Former melt inclusions in garnet from UHP gneisses of the Seve Nappe Complex (Scandinavian Caledonides)

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Ultrahigh-pressure metamorphism has been recently reported in the Seve Nappe Complex (SNC) of the Scandinavian Caledonides (Klonowska *et al.*, 2017). This study is focused on former melt inclusions (nanogranitoids: Bartoli *et al.*, 2016; Cesare *et al.*, 2015) and anatectic processes occurring during the ultradeep subduction of paragneisses from Åreskutan, SNC, where the presence of microdiamond was reported (Klonowska *et al.*, 2017).

The mineral assemblage of the paragneiss is K-feldspar, garnet, quartz, plagioclase, biotite, white mica, kyanite, sillimanite and rutile. Garnets occur as porphyroblsats or aggregates of coalesced crystals up to 3 mm in diameter and they are randomly spread in the matrix. Clusters of inclusions are present in most of the garnets, and they are composed of small multiphase inclusions (MPI), less than 5 μm in size and represent former fluid. MPI consist of various carbonates such as calcite, siderite, magnesite, biotite, pyrophyllite rarely quartz, graphite, or rutile and a residual fluid made of CO_2 and CH_4. Within the clusters, relatively larger (5–20 μm) and rarer inclusions are nanogranitoids, composed of quartz, biotite, K-feldspar, plagioclase and rarely of carbonates. The presence of microdiamonds coexisting with nanogranitoids and MPI in the clusters was confirmed by Raman spectroscopy.

Seven re-homogenization experiments at different conditions were conducted in a piston cylinder apparatus to remelt nanogranitoids and determine the composition of the anatectic melt. The best homogenization was acquired at 900˚C and 4.5 GPa. The entrapped melt is mostly rhyolitic to trachytic in composition, with a systematic high alkali content (~10 wt.% N_2O+K_2O). The H_2O and CO_2 content of the remelted nanogranitoids analyzed by NanoSIMS is respectively ~ 5 wt.% and 2000–5000 ppm. The chemical composition of reconstructed anatectic melt from paragneisses of SNC is consistent with experimental studies of UHP melts derived from metapelites.

Bartoli, O., Acosta-Vigil, A., Ferrero, S., Cesare, B., 2016. Granitoid magmas preserved as melt inclusions in high-grade metamorphic rocks. *American Mineralogist* 101, 1543-1559.

Cesare, B., Acosta-Vigil, A., Bartoil, O., Ferrero, S., 2015. What can we learn from melt inclusions in migmatites and granulites? *Lithos* 239, 186-216.

Klonowska, I., Janak, M., Majka, J., Petrik, I., Froitzheim, N., Gee D., G., Sasinkova, V., 2017. Microdiamond on Areskutan confirms regional UHP metamorphism in the Seve Nappe Complex of the Scandinavian Caledonides. *Journal of Metamorphic Geology* 35, 541-564