Re-investigating the Barrovian metamorphic rocks of the Isbjørnhamna Group, Svalbard Caledonides

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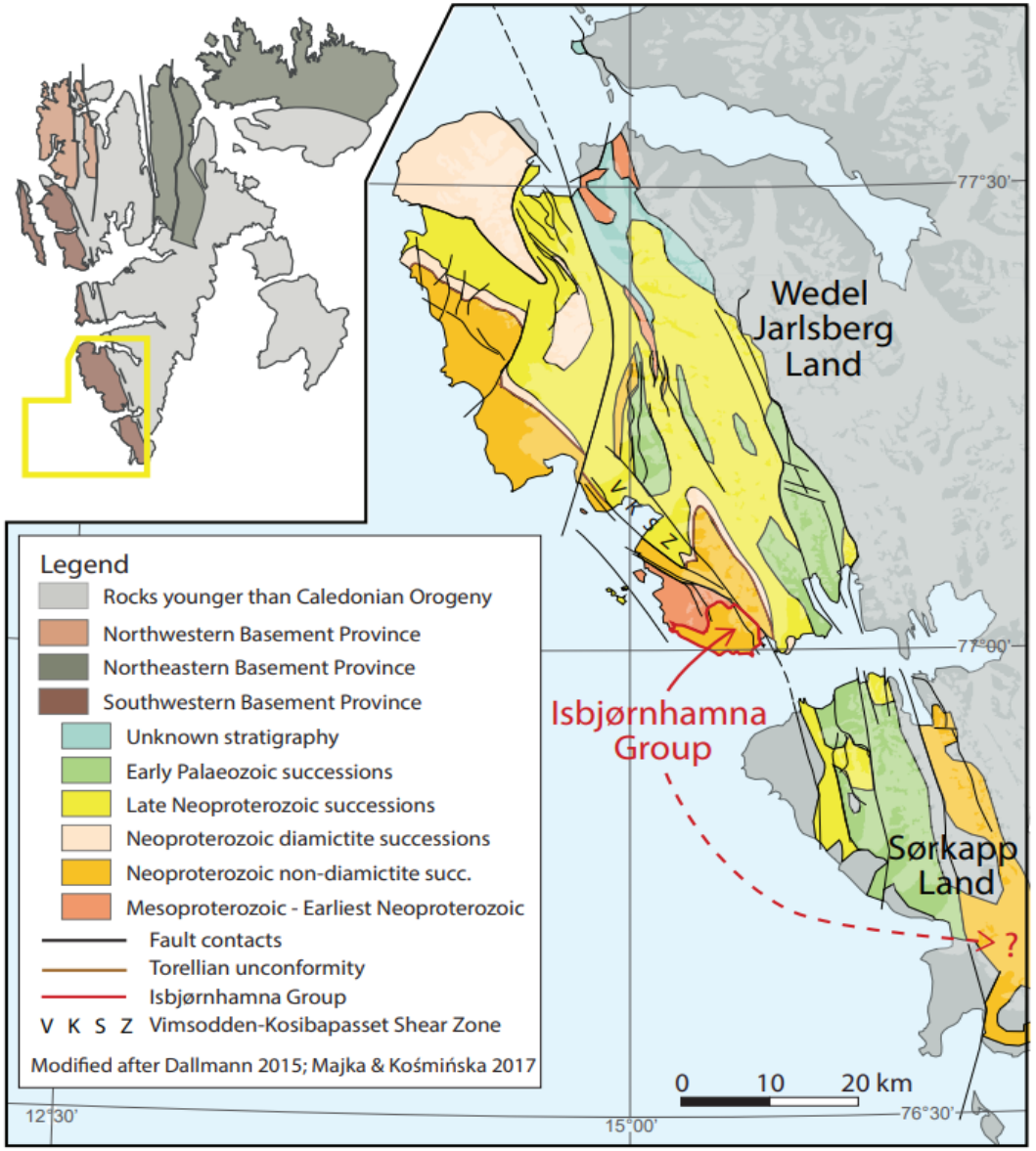


Svalbard: Norwegian island in the High Arctic region

In the south-western part of this island we can find the Isbjørnhamna Group in Wedel Jarlsberg Land. It can possibly be traced in Sørkapp too (one of the goal for our next fieldwork).

Important rocks for understanding the High Arctic history : first stage of metamorphism has been dated c. 640Ma (Torellian orogeny; Majka et al. 2008), and then they have been overprinted by the Caledonian orogeny.

Only 1 petrological approach (Majka et al., 2010) and already out of date.

