



## **Adakite-like granitoid porphyries, Eastern Turkey: potential parental melts and geodynamic implications**

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Tectonic setting of the Eastern Pontides during late Mesozoic to early Cenozoic remains a subject of debate. Hence, origin of the adakite-like granitoid porphyries provides important insights about nature of the lower crust and mantle dynamics during orogenic process in the region. The adakitic porphyries, which emplaced in the subduction-related Turonian-Santonian volcanics from northern part of the Eastern Pontides, consist of calc-alkaline and high-K calc-alkaline I-type quartz monzonite, tonalite, granodiorite and granite porphyries, with SiO<sub>2</sub> contents ranging from 62.89 to 70.43 wt %. Also, they display peraluminous to metaluminous geochemical character. The rocks have high K<sub>2</sub>O (1.50-3.84 wt.%), Na<sub>2</sub>O (3.48-6.45 wt.%) and low MgO (0.91-1.72 wt.%). Ar-Ar geochronology studies on amphibole separates reveal that the adakite-like porphyries have a crystallization age of 51 [U+FOB1] 0.36 Ma. In this paper, we described, for the first time, early Eocene adakite-like granitoid porphyries from the northern part of Eastern Pontides, although their counterparts have already been described in the southern part. Here, we contend that these rocks formed by partial fusion of a mafic lower continental crust in a continental setting unrelated to subduction of oceanic crust. The samples exhibit typical geochemical characteristics of adakite, i.e. high Sr (250-1141 ppm), high Sr/Y ratios (16-147) and low Y (6.8-14.8 ppm), low HREE concentrations, similar to adakites formed by slab melting associated with subduction. However, the rocks are characterized by relatively high ISr (0.70554-0.70986), Th, Th/U, low εNd (50 Ma) values (-0.9 to -8.5), and no significant Eu anomalies, implying that garnet is stable in their source during partial melting. All the features are inconsistent with a slab-melting origin and slab-related petrogenetic model, but favor an origin by melting of a mafic lower continental crust due to a thermal anomaly induced by upwelling of asthenosphere through a slab break-off. These interpretations weaken presence of the early Cenozoic arc setting in the Eastern Pontides. Instead, the early Cenozoic in the Eastern Pontides may be attributed to a geodynamic response to post-orogenic lithospheric extension subsequent to the continent-continent collision between the Pontide and the Anatolid-Taurid blocks.

**Keywords:** Adakitic porphyry, partial melting of mafic lower crust, Eastern Pontides, NE Turkey