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Origin of post-collisional magmatism in the Tavsanli Zone, central Turkey: Constraints from geochemistry, geochronology, Nd-Sr and oxygen isotopes

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We investigate mineralogy, geochemistry, stable-radiogenic isotope compositions and radiometric age of granitoids exposing in western part of Tavşanlı zone, Anatolia. The granitoids (namely Yürükçaören, Topkaya, Kaymaz, Sivrihisar, Tekören, Kadıncık, Dinek and Karacaören granodiorites extending from NW to SE) which were intruded into the rocks of Tavşanlı Zone display significant textural and geochemical variations. The Sivrihisar and Dinek alkaline granitoids are of alkaline character whereas all other granitoid masses are of calc-alkaline and sub-alkaline affinity. The compositional spectrum yields strong metaluminous to weak peraluminous (Kaymaz granitoid) melt composition. The intrusive rocks are cut by holocrystalline dykes in aplitic, andesitic, pegmatitic and diabasic compositions. The microgranular mafic enclaves are ellipsoidal-shaped, fine grained and have sharp contacts with their host rocks. Chondrite-normalized trace element distributions of intrusives in the Tavşanlı zone show similar patterns. Large ion lithophile elements (e.g. Rb, K, Sr) are enriched whilst high field strength elements (e.g. Nb, Ti, Hf) are represented by depletion trends. Depletion of Ba, Nb, P and Ti elements is the evidence of subduction-related magmas. In tectonic setting diagrams Tavşanlı zone intrusives plot into the Volcanic Arc Granites (VAG) indicating development of post-collisional magmatic activity which agrees well with K-Ar whole-rock and mineral-separate ages of granitoids ranging from 44 to 58 Ma. Sr-Nd isotope data for samples show two different ranges. On the Sr–Nd isotope diagram, with the exception of Kaymaz granitoid, all other Tavşanlı zone intrusive rocks plot within the mantle array. Although there is a large spread for all rock types, the alkaline rocks are characterized by rather higher 87Sr/86Sr and lower 143Nd/144Nd ratios than the subalkaline rocks. Isotope equilibrium temperatures estimated for quartz-biotite pairs (300-600 ºC) are significantly lower than those of quartz-feldspar counterparts (500-600 ºC) which is most probably due to meteoric water infiltration.