



Origin of the Gargia Nappe in the northernmost Scandinavian Caledonides: Pre-Caledonian hyperextension or a traditional basement-cover nappe?

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In western Finnmark of northern Norway, a melange-type assemblage with km-size serpentinite bodies embedded in various metasedimentary rocks, schists and mylonitic gneissic units occurs in the Gargia Nappe. The nappe overlies an autochthonous basement suite of Early Paleoproterozoic (ca. 2150 Ma) basalts and associated sedimentary rocks and its Neoproterozoic sedimentary cover, including an Ediacaran (?) tillite. The Gargia Nappe is itself overlain by the Kalak Nappe Complex (KNC), which in this region is composed mainly of metasandstones, likely deposited around 1000 Ma. The KNC contains the record of a multistage tectonic evolution with several episodes of magmatism and metamorphism between 900 and 550 Ma that paleogeographically do not fit the Archean to Palaeoproterozoic evolution of the underlying autochthon of the Baltic Shield. Because of this new information, the postulation, in the past decades, of an origin of the KNC from the Baltic margin is considered problematic.

The presence of serpentinitised exhumed mantle peridotite bodies in the underlying Gargia Nappe, however, provides potential evidence for a truly allochthonous nature of the overlying nappes. The serpentinite mega-boudins of the Gargia Nappe are embedded in mica- and hornblende schists and rare marbles. They are structurally overlain by ancient felsic gneisses. New U-Pb geochronology on these mylonitic gneisses indicates that their protoliths in the nappe are ~2830 Ma. They were thus derived from a basement terrane of Archean age similar to the local Baltic shield of northernmost Scandinavia. The time of extension exhuming the mantle peridotites is still uncertain and is presently under investigation. We note, however, that the Gargia Nappe lies in the apparent extension of the Corrovarre Nappe, which is characterized by 610 Ma dykes, akin to those in the Sarek segment of the Seve Nappe further south. The two events may be related. We propose that the structural and lithological architecture of the Gargia nappe may be inherited from a magma-poor crustal extensional event along the pre-Caledonian margin of Baltica, where the Archean continental crust was hyperextended and the lithospheric mantle was exhumed.