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Geochemical, geochronological characterization and tectonic setting of the metamorphic rocks from the Biga Peninsula, NW Turkey

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The Biga Peninsula in the northwest Turkey is one of the world's important natural laboratories to study geochronology due to having complex geology. The Biga Peninsula has different metamorphic basements including Kazdağ Massif, Çamlıca metamorphics, Kemer metamorphics and Karadağ Massif under cover of the Cenozoic volcano-sedimentary association. The Çamlıca metamorphic assemblage are one of the most critical regions for understanding of the geology of northwestern Turkey. The Çamlıca metamorphic association located on the westernmost part of Turkey is mainly composed of the Andıktası formation, the Dedetepe formation and the Salihler formation, from bottom to top.
Metasedimentary rocks of the Çamlıca metamorphics have high SiO_2 and medium $Al2O_3$ and TiO_2 values. The protolith of these metasediments is arkose-subarkose and greywacke. However, whole-rock geochemistry for the HP eclogite/blueschist within the Çamlıca metamorphics suggests that their protolith was basalt with high TiO_2 and K2O-Na2O content and Nb/Y ratios. REE pattern and trace element contents of the HP eclogite/blueschist similar to typical MORB based on tectonic discrimination diagrams. The metavolcanic rocks occurring on the lowest part of the Çamlıca metamorphicassociation has andesitic composition with calc-alkaline character. All metavolcanic rocks in this unit cluster within the volcanic arc field.
Zircon grains from metavolcanic rocks and HP eclogite/blueschists were dated by LA-ICPMS. Zircon ages of two metavolcanic samples yielded 328.6 $\pm$ 3.5 Ma and 343.2 $\pm$ 2.6 Ma, respectively. These ages are interpreted as the time of protolith crystallization of metavolcanic rocks. Moreover, zircon ages from HP eclogite/blueschist yielded 338 $\pm$ 1.8 Ma (Early Carboniferous) which is interpreted as the age of protolith crystallization of HP eclogite/blueschist. Geochemical and isotopic data indicate that Early Carboniferous Variscan ages within the Sakarya Zone may form the eastern continuation of the Armorican terrane assemblage.
HP eclogite/blueschists occur as a tectonic slice within the Çamlıca metamorphics. The host Çamlıca metamorphic rocks record only a single - stage greenschist - facies metamorphism and were juxtaposed with the HP metamorphic rocks along ductile – semi-brittle strike - slip faults after the high degree metamorphism and during or after the low-grade metamorphism of the Çamlıca metamorphics.