Osmium isotope systematics in the Chyulu Hills Volcanic Province, southern Kenya

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The Chyulu Hills volcanic field, located in southern Kenya, is considered to be an off-rift manifestation of volcanism broadly related to the East-African Rift System (EARS). Primitive alkaline magmas, ranging from nephelinites to alkali and transitional basalts have erupted during the Pleistocene and Holocene [1]. Systematic temporal and compositional variations within the volcanic field have been noted: Pleistocene volcanism of the northern Chyulu Hills is highly silica-understaurated compared to the Holocene volcanism of the southern Chyulu Hills, interpreted to reflect increasing degree of melting at shallower depth in the south [1]. Pronounced negative K-anomalies and enriched trace element and Sr-Nd-Pb isotopic signatures have been interpreted to reflect melting of an amphibole-bearing, metasomatised subcontinental lithospheric mantle source [2].

We have analyzed Os isotopes in a suite of lavas spanning the northern and southern Chyulu Hills to help elucidate the roles of lithospheric versus sublithospheric melting in the generation of off-rift magmatism. The osmium isotope signatures are all more radiogenic than depleted or primitive upper mantle, and generally fall within the range of primitive OIB; some samples also overlap radiogenic signatures found in highly metasomatized mantle xenoliths associated with the nearby Tanzanian craton [3]. Similar isotopic signatures to those in the Chyulu Hills suite have been reported previously in other parts of the Kenyan EARS, including the HIMU Miocene Turkana picrites and basalts from Kivu and Rungwe associated with the Western Branch of the EARS, interpreted to reflect, respectively, plume-derived and metsomatized subcontinental lithospheric mantle sources [4]. The Os isotope signatures of the Chyulu Hills lavas are likewise consistent with a plume source, although combined Sr and Nd isotopes indicate that the source is either distinct from that of Turkana or that the melts are modified in the SCLM, potentially consistent with seismic evidence for a partially molten region in the SCLM beneath the Chyulu Hills [2] [5].

[1] Spath et al. (2000), *J. African Earth Sciences* **31**, 337-358. [2] Spath et al. (2001), *J. Petrol.* **42**, 765-787. [3] Chesley et al. (1999), *GCA* **63**, 1203-1217. [4] Nelson et al. (2012), *Chemical Geology* **320/321**, 66-79. [5] Ritter & Kasper (1997), *Tectonophysics* **278**, 149-169.