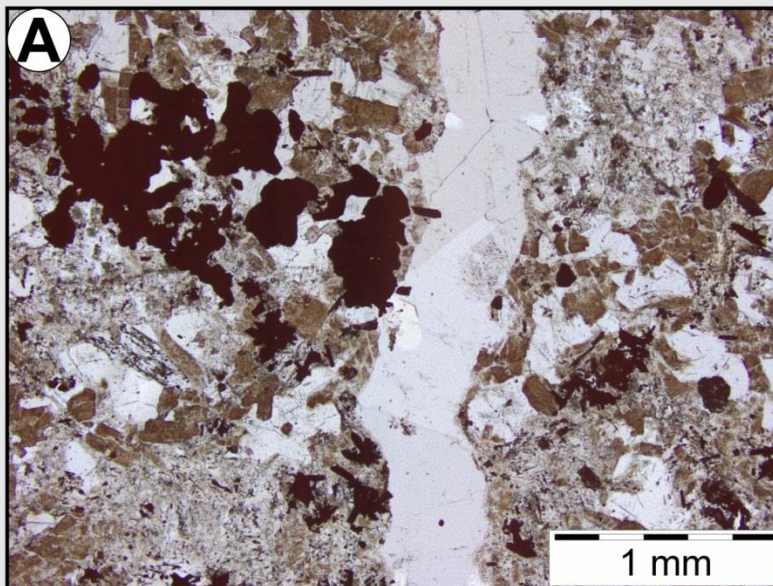


Salmon River mineralization core thin sections

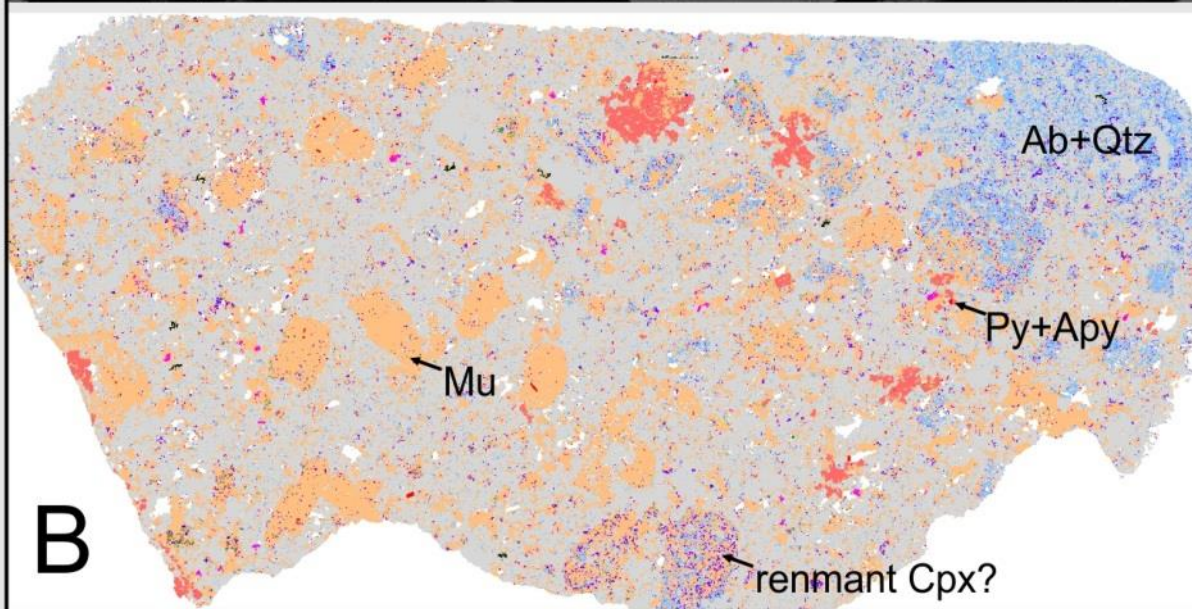
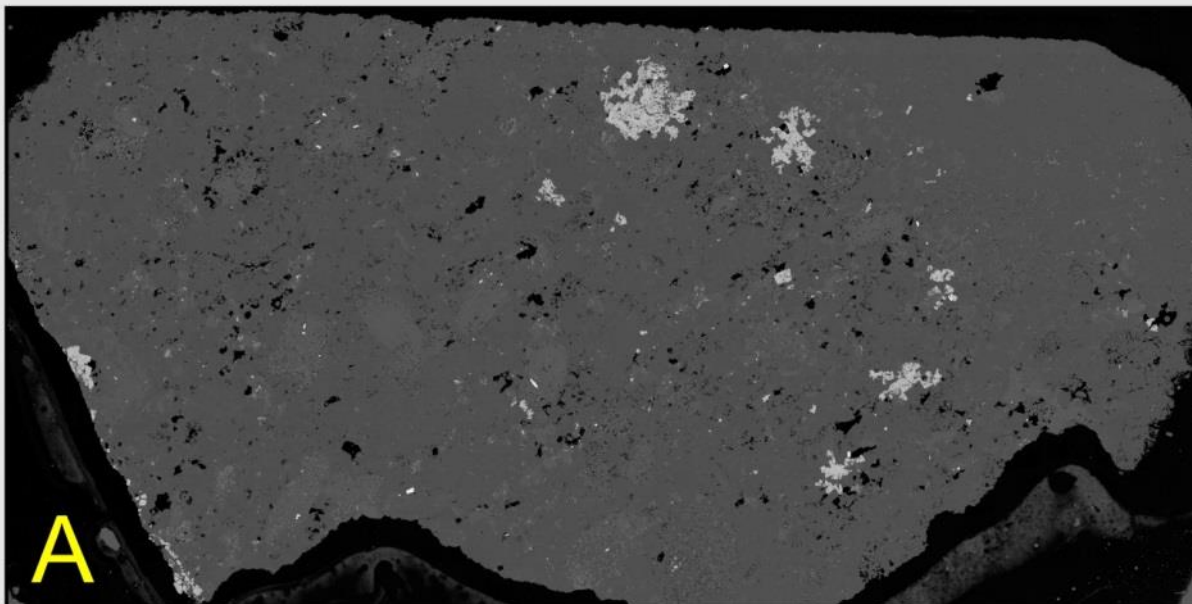
Newfoundland
Labrador

