



Did the entire Seve Nappe Complex in the Scandinavian Caledonides undergo HP metamorphism?

I. Klonowska (1,2), Å. Rosén (2), J. Majka (2), A. Ladenberger (3), and D. G. Gee (2)

(1) AGH University of Science and Technology, Krakow, Poland, (2) Uppsala University, Uppsala, Sweden, (3) Geological Survey of Sweden (SGU), Uppsala

The Seve Nappe Complex (SNC) in the Scandinavian Caledonides is composed of high grade metamorphic rocks, derived from the outer(most) parts of the Baltica margin. The main lithologies are represented by amphibolite facies metasediments and granulite facies gneisses, locally with migmatites. Granulites from the SNC on Åreskutan and Snasahögarna in west-central Jämtland (Sweden), give an excellent opportunity to investigate the high grade metamorphic history of these far-travelled nappes. As there are only two areas within the SNC, where eclogites have been found, there is a necessity to look for other evidence of HP metamorphism elsewhere to unravel a more complete history of the SNC. The latest zircon ion microprobe dating (Ladenberger et.al., 2012) of the Åreskutan Nappe indicate that the peak (temperature) of metamorphism occurred at 442-436 Ma. An earlier history of higher pressure metamorphism has been identified by EMP monazite dating (Majka et. al., in press), probably occurring in the mid-late Ordovician as in northwestern Jämtland (Root and Corfu, 2011, Brueckner and van Roermund, 2007).

Kyanite-bearing leucogranulite and pyroxene-dominated paleosome samples from granulite facies migmatites were collected in the Åreskutan Nappe, as well as garnet-clinopyroxene granulite on Tväråklumparna in the Snasahögarna area near Storlien. Garnet chemistry and kyanite-sillimanite transformation were investigated in thin sections using light microscopy, WDS analysis and Raman spectroscopy. In the Tväråklumparna granulite almandine with high Ca content (19-20% grs) contain inclusions of diopside. Garnets from the Åreskutan granulite are homogenous, have high Ca content (26-27% grs) and lack inclusions. Preliminary estimates from garnet – clinopyroxene geothermobarometric calculations give 760°C and 18kbar for the Tväråklumparna granulite and 740°C and 20kbar for the Åreskutan mafic granulite. The presence of HP kyanite- replaced by LP sillimanite-bearing assemblages in leucogranulite, provide evidence of possible continuous partial-melt crystallization from high pressure towards lower pressure conditions.

Extensive field work, chemical profiling of garnets and pyroxenes, the discovery of the kyanite – sillimanite transformation and microtextures analysis suggest that the entire SNC in western Jämtland may have undergone high pressure metamorphism prior to the early Silurian partial melting and emplacement from the hinterland eastwards onto the Baltoscandian platform.

References:

- Ladenberger A., Gee D.G., Claesson S., Majka J., The Scandian collision revisited - when did the orogeny start? EGU 2012 – this volume.
- Majka J., Be'eri-Shlevin Y., Gee D.G., Ladenberger A., Claesson S., Konecny P. 2012. Multiple monazite growth in the Åreskutan migmatites: evidence for a polymetamorphic Caledonian evolution of the Seve Nappe Complex in the west-central Jämtland, Sweden. *Journal of Geosciences*, in press.
- Root D. and Corfu F. 2011. U–Pb geochronology of two discrete Ordovician high-pressure metamorphic events in the Seve Nappe Complex, Scandinavian Caledonides. *Contributions to Mineralogy and Petrology*, in press.
- Brueckner, H.K. & Van Roermund, H.L.M. 2007. Concurrent HP metamorphism on both margins of Iapetus: Ordovician ages for eclogites and garnet peridotites from the Seve Nappe Complex, Swedish Caledonides. *Journal of the Geological Society*, 164, 117-128.