The petrogenesis of Early Eocene non-adakitic volcanism in NE Turkey: Constraints on the geodynamic evaluation

E. AYDıNÇAKIR[1*]

[1]Dept Geol Engn., Gümüşhane Univ.,TR-29100 Gümüşhane, Turkey (*correspondence:aydincakir61@gmail.com)

Whole-rock geochemistry, mineral chemistry, the ^{40}Ar-^{39}Ar age, and Sr-Nd isotopic data are presented for the Early Eocene non-adakitic volcanic rocks on the eastern corner of the Eastern Pontides orogenic belt (NE Turkey). The tectonic setting of the Eastern Pontides during the Late Mesozoic to Early Cenozoic remains a topic of debate. Here, for the first time, we describe the Early Eocene non-adakitic volcanic rocks from the Eastern Pontides [1].

These rocks contain plagioclase, hornblende phenocrysts, and magnetite / titanomagnetite and apatite microphenocrysts. Geochronology studies based on the ^{40}Ar-^{39}Ar ratio of the amphibole separates reveal that the non-adakitic porphyritic volcanic rocks have a crystallization age of 50.04 ± 0.10 to 50.47 ± 0.22 Ma (Ypresian). The volcanic rocks show tholeiitic to calc-alkaline affinities and have low-to-medium K contents. They are also enriched in large ion lithophile elements (LILE), light rare earth elements (LREE), and depleted in high field strength elements (HFSE), with a no negative Eu anomaly (Eun/Eu* = 1.03–1.08) in mantle-normalized trace element spidergrams. The samples (La_{cn}/Lu_{cn}=2.60-4.28) show low-to-medium enrichment in LREEs relative to HREEs, in chondrite-normalized REE patterns indicating similar sources for the rock suite. These rocks display a range of I_{Sr} (50 Ma) values from 0.70451 to 0.70485, and ε_{Nd} (50 Ma) 2.9 and 3.7. The main solidification processes involved in the evolution of these volcanics consist of fractional crystallization, with minor amounts of crustal contamination [1].

All of our evidence supports the conclusion that the parental magma of the rocks probably derived from an enriched mantle, previously metasomatized by fluids derived from the subducted slab, in a post-collisional, geodynamic setting.

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