Geophysical Research Abstracts
Vol. 16, EGU2014-6703, 2014
EGU General Assembly 2014

Plateau basaltic volcanism in a syn-collision setting (South Caucasus)

Khachatur Meliksetian (1), Iain Neill (2), Mark Allen (2), and Gevorg Navasardyan (1)

(1) Institute of Geological Sciences, Armenian National Academy of Sciences, Yerevan, Armenia (km@geology.am), (2) Department of Earth Sciences, University of Durham, United Kingdom (iain.neill@durham.ac.uk)

The present Turkish-Armenian-Iranian Plateau formed during the Cenozoic due to collision between the Arabian and Eurasian margins. Recent (<5 Ma) Armenian collision-related volcanism exhibits a full range of compositions from basanites to rhyolites, variable volatile content and diverse types of volcanic eruption.

The South Caucasus magmatic record includes thick, laterally extensive sequences of Upper Pliocene - Pleistocene mafic lava flows. Mostly they consist of valley-filling ophitic doleritic basalts usually attributed to fissure eruptions, similar to continental flood basalt volcanism, although the total volume of plateau basalts is much lower than typical CFB provinces. Many samples display textures consistent with magma mixing processes. These thick (up to 400 m) mafic flows generated several plateaux within the Lesser Caucasus: the Javakheti Plateau (S Georgia and NW Armenia), and the Lori and Kotayk Plateaux (Armenia). These basalts also extend to the NE Kars-Erzurum Plateau in Turkey.

Complete cross-sections containing several generations of lavas can be observed in the Dsoraget, Akhuryan, Debed and Hrasdan river canyons in Armenia and were sampled during field campaigns in 2011-2012. Most plateau basalts have a narrow silica range (SiO_2 = 48-53 wt%), low MgO (<7 wt%) and are mostly mid-K basalts-trachybasalts-basaltic trachyandesites. Most lavas exhibit modest enrichment of LREE over HREE (La/Yb = 8-13). More fractionated dolerites are typical for Kotayk plateau in central Armenia (La/Yb = 12-28). Increasing SiO_2 coupled with increasing LREE/HREE fractionation from the oldest to youngest flows is evident only in the Hrasdan river canyon, Yerevan: other sections are more homogeneous in composition suggesting a continuum of magma supply, efficient magma mixing and limited crustal storage time.

Trace element and isotope models suggest the primary magma formed by «10 % spinel-facies melting of a subduction-modified mantle source with a moderately enriched background composition. High Zr/Hf ratios (>50) and low MgO point towards a pyroxenitic source. Isotope signatures also indicate a lithospheric mantle source which inherited its subduction component during recent magmatic events (e.g. Mesozoic Tethyan arc activity): compositions of these mafic lavas ($^{87}/^{86}$Sr = 0.7041-0.7045, $^{143}/^{144}$Nd = 0.5128-0.5129) are homogeneous and amongst the most depleted of the Turkish-Armenian-Iranian Plateau. There seems little evidence for crustal contamination during magma ascent even though some lavas have been erupted through ancient basement terranes. The trigger for magmatism some 25 Myr after initial Arabia-Eurasia collision may lie in small-scale delamination of lithospheric mantle and heating of the lower lithosphere during asthenospheric upwelling following Tethyan slab break-off.