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Petrogenesis and tectonic setting of the Oraeokastro Ophiolite, N. Greece: Petrological, geochemical and isotopic constraints

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The Vardar Zone in northern Greece has long been regarded as a major oceanic suture between the Serbo-Macedonian Massif to the east and the Pelagonian Zone to the west. The eastern border of the Vardar Zone is characterised by the existence of dispersed ophiolitic outcrops aligned in NNW-SSE direction. These ophiolitic bodies, known as the Innermost Hellenic Ophiolite Belt, include the Guevguely, Oraeokastro and Chalkidiki complexes. Here we present petrological, geochemical and isotopic data on the Oraeokastro ophiolite.

The Oraeokastro ophiolite fits well with the 1972 Penrose conference ophiolite definition. It is composed of pillow lavas, dykes, upper level gabbros and trondhjemites, gabbroic cumulates, dunite and tectonite harzburgite. Hydrothermal alteration caused the formation of epidotite (Ep) and epidosite (Ep+Qtz) veins and produced the mineral assemblage Ep+Chl+Act+Ab$\pm$Qtz. Primary minerals found are augite ($En_{52}Fs_8Wo_{40}$) and scarce relics of plagioclase. Crystallisation temperatures and pressures calculated using single-pyroxene thermobarometry for augites from dykes and lavas range between 1095$\pm$22ºC and 1130$\pm$22ºC and from 1.9$\pm$0.6 to around 3.3$\pm$1.4kb re-

spectively. The rocks of the extrusive-hypabyssal sequence can be divided into two groups, a high-TiO_2 group and a lowTiO_2group. The high-TiO_2 group seems to be more influenced by the alteration than the gabbros and the low-TiO_2 group. Based on immobile trace elements the samples are mostly classified as basalts with a few basaltic andesites. Multi-element diagrams, normalised to N-MORB, show contrasting patterns for the two groups. The low-TiO_2 groupis quite enriched in large-ion lithophile (LILE), depleted in high-field-strength elements (HFSE) and has a negative Nb anomaly. By contrast, the high-TiO_2 group shows a less pronounced enrichment in LILE and nearly sub-horizontal patterns, but nevertheless negative Nb anomalies. Enrichment in Th is observed in both groups, interpreted as the effect of fluids released from a downgoing slab in a subduction zone. Rare-earth element (REE) systematics shows depletion in light REE relative to heavy REE and distinct Eu anomalies for all samples. The low-TiO_2 group rocks are relatively more depleted in the total REE content than the highTiO_2 group rocks. Samples from both groups have negative Eu anomalies suggesting plagioclase fractionation in the source. $\varepsilon_{Nd(init)}$ values range between 5.23 and 6.7, whereas $^{87}Sr/^{86}Sr$ ratios range between 0.70669 and 0.70342.

Tectonomagmatic discrimination diagrams classify the extrusive rocks as island-arc tholeiites (IAT), mid-ocean ridge basalts (MORB) and/or back-arc basin basalts (BABB); transitional magma types among these groups also exist. The coexistence of the two TiO_2 magmatic groups can best be explained by invoking their formation in a back-arc basin environment.

Literature

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