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Origin of Eocene granitoid magmatism in Northwestern Turkey: evidence from Nd and Sr isotopes, and trace elements

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The post-collisional Eocene plutons in NW Anatolia occur in two E-W-trending subparallel belts within and immediately north of a Tethyan suture zone and consist of subcircular, composite granitoid intrusions. They range in age from 54 to 34 Ma and include diorite, quartz diorite, granodiorite, granite, monzogranite and syenite

Eocene granitic rocks are represented by predominantly metaluminous, I-type granitoids. They have medium to high-K calcalkaline compositions, Nd-Sr isotopic compositions and trace element patterns displayed by granitoids suggest a metasomatized lithospheric mantle source modified by the Late Cretaceous subduction event for their parental melts. Mantle derived melts were modified by crustal contamination, assimilation, and fractional crystallization processes as they migrated through the overlying crust. The Eocene granitic plutons in NW Anatolia mark the onset of post-collisional magmatism in the broader extensional province in the eastern Mediterranean region. The geochemistry, petrogenesis, geochronology and distribution of the Eocene granitoids indicate that the localized Eocene plutonism in NW Anatolia was a result of slab breakoff-induced, post-collisional magmatism, rather than subduction-originated magmatism. Detachment of the Tethyan oceanic lithosphere during and after the collision of the Anatolide-Tauride and Sakarya continental blocks in the Early-Middle Eocene caused asthenospheric upwelling beneath the Izmir-Ankara-Erzincan Suture Zone and the Sakarya Continent that facilitated partial melting of the metasomatized lithospheric mantle. Although the active subduction had already ceased in this region, melts derived from the previously hydrated and metasomatized mantle carried subduction signatures, affecting the chemical compositions of post-collisional magmas.