The influence of aqueous alteration in carbonaceous meteorites on its soluble organic content

*Zita Martins[1]

1. Imperial College London, Department of Earth Science and Engineering, South Kensington Campus, SW7 2AZ London, UK

Carbonaceous meteorites are fragments from the asteroid belt that may be used as time capsules to understand the processes that happened in the early solar system. The analysis of these organic carbon-rich meteorites provide crucial information regarding the chemical reactions that occurred on the meteorite parent bodies, solar nebula or interstellar medium. They contain a rich inventory of extra-terrestrial molecules, present as insoluble organic matter (IOM) [1, 2], and as soluble organic compounds [3-5]. Bulk analysis of the soluble organic fraction of the Murchison meteorite has revealed a high molecular diversity of tens of thousands of different molecular compositions [6]. In addition, different carbonaceous meteorites show different abundances and distributions of their soluble organic content. The reason for this is not fully understood. Aqueous alteration on the meteorite parent body of carbonaceous chondrites may play a role as it is an important alteration process of their mineral, isotopic and volatile content [7-12]. In relation to the soluble organic content, a few studies show that the relative distribution of amino acids in carbonaceous chondrites seems to be influenced by the degree of aqueous alteration on the parent body [13-16]. In this talk I will present the organic inventory of different carbonaceous meteorites, and how the extension of aqueous alteration on the meteorite parent bodies may be related to this. For example, the least aqueously altered CM chondrites have smaller L-enantiomer excess (Lee) values of isovaline [17-19]. The Paris meteorite, one of the most primitive CM chondrites analysed to date has an isovaline Lee close to zero [17]. While aqueous alteration does not create an isovaline asymmetry by itself, it may amplify an L-enantiomeric excess that was originally created by other mechanisms (e.g. ultraviolet circularly polarized light (UV-CPL) photo-processing of interstellar/circumstellar ices [20-25]).

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