Natural Resources

Geological Survey



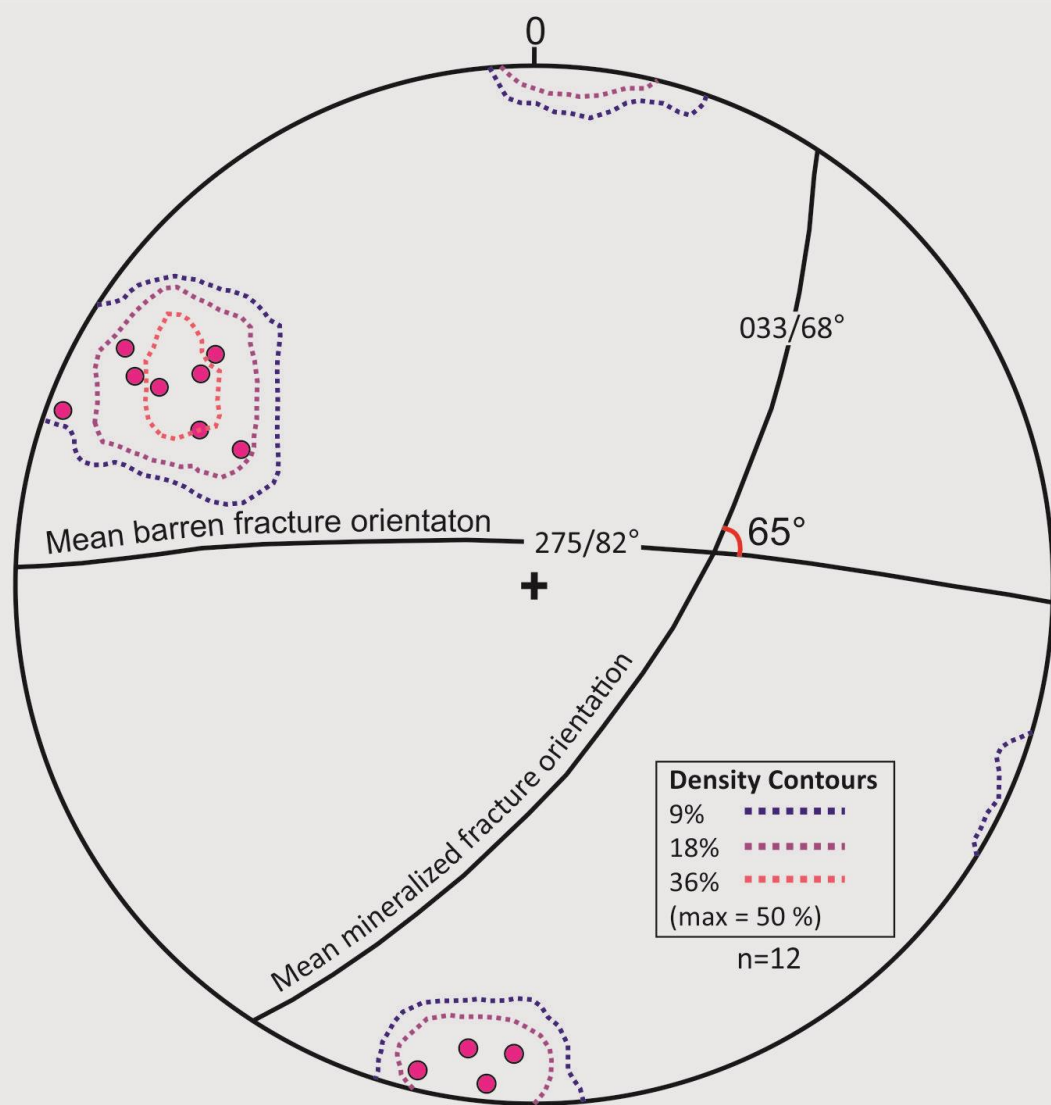
Salmon River mineralization MLA



Mineral Key:

Grey	Quartz
Orange	Muscovite
Light Blue	Feldspar
Purple	Pyroxene
Red	Py-Arsenian
Olive Green	Siderite
Dark Blue	Biotite-Fe
Magenta	Rutile
Green	Hornblende-Fe
Olive	Limonite
Black	Unknown
Red	Arsenopyrite
Yellow	Zircon

Mineralized and non-mineralized fractures and joints



n = 12

Mean Principal Orientation = 42/73

Mean Resultant dir'n = 65-086

Mean Resultant length = 0.64

(Variance = 0.36)

