

Analysis of Archean Quartzite, Granite Mountains, Wyoming

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Objective

- Is Archean quartzite from the Granite Mountains the product of intense weathering in an acidic climate of early Earth?
 1. Field work to collect samples
 2. Processed samples
 3. Analyzed samples using thin sections and x-ray fluorescence

Field Work



Collecting sample 14SQ6 (PC. Carol Frost)



Collecting sample 14SQ7 (PC. Carol Frost)

Sample Processing

Thin Sections



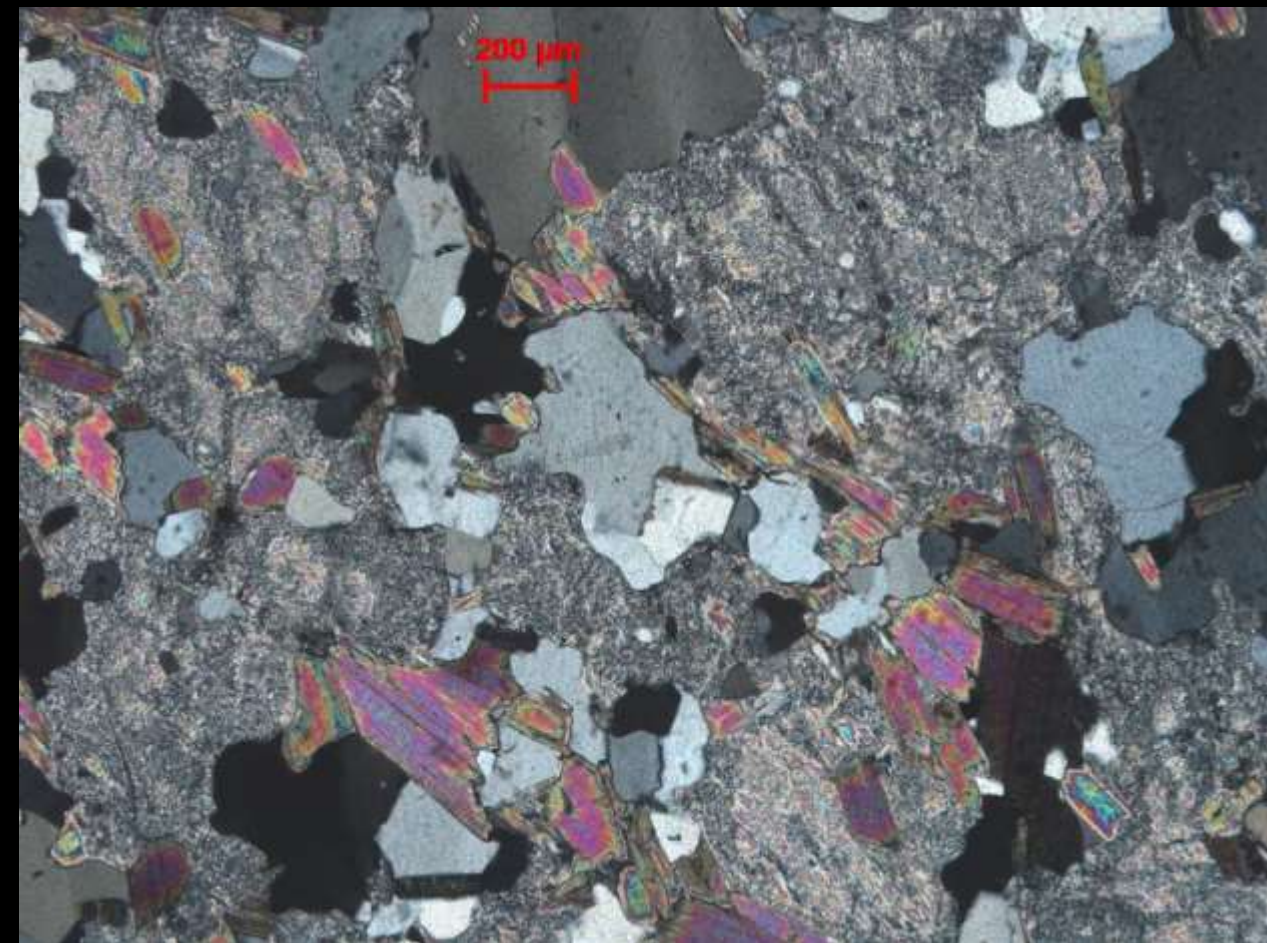
Sample Processing

Geochemistry

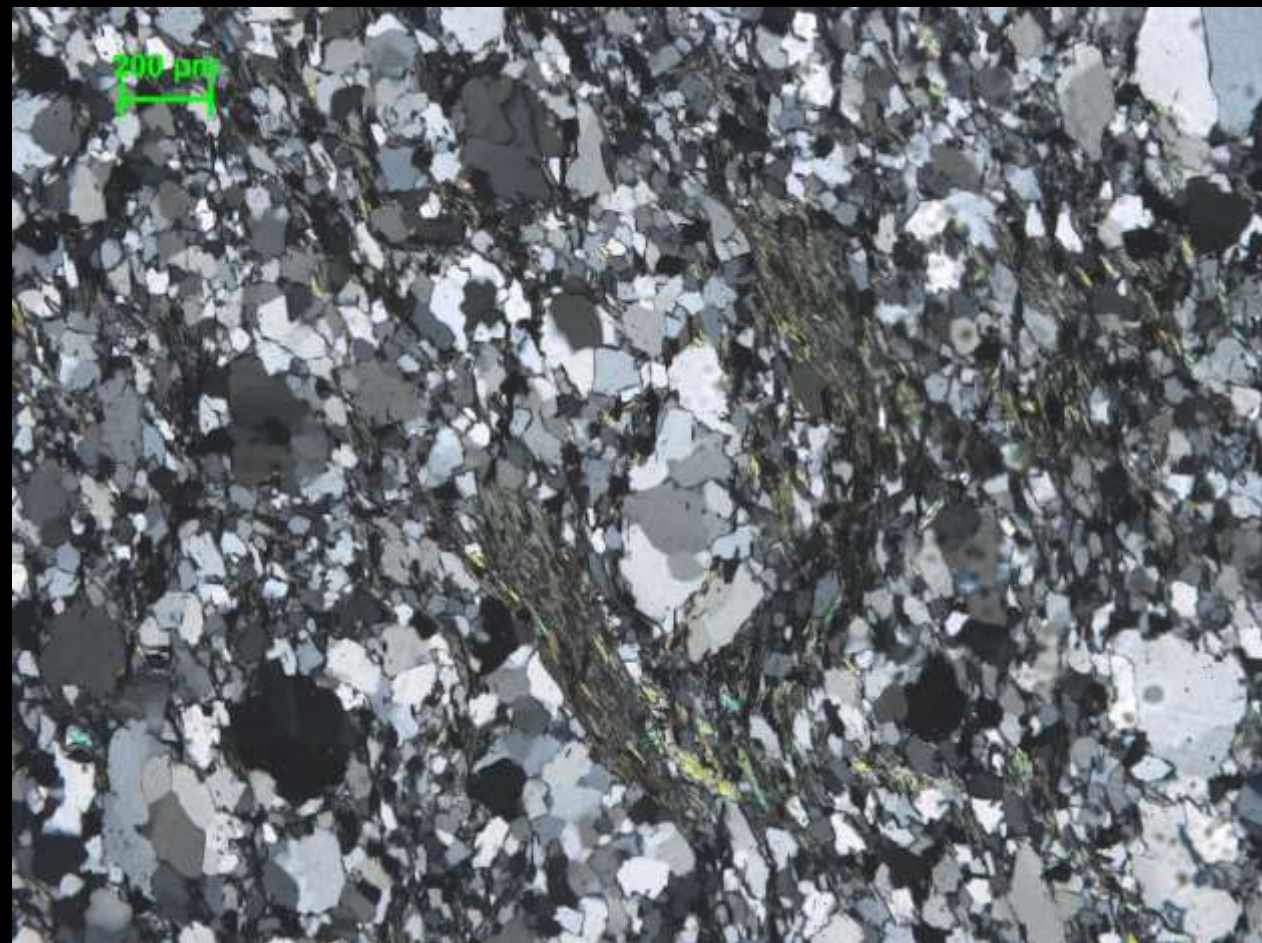


Sample locations





14CS2 in cross polar