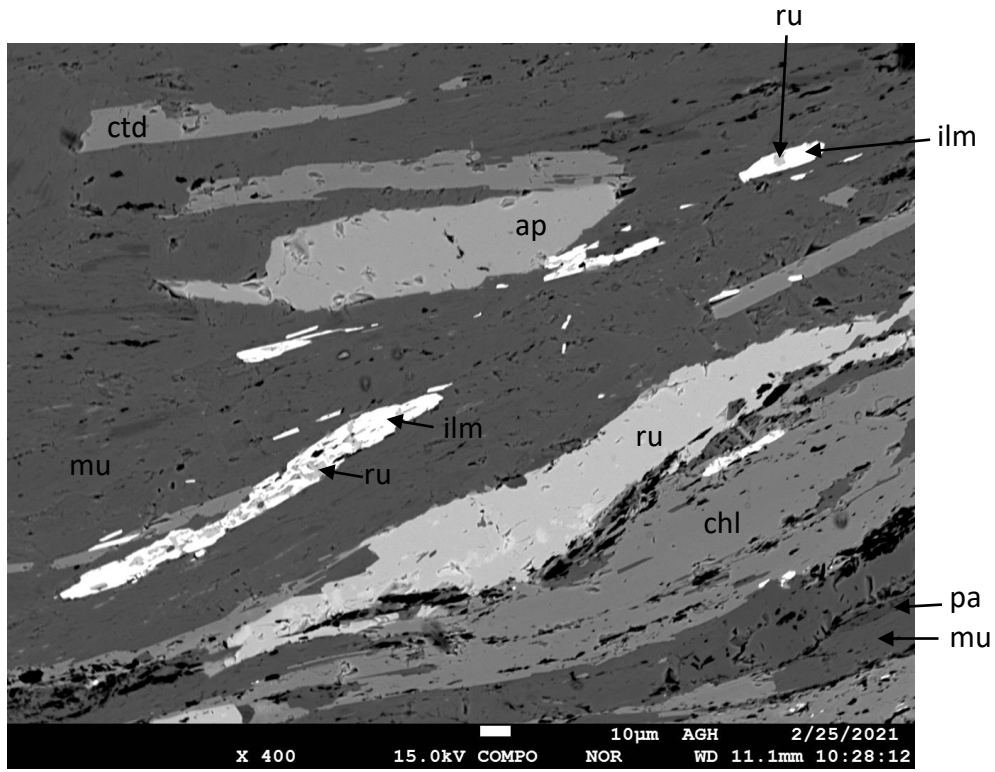
Rocks: Barrovian-type series of garnet-bearing micaschists, ranging from chlorite to kyanite metamorphic zones.

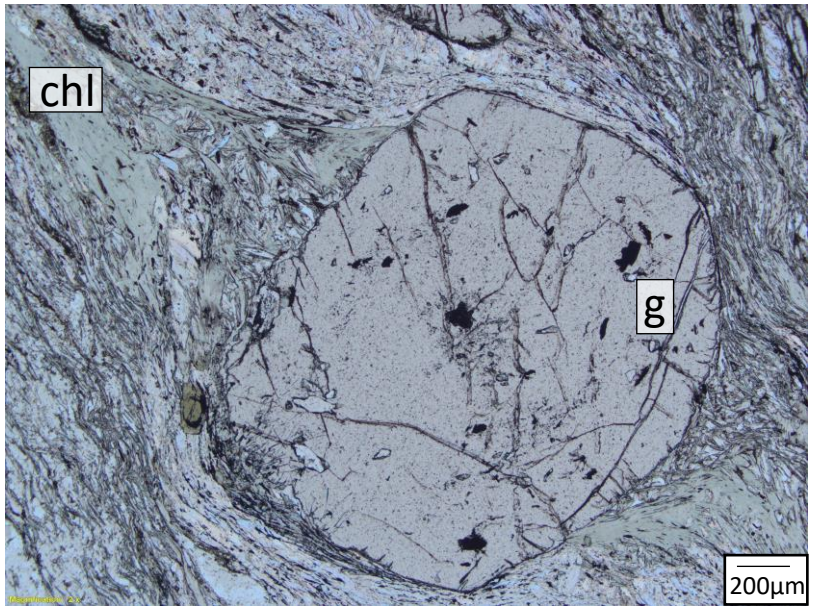
Example of a rock from the chloritoid-chlorite zone:

