

Cobalt Transect

PDAC 2019

Shawna E. White & Ross Sherlock



A new Canadian research initiative funded by Canada First Research Excellence Fund.



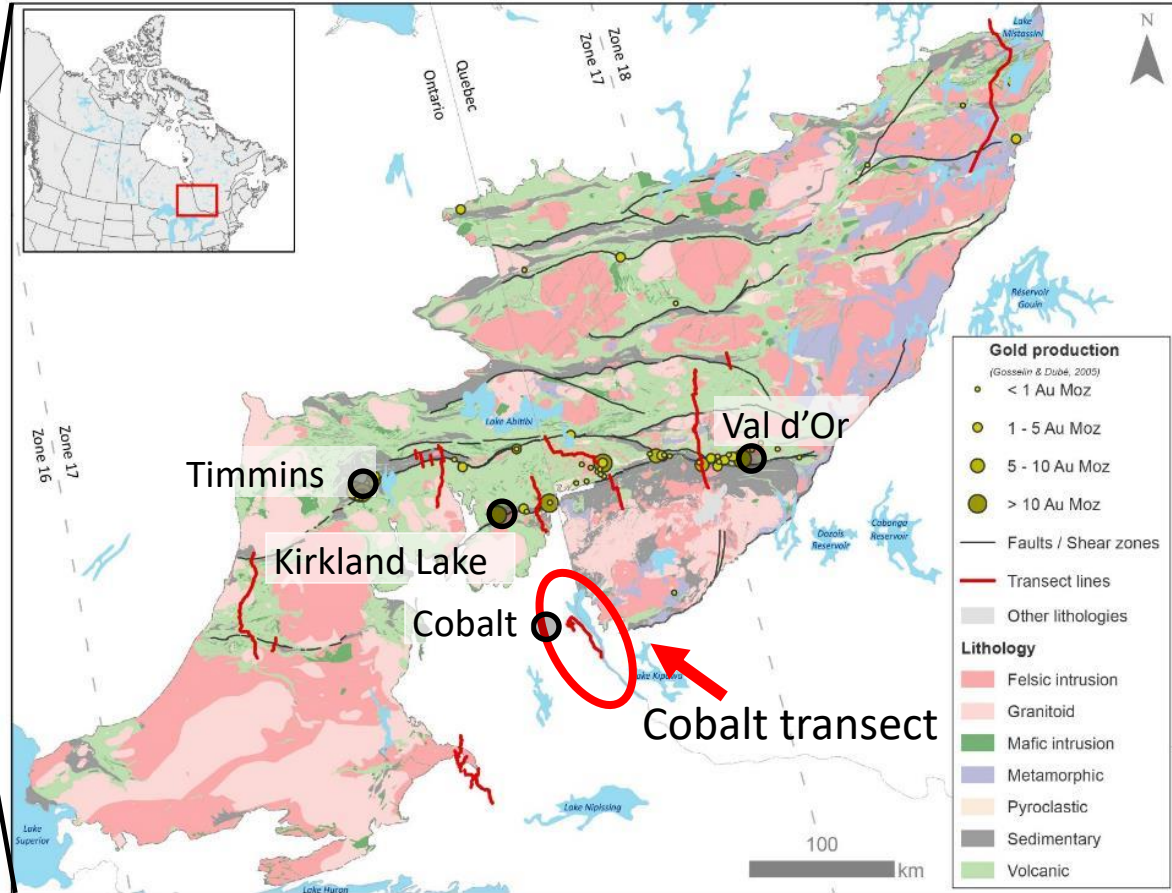
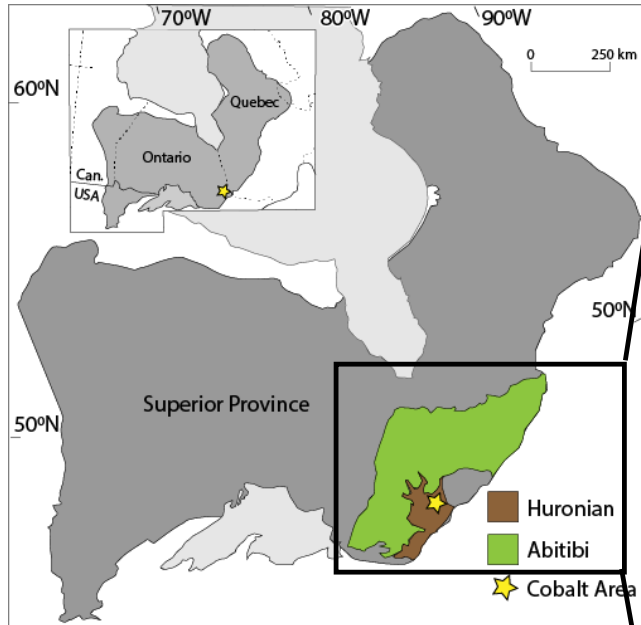
Canada



HARQUAIL SCHOOL OF EARTH SCIENCES
ÉCOLE DES SCIENCES DE LA TERRE

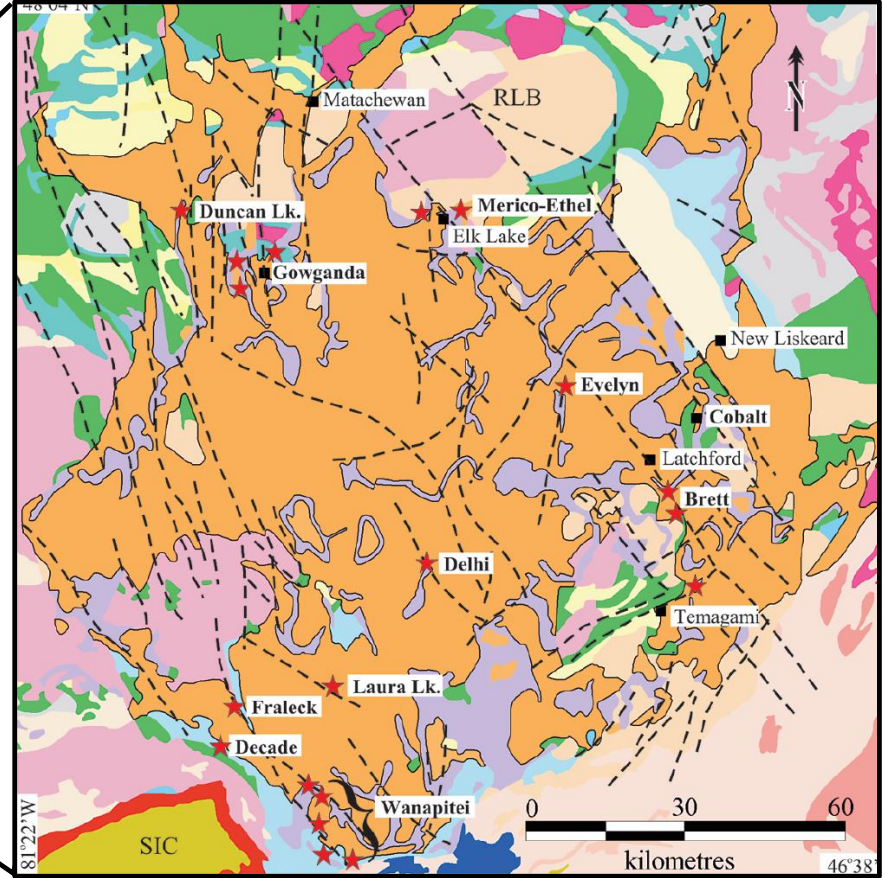
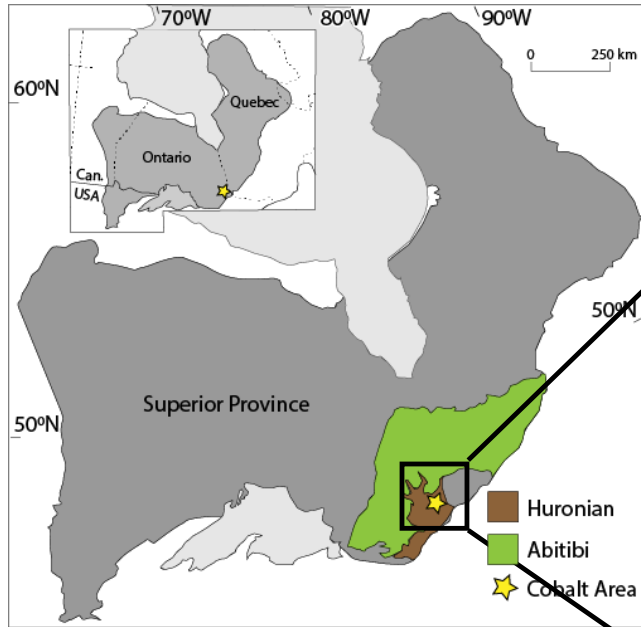


The Cobalt Transect

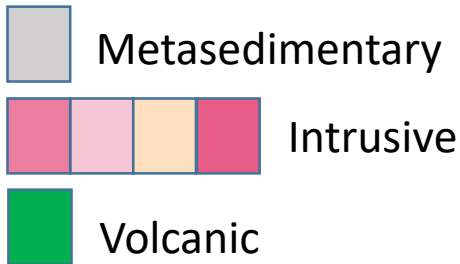


- Cobalt region is unique with respect to geology and mineralization
- Not well understood

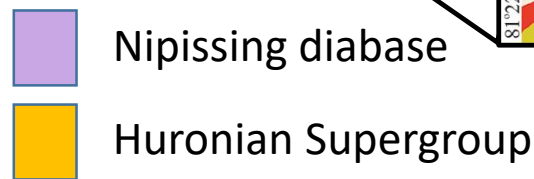
Location



Archean

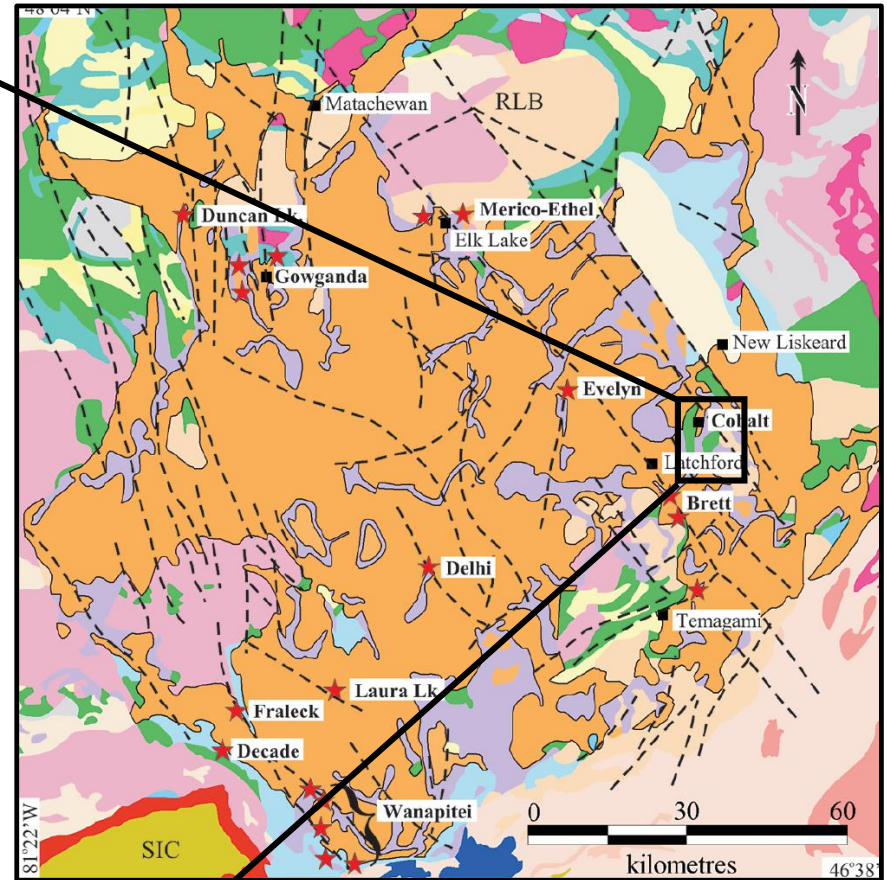
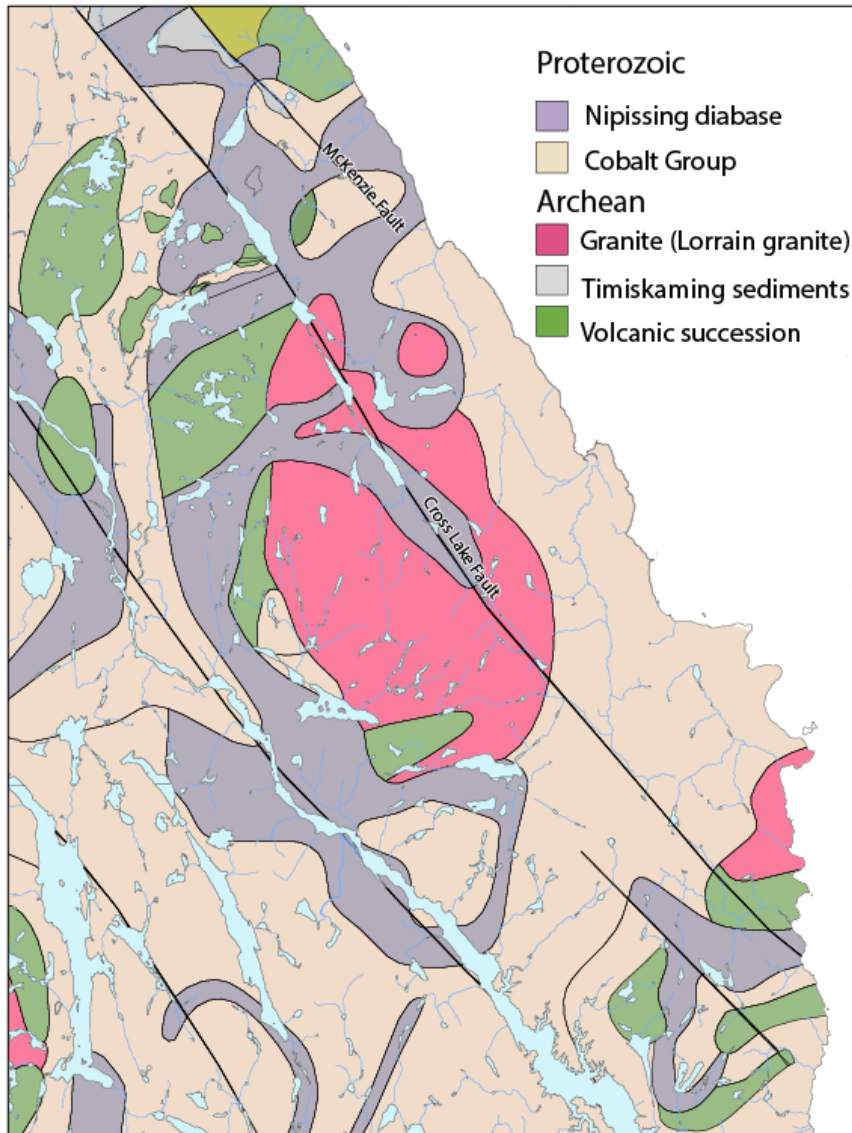