Calculated. girdle: 172/25

Avg. Population A: 275/82

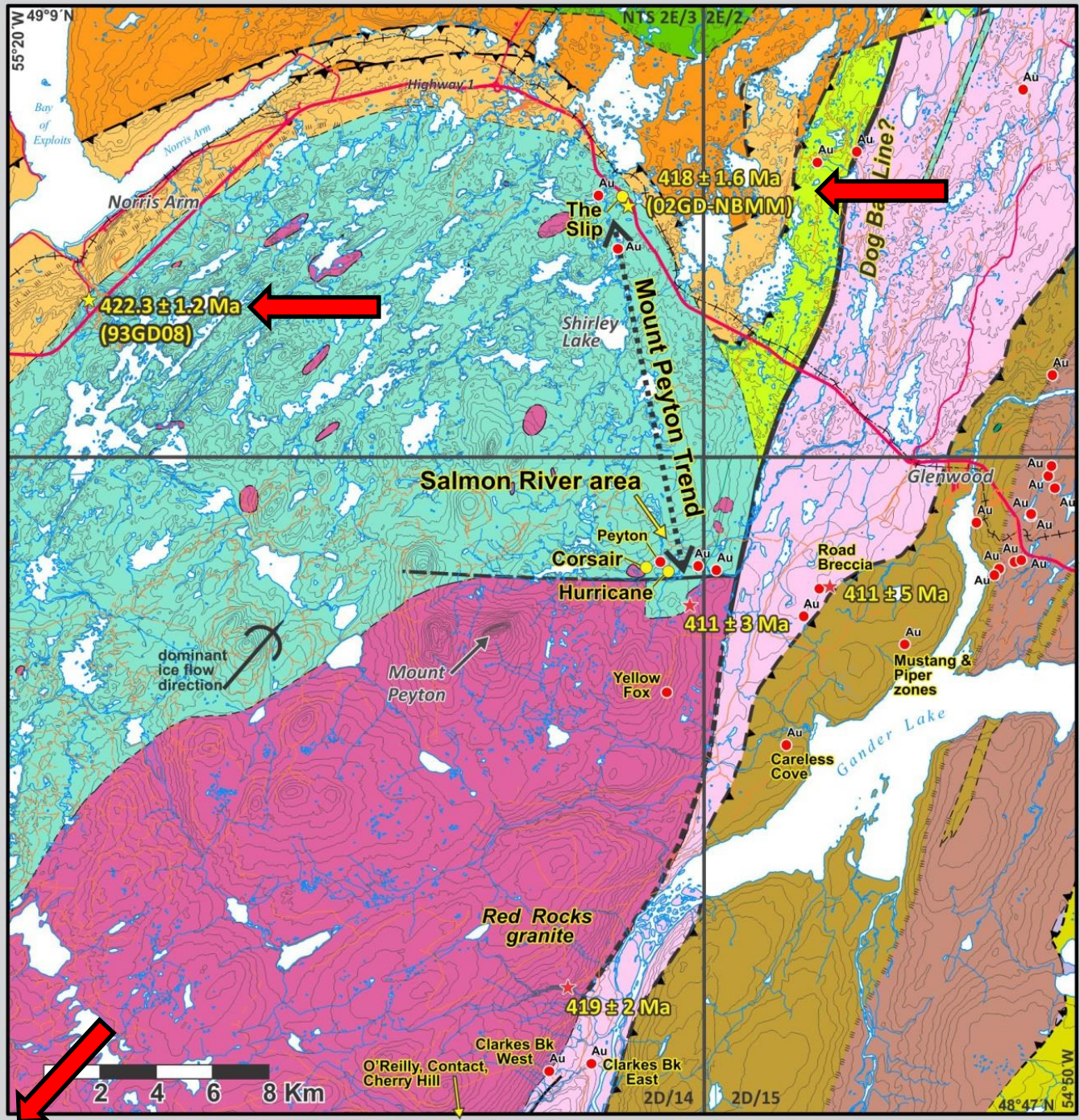
Avg. Population B: 033/68

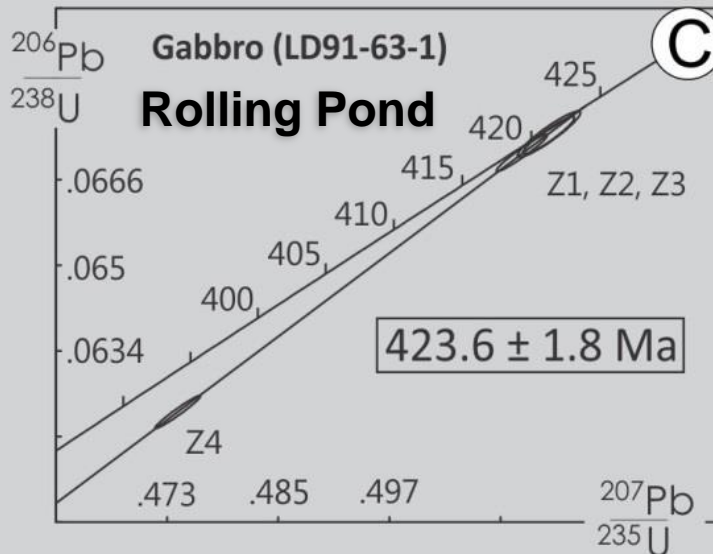
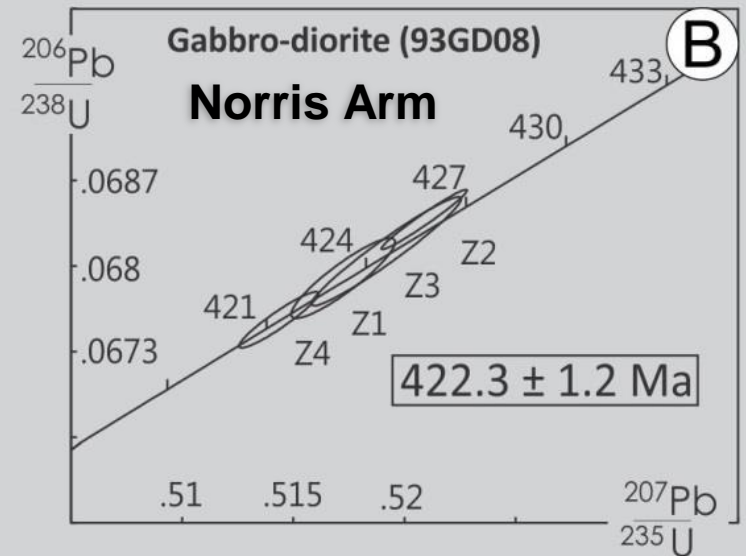
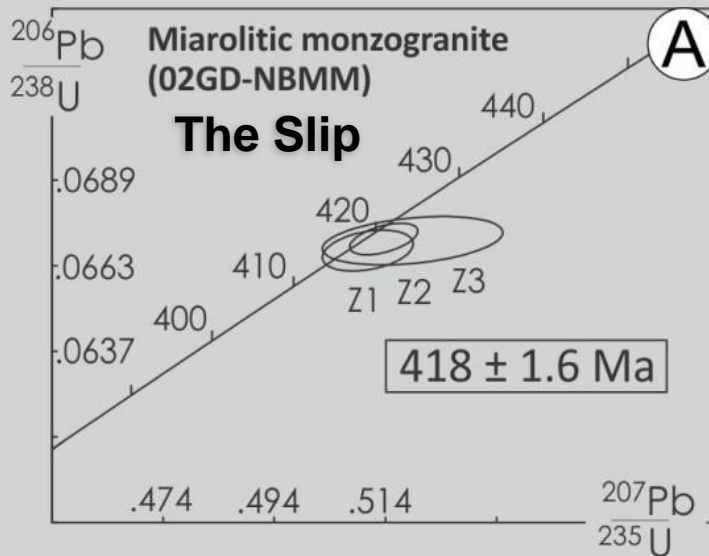
Dihedral Angle: 65 degrees