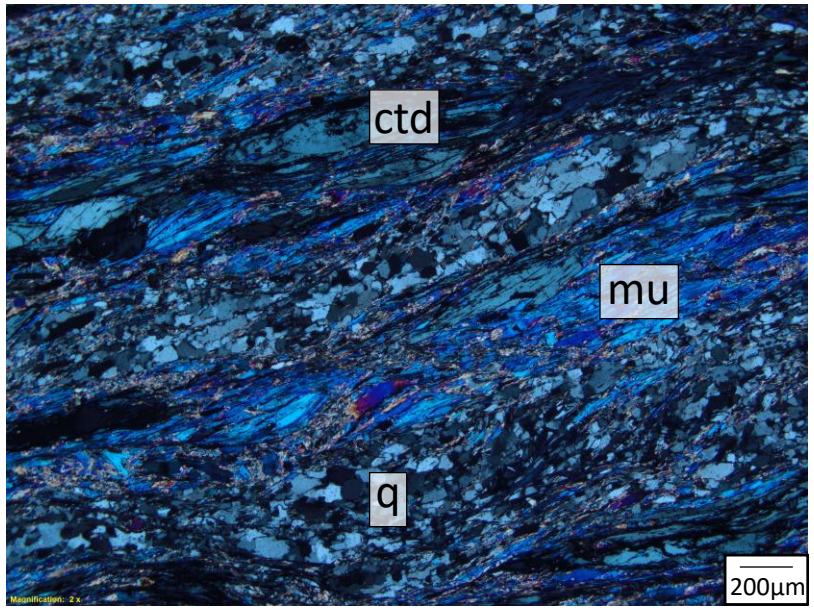
Observed minerals: garnets (max 2mm), quartz, muscovite, paragonite, chlorite, chloritoid, rutile, ilmenite, and accessory phases like tourmaline, pyrite or apatite.

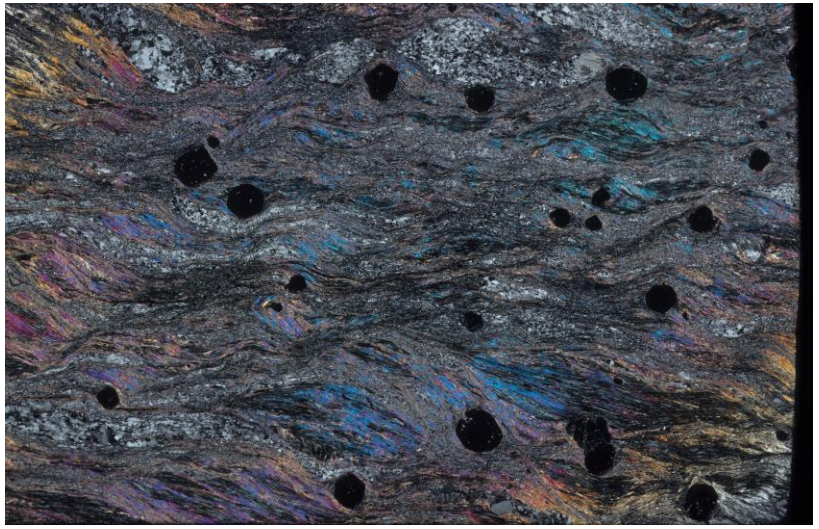
Folded foliation marked by different layers of minerals: xenomorphic quartz forming boudins and oriented muscovite/chlorite/chloritoid.

Some rutile are totally overgrown by ilmenite.