Paleoproterozoic



Potter and Taylor 2010

Regional Geology

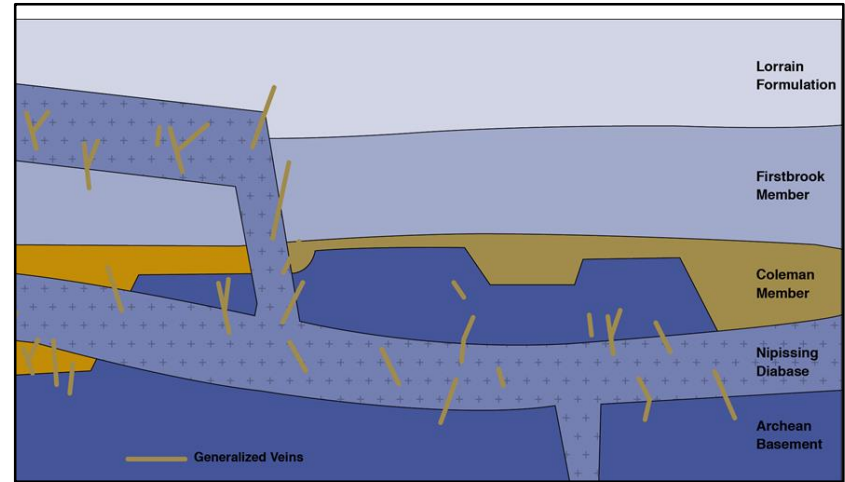
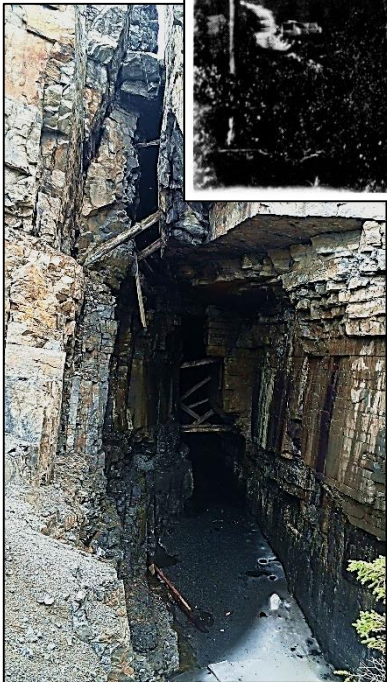
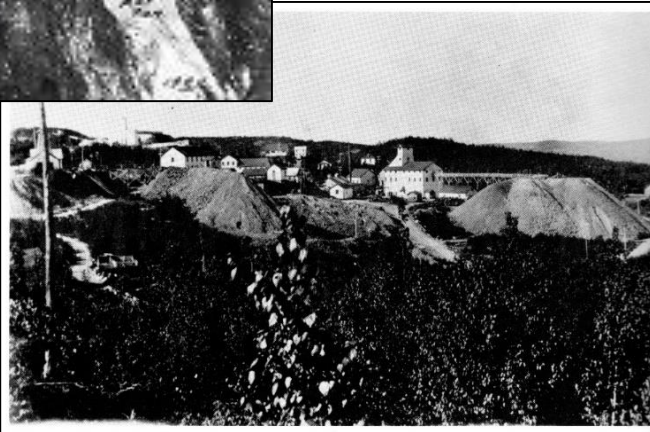


Potter and Taylor 2010

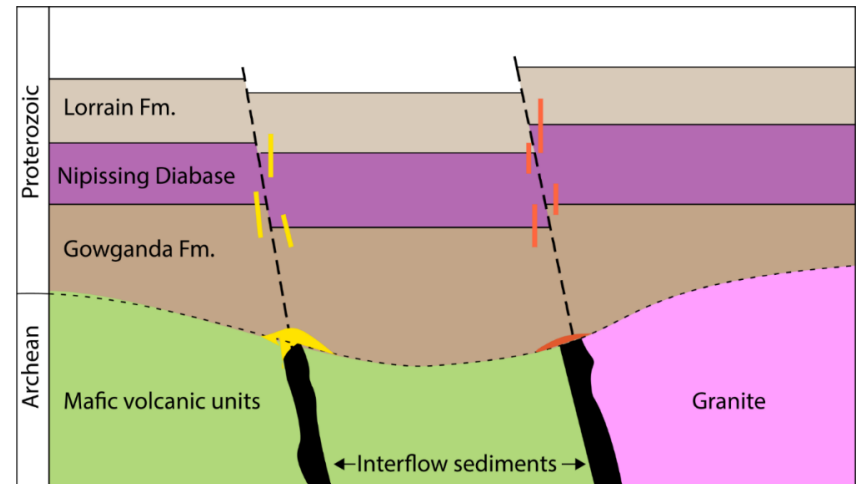
History and Previous Models



Frontier Mine 1927
(Fancy, 1982)



Andrews et al. 1984



Potter and Taylor 2010

Field Work 2018

The Question?

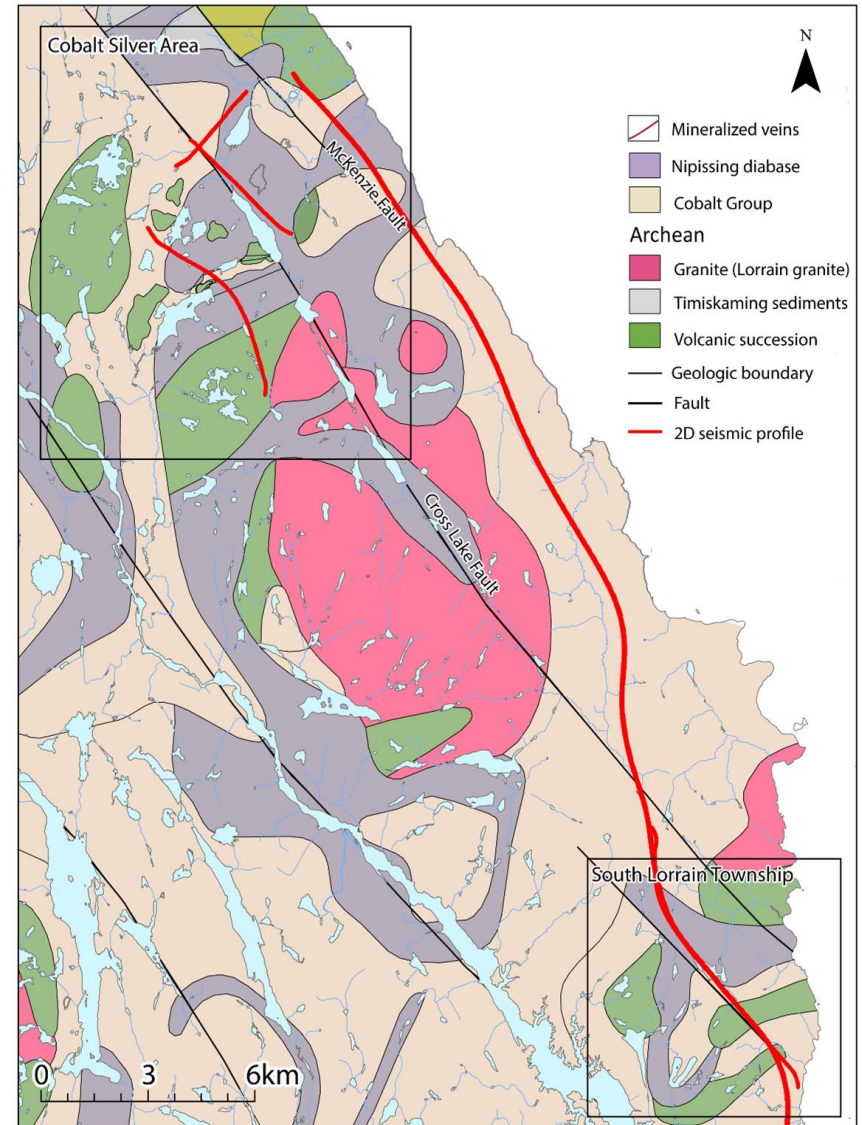
- What are the controls on the Co-Ag veins?

2 Study Locations

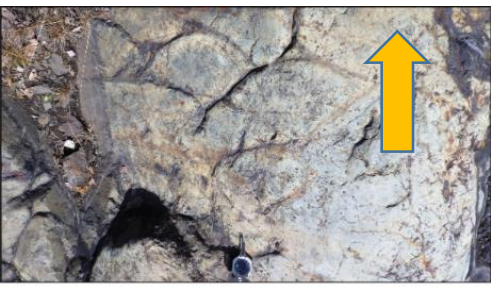
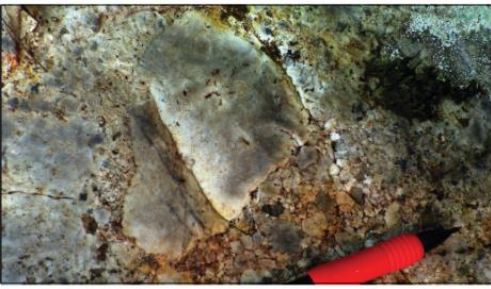
- Cobalt Silver Area
- South Lorrain

Why These Areas?

- Historical **economic significance**
- **Location** relative to seismic transects and other **geophysical datasets** available
- Variability in geology



