

A07

## Tectonically Conditional Zones with an Occurrence of Deep Magnetic Anomalies

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### SUMMARY

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The Slovak Republic territory is from the abyssal geological structure point of view built by several tectonic mega units of various age. From the North it is the Proterozoic unit Brunia with overlying the Flysch; the next is the Klippen belt; than the partial tectonic crust unit of Cretaceous age (Tatricum, Veporicum, Gemericum) and superficial nappes system; and finally the South Alpine units (Pelső). In the areas of the Neogene development markedly hits into the deep structure influence of the lower crust and the upper mantle as a consequence of crust thinning and the ascent of the asthenolite what eventuated into creation of potential geothermal areas.

The Slovak Republic territory is from the abyssal geological structure point of view built by several tectonic mega units of various age. From the North it is the Proterozoic unit Brunia located in the North with overlying the Flysch; the next is the Neogene tectonic element of the Klippen belt; the consecutive the tectonic segment of the Inner Carpathians with the partial tectonic crust unit of Cretaceous age (Tatricum, Veporicum, Gemericum) and superficial nappes system; and finally the South Alpine units (Pelső) situated in the South. In the areas of the Neogene development markedly hits into the deep structure influence of the lower crust and the upper mantle as a consequence of crust thinning and the ascent of the asthenolite.

The new digital magnetic map of Slovakia completed in the last years facilitated to take a stand and geological classification of all types of magnetic sources. The variable geological structure of the Western Carpathians is depicted in an equally variable magnetic field of this region. A sizable number of magnetic anomalies with manifold character have been recognized.

The basic anomalies distribution was performed into two groups. Into the first one belong local magnetic anomalies, that are caused by individual magnetic bodies, or system of anomalies mostly in the environment of crystalline basement, or volcanics: They are caused by Neogene volcanic rocks on the surface, or within the Neogene sedimentary filling; next by the Early and the Late Paleozoic volcanics, and by shallow or deeper seated rocks in the frame of crystalline basement - tonalites, amphibolites, mica-schists, gneisses in the various tectonic units of the Western Carpathians.

The second group is represented by large, deep seated magnetic anomalies caused by tectonic blocks in the fundament of the Western Carpathians. There are blocks of Cadomian basement, which contents of heavy and magnetic solids (mostly metabasic rocks). Next type of deep anomalies is caused by ascent of asthenolite and accompanying basic and ultrabasic intrusions of the Neogene age (the area of the Danube basin and the Trans Carpathian basin).

Cadomian crust was detected in the following positions:

1. The relatively heavy and magnetic crust of Brunia unit as a part of the North European platform.
2. Fragments of the crust of similar type in the pattern of the block of the Inner Western Carpathians:
  - a/ remnants in the Paleo Alpine pattern in the Northern part of this block
  - b/ remnants in the Hercynian pattern in the Southern part of this block where the magnetic effect is combined with superficial responses of mica-schists, ultramafic and mafic rocks mainly.

Based on such magnetic sources partitioning is possible to formulate comprehensive conclusions contributing to the solution of issues regarding the deep geological structure of the Western Carpathians and adjacent areas.

The additional value of proposed interpretation for geoenergy purposes utilization is in the case of the anomalies caused by asthenolite ascent therein that these areas are suitable for geothermal energy exploration.