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NEW EVIDENCE FOR HIGH-PRESSURE METAMORPHIC ROCKS IN WESTERN SVALBARD

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During a field expeditions to Nordenskiöld Land and Wedel Jarlsberg Land (western Svalbard), previously unrecognised high-grade metamorphic rocks were observed. These rocks are represented by blueschists *sensu stricto* and blueschist facies metapelites.

In Nordeskiöld Land, blueschists occur in form of isolated bodies/tectonic lenses of different size enclosed within metasediments. The rocks in question are dark green, consist mainly of reddish garnet porphyroblasts and greenish and bluish amphiboles (including ferroglaucophane). They also contain chlorite, epidote, phengite, biotite, pumpellyite, quartz and albite. Garnet forms euhedral to subhedral poikiloblasts containing voluminous inclusions of epidote, albite, quartz, amphibole and titanite. Garnet shows chemical compositional variation from $Alm_{49}Pyr_{1}Grs_{33}Spss_{17}$ in the cores to $Alm_{63}Pyr_{2}Grs_{32}Spss_{3}$ in the rims. Gradual changes in chemical zoning as well as bell-shaped Spss content profiles suggest one-step, progressive garnet growth. P-T estimates based on thermodynamic modeling (using Perple_X'07) in the NCKFMMnASHT system suggest peak pressure conditions of ca. 20 kbar and 480^{o}C. P-T estimates are based on garnet and phengite compositional isopleths and stability field of the paragenetic assemblage (Chl-Ph-Amp1-Amp2-Grt-Spn).

Tectonically, the whole area is characterized by a moderate, 50^{o}-dipping of S0 and S1 (the main metamorphic foliation) to the north. Deviations from this direction are small and occur only locally. They are mostly caused by the presence of rigid metamafic bodies, around which the common orientation of the bedding and the metamorphic foliation is disturbed. The observed stretching lineations plunge towards the N-NNE and are therefore

in very good agreement with the orientation of S0 and S1. Moreover, shear sense indicators such as commonly observed sigma clasts clearly indicate a transport direction from the north to the south.

The structural observations are in good agreement with those collected south of the Nordenskiöld Land, in the northern part of Wedel Jarlsberg Land (Antoniabreen area), where high grade augen gneisses and metapelites thrusted onto typical low-grade rocks of SW Svalbard occur. The metapelites contain mainly garnet, muscovite, biotite, chlorite and quartz. Most of the garnet porphyroblasts show two distinct growth zones. Garnet-I ($Alm_{64}Pyr_6Grs_9Spss_{21}$) represents the inner growth zone, forming inclusion-rich garnet core and garnet-II ($Alm_{52}Pyr_2Grs_{30}Spss_{16}$) builds the outer growth zone, forming euhedral garnet rims. Some of the smaller garnet porphyroblasts show only a single growth zone (representing grt-II). Preliminary P-T estimates based on thermodynamic modeling in the NCKFMMnASHT system indicate the growth of garnet-I at ca. 550^{o}C and relatively low pressure (ca. 5 kbar), whereas garnet-II grew at ca. 500^{o}C and 12 kbar. The P-T estimates for garnet-I are based on garnet, biotite and plagioclase compositional isopleths and stability field of the paragenetic assemblage (Bt-Chl-Pl-Ms-Grt), whereas for garnet-II on the garnet and muscovite isopleths and stability field of the assemblage (Bio-Chl-Ms-Grt-Ab). We suggest that the growth of garnet-I is connected to the Late Neoproterozoic Torellian event, while garnet-II has been growing under blueschist facies conditions, hence most probably during the Caledonian orogeny.

Tectonic observations and P-T conditions are similar in both studied areas. It suggest that vast parts of the Caledonian basement of Nordeskiöld Land and northern Wedel Jarlsberg Land were metamorphosed under high pressure conditions.

These blueschist facies rocks may be an equivalent of the high pressure unit known from Oskar II Land (Motalafjella region), occurring to the north from the research area. Further, detailed petrological and geochronological studies to verify this hypothesis are in progress.