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Mesozoic-Cenozoic tectonics and Tethyan evolution of the western Balkan Peninsula: an ophiolite perspective

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Tethyan ophiolites represent the remnants of heterogeneous oceanic crust developed in protoarc-forearc settings during the closing stages of restricted ocean basins within a larger Tethyan realm situated between Eurasia and Gondwana. The geodynamic evolution of these ophiolites was strongly controlled by subduction zone tectonics, slab rollback, and the relative motions of the bounding continental fragments. Arcuate ophiolite belts extending from the Balkan Peninsula through Anatolia to the Zagros Mountains in Iran and containing coeval or disparate ophiolite occurrences delineate the relics of separate marginal basins evolved between a series of Gondwana-derived ribbon continents, rather than representing far-traveled nappe sheets with a single oceanic root zone. Our work in the Western Hellenic (Greece) and Mirdita (Albania) ophiolites suggests that these Middle Jurassic ophiolites developed within a Triassic-Jurassic basin that had evolved between Apulia (west) and Pelagonia (east) after dismantling of the northern edge of Western Gondwana. Triassic N-MORB to T-MORB basaltic rocks associated with hemipelagic-pelagic rocks in the Dinaride-Albanide-Hellenide orogenic belt represent the initial continental rifting to oldest seafloor spreading related magmatism in this basin (Pindos-Mirdita basin). The collapse of the Pindos-Mirdita basin along a west-dipping intra-oceanic subduction zone and ensuing rapid slab retreat produced an anomalous oceanic crust showing MORB to IAT to boninitic progression of magmatism, which was increasingly affected by the subduction of oceanic sediments that played a major role in mantle enrichment. Thus, the Western (i.e. Püke) and Eastern (i.e. Lure-Kukes) ophiolites in the Mirdita zone and the Pindos and Vourinos ophiolites farther south formed nearly contempo-

raneously, as subduction zone magmatism and tectonic extension kept pace with the eastward retreat of the slab that was operating faster than the convergence rates in the closing basin. Magnetic anomaly data from these ophiolite zones show the existence of a mafic-ultramafic slab that has a deep root ($>$10 km) beneath the Vourinos and the Eastern Mirdita ophiolites, and that continues underneath the Mesohellenic Trough and its continuation to the north (Korçe, Mokrë-Librazhd basins). This geophysical feature alone indicates that the Western Hellenic and Mirdita ophiolites are relatively in-situ in their tectonic position between the Apulian and Pelagonian continents, instead of representing allochthonous nappe sheets derived from the Vardar Zone to the east of Pelagonia. The bidivergent emplacement of these ophiolites onto the bounding continental margins was facilitated first by the collision of Pelagonia with the trench-subduction zone system in the east during the Middle-Late Jurassic, and then by the oblique underplating of Apulia (Adria) beneath Eurasia in the west during the Early Paleogene. Therefore, the collisional processes that affected the ophiolite emplacement and continental deformation in the Balkan Peninsula propagated from east to west in space and time throughout the late Mesozoic – early Cenozoic. The Mesohellenic Trough and its discontinuous counterparts in Albania evolved first as a remnant ocean basin (flysch stage) during the culmination of these orogenic phases until the Middle-Late Eocene, and then as a terrestrial basin (molasse stage) affected mainly by dextral transpressional deformation until the Early-Middle Miocene. These sedimentary basins underwent transtensional deformation and extension during the Late Miocene-Quaternary as the Dinaride-Albanide-Hellenide orogenic belt started collapsing in the hinterland of the broad zone of oblique convergence between Adria (Apulia) and Eurasia. The Jurassic ophiolites and the supra-ophiolitic tectonic units in the Balkan Peninsula thus present an excellent, continuous record of the Mesozoic-Cenozoic tectonic evolution of Tethys in this region.