

Orbital energy – a main source of structuring force for celestial bodies

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The classical planetology considers impacts as a main source of energy reworking surfaces and partly the deeper spheres of celestial bodies. However a region or regions of origin of impacting objects affecting all without exception planetary bodies in all parts of the Solar system is poorly understood. At the same time planetologists now have several tens of images of full discs of these bodies. Distribution patterns of “impact traces” – craters in many of them are surprisingly regular. They show alignments, regular grids not related to random hits expected from impacts but rather require more regular and ubiquitous structuring force. Moreover, such regular patterns appear in the outer gaseous spheres of some bodies including the Sun’s photosphere.

It was shown earlier [Kochemasov, 1995-2013] that such regular patterns appear due to warping action of inertia-gravity waves affecting all bodies moving in keplerian elliptical orbits. Periodically changing accelerations of celestial bodies cause their wave warping having in rotating bodies (but all bodies rotate!) four ortho- and diagonal directions. An interference of 4 directions of standing waves brings about a regular net of uprising, subsiding and neutral tectonic blocks. Naturally polygonal in details they appear as rings in cosmic images. This is one of reasons why they are often confused with round impact craters and essentially disfigure their statistics.

A fundamental nature of the wave woven nets of even sized round “craters” (granules) is dependence of the “crater” sizes on orbital frequencies of bodies. The lower frequency the larger sizes, the higher frequency the smaller granule sizes. One could compare 5 bodies with widely differing orbital frequencies, sizes and compositions: Titan (1/1594), Callisto (1/1669), Moon (1/2732), Mercury (1/8797), Earth (1/3653). Images of their discs “peppered” with round features diameters of which precisely correspond to their orbital frequencies witness that such tectonic patterns can originate due to orbital energies. “Orbits make structures” – this short notion adequately reflects the expressed above observations.

The existing correspondence between orbital frequencies and tectonic granulations proving the structuring role of orbital energy was earlier noted in comparative planetology of the terrestrial planets. The row of Mercury, Venus, Earth, Mars, asteroids with decreasing orbital frequencies is remarkable by increasing relative sizes of tectonic granules, relief ranges, iron content in lowland basalts and decreasing atmospheric masses from Venus to Mars.