Sm and Nd nucleosynthetic anomalies in EL and EH chondrites

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Enstatite chondrites (EC) have been proposed to be genetically related to the main building blocks of the Earth [1, 2]. EC are divided into two groups, EH and EL, according to their metallic Fe content. These two groups also differ in terms of petrological types, with EH being mostly primitive and unequilibrated (a few EH5), and EL being mostly highly metamorphosed with a very few EL3 meteorites. The origin of EL3 chondrites is still debated, whether it is primitive or melted [3, 4]. Trace element abundances and the Nd isotopic composition of EC suggest that EL3 are from a different parent body than equilibrated EL and EH chondrites [5]. An earlier study by [6] also reported the heterogeneous Nd nucleosynthetic compositions of EH3 chondrite leachates.

We will report Nd and Sm isotope compositions of leachates obtained by step-wise dissolution and mineral separates on unequilibrated enstatite chondrites from EH and EL type. Preliminary results on EL3 chondrite leachates indicate no resolvable Nd nucleosynthetic anomalies. In contrast, EH3 chondrites display very large anomalies in the different leached components, especially residues that have an isotope composition enriched in s-process. The homogeneous Nd composition of the EL3 leachates is at odds with its primitive characteristics identified by some authors. It appears that contrary to the isotope complementarity (Mo, W) between chondrules and matrix observed in carbonaceous chondrites [e.g. 7], EH3 chondrite separates sorted to represent the main EH3 components share an homogeneous Nd isotope composition. Therefore, metal-sulphide nodules, chondrules and matrix of EH3 seem to have been formed in a similar region of the protoplanetary disk, homogeneous in Nd isotope composition.

[1] Javoy et al., 2010, GCA. [2] Dauphas et al., 2017, Nature. [3] El Goresy et al., 2017, MAPS. [4] Van Niekerk and Keil, 2011, MAPS. [5] Boyet et al., 2018, EPSL. [6] Boyet and Gannoun, 2013, GCA. [7] Budde et al., 2016, EPSL.