

A petrological and geochemical study of the Surna Nappe (Seve Nappe Complex?) in the Central Scandinavian Caledonides, Norway

Silvia Weigand (1), Christoph Hauzenberger (1), and Deta Gasser (2)

(1) Institute of Earth Sciences, University of Graz, Universitätsplatz 2, 8010 Graz, Austria, (2) Geological Survey of Norway, Postboks 6315 Sluppen, 7491 Trondheim, Norway

The Seve Nappe Complex, mainly outcropping and investigated in Sweden, comprises relics of Ordovician HP and UHP metamorphic rocks, which were overprinted by upper amphibolite facies metamorphism and anataxis during the Silurian. In Norway, in the hinterland of the Caledonian orogen, rocks of the Surna and Blåhø nappes are generally correlated with the Seve Nappe Complex. However, no detailed metamorphic studies are available from these units to compare it with the Seve Nappe Complex. The Surna and Blåhø nappes are located between the oceanic-derived Støren nappe and the continentally-derived Sætra nappe. Due to a strong post-Caledonian extensional and transtensional overprint and a close proximity to the MTFC (Møre-Trøndelag Fault Complex, a prominent post-Caledonian strike-slip fault complex) investigations of the early metamorphic history of the Surna and Blåhø nappes are challenging.

In this contribution we present the results of a petrological and geochemical study of the Surna Nappe, from a ca. 10 km wide transect across this nappe west of Trondheim in Norway. The nappe is lithologically very heterogeneous, consisting of quartz-rich mica-schists, amphibole-garnet-mica-schists, amphibolites, calcsilicates as well as pegmatites. Geochemically, the whole rock compositions vary from ultrabasic to acidic, but a distinction between metavolcanic and metasedimentary origin of the lithologies is not always straightforward. Although there are metabasic rocks present they do not show a mineral assemblage with a relic eclogite facies. Garnet occurs in several lithologies and is used together with plagioclase and biotite for conventional geothermobarometry using the TWQ and PET software tools. Additionally, Zr-in-rutile and garnet-biotite thermometers were applied. PT calculations from 18 different samples reveal PT conditions of 600 to 700°C and pressures of 10 to 16 kbar. The elevated phengite content in muscovite (Si up to 3.28) in a few samples may indicate a high pressure evolution of these rocks. Garnet zoning patterns show an evolution of X_{grs} from 0.2 in the cores to 0.35 at the rims, X_{sps} shows a typical bell shape, and all garnets are almandine rich ($X_{\text{alm}} = \sim 0.6$). The garnet zoning patterns and thermodynamic modeling results indicate a regional metamorphic prograde PT path reaching upper amphibolite to lower eclogite facies.

Even though no classical eclogite facies assemblages in metabasic rocks are encountered in the Surna nappe, PT calculations from more intermediate and acidic lithologies indicate that they experienced elevated pressures of up to lower eclogite facies at some point, strengthening the possible correlation with rock of the less-overprinted Seve Nappe Complex in Sweden.