Geophysical Research Abstracts
Vol. 12, EGU2010-12272, 2010
EGU General Assembly 2010

Crust and upper mantle of Europe, Greenland, and the North Atlantic region: Multidisciplinary geophysical analysis

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We present the results from seismic (reflection and refraction profiles, P- and S-wave body-wave and surface-wave tomography), thermal, gravity, and petrologic studies of the crust and the upper mantle in an area which covers about 1/8 of the globe and encompasses most of Europe, Iceland, Greenland, and Svalbard. These multidisciplinary models are used to discuss geodynamic processes in the region where the age of tectonic structures spans over $\sim$4 Ga. Our primary attention is to the lithosphere structure of the onshore parts of the region, but the less well constrained deep structure of the North Atlantic is also discussed. We present a new model of the crustal structure of the region based on all seismic reflection, refraction and receiver functions studies available for the region, acquired and interpreted from the 1970-ies until present. Unreliable constraints, such as based on seismic interpolations, gravity modelling or tectonic similarities, were excluded from the compilation. We propose an integrated model of the structure and physical properties of the crust and the upper mantle in the entire region down to a depth of 250-300 km. The results are summarized in a series of maps of lateral variations in crustal and lithospheric thicknesses, seismic shear wave velocity at different depth slices, heat flow and lithosphere temperatures, as well as density and compositional variations in the lithospheric mantle.