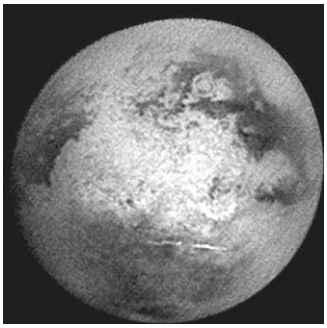
ON CONNECTION BETWEEN TECTONIC GRANULATION AND ENIGMATIC OBLONG SHAPE OF MARS; Kochemasov G.G., IGEM of the Russian Academy of Sciences, 35 Staromonetny, 119017 Moscow, kochem.36@mail.ru

The third theorem of the wave comparative planetology states: "Celestial bodies are granular" [1-6]. Moreover, cosmic observations of the last fifty years have shown that these tectonic grains are not randomly sized but occur in a close relation with bodies' orbital periods (orbital frequencies). Higher frequency – smaller tectonic grains and, vice versa, lower frequency – larger grains. Some grains (craters, rings, multi-ring concentric structures) on solid surfaces of planetary bodies have a random impact nature, but the prevailing majority has a wave woven nature. They are distinguished by grouping in lines and grids, normally in a shoulder-to-shoulder pattern, even diameters. Moreover, a granulation pattern on solid surfaces is reproduced in atmospheres (where they are present) proving the regular wave character of their origin [7].

Origin of the warping waves is due to elliptical keplerian orbits causing in periodically accelerating and slowing celestial bodies inertia-gravity waves. They have in rotating bodies four interfering ortho- and diagonal directions [8]. As a result, grids and lines of even sized shoulder-to-shoulder rings (craters) are formed [1-5, 7]. A row of tectonically granulated bodies is in Fig.1-6, where all diameters are reduced to one size. Their orbital frequencies diminish from Titan to Mars and granules sizes, consequently, increase. Titan (radius, R 2913 km, orbital frequency 1/15.9 days, granule diameter πR/91), Callisto (2445, 1/16.7, πR/88), Moon (1738, 1/27.3, πR/48), Mercury (2440, 1/88, πR/16), Earth (6378,1/365, πR/4), Mars (3397,1/687, πR/2). The first five bodies have rather spherical shapes; Mars has a surprisingly elongated shape (Fig. 7). Small warping waves inscribed in globes do not change much their sphericity, but large martian waves inevitably significantly deform body making it oblong and ellipsoidal (Fig. 7).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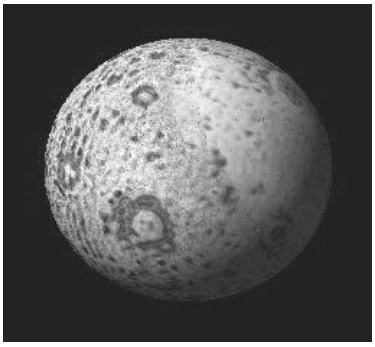
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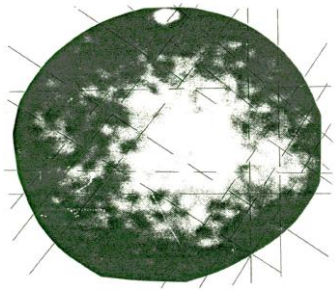
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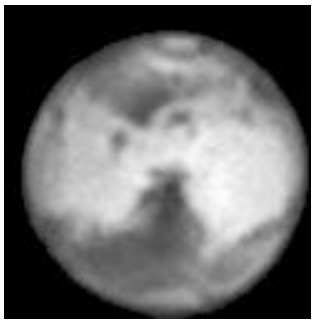
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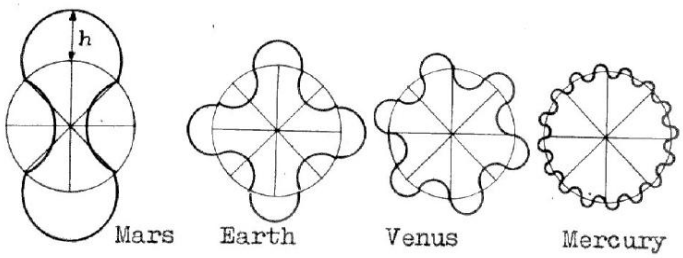
Mars' peculiar shape is vividly underlined by its geoid (areoid) form (Fig. 8-9). Two bulges are separated by two depressions. Geoid and venoid forms are much smoother. Thus, the martian orbit producing very long body shaping standing waves is responsible for the oblong shape of Mars. Two its satellites sharing with it the same circumsolar orbit also have oblong shapes contrary to the other four bodies of the terrestrial group - 3 melons against 4 watermelons [3].