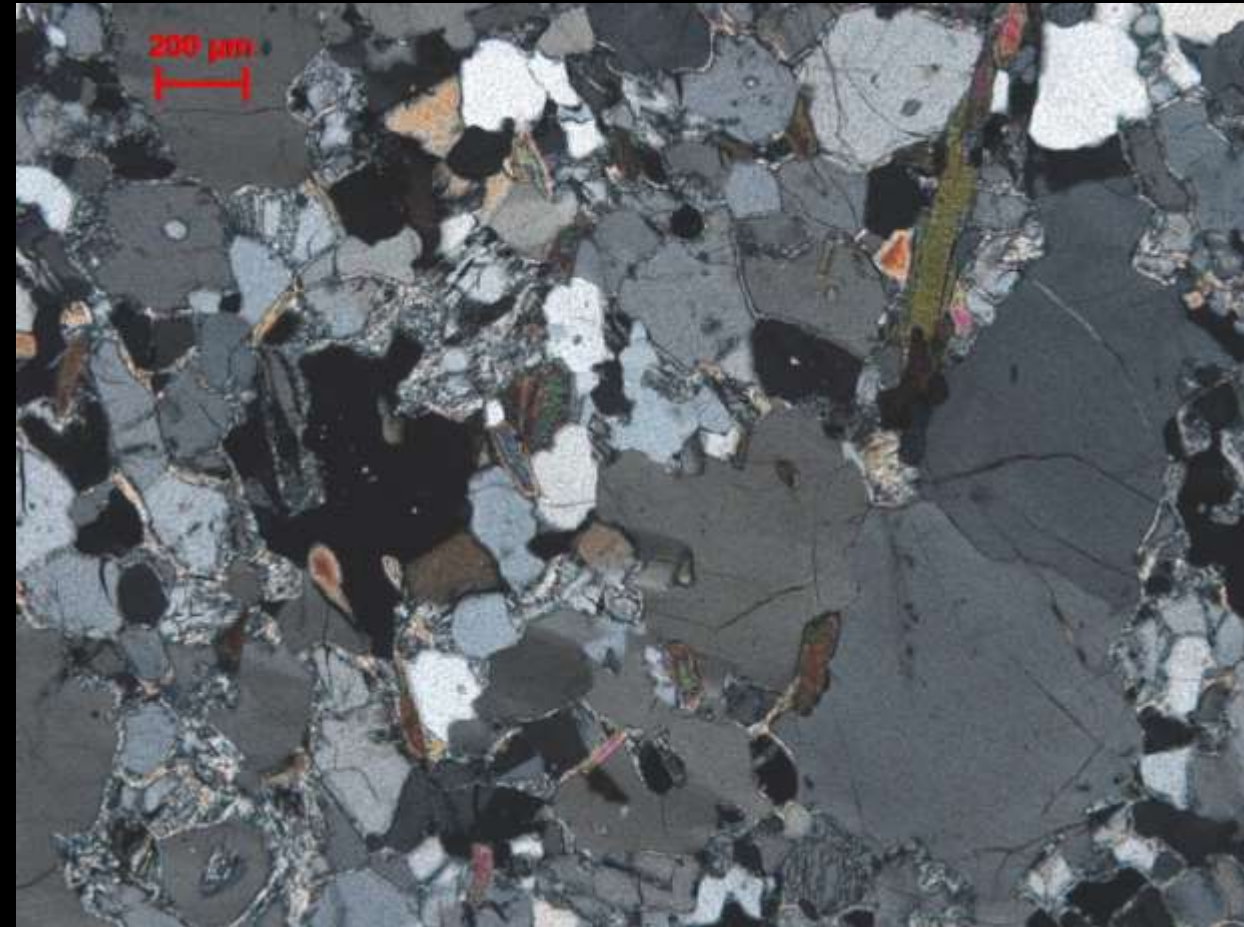


14SQ7 in cross polar

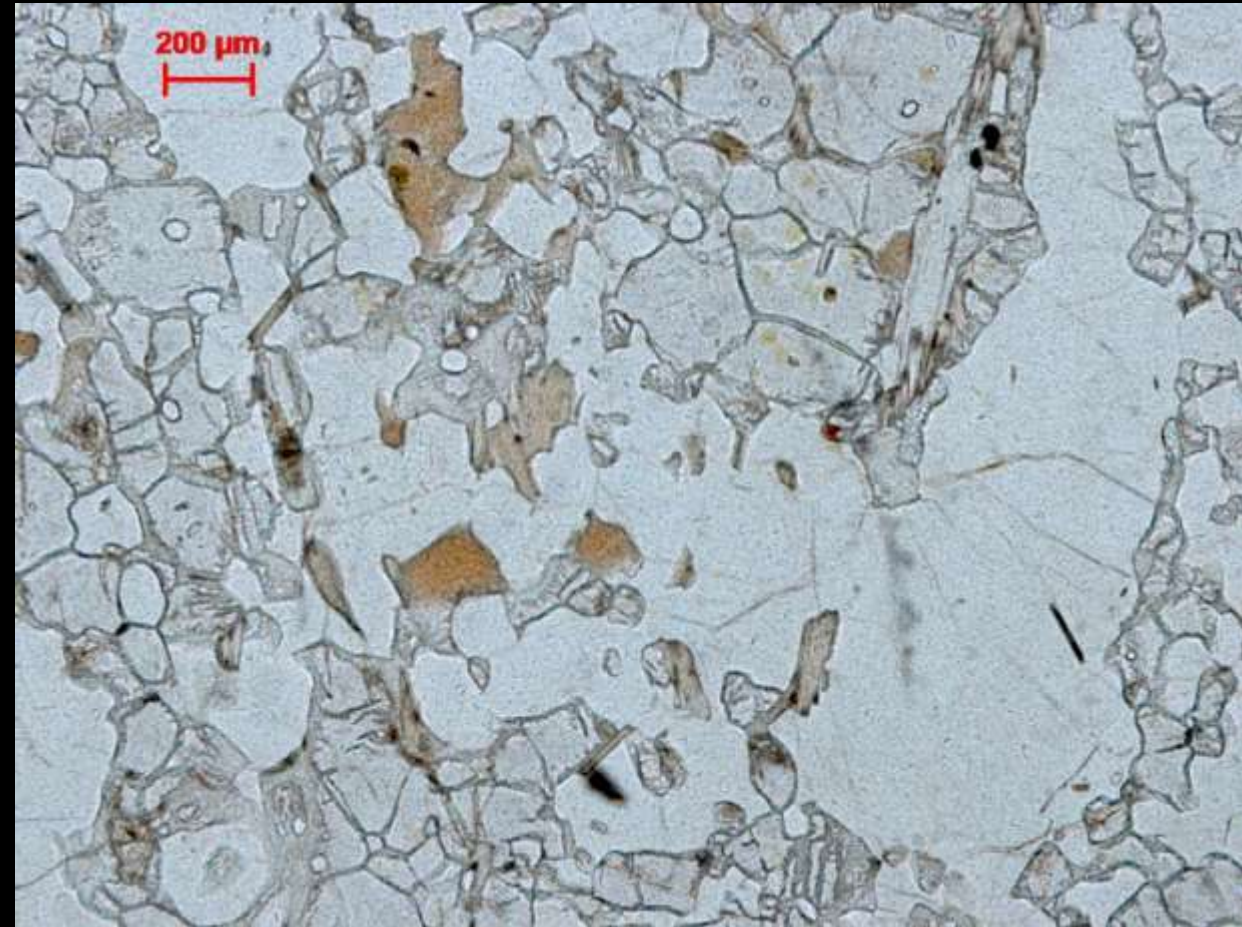
The Granite Mountains have two kinds of quartzite:
those with cordierite (left) and those without (right)