Stratigraphy



Nipissing
Diabase

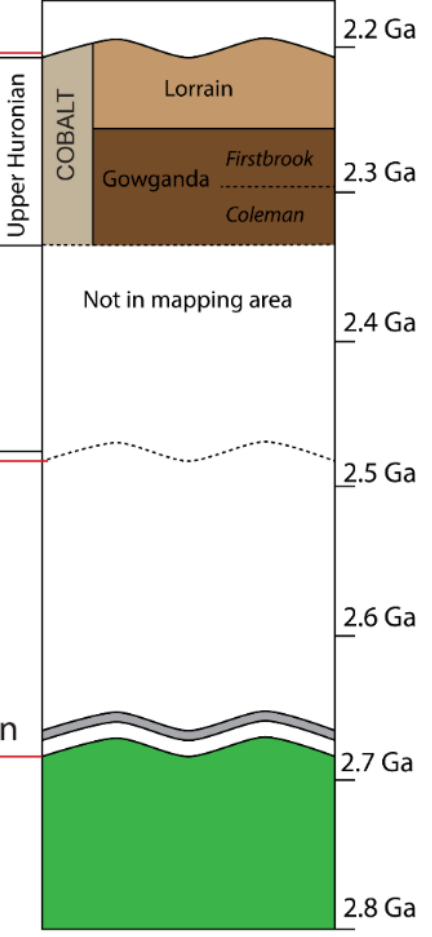
2219 Ma

Synvolcanic
intrusions

2480 Ma

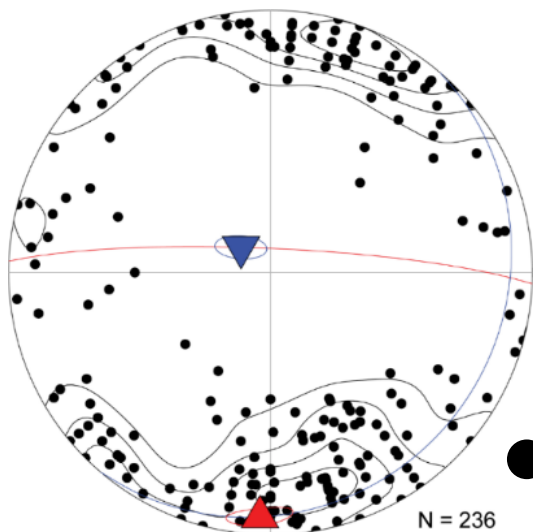
Detrital zircon

<2682 Ma

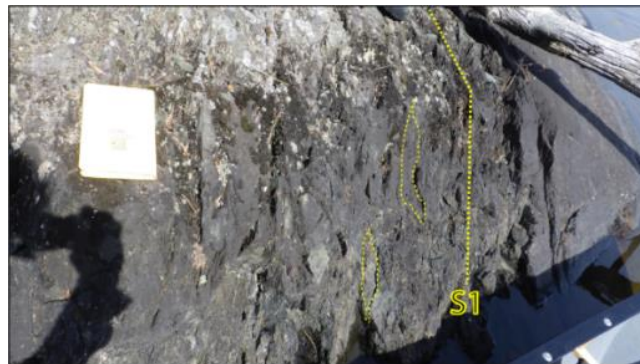


Structure

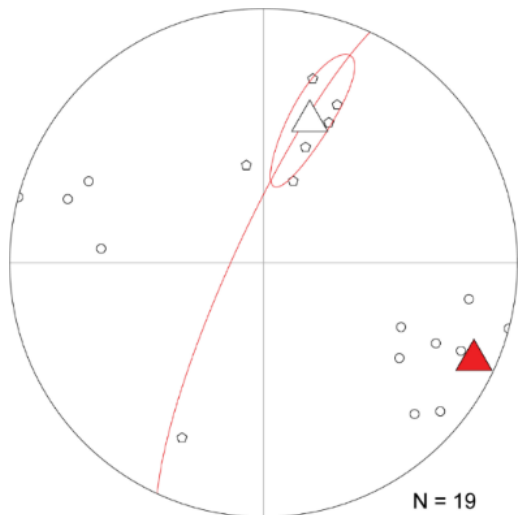
S1: Main Foliation



● Poles to S1



Crenulation Cleavage



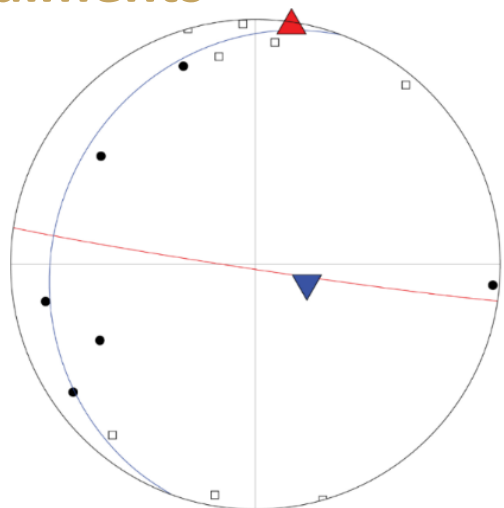
◡ Crenulation hinges

○ Poles to crenulation cleavage



Structure

Deformed Timiskaming Sediments



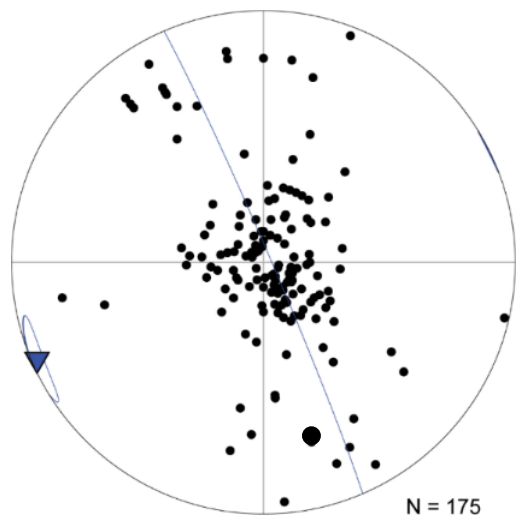
● Poles to bedding

□ Poles to cleavage



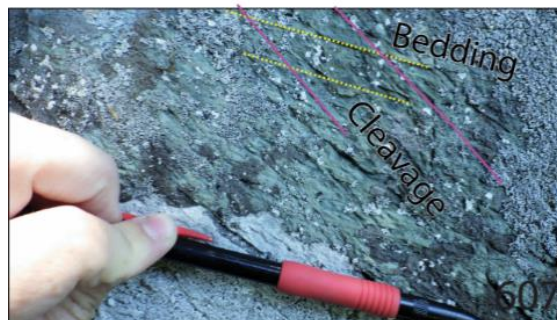
Folded Huronian Supergroup

N = 14



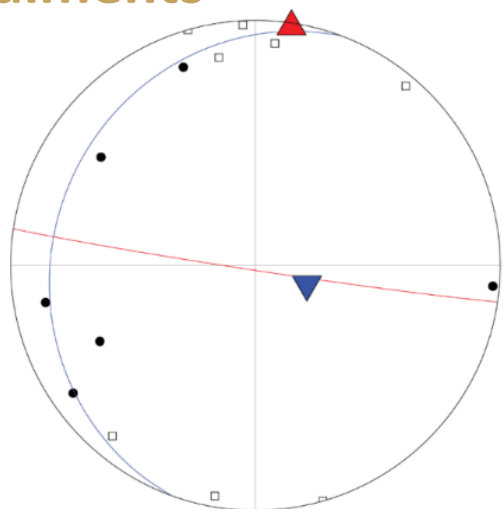
● Poles to bedding

N = 175



Structure

Deformed Timiskaming Sediments

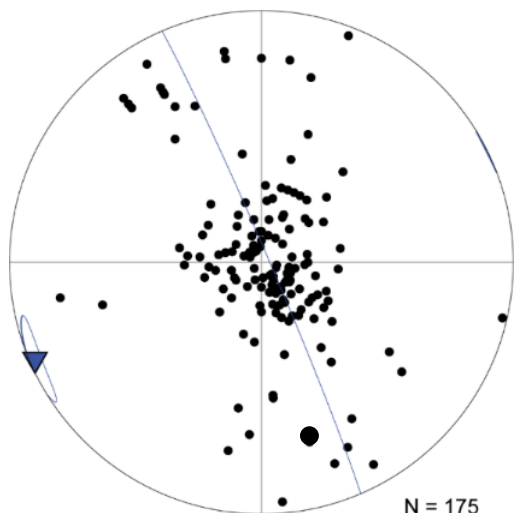


● Poles to bedding

□ Poles to cleavage

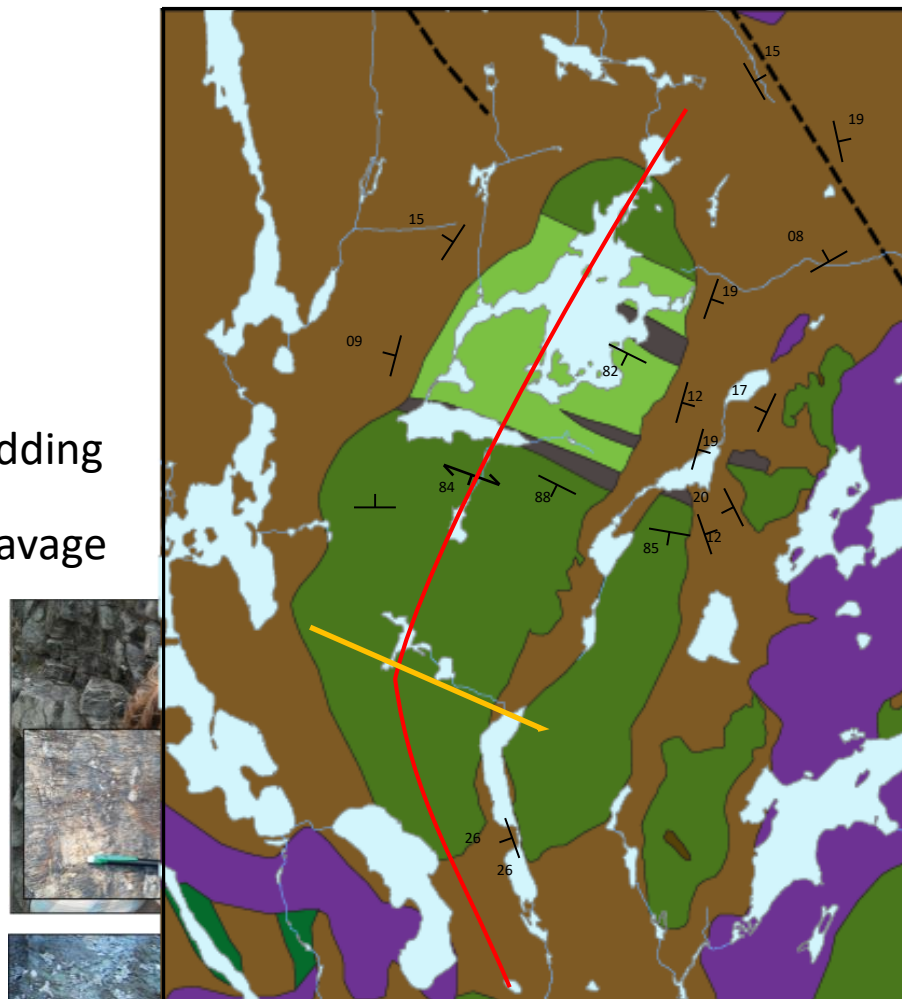
N = 14

Folded Huronian Supergroup



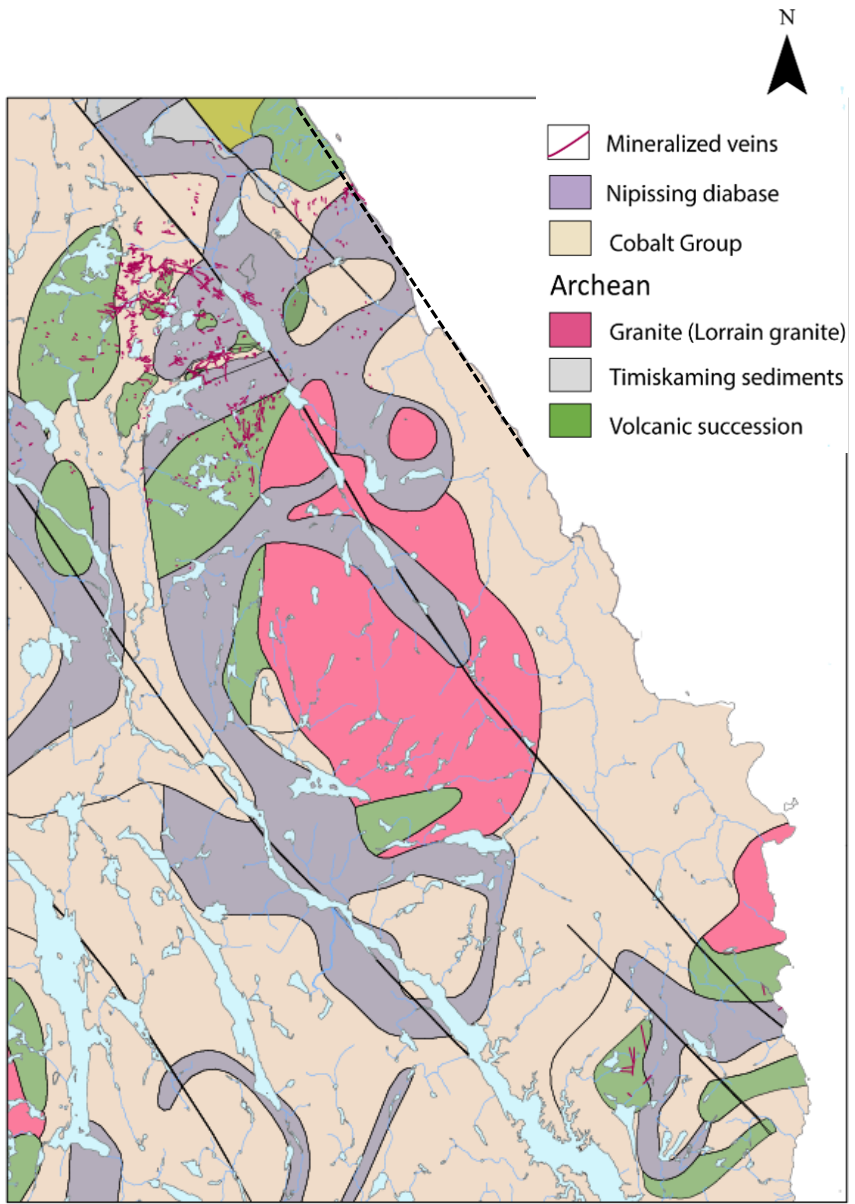
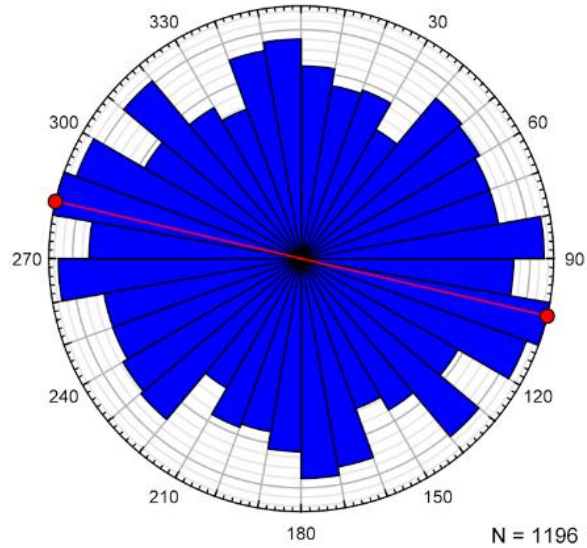
● Poles to bedding

