Geophysical Research Abstracts
Vol. 13, EGU2011-3736, 2011
EGU General Assembly 2011

Kuiper Belt objects: interior matter differentiation for different composition of accretion material

Oleg Shchuko (1), Svetlana Shchuko (2), Daniil Kartashov (3), and Roberto Orosei (4)

(1) NIRFI, Nizhny Novgorod, Russian Federation , (2) State Technical University, Nizhny Novgorod, Russia, (3) Photonic Institute, Vienna University of Technology, Austria, (4) Istituto di Fisica dello Spazio Interplanetario, Rome, Italy

Thermal evolution models of large Kuiper Belt objects (KBOs) with an average density exceeding 1700 kg m-3 are considered. The solid dust material of protosolar cloud fringe regions and fine-fractured H2O condensate in the form of amorphous ice are considered having been the building matter for these objects.
The solid dust matter of the accretion material is represented by small dust particles of different chemical and mineralogical composition. Type one particles consisted mainly of aluminosilicate minerals typical for stone meteorite matter. They were embedded with radionuclides 238U, 235U, 232Th, 40K, 26Al, the sources of radiogenic heat. The other particles consisted of minerals typical for iron and stone-iron meteorites having substantially larger density and did not contain radionuclides.
H2O condensate secured the presence of amorphous ice in the forming body's matter. Radiogenic heat leads to H2O phase transitions which define a body's interior matter differentiation. The radionuclide content at the initial stage of the body formation determined the dynamically changing degree of the interior matter differentiation for the whole period from the initial up to the present time.
For the models considered in our contribution the accretion material properties have been determined which lead during the evolution of the object to formation of the celestial body with physical characteristics, such as average density and albedo, measured in observations. The borders of spherically symmetric areas with different degrees of the matter differentiation have been determined as a function of the matter average density, specific content of solid dust component (of different types) in the accretion material, as well as on the content of radionuclides and amorphous ice.