TECTONO-MAGMATIC SIGNIFICANCE OF TRIASSIC MORBS FROM THE ARGOLIS PENINSULA (GREECE): IMPLICATION FOR THE ORIGIN OF THE PINDOS OCEAN°

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ABSTRACT

The Triassic age for the beginning of spreading of the Neo-Tethyan-Pindos Ocean, although proposed by some authors, is poorly constrained because it is generally based on limited data on Triassic radiolarites, which are tentatively associated with volcanic rocks represented by basaltic sequences mainly showing within-plate (alkaline) affinity or, subordinately, ranging from transitional WPB to transitional MORB compositions.

The Middle Unit of the central-northern Argolis (eastern Peloponnesus, Greece) consists of a composite tectonic association of various types of thrust sheets, some of which include coherent sequences of basalts topped by radiolarian cherts previously attributed to the Middle-Late Jurassic (Baumgartner, 1985). However, recent biostratigraphic data (Bortolotti et al., 2001) indicate that several thrust sheets are Middle-Late Triassic in age.

The Jurassic volcanics are represented by MOR basalts. By contrast, the nature of the Triassic basalts is still unknown, and may provide important constraints on the early phases of oceanic development of the Pindos basin.

Petrological studies have been performed on basalts sampled from seven selected sections (where clear stratigraphic relationships between volcanics and Triassic radiolarian cherts were observed), and indicate that they originated in a mid-ocean ridge setting. On the basis of immobile trace elements, two chemically distinct groups of Triassic lavas can be recognized. One group is represented by transitional-type MORBs displaying moderate LREE enrichment, and incompatible elements abundance very similar to those observed in present-day T-MORBs. The other group exhibit a range of characteristics typical of many normal-type MORBs, that is, variable LREE depletion, and flat N-MORB normalized patterns of incompatible elements. Moreover, many geochemical characteristics indicate that the different N-MORB type volcanic sequences originated from chemically heterogeneous mantle sources. Analogously to similar basalts from ophiolitic mélanges of the Dinaride-Hellenide belt, the T-MORBs from the Argolis Middle Unit are interpreted as having originated from a primitive mantle source variably enriched by an OIB-type component. By contrast, the occurrence of N-MORBs implies that, during the Middle-Late Triassic, the oceanic spreading of the Pindos basin had already reached a quasi-steady state involving only sub-oceanic mantle sources and their partial melt derivations.

Triassic MORBs from the Middle Unit of the central-northern Argolis Peninsula represent the oldest unequivocally dated oceanic crust in the Hellenide sector of the Pindos basin. Moreover, the occurrence of Triassic N-MORBs testifies that, at least in some sectors of the Pindos basin, the oceanization was already fully developed in the Middle?-Late Triassic.

In the light of the new data presented herein, a model for the evolution of the Pindos oceanic basin in the south Hellenide belt can be summarized as follows. From the Early Triassic, extensional tectonics induced continental rifting between the future Apulia and Pelagonia microplates. The eruption of chemically enriched alkaline basalts associated to the rifting indicates that an OIB-type mantle plume had active since the Early Triassic. Starting from the Middle Triassic, the continuous extension produced the generation of the early oceanic crust of the Pindos Ocean. The interaction between the uprising asthenosphere and the OIB-type plume resulted in the production of transitional-type MORBs. At this stage, enriched alkaline basalts may have been erupted either onto the passive continental realms or in oceanic islands. In addition, N-MORBs with primitive asthenospheric geochemical characteristics were produced starting from the Middle?-Late Triassic. The contemporaneous occurrence during the Middle?-Late Triassic of both T- and N-MORBs, as well as alkaline basalts, can be explained by both along-strike and off-axis chemical variations in the magmatic activities of the Pindos basin.

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PETROLOGY OF THE KURANCALI PHLOGOPITIC METAGABBRO: AN ISLAND ARC-TYPE OPHIOLITIC SLIVER IN THE CENTRAL ANATOLIAN CRYSTALLINE COMPLEX

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ABSTRACT

In the Central Anatolian Crystalline Complex (CACC), besides the ophiolitic bodies with more or less recognisable sequence and preserved magmatic pseudostratigraphy, there are many massive and layered gabbroic masses occurring as isolated outcrops. Most of these mafic rocks were interpreted as dismembered parts of an allochthonous ophiolitic assemblage (Yaliniz et al, 2000), derived from the northerly located Izmir-Ankara branch of the Alpine Neotethys. An overall supra-subduction zone genesis has been envisaged for the Central Anatolian Ocean (CAO). However, remarkable differences in the geochemical characteristics of different isolated outcrops suggest differences in the source areas and tectonic settings within the intra-oceanic subduction zone. One of these gabbro units, the Kurancali Metagabbro, occurs as an isolated body in the central part of CACC. It is thrust along a steep south vergent thrust-plane onto the uppermost units of the Central Anatolian Metamorphics (CAM). The main body of the Kurancali Metagabbro is characterised by a distinct compositional layering. The layered gabbros are represented by pyroxene and hornblende gabbros. Phlogopite-rich plagioclase-hornblende gabbro occurs mainly as pegmatitic dikes intruding the layered gabbro sequence. The layered gabbros in general consist mainly of diopsidic augites, brown hornblendes, plagioclase. Secondary phases are phlogopitic mica, brownish green hornblende replacing clinopyroxenes, and fibrous greenish actinolitic hornblende partially or completely replacing brown hornblende. The primary dark micas display phlogopitic composition within the range of annite$_{30.13\text{-}42.60}$ and plogopite$_{69.9\text{-}57.4}$ The analysed pyroxenes are diopsidic ($En_{32.3}Fs_{18.5}Wo_{49.1}$ - $En_{34.9}Fs_{17.9}Wo_{48.2}$). The whole-rock geochemistry of the gabbros indicates the presence of two distinct groups of rocks; a subordinate group of phlogopite gabbro with island arc calc-alkaline affinity and a dominating layered gabbro sequence with island arc tholeiite characteristics. They are extremely enriched in LIL elements, indicative of an alkaline metasomatism in the source region and they display geochemical features of transitional back arc basin basalts (BABB)/island arc basalts (IAB)- and IAB-type oceanic crust. Based on their geochemical similarities with modern island arc basements, we suggest that the Kurankali Metagabbro may represent the basement of an initial island arc, generated in a supra-subduction zone setting within the Izmir-Ankara branch of Neotethys.

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