Geophysical Research Abstracts
Vol. 13, EGU2011-13238, 2011
EGU General Assembly 2011

Geochemical and geological evidence for progressive evolution of subduction initiation magmatism in the Neotethyan ophiolites along the Izmir-Ankara-Erzincan suture zone, Turkey

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Ophiolite fragments with MORB-like and island arc tholeiite (IAT) affinities occur as blocks in the Ankara Mélange along the Izmir-Ankara-Erzincan suture zone in north-central Turkey, and provide temporal and geochemical evidence for magmatism associated with subduction initiation and evolution in the Northern Neotethys. These ophiolitic blocks and the serpentinite and/or greywacke matrix of the mélange are deformed and imbricated along generally south-directed thrust sheets as a result of the north-dipping subduction polarity and the continental collision tectonics in the early Paleogene. Plagiogranite dikes intruding the SSZ gabbros have revealed U/Pb zircon ages of $\sim$179 Ma; epi-ophiolitic pelitic rocks resting directly on various ophiolitic units, on the other hand, contain zircons with ages around 130 Ma. Upper Cretaceous flyschal deposits unconformably cover imbricate thrust sheets of the SSZ-type ophiolite and the ophiolitic mélange containing MORB-like ophiolitic slabs and seamount fragments. SSZ-type ophiolite blocks include upper mantle peridotites, cumulate to massive gabbros, sheeted diabase dykes, plagiogranite veins and stocks, and basalt-chert-radiolarite. MORB-like ophiolitic blocks mainly contain upper mantle peridotites, massive gabbros, basaltic lavas, and chert-radiolarite. The TiO2 contents of the SSZ-type, diabasic dykes and basaltic lavas are between 0.2 – 0.93 wt.%, whereas those of the MORB-like basalts range between 0.85 – 5.05 wt.%. The Nb contents of the SSZ-type diabasic dykes and basaltic lavas range between 0.1 – 2.5 ppm and of the MORB-like lavas between 3.7 – 5.4 ppm. SSZ-type basic rocks have Th/Yb ratios of 0.1 – 1 whereas the MORB-like basic rocks show Th/Yb values ranging from 0.01 to 0.3, suggesting enrichment by slab-derived fluids. The low TiO2 and Nb values, combined with higher Th/Yb rations, indicate an IAT affinity of the SSZ rock suites in comparison to the tholeiitic features of the MORB-like suites. Based on the biostratigraphic and radiometric age relations and data we infer that the MORB-type oceanic lithosphere formed in early Triassic – late Cretaceous time between Pontides (north) and Anatolide–Tauride (south) continental blocks. The SSZ-type oceanic crust and seamounts evolved in and across this pre-existing MORB-like oceanic lithosphere throughout the Liassic and Cretaecous.