TECTONIC AND GEODYNAMIC SETTING OF THE BERCA-ARBANASI MUD VOLCANOES (ROMANIA) AS INFERRED FROM GEOPHYSICAL DATA

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Within the bending area of East Carpathians, Romania, close to the Vrancea active seismic zone, several mud volcanoes occur. During the time various researches were carried out and many attempts have been made to decipher their genesis and evolution.

The paper is aimed to reveal the regional tectonic setting and geodynamic environment of these volcanoes mainly based on the geophysical data interpretation. Previously gathered gravity, ground and airborne magnetics, geomagnetic induction studies, electromagnetic (MTS), seismic (DSS), and stress tensor data were reprocessed and interpreted in order to get new information on purpose. Among the main results, mention should be made to the followings:

- at least three main lithosphere compartments should be considered on the Romanian territory: the East European Plate (EEP), the Intra-Alpine micro-plate (IaP), and the Moesian micro-plate (MoP);
- according to MTS and DSS data, the lithosphere thickness is about 80 km within IaP, 120 km within MoP, and more than 150 km within EEP: at their junction, within Vrancea zone, MTS data advocate for a more than 200 km thick lithosphere;
- the nature of the contacts between the above mentioned lithosphere compartments is different: while the Tornquist-Teisseyre zone (TTZ) stands as a compression contact between EEP and IaP, both Peceneaga-Camena fault (as the contact between EEP and MoP) and Trans-Getica Fault (as the northern boundary of MoP) are active dextral strike-slip faults;
- the three plates seem to met each other into the Vrancea unstable transform-transform triple-junction (VTJ).

It is very likely that the Berca-Arbanasi mud volcanoes area is closely connected to the VTJ structure. It is located on its southern flank, on the so-called Trans-Getica Fault. This major tectonic contact delineating the northern boundary of MoP has been sharply outlined at the basement level within the image of the residual geomagnetic anomaly. The divergence of the Wiese vectors along it advocates for its extension downward to the bottom of the crust. Both active seismicity and radical change in the regional stress strike shows the Trans-Getica Fault (TGF) as an active plate transform contact.

The VTJ evolution seems to start in Lower Triassic, when an important EEP compartment was shifted several kilometers toward west along the TGF path. The next step started on Upper Cretaceous, and extended during the Black Sea opening. Crust extension, related to the W Black Sea opening, split the SE Carpathians foreland into several compartments, by re-activating or creating brittle crust block bounding faults that striking northwestward. In turn, crust shortening took place in various environments. East Carpathians, crustal slivers expelled by the Black Sea opening met the TTZ inclined plan and come into an oblique subduction, to which the S Harghita Mts. volcanism seems to be associated. South Carpathians, they faced the vertical contact of TGF, and engaged into a lithosphere buckling, well outlined by the lowest gravity low in Romania, which lay in front and not beneath the highest mountains in the country. After the Black Sea completed its evolution, active rifting within SW Arabian Plate represents the “engine” of the present dynamics within MoP, by creating a “tectonic escape” environment along TGF, in a rather similar to the North Anatolian Fault situation.