. 7



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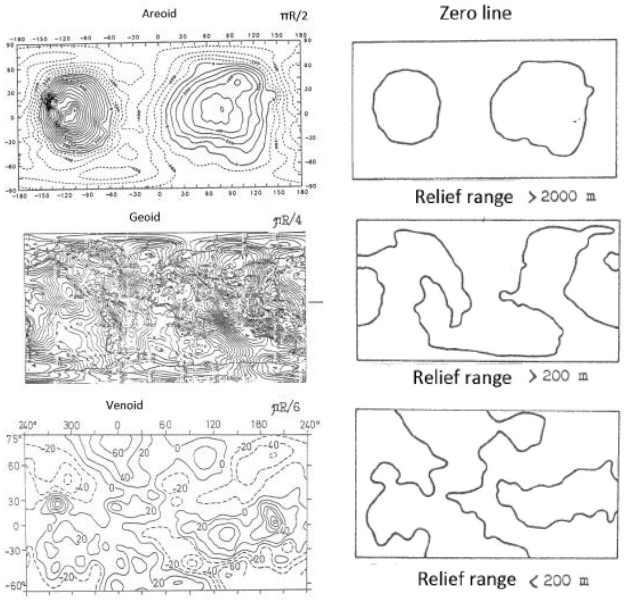

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Fig. 1-6. Full disk images of celestial bodies in order of diminishing orbital frequencies.

Fig. 1. Titan, PIA06154; **2**. Callisto (Voyager image); **3**. Moon, Kaguya mission, forum.worldwindcentral.com; **4**. Mercury [9]; **5**. Earth, PIA04159, (the MRO image from the distance of 1.2 mln.kms); **6**. Mars (image 314_2, Jaime Fernández, telescope Clestron 9.25, Valdemorillo, Spain); **7**. Scheme of tectonic granulations of terrestrial planets. The martian orbit requires large granules and a loss of sphericity. **8-9**. Geoid forms of Venus, Earth, and Mars. Areoid has two large bulges and two depressions making an oblong shape of the body.

References:

[1] Kochemasov G.G.(1992) Concerted wave supergranulation of the Solar system bodies // 16th Russian-American microsymposium on planetology, Moscow, Vernadsky Inst. (GEOKHI), Abstracts, 1992, 36-37. **[2]** Kochemasov G.G. (1993) Relief-forming potential of planets // 18th Russian-American Microsymposium on Planetology, Moscow, Vernadsky Inst. (GEOKHI), Abstracts, 1993, 27-28. **[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 microsymposium on planetology, Moscow, Vernadsky Institute (GEOKHI), 1994, 44-45. **[4]** Kochemasov G.G. (1996) Inner planets and asteroids: diminishing sphericity and growing lowland/highland compositional dichotomy with increasing solar distance // 24th International Microsymposium on Planetology, Vernadsky Inst.(GEOKHI), Moscow, Abstracts,1996, 40-41. **[5]** Kochemasov G.G. (1998) 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. **[6]** Kochemasov G.G. (1999) Theorems of wave planetary tectonics // Geophys. Res. Abstr.1999. V.1, №3, p.700. **[7]** Kochemasov G.G. (2003) Coherent structurization of the Earth’s geospheres from core to atmosphere and lithospheric weakness zones favourable for concentration of metals // Global Tectonics and Metallogeny, Vol. 8, # 1-4, June 2003, p. 209-212. **[8]** Kochemasov G. G. (2004) Mars and Earth: two dichotomies – one cause // In Workshop on “Hemispheres apart: the origin and modification of the martian crustal dichotomy”, LPI Contribution # 1203, Lunar and Planetary Institute, Houston, 2004, p. 37. **[9]** Slade, M.A. et al. (1992) Mercury: the radar experiment from Earth. Science, v.258, 635-640.