Frank Quartzite

- Quartz, cordierite, biotite, chlorite \pm muscovite and sillimanite

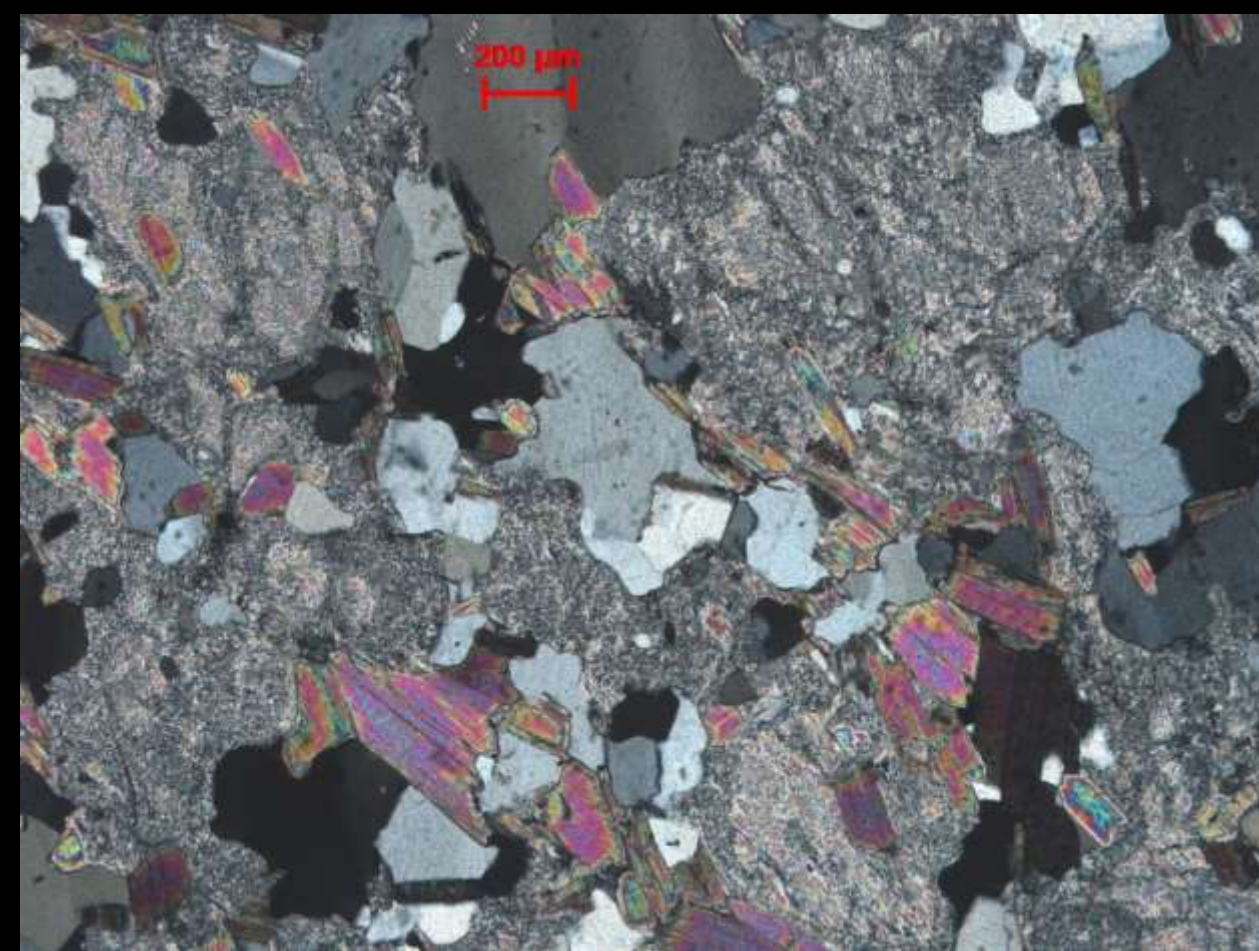


00BBL43 in cross polar



00BBL43 in plane polar

Frank Quartzite

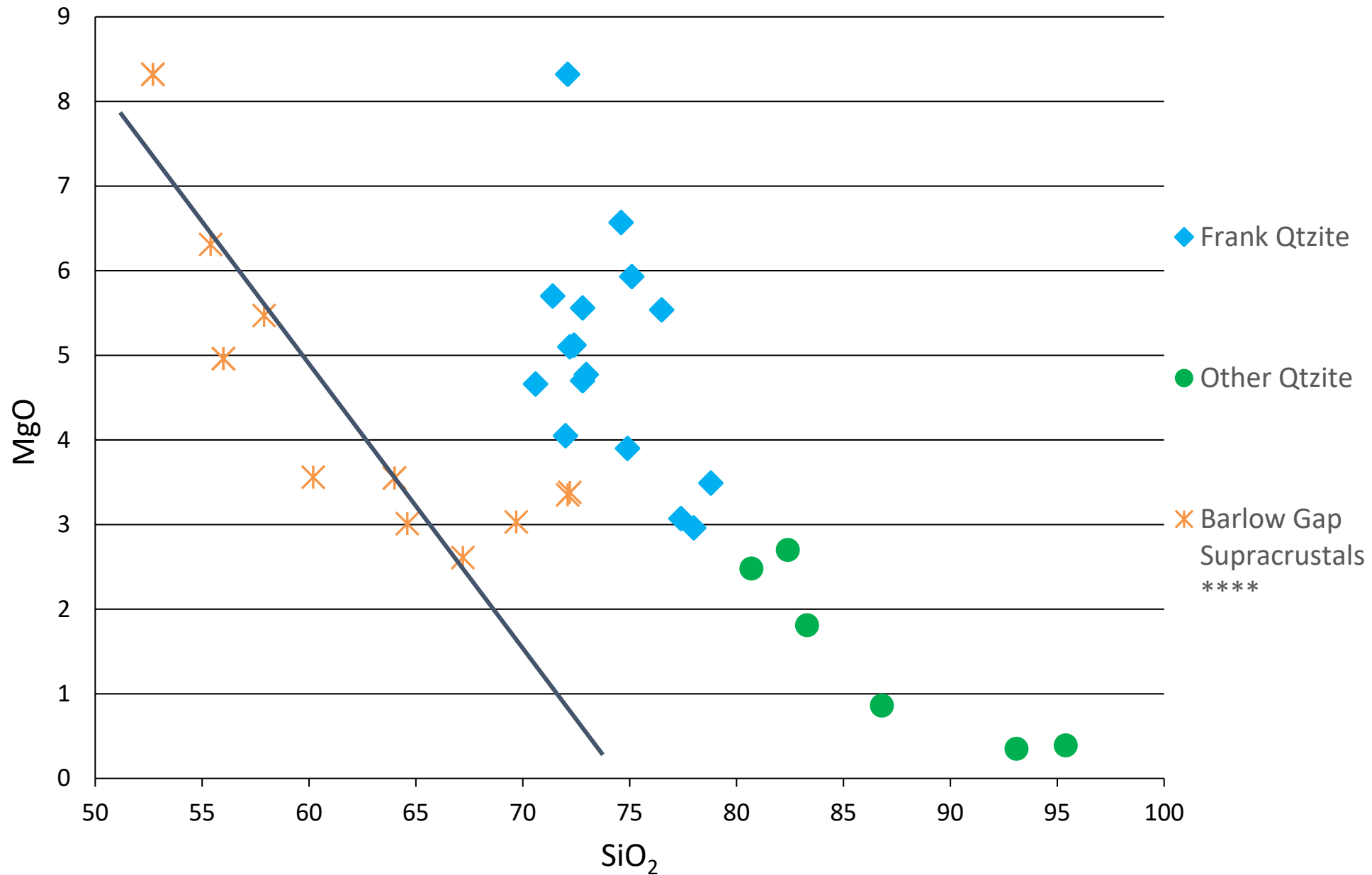


14CS2 in cross polar

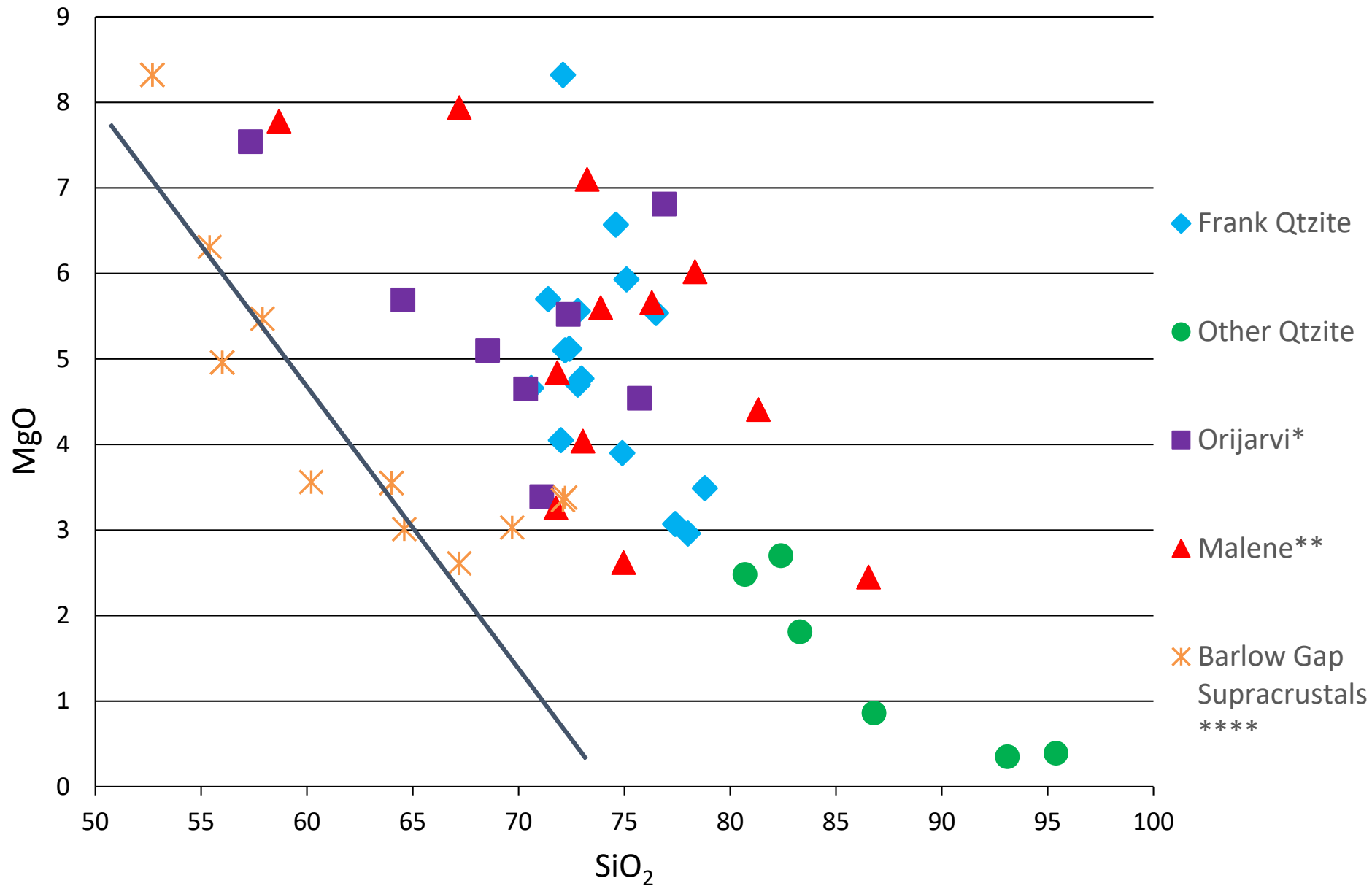


14CS2 in plane polar

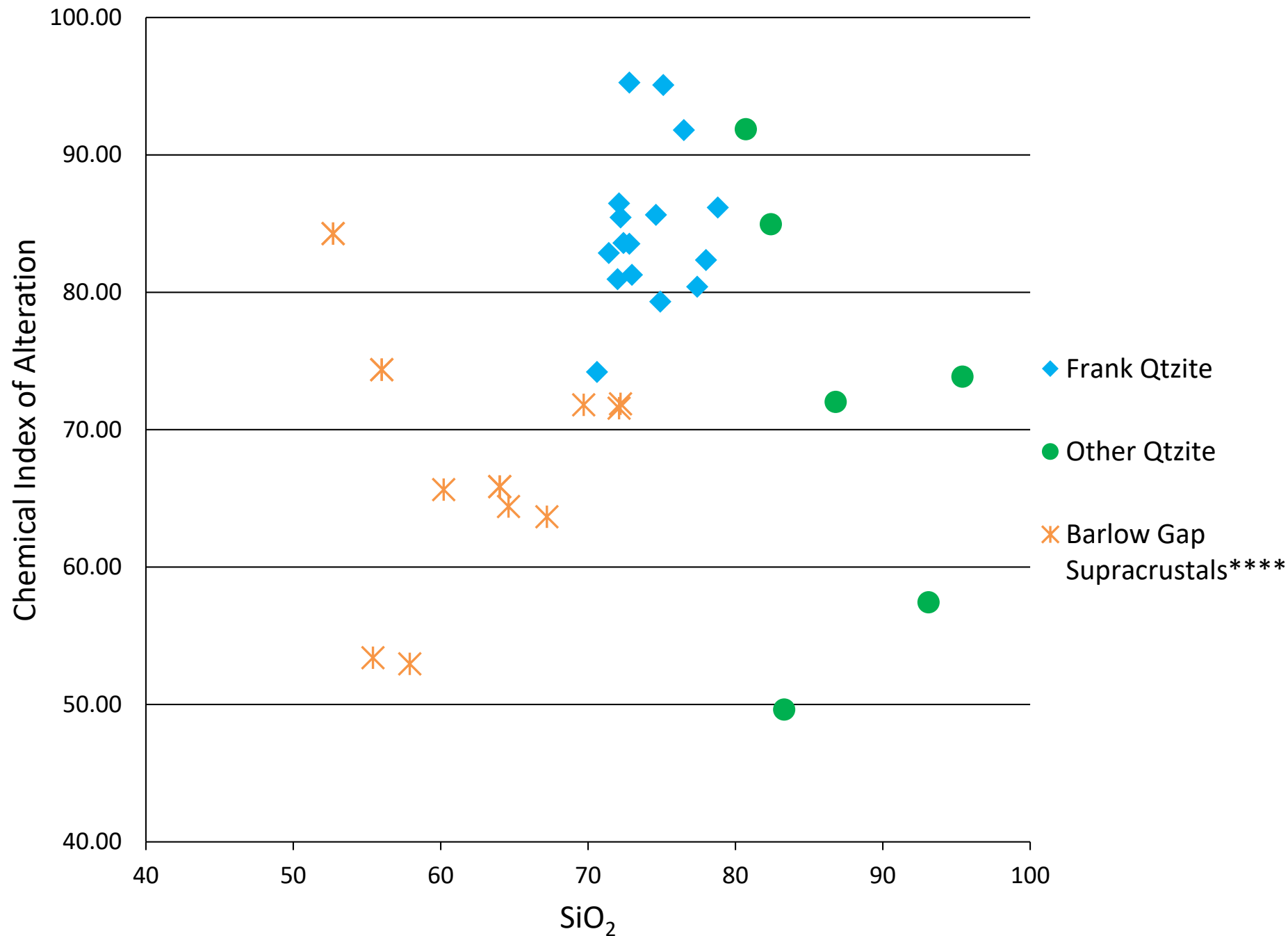
Cordierite readily alters to pinite



