

Lithospheric structures of Inner and Outer Western Carpathians in Slovakia

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A multidimensional geophysical modelling in the Central and Eastern Slovakia in area of contact zone between the Inner and Outer Western Carpathians is presented. Geophysical data collected during CELEBRATION 2000 project and project THERMES are used for magnetotelluric (MT), gravimetric and seismic studies of crustal and lithospheric structures. We put together MT, seismic 2D wide angle refraction profiles and gravimetric models with thermal information gathered from the area and create integrated geophysical models of structures of the Carpathian orogen.

The Eastern Slovakia MT modelling suggests more electrically conductive structures in the middle and lower crustal depths in comparison with Central Slovakia, where we observed structures dominated by resistive complexes overlaid by conductive sedimentary formations. The higher conductivities below the East Slovakian Basin restrict penetration depth of the geoelectrical images. The electrically conductive structures are connected with tectono-thermal development in Neogene and presence of volcanic activity. Another significant conductive anomaly is imaged along the contact zone between Inner and Outer Western Carpathians in depths of about 10 - 20km, which is known as the Carpathian Conductivity Anomaly (CCA). In order to improve the depth resolution of MT models we decided to combine geoelectrical images with density and velocity models of the area. We used integrated petrological and geophysical modelling code to obtain thermally consistent lithospheric scale models of the area.

A possible preliminary geological interpretation of the northern segment of investigated area suggests a resistive European platform below conductive flysch sediments. The boundary between Inner and Outer Western Carpathians represented by the Klippen Belt on the surface is changed to the CCA in higher depths. In the direction to the south there are higher amount volcanic fluids in middle crustal depths. Our models are important in enabling of understanding the geodynamical and thermal processes during the collision of Carpathian block with the European platform and the connected development of the Pannonian Basin. There are still uncovered features in tectonic structures, which should be further investigated by integrated thermal geophysical modelling of available data.