N = 175



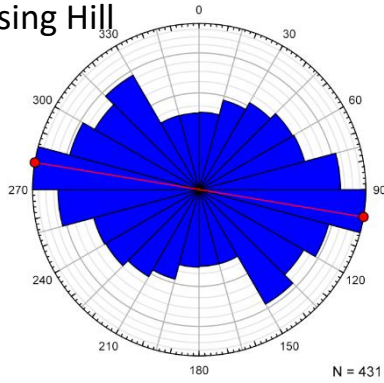
Vein Orientations

All Veins



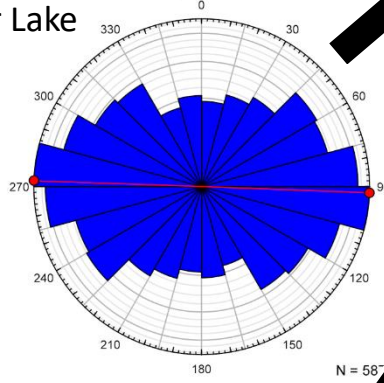
Vein Orientations

Nipissing Hill



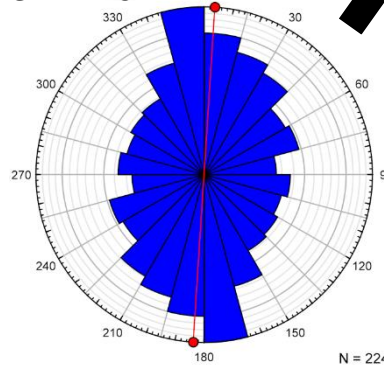
N = 431

Kerr Lake



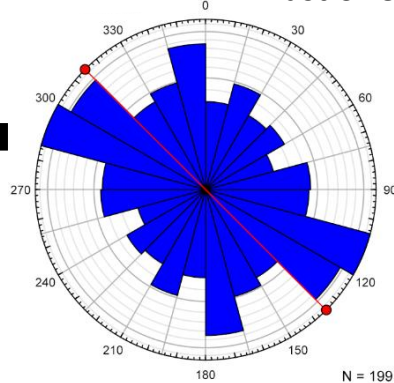
N = 58

Beaver-Timisk



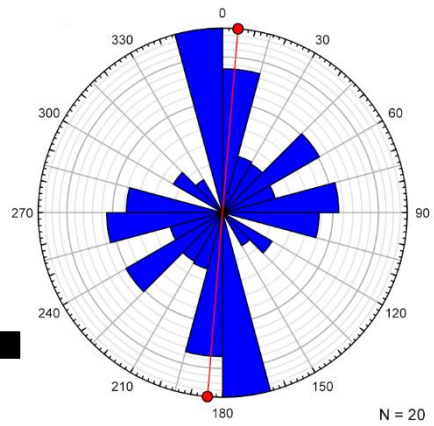
N = 224

East of Crosslake Fault

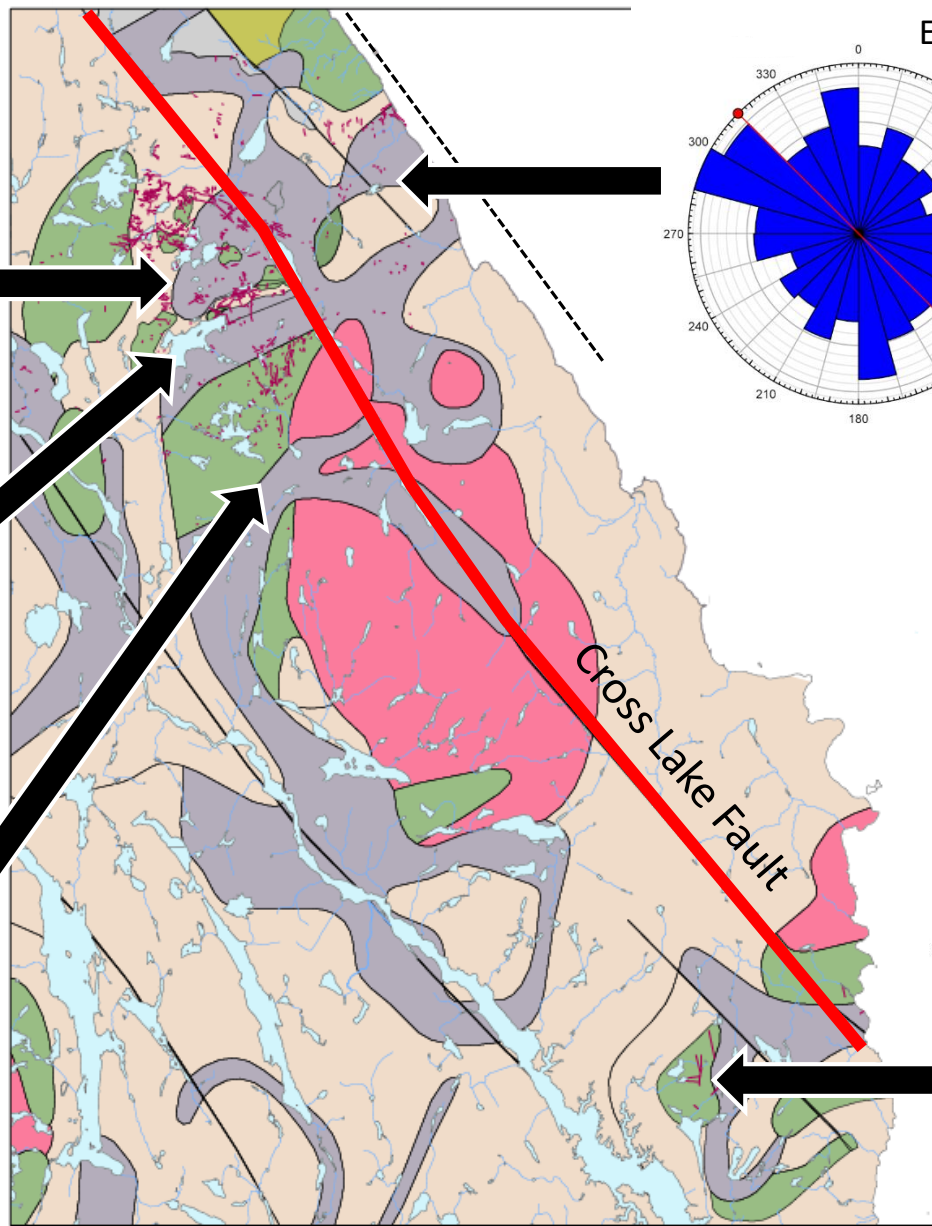


N = 199

South Lorrain



N = 20

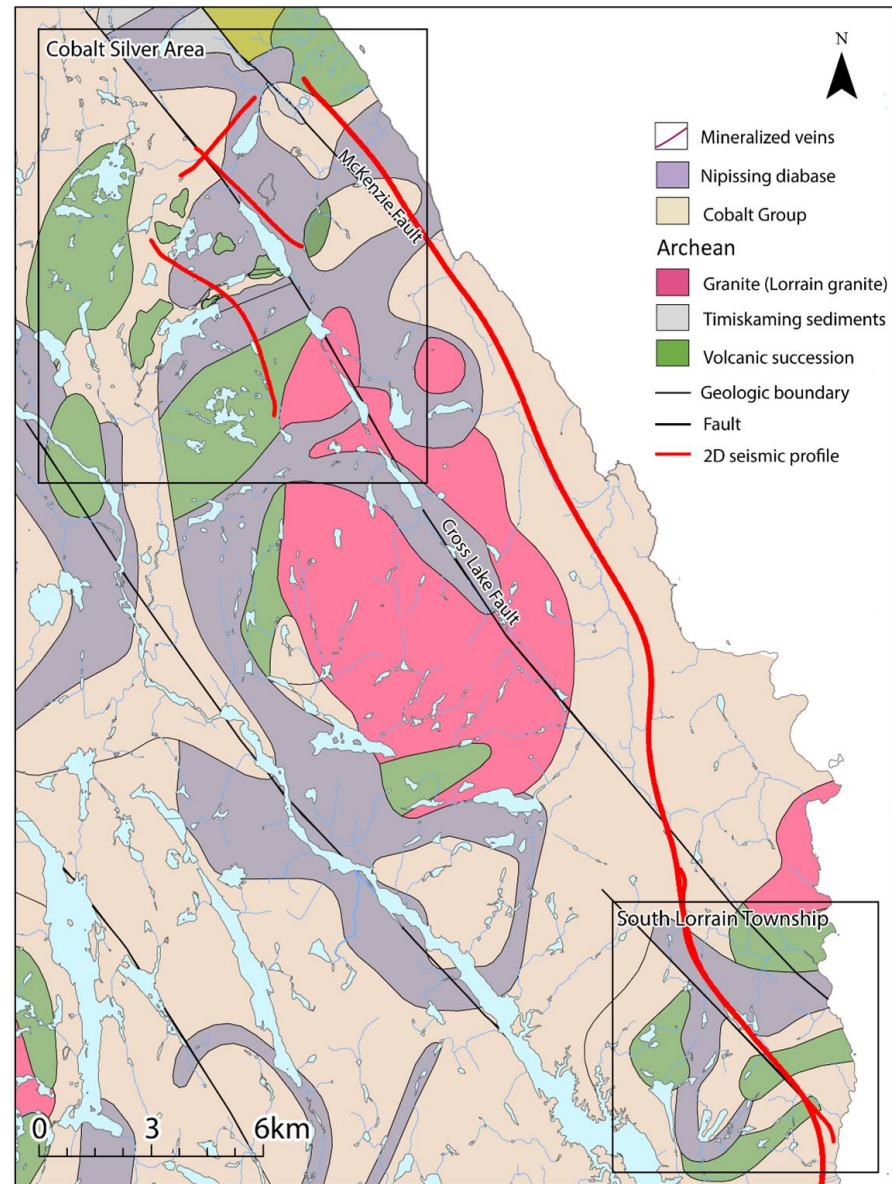


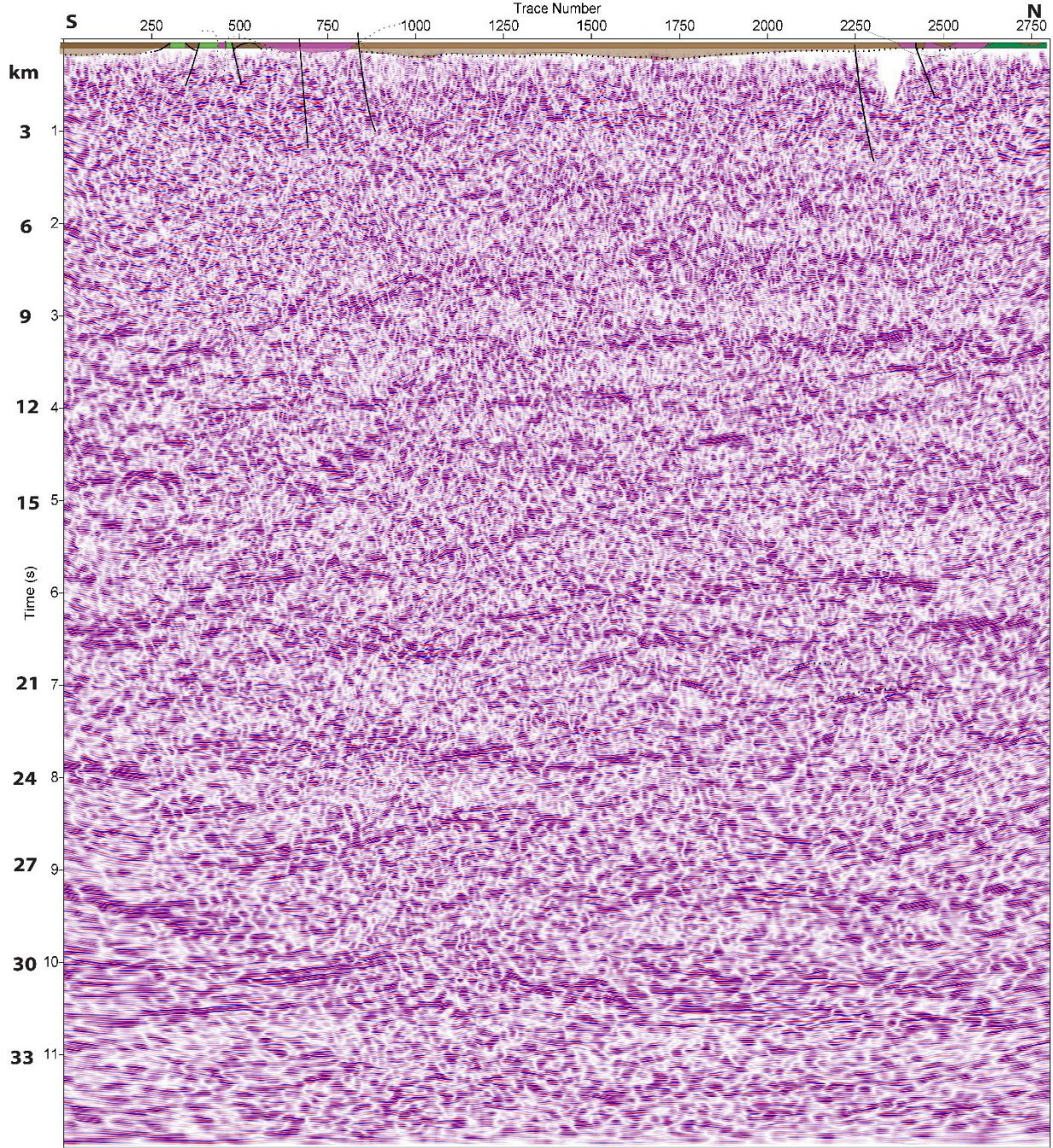
Cross Lake Fault

Geophysical Data

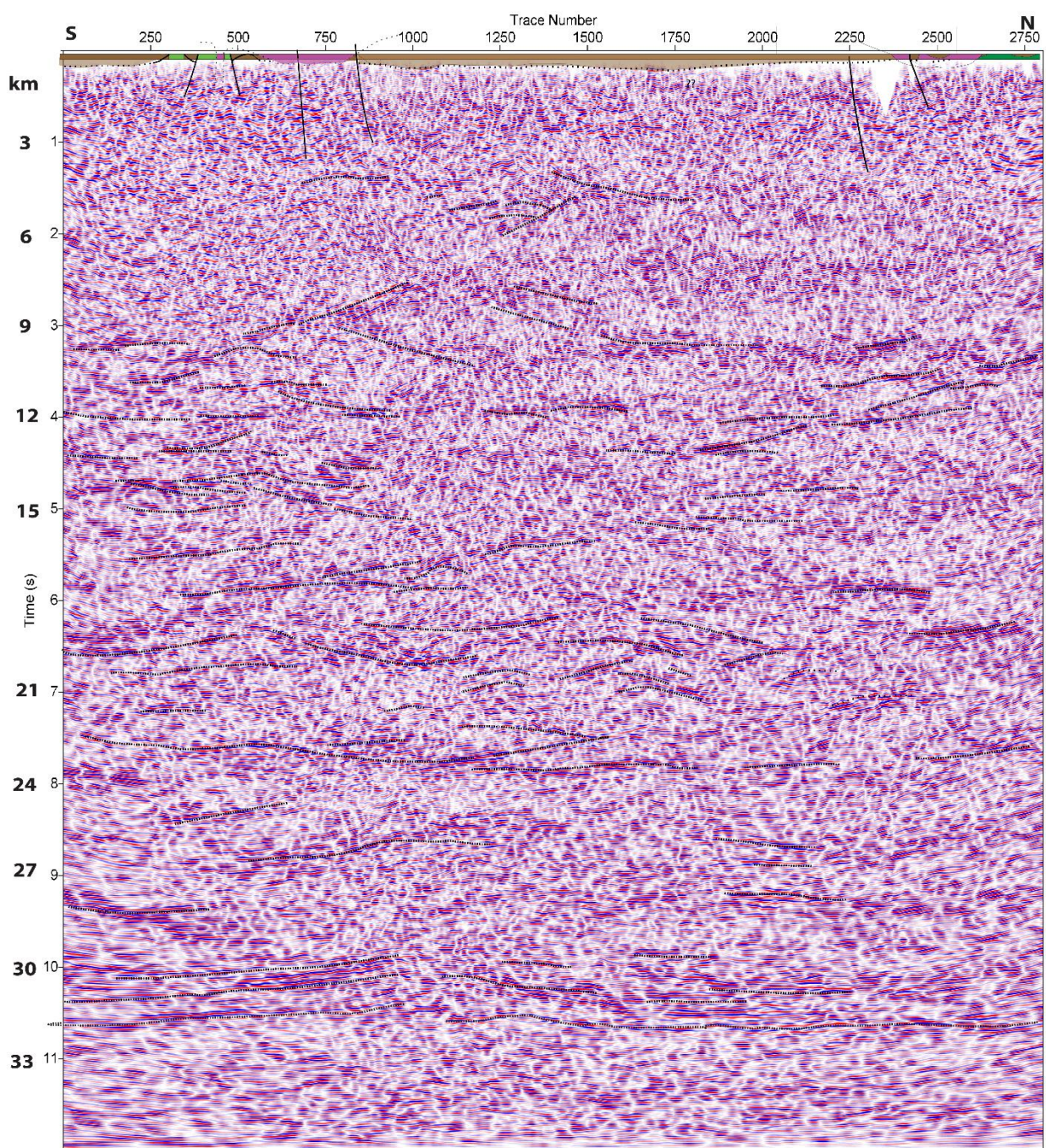
Main datasets:

- Deep 2D seismic reflection data
- Aeromagnetic data
- MT and gravity data along seismic transect (currently being processed)

