Eclogites and gneisses of the Seve Nappe Complex, Scandinavian Caledonides – recent progress in understanding these (U)HP rocks

Iwona Klonowska[1], Jarosław Majka[1,2], Marian Janák[3], Michał Bukała[4], Christopher J. Barnes[4]

[1] Faculty of Geology, Geophysics and Environmental Protection, AGH – University of Science and Technology, 30-059 KRAKÓW, Poland;
[2] Department of Earth Sciences, Uppsala University, 752 36 UPPSALA, Sweden;
[3] Earth Science Institute, Slovak Academy of Sciences, 840 05 BRATISLAVA, Slovak Republic;
[4] Institute of Geological Sciences, Polish Academy of Sciences, 31-002 KRAKÓW, Poland.

The Seve Nappe Complex (SNC) in the Scandinavian Caledonides in Sweden represents a composite terrane, within which the (U)HP metamorphism is recorded in a range of lithologies. The mineral assemblages of eclogites and gneisses of the SNC record deep subduction and subsequent exhumation. The specific P-T-t-d conditions at different stages of the rock evolutions are deducted by thermobarometry, thermodynamic modeling, geochronology, thermochronology, geochemistry and microstructures. Here we summarize the most recent advancements in the understanding of the tectonometamorphic evolution of the outermost margin of Baltica and Iapetus-Baltica ocean-continent transition zone.

The SNC in its southern segment underwent higher-*T* metamorphism and (U)HPM is recognized by diamond-bearing migmatized paragneisses, eclogites and garnet peridotites. The predominant Middle-Ordovician ages resolve the (U)HP event, followed by a granulite-to-amphibolite facies overprint. However, zircon rims from the diamond-bearing Tväråklumparna gneiss yield a ca. 482 Ma U-Pb age of decompression after a (U)HP event (Walczak *et al.,* 2020), which is similar to the metamorphic ages known from the northern part of the SNC. (U)HP metamorphism in the latter is mostly preserved in eclogites. The most recent Lu-Hf garnet dating of eclogites, including the eclogitized pillow lavas, preserving HP brittle failure along the cold geotherm (~8°C/km; Bukała *et al.,* 2020), confirmed the late-Cambrian – early-Ordovician subduction of the SNC (Fassmer *et al.,* 2021). Similarly, late-Cambrian – early-Ordovician subduction has been recently recorded in eclogite-hosting gneisses from the classical Sippmikk locality where only Middle-Ordovician Sm-Nd, Lu-Hf and U-Pb ages had been reported from peridotites, eclogites and gneisses. Hence, it becomes apparent that the entire Baltica outer margin subducted already in the late-Cambrian – early-Ordovician, which was followed by the second Middle-Ordovician event, recorded locally by UHPM whereas the other regions show overprint under middle-*P* granulite- and/or amphibolite-facies conditions. The advancements in analytical methods and detail studies of various lithologies in the SNC allowed for more comprehensive understanding of the subduction-collision system in the Scandinavian Caledonides and changes in the existing paradigm.

This work is financially supported by the National Science Centre (Poland) research projects no. 2014/14/E/ST10/00321, 2018/29/B/ST10/02315, 2019/33/N/ST10/01479.

Bukała, M., Barnes, C.J., Jeanneret, P., et al., 2020. *Frontiers in Earth Science* 8.
Fassmer, K., Froitzheim, N., Janák, M., et al., 2021. *Journal of Metamorphic Geology* 39(7), 819-842.
Walczak, K., Barnes, C.J., Majka, J., Gee, D.G., Klonowska, I., 2020. *Geoscience Frontiers* 13(2), 101112.