Eastern MPIS (nr. Beaverbrook Mine)



Geochronology sample locations

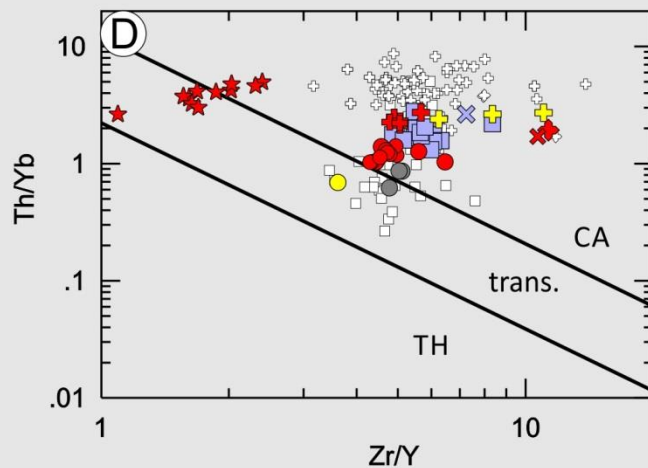
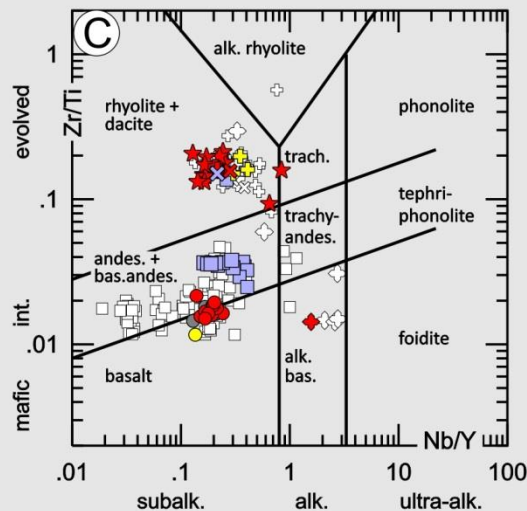
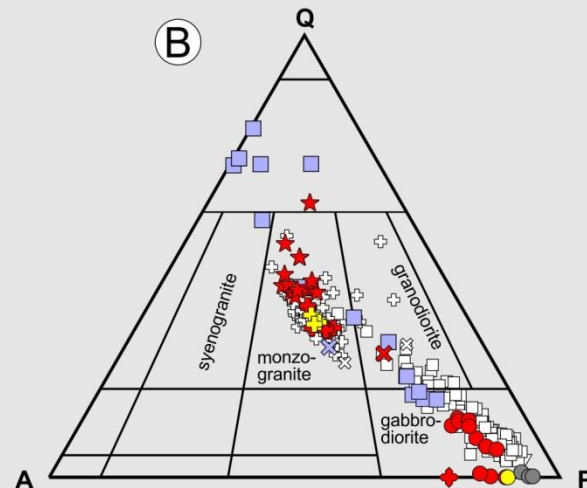
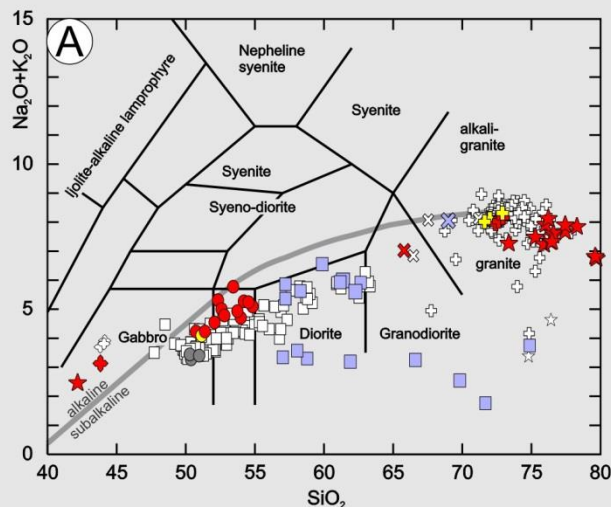




