



A glimpse into upper crustal conditions of an ancient orogen preserved within another; A late-Sveconorwegian volcano–sedimentary sequence in the southwestern Scandinavian Caledonides

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In southern Norway, large nappes were emplaced during the Ordovician–Silurian Caledonian orogeny onto the deeply eroded Meso- to Neoproterozoic Sveconorwegian orogen. Although much is known about the internal structure and evolution of the Sveconorwegian orogen, few syn-orogenic supracrustal rocks are currently exposed, which could limit our understanding of the orogenic and geodynamic evolution. New mapping of Caledonian nappes in the Stavanger area, SW Norway, reveals, however, the presence of a volcanic and sedimentary sequence of earliest Neoproterozoic age that is interpreted to represent part of the upper section of the Sveconorwegian orogenic system.

In the Stavanger area, the Jæren Nappe Complex (Middle Allochthon) is made up of the lower Madla Nappe, comprised of c. 1500 Ma tonalitic to granitic gneisses, and the overlying, newly named, Sola Nappe, which consists of metasedimentary rocks. The Sola Nappe may be correlated with the Boknafjord and Revsegg nappes of the Hardangervidda–Ryfylke Nappe Complex to the north. In detail, it consists of a sequence of metasandstone, quartzite, calc-silicate, marble, mica-garnet schist, amphibolite, and felsic metavolcanic rocks. These are cut by a syn-tectonic leucogranite pluton of Silurian age (c. 429 Ma). The Sola Nappe is also known for an eclogite locality with an Ordovician metamorphic age (471–458 Ma). The felsic metavolcanic rocks, called the Snøda formation, are fine-grained, frequently porphyritic, strongly lineated two-mica gneisses that, where less deformed, display igneous flow structures. They have a calc-alkaline, peraluminous character with negative-sloping REE-spectra and negative Nb and Ta anomalies. U-Pb zircon geochronology of two samples yields extrusion ages of c. 941 and 934 Ma, dating the sequence. A metasandstone in the sequence contains detrital zircons ranging from c. 2800 to 990 Ma (n = 138, < 5% discordant), with main modes at c. 1050 and 1150 Ma and a dispersion of Proterozoic and Archaean modes. The age distribution indicates a maximum deposition age of c. 990 Ma.

The supracrustal sequence observed in the Sola Nappe is interpreted as a late-Sveconorwegian marine sequence transported southeastwards during the Caledonian orogeny. It attests to volcanism coeval with the plutonic hornblende-biotite-granite suite and anorthosite-mangerite-charnockite suite intruded at a depth of c. 15 km in the Sveconorwegian orogen (980–930 Ma), to clastic sedimentation with a dominant provenance in the Sveconorwegian orogen, and to carbonate precipitation. It provides a glimpse into upper crustal conditions at the end of the Sveconorwegian orogeny.