Geophysical Research Abstracts
Vol. 14, EGU2012-7894, 2012
EGU General Assembly 2012

Pliocene-Quaternary syn-collision volcanism of the Javakheti Ridge, NW Armenia: impact on models of magma generation in the Arabia-Eurasia collision zone

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The Armenian Highlands and Southern Caucasus formed during convergence and collision between the Arabian and Eurasian margins from the Late Mesozoic to the present. These events culminate in the growth of the present-day Turkish-Iranian high plateau. Pliocene-Quaternary magmatism followed plateau building, and is a key feature of the entire region. However, petrogenetic models are sparse, particularly for outcrops in the Armenia sector. Mantle-derived magmatism in Turkey has been linked to Tethyan slab break-off and/or lithospheric delamination following the Arabia-Eurasia collision. In this study we consider preliminary petrographic and geochemical results from the Javakheti ridge and surrounding areas, in NW Armenia, and their relationship to the orogenic plateau as a whole.

The N-S trending Javakheti ridge is the southerly extension of the Samsari ridge in Georgia, and is one of several Pliocene-Quaternary volcanic uplands in Armenia and the Lesser Caucasus (e.g. Gegham, Vardenis and Syunik). The basement consists of the Sevan-Akera suture between the South Armenian Block, of Gondwanaland origin, and the Eurasian active margin and associated Mesozoic island arc of the Lesser Caucasus. Arc-continent collision and obduction occurred in the Late Cretaceous or Paleocene-Eocene. The first Pliocene-Quaternary magmatism in the area is represented by valley-filling fissure-fed basaltic flows, examples of which have been dated to $\sim$2.7-2.0 Ma in Georgia and Armenia. The ridge itself consists of eroded intermediate to felsic flows forming a central volcanic complex. Recently published Ar-Ar dating of ash layers related to the complex reveal ages of $\sim$1.8-1.9 Ma. The flows are cut by numerous Quaternary cinder cones. Volcanism on the ridge complex appears to young towards the north, and the ridge remains tectonically active, undergoing extension at 1.25 mm/yr, according to GPS data.

Preliminary geochemical results indicate the valley-filling flows, the ridge, and cinder cones, are petrogenetically related, and form a continuum from silica under-saturated to over-saturated, indicating crustal assimilation during differentiation of mantle-derived magmas. The more primitive compositions strongly resemble those of the well-known centre Mt. Ararat, suggesting that similar petrogenetic circumstances and degrees of partial melting apply at both localities, despite their differing distance to the Arabia-Eurasia suture zone.