



## Sediment provenance signatures in the Middle Allochthon of the Scandinavian Caledonides - evidence of Sveconorwegian source terrains

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Neoproterozoic sedimentary successions dominate the Middle Allochthon (MA) in the Scandinavian Caledonides, locally reaching up through "Vendian" tillites, possibly into the early Cambrian. As in the Lower Allochthon, they were deposited in rift basins along the Baltoscandian margin; however, they differ from the underlying units by being derived from the outer to outermost parts of Baltica's continental shelf and are intruded by abundant dolerite dykes (Särv nappes), also associated gabbros and occasional ultramafites (Seve nappes). Fluvial and shallow marine sandstones dominate the Särv nappes; similar, but more highly deformed and metamorphosed units occur in the lower parts of the Seve nappes. Metamorphic grade increases upwards from greenschist in the base of the MA to amphibolite, granulite and eclogite facies in the Seve. The dykes have been dated locally to c.610 Ma (Svenningsen, 2001, PrecRes). Their presence in the Särv and Seve nappes and absence in underlying allochthons and basement provides compelling evidence that they have been displaced at least 200 km eastwards from source areas that were once located beneath what are now the continental shelves of the Norwegian Sea. Sedimentary rocks of the MA thus provide suitable targets for detrital zircon studies, to promote better understanding of Neoproterozoic basins along the nearly 1800km length of the Baltoscandian margin, and to throw light on the character of basement in the hinterland of the Orogen during break-up of Rodinia and opening of the Iapetus Ocean.

Early studies of ages of high-grade metamorphism of Seve paragneisses (Claesson, 1982 GFF; 1987 ConMinPet) in the central Scandes of Jämtland and Västerbotten counties also provided evidence of late Paleoproterozoic (1730 Ma) and Mesoproterozoic sediment source terrains. The former are similar to that of granites of the Trans-Scandinavian Igneous Belt (TIB) in the adjacent autochthonous basement. The latter are only known in the Sveconorwegian Orogen of southernmost Norway and Sweden. Complementary SHRIMP data (Williams and Claesson, 1987 ConMinPet) confirmed this, with detrital zircon ages from c.1000 to 1700 Ma and a cluster at 1400-1600 Ma. Likewise, recent SIMS analyses (Ladenberger et al., 2009 GoldschmidtConf) show that the Seve paragneisses have a strong 1000 Ma signature, associated older Mesoproterozoic Hallandian-Danopolonian ages, and prominent TIB. New LA-IPC-MS studies of the underlying Särv nappes (Beeri et al., in press, PrecRes) show a strong bimodal signature, with 900-1200 Ma and 1400-1700 Ma ages prominently represented.

Allochthonous "basement" is also present in the MA, e.g. in the lower part (e.g. the Tännäs Augen Gneiss Nappe, c.1680 Ma and the Risberget in Norway c. 1640 and 1190 Ma, Handke et al. 1995) and in minor slices (e.g. dolerite-intruded granites and gabbros) near the base of the Särv nappes in southern Jämtland (undated) and in the Seve nappes of Västerbotten (Nuortenjuone orthogneiss, 1645 Ma, Zachrisson et al 1996, SGU-ResPapers). Farther north, in southern Norrbotten, dacitic metavolcanics, intruded by eclogitized dolerites, gave an age of c.945 Ma (Albrecht, 2000 Ph.D-thesis).

Evidence given above implies that detrital zircon and "basement" signatures of the MA persist northwards for at least 600 km north of the postulated Grenville-Sveconorwegian front (cf. Rodinia reconstructions, e.g. in PrecRes 2008). 400-500 km farther north in the orogen, Grenville-Sveconorwegian signatures have been identified in tectonic units equivalent to the Särv and Seve nappes (the Kalak nappes) of northernmost Norway (Kirkland et al., 2006 JGeol). We suggest that these Grenville-Sveconorwegian signatures are a continuation of the characteristic features of the Baltoscandian margin farther south and require no special interpretation involving displacement or rotation of Baltica relative to Laurentia. This hypothesis is supported by the widespread occurrence of Grenville-Sveconorwegian signatures farther north across the Barents shelf, as summarized by Lorenz et al. (this volume).