Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05876, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05876
EGU General Assembly 2008

Ophiolite genesis in Tethyan subduction factories of the Mesozoic Eastern Mediterranean region

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Suprasubduction zone (SSZ) ophiolites in orogenic belts represent oceanic crust generation in subduction rollback cycles during the closing stages of basins prior to terminal continental collisions. Mantle flow and slab rollback result in one or more episodes of arc splitting and basin opening, producing a collage of 'proto-arc and forearc oceanic lithosphere' in suprasubduction zone settings. Unusual occurrence of fertile peridotites and high-Mg andesites in forearc oceanic crust is likely to result from the injection of high-temperature asthenospheric material into the mantle wedge in these rollback cycles. The Jurassic – Cretaceous SSZ Tethyan ophiolites in the eastern Mediterranean region (i.e. Mirdita, Pindos, Troodos, Kizildag, Oman) generally have Penrose-type oceanic crust and contain well-developed sheeted dike complexes indicative of magmatic extension beneath narrow rift zones during their seafloor spreading evolution. Igneous accretion of these 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. However, there are some distinct differences in the geochemical evolution of these Tethyan ophiolites that appear to have resulted from variations in their subduction zone geodynamics. Whereas a major part of the Kizildag and Troodos lavas show island arc affinity similar to their counterparts in the Pindos and Mirdita ophiolites, a significant component of the Oman lavas indicate MORB affinity and the majority of the Kizildag and Oman data plot within the mantle array between N-MORB and E-MORB on the Nb/Yb – Th/Yb

discriminant diagram. Furthermore, the Troodos and Oman lavas do not show any particular Th-enrichment in their multi-element patterns, suggesting that fluid/melt input from subducted sediments was not that significant in generation of their magmas. 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 Epsilon-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. We evaluate different parameters of convergent margin evolution of separate Mesozoic basins within the Tethyan realm in light of the tectonic and geochemical characteristics of these SSZ ophiolites in the eastern Mediterranean region. We then compare our model to the evolution of arc-forearc crust of the Izu-Bonin-Mariana (IBM) system to draw some inferences about oceanic crust formation and related processes in subduction factories with different geodynamic evolutionary paths.