U-Pb zircon geochronology

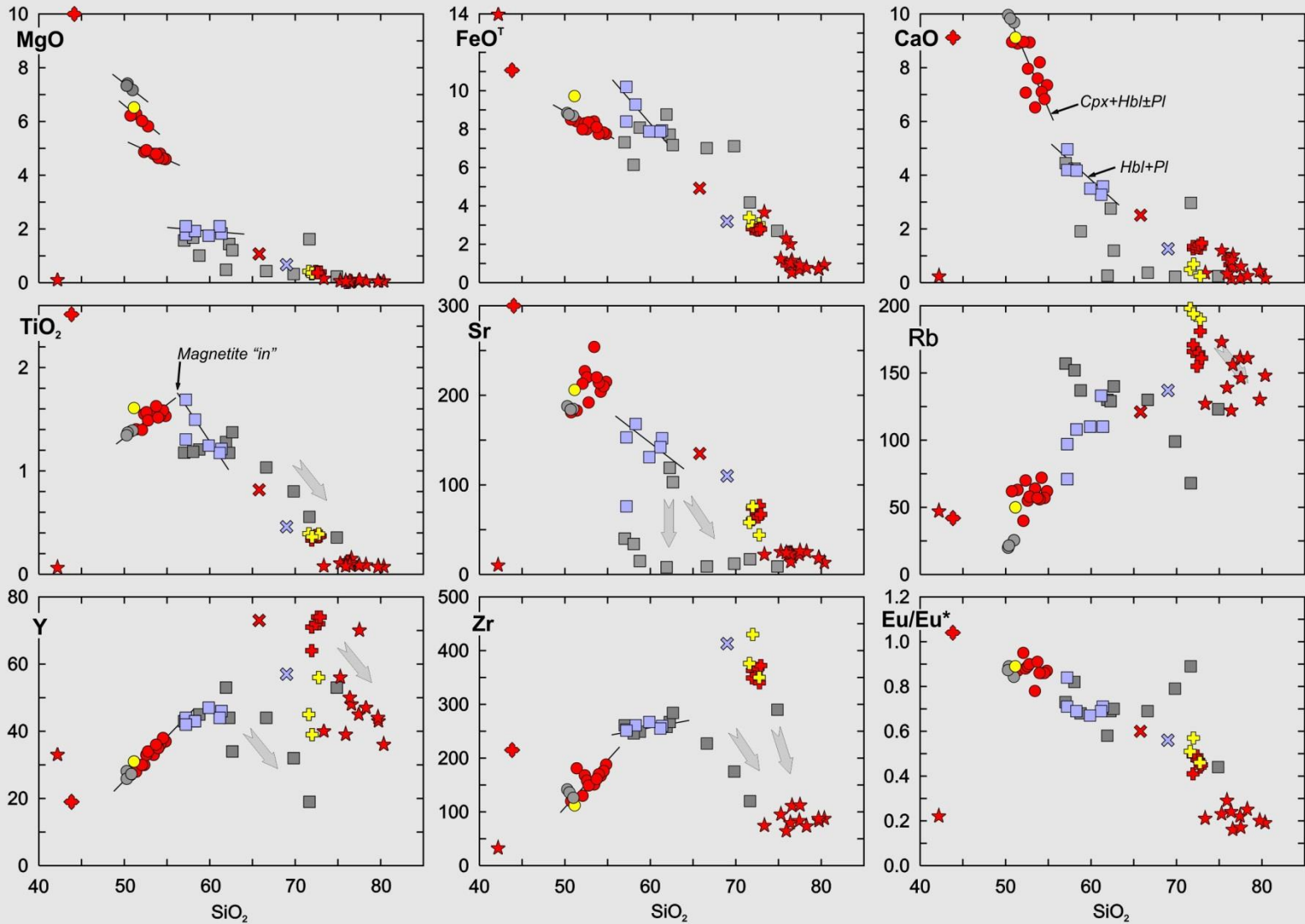
Classification

(Wilson, 1989; Strekeisen, 1976; Pearce, 1996; Ross & Bedard, 2009)



