HSE and stable Fe and V isotope systematics of mafic lavas from the Solomon island arc - a complex mantle history

S. SCHUTH[1], A. LUGUET[2], G. BRÜGMANN[3], C. BALLHAUS[2], S. WEYER[1], C. MÜNKER[4]

[1]Institut für Mineralogie, Universität Hannover, Germany (s.schuth@mineralogie.uni-hannover.de)
[2]Steinmann Institut, Universität Bonn, Germany
[3]Curt-Engelhorn-Zentrum, Mannheim, Germany
[4]Institut für Geologie und Mineralogie, Universität zu Köln, Germany

Along the Solomon island arc, SW Pacific, the Indian-Australian plate is presently subducted beneath the Pacific plate. The arc features extremely Mg-rich picritic lavas with up to ~30 wt.-% MgO above the young (< 5 Ma) Woodlark mid-ocean ridge system that is subducted beneath the central section of the arc at the New Georgia Archipelago (NGA). Trace element abundances and combined Pb-Nd-Hf isotope data indicate a strong source overprint by subduction components in particular by slab melts ([1] for an overview).

To further elucidate mantle wedge dynamics and the sources of the NGA ultramafic lavas, combined analyses (with/without desilicification digestion steps) of the HSE (PGE+Re), and stable Fe and V isotope signatures were conducted on a representative subset of (ultra-)mafic lavas from four NGA volcanic centers. The NGA lavas, independently of the digestion steps adopted, exhibit melt-like chondrite-normalized PGE patterns ($Ir_N = 10^{-3} – 10^{-4}$, $Pd_N/Ir_N = 6 – 60$) with a marked Re depletion ($Re_N/Pd_N = 2 – 8$). Their $^{187}Os/^{188}Os$ compositions range from non radiogenic to PUM-like (0.1264 to 0.1291). HSE abundances however are 10 % to a factor of 16 higher in the desilicified sample fractions, suggesting that the HSE are partly hosted by silicate phases. Stable $\delta^{56}Fe$ isotope signatures range from +0.03 to –0.21 ‰ and anti-correlate well with FeO, suggesting either an oxidation signature or a mixing process. The $\delta^{51}V_{NIST}$ values vary between –1.7 and –1.5 ‰, and are similar within a volcanic center.

Similarly to earlier findings, based on lithophile elements (e.g., Ba/Th, La/Yb) and radiogenic isotopes (Sr, Nd, Hf, Pb) [1], the findings of this study, based on HSE, ^{187}Os, $\delta^{56}Fe$ and $\delta^{51}V$, provide additionnal evidence that the mantle wedge under the New Georgia Archipelago, which was tapped locally by the volcanic centers, has been variably overprinted by slab fluids, and slab melts from the Woodlark Ridge.

[1] Schuth et al. (2009) *J. Petrol.* **50**, 781-811.