Frank quartzite is chemically distinct from other immature quartzite in the Granite Mountains.



Frank quartzite is similar to quartzite found in Finland and Greenland that were interpreted to have formed by interactions with hot, Mg-rich fluids



Alteration of Frank quartzite is different from most younger Archean quartzite

Conclusions

- Frank quartzite is high MgO and is comprised of quartz, cordierite, biotite, chlorite
- Data gathered during this project points to distinct metasomatic event and not weathering
- These rocks do exist world wide
- First time they have been described in the Wyoming province

References

**Dymek, R. F., & Smith, M. S. (1990). Geochemistry and origin of Archean quartz-cordierite gneisses from the Godthabsfjord region, West Greenland. *Contributions to Mineralogy and Petrology* 105(6), 715-730.

****McLaughlin, J.F., Bagdonas, D., Frost, C.D., Frost, B.R., 2013, *Geologic Map of the Stampede Meadows quadrangle, Fremont County, Wyoming*. Wyoming State Geological Survey Bedrock Geologic Map, 1:24,000 scale and unpublished data by McLaughlin, Fruchey, and other UW students.

*Smith, M. S., Dymek, R. F., & Schneiderman, J. S. (1992). Implications of Trace Element Geochemistry for the Origin of Cordierite-Orthoamphibole Rocks from Orijarvi, SW Finland. *The Journal of Geology* 100(5), 545-559

