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Updated maps of Moho topography and the earth crust thickness in the Deep Arctic Ocean based on results of potential field zoning and 3-D gravity modeling

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Both initial (Glebovsky et al., 2013) and updated maps and digital models (DM) of Moho topography and earth crust thickness in the deep Arctic Ocean were compiled using the same procedure. It included several steps: analysis of potential fields information compiled under CAMPGM and ArcGP projects and updating by new Russian data; separation of the study area into individual geostructures; calculation of gravitational effects from two main boundaries lying above Moho, presented by IBCAO grid, and by grid of basement relief (Kaminsky et al., 2012); subtraction of these effects from observed gravity anomalies, and converting of residual anomalies to depths to Moho using Parker's (1974) algorithm. Averaged depth to Moho required by Parker's algorithm to estimate its relative variations was determined from available deep refraction seismic data. It varies for different regional geological structures (basins, ridges and rises) which boundaries were contoured based on results of potential fields zoning. Modeling process for each structure was iterative and calibrated by seismic data. Results that best fit with seismic sections were merged to compile the grid of depths to Moho. This grid was specified by estimation of gravitational effects related both with increasing of density of sediments with depth and with uplift of asthenosphere beneath the Gakkel Ridge (GR). Grids of total and consolidated crust thickness were computed by sequential subtracting the IBCAO and sediment thickness grids from the final grid of depths to Moho. Updated versions of maps and DM of Moho topography and earth crust thickness are specified by recent Russian multi-channel and DSS seismic data collected in 2011-2012. It is confirmed the significant differences in crustal structure between the Eurasian (EB) and Amerasian Basins (AB). The thickness of the consolidated crust in the EB shows a fairly clear bilateral symmetry with respect to the GR. In the Nansen and Amundsen basins it varies from 3 to 8 km. The GR is underlain by the thinnest crust (2 km or less km). The crustal thickness of the Lomonosov Ridge varies along its strike within 16–26 km which may indicate its block structure. Within the AB there are a number of large highs and deep basins. The Mendeleev and Alpha ridges are underlain by crust that varies from 24 to 30 km and reaches maximum values of 30–32 km, respectively. The thickest crust that reaches 32-34 km is observed at the Northwind Ridge and Chukchi Plateau. Thickness of crust in deep basins of the AB varies widely. In the Canada and Makarov basins, it ranges from 10 to 16 km, and in the Podvodnikov Basin, from 16 to 20 km.