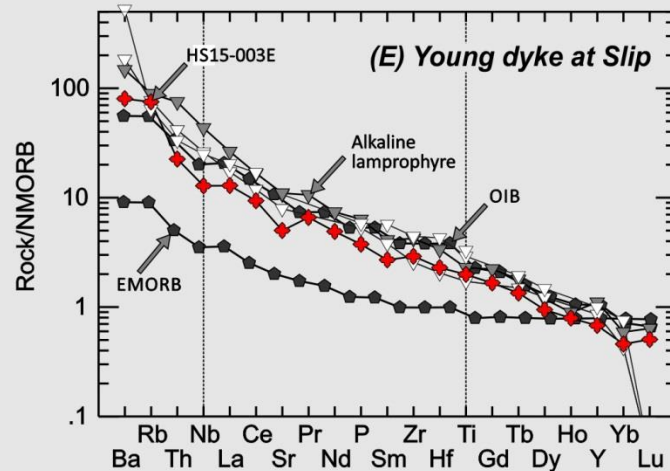
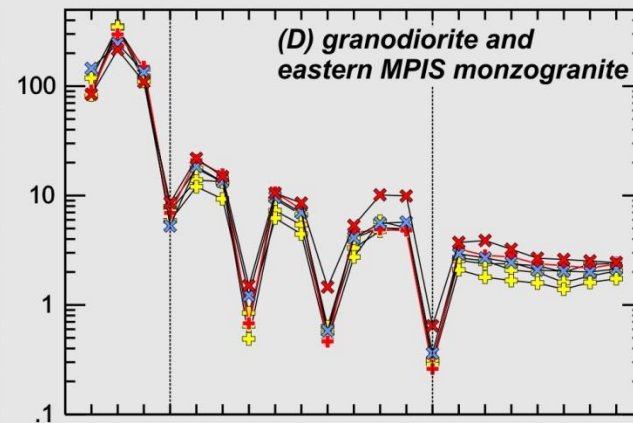
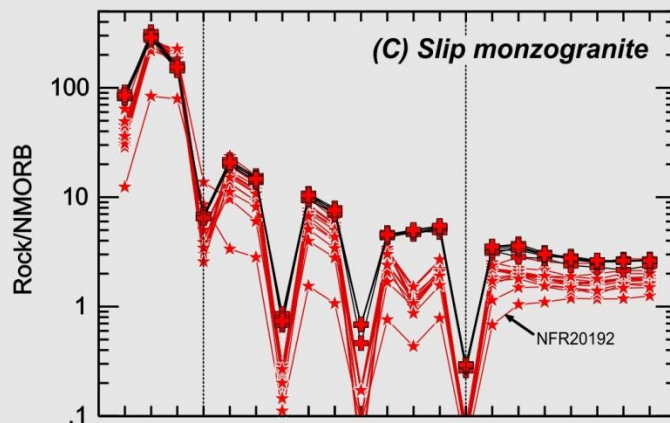
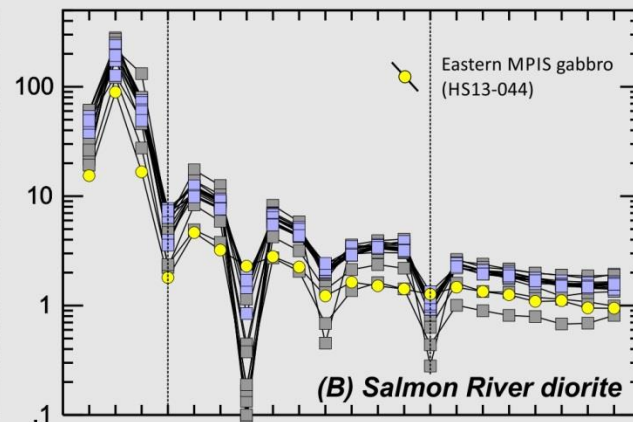
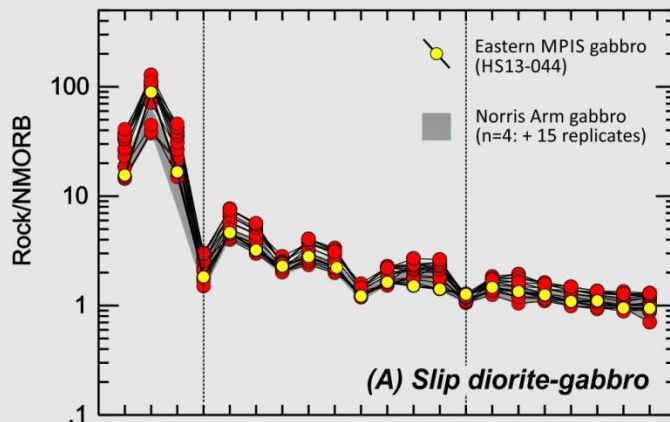
Key:	Slip	Salmon River	eastern MPIS
orange-red, granophyric monzogranite	+	+	+
granodiorite	x	x	x
gabbro to quartz diorite	●	■	●
miarolitic monzogranite	★		
Cpx-phyric, late dyke	◆		
● Norris Arm gabbro (422.3 ± 1.2 Ma)			

Lithogeochemical Classification



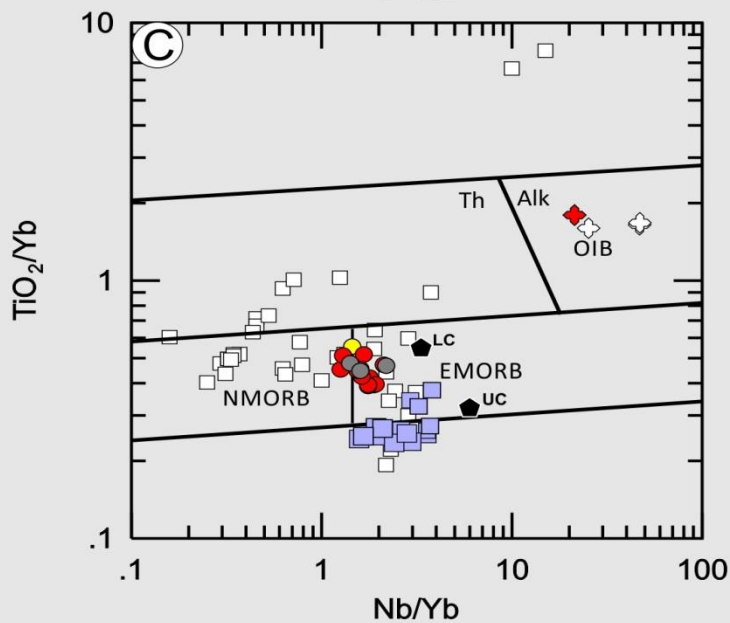
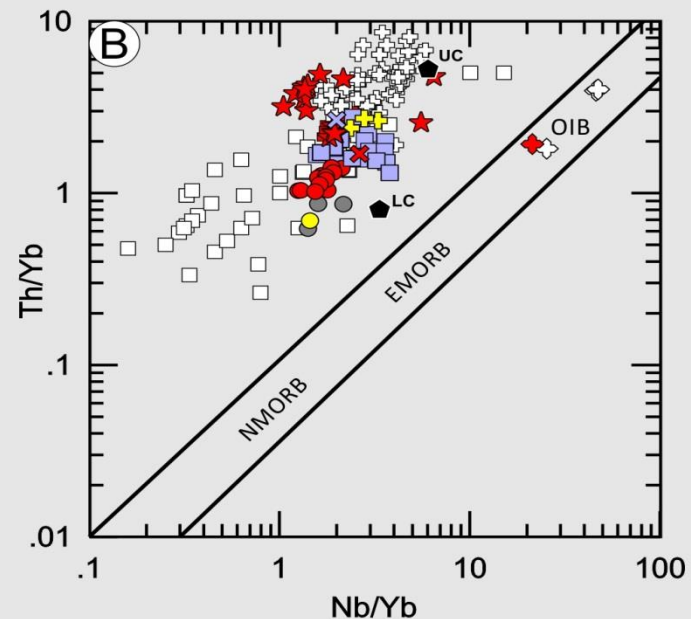
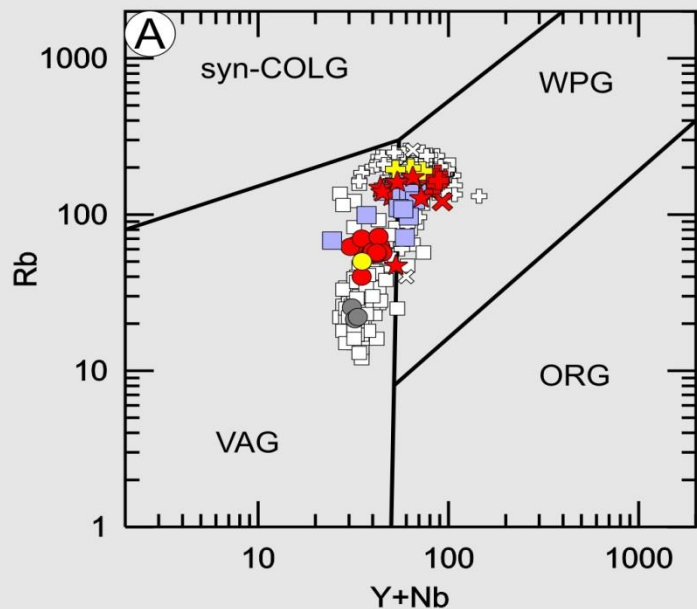
Variation diagrams

