



Universal planetary tectonics (supertectonics)

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The wave planetology [1-3 & others] proceeds from the following: “planetary structures are made by orbits and rotations”. A uniform reason makes uniform structures. Inertia-gravity waves arising in planetary bodies due to their movements in Keplerian elliptical orbits with periodically changing accelerations warp these bodies in such way that they acquire polyhedron shapes (after interference of standing waves of four directions). Strong Newtonian gravity makes bodies larger than 400 to 500 km in diameter globular and polyhedra are rarely seen. Only geomorphologic, geologic and geophysical mapping can develop these hidden structures. But small bodies, normally less than 300 to 400 km in diameter, often show parts of the polyhedra, rarely fully developed forms (the asteroid Steins and satellite Amalthea present rather perfect forms of “diamond”). Depending on warping wavelengths (they make harmonics) various Plato’s figures superimposed on each other can be distinguished. The fundamental wave 1 produces a tetrahedron, intrinsically dichotomic figure in which a vertex (contraction) always is opposed to a face (expansion). From the recent examples the best is the saturnian northern hexagon (a face) opposed to the southern hurricane (a vertex). The first overtone wave 2 is responsible for creation of structural octahedra. Whole ‘diamonds’ and their parts are known [4, 5]. Other overtones produce less developed (because of smaller wave amplitudes) planetary shapes complicating main forms. Thus, the first common structural peculiarity of planetary bodies is their polyhedron nature.

Not less important is the second common structural peculiarity. As all globular or smaller more or less isometric bodies rotate, they have an angular momentum. It is inevitably different in tropic and extra-tropic belts having uneven radii or distances to the rotation axe. But this unevenness is undesirable because it creates tectonic stresses and increases energetic status that is against the natural tendency to minimize these physical characteristics. So, a body tends to lower angular momentum of tropics and increase it in extra-tropics. With the same angular velocity it remains only mass and radius to play in this tendency. Tropical belt is destructed (for an example, the lithosphere disintegration in solid bodies), extra-tropical belts add dense material (plumes), expand – the constructive tendency [6].

Both tectonic peculiarities-polyhedrons and constructive – destructive tendencies - are common for celestial bodies of various classes. They are characteristic for our star, planets, satellites and small bodies. That is why a term “supertectonics” seems rather suitable.

References: [1] Kochemasov G.G. Concerted wave supergranulation of the solar system bodies // 16th Russian-American microsymposium on planetology, Abstracts, Moscow, Vernadsky Inst. (GEOKHI), 1992, 36-37. [2] Kochemasov G.G. Tectonic dichotomy, sectoring and granulation of Earth and other celestial bodies // Proceedings of the International Symposium on New Concepts in Global Tectonics, “NCGT-98 TSUKUBA”, Geological Survey of Japan, Tsukuba, Nov 20-23, 1998, p. 144-147. [3] Kochemasov G.G. Theorems of wave planetary tectonics // Geophys. Res. Abstr., 1999, V.1, №3, 700. [4] Kochemasov G.G. Plato’ polyhedra as shapes of small icy satellites // Geophys. Res. Abstracts, Vol. 10, 2008, EGU2008-A-01271, CD-ROM; [5] Kochemasov G.G. (1999) “Diamond” and “dumb-bells”-like shapes of celestial bodies induced by inertia-gravity waves // 30th Vernadsky-Brown microsymposium on comparative planetology, Abstracts, Moscow, Vernadsky Inst., 49-50; [6] Kochemasov G.G. Tectonics of rotating celestial globes // Vernadsky-Brown microsymposium 48, 20-22 Oct.

2008, Moscow, Abstr. m48_20.