



## Calculation of the 3D density model of the Earth's crust in the Sea of Okhotsk

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The study of the Earth's crust is a part of investigation aimed at extension of the Russian Federation continental shelf in the Sea of Okhotsk. Gathered data allow to consider the Sea of Okhotsk' area located outside the exclusive economic zone of the Russian Federation as the natural continuation of Russian territory.

The Sea of Okhotsk is an Epi-Mesozoic platform with Pre-Cenozoic heterogeneous folded basement of polycyclic development and sediment cover mainly composed of Paleocene – Neocene - Quaternary deposits. Results of processing and complex interpretation of seismic, gravity, and aeromagnetic data along profile 2-DV-M, as well as analysis of available geological and geophysical information on the Sea of Okhotsk region, allowed to calculate of the Earth crust model.

4 layers stand out (bottom-up) in structure of the Earth crust: granulite-basic (density 2.90 g/cm<sup>3</sup>), granite-gneiss (limits of density 2.60-2.76 g/cm<sup>3</sup>), volcanogenic-sedimentary (2.45 g/cm<sup>3</sup>) and sedimentary (density 2.10 g/cm<sup>3</sup>). The last one is absent on the continent; it is observed only on the water area. Density of the upper mantle is taken as 3.30 g/cm<sup>3</sup>. The observed gravity anomalies are mostly related to the surface relief of the above mentioned layers or to the density variations of the granite-metamorphic basement. So outlining of the basement blocks of different constitution preceded to the modeling. This operation is executed after Double Fourier Spectrum analysis of the gravity and magnetic anomalies and following compilation of the synthetic anomaly maps, related to the basement density and magnetic heterogeneity.

According to bathymetry data, the Sea of Okhotsk can be subdivided at three mega-blocks. Taking in consideration that central Sea of Okhotsk area is aseismic, i.e. isostatic compensated, it is obvious that Earth crust structure of these three blocks is different.

The South-Okhotsk depression is characteristics by 3200-3300 m of sea depths. Moho surface in this area is at the depth 15-17 km and intracrustal Konrad surface – at the depth 8-9 km. Thickness of sediment cover in the South-Okhotsk depression is up to 4-6 km. Type of the Earth's crust in the South-Okhotsk depression has to be defined as suboceanic.

Steep slope with the more than 1.5 km depth difference separates South-Okhotsk depression from mega-block including Academy of Sciences and Institute of Oceanology Uplifts and Central Okhotsk and Deryugin Depression. Sea depths in this area are alternating mostly between 1000 and 1500 m. Moho surface in this mega-block is at the depth 23-25 km and intracrustal Konrad surface – at the depth 13-14 km with the exception of Deryugin Depression (10 km). Thickness of sediment cover varies up to 2-4 km and only in the Deryugin Depression reaches 9 km. Type of the Earth's crust in this mega-block has to be defined as continental.

Northern and north-eastern parts of the Sea of Okhotsk is characteristics by 200-300 m sea depths (with the exclusion of the Tinro depression). Moho surface in this area is at the depth 28-32 km and intracrustal Konrad surface – at the depth 13-18 km with the exception of Tinro Depression (10 km). Thickness of sediment cover is minimal and only in the Tinro Depression reaches 8-9 km. Complete similarity of the potential field anomaly distribution in this region and in the western Kamchatka region is remarkable.

The distribution of the potential field anomalies and features of the constructed Earth's crust density model give us evidences of Pre-Late Cretaceous consolidation of basement in northern and north-eastern parts of the Sea of Okhotsk as well as in the Russian territory of western Kamchatka peninsula.