multi-element diagrams
(Normalized to Sun and McDonough, 1989)



Key:

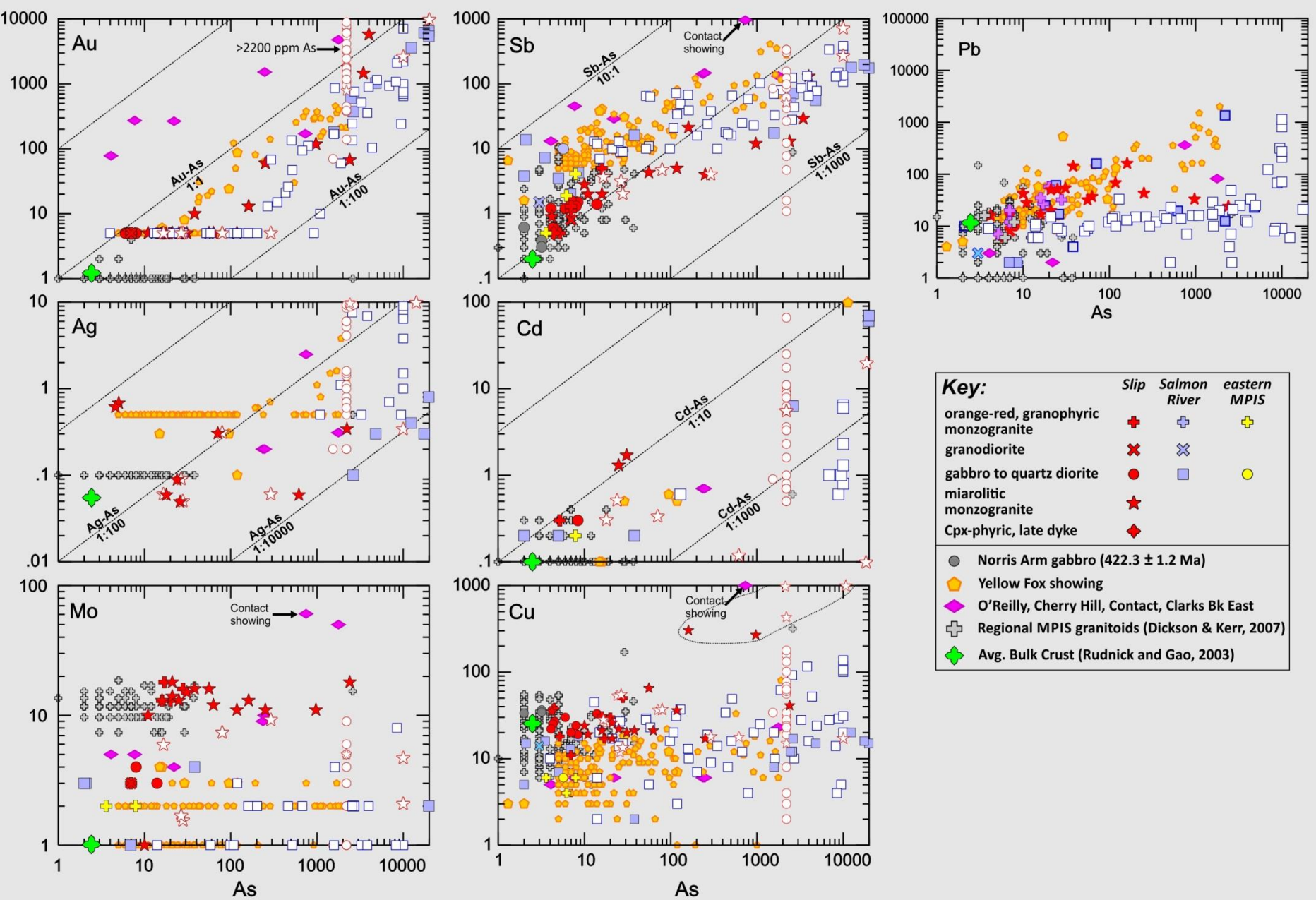
	Slip	Salmon River	eastern MPIS
orange-red, granophytic monzogranite	+	+	+
granodiorite	×	×	
gabbro to quartz diorite	●	■	●
miarolitic monzogranite	★		
Cpx-phyric, late dyke	◆		
● Norris Arm gabbro (422.3 ± 1.2 Ma)			



