Geophysical Research Abstracts
Vol. 14, EGU2012-190, 2012
EGU General Assembly 2012

Mantle amphibole control on arc and within-plate chemical signatures: Quaternary lavas from Kurdistan Province, Iran

M. Kheirkhah (1), M.B. Allen (2), I. Neill (2), M.H. Emami (1), and C. McLeod (2)

(2) Durham, Earth Sciences, Durham, United Kingdom (m.b.allen@durham.ac.uk), (1) Research Institute for Earth Sciences, Geological Survey of Iran, Tehran, Iran

New analyses of Quaternary lavas from Kurdistan Province in west Iran shed light on the nature of collision zone magmatism. The rocks are from the Turkish-Iranian plateau within the Arabia-Eurasia collision. Compositions are typically basanite, hawaiite and alkali basalt. Sr-Nd isotope values are close to BSE, which is similar to Quaternary alkali basalts of NW Iran, but distinct from a depleted source melting under Mount Ararat. The chemical signatures suggests variable melting of two distinct sources. One inferred source produced melts with La/Nb from$\sim$3.5 to$\sim$1.2, which we model as the result of depletion of amphibole during $\leq$1% melting in the garnet stability field. We infer phlogopite in the source of potassic lavas from Takab. Lithosphere delamination or slab break-off mechanisms for triggering melting are problematic, as the lithosphere is$\sim$150-200km thick. It is possible that the negative dT/dP section of the amphibole peridotite solidus was crossed as a result of lithospheric thickening in the collision zone. This explanation is conditional upon the mantle source being weakly hydrated and so only containing a small proportion of amphibole, which can be exhausted during small degrees of partial melting. Our model maybe viable for other magmatic areas within orogenic plateaux, e.g. northern Tibet. Depletion of mantle amphibole may also help explain larger scale transitions from arc to within-plate chemistry in orogens, such as the Palaeogene Arabia-Eurasia system.