Geophysical Research Abstracts
Vol. 16, EGU2014-14800-1, 2014
EGU General Assembly 2014

Pliocene-Quaternary Post-collisional Magmatism in the Greater Caucasus

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Whole-rock elemental and isotopic analyses are presented for Pliocene-Quaternary volcanism from northern Georgia. Intense magmatic activity erupted through the thickened crust (50-60km) of the Greater Caucasus mountain belt, tens of millions of years following continental collision between the Arabian and Eurasian plates.
Compositions range from basaltic-andesite to dacite (56-67 wt% SiO_2). Enrichment of large ion lithophile elements (LILEs) and light rare earth elements (LREEs) relative to the high field strength elements (HFSEs) is seen in all samples. Rare earth element patterns have small enrichments in the middle to heavy REE ($(Dy/Yb)_N$ ratios (1.22-1.65)). Strontium ($^{87}Sr/^{86}Sr$ of 0.7041-0.7049) and Pb isotope ratios suggest a source that has been enriched relative to DMM with Pb isotopes plotting on an array sub-parallel to, but enriched compared to the northern hemisphere reference line ($\Delta 7/6$ = 10.7-11.3).
LILE enrichment may be indicative of a source enriched by subduction related fluids. Compositions are also similar to local crustal samples. On Pb isotope plots, samples lie on a trend extending towards radiogenic crustal values. Trace elements and isotopes are used to decipher the importance of these two signatures. Heavy REE data provide evidence melting was relatively shallow (<70km).
Olivine and Cpx grains show concentric zoning, with Mg# 84-86 in the cores, and $\sim$60 for the rims. This provides an insight into the early fractionation history of the samples. High-Al, sub-calcic pyroxenes (Al_2O_3 > 10wt%) indicate fractionation occurred deep in the crust.
Further investigation will allow the sources for Greater Caucasus magmatism to be better constrained and the petrologic evolution of the magmas to be compared with those from the wider Arabia-Eurasia collision zone and hence integrated into a post-collisional tectonic model for the region.