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Locations of Curie point depths and Moho of the Bulgarian territory

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Determination of the depths at which rocks no longer exhibit their magnetic properties comprises an actual problem, successfully solved using geophysical data. As is known, crustal rocks lose their magnetization at the Curie point temperature, become paramagnetic and their ability to generate detectable magnetic anomalies disappears. The Curie temperature for titanomagnetite, the most common magnetic mineral in igneous rocks, is approximately 580^{o}C. Consequently, it may be possible to locate a point on the isothermal surface by determining the depth to the bottom of a magnetized rock mass. In certain approximation, adequate for the inverse problem solution, this surface could be marked as a Curie temperature isotherm or Curie point depths (CPD).

One of the important parameters which determine the relative depth of the isotherm with respect to sea level is the heat content in a particular region. It is therefore to be expected that a region having significant geothermal energy near the surface of the earth will be associated with conspicuously shallow Curie point depths, relating to the adjoining regions.

Variations in the bottom of magnetically active layer of the lithosphere could be an essential parameter during the process of structural interpretation for particular regions. Depths to the bottom of this layer were calculated for Bulgarian territory using spectral analysis of geomagnetic data. Results show that Curie point depths of Bulgarian territory range between 17 and 35km. In the Moesian platform they vary from 28 to 32 km, except two anomalous zones having shallower values. These anomalous zones are in good agreement with the heat flow density map of Bulgaria.

The smallest values of CPD were obtained in the southern part of Bulgaria where some areas with significantly high heat flow are presented.

The map of Moho discontinuity reveals several interesting structures. The first one is a negative structure at the southwest part of Bulgaria where the greatest depth of 51km is observed. It is limited by steep gradients parallel to the front of the movement of paleosubduction zone beneath the Rhodopes, dipping to the northeast. Steep gradients but with negative correlation correspond to this zone in the map of CPD. The calculated values range between 18 and 22km. Therefore the sources' nature of these anomalies could be classified as zones of late magmatism, sharply expressed neotectonic or recent movements, or increased seismic activity. The other interesting structure is in the region of East Rhodopes, where the Moho discontinuity lies at depth of about 30km. It corresponds to a relatively deeper for this area CPD, having the same values: 28-30km.

The analyses of Curie point depths of Bulgaria delineate regions having increased geothermal potential. Combined with the configuration of Moho we have obtained useful information about the geometry of the important boundaries influencing major structure's development.