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Compositions & Melt Evolution of Upper Mantle Peridotites in the Tethyan Ophiolites

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The Jurassic–Cretaceous ophiolites in the Alpine–Himalayan orogenic belt represent fragments of oceanic lithosphere, developed in different seaways separated by Gondwana–derived ribbon continents within a broad Neotethyan realm. These ophiolites display structural, geochemical and petrological evidence for magmatic-metamorphic events and tectonic processes associated with the construction and consumption of Neotethyan ocean basins from their rift–drift and seafloor spreading to subduction initiation and final closure stages. Magmatism during each of these phases produced ultramafic to mafic and evolved rock assemblages with distinct internal structures, geochemical affinities, and age ranges, depending on their original tectonic setting of formation. The upper mantle sequences in the Neotethyan ophiolites are excellent archives of the melt evolution of ophiolitic magmas via different episodes of melting and melt extraction events, and hence variable degrees of depletion, and through fluid/melt – rock interaction events that caused re-enrichment and fertilization of the peridotites. We have examined the upper mantle sequences of Neotethyan ophiolites in the Ligurian (Italy), Anatolide (Turkey), Zagros (Iran), SE Arabian (Oman), and South Tibetan (China) orogenic belts, and their melt evolution based on the whole-rock major and trace element geochemistry and mineral chemistry data. With the exception of the mantle rocks in the Ligurian ophiolites, the peridotites in the other ophiolites indicate a multi-stage melt evolution history that involved both MOR and SSZ tectonic settings. Combined with the structural and geochemical data from their crustal derivatives, our modeling of the melt evolution of the studied upper mantle peridotites indicates that the Neotethyan ophiolites formed in marginal basins, whose MOR to SSZ magmatic construction was terminated by partial subduction of trailing continental margins in downgoing oceanic slabs, followed by ophiolite emplacement.

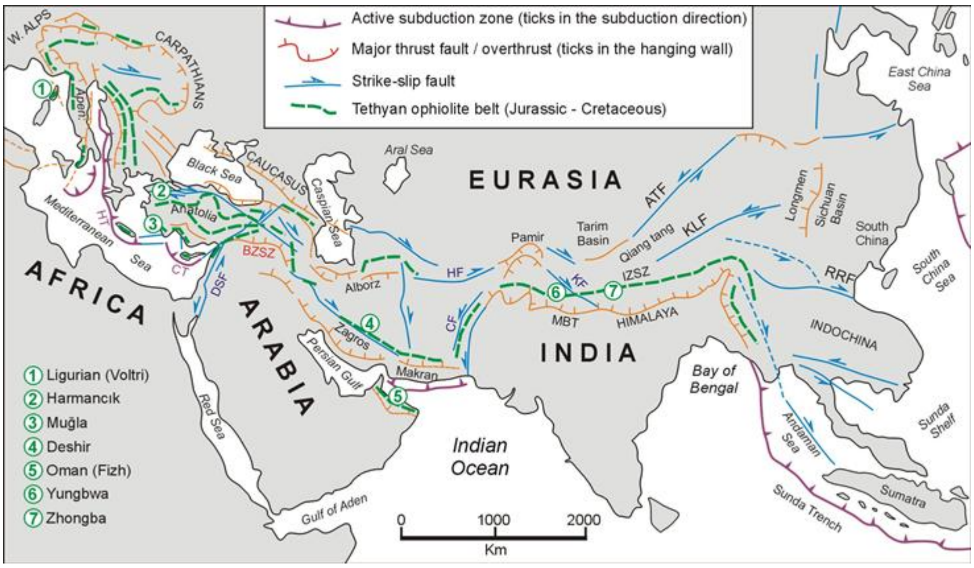

Fig.1 Dilek *et al.* (Lithosphere 2016)

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