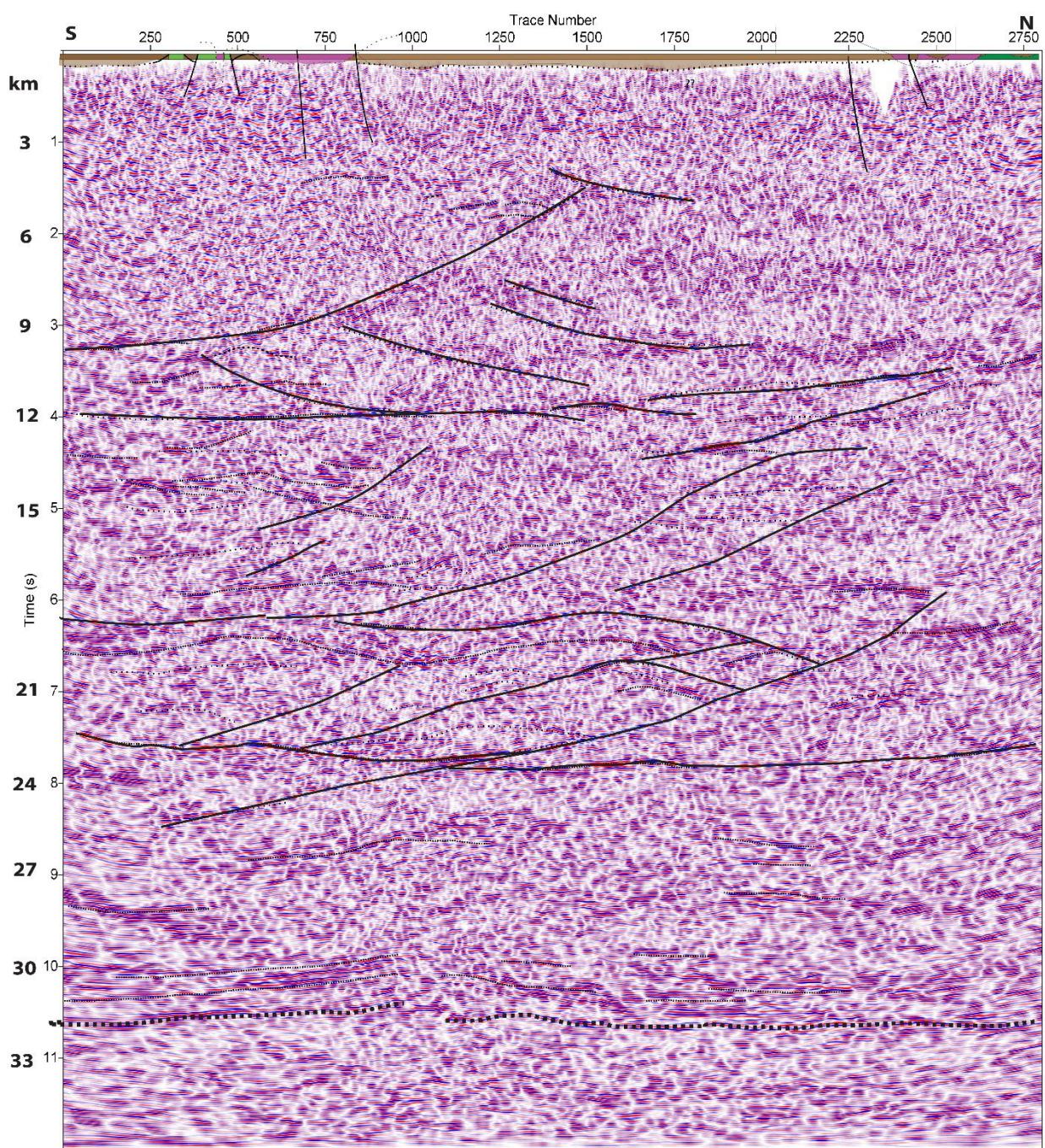




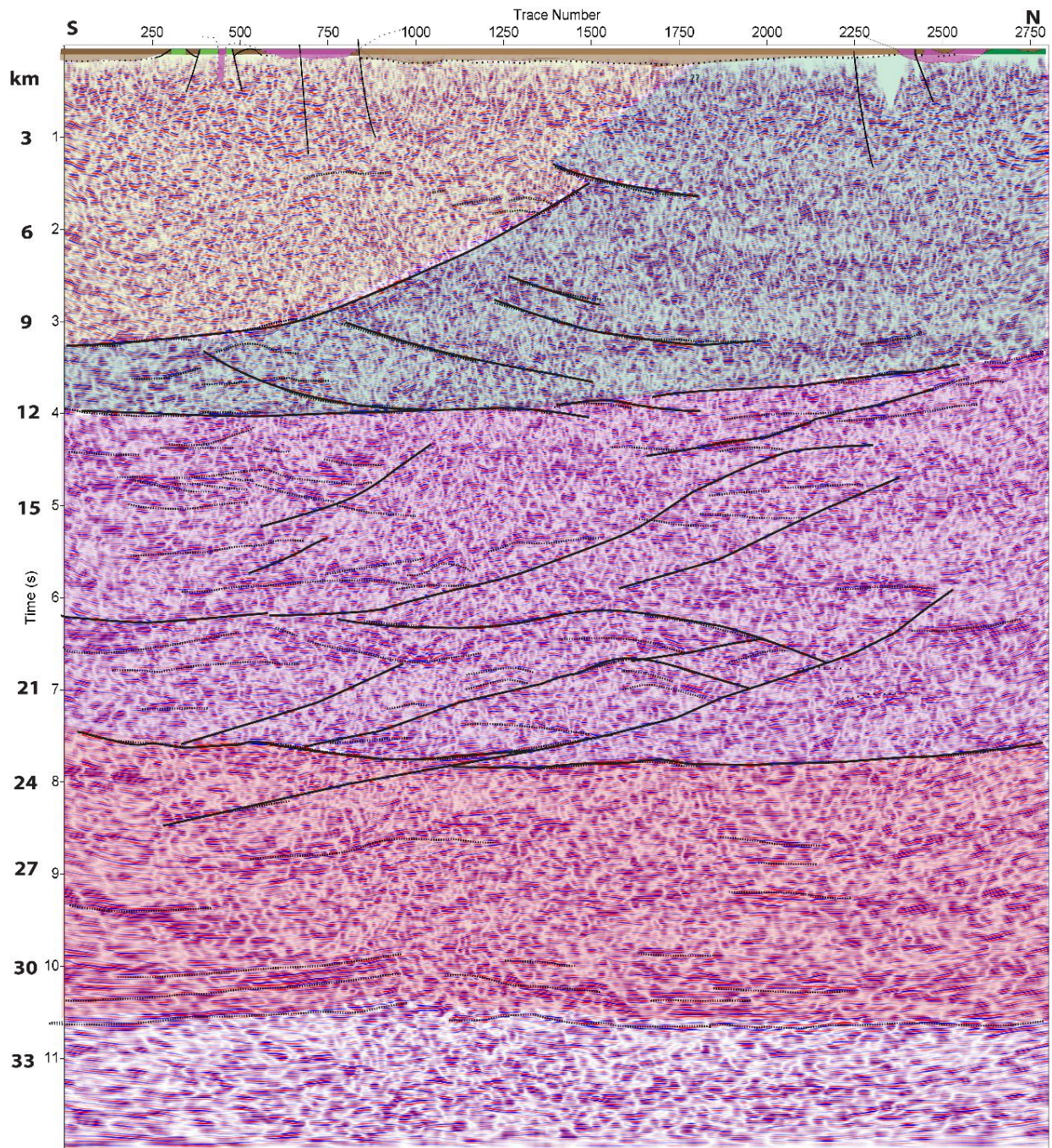
Metal Earth COBALT_LN391_R1 Seismic Transect



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Metal Earth COBALT_LN391_R1 Seismic Transect

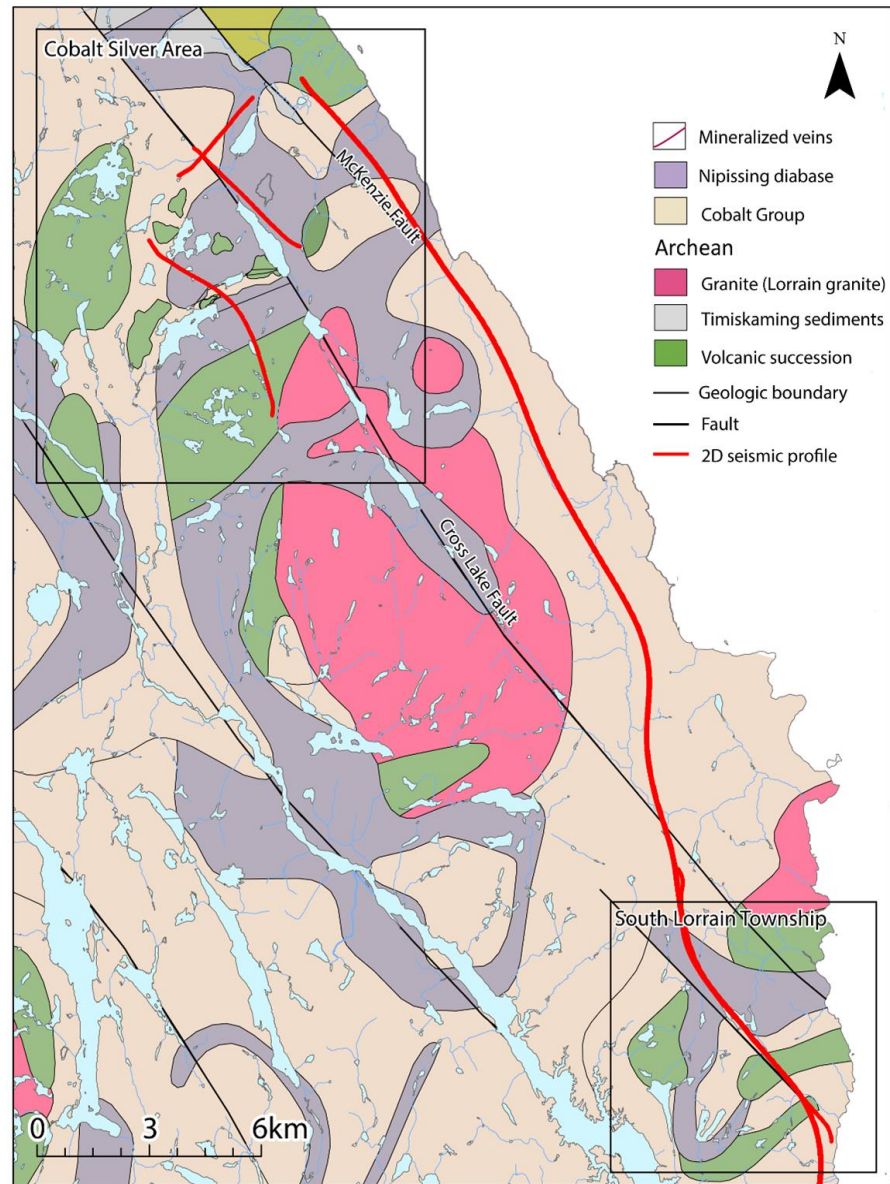


Metal Earth COBALT_LN391_R1 Seismic Transect

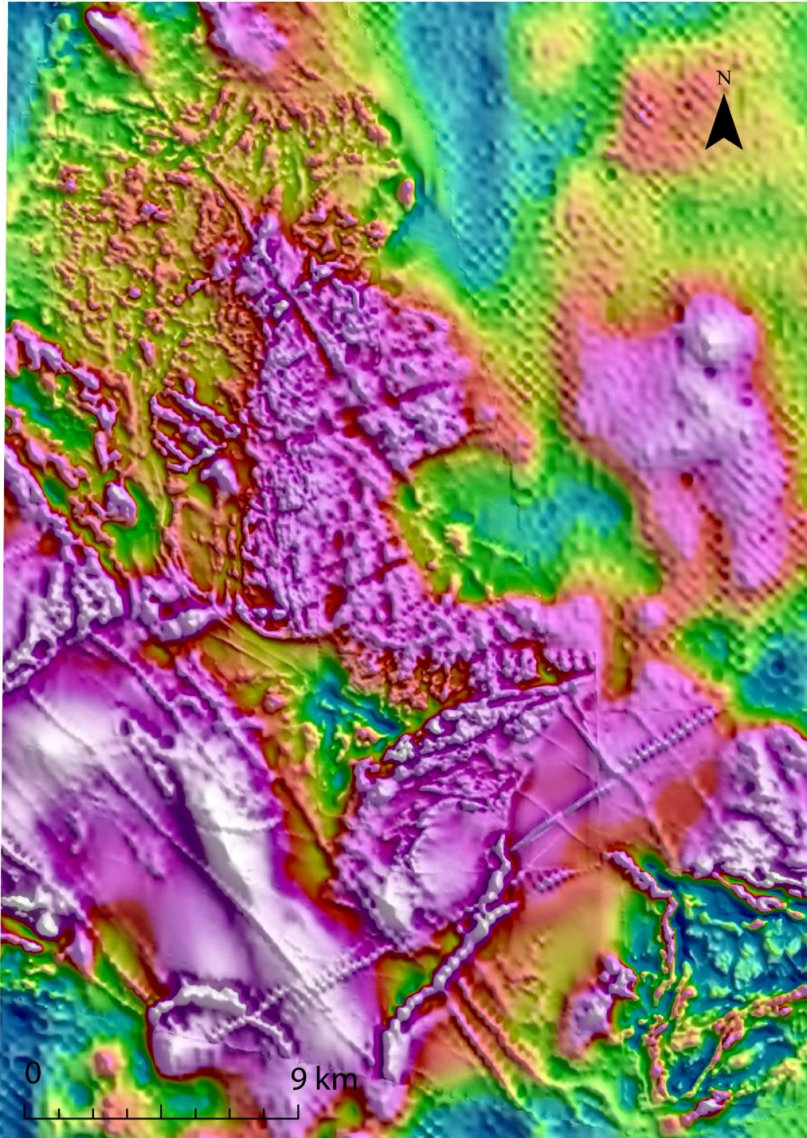
Geophysical Data

Main datasets:

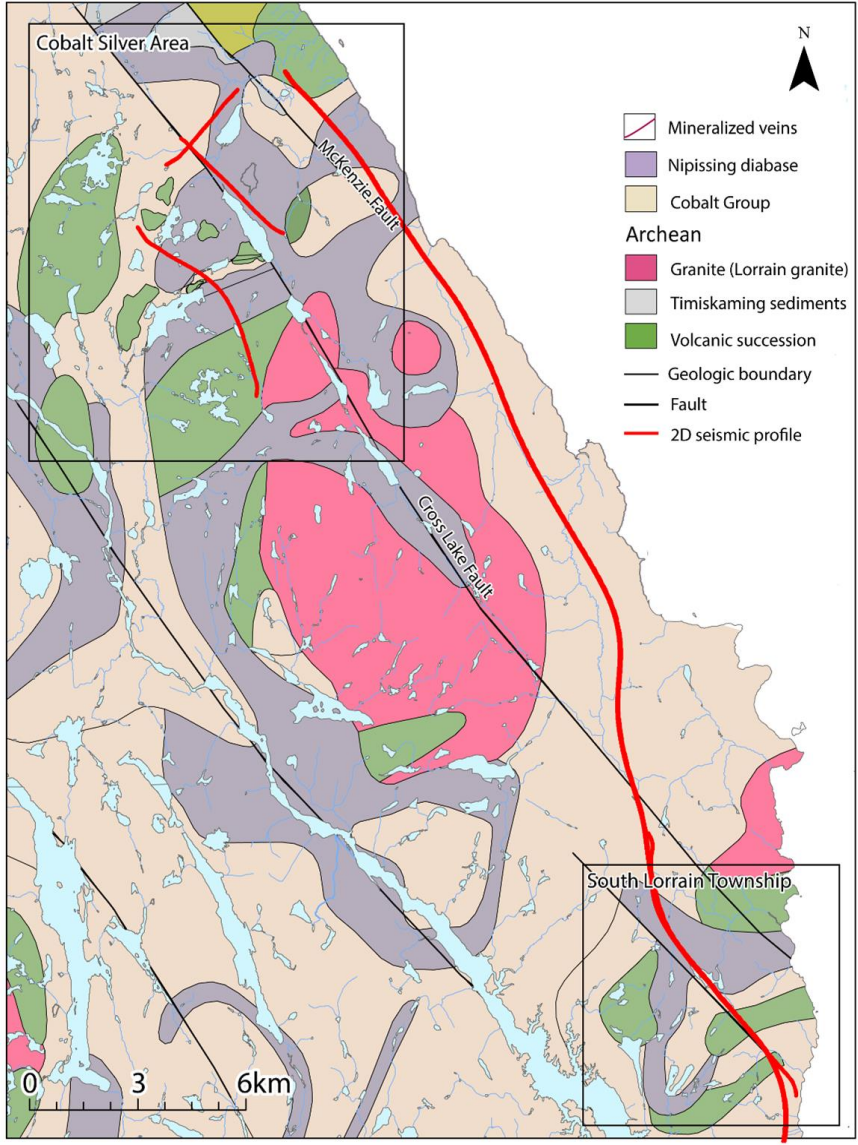
- Deep 2D seismic reflection data
- **Aeromagnetic data**
- MT and gravity data along seismic transect (currently being processed)



