

EARLY-MIDDLE DEVONIAN MAGMATISM IN THE SAKARYA ZONE: LOWER CRUSTAL MELTS AT A CONSUMING PLATE MARGIN

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Early-Middle Devonian plutonic rocks are exposed widely in the Biga Peninsula, W Sakarya Zone. These plutons consist of coarse grained, equigranular, hypidiomorphic and rarely foliated monzogranite and granodiorite. Main mineral assemblage of the plutons are composed of quartz, K-feldspar, plagioclase and biotite. Zircon, apatite, monazite, magnetite and sphene occur as accessory phases.

The crystallization ages are 389.1±2.6 Ma for the Yolindi, 401.5±4.8 Ma for the Güveyleyrobasi, 401.4±7.8 Ma Bayatlar, 401.4±3.7 Ma for the Karaaydın, 400.3±1.4 Ma for the Karacabey and 399.6±9.9 Ma for the Balçikhisar stocks according to their zircon U–Pb isotope analyses. The ASI values are between 0.71 – 1.63 and they show I- and S-type character. These plutons are plotted in the high- K-calcalkaline field on the SiO₂ vs. K₂O diagram, and they are enriched in LILEs and LREE and depleted in HFSEs with negative Eu anomalies, indicating that the melts were derived from an enriched mantle modified by crust derived melts. Chondrite-normalised rare earth element spidergrams are indicative of the importance of plagioclase and amphibole fractionation. In tectonic discrimination diagrams, all of the metagranite samples fall into the volcanic arc granite and late post-collisional granite fields. $\epsilon\text{Nd}_{(t)}$ values of Devonian plutons range from -9.1 to -5.3, with corresponding Nd model ages of 1.9 to 1.6 Ga. Devonian aged zircons define a tight cluster of $\epsilon\text{Hf}_{(t)}$ values ranging from -8.5 to -7.1, with corresponding Hf model ages from 1.4–1.5 Ga.

Our new data suggest that these plutons were generated in a subduction-related magmatic arc setting in response to subduction of a Late Palaeozoic ocean. We think that underplated arc magmas triggered melting of lower crustal rocks that gave rise to Early – Middle Devonian plutons in the Sakarya Zone.