

Geochemical evolution of the monogenetic volcanic islet Psathoura in the NE Aegean region, Greece

Theodoros Ntaflos (1), Wencke Wegner (1), Christoph Hauzenberger (2), Kostas Vatougiou (3), and Kitipis Christos (4)

(1) University of Vienna, Dept. of Lithospheric Research, Austria (theodoros.ntaflos@univie.ac.at), (2) University Graz, NAWI Geocenter, Austria, (3) Beikou, Rodies, Chalkida, Greece, (4) Asklipiou, T.K. 42100, Greece

The magmatic activity in the Aegean-Anatolia region developed in three distinct time periods. The first period between Late Eocene and Middle Miocene is characterized by orogenic calc-alkaline, high K calc-alkaline and shoshonitic rocks. In the second period from late Miocene to Early Pliocene the prevailing magmatic activity consists of alkaline rocks, which have a within-plate character. The third period, between Pliocene and Quaternary, comprises the South Aegean Volcanic Arc of calc-alkaline character and the Western Anatolia region with an OIB-type volcanism (Innocenti et al., 2001).

Psathoura is a volcanic islet located in NW Aegean within the westward prolongation of the Anatolia Fault System. It is part of the diffuse distributed magmatic activity, which affected this area during the third period of magmatism. The age of the islet, estimated by K-Ar method, is 0.7 Ma (Fytikas et al., 1984).

The lavas in Psathoura are exceptional homogeneous with visible small up to 1 mm olivine phenocrysts and have typical trachytic texture consisting of plagioclase laths and interstitial microphenocrysts of augite. Euhedral to subhedral olivine phenocrysts contain an unusual high number of euhedral spinel inclusions. The olivine is relatively homogeneous with Fo=85.0, which drops at the very rim to Fo=75.5. The augite is zoned and the Mg# varies from 80.6 in the core to 70.3 at the rim. The plagioclase is labradorite (Ab₄₁An₅₆Or₃) and its composition does not vary from sample to sample. Two kinds of spinel inclusions have been identified: spinel 1 with Cr# ranging from 16 to 23 and spinel 2 with Cr#=44.

The lavas in Psathoura are basaltic trachyandesites. Their bulk rock composition is remarkable constant indicating that the islet has been formed from single eruption event of a very homogenous source. Their Mg# is 62 and the K₂O/Na₂O ratio varies from 0.62 to 0.66. The REE patterns show steep LREE (LaN/SmN= 3.7) and relative flat HREE (TbN/YbN=1.6). A striking feature of the PM normalized trace element abundances is the prominent positive K-anomaly and the enrichment of the LIL elements.

The preliminary results suggest that the islet Psathoura has been formed after a single eruption event.

The extensional regime that occurs in the area could have triggered the partial melting of a hydrous mantle, most likely an amphibole bearing peridotite, producing an OIB-like melt which subsequently experienced en route olivine fractionation. The metasomatized source could be attributed to subduction related components. However, the melts do not show evidence for crustal contamination. The relative high Nb/U ratio which ranges between 28 and 33 and the radiogenic Sr isotopic ratio ($^{87}\text{Sr}/^{86}\text{Sr}=0.70443$) preclude such a contamination.

Fytikas, M., Innocenti, F., Manetti, P., Peccerillo, A., Mazzuoli, R., Villari, L., 1984. Tertiary to Quaternary evolution of volcanism in the Aegean region. *GSL, Special Publications* 17, 687-699.

Innocenti, F., Agostini, S., Di Vincenzo, G., Doglioni, C., Manetti, P., Savaşçin, M.Y., Tonarini, S., 2005. Neogene and Quaternary volcanism in Western Anatolia: Magma sources and geodynamic evolution. *Mar Geol* 221, 397-421.