Precise determination of Lu, Hf concentrations and Hf isotopic compositions in mafic to ultramafic rock reference materials by MC-ICP-MS

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In this work, we measured Lu, Hf concentrations and Hf isotopic compositions for ten mafic to ultramafic rock reference materials. The samples include two dunite (NIM-D, DTS-2b), two peridotites (WPR-1a, JP-1), two harzburgites (MUH-1, HARZ01), a serpentinite (UB-N), a komatiite (OKUM), a pyroxenite (NIM-P) and a norite (NIM-N). Individual isotopic ratios are reported with 2-8 complete analytical duplicates for each sample at several analytical sessions over the course of nearly four years. All measurements were carried out on a Neptune Plus MC-ICP-MS employing an Aridus II desolvator. The H_3BO_3 treatment during sample dissolution was applied for complete dissolution of fluoride formed during the HF decomposition step. There is no evidence of isotopic difference beyond analytical uncertainties between the hotplate and the high-pressure digestion, indicating the insoluble minerals (such as chromite, spinel) has little or no effect on Lu-Hf isotopic compositions. WPR-1a, UB-N, JP-1, NIM-D, HARZ01 and DTS-2b present good reproducibility in Lu-Hf isotopes and thus are suitable and potential ultramafic reference materials for Lu-Hf isotopic analysis, whereas OKUM, NIM-N, NIM-P and MUH-1 are not appropriate reference materials for monitoring Lu-Hf analysis due to their inherent heterogeneity in Lu-Hf isotopic system. Besides, OKUM, NIM-N, NIM-P and MUH-1 yielded isochron ages which are identical to their associate geological complex, indicating Lu-Hf isotopic system preserve petrogenesis. Collectively, these newly obtained results can be useful for interlaboratory evaluation of Lu-Hf isotope data of mafic-ultramafic rocks in the geochemical community.