

THE JURASSIC ASSOCIATION OF BACKARC BASIN OPHIOLITES AND CALC-ALKALINE VOLCANICS IN THE GUEVGUELI COMPLEX (NORTHERN GREECE): IMPLICATION FOR THE EVOLUTION OF THE VARDAR ZONE

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ABSTRACT

The Middle-Late Jurassic Guevgueli Complex (Greek Macedonia) represents one of the main ophiolitic complexes of the Vardar Zone and has been subdivided into two distinct sub-units, that are the East and West Guevgueli, both including intrusive and volcanic sequences crosscut by several dykes. The Guevgueli Complex is intruded by the Fanos Granite and, together with this, is sandwiched, through a north-south striking thrust zone, between the Serbo-Macedonian Massif, to the east, and the Paikon Unit, to the west. Intrusive rocks are represented mainly by gabbros showing both cumulitic and isotropic textures and very subordinate ultramafic cumulates, Fe-gabbros, and diorites. Mineralogically and chemically, they are very similar to high-Ti, mid-ocean ridge-type gabbros, having high contents of Ti and V, and very low contents of incompatible elements. However, many isotropic gabbros show some subduction-related imprinting testified by Nb, Zr, and Ti relative depletion and light rare element (LREE) enrichment with respect to heavy rare earth elements (HREE). Incompatible elements and rare earth elements analyses carried out on volcanic, and subvolcanic rocks from both East and West Guevgueli indicate that two different rock-types can be identified within the volcanic sequences. They are: (1) calc-alkaline (CAB) rocks ranging from basalt to basaltic andesite, andesite, dacite, and rhyolite represented by lavas and dykes; (2) back-arc basin basalts (BABB) occurring as pillow lavas, as well as dykes crosscutting High-Ti gabbros and CAB volcanic series. CAB rocks show marked depletion in Nb, Ta Ti and enrichment in LREE and Th, which point out for their generation in a volcanic arc setting that can be most likely correlated with the development of the Paikon volcanic arc onto the Serbo-Macedonian continental realm. BABB rocks show many similarities with mid-ocean ridge basalts (MORB), such as marked Fe, Ti, V enrichment from less fractionated to fairly fractionated rocks, relatively high Ti, P, Y contents, and significant Nb depletion. However, they show higher Th/Ta and LREE/HREE ratios compared with MORBs. Such characteristics are commonly interpreted as a typical supra-subduction zone chemical imprinting, which can be correlated with the injection of a MORB-type mantle source into the sub-arc mantle wedge. In addition, BABB volcanic and subvolcanic rocks display co-magmatic relationships with the associated gabbros. So, the Guevgueli ophiolites can be regarded as representative of an ensialic back-arc basin located between the Paikon Volcanic arc and the continental margin of the Serbo-Macedonian Massif. In this framework, the close association in the Guevgueli Complex of coeval oceanic and continental arc magmatic rocks can be explained as the result of the opening of the back-arc basin mainly controlled by transtension leading to complex geometry of boundaries between the volcanic arc and the oceanic basin.