



## **Petrogenesis of the post-collisional Oligo-Miocene Volcanism in NW Anatolia (Turkey): Balıkesir Volcanites**

Alp Ünal (1), Şafak Altunkaynak (1), and Jeff A. Benowitz (2)

(1) İstanbul Technical University, Faculty of Mines, Geological Engineering Dep., İstanbul, Turkey (alp.unal@itu.edu.tr), (2) Geophysical Institute, University of Alaska Fairbanks, PO Box 755940, Fairbanks, AK 99775, USA

In this study, we present whole-rock chemical and Sr-Nd-Pb-O isotopic compositions as well as  $^{40}\text{Ar}/^{39}\text{Ar}$  ages of Balıkesir volcanites to evaluate the nature, genesis and timing of the post-collisional Oligo-Miocene magmatism in NW Anatolia.

Three main volcano-stratigraphic groups distinguished in the Balıkesir volcanites on the basis of field observations and petrographical investigations; 1) andesitic lavas and related pyroclastic units representing the lower part of the volcanic sequence; 2) Trachyandesite- basaltic trachyandesite lavas and 3) dacitic lavas and associated pyroclastic units corresponding to the upper part of the volcanic sequence. Both andesitic and dacitic pyroclastic units are represented with ash fall, ash block flow and flow breccia units.

Geochemically, Balıkesir volcanites are ranging in composition from basaltic trachy-andesite to dacite. They are sub-alkaline in character and show enrichment in large ion lithophile elements (LILE) and light rare earth elements (LREE) relative to the high field strength elements (HFSE). Balıkesir volcanites display depletion in P, Ta, Nb and Ti. All these trace element characteristics and inter-element ratios suggest that magma forming the Balıkesir volcanites show similar patterns to those of subduction-related arc magmas and/or post collisional lavas. They have high initial  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios (0.707109-0.708620), low  $^{143}\text{Nd}/^{144}\text{Nd}$  (0.512322- 0.512493),  $^{206}\text{Pb}/^{204}\text{Pb}$  and  $^{207}\text{Pb}/^{204}\text{Pb}$  values vary from 18.703 to 18.867 and 15.681 to 15.714, respectively and  $\epsilon\text{Nd}$  values range between -5.61 and -2.27.  $^{18}\text{O}$  isotopic ratios range between 8.3 and 11.8. All these isotopic characteristics and major-trace element compositions of Balıkesir volcanites suggest that the lavas are co-genetic and originated from a hybrid magma derived from enriched mantle (EM II) source.

$^{40}\text{Ar}/^{39}\text{Ar}$  dating yielded isochron ages of  $22.9\pm 0.2 - 21.0\pm 0.2$  which is consistent with other volcanic and plutonic associations of western Anatolia (eg. Solarya pluton, Susurluk volcanites) and the adjacent regions. When the petrological evolution and the age of the Balıkesir volcanites evaluated together with the general Cenozoic tectonic history of NW Anatolia, this post-collisional magmatism was most probably the result of partial delamination or convective removal of the base of mantle lithosphere beneath NW Anatolia.