Halogen (Cl, Br and I) inventory of the primitive meteorites

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The halogens (Cl, Br and I) are sensitive tracers of planetary processing (e.g., melting, differentiation, crust formation, etc.) due to their low abundance and incompatible nature. In order to further our understanding of the halogens response to these crucial aspects of planetary formation, extending our baseline knowledge of their concentration and distribution in the materials that accreted to form the planets (and planetesimals) is essential. The relative scarcity of halogen measurements, particularly Br and I, in the literature attests to the ultra low abundance of these elements in the primitive meteorites and thus their lack of suitability for measurement by traditional ion-and micro-probe techniques.

A systematic study of the halogens in the primitive meteorites (carbonaceous, ordinary and enstatite chondrites) was undertaken to extend the existing halogen database. Chlorine, Br and I were extracted from IR laser stepped-heating of 0.25 to 3.3 mg of neutron-irradiated samples and measured by noble gas mass spectrometry using the noble gas proxy isotopes $^{38}Ar_{Cl}/Cl$, $^{80}Kr_{Br}/Br$ and $^{128}Xe_{I}/I$. The results of carbonaceous (CV), ordinary (H, L and LL) and enstatite chondrites (EH and EL) are given here. The ordinary chondrites have variable halogen concentrations (5–600 ppm Cl, 1–1650 ppb Br and 2–390 ppb I) and very low molar I/Cl ($\sim10^{-6}$) and Br/Cl ($\sim10^{-4}$) ratios, comparable to those measured in some terrestrial hydrothermal fluids [1]. The EH chondrites are overall the most *consistently* enriched in halogens (65–330 ppm Cl, 610–2290 ppb Br and 140–180 ppb I) and show near constant I concentration, regardless of petrologic type. The EL6 Daniel's Kuil is depleted in halogens (25 ppm Cl, 60 ppb Br and 9 ppb I), which could be due to loss during metamorphism on the EL parent body. Two of three Antarctic meteorite analyses (MIL 07139; EH3) show an extreme enrichment in halogens (e.g., 6700 ppb Br); this is likely a surface phenomenon related to terrestrial weathering [2] and are therefore not included in the above ranges. Forthcoming results from CI, CM and CR chondrites, as well as extension to other petrologic types for the above groups, will further elucidate the distribution of halogens in the most primitive solar sytem materials.

[1] Böhlke & Irwin (1992) EPSL, 110: 51-66. [2] Langenauer & Krahenbuh (1993) *Meteoritics*, 28: 98-104.

Li and Sr constraints on biogeochemical processes in a tropical andesitic watershed

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In this study, we analysed Sr and Li concentrations and isotopic compositions in the surface reservoirs (soils, rocks, plants, stream and rain waters) of a small forested andesitic watershed located in the tropical rain forest of Guadeloupe. Sr is used to identify the sources contributing to soil genesis and Li is good tool to describe weathering dynamic.

Our results show that the $^{87}Sr/^{86}Sr$ ratio of unweathered andesite is 0.704. Previous studies have shown that deposition of Saharan dusts with signature around 0.717 occurs in the Carribean. Most of soil samples Sr isotopes ratios (between 0.7086 and 0.7155) are intermediate between rainfall (0.710) and Saharan dust endmembers. That reveals the significant contribution of atmospheric deposition to soil composition and confirms previous study done in Puerto Rico (Pett-Ridge *et al.*, 2009).

The δ^7Li signature of unweathered andesite and Montserrat dusts is around 4.5‰. Because of its origin, Saharan dust signature can be estimated around 1‰. In the soil, δ^7Li signature decreases from 3.0‰ to -10.5‰ between 0 and 1250cm. Many studies have shown that during chemical weathering Li isotopes are fractionated as ^6Li is preferentially retained in solid secondary phases whereas dissolved fraction are enriched in ^7Li. Here the decrease of δ^7Li reflects the increase of weathering intensity with depth.

In this tropical Caribbean context, with very thick and cation poor soil, Saharan minerals have strong impact on soil genesis. Because of thick saprolite layer, vegetation is isolated from primary minerals and those atmospheric inputs might constitute a significant nutrient supply for vegetation growth.

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