Geophysical Research Abstracts, Vol. 9, 10556, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10556

The origin of water on Mars

A.L. Graps (1,6), J.I. Lunine (2), J. Chambers (3), A. Morbidelli (4), L.A. Leshin (5) and D.P. O'Brien (6)

(1) INAF Istituto di Fisica dello Spazio Interplanetario, Rome, Italy, (2) Lunar and Planetary Laboratory, The University of Arizona, Tucson, AZ 85721, USA, (3) DTM, Carnegie Institution of Washington, Washington, DC 20015, USA, (4) Observatoire de la Cote d'Azur, BP 4229, F-06304 Nice Cedex 4, France, (5) Sciences and Exploration Directorate, NASA Goddard Space Flight Center, Greenbelt, MD, 20771, USA, (6) Planetary Science Institute, Tucson, Arizona, 85719, USA

Here we consider the origin of water on Mars, in the context of a dynamical model that accounts for most of the Earth's water as a product of collisions between the growing Earth and planet-sized "embryos" from the asteroid belt. Mars' history is found to be different; to explain the present mass of Mars, its core formation times (Hf-W), and the broad age range and homogeneity of SNCs (O isotopes), it requires that it suffer essentially no giant collisions, was homogenized early in its history, and the bulk of its growth was through the addition of smaller bodies. Essentially Mars is itself an embryo. Nitrogen isotope ratios, the Fe-O magma content, and new dynamical simulations together suggest that parent bodies from the inner asteroid belt could have provided Mars' interior component as well as providing some part of Mars' water. This water can be supplemented with parent bodies of asteroids beyond 2.5 A.U. and cometary material. The percentage of each contribution, along with the material's D/H ratio will be given in the presentation.