



## **Constraints on the origin of the Seve and Kalak Nappe Complexes, Scandinavian Caledonides**

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The Seve and Kalak Nappe Complexes have generally been assumed to represent basins developed on the outermost (western) margin of Baltica, subsequently detached from, and thrust onto the continent during Caledonian collisional processes. However, the link to Baltica is tenuous and there are various lines of evidence suggesting derivations from non-Baltic settings. The clastic sedimentary sequences in these nappe complexes have been deformed, metamorphosed and intruded by granitic rocks variously during Grenvillian (ca. 970 Ma), Tonian (870-840 Ma), Cryogenian (ca. 700 Ma) and Ediacaran (600 Ma, 570-560 Ma) events. The supracrustals rocks also locally include Grenvillian volcanic rocks (Albrecht). Hence deposition cannot have been linked to stretching of Baltica related to opening of Iapetus, as was earlier thought. Moreover, detrital zircon dating, especially by C. Kirkland and by others, shows that the sediments were sourced mainly from Mesoproterozoic basement rather than the Paleoproterozoic and Archean crust of the northern Baltic domains. This feature suggests that these basins developed on the margins of a craton such as Laurentia. Another important set of considerations is given by the multiple Neoproterozoic magmatic and deformation episodes that affected these nappes. Apart from minor local anorogenic magmatism, this period was essentially quiescent in both Baltica and the eastern part of Laurentia, whereas Neoproterozoic activity was intense in the peri-Gondwanan realm, but also in parts of Siberia and other cratons. A Timanian connection of the Kalak nappe Complex has been discussed, but in general the two age patterns do not match very well. The Seiland Igneous Complex (mainly 570-560 Ma) correlates with extensive magmatism in terranes along the eastern margin of Laurentia, pointing to a possible relationship to rifting of Laurentia from Gondwana. The ages of eclogites in the Seve nappe Complex, 482 Ma and 446 Ma (Root), are also consistent with a link to subduction processes active at the Laurentian margin in the Ordovician. An alternative that has been variously discussed is a genesis of the Seve and Kalak Nappe Complexes in an Arctic context (in present day terms). Such a view would be consistent with the paleomagnetic signature of the Silurian Honningsvåg Igneous Complex in northern Norway, which indicates a northern provenance with respect to Baltica. However, the boundary between the Silurian flysch hosting the Honningsvåg Igneous Complex and the Grenville age basement is tectonized and hence the link between the two speculative.