

# Integrated gravity and magnetics as a tool for investigating volcanic areas.

## The Neogene- Quaternary volcanism of East Carpathians

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The East Carpathians Neogene-Quaternary volcanism (ECV) occurs in the inner part, mostly parallel to the orogene catena. There have been several attempts to explain its peculiarities. Thus, the systematic lowering of the age of the volcanic manifestations towards the south has been explained by an oblique subduction process, while southernmost Persani volcanism has been attributed to an intra-plate fissure mechanism.

Large-scale gravity and ground geomagnetic surveys have been conducted recently over the ECV and neighbouring region in the frame of INSTEC project. For some confined areas, investigations were performed at a higher resolution in order to help solving more intricate problems. In a region largely covered by tephra and/or sedimentary deposits, geophysics were mainly intended to outline hidden or partly cropping out volcanic forms, and to help clarify structural relations among them, or between them and the host geological units. The present paper aims at presenting some of the preliminary results. Based on the acquired data, consistent images of the gravity and geomagnetic field have been obtained. To enhance the signal/noise ratio, data were further processed by using various filtering techniques. For example, both gravity and geomagnetic anomalies were upward transferred to planar surfaces above the topography for mitigating relief effects, and higher order derivatives have been computed to better outline the contour of the sources. To avoid distortions in positioning, the geomagnetic anomalies were reduced to the pole, and apparent susceptibility maps were constructed. Power spectra of the geomagnetic field were determined and analysed for various

types of volcanic manifestations. Pseudo-gravity anomalies were inferred from the geomagnetic data, and results were compared to the Bouguer images.

In-depth development of volcanic structures was studied by using joint inversion and forward modelling of the gravity and geomagnetic data under the constraints of the rock physical parameters provided by the lab works. Integrated interpretation of the potential fields along with other additional data allowed for more documented considerations on several aspects such as: (i) location of the main volcanoes along NW-SE trending fault system that seem to belong to the SE extent of Trans-European Suture Zone (Fig. 1), (ii) the overall decrease of the gravitational energy from north to south, and (iii) more accurate estimates on the ratio between the volumes of lava flows and tephra deposits.

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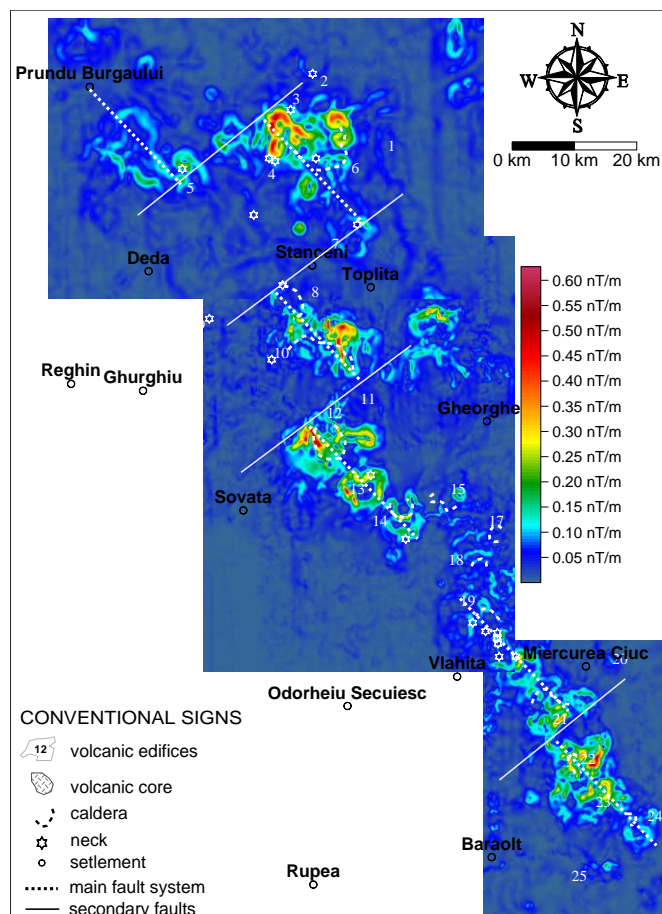


Figure 1: Imprints of ECV structures in the horizontal gradient of the geomagnetic anomaly