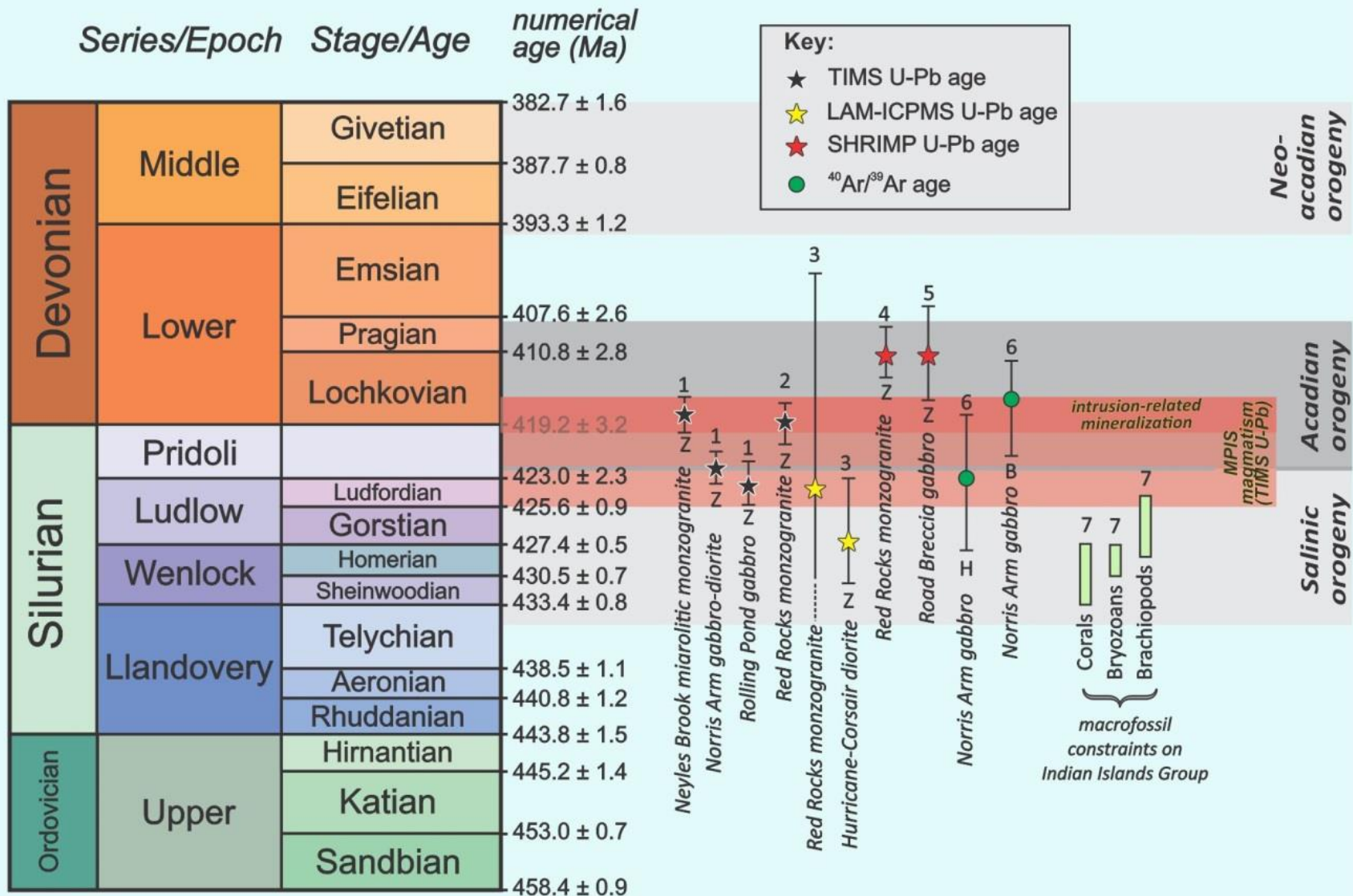
Key:

	<i>Slip</i>	<i>Salmon River</i>	<i>eastern MPIS</i>
orange-red, granophyric monzogranite	+	+	+
granodiorite	x	x	
gabbro to quartz diorite	●	■	●
miarolitic monzogranite	★		
Cpx-phyric, late dyke	◆		
●	Norris Arm gabbro (424 ± 2 Ma)		

Trace element constraints on their petrogenesis



Metal associations in mineralization



References: 1) This study; 2) Dunning and Manser (1993); 3) O'Driscoll and Wilton (2005); 4) Dickson et al. (2007); 5) McNicoll et al. (2006); 6) Reynolds et al. (1981); 7) Boyce and Dickson (2006).

Summary chronostratigraphy

Summary:

- *Mount Peyton trend is anomalous in Au, Ag, As and Sb (common element association in region).*
- *Cpx-Bt-Hbl gabbro-diorite at Norris Arm and Rolling Pond are constrained at 422.3 ± 1.2 and 423.6 ± 1.8 Ma.*
- *broadly northwest-trending miarolitic monzogranite at Slip is 418 ± 1.6 Ma and contains granite-related mineralization.*
- *Near Slip, quartz veins in gabbro-diorite also contain similar mineralization and metal associations*
- *Salmon River mineralization trends NE and consists of broad Py-Apy-quartz-muscovite-siderite alteration envelopes around thin quartz-carbonate veinlets in diorite*

Summary continued:

- *Similar metal associations and tenors, but a distinct geological setting.*
- *Salmon River mineralization may therefore represent more 'distal' vein-wall-rock mineralization above miarolitic granite dykes and cupolas*
- *Other showings in the region with the metals $As \pm Au \pm Ag \pm Sb \pm Hg \pm Cd \pm Te$ commonly exhibit epithermal, epizonal styles of mineralization (void-filling textures and hydrothermal breccias)*
- *The majority are likely 'intrusion-related', structurally controlled examples of similar mineralization.*

Acknowledgements

➤ Assistants Kendra Power and Chris Voisey; Ryan Newman (chief geologist Beaverbrook Mine), Carol-Anne and Greg Higgins of Norris Arm, Gerry Kilfoil and Neil Stapleton (NLGS)





