

A GEOCHEMICAL ATTEMPT TO DISTINGUISH FOREARC AND BACK ARC OPHIOLITES FROM THE “SUPRA-SUBDUCTION” CENTRAL ANATOLIAN OPHIOLITES (TURKEY) BY COMPARISON WITH MODERN OCEANIC ANALOGUES

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ABSTRACT

The Central Anatolian Ophiolite (CAO) includes oceanic crust and mantle fragments and contains all the components of a typical ophiolitic sequence: metamorphic tectonites, cumulates, isotropic gabbros, plagiogranites, dolerite sheeted dykes, basaltic lavas and sedimentary cover. They are found as dismembered but partially preserved allochthonous bodies in the Central Anatolian Crystalline Complex (CACC) representing the metamorphosed passive northern edge of the Tauride-Anatolide Platform (TAP), central Turkey. Geochemically, the magmatic rock units of the CAO display part of a dominant co-magmatic differentiated series of island-arc tholeiites (IAT). In addition, IAT are overlain by a subordinate group of boninite-like basalts which are chemically and mineralogically intermediate between IAT and more depleted boninites. The variations in lava chemistry of the CAO reflect eruption of progressively more depleted magmas through time and point to diverse mantle source compositions and partial melting.

Detailed chemical analyses of the magmatic units of the CAO revealed typical supra-subduction zone (SSZ) features with depleted high field strength elements (HFSE) and light rare earth elements (LREE: $La_N/Yb_N < 1$) and enriched large-ion lithophile elements relative to normal mid-oceanic ridge (N-MORB) and back-arc basin basalts (BABB). In this respect the CAO is similar to oceanic crust generated in the Izu-Bonin and Mariana fore arcs. A N-MOR or BAB spreading seems unlikely. However, progressive depletion in the lava sequence and absence of calc-alkali basalts and their differentiates indicate that the CAO formed at an initial stage of subduction from previously depleted MORB mantle (DMM) and oceanic lithosphere, prior to development of any island arc within the Vardar-İzmir-Ankara-Erzincan (VIAE) ocean segment of Neotethys. Accordingly, a forearc setting proposed for the genesis of the CAO is inappropriate and misleading. It was generated above a short-lived north-dipping nascent intra-oceanic subduction zone during early-middle Turonian-early Santonian, then, it was rapidly emplaced southwards onto the CACC, soon after formation between post-early Santonian and pre-middle Campanian.