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Transitional directions from Early Miocene Lavas at Samothraki Island, N. Greece

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The North Hellenic orogen was formed at the expenses of the Variscan and Jurassic oceanic crust, preserved in scattered ophiolitic massifs. Strong post-orogenic extension with coeval emplacement of granodioritic plutons, deposition of clastic sediments and calc-alkaline volcanism appeared from the Middle-Late Eocene to the Middle Miocene. These widespread Tertiary volcanic products, outcropping also in north and central Aegean, have been extensively studied as far as their emplacement conditions are concerned. In parallel, they have been the object of several palaeomagnetic studies, all consistently indicating a general pattern of clockwise rotations.

The island of Samothraki belongs to the Circum-Rhodope Zone, a series of Triassic-Jurassic continental margin sedimentary and volcanic rocks that surround the crystalline Serbo-Macedonian and Rhodope Massifs. The geochronological data, along with the morphology and the eruption mode of the Samothraki Tertiary volcanic rocks, allow a division into three groups, namely the “old”, the “intermediate” and the “young” ones. Several radiometric ages have been assigned to the three groups, spanning from 25 to 19 Ma. Isotope and trace-element modeling do not favor a continuous evolution of these magmas.

The major granitic and volcanic formations of the island have been subjected to paleomagnetic studies. The results revealed a complex pattern with coexisting straightforward directions and puzzling ones, only within the younger lavas, mostly domes. These samples are characterized by a medium temperature component with an eastward declination and a positive inclination and a high temperature one with a negative inclination. Experiments of absolute paleointensity have been conducted on twenty-eight samples from 3 separate domes with ages between 22-19 Ma using a modified Thellier technique with very narrow 4°C to 10°C temperature steps between 500°C and 595°C. The results indicate significantly low field values at two sites. The presence of low paleointensities combined with intermediate directions suggest that they recorded a transitional field state. Interestingly, similar directions were obtained in miocene volcanics from the nearby island of Lemnos as well as from the mainland Thrace area. A further study of these formations will hopefully improve our knowledge of the field behavior in Early Miocene.