

EGU2020-18271

<https://doi.org/10.5194/egusphere-egu2020-18271>

EGU General Assembly 2020

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### 3D lithospheric structure and density of the NE Atlantic

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The NE Atlantic is a tectonically complex region, also interesting in terms of georesources and therefore large areas are well covered by geophysical and geological data. In this work, we present a 3D lithospheric-scale structural and density model of the region including the eastern-most area of Greenland, the western coast of Norway, Iceland and Svalbard. It covers an area of 2000 km in longitude by 2500 km in latitude with a depth of 300 km and a resolution of 10 km. The model was developed by integrating different kinds of data and regional or global previous models, mainly of seismic origin, and constrained by gravity observations.

The developed model includes the topography, bathymetry and ice thickness obtained from global compilations models. The thickness distribution of sediments was incorporated based on detailed mapping of most areas covered by the model. The structure of the crystalline crust, differentiating between the oceanic and continental areas, is based on seismic information and previous regional models, cross-checked by additional seismic profiles available in the region. The model also includes high velocity/density lower crustal bodies defined by a previous compilation at the Norwegian and Greenland margins and by the analysis of deep seismic profiles in the case of the Iceland area.

We assigned constant densities to each layer following seismic velocities and literature-suggested values for every lithology. Due to the active tectonic setting of the area and its consequent elevated temperature and thus low density, the portion of mantle included in the model is the only layer with variable density. To obtain the mentioned density variation, we evaluated different seismic tomographic data for the area and converted them into temperatures. To mitigate the poor reliability of the tomographic models at shallow depths and also taking into account that the effect of the temperature in the uppermost mantle is especially important near mid oceanic ridges, we evaluated the thermal effect of this area by running a thermal model. Therefore, we calculated 3D distribution of temperatures for the whole portion of the mantle included in the model to obtain the reduction in density that these temperatures would cause considering the thermal expansivity of mantle rocks.

The gravity response of the model was calculated and compared to the gravity observations using the 3D interactive software IGMAS+. The developed model includes the latest data and information of the area and, at the same time, reasonably fits the measured gravity anomalies. Comparison of the first-pass 3D gravity model to the observed gravity data detected some residual anomalies that require further differentiation of crustal densities. The new 3D lithosphere-scale model allows us to analyze the structural configuration of the area and interpret its tectonic implications. It also forms the base for thermal and mechanical models to obtain the 3D distribution of physical variables and predict the rheological and dynamic behavior of the wider NE Atlantic region.