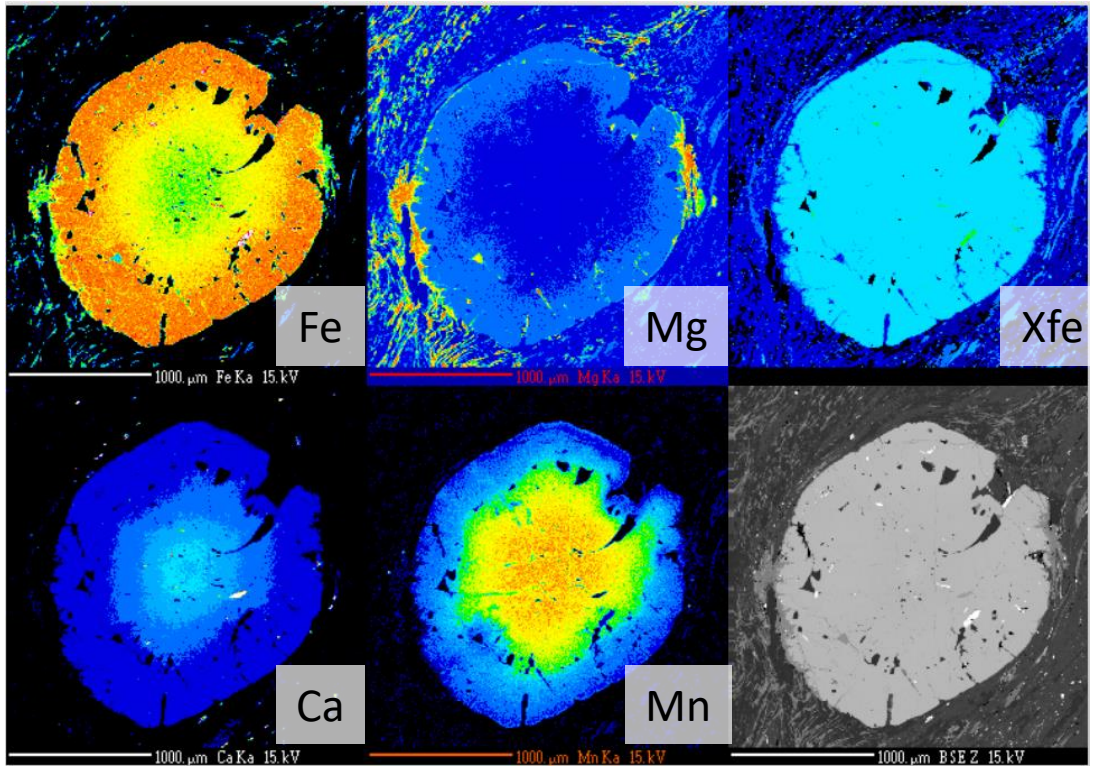




Scan of a thin section in polarized+analyzed light

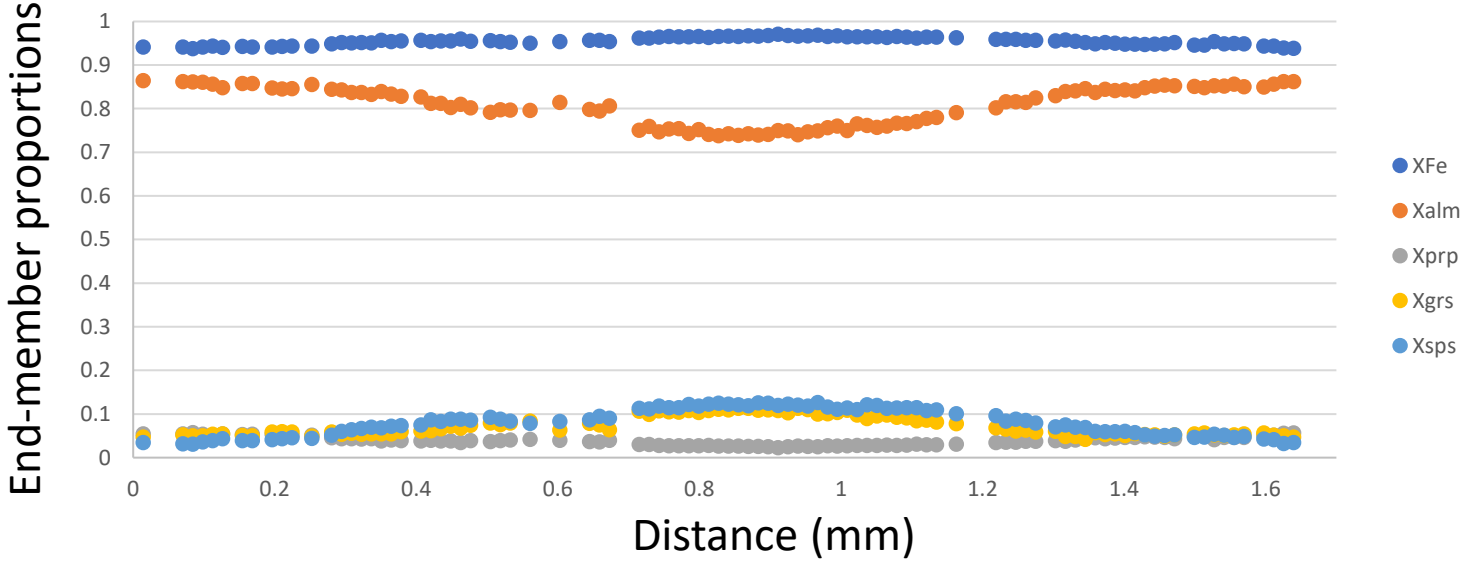
Garnet study:

1000µm



Garnets show zonations, especially in Iron, Calcium and Manganese.

