https://doi.org/10.7185/gold2021.7137

Magnesium isotopic composition of Variscan subduction-related plutonic rocks and its significance for the origin of ultrapotassic magmas (Moldanubian Zone of Bohemian Massif)

VOJTECH JANOUSEK[1], YULIA KOCHERGINA[1], ALEXANDRE ANDRONIKOV[1] AND VLADIMIR KUSBACH[2]

[1]Czech Geological Survey

[2]Institute of Geophysics, Czech Academy of Sciences

Presenting Author: vojtech.janousek@geology.cz

Variscan Orogeny in the Bohemian Massif was likely driven by oceanic subduction passing to subduction/relamination of the Saxothuringian continental crust [1]. This resulted in extensive magmatism ranging from (1) ~354 Ma normal calc-alkaline (CA), through (2) ~346 Ma K-rich calc-alkaline (HKCA) to (3) ~340–335 Ma (ultra-)potassic (UK) [2–3]. The Sr–Nd isotopic compositions of mantle-derived members evolved from CHUR-like ($^{87}Sr/^{86}Sr_{354}$ ~0.705, ε^{354}_{Nd} ~+1; CA), through slightly ($^{87}Sr/^{86}Sr_{346}$ ~0.707, ε^{346}_{Nd} = –3 to –4; HKCA) to strongly enriched ($^{87}Sr/^{86}Sr_{337}$ > 0.7128, ε^{337}_{Nd} < –7.5; UK) [3–4]. The ultrapotassic primary melts came from harzburgitic mantle contaminated by deeply subducted mature crustal material and/or metasomatized by (U)HP melts/fluids derived therefrom [4–7].

The three suites yield heterogeneous $\delta^{26}Mg$ values (–0.12 ‰ to –0.53 ‰). Surprisingly, the most magnesian samples, taken as proxies for mantle-derived sources, all fall within the range of the local orogenic mantle peridotites (–0.33 ‰ to –0.29) or above, close to the global mantle average (–0.25 ‰ [8]). Thus the $\delta^{26}Mg$ of the metasomatized mantle was buffered by the harzburgitic mantle end-member, and/or the crustal contaminant was not very contrasting in $\delta^{26}Mg$. This implies insignificant role for Mg in melts/fluids derived from subducted clastic or carbonate sediments.

However, the inventory of incompatible elements and related isotopic systems (Sr–Nd–Pb) in the hybrid UK suite (high mg#, transition metal and Cs, Rb, K, Th, U, Pb, Li contents; low Nb, Ta and Ti contents) was swamped by the crustal signal. This confirms the hypothesis that the within-mantle contaminant and source of metasomatic melts/fluids was mainly Mg-poor, felsic igneous material of Saxothuringian provenance [4, 7].

Supported by GACR project 18-24378S to VJ.

[1] Schulmann *et al.* (2014), *Geology* 42, 275–278.

[2] Žák *et al.* (2014), *Geol. Soc. London Spec. Pub.* 405, 169–196.

[3] Janoušek *et al.* (2000), *J. Petrol.* 41, 511–543.

[4] Janoušek *et al.* (2020), *Int. J. Earth Sci.* 109, 1767–1810.

[5] Becker *et al.* (1999), *J. Petrol.* 41, 315–338.

[6] Janoušek & Holub (2007), *Proc. Geol. Assoc.* 118, 75–86.

[7] Janoušek *et al.* (2019), *Lithos* 342–343, 239–262.

[8] Teng *et al.* (2010), *Geochim. Cosmochim. Acta* 74, 4150–