



Late Cretaceous infant intra-oceanic arc volcanism, the Central Pontides, Turkey

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Low-grade bimodal metavolcanic rocks overlain by recrystallized micritic limestone with volcanogenic metasediments are exposed along the central part of the İzmir-Ankara-Erzincan suture separating Laurasia from Gondwana-derived terranes. Metavolcanic rocks mainly consist of rhyolite and basaltic andesite with pyroclastic equivalents that are interbedded with pelagic limestone and chert. Two groups can be identified based on rare and trace element characteristics. The first group consists of basaltic andesite/andesite and rhyolite with abundant cognate gabbroic xenoliths. It is characterized by relative enrichment of LREE with respect to HREE. The rocks are enriched in fluid mobile LILE, and strongly depleted in Ti and P reflecting fractionation of Fe-Ti oxides and apatite, which are found in the mafic cognate xenoliths. We infer that this group is cogenetic and felsic rocks are derived from a common mafic parental magma. The second group consists only of basaltic andesites with flat REE pattern resembling island arc tholeiites. Although enriched in LILE, this group is not depleted in Ti or P.

Geochemistry of the bimodal volcanic rocks indicates supra-subduction volcanism. The tectonic setting and absence of continent derived detritus in the arc sequence suggest an intra-oceanic setting. Zircons from two metarhyolite samples give 93.8 ± 1.9 and 94.4 ± 1.9 Ma U/Pb ages, respectively. Low-grade regional metamorphism is constrained to 69.86 ± 0.4 Ma by $^{40}\text{Ar}/^{39}\text{Ar}$ dating on metamorphic muscovite.

The zircon age data shows that the intra-oceanic arc is coeval with the ophiolite obduction in NW Turkey, Armenia and Oman suggesting that it formed during an initial subduction leading to the regional ophiolite obduction. Reduced thickness of the arc sequence and its short age span depicts the infancy of the arc. Non-collisional cessation of the young volcanism was probably associated with southward migration of the arc volcanism as in the Izu-Bonin-Mariana arc system.