A recycling of subducted crust in Archean mantle inferred from S-MIF of Belingwe komatiite

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Multiple sulfur isotopes of a 2.7 Ga komatiite from the Belingwe Greenstone Belt, Zimbabwe and related volcanics were measured to study recycled crustal material in the Archean mantle. The measured komatiites represents one of the best-preserved Archean komatiites in the world [1]. The results show that 7 of 19 samples exhibit clear S-MIF ($-0.20‰ < \Delta^{33}S < -0.12‰$), whereas all the other samples do not show S-MIF ($-0.03‰ < \Delta^{33}S < +0.04‰$). Based on petrology of the S-MIF-bearing samples, sulfides were crystalized from magma, not introduced after emplacement. Furthermore, trace element geochemistry and Sr-Nd-Pb isotope systematics suggest that the S-MIF-bearing komatiites and basalts are derived from depleted mantle source, whereas non-MIF samples often show clear signature of assimilated continental crust (Fig. 1). Therefore, we conclude that the source mantle of the 2.7 Ga Belingwe volcanics contained S-MIF-bearing material that probably represent subducted crustal material. Irrespective to the tectonic style including 'Plate Tectonics', our study demonstrate that transfer of surface material into the mantle was operating at least prior to 2.7 Ga.

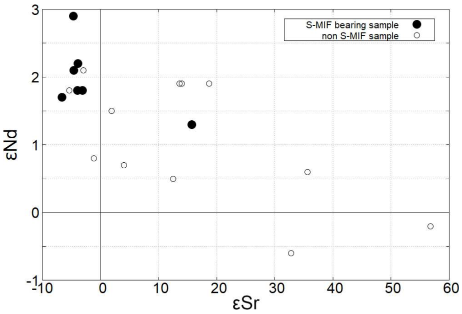

Figure 1: Sr-Nd isotope systematics of the studied komatiites and related basalts. The S-MIF-bearing samples show relatively depleted compositions.

[1] Nisbet *et al.* (1987) *Geology* **15**, 1147-1150. [2] Shimizu *et al.* (2005) *Journal of Petrology* **46**, 2367-2394.