Geochemistry and tectonic setting of mafic rocks from the Othris Ophiolite, Greece

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The Othris Ophiolite in central Greece is a remnant of the Jurassic Neotethys Ocean, which existed between Eurasia and Gondwanaland. The mantle section of the Othris Ophiolite shows evidence for both mid-ocean ridge and supra-subduction zone tectonic settings (Barth *et al*., 2007). In this study geochemical analyses of minerals and whole rocks are presented for a suite of mafic rocks from the crustal section of the Othris Ophiolite. The mafic rocks form three chemically distinct groups.

Group 1 is characterized by NMORB-type basalt and basaltic andesite with Na- and Ti-rich clinopyroxenes. These rocks show mild LREE depletion and no HFSE anomalies, consistent with moderate degrees (~15%) of anhydrous partial melting of depleted mantle followed by 30-50% crystal fractionation.

Group 2 is represented by EMORB-type basalt with clinopyroxenes with higher Ti contents than Group 1 basalts. Group 2 basalts also have higher concentrations of incompatible trace elements with slightly lower HREE contents than Group 1 basalts. These chemical features can be explained by ~10% partial melting of an enriched mantle source.

Group 3 includes high MgO cumulates with Na- and Ti-poor clinopyroxene, forsteritic olivine, and Cr-rich spinel. The cumulates show strong depletion of HFSE, low HREE contents, and LREE enrichments. These rocks may have formed by olivine accumulation from boninitic magmas.

The petrogenesis of the Group 1 basalts is in excellent agreement with the melting conditions inferred from the MOR-type peridotites in Othris. Furthermore, the inferred parental magmas of the Group 3 cumulates are broadly complementary to the SSZ-type peridotites found in Othris. These results suggest that the crustal section may be genetically related to the mantle section.

In the Othris Ophiolite mafic rocks recording magmatic processes characteristic both of mid-ocean ridges and subduction zones occur within close spatial association. These observations are consistent with the formation of the Othris Ophiolite by intra-oceanic thrusting and forced subduction initiation at (or near) a mid-ocean ridge.

References

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Nd model ages (T_{DM}) as an indicator of West Gondwanan suture in southeastern South America

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Available Nd (T_{dm}) ages for a roughly W–E transect across the units observed on both sides of the South Atlantic Ocean shows a conspicuous decrease in model ages eastwards; with the Damara Belt displaying the youngest values. There is a concentration of model ages around 2.0 Ga for the Supracrustal Schist Belt of the Dom Feliciano Belt, whereas for the Eastern Granite Belt the average falls to 1.3–1.6 Ga. For the Damara Belt (mainly its granitoids), the average also falls in the 1.3–1.6 Ga interval (McDermott and Hawkesworth 1990; Jung *et al* 1998). This similarity, which may represent an affinity of the source areas for the Eastern Granite Belt and the African portion, can be explained by the participation of similar sources in the generation of these materials. Therefore, the isotopic differences between the Eastern Granite Belt and those further west, strengthen suggestions that the Major Gercino–Sierra Ballena lineament should be viewed as a Neoproterozoic Lithospheric suture (Basei *et al.* 2005). These results highlight the differences in the detrital zircon signatures across a proposed West Gondwanan suture, with those in the west being derived from distinctive South American basement sources and those in the east from distinctive African sources. An important gravimetric anomaly along the MGSB lineament also supports this interpretation (Hallinan and Mantovani 1993).

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