



Subduction and thrust emplacement of the Lower Seve Nappe in the Scandinavian Caledonides: a pressure profile along the COSC-1 drill core

Johanna Holmberg (1), Iwona Klonowska (1), Jarosław Majka (1,2), Henning Lorenz (1), Karolina Kościńska (2,3), and Sofia Korhonen (1)

(1) Department of Earth Sciences, Uppsala University, Uppsala, Sweden (holmberg.johanna0921@gmail.com; iwona.klonowska@geo.uu.se), (2) Faculty of Geology, Geophysics and Environmental Protection, AGH - University of Science and Technology, Kraków, Poland, (3) Department of Earth and Environmental Sciences, Rensselaer Polytechnic Institute, Troy, NY, USA

Determining the pressure and temperature history of continental crustal rocks is crucial for our understanding of mountain building processes. For that purpose, a deeply eroded, major Paleozoic mountain belt was drilled in 2014 by the Collisional Orogeny in the Scandinavian Caledonides (COSC)-1 scientific drilling project. A continuous c. 2.4 km long drill core through the high grade metamorphic Lower Seve Nappe of the Middle Allochthon was retrieved. The Seve Nappe is considered to have been still hot when emplaced and, thus, the COSC-1 profile provides a unique opportunity to relate the pressure and temperature conditions of this critical allochthon to observed structures that formed during emplacement at mid-crustal depth. COSC research does not only provide insights into the development of orogens in the Paleozoic but gives important clues about mountain building processes that operate in modern orogens, like the Himalayas, at unreachable depth.

Our goal is to construct a complete pressure profile along the COSC-1 drill core using quartz-in-garnet (QuiG) Raman based barometry, an innovative in situ method based on Raman-band shift of quartz inclusions preserved in garnet. For the complementary analysis of temperatures, the TitaniQ (titanium in quartz thermometry) coupled with quartz fabric analysis will be employed. The drill core comprises a diversity of calc-silicates, mica schists and gneisses that record different degrees of deformation. Where the lithology does not allow the use of QuiG (i.e. lack of garnet and/or garnet with quartz inclusions), conventional barometry based on Si content in phengite is used. At the time of abstract submission, preliminary results indicate a pressure range between ~5-11 kbar, calculated with an assumed temperature in the range of 450-550°C, which is based on mineral assemblages observed in the studied samples. Our preliminary results do not show a clear trend along the drill core, which might be the result of tectonic juxtaposition in the highly deformed rock units. Further studies, including temperature analyses, are needed to get a more comprehensive view of pressure-temperature relationships in the Lower Seve Nappe.

This research was supported by Sveriges geologiska undersökning.