CHEMISTRY OF CARBONACEOUS CHONDRITE MATRICES: PARENT-BODY ALTERATION AND CHONDRULE-MATRIX COMPLEMENTARITY.

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Introduction: The contribution of chondrite matrices to the volatile element budget and the Mg/Si of the bulk rocks is fundamental. [1] showed LA-ICP-MS volatile element abundances of CC matrices to be related to those of the bulk rocks, suggesting a "complementarity" with their adjoining high T fractions. [2] also advocates "complementarity" based on the Mg/Si of these components determined by EMP. However, [3,4] argued that these relationships were due to parent-body alteration. Here we present new data to support this conclusion.

Method: We selected a suite of carbonaceous chondrites with varying degrees of alteration [5,6], including CI chondrites [7] and the Paris CM breccia, which contains significantly different lithologies [4]. Bulk chemical analyses were conducted both at UBO by ICP-MS and ICP-AES after wet chemistry, and at NHMFL by an in-situ rastering with LA-ICP-MS. In-situ analyses of matrices were performed both by EMP and LA-ICP-MS.

Results and discussion: Bulk analyses conducted by the two methods are reproducible and consistent [*7*]. In particular, they show the bulk compositions of the less altered and more altered zones of Paris to be indistinguishable. On the other hand, in-situ analyses of the matrix differ significantly: matrix in the less altered zones has a CI composition, while that of the more altered zones has lost S and chalcophiles and gained Fe and siderophiles [4]. EMP data for other CM matrices indicate that their S/Si decreases with the extent of parent-body alteration, in agreement with the above results. Matrix compositions thus vary with alteration although the bulk rocks remain isochemical. This suggests local exchange between matrices and high temperature fractions, and a CI composition for the matrices at the time of accretion.

Conclusion: These results contradict pre-accretion complementarity between matrix and the high T fraction as advocated by [1,2] and support the two-component model of Anders [8]. They allow these components to be formed independently and accrete in varying proportions to generate the range of bulk CC compositions. It is thus possible that high T components formed near the Sun were transported over large distances and mixed with matrix in colder regions of the disk, which would explain their presence in cometary materials.

References: [1] Bland P. et al. (2005) *Proceed. Nat. Acad Sci. 102*, 13755–13760. [2] Hezel D. and Palme H. (2010) *Earth Planet. Sci. Lett. 294*, 85-93. [3] Zanda B. et al. (2009) *Meteoritics Planet. Sci.*, vol. 44supl. abstr. #5280. [4] Zanda et al. (2011) *Lunar Planet. Sci. XVII*, abstr #2040. [5] Browning et al. (1996) *Geochim. Cosmochim. Acta 60*, 2621-2633. [6] Rubin et al. (2007) *Geochim. Cosmochim. Acta 71*, 2361-2382. [7] Barrat et al. (2011), *this conf.* [8] Anders E. (1964) *Space Sci. Rev., 3*, 583-714.