

# **The geochemistry and petrogenesis of volcanic rocks within ophiolitic formations at the Northeast Othris Region, Greece**

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Volcanic rocks from ophiolitic formations in northeast Othris region are categorized based on their geochemical characteristics in two distinct groups. The first includes volcanic rocks from the ophiolitic formations of Eretria and Velestino, which, as their immobile element chemistry and geochemical plots indicate, seem to have formed in an N-MORB environment with 5-15% partial melting of a fertile or moderately depleted mantle source and extensive fractional crystallization processes. The second group is exclusively from the ophiolitic formation of Aerino having rocks with generally higher MgO contents, subduction related features (e.g. low Ti/V<10) and having been derived from a highly depleted mantle source but with similar partial melting degrees (10-20%). These differences may reflect an evolution from an earlier MORB to a latter IAT volcanism within the same oceanic basin or correspond to two separate oceanic environments.

## **Database of geomagnetic induction vectors across the Carpathians and modelling of the regional conductivity distribution**

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Study of the geoelectrical structure of the Carpathians has a long history. The first induction studies performed in the late fifties revealed reversals in orientation of the geomagnetic induction vectors. Until the nineties, geoelectric groups from former Czechoslovakia, Poland, Hungary, Ukraine and Romania carried out a series of deep induction experiments and covered the whole Carpathian region by number of field stations clustered along profiles crossing the Carpathian arc. The collected long period electromagnetic induction data made it possible to map the surface trace of the Carpathian geoelectrical anomaly and to estimate the depths range and conductivity of the causative electrical conductor in the crust. Various methods were applied to model the electrical structure beneath the Carpathians. Based on a compilation of previous results as well as on our original modelling experiments we present a generalized conductivity model of the Earth's crust of the western, northern and eastern parts of Carpathians. Electromagnetic induction data from the period range of 400 to 6000 s collected on the territory of former Czechoslovakia, Poland, Hungary and Ukraine were used to study the crustal structure of the electrically anomalous zone. Along several profiles, magnetotelluric data were acquired which provided information on the directional properties of subsurface structures and on their directionality. 2D electrical cross-sections along the magnetotelluric profiles were constructed by stitching formal 1D anisotropic inverse models obtained from complete magnetotelluric impedance tensors and, further, by employing the 2D REBOCC inversion procedure. The obtained models were used as pilot conductivity distributions for a subsequent quasi 3D modelling. 3D modelling and inversion aimed at fitting the geomagnetic induction data across the whole area by a regional distribution of the integrated electrical conductivity (conductance) and was carried out by applying a thin sheet approximation of the crustal structures as well as by utilizing results of numerical simulations of the horizontal magnetic

tensor (HMT) obtained from the observed induction vectors. The electrical model of the Carpathian region is presented and discussed in relation to other geophysical data available and with respect to the basic regional geological units. The modelling allowed us to constrain both the geometry and electrical properties of the anomalous electrical structures beneath the Carpathians. The models show significant spatial variability of the geometry of the Carpathian conductivity anomaly along the Carpathian arc. Particularly, according to the modelling results the maximum width of the electrically anomalous zone reaches 50 to 60 km and the depth of the crustal conductors varies between 10 and 30 km in the West Carpathians and between 6 and 25 km in the northern and eastern part of the Carpathians. A special character of the induction vectors is observed in the western part of the Carpathian region where it makes contact with the Variscan structures of the Bohemian Massif and shows a complex 3D structural pattern generated most likely by a couple of pronounced but discordant anomalous induction features.

## **An integrated study on the Late Miocene Tuğlu formation – palaeoecological, palaeoclimatic and palaeogeographical interpretation (Çankiri Basin, Central Anatolia, Turkey)**

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Within the framework of the EUROCORES Topo-Europe programme the VAMP (Vertical Anatolian Movements Project) Project, an international and interdisciplinary research team (APVV-ESF-EC-0009-07 and IGAG-CNR TA.P05.009.003) has achieved detailed sampling and study of key stratigraphic sections in the Çankiri Basin (Central Anatolia). Ostracods, benthic foraminifera, nannoplankton, charophytes, molluscs, fish remains, palynomorphs and micromammals have been recovered from the 21m thick Tuğlu section. Biostratigraphy based on small mammals is still in progress, because new data from VAMP sampling during last year point to an age of rodent assemblage (MN7-8) older than the previously published data (MN10). The rodent assemblage composition is characterized by the dominance of *Byzantinia* cf. *bayraktensis* and unusually diversified Gliridae (genera *Myomimus*, *Myoglis*, *Muscardinus* and *Glirulus*). The genus *Myoglis* was not previously known from Anatolia. The less common taxa are *Democricetodon*, *Keramidomys* and *Spermophilinus*. The association of rodents from Tuğlu suggests humid and forested environment. Insectivores have not yet been processed. Both magnetic mineralogy and magnetic susceptibility analyses were carried out and the variations of magnetic parameters (SIRM, SIRM/k, IRM<sub>1/0.1</sub>) along the section were studied. These parameters display a link with the distribution of freshwater ostracods probably related to humid climatic inputs. Most likely, the Tuğlu formation deposited in a continental setting characterised by permanent water bodies affected by strong salinity and depth oscillations. The molluscs from the middle and upper part of the section are characterised by terrestrial, freshwater and low-oligohaline gastropods and bivalves represented by the genera *Lymnaea*, *Bithynia*, *Melanopsis*, *Dreissena*, *Potomida* and Helicidae, showing alternating open land, lacustrine and fluvial conditions. A diversified charophyte assemblage (*Nitellopsis*, *Lychnothamnus* and *Chara*) confirms the existence of a permanent water body in the middle part of the section. Since dating is still in progress, it is difficult to estimate sedimentation rates and to distinguish seasonal or inter-annual salinity changes from changes in salinities due to other inputs. To better understand such oscillations, high-resolution sampling of a 350-cm-long section has been performed. The palynological record documents subtropical climate (*Cathaya*,