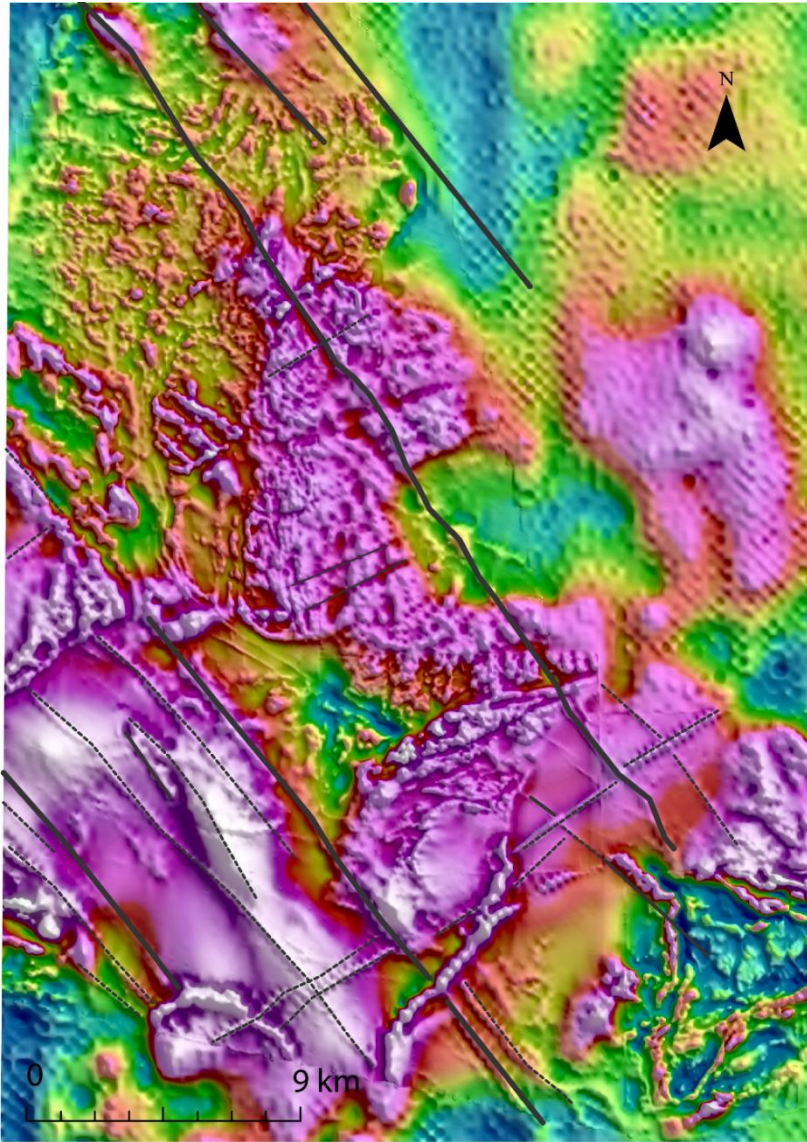
Aeromagnetic Interpretation



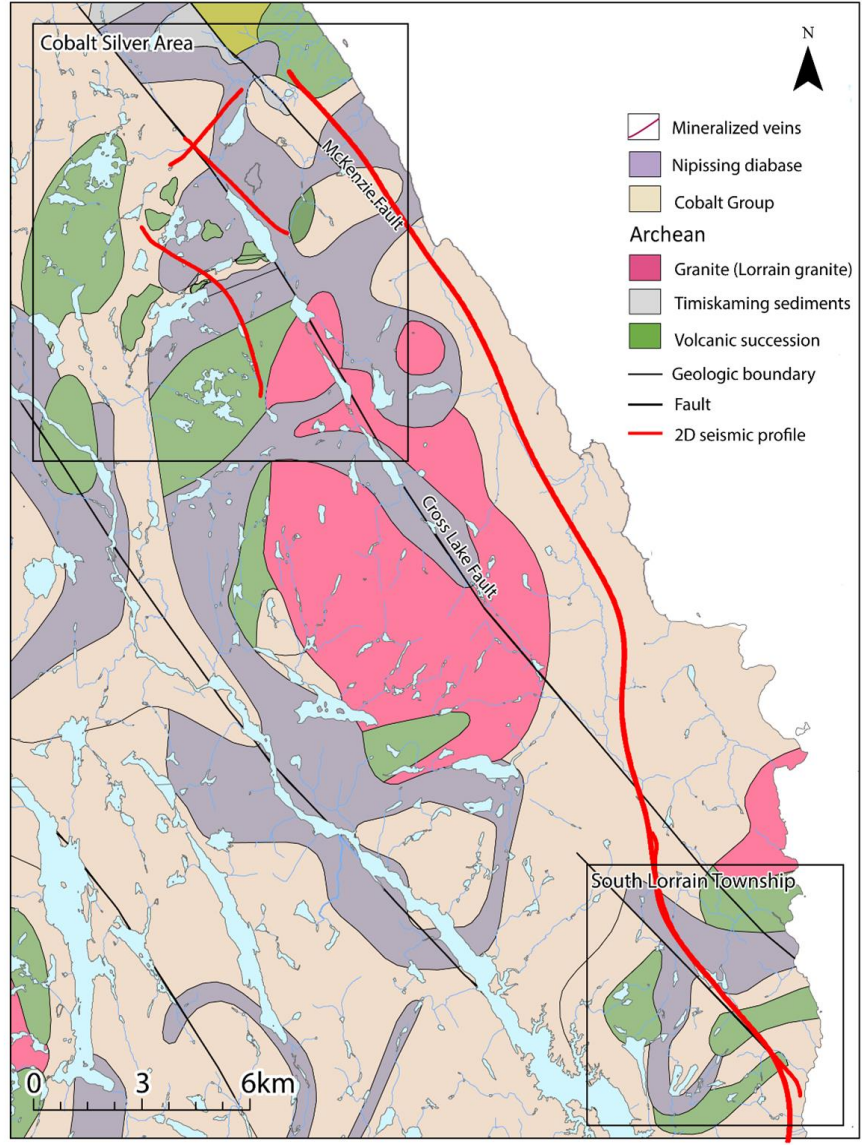
1VD RTP



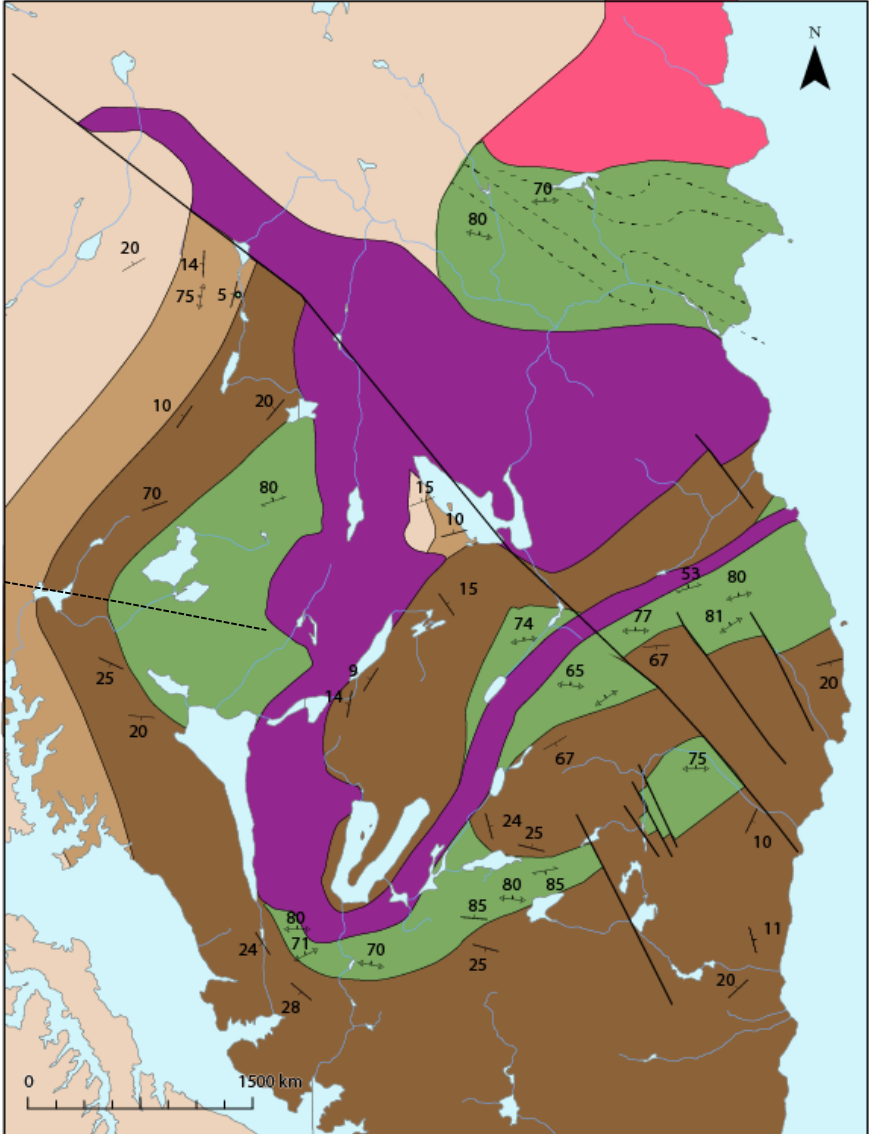
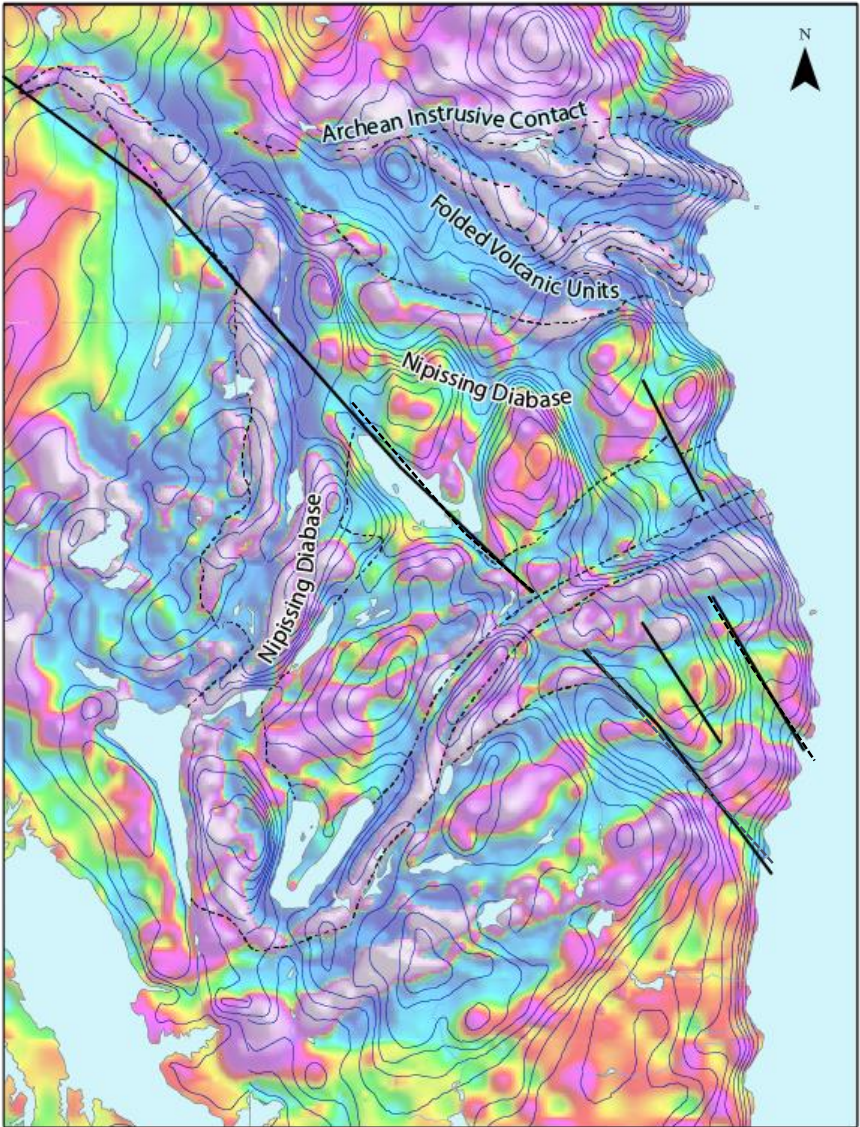
Aeromagnetic Interpretation



1VD RTP

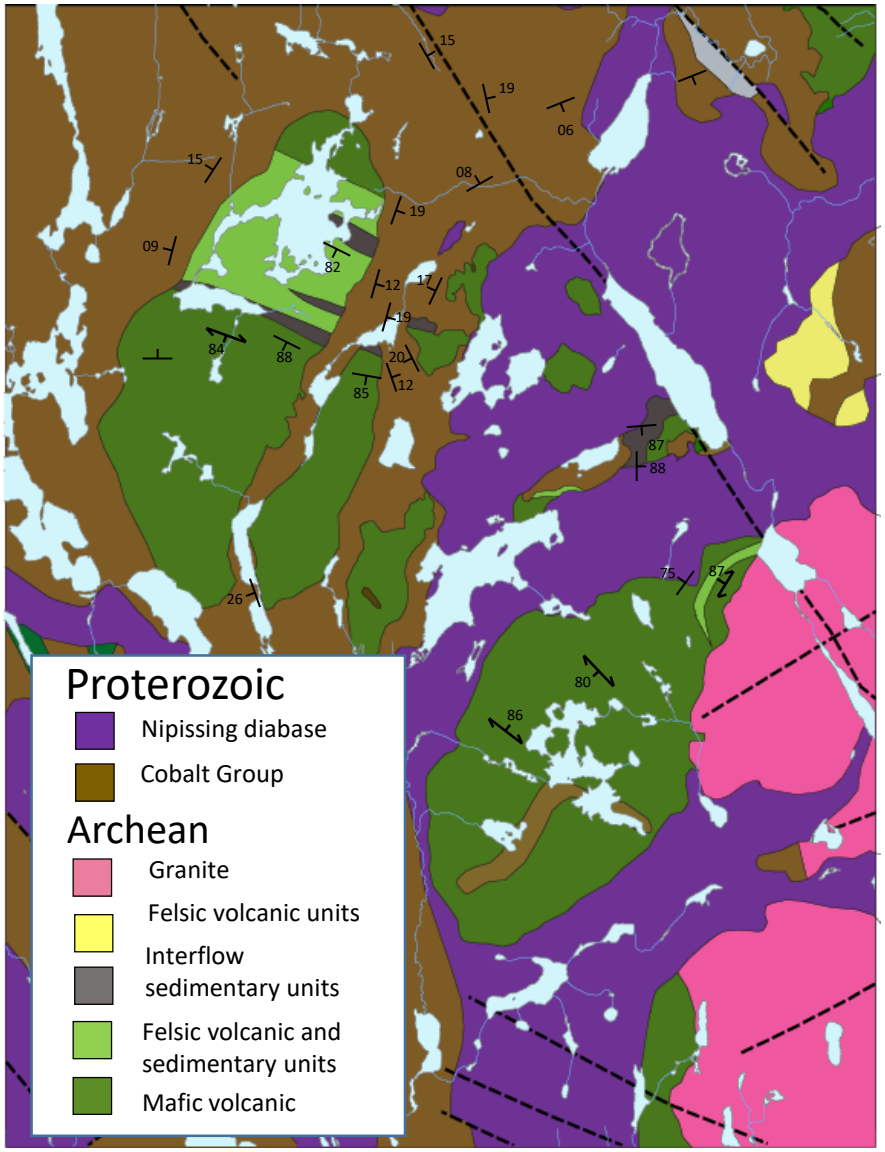
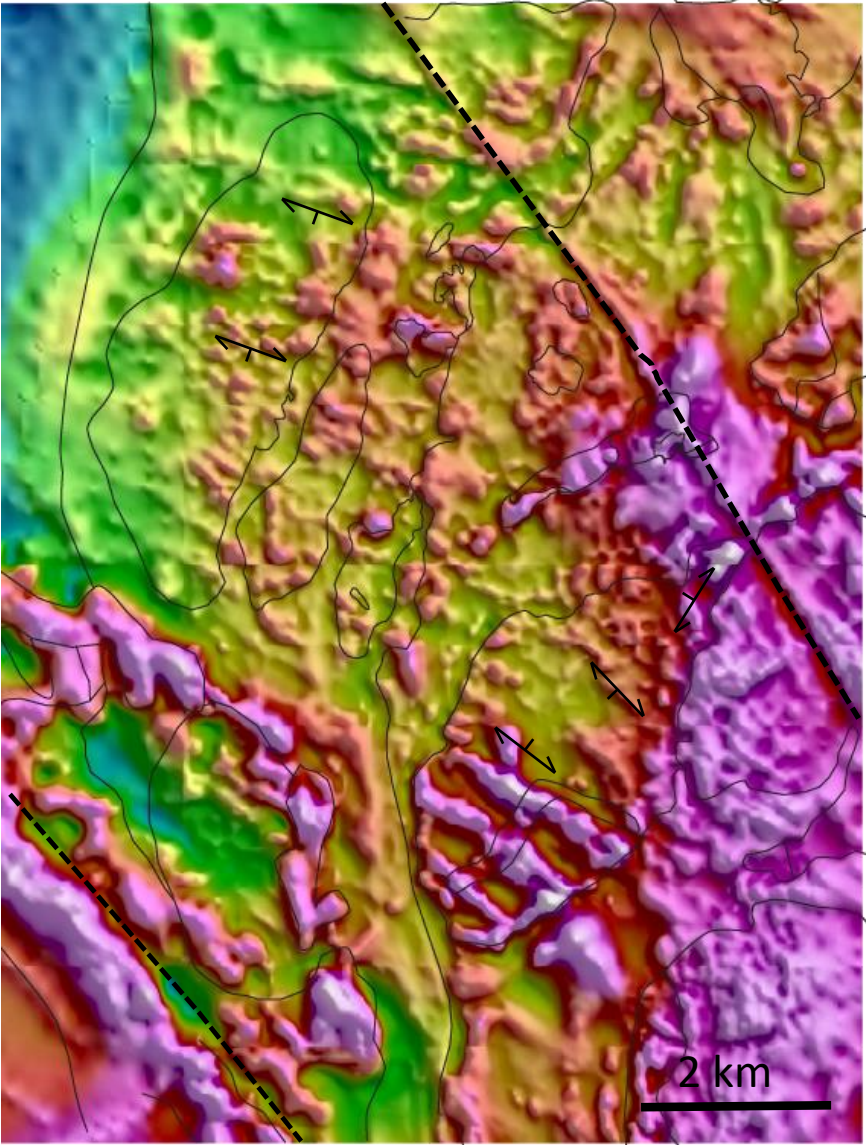


