NWA 7034 and the enriched end-member for shergottites

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Shergottites represent a compositional continuum from enriched to depleted based on their incompatible element characteristics as well as Sm-Nd isotopic systematics [e.g. 1]. Attributing this variation to crustal assimilation and fractional crystallization is problematic as there is little correlation between the incompatible element abundances and indices of differentiation [1, 2]. In addition, the coupling between the initial ε^{143}Nd and γ^{187}Os in shergottites makes it unlikely that the crust is the enriched end-member [3]. The favoured interpretation is that the compositional variation in the shergottites reflects mixing of distinct ancient mantle source regions possibly established during cooling and crystallization of the martian magma ocean [1, 3-5]. Data from the recent meteorite fall, Tissint, suggest that the relationship between the shergottites may be more complex than simple two-stage mixing [6]

The meteorite NWA 7034 is a martian regolith breccia with a composition similar to the average martian crust from mission and rover data [7-8]. From modelling of the trace element profiles in the paired meteorite NWA 7533, [9] suggested that the crust could be the enriched end-member for the shergottites. The measured ε^{142}Nd composition of NWA 7034 is more negative than the enriched shergottites [10], and as such could point to a link between the enriched shergottite source and the crust. However, the precision on this value does not allow for evaluation of the relationship between NWA 7034 and the enriched reservoir for the shergottites in terms of the ^{146}Sm-^{142}Nd systematics. We will investigate the possible connection between the martian crust and the enriched shergottite end-member by presenting high precision ^{142}Nd data on three aliquots of NWA 7034.

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