EGU22-3316
https://doi.org/10.5194/egusphere-egu22-3316
EGU General Assembly 2022

The geoid gravity potential inversion to dense anomalies and their comparison with the seismic tomography models

Rudolf Greku and Dmitry Greku
Institute of Geological Sciences, Kyiv, Ukraine (r.greku@gmail.com)

Greku R.Kh., Greku D.R.

Institute of Geological Sciences, Ukraine

SATMAR Laboratory, DDS Capital Investments, Australia

The geoid gravity potential inversion to dense anomalies and their comparison with the seismic tomography models

The results of using the gravitational tomography method is based on the use of algorithms for inverting the values of the gravitational potential (geoid) for calculating the Earth's density anomalies in the entire range of depths up to 5300 km [H. Moritz. The Figure of the Earth's Interior, Wichmann / Karlsruhe, 1990]. The initial data are the anomalies of the geoid heights according to the EGM2008 model in the expansion in spherical functions to harmonics n, m = 2190. The spatial resolution of the data on the surface is 10 km. The depths of the disturbing masses are determined taking into account the harmonic number. The result is maps of density distribution at specified depths, vertical sections and 3D models.

Examples of the distribution of density anomalies for certain regions of Ukraine, Europe and Antarctica are given. Discrepancies with known works on seismotomography are mainly due to different physical properties of the studied medium: density and acoustic properties of rocks.

Density anomaly results are reported as the percent deviation from the Earth's PREM density model for a given location and depth. The entire range of density anomalies in the form of deviations from the PREM model does not exceed 12%. Complete coincidence of the results is observed, for example, at great depths of 2800 km throughout the Earth. The section through the continent of Antarctica with a complex relief and structure to a depth of 400 km also shows similar images from seismic and gravity tomography. The gravitomographic model of the tectonically active region of Vrancea confirms the delamination nature of the formation of the disturbing mass and the occurrence of earthquakes in Europe.

The original call to the present topic of the GD7.5 session (Prof. Saskia Goes) rightly notes the important role of rheological variability in the mantle layers on the deformation of the earth's crust and surface, which can cause catastrophic destruction of large-block structures. In this sense, the intensity of the inner layers according to the data of structural inhomogeneities becomes more and more urgent.