



Does the Lower Paleozoic deposits on Hardangervidda, South Norway, record remnants of a foreland fold-thrust belt northeast of the Polish-North German Caledonides?

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Stratigraphic and structural data from the Lower Paleozoic cover deposits on Hardangervidda, a high mountain plateau within the Caledonian foreland in Central South-Norway, indicate soft docking and collision between Avalonia and SW Baltica in the Ordovician-Silurian. The first sign of docking between the two lithospheric plates is recorded by a 50-60 m thick Lower-Middle Ordovician (Floian to Dapingian) coarsening-upward clastic sequence (Holberg Fm) with a distinct Baltican detrital zircon (DZ) signature. Paleocurrent observations and thickness data within the Holberg Fm indicate that the source area was located somewhere south of their present location, and a favored interpretation is to link the source area to a fore-bulge developed on the Baltic plate as it was subducted underneath the Avalonian plate. A ca. 5-10 m thick impure Darvillian carbonate sequence (Bjørnaskalle Fm) caps the clastic deposits. Intensely deformed chlorite schist, impure marble and sandstone/conglomerate units characterizes the overlying Solnut Fm of inferred Upper Ordovician (Sandbian/Katian) age. Detrital zircons from the sandy units within the Solnut Fm have a large population of Cryogenian and Ediacaran zircons, a DZ population not found in the underlying Holberg Fm. The Late Neoproterozoic DZ population, combined with an increase in chlorite, strongly suggest an Avalonian source area for units within the Solnut Fm., as does the brachiopod fauna which has links to both Baltic and Celtic faunal provinces.

Variation in orientation of macroscopic fold axes and related axial planes within the Hardangervidda Gr demonstrate a change in stress field with time. The earliest fold set (F1), dominating eastern and central Hardangervidda, are oriented NE-SW are related to emplacement of the overlying Iapetan and Baltican nappes from NW towards SE during the first Scandian orogenic phase D1. Superimposed on these early folds are a series of NW-SE trending folds (F2) and thrusts (F2), well developed within southern Hardangervidda. Fold asymmetry and the orientation of thrusts (D2) show top-towards-NE displacement of the hanging walls. The D2 structures are linked to closure of the Tornquist Sea and subsequent collision between Avalonia and Baltica. The D2 structures on Hardangervidda are interpreted to represent remnants of NW-SE striking foreland fold-thrust belt NE of the Polish-North German Caledonides. Clearly superimposed on the D1 and D2 structures is a SE-dipping cleavage (S3). This cleavage is particularly well-developed in the pelitic and semi-pelitic lithologies, and is linked to late orogenic collapse and top-to NW shearing of the entire nappe stack, most likely in the Late Silurian/Early Devonian.