The nature of the early Cenozoic alkaline mafic magmatism: Implications for mantle source

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The calcalkaline and alkaline felsic magmatism prevailed during the late Cretaceous-Early Paleogene as a result of the closure of Neotethys Ocean within the Central Anatolia Crystalline Complex (CACC). After formation of felsic magmatism an alkaline mafic magmatism, which have not reported before, is induced during the Paleocene and early Eocene to Çiçekdağ igneous complex (ÇIC). Timing of these alkaline mafic magmatism is very important for understanding the magmato-tectonic evolution of Early Cenozoic magmatisim of CACC. There is lack of petrogenetic explanation about these alkaline mafic products and the relation between Neotethyan ophiolites. ÇIC is the area where these late mafic magmatism is observed within the CACC. In accordance with these purposes, we have carried out detailed petrographic, whole rock geochemical, Sr-Nd-Pb-O isotopic and Ar-Ar geochronological study in order to unravel the nature of these alkaline basaltic dykes and thus constrain the tectonic evolution. The alkaline mafic dykes are intruded into the ophiolitic, calcalkaline and alkaline felsic intrusive rocks of ÇIC. These rocks have relatively flat REE pattern, high $^{87}Sr/^{86}Sr$ (0.705014-0.706215) and $^{143}Nd/^{144}Nd$ (0.512843-0.512979), low $\delta^{18}O$ values (2.6-6.1‰), moderate $^{208}Pb/^{204}Pb$ (38.51-38.91) and $^{207}Pb/^{204}Pb$ (15.54-15.69) and high $^{206}Pb/^{204}Pb$ (18.39-18.73). Trace element ratio diagrams suggest heterogeneous mantle source and subduction enrichment. Dy versus Dy/Yb diagram and calculated partial melting curve suggest 20-25% degree of partial melting of phlogopite bearing spinel lherzolitic mantle sources. As a result of high temperature hydrothermal alteration $\delta^{18}O$ values depleted and the exchange of Sr between rock and seawater raises the $^{87}Sr/^{86}Sr$ values. Ar-Ar dating of whole rock yielded cooling ages of 63.96±0.19-46.48±0.65Ma and calculated isochron ages of 64±14-43.4±4Ma for alkaline basaltic dykes. Alkaline felsic and mafic magmatism are coexistence and close may have coevally been confined from different sources. Alkaline mafic magmatism may derived from melting phlogopite rich veins in the peridotitic mantle.