

# Pressure-temperature estimates on blueschists from the Vestgötabreen complex (Western Svalbard)

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In Oscar II Land (Motalafjella area, western Svalbard), an exotic high-pressure (HP) metamorphic unit, namely the Vestgötabreen Complex (Kanat & Morris 1988) occurs. It is thrust over low-grade metasediments (e.g. Labrousse et al. 2008) of inferred Neoproterozoic age. This complex is subdivided into the Lower (LU) and Upper Unit (UU) differing from each other in terms of lithologies and pressure-temperature (*P-T*) conditions. The LU is composed of high pressure-low temperature (*HP-LT*) metasediments with minor intercalations of blueschists, whereas the UU comprises metasediments, more voluminous blueschists and scattered lenses of eclogites. Radiometric dating yield the age of c. 470 Ma for the HP metamorphism in the Motalafjella region (Horsfield 1972, Dallmeyer et al. 1990, Bernard-Griffiths et al. 1993). The *P-T* conditions for carpholite-bearing schists from the LU yield the pressures up to c. 16 kbar and temperatures in the range of 330–450°C (Agard et al. 2005), whereas eclogites from the UU were subjected to 18–24 kbar pressure and temperatures of 580–640°C (Hirajima et al. 1988).

The aim of this study is to decipher metamorphic evolution of blueschists using thermodynamic phase equilibrium modeling. Samples have been collected from the UU, cropping out at the Skipperryggen ridge. They contain mostly garnet, glaucophane, phengite, rutile and chlorite. Additionally lawsonite, ilmenite and epidote can be found in minor amounts.

Garnet typically forms euhedral to subhedral porphyroblasts. It contains voluminous inclusions of white mica, epidote, rutile and amphibole. Garnet shows chemical compositional variation from  $\text{Alm}_{63}\text{Prp}_{13}\text{Grs}_{22}\text{Sps}_2$  in the cores to  $\text{Alm}_{60}\text{Prp}_{19}\text{Grs}_{20}\text{Sps}_1$  in the rims. The pyrope zoning is bowl-shaped, whereas grossular and spessartine profiles show bell-shaped trends. The almandine content is generally constant through the grain.

The *P-T* conditions were estimated using the phase equilibrium modeling in the NCKFMASHTO system using the Perple\_X software (Connolly 2005). Modeling was based on bulk-rock chemistry as well as garnet and phengite compositional isopleths. *P-T* estimates indicate peak conditions of ca. 20 kbar and 520°C. These estimates for studied blueschists from Skipperryggen are in agreement with previous studies on the Vestgötabreen Complex. Also, recent studies in Nordenskiöld Land (south of Oscar II Land) revealed the occurrence of blueschist facies rocks. These blueschists yielded similar *P-T* conditions to blueschists from the Vestgötabreen Complex (18 kbar, 470°C; Kościńska et al., in press). More regionally, all aforementioned *HP-LT* lithologies may be correlated with the ophiolitic sequence occurring within the Pearya Terrane of northern Ellesmere Island (e.g. Labrousse et al. 2008, Kościńska et al., in press). Detailed tectonic, petrological and geochronological studies are in progress.

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