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The UHP metamorphic Seve Nappe Complex of the Swedish Caledonides - a new occurrence of the microdiamond-bearing gneisses and their exhumation

Iwona Klonowska (1), Marian Janák (2), Jarosław Majka (1), Nikolaus Froitzheim (3), and David G. Gee (1)

(1) Uppsala University, Department of Earth Sciences, Solid Earth Geology, Uppsala, Sweden (iwona.klonowska@geo.uu.se), (2) Geological Institute, Slovak Academy of Sciences, Bratislava, Slovak Republic, (3) University of Bonn, Steinmann-Institut, Poppelsdorfer Schloss, 53115 Bonn, Germany

The ultra-high pressure metamorphism (UHPM) in the Seve Nappe Complex of the Swedish Caledonides has been recently recognized within several lithologies including gneisses, eclogites and garnet pyroxenites (e.g. Janák et al. 2013, Klonowska et al. 2014a, Majka et al. 2014). Thermodynamic modelling and thermobarometric calculations indicate peak pressure conditions of >3GPa at c. 800-900ºC (reaching the diamond stability field) for eclogites and garnet pyroxenites from northern Jämtland (e.g. Klonowska et al. 2014b). In addition to this, the first microdiamonds were found in paragneisses from the Snasahögarna Mt. in central Jämtland (Majka et al. 2014). Here we report a new discovery of microdiamond together with moissanite (SiC) from one of the world's most famous localities for thrusting, Mount Åreskutan, where long transport distances were recognized already in the 19th century (Törnebohm 1888).

Garnet porphyroblasts in gneisses from the Åreskutan Mt. contain abundant mineral inclusions, mainly graphite, carbonates and quartz, together with fluid inclusions of CO_2 concentrated in swarms. Among these inclusions three microdiamonds were found in two gneiss samples. In one of the samples moissanite was also discovered. Both minerals were identified by micro-Raman spectroscopy. In addition to these 'swarm' inclusions, biotite, kyanite, rutile, feldspars, zircon, monazite, ±phengite, ±muscovite, ±spinel, ±ilmenite, ±apatite occur in garnets. Phase equilibrium modelling for the phengite-bearing gneiss confirms its UHP history at temperatures of c. 800ºC.

Recent discoveries of UHP metamorphism within the Seve Nappe Complex derived from the Baltican outer margin (part of the Middle Allochthon) challenged us to present a new tectonic model incorporating exhumation of the deeply subducted continental rocks together with mantle lithosphere peridotites. Majka et al. (2014) introduced a new "under-pressure"–driven exhumation mechanism of rocks buried in subduction systems to depths exceeding 100 km. It was proposed that the diamond-bearing continental rocks were subducted in an arc-continent collision setting and exhumed together with garnet peridotites (incorporated from the lower plate) of sub-Baltic Shield affinity (Brueckner et al., 2004). In this model, the exhumation is mostly driven by the local reduction of pressure as a result of the extraction of forearc lithosphere and leading to the rise of the subducted Seve rocks.

Brueckner H.K., van Roermund H.L.M. & Pearson N., 2004. Journal of Petrology, 45, 415-437.
Janák M., Van Roermund H.L.M., Majka J. & Gee D.G., 2013. Gondwana Research, 23, 865-879.
Klonowska I., Majka J., Janák M., Gee D.G. & Ladenberger A., 2014a. In: Corfu F., Gasser D. & Chew D. M. (eds) New Perspectives on the Caledonides of Scandinavia and Related Areas. Geological Society, London, Special Publications, 390, 321–336.
Klonowska I., Janák M., Majka J., & Kośmińska K., 2014b. Geophysical Research Abstracts, Vol. 16, EGU2014-6440-2.
Majka J., Rosén Å., Janák M., Froitzheim N., Klonowska I., Manecki M., Sasinková V. & Yoshida K., 2014. Geology, 42, 1107-1110, doi:10.1130