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Mantle sources and magma genesis in the Albanide-Hellenide ophiolites: Implications for the Triassic-Jurassic geodynamic evolution of the Eastern Tethyan branch

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The Albanide-Hellenide ophiolites and related ophiolitic mélanges include eight different types of volcanic and subvolcanic rocks. They are: 1) Triassic alkaline rocks generated in within-plate settings (WPB); 2) Triassic high-Ti mid-ocean ridge basalts showing enriched compositions (E-MORB); 3) Triassic-Jurassic high-Ti mid-ocean ridge basalts showing normal compositions (N-MORB); 4) Jurassic basalts with geochemical features intermediate between MORB and island arc tholeiites; hereafter defined as medium-Ti basalts (MTB); 5) Jurassic low-Ti, island arc tholeiitic (IAT) rocks; 6) Jurassic very low-Ti (boninitic) rocks; 7) Jurassic backarc basin basalts and basaltic andesites (BABB); 8) Triassic and Jurassic calc-alkaline (CAB).

It can be assumed that these different rock-types have formed from distinct mantle sources that are associated in turn to distinct tectonic settings within an oceanic environment (and surrounding areas), and that they record the fundamental stages of ocean basin development: continental break-up, sea-floor spreading, subduction initiation, and supra-subduction zone (SSZ) lithospheric accretion. The main aim of this work is therefore to identify the possible petrogenetic mechanisms (associated to mantle evolution) for the distinct lava groups and their related tectonic settings of formation, in order to propose a reconstruction of the geodynamic evolution of the Mesozoic Tethys in the Dinaride sector.

The results of this study are mainly based on REE modelling of mantle sources, primary melt generation, and mantle residua and can be synthesised as follows:

1) From the Late Paleozoic - Early Triassic, extensional tectonics affecting the Gondwana trigged the rifting of the continental lithosphere. The associated magmatic activity included: (a) the formation of calc-alkaline rocks from a sub-continental mantle modified by geochemical components inherited from Hercynian subduction below Gondwana; (b) the eruption of alkaline basalts deriving from an OIB-type mantle source associated, in turn, with plume-type components.

2) During Mid-Late Triassic, the uprising of primitive asthenosphere led to the generation of the Tethyan oceanic lithosphere. This stage is associated with the formation of: (a) N-MORB magmatism derived from ~10-20% partial melting of primitive asthenosphere; (b) the persistence of alkaline WPBs; (c) generation of E-MORBs due to ~12% partial melting of primitive asthenosphere influenced by the OIB-type component. Residual MORB mantle is represented by depleted lherzolites.

3) During the Early Jurassic, the oceanic spreading involved only primitive asthenospheric mantle sources and their partial melt derivatives (N-MORBs).

4) From the Early-Mid Jurassic, the tectonic regime was dominated by intra-oceanic convergence associated with the development of MTB and IAT magmatisms, which derived respectively from ~10% and 10-20% partial melting of the MORB residual mantle with variable addition of subduction components. Afterwards, the progressive slab roll-back led to mantle diapirism toward the forearc and incipient arc spreading associated either with 10-20% partial melting of previously depleted mantle sources (harzburgites) or with ~30% partial melting of the MORB residual mantle (depleted lherzolites), both enriched in LREE by subduction-derived fluids. These partial-melting events produced the boninitic magmas in both forearc and inner arc and left depleted extremely depleted harzburgites and dunites as the residual mantle.

5) During the Late Jurassic, a magmatic arc developed onto the Eurasia continental realm, leading to the forma-

tion of CAB rocks by $\sim$15-20% partial melting of depleted peridotite mantle significantly enriched in Th and LREE by subduction-derived fluids. Soon after, extension in the backarc region (most likely favoured by strike-slip tectonics) led to the uprising of primitive asthenosphere, which was enriched in Th and LREE by the nearby subduction. 10-20% partial melting of this source produced the BABBs, which crop out (with CAB intercalations) in the Guevgueli Complex.