

From Craton to Shelf: example from the Barents Sea

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This study presents a crustal-scale seismic profile in the Barents Sea based on new data. Wide-angle seismic data were recorded along a 600 km long profile at 38 ocean bottom seismometers and 52 onshore station locations. The modelling uses the joint refraction/reflection tomography approach where co-located multichannel seismic reflection data constrain the sedimentary structure. Further, forward gravity modelling is based on the seismic model. We also calculated net regional erosion based on the calculated shallow velocity structure.

Our model reveals a complex crustal structure of the Baltic Shield to Barents shelf transition zone as well as strong structural variability on the shelf itself. We document large volumes of pre-Carboniferous sedimentary strata in the transition zone that reach a total thickness of 10 km. A high-velocity crustal domain found below the Varanger Peninsula likely represents an independent crustal block. Large lower crustal bodies with very high velocity and density below the Varanger Peninsula and the Fedynsky High are interpreted as underplated material that may have fed mafic dykes in the Devonian. We speculate that these lower crustal bodies are linked to Devonian rifting processes in the East European Craton or belong to the integral part of the Timanides, as observed onshore in the Pechora Basin.