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**B. Z. Belashev, L. I. Bakunovich, M. Yu. Nilov, N. V. Sharov** (Petrozavodsk, IG KRC RAS)**. Modelling of the earth crust's density structure of the White Sea Region .**

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*Abstract*: The goal of the study is to simulate the density and the velocity structures of the White Sea Region's earth crust and to analyze connections between density heterogeneities and geophysical fields using the program complex Integro.As a result of 2D modelling, the density structure of the local portions of the earth crust was understood better and a 3D density model, showing the deep crustal structure of the White Sea Region, was constructed.

*Key words*: seismic profile, earth crust, the White Sea Region, velocity reference model,Integro, 2D and 3D density models.

The study of the deep structure of the White Sea Region is important because of its position in the Fennoscandian Shield-Russian Plate conjugation zone and magmatic events that have formed diamond and other useful mineral deposits, as well as the hydrocarbon prospecting potential. The study was based on instrumental data obtained by seismic, gravimetric and magnetometric methods. The results are interpreted using models that operate the petrological characteristics of rocks such as density and magnetization.

A modern instrument used for data interpretation and modeling of structures is an Integro Complex developed by VNIIgeosystems for forecasting-diagnostic problems and thematic areal zoning problems [1]. The complex is used to solve direct and inverse geophysical problems, to compile digital maps, to do cartographic referencing and to process and store data.

The goal of the study is to simulate the velocity structure of the region's earth crust and to analyze connections between its velocity stores, density heterogeneities and geophysical fields using the Integro.

Initial modelling data are represented by 1:1000 000 scale digital maps based on gravimetric and magnetic surveys, seismic data, the results of geophysical studies along the geotraverses 3-AP, 1-EB, QUARTZ, AGATE, the reference profile Land-Sea 4B, and 3-AP and geologo-geophysical summary maps and schemes [2].

A basis for the models constructed was provided by a velocity model of crystalline crust used to estimate the correspondence of the velocities of the longitudinal P-waves measured to the densities of crustal layers [3].

Modelling was done by selecting a model of the medium and its geometric framework, constructing 2D density models from seismic sections and passing to a 3D density model of the region's earth crust. A 3D model was obtained by solving an inverse gravimetric problem. In the frameworks of this model data from 2D models related to deep profiles were interpolated and the positions of the velocity layers of seismic P-waves calculated from the model.

The sedimentary layer (lower boundary K1) is present in part of the region. The underlying surface of the granitic-metamorphic layer K2 decreases to the south-west and north-east. In the central portion the depression is confined to the sedimentary basins of the Severnaya Dvina and Mezen rivers. The uplifts of surface K2 are consistent to the structures of the Karelian and Kola megablocks. The diamondiferous Zimny Bereg Uplift in the Arkhangelsk Province is an extension of the Tersky Bereg Structure in the White Sea. Granulitic-basic layer K3 varies in thickness from nesr-zero values to 30 km. The south-western depression of its lower boundary occupies a large area. The Zimny Bereg Uplift occurs as a zone of variably directed gradients. One characteristic of M-discontinuity is a major depression in in the White Sea inlet surrounded by uplifts. M-discontinuity maxima are consistent with positive and minimum with negative gravity anomalies. The depression affects upper crustal layers. Narrowly-spaced M-discontinuity extremuma are connected with vertical structures indicating the interprenetration, mixing and transformation of the deep-seated matter during the interaction of the ascending Fennoscandian Shield with the Russian Plate. The M-discontinuity depression is interpreted as indicative of the region's diamond potential.

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