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# The Thessaloniki Ophiolite. A Middle Jurrassic supra-subduction zone ophiolite between the Vardar Zone and the Serbomacedonian Massif, N. Greece

**Panagiotis Zachariadis**(1), Thomas Reischmann (2) and Dimitrios Kostopoulos (3)

(1)Johannes Gutenberg-Universitä zacharia@mail.uni-mainz.de

(2) Max-Planck-Institut für Chemie, Abteilung Geochemie, Mainz,Germany

(3) National and Kapodistrian University of Athens, Faculty of Geology and GeoEnvironment, Department of Mineralogy and Petrology, Panepistimioupoli, Zographou, Athens 157 84, Greece

Here we report, for the first time, on a hitherto unrecognised ophiolite that outcrops near the eastern boundary of the Vardar Zone with the Serbo-Macedonian Massif, at the city of Thessaloniki in northern Greece. The outcrop is dominated by extrusive and hypabyssal rocks, lavas and dykes, with fewer high-level intrusives. The lavas are in flow and pillow forms. The dykes form sheeted complexes and rarely intrude gabbros.

The rocks have been altered to greenschist-facies metamorphism. Only clinopyroxene and rare relics of anorthitic plagioclase have been preserved from the primary mineralogical assemblage. Secondary minerals observed include albite, titanite, chlorite, actinolite, magnetite and quartz. Based on trace-element discriminant diagrams the samples are classified as basalts, basaltic andesites and dacites. Using standard Ti-V and Th-Ta-Hf systematics they appear to belong to the island-arc tholeiite series. Normalised to mid-ocean ridge basalt, the Thessaloniki arc samples show negative Nb anomalies and depleted high-field-strength element (HFSE) and large-ion lithophile element (LILE) patterns. The latter depletion is interpreted as the result of hydrothermal circulation that also caused the greenschist-facies metamorphism. The pronounced Th enrichment observed is interpreted as the effect of fluids released from a downgoing slab in a subduction zone. The basic and intermediate samples have slightly depleted LREE patterns except for the high-$SiO_2$ samples that are LREE enriched. All samples have negative Eu anomalies suggesting plagioclase fractionation

in the source. The samples from Thessaloniki have $\varepsilon_{Nd(init)}$ values between 4.05 and -0.67 and $^{87}Sr/^{86}Sr$ ratios between 0.7112 and 0.7049.

Overall, the geochemical characteristics suggest that these rocks have been generated from a depleted mantle source that has been isotopically modified by an enriched end-member, possibly fluids that have been released from a subducted slab in an islandarc setting.

Zachariadis et al. (2006) determined the age of the Thessaloniki arc by SHRIMP-II on zircon separates from a dioritic outcrop situated among high-level intrusives. The zircons yielded a concordia age of 169$\pm$1 Ma (MSWD=0.16), which has been interpreted as the crystallisation age of the diorite. The age obtained for the Thessaloniki ophiolite is concordant with the ages of the Guevguely and Chalkidiki ophiolites suggesting that there was an active subuction zone and spreading followed by mafic magmatism in this area that led to the genesis of these ophiolites.

To summarise, the Thessaloniki ophiolite has geochemical characteristics of supra-subduction zone magmatism. The importance of this newly-established Mesozoic arc is that it marks the existence of a subduction zone in the eastern part of the Vardar zone at its border with the Serbomacedonian massif.

**Literature**

P. Zachariadis, T. Reischmann, D. Kostopoulos. U–Pb ion-microprobe zircon dating of subduction-related magmatism from northern Greece: The ages of the Guevgueli, Thessaloniki and Chalkidiki igneous complexes. Geophysical Research Abstracts, Vol. 8, 05560, 2006.