



A new interpretation of seismic and magnetotelluric transect 2T across the Western Carpathians

Vladimir Bezak (1), Josef Pek (2), Jan Vozar (1), Miroslav Bielik (1,3)

(1) Earth Science Institute SAS, Division of Geophysics, Bratislava, Slovakia (geofjavo@savba.sk), (2) Institute of Geophysics, Academy of Sciences of the Czech Republic, Czech Republic (jpk@ig.cas.sk), (3) Faculty of Natural Sciences, Comenius University, Bratislava, Slovakia

The deep seismic reflection profile 2T crossing the central part of Slovakia plays an important role in the understanding of the Western Carpathians tectonic development. The profile provides images of the European Platform overlaid by the Outer Carpathian flysch in the north. To the south, the profile is crossing the following main tectonic units: the Klippen Belt, main crustal units of the Inner Carpathians (Tatric, Veporic, and Gemeric units) with superficial nappes and sedimentary and volcanic post-tectonic Tertiary formations. In addition to the seismic profile a magnetotelluric (MT) interpretation and gravity modelling were carried out along the same profile. Joint modelling of different geophysical data brings a new perspective to the understanding of deep crustal structures and of the evolution of the Western Carpathians. Particularly the MT method adds a new property of the imaged units, the electrical conductivity, which is physically different from the features obtained from the seismic and gravity modelling.

The original interpretation of the profile 2T, based on seismic data, exhibits mostly sub-horizontal interfaces of contrasting units. A combination of a relatively low resolution gravity data with MT models gives a possibility to identify units with new contrasting physical properties. The north-south 2D MT profile imaged three different conductivity segments of the Western Carpathian crust. Significant differences in physical properties observed in the segments allow us to classify them as due to a different tectonics. The northern part of the profile is dominated by resistive complexes overlain by conductive sedimentary formations. A possible geological interpretation of the northern segment suggests the resistive European platform below conductive flysch sediments and, more to the south a predominance of resistive granitoids and gneiss units. The middle part of the profile contains a complex superimposition of resistive and conductive structures. It shows that the relict of Hercynian tectonic structures consisting of the superposition of granitoids over metamorphic rocks is preserved. The southern segment of the profile is characterized by high conductivity throughout the whole crust, which may indicate that the entire segment is affected by a Neogene volcanic activity which masks the old tectonic units that build the crust in this area.