

THE CASE FOR MANY OR MOST UNEQUILIBRATED ORDINARY CHONDRITES NOT COMING FROM THE SAME PARENT BODIES AS EQUILIBRATED ORDINARY CHONDRITES.

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Introduction: While Dodd and others described the UOC as a group distinct from the EOC [1], Van Schmus and Wood saw a continuous gradational trend from type 3 (UOC) to type 4, 5 and 6 (EOC) [2]. Thus most researchers came to accept that these four petrologic types came from single H, L, or LL parent bodies, perhaps internally heated and concentrically zoned with type 6 in the center and type 3 on the surface [3]. I wish to suggest that members of a series do not need to be cogenetic and that there are astronomical and meteoritical data to suggest that while the EOC come from just a few bodies, most UOC come from a large number of separate parent asteroids.

Asteroid data: Geitzen et al [4] recently obtained IR reflectance spectra for a number of S asteroids and found that many plotted in the S(IV) field that Gaffey and coworkers have connected with ordinary chondrites [5]. An analysis by the MGM method (curve fitting modified Gaussian curves to the absorption bands) suggested that the pyroxene in these asteroids was in the monoclinic form. Pyroxene in UOC is also clinopyroxene [1], and Geitzen et al. find that UOC also plot in the S(IV) field. It is thus arguable that many S(IV) asteroids have UOC material on their surfaces.

Meteorite Data: The cosmic ray exposure age histograms suggest that EOC come from a small number of parent objects. In the case of the H chondrites more than 2/3 have CRE ages of 8 Ma, suggesting a major break up of their parent body at that time [6]. Similar data, and Ar-Ar data, exist for the L and LL chondrites [6,7]. For the UOC the CRE data are relatively meager and there is a problem of artificial peaks in the CRE histograms due to pairing, but on the basis of existing data it is arguable that the CRE age distributions are unlike those of EOC. This suggests that they did not share the fragmentation history of the EOC.

Conclusions: The gradational nature of the type 3 to type 6 sequence does not prove that these meteorites are single series. I suggest that it is at least arguable that while EOC are coming from a small number of parent asteroids, the UOC are coming from the surfaces of a large number of discrete S(IV) asteroids.

References: [1] Dodd R. T. et al. 1967. *Geochimica Cosmochimica Acta* **31**: 921-951. [2] Van Schmus W. R. and Wood J. A. 1967. *Geochimica Cosmochimica Acta* **31**, 747-765. [3] Trieloff, M. et al. 2003. *Nature* 422: 502-506. [4] Gietzen, K. M. et al. 2008. Abstract 1125. *39th Lunar and Planetary Science Conference*. [5] Gaffey M. J. et al. 1993. *Icarus* **106**: 573-602. [6] Marti K. and Graf T. 1992. *Annual Reviews of Earth and Planetary Science* 20:221-243. [7] Bogard D. D. 1994. *Meteoritics* **30**: 244-268.