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Hyperextension, micro-continents, magma-poor and magma-rich segments in the pre-Caledonian margin of Baltica: research in progress

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The more than 2400 km long pre-Caledonian passive margin of Baltica evolved into a highly complex geological province, formed by magma-poor and magma-rich rifting and extreme crustal attenuation in the late Neoproterozoic (Ediacaran) and the Cambrian. Transition from continental rifting and extension to oceanic spreading was probably related to emplacement of a ∼610-590 Ma Large Igneous Province (LIP) dominated by basalt magmatism. The LIP geochemistry and aspects of the dyke-swarm emplacement and geometries will be discussed further in other presentations at this meeting (see abstracts by Chr. Tegner et al. and HJ. Kjøll et al.). The magma-rich domain presently constitutes a more than 800km long segment in central Scandinavia. This segment shows transitions into a magma-poor domain in south-central Norway and possibly also in the north (see abstracts by J.Jakob et al.1 & 2 and F. Corfu & TB. Andersen). The magma-poor southern segment is dominated by large crystalline nappe complexes (NC) of Proterozoic continental crust with Baltican affinity, comprising both lower- to upper crustal units in the Jotun, Lindås and Bergsdalen NCs, respectively. These NCs are underlain and partly inter-finger with the melange matrix dominated by deep marine metasediments. The melange also contains numerous exhumed solitary mantle-peridotite, ophicarbonates and smaller slivers of Proterozoic gneisses of Baltican age affinity, as well as local coarser-grained meta-sediments including conglomerates and monomict detrital serpentinites. Some of these large crystalline nappes probably constituted structural highs of continental slivers or even micro-continents separated by hyperextended to immature oceanic (?) basins along the ancient margin of Baltica. The youngest basin sediments in the melange(s) are of Lower-Middle Ordovician age, as demonstrated by fossils and minimum ages of clastic zircons. Further details, including age and metamorphism as well as stable isotope signature of rocks in the magma-poor melange basin will be discussed further at this meeting (see abstracts 1 and 2 by Jakob et al.).
The remnants of the pre-Caledonian passive margin complexes of Baltica are presently structurally positioned in lower and middle nappe units in the Scandinavian Caledonides. Large parts of these units were also affected by early Caledonian deformation and metamorphic events before their final emplacement as composite NCs during the Siluro-Devonian Scandian orogeny. This protracted orogenic history strongly contributed to the complexity of these units; nevertheless some parts are remarkably well preserved and can be used, as field analogues to further understand processes associated with passive margin evolution.