Abundances of chalcophile volatile elements in 2.7 Ga komatiites from Belingwe, Zimbabwe

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The abundances of incompatible elements in komatiites can be used to verify the model composition of the bulk silicate Earth obtained from data on mantle peridotites. Komatiites are produced by 30-50% partial melting of the mantle, which should result in complete exhaustion of base metal sulfides in their mantle sources. Chalcophile volatile elements (CVEs, *i.e.,* S, Se, Te, Ag, and Cu), are all incompatible elements at high degrees of partial melting, and their abundances in komatiites can be used to constrain abundances of these elements in the mantle sources of komatiites.

However, difficulties arise from the scarcity of komatiites in which CVEs were immobile during seafloor alteration and metamorphism. In this study, we present CVE abundances in remarkably fresh 2.7 Ga komatiites from the Belingwe greenstone belt. The data were obtained by isotope dilution ICP-MS on samples collected across a single differentiated lava flow. Except for Ag and S in the chilled margin, abundances of Se, Te, and Cu show well-defined linear correlations with indices of magmatic differentiation, such as MgO, indicating a fractional crystallization control of element distributions in the flow, with only very limited influence of degassing and post-eruptive alteration. Calculated CVE abundances (S=230±90 ppm, Se=66±11 ppb,Te=9±4 ppb, Ag=6±4 ppb and Cu=25±6 ppm; @MgO=38.0%[2]) and ratios (S/Se=3421±422, Se/Te=7.1±1.3, and Cu/Ag=3923±804) in the mantle source of the Belingwe komatiites, agree well with estimates for the composition of the bulk silicate Earth derived from mantle peridotites[3-4].

[1] Bockrath et al., (2004), *Science* **305**, 1951-1953; [2] McDonough and Sun, (1995), *Chem. Geol.* **120**, 223-253; [3] Wang & Becker (2013), *Nature* **499**, 328-331; [4] Wang & Becker (submitted), *GCA*.