Geophysical Research Abstracts,
Vol. 11, EGU2009-10376, 2009
EGU General Assembly 2009

Spatial relations between D and ^{15}N hotspots in Orgueil and Murchison insoluble organic matter : a NanoSIMS study.

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Carbonaceous Chondrites (CC) contain a high carbon concentration (up to 3.5 wt.%) mainly in the form of carbonates, soluble and Insoluble Organic Matter (IOM). IOM is isolated from the rock by acid dissolution techniques. It is a network of small aromatic moieties linked by short aliphatic chains. One of its puzzling features is the heterogeneous H and N isotopic compositions observed at several spatial scales [1, 2, 3, 4, 5] by several analytical methods. Recent studies with the NanoSIMS show sub-micrometric spatial enrichments in D and/or ^{15}N in the isolated IOM and in the matrix of CCs. These so called *hotspots* are, at a first approximation, randomly distributed in the ion images [2, 3]. The highest H and N isotopic compositions in Solar System bodies measured by NanoSims in IOM were found in two CR chondrites having D and ^{15}N up to +19400‰ and +1770‰, respectively. However, no evidence for a spatial correlation between D and ^{15}N *hotspots* was detected.
Here we report H and N isotopic compositions in Orgueil and Murchison IOM measured with the NanoSIMS. In order to inquire for such a possible correlation between H and N *hotspots*, a special care was taken to have the same spatial resolution for both H and N isotope images. The NanoSIMS was thus set up with 3 magnetic fields, each of them measuring the 3 following masses: H^- and D^-, $^{12}C^{14}N^-$ and $^{12}C^{15}N^-$ and $^{13}C^-$ and $^{13}CH^-$. IOM was pressed in gold foil and isotopic compositions were determined in 20x20μm^2 ionic areas corresponding to 256x256 pixels i.e. to a spatial resolution at $\sim$400nm. Although H and N isotopes are not detected simultaneously, the intensity of the primary current and the ion spot size being constant during the whole duration of image acquisition, the spatial correlations between *hotspots* should be preserved. Indeed, preliminary examinations of these images show that a noticeable fraction of the H and N *hotspots* are spatially correlated in both IOM meteorites. For example, among the 5 Murchison images, the relative fraction of correlated *hotspots* lies between 50 and 100% (100% corresponding to all detectable D and ^{15}N *hotspots*), reinforcing a previous observation made by [6] in the carbonaceous globules of the Tagish Lake CC. The corresponding maxima in D and ^{15}N values reach +5600‰ and +400‰, respectively. We will discuss the mechanism of formation of such correlated anomalies in these organic *hotspots*.

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