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.

REFERENCES

Baumgartner P.O., 1985. Jurassic sedimentary evolution and nappe emplacement in the Argolis Peninsula (Peloponnesus, Greece). Mém. Soc. Helv. Sci. Natur., 99: 1-111.

Bortolotti V., Carras N., Chiari M., Fazzuoli M., Marcucci M., Photiades A. and Principi G., 2002. Geological frame of the Argolis Peninsula: Paleogeographic and geodynamic implications. Ofioliti, 27 (1), this volume.

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