Aeromagnetic Interpretation

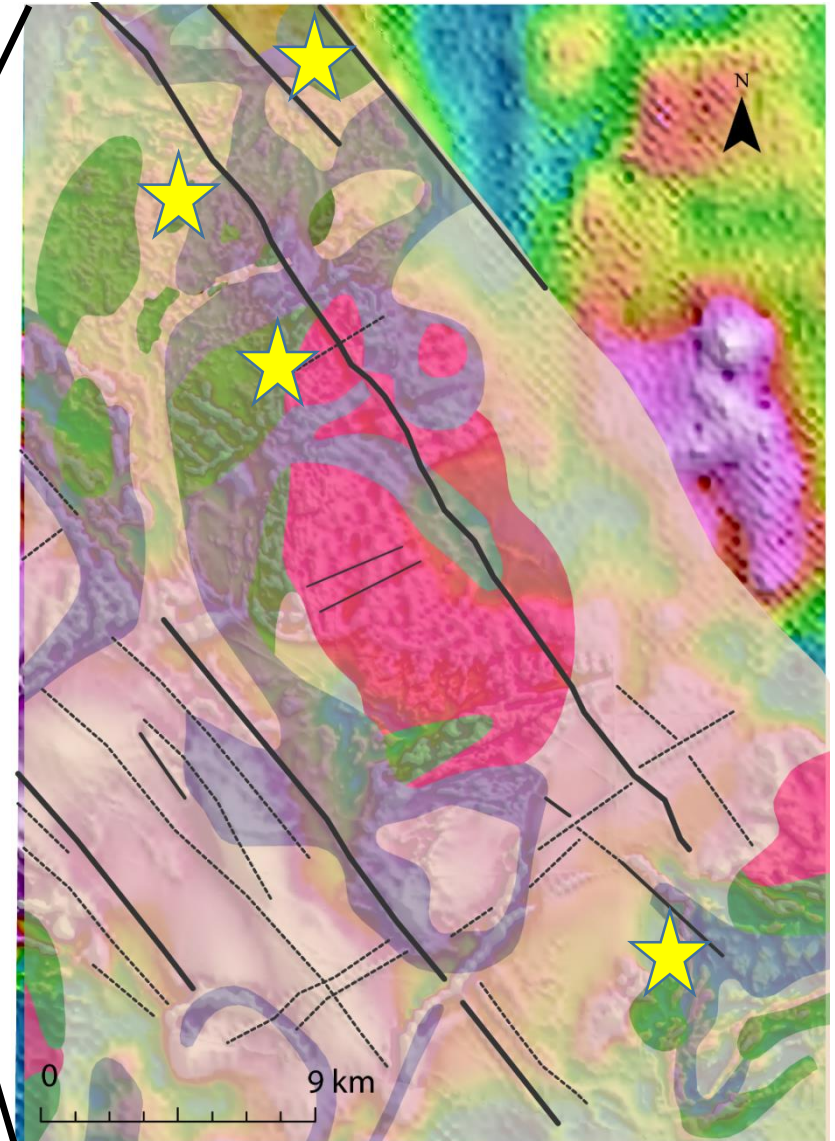
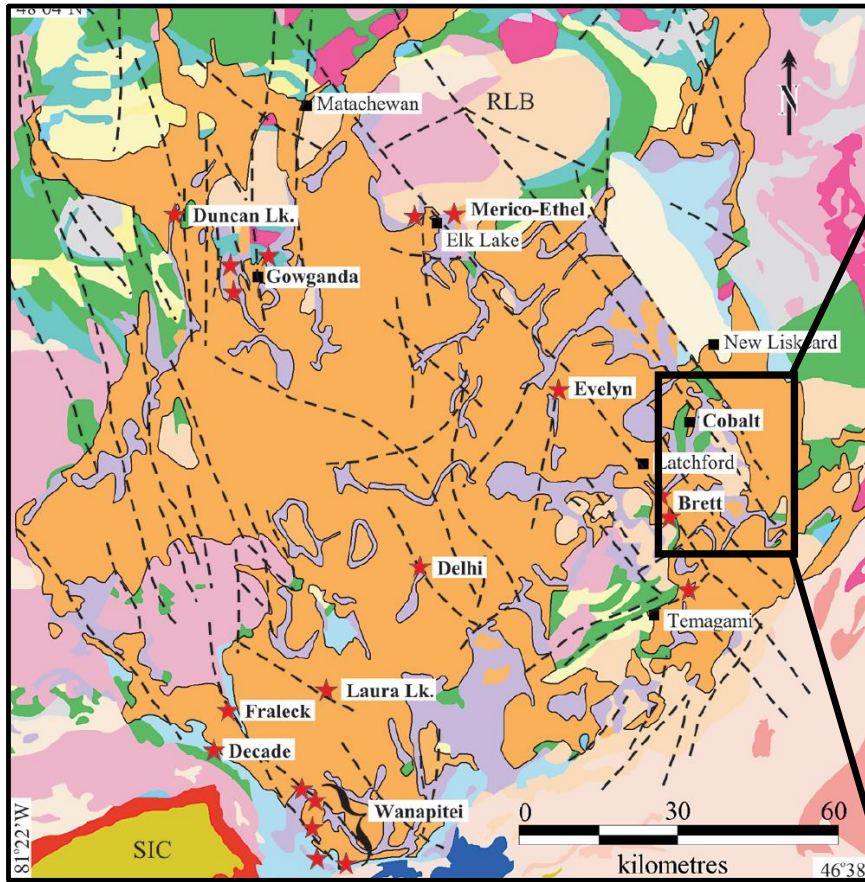


1VD RTP

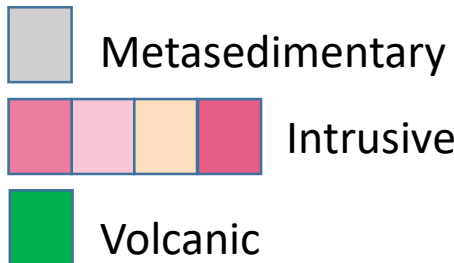
Aeromagnetic Interpretation



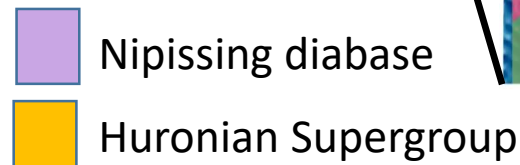
Major NW-Striking Faults



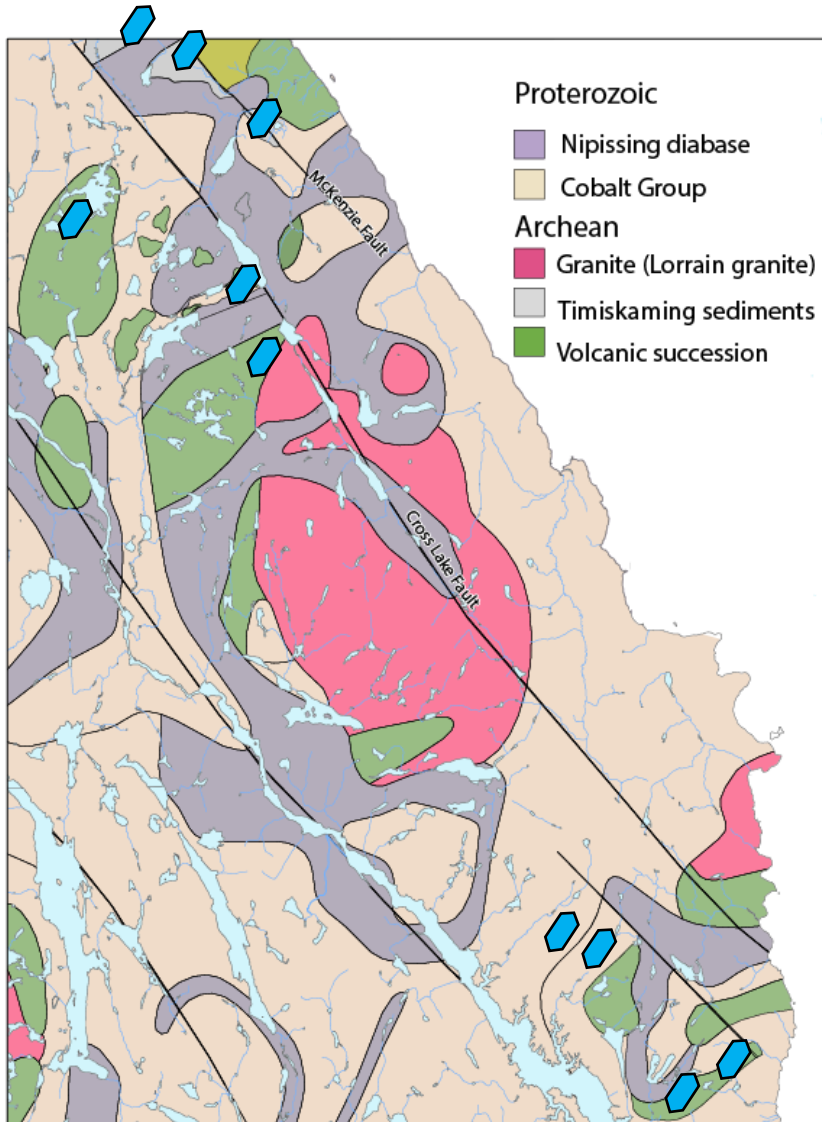
Archean



Paleoproterozoic

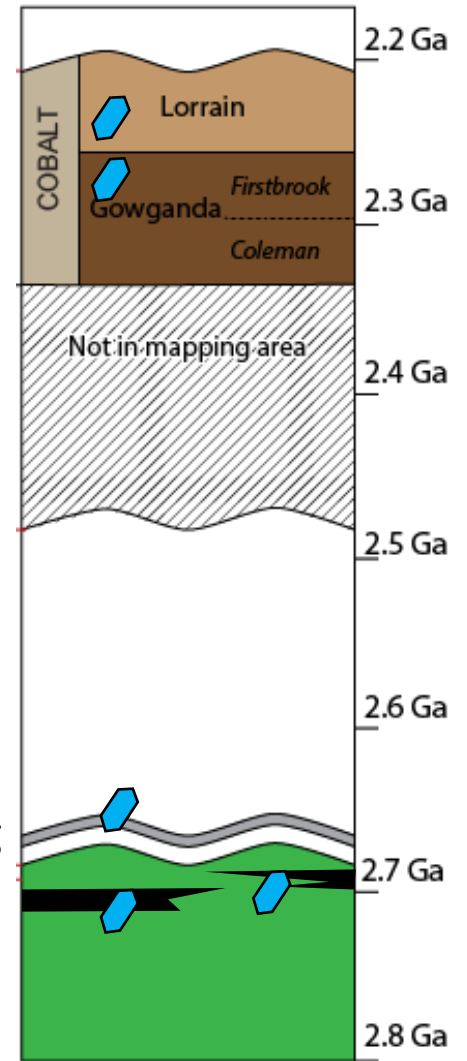


U-Pb Data: Detrital Zircon

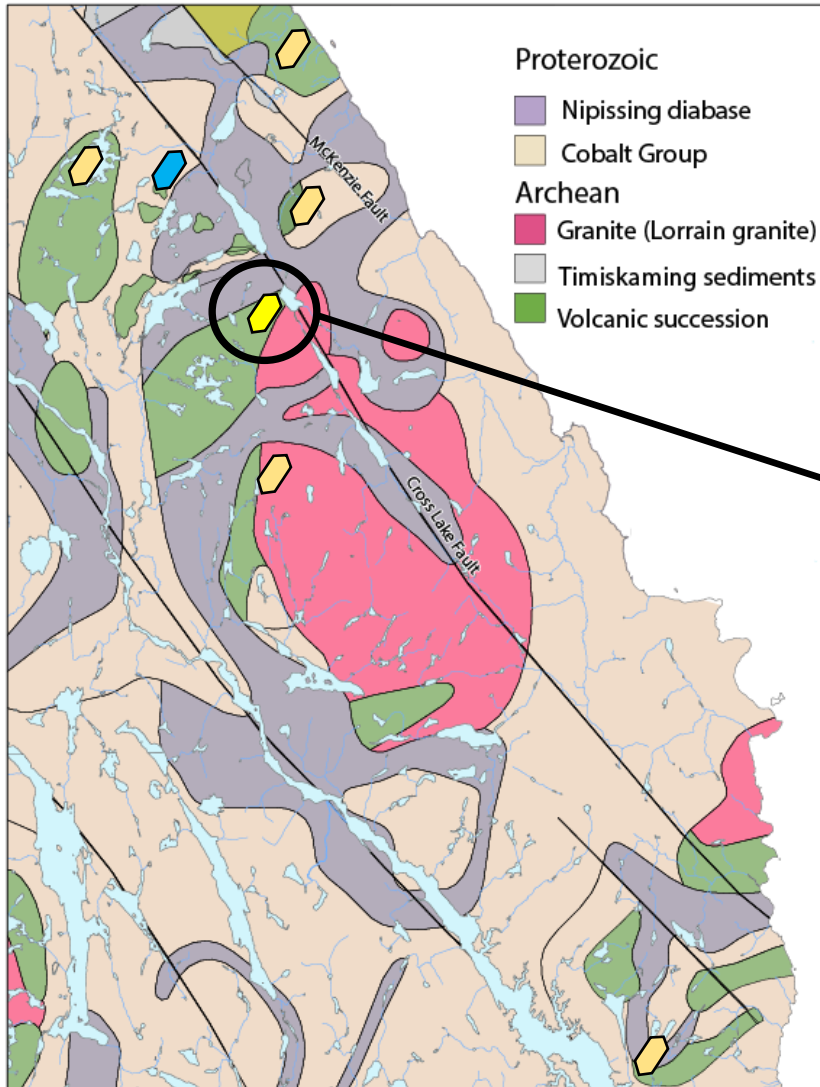


Upper Huronian

Timiskaming
Interflow sediments



U-Pb Data: TIMS Analyses of Zircon



Previous Work: Ayer and Chartrand 2011

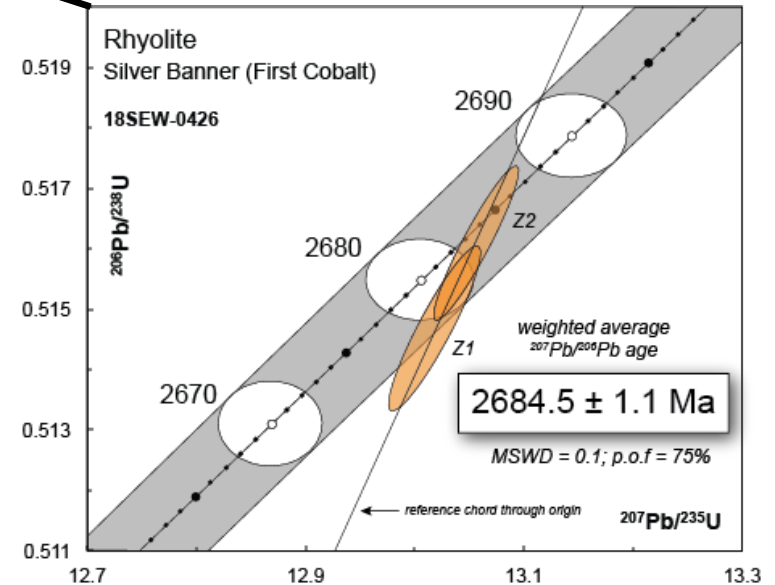
Detrital zircon age felsic tuff: **< 2682 Ma**

