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Lithospheric structure in Central Europe: integrated geophysical modelling

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We present four new lithosphere-scale profiles based on the joint interpretation of gravity, geoid, topography and surface heat flow data. The approach is capable to constrain the complicated lithospheric structures of the studied region better than interpreting each data set on its own. The calculation is performed using a finite element technique that links the different physical equations (Zeyen and Fernandez, 1994). The new profiles cross Central Europe from the European Platform in the North to the Aegean Sea in the South and from the Adriatic Sea in the West to the East-European platform in the East. Wherever possible, the crustal structure of the models was constrained by seismic data. In the resulting models, the thickness of the lithosphere decreases from the older and colder platforms to the younger and hotter Pannonian Basin with a maximum thickness under the Eastern and Southern Carpathians. Similar to earlier studies, the thickness of the Carpathian arc lithosphere varies between 150 km in the North (the Western Carpathians) and about 300 km in the Vrancea zone (the Eastern and Southern Carpathian junction). In the platform areas it is between 120 and 150 km and in the Pannonian basin it is about 70 km. The lithosphere thickens strongly underneath the Transylvanian Basin reaching locally values of nearly 200 km. New results are given for the Southern Carpathians and the Moesian Platform. The models show that the Moesian Platform is overthrusted from the North by the Southern Carpathians and from the South by the Balkanides and is characterized by bending of this platform. Coherent with seismic models, the thickest crust is found in all profiles underneath the Carpathian Mountains or their immediate foreland. The maximum thickness is found not underneath the highest topography but under the Focsani foreland basin. The thickest crust outside the orogens is modelled for the Moesian platform with Moho depths of up to 45 km. The thinnest crust is located under the Pannonian Basin with about 26-27 km.

Zeyen, H., and Fernandez, M., 1994: Integrated lithospheric modeling combining thermal, gravity and local isostasy analysis: Application to the NE Spanish Geotransect. J. Geophys. Res., 95, 2701-2711.