Geophysical Research Abstracts
Vol. 17, EGU2015-4278, 2015
EGU General Assembly 2015

Evidence of residual core material from the moon-forming impactor

George Helffrich (1) and Bernard Wood (2)

(1) ELSI, Tokyo Inst. of Technology and Earth Sciences, U. Bristol, Bristol UK (george.helffrich@bristol.ac.uk), (2) Earth Sciences, Oxford University, Oxford UK

Earth was accreted from smaller bodies initially dispersed over a wide range of heliocentric distances (Albarède, 2009; Morbidelli et al. 2012). Models of their assembly include timing constraints from short-lived isotopic systems (W-Hf (Allègre et al. 2008), Ag-Pd (Schönbächler et al. 2010)), physical condition constraints from metal-silicate element partitioning (W, Mo, Ni, Co, Cr, V, Si; Wade et al. (2012)) and orbital parameter constraints from accretion histories (Morbidelli et al. 2012). Current models invoke continuous or multi-stage core formation with later epochs being more oxidized and volatile rich (Wood, 2008; Schönbächler et al. 2010; Rubie et al. 2011). Here we show, using models of core liquid wavespeeds, that a volatile-enriched outermost outer core leads to the observed layering in it, as well as satisfying the relative abundances of W and Mo in the mantle and the volume of material added in late-stage core accretion. Layering can be explained by incomplete mixing of late-added core material. Densities of progressively accreted metal vary, initially mixing the growing core but then stratifying upon it. The topmost outer core's structure is consistent with it being a physical remnant of the Moon-forming impact.