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Timing of magmatic episodes in the composite Kackar batholith, eastern Pontides, Turkey: from subduction through slab break-off to within-plate extensional magmatism

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Hornblende and biotite K-Ar ages and titanite, zircon and apatite fission-track ages of various intrusive units of the composite Kackar batholith in the Turkish eastern Pontides provide insights into the timing of different igneous episodes. These episodes are related to: (1) subduction, (2) post-collisional slab break-off and (3) within-plate extension. The latter accompany the convergence between the Eurasian plate and Tauride-Anatolide platform and the closure of the northern branch of the Neo-tethys along the Izmir-Ankara-Erzincan suture zone.

(1) Subduction: Arc-related granitoid rocks were emplaced as relatively deep-seated intrusions during two major episodes: (1) an early phase represented by the Camlikaya granitoid with medium-K CALK bulk composition and a titanite fission-track unweighted mean age (uma) of 112.0 $\pm$ 3.2 Ma; (2) a mature phase represented by the Bogali, Sirtyayla and Marselevat granitoids with medium- to high-K CALK composition, hornblende and biotite K-Ar cooling ages from early Palaeocene (uma = 56.8 $\pm$ 0.8 Ma) to late Cretaceous (uma = 75.3 $\pm$ 0.5 Ma) (Bogali) and titanite fission-track uma of 57.1 $\pm$ 1.0 Ma (Sirtyayla) and 52.9 $\pm$ 1.3 Ma (Marselevat).

(2) Post-collisional slab break-off: The shallow Ayder unit from the Kackar batholith in the eastern Pontides, with high-K CALK composition, widespread K-feldspar megacrysts and common occurrence of various mafic microgranular enclaves, repre-

sents mingling and mixing of coeval felsic and mafic magmas generated as a result of post-collisional slab break-off. The titanite fission-track cooling age of the Ayder unit (uma = 46.4 $\pm$ 1.0 Ma) and the post-Senonian fast-uplift-related apatite fission-track ages of the Dereli-Sebinkarahisar area in the central eastern Pontides (uma = 48.4 $\pm$ 3.4 Ma) are similar. The quasi-simultaneous generation of high-K CALC hybrid magmas and accelerated uplift of the older units around 50 Ma ago is interpreted as confirmation of a post-collisional slab break-off stage that induced melting and mixing of mantle and crustal materials, due to the advection of hot asthenosphere to the base of continental lithosphere, and tectonic denudation due to release of load in the eastern Pontides.

(3) Within-plate extension: Medium-K CALC to slightly THOL (Halkalitas quartz diorite) and mildly ALK (Gullubag monzonite) units with a titanite fission-track age of 43.7 $\pm$ 2.3 Ma (Halkalitas) and zircon fission-track uma of 38.1 $\pm$ 0.6 Ma (Gullubag) are exposed as small shallow porphyritic stocks and vein rocks. The medium- to high-K CALK, typically I-type Uzuntarla porphyritic granodiorite, with hornblende K-Ar ages of 42.4 $\pm$ 0.9 and 41.2 $\pm$ 0.9 Ma, is also exposed as a shallow-seated porphyritic intrusion. They represent a within-plate extensional magmatic episode, indicating that Eurasia and the Tauride-Anatolide platform were already amalgamated along the Izmir-Ankara-Erzincan suture zone in the middle Eocene.