

Tectonic granulation of terrestrial planets in connection with their orbital frequencies

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The comparative wave planetology states that “orbits make structures” [1, 2 & others]. Moving in elliptical keplerian orbits with periodically changing accelerations celestial bodies are subjected to a warping action of inertia-gravity waves. In rotating bodies they acquire a stationary character and go in 4 crossing ortho- and diagonal directions. Interference of these directions produces uplifting (+), subsiding (-) and neutral (0) tectonic blocks size of which depends on lengths of warping waves. The fundamental wave 1 long $2\pi R$ produces ubiquitous tectonic dichotomy – an opposition of two segments – one (+), another (-). Well known at Earth, Mars and the Moon it is not so sharp at Venus and just discovered on Mercury (Dr. Ksanfomality’s telescopic observations of a huge basin > 2000 km in diameter on unknown portion of Mercury’s surface). Asteroids at the farthest end of the terrestrial planets row all show oblong and convex-concave shape due to warping action of wave 1 . The fundamental wave 1 has overtones of which the first long πR produces tectonic sectors – very prominent features. At Earth, for an example, these are continents and secondary oceans (the primary Pacific is a segment – a part of the dichotomous structure). On these common for all planets basic warpings are superimposed individual warpings or tectonic granules. Their sizes are inversely proportional to orbital frequencies: higher frequency – smaller grain and, vice versa, lower frequency – larger grain. Starting from the solar photosphere (it orbits the center of the solar system with frequency $1/1$ month) one has the following row of tectonic grain sizes (a half of a wavelength): photosphere $\pi R/60$, Mercury $\pi R/16$, Venus $\pi R/6$, Earth $\pi R/4$, Mars $\pi R/2$, asteroids $\pi R/1$. Photosphere grains are famous solar supergranules about 30000 km across (this size was never explained by the solar physics). Mercury’s grains are typical small basins occupying $3-4^\circ$ of a big circle arc. Venus’ grains are 12 superstructures or “blobs” (after

Herrick & Phillips, 1990) in the equator about 3000 km across. Earth's grains are represented by superstructures of the AR cratons about 5000 km across. At Mars' equator 4 giant ring superstructures are symmetrically placed: Tharsis, Xanthe, Arabia, Cimmeria. At the main asteroid belt a strong resonance 1:1 occurs between lengths of the fundamental wave 1 and the individual wave also wave 1. This could explain "destruction of Phaethon". In reality, in the asteroid zone the strong wave resonance (1:1) probably prevented an "assembly" of a planet and led to known matter deficit. Mars also is comparatively unstable (in 1:1 resonance are the first overtone wave 2 and the individual wave also wave 2): its shape in the equatorial plane is farther from circle than the Earth's one. This new conception of planet "stability" can be numerically expressed as degree of departure from a circle (a stable configuration) of an inscribed figure – polygon made by standing waves. For this a ratio is taken: denominator – a circle area; numerator – an area of inscribed in circle figure whose shape is determined by a number of waves fitted in the circle. The following row of sphericity (stability) is obtained: photosphere, 60-gon, 0.997; Mercury, 16-gon, 0.973; Venus, hexagon, 0.830; Earth, square, 0.637; Mars, rectangle or rhombus, 0.420; asteroids, line, 0 (zero stability)[3]. Earth is unique by its near to "golden section" value, most favorable position determining its basic features including appearance and existence of a steady life. **References:** [1] Kochemasov G.G. (1992) Concerted wave supergranulation of the solar system bodies // 16th Russian-American microsposium on planetology, Abstracts, Moscow, Vernadsky Inst. (GEOKHI), 36-37. [2] Kochemasov G.G. (2002) Mars, Earth, Venus: concerted properties of lithospheres and atmospheres connected with regular tectonic granulation of the planets // Vernadsky-Brown microsposium 36: "Topics in Comparative Planetology", Oct. 14-16, 2002, Moscow, Russia, Abstracts, CD-ROM. [3] Kochemasov G.G. (1994) Three "melons" and four "watermelons" in the inner Solar system: why all "melons" are in the martian orbit? // 20th Russian-American microsposium on planetology, Abstr., Moscow, Vernadsky Inst., 44-45.