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Petrological and Geodynamic Evolution of Post-Collisional Eocene-Oligocene Magmatic Rocks In The Biga Peninsula, NW Anatolia

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The post-collisional Eocene-Oligocene magmatic activity in the Biga Peninsula (NWAnatolia) started in the Middle Eocene and produced widespread volcano-plutonic complexes. Two main magmatic episodes (Eocene and Oligocene) formed the igneous assemblages in the region. We classified 6 different magmatic units based on their lithostratigraphic and chonorostratigraphic properties, determined by 40Ar/39Ar methods (Eocene-Early Oligocene, 42.08±0.09 to 29.02±0.29 Ma). The Eocene sequence is associated with calc-alkaline composition Laledağ granodiorite, Beyçayır (andesite, dacite) volcanics and alkaline Kızıldam volcanics (basaltic trachyandesite, trachybasalt). Subsequent, Oligocene volcanism results in calc-alkaline Dededağ volcanics (trachydacite to ryholit), Kırcalar volcanics (basalts, basaltic andesites) and calcalkaline/alkaline Harmancık volcanics (basalt to rhyolite). The calcalkaline magmatic suites are in middle, high-K and alkaline suites high-K, shoshonitic chemical composition.

Trace and rare earth elements (REE) diagrams show enrichment in large-ion lithophile elements (LILE), light rare earth elements (LREE) relative to the high field strength elements (HFSE) and a significant increase in heavy rare earth element consumption (HREE). The enrichment of incompatible elements suggests derivation from a metasomatized mantle source, whereas the troughs in Nb and Ta indicate a subduction influence in the mantle melt sources. Mantle-derived magmas partially were modified by AFC/FC processes for all volcanic sequences. Geochemical features and compositional variations of Eocene volcanic group indicate decreasing amounts of partial melting, whereas Oligocene volcanic group indicate the effects of increasing crustal contamination and/or assimilation. However, crustal contamination and/or assimilation was not an important process in the evolution of Eocene-Oligocene alkaline group. The Eocene-Oligocene post-collisional volcanism in Biga Peninsula displays lithospheric mantle source enriched by subduction which controlled by slab break-off and lithospheric delamination.

Keywords: NW Anatolia, post-collisional volcanism, geodynamic evolution, geochronology