Geophysical Research Abstracts,
Vol. 11, EGU2009-10708, 2009
EGU General Assembly 2009

Tectonic Evolution of Tethyan Ophiolites and Backarc Basins in Subduction Rollback Systems in the Eastern Mediterranean Region

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The late Mesozoic-Cenozoic evolution of the Eastern Mediterranean region was controlled by a series of collisions between Gondwana-derived continental blocks and Eurasia as the intervening ocean basins closed. Rifting of these 'ribbon continents' from the northern edge of Gondwana occurred within a broadly convergent Tethyan realm and was mostly driven by slab-pull generated far-field stresses. Continued subduction of the Paleo-Tethyan ocean floor northward beneath Eurasia was responsible for both these continental rifting events in its trailing edge and rapid backarc extension in the leading edge of Eurasia in the upper plate. Collapse of the backarc basins and Neo-Tethys through intra-oceanic subduction and ensuing slab rollback processes produced extended incipient arc–forearc crust nested within the older Tethyan lithosphere. Fragments of these ancient protoarc-forearc lithospheric material constitute most of the Jurassic–Cretaceous suprasubduction zone (SSZ) ophiolites along the Tethyan suture zones. Igneous accretion of the SSZ Tethyan ophiolites involved upper plate extension and advanced melting of previously depleted asthenosphere in host basins, showing a progressive evolution from MORB-like to IAT (island arc tholeiite) to boninitic (extremely refractory) proto-arc assemblages. Although all ophiolites exhibit geochemical features indicating increased subduction influence during the melt evolution of their younger extrusive sequences and dike intrusions, as evidenced by their negative Nd values, their overall characteristic trace-element patterns seem to have been strongly affected by the maturity of the subduction systems in which they developed. Emplacement of SSZ ophiolites was facilitated by passive margin–trench collisions, which led into and was followed by partial subduction of continental edges, their high-P metamorphism, continental collisions, slab breakoff, and crustal exhumation and core complex formation. The suture zones between the amalgamated microcontinents are marked by ophiolites, accretionary melanges (including seamounts), and rift assemblages that are commonly telescoped structurally in this descending order. The Tethyan suture zones include, therefore, a variety of tectonostratigraphic units with different geochemical and tectonic affinities, ages, and structural architecture, representing the remnants of collapsed backarc basin and protoarc-forearc oceanic lithosphere, and passive margin units of the bounding microcontinents.