

Density modeling along the CELEBRATION 2000 profiles CEL01, CEL04 and CEL05

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Abstract: One of the most important question of the deep seated geological-geophysical investigation of the lithosphere in the Central Europe is related to the study of the structure and evolution of the geological Megaunits as are: the Carpathian orogen, Pannonian Basin System, Bohemian Massif, Palaeozoic platform, Trans European Sutura Zone and Baltica. The solution of such serious problems required to organize an extremely huge international project CELEBRATION 2000, which consisted of the large system of the refraction and reflection seismic profiles. From the view of the Western Carpathians and their tectonic position in the face of the surrounding tectonic units, the Profiles CELEBRATION 2000: CEL01, CEL04 a CEL05 belong to the most representative profiles of this project. The Profiles CEL01 and CEL05 are parallel and they are going perpendicularly to the main geological units and the Profile CEL04 crosses them. The density modelling along the mentioned

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profiles has been performed by the 2D integrated gravimetric modelling with constrains of the seismic refraction modeling results. The integrated modelling was based on detailed analysis in the world the most used formulas for transformation seismic velocity on density. The analysis these formulas showed that the Sobolev and Babeyko's (Sobolev and Babeyko, 1994), Christensen and Mooneyho (Christensen and Mooney, 1995) and Lachenbruch-Morgan's (Lachenbruch and Morgan, 1990) formulaes are the best and they have been used for determination of the average crustal and lower lithosphere densities. The calculated integrated density lithospheric models along the profile CEL01 (Fig.1), CEL04 and CEL05 belong to the most interesting results. Their interpretation indicates clear a significant different geophysical (geological) lithospheric structure of the individual Megaunits and the complicated structure of the tectonic contact between the Western Carpathians and the southern margin of the European platform. From a new and original Moho depth map can be seen all-new knowledge about its relief in the area of the Western Carpathians and the Trans European Sutura Zone. The map in the Western Carpathians reflects deep, very narrow Moho depression (42 km), which does not spread under the highest topography (the High Tatras), but it is located north-eastern from there. Based on the comparison of older Moho maps and new one it was found out that the Moho depth over the Trans European Sutura Zone is 15 km smaller than it has been interpreted in former time (Guterch et al., 1986). From the stripped gravity map of the Danubian Basin, which was calculated on the basis of the three-dimensional modelling by the software GMT-AUTO it can be observed the Danubian Basin with the Little Hungarian Lowland are the parts of the same sedimentary basin of which centre is located in the Gabčíkovo depression. It is suggested the significant gravity gradient along the south-eastern margin of the basin could characterize the Rába-Hurbanovo fault.

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Key words: gravimetry, seismics, 2D and 3D density modelling, stripped gravity map, Moho discontinuity, lithosphere

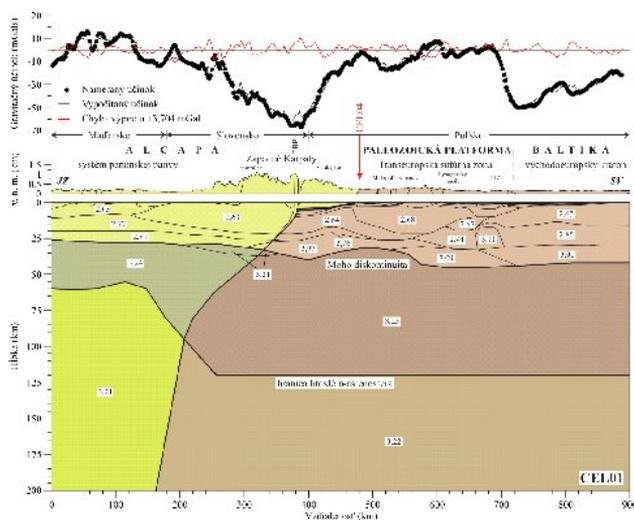


Fig. 1. Density model along the profile CEL01.

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