BREAKING ASTEROID PRODUCES BIG FRAGMENTS AND HUGE GAS-DUST CLOUD – A POSSIBLE ENVIRONMENT FOR MECHANICAL GRAVITATIONAL SEPARATION OF PRIMORDIAL MINERAL GRAINS BY DENSITY

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A model of primordiaal matter differentiation in orbiting gas-dust cloud was considered at the Hayabusa 2013 symposium [1]. Now, when the asteroid P/2013 R3 disintegrates at present and this process is accompanied by production of a huge gas-dust cloud one may say that proposed mechanism is not a fantastic one but could be real. Impoverishment of the Itokava asteroid composition with dense minerals could be attributed to its origin in that part of the primordial nebula where heavies were rare. They concentrate themselves in the inner parts of the orbiting primordial gas-dust disc. Mercurian enrichment with sulfur and metal iron is the best proof of this process.

The asteroid belt in a center of the planetary system is a proper place for observing an effect of this disintegration. Decreasing sphericity of celestial bodies with increasing solar distance in the inner solar system, caused by warping action of planetary standing inertia-gravity waves, culminates in the asteroid belt (Kochemasov, 1986-2014). Asteroids are flattened and bent, and often acquire crescent-like shapes. This severe action is due to wave resonance between the fundamental wave 1 warping any cosmic body in elliptical orbit and inherent to the asteroid belt wave also long $2\pi R$. This 1:1 breaking resonance leaves no chance to any relatively large body to survive in the asteroid orbital zone. An enormous mass deficit exists here. Along with the impact action the wave bending contributes to development of high-pressure assemblages (diamond dust) and asteroid destruction – development of binaries, polycomponent asteroids, satellites (a significant proportion of observed asteroids has satellites!). Dumb-bells shapes often are observed. Examples of various stages of this destruction are asteroids Eros, Toutatis, Braille, Castalia, Hector, and recently observed P/2013 R3 self-disintegrating without an impact participation [2]. Enormous volumes of dust clouds under destruction of an asteroid were observed for the first time though splitting of the nuclei of comets into multiple components has been frequently observed. Thus, the primordial gas-dust nebula intensified by breaking comets, asteroids, and impacts is a natural orbiting medium for mineral separation by density.

References:[

1] Kochemasov G.G. Hayabusa' grain composition shows deficiency of troilite – how to explain this? HAYABUSA 2013, Saga., Japan.

[2] Jewitt D., Agarwel J., Li J. et al. Disintegrating Asteroid P/2013 R3. *Astronomical J. Lett.*, 6 March 2014, 1-16.