

Density modeling of the lithospheric structure along the CELEBRATION 2000 seismic profile CEL01

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Abstract: The paper deals with density modeling along the seismic refraction Profile CEL01 and finding out a possibility of application of special formulae for transformation of the P-velocities to densities. We present three variants of the resulting density models. In general, good agreement between the seismic and gravity interpretations of the lithosphere was acquired. The largest disagreement between the seismic and gravity interpretations is observed beneath the TESZ. To obtain good fit between data and model predictions it was necessary to increase densities and to adjust the geometry of the anomalous bodies of the lower part of the upper crust and the lower crust. The lithospheric structure is the most complicated in the TESZ and EEP junction. The upper (lower)

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crustal anomalous bodies with densities of 2.68 g.cm^{-3} and 2.62 g.cm^{-3} (3.05 g.cm^{-3}) were modeled. The high-density lower crustal anomalous body was modeled based on seismic and gravity interpretations. The large differences can be observed in the crustal thicknesses of the EEP and the microplate ALCAPA. The EEP crustal thickness (43 km on average) is larger in comparison with the ALCAPA crustal thickness (32 km on average). In the Western Carpathians the largest thickness (37 km) is indicated beneath the Pieniny Klippen Belt and Outer Western Carpathians Flysch zone junction (around of 400 km of the profile). The Pannonian Basin is characterized by thin crust (28 km on average only). The thickness of the lower crust beneath the Pannonian Basin is also very thin (8–10 km). The lower part of the lower crust of the TESZ and EEP with the seismic velocities $6.85\text{--}7.05 \text{ kms}^{-1}$ and density $\rho \geq 3.00 \text{ gcm}^{-3}$ does not exist beneath the Pannonian Basin. The interpretation indicates that the thickness of the crust beneath the TESZ and EEP is thinner than it was suggested in the former seismic interpretation.

Key words: gravity, density modeling, lithosphere, East European platform, Western Carpathians, Pannonian Basin, CELEBRATION 2000 project