

EGU21-16408

<https://doi.org/10.5194/egusphere-egu21-16408>

EGU General Assembly 2021

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Reconstructing the Ediacaran to Ordovician history of the Baltoscandian Margin of continent Baltica

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In the Scandes, the lower thrust sheets of the Caledonian allochthons provide unambiguous stratigraphic evidence of correlation with the successions of the Baltoscandian platform. Cambrian successions, including the Alum Shale Formation, providing the footwall for the main Caledonian decollement in Scandinavia, can be followed at least 200 km westwards from the thrust front into the hinterland of the orogen. The overlying early Palaeozoic strata provide evidence of facies changes into foreland basin deposits in the mid Ordovician and early Silurian; also of Ediacaran and Cryogenian successions, including Marinoan tillites. The amount of internal shortening in the Lower Allochthon is not uncontroversial, but certainly amounts to more than 100 km, implying that all the overlying allochthons in the Scandes were derived from west of the Norwegian coast.

The metamorphic grade of the units in the Lower Allochthon increases from low to high greenschist facies, from the thrust front westwards into the deep hinterland. Overlying thrust sheets of the Middle Allochthon are of higher metamorphic grade and more ductilely deformed. The basal parts are usually dominated by basement-derived units and Neoproterozoic sedimentary rocks. They are overthrust by dolerite dyke-intruded thrust sheets, the Särvi Nappes, with host-rocks dominated by Cryogenian and Ediacaran sandstones, the former including subordinate limestones and Marinoan tillites. The Baltoscandian margin dolerite dyke swarms amount to up to c. 35% of these thrust sheets.

The overlying, highest tectonic units in the Middle Allochthon (the Seve Nappe Complex, SNC) are of amphibolite and higher metamorphic grade. They include a greater variety of lithologies, including some that are very similar to those in the underlying Särvi Nappes (e.g. quartzites and eclogitized dolerites). The metasedimentary host rocks include a wide range of paragneisses and marbles. Abundant mafic rocks include metamorphosed gabbros, basalts and peridotites and, together with the dyke swarms, can totally dominate the composition of some thrust sheets. The similar geochemistry and early Ediacaran age (c. 600 Ma) of the mafic rocks in the Särvi and Seve nappes define the Baltoscandian outermost margin and continent-ocean transition zone (COT). Iapetus Ocean terranes comprise the overlying thrust sheets of the Upper Allochthon (e.g. the Köli Nappe Complex).

The metamorphism of the different thrust sheets in the SNC provide clear evidence that some

parts were subducted; others not. A wide range of isotope age data constrain the timing of subduction, with the earliest ages in the mid Cambrian (c. 505 Ma) to early Ordovician (c. 483 Ma). It has been suggested that the deposition of the Alum Shale Formation on the Baltoscandian platform, was related to this early Caledonian subduction. A more probable interpretation is that subduction along the outermost edge of this highly extended COT did not influence the edge of the platform till the early Tremadoc.

Some authors have introduced cryptic sutures into the Baltoscandian outer margin, described above. They should reassess their data and better define the evidence for their conviction.