Minerals for this sample has been studied on electron microprobe twice and on 2 different thin sections.

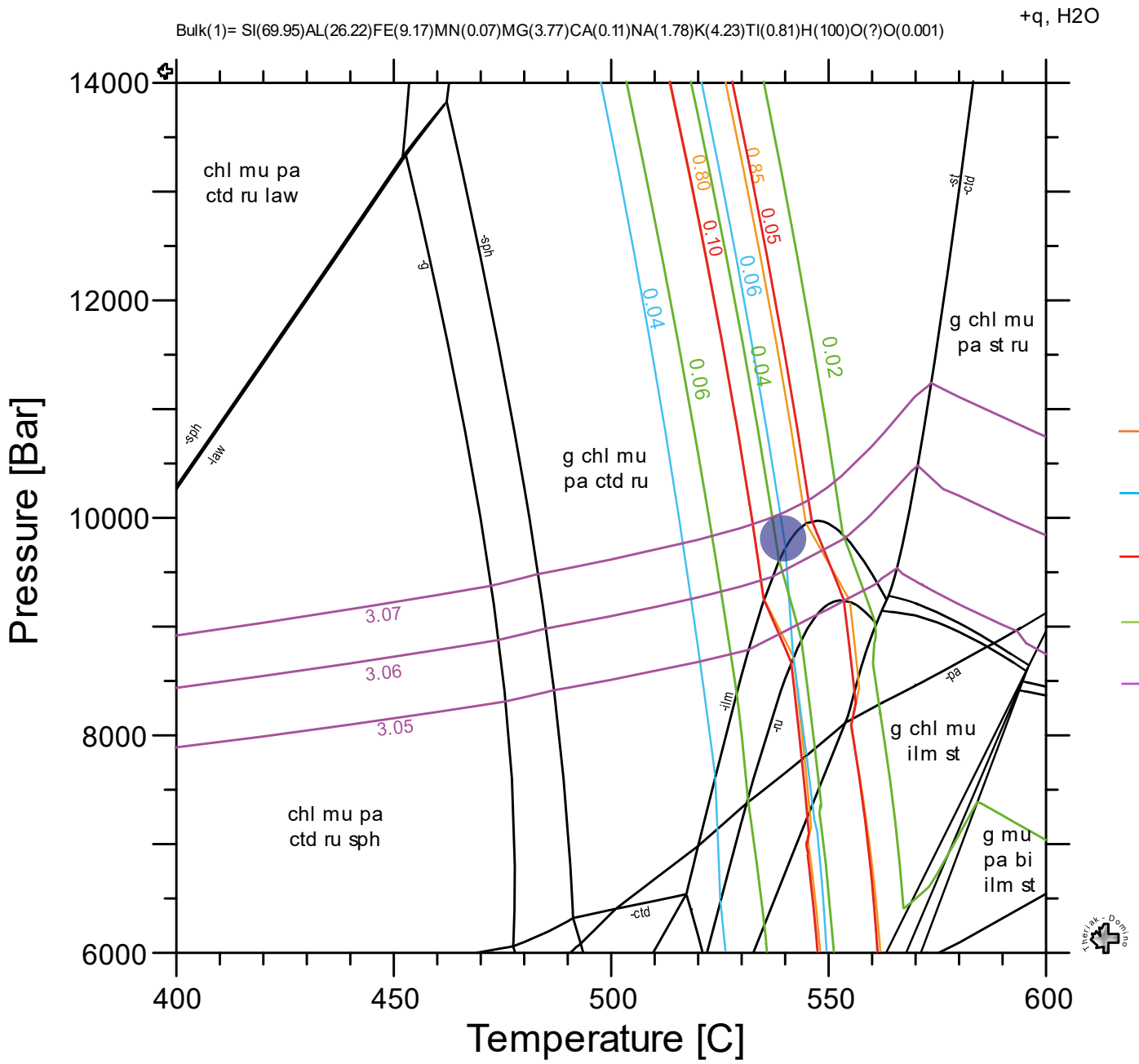


For the garnet rims:

Average numbers from 3 different garnet profiles

Xalm=0.84
Xprp=0.06
Xgrs=0.053
Xsps=0.038

Pseudosection on effective bulk composition:



Rim

Xalm

Xprp

Xgrs

Xsps

Si in mu

Paragenesis

g, chl, mu, pa, ctd, ru±ilm

For the garnet rims:

Xalm=0.84
Xprp=0.06
Xgrs=0.053
Xsps=0.038

For muscovite:

Si=3.065

Pressure peak of metamorphism for this rock:
~540 °C, 9 to 10 kbar