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# 3D integrated geophysical modelling of large-scale gravity anomaly in N Norway and its possible conjugate in NE Greenland

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Our study area in Northern Norway and Sweden lies at the transition between Archean and Proterozoic lithosphere and is bounded by the late Palaeoproterozoic Transscandinavian Igneous Belt. This region has been overthrusted by the Palaeozoic nappes of the Caledonian orogen and now forms the passive margin of the NE Atlantic.
A prominent gravity and geoid low lies just south of the Lofoten peninsula, partly coinciding with the location of the Proterozoic granites and being slightly offset to the highest topography of northern Norway. We investigate this gravity anomaly performing combined 3D geophysical-petrological forward modelling of the lithosphere and sublithospheric upper mantle using the interactive modelling program LitMod3D. We compare two possible origins of the anomaly: a low-density upper crust, representing the northward extension of the Transscandinavian Igneous Belt and thick, depleted lithospheric mantle of possibly Archean origin. In oceanic domains and in the transition to the continental shelves, the lithosphere thickness is primarily thermally controlled. In the North Atlantic region this is reflected in the long-wavelength gravity field and even more clearly in the geoid undulations.
A similar, yet larger gravity anomaly is found on the conjugate margin in northeastern Greenland. For a proper comparison of the conjugate structures, the ice-effects have been removed from the gravity and geoid data sets of Greenland and are respectively considered in the isostatic calculations.
The existence of similar lithospheric structures (either shallow or deep) along both sides of the conjugate Atlantic margins, has important implications for the Cenozoic rifting history. To which degree can older, lithospheric structures (like the juxtaposition of Neo- and Palaeoproterozoic mantle) guide the location and extent of rifting? Did these structures already play a role in previous tectonic processes like the Caledonian orogeny? A number of ongoing geophysical studies aim to shed a better light on this part of the Norwegian margin in the coming years, including active and passive seismic arrays as well as magnetotelluric studies.