Laser ablation analysis of Sr isotopes in kimberlitic perovskite

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Kimberlites are complex rocks, typically containing abundant crustal and mantle contaminants which can be microscopic in size. They are also highly susceptible to alteration during weathering, particularly for highly mobile elements such as Rb and Sr. Thus the combined effects of contamination and post-emplacement alteration limit the reliability of bulk-rock Sr isotope analyses. In addition, the Indian kimberlites, which are the focus of this study, are mesoproterozoic with poorly constrained ages, further limiting the accuracy of initial Sr isotope ratio estimation.

It is demonstrated here that the problems outlined above for bulk-rock analyses can be circumvented through the analysis of groundmass perovskite. This phase is resistant to weathering, contains no xenolithic material and has extremely low $^{87}Rb/^{86}Sr$ ratios (e.g. 0.0015 c.f. 0.4 for bulk-rock), while Sr concentrations are typically several thousand ppm. Unfortunately the small grainsize of kimberlitic perovskites (typically 50-150μm) makes bulk solution analyses an unattractive proposition.

In this study we present high quality initial-Sr isotope data from Indian kimberlitic perovskites obtained using an excimer laser coupled to a Nu MC-ICPMS. The potential interferences from Kr, CaAr, Rb and doubly charged ions of REE and Hf are generally small to insignificant and, as a result, existing protocols, developed for the *in situ* analysis of carbonates [1], are readily employed. The resulting data can be used to aid in petrogenetic interpretation, or to help constrain Rb-Sr isochron formalisations.

References

[1] Woodhead, J., Swearer, S., Hergt, J and Maas R. (2005) *Journal of Analytical Atomic Spectrometry*, **20**, 22-27.