U-Pb age felsic flow: **2687 Ma**

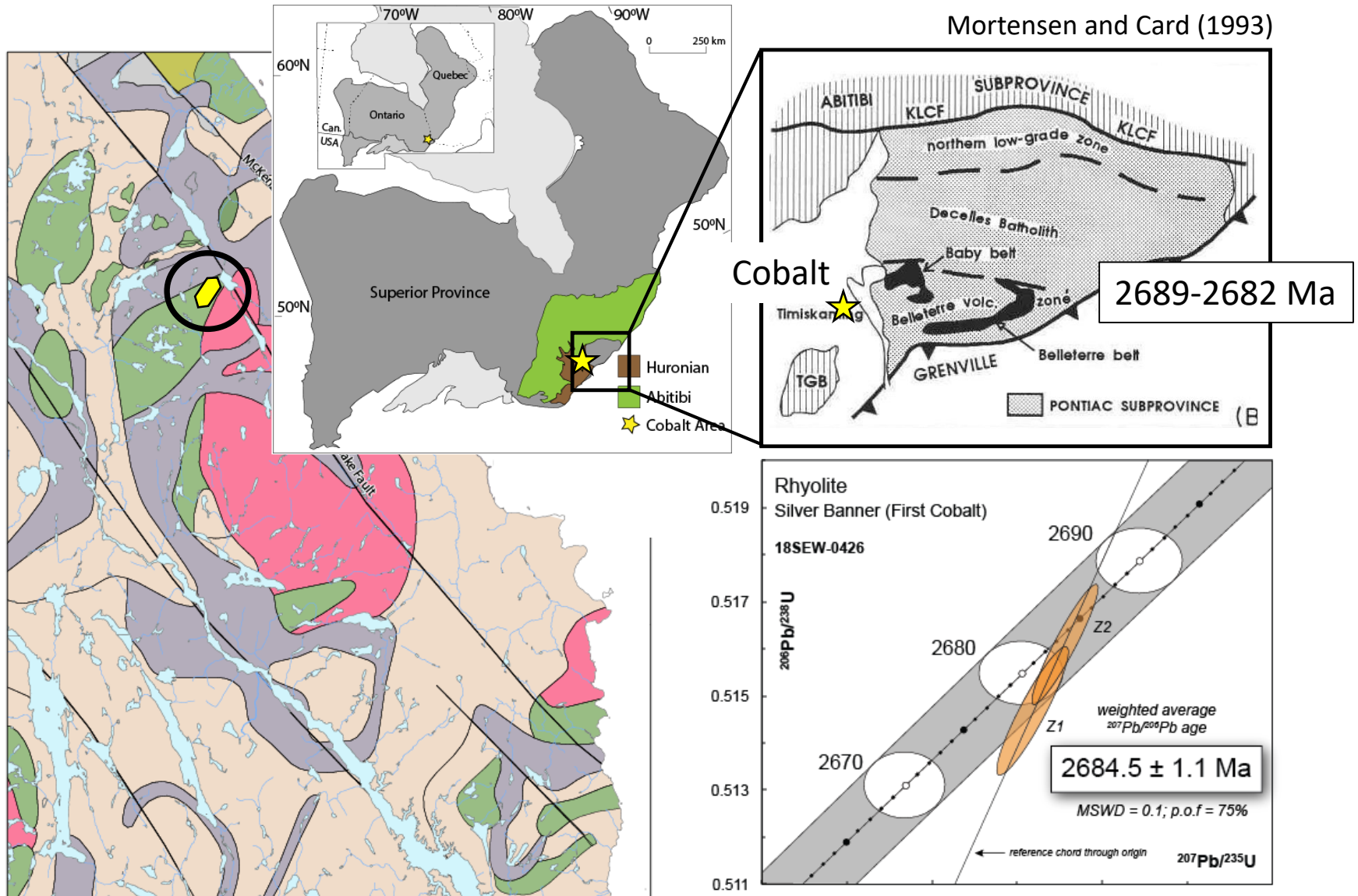
This Study: **2684.5 \pm 1.1 Ma**

Lorraine granite (1 sample)

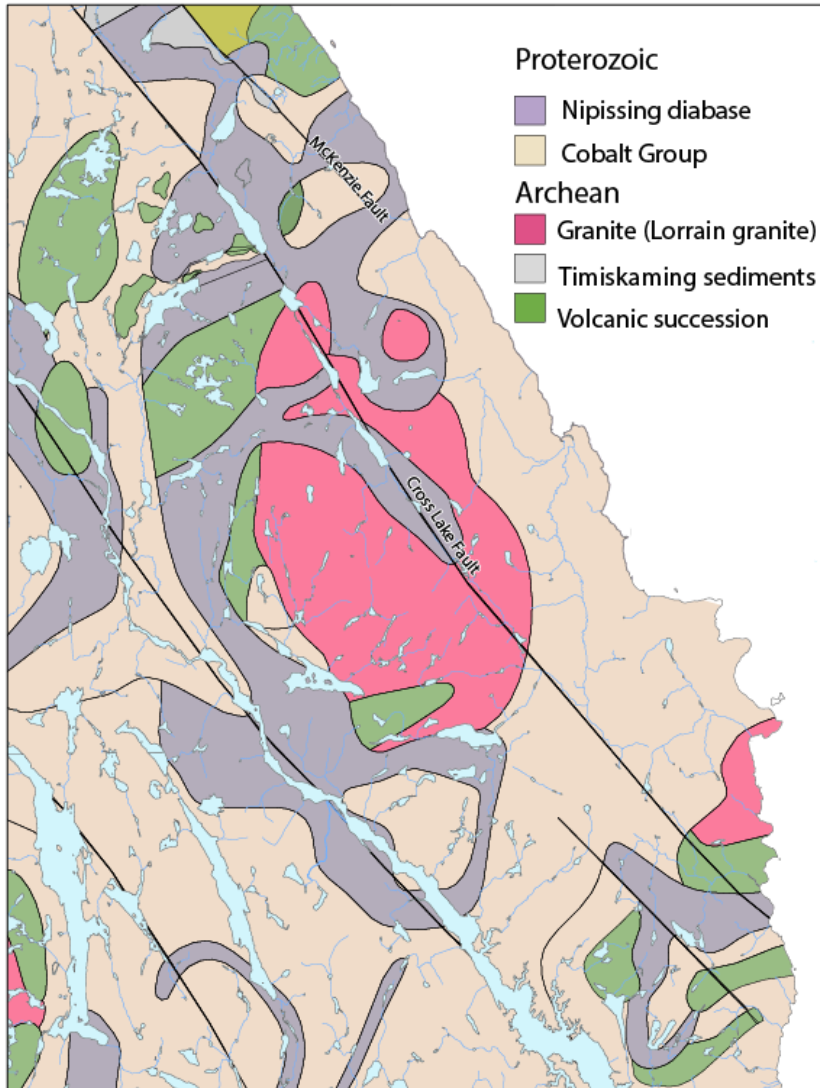
Felsic volcanic units (5 samples)



U-Pb Data: TIMS Analyses of Zircon

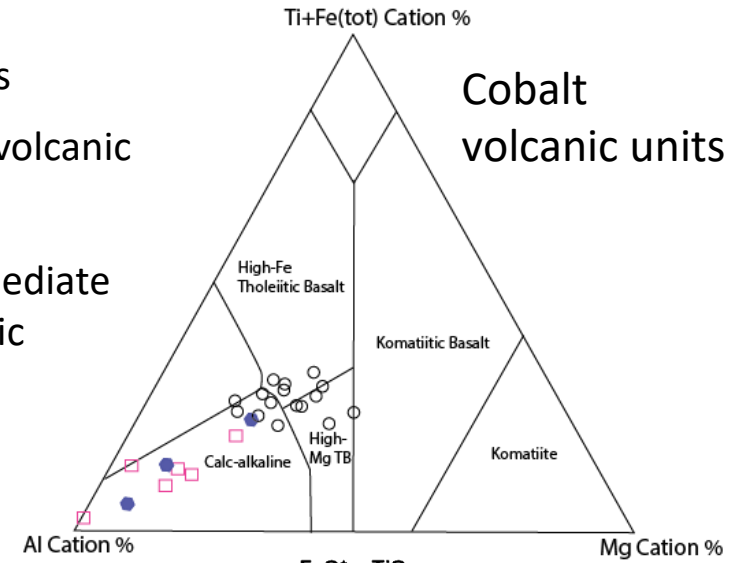


Geochemistry



- Basalts
- Felsic volcanic rocks

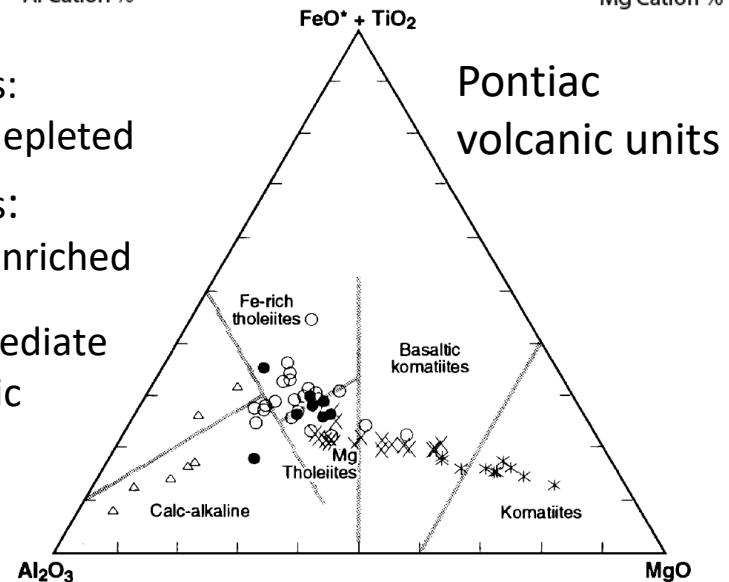
- Intermediate volcanic rocks



- Basalts: LREE-depleted

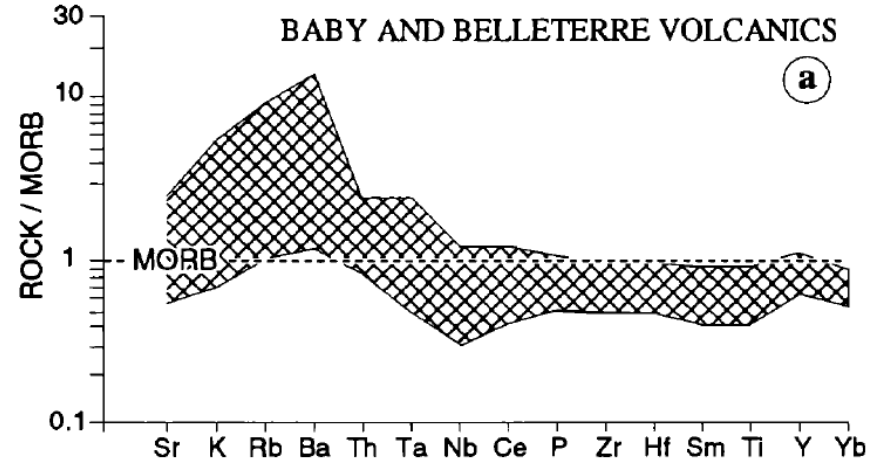
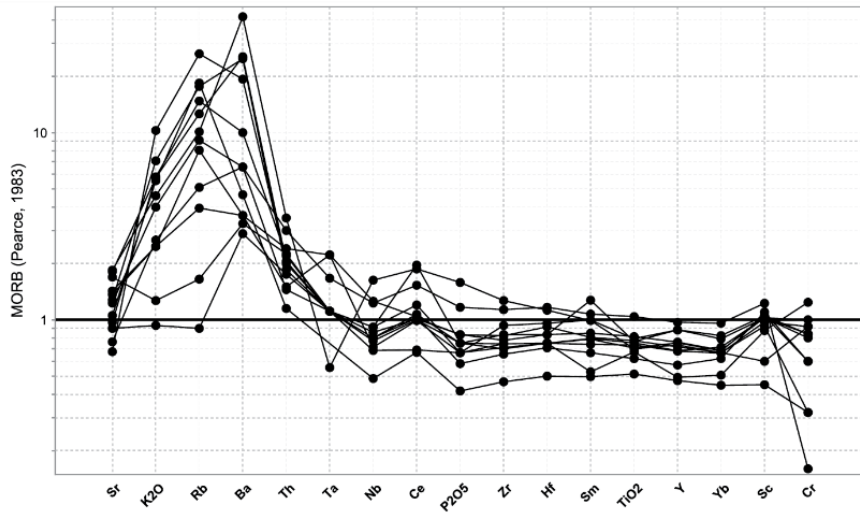
- Basalts: LREE-enriched

- △ Intermediate volcanic rocks

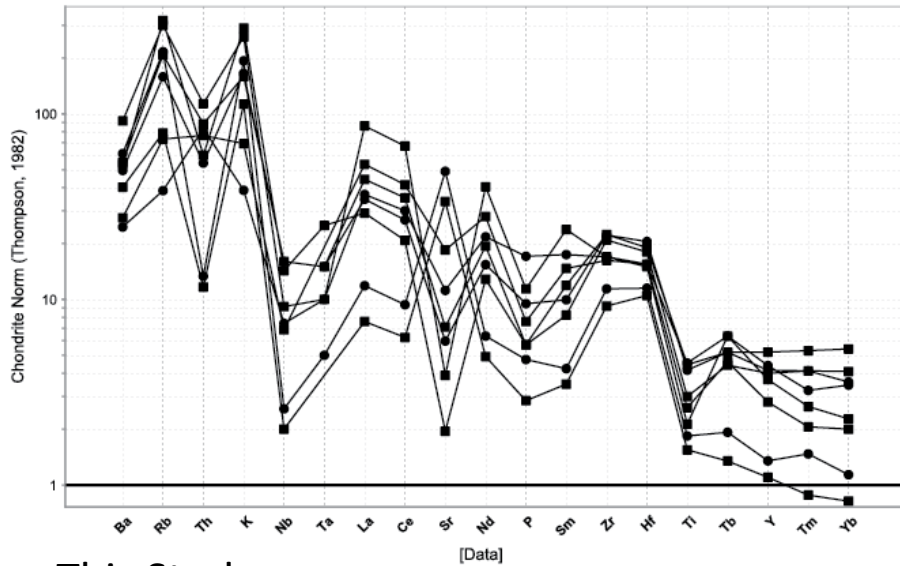


Barns et al. 1993

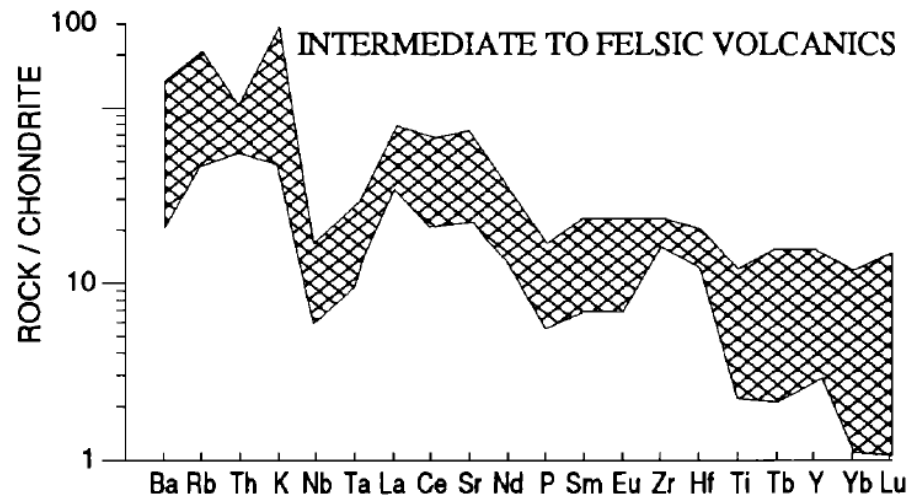
basalts



Intermediate to felsic volcanic units



This Study



Barns et al. 1993

Future Work

Near Future: Field 2019

- Further break-out stratigraphy in unmapped Archean inliers
- Determining generation of and reactivation periods along major NW-striking faults

Farther Future: Fall 2019

- Controls on mineralized veins
- Possible correlations with Pontiac basement
- Provenance shifts across the Gowganda-Lorrain boundary
- Max depositional age of Timiskaming in the area
- Generate a 3D model of the region with added geophysics and interpretation

A Little More Farther Future

- Eventually work on Abitibi-scale seismic modeling of major faults

Future Work

Goal: Understand the metallogenic framework of the Cobalt Camp:

- Determine metal zoning of the camp;
- constraining fluid chemistry;
- determine P-T evolution of the ore forming fluid;
- dating the timing of fluid flow and ore formation.



Louise Rush: Masters student

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