

Origin of the Moon and its water

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Abstract. *Orbits make structures. Two “sister” planets Earth and Venus principally are different in having a satellite: Earth has it, Venus not. Separation by densities started very earlier – in the primordial dust (debris) clouds. More amplitudinal wave action created in the terrestrial zone the outer lunar sub-zone. Wave throughing out of lighter and volatile rich material from the Earth primary dust zone results in the Moon creation. Water is in lunar depths but dries on surface by cosmos. Two lunar problems – origin of the Moon and where water came from – solve one scenario. Probably, for the first time.*

Аннотация. *Происхождение Луны и ее воды. Орбиты делают структуры-стержень новой волновой планетологии и геологии. Две планеты «сестры» - Земля и Венера резко отличаются тем, что первая имеет спутник, вторая-нет. Плотностная волновая сепарация началась в первозданном газо-пылевом облаке (и в зонах планет) рано, еще до сборки планет. Более амплитудная волновая акция привела к созданию в земной зоне лунной под зоны, обогащенной менее плотными материалами и летучими, в том числе водой. Волновой выброс этих материалов привел к созданию Луны. Вода есть в лунных глубинах, но ее поверхность иссушена космосом. Две лунные проблемы-происхождение спутника и откуда взялась вода – решаются одним сценарием. Вероятно, впервые.*

The comparative wave planetology [2-8] demonstrates graphically its main conceptual point: orbits make structures. The structures are produced by a warping action of stationary waves induced in bodies by non-circular orbits with periodically changing bodies' accelerations. A geometric model of tectonic granulation of planets is a schematic row of even circles adorned with granules radii of which increases in direction from Sun to the outer planets (Fig.) It was shown that the granule radii are inversely proportional to the orbital frequencies of planets. Thus, there is a following row of these radii: Mercury $\pi R/16$, Venus $\pi R/6$, Earth $\pi R/4$, Mars $\pi R/2$, asteroids $\pi R/1$. It was also shown that these radii well correlate with planetary surface “ruggedness” (Fig.). This observation led to a conception of the “relief-forming potential of planets” [4-5]. Therefore, this potential is rather weak in Mercury and Venus, rather high in Mars and intermediate in Earth. Certainly, orbital eccentricities were even higher at the earlier stages of planetary formation, in debris zones of their accretion causing scattering debris material. This scattering was small at Mercury' and Venus' zones, large at the Mars' zone and intermediate at the Earth's zone. Consequently, gravity kept debris in the first zones, allowed them escape in the Martian zone, and allowed to separate an outer sub zone near the Earth's zone or around not fully consolidated (accreted) Earth [5].

Rejecting the giant impact hypotheses of Moon formation as contradicting the fact of the universal wave induced tectonic dichotomy of celestial bodies (Theorem 1 [2-3]) we consider a formation hypotheses from primordial debris in a near-Earth heliocentric orbit (actually the outer part of terrestrial zone), or in a circumterrestrial orbit. Wave scattering of primordial material from an accretion zone is a normal process traces of which we observe now as satellites around all planets except Venus and Mercury (both with smallest granules). Therefore, Venus during its formation was not able to throw away enough solids to form a satellite. Earth with the larger amplitude of its granule forming waves produced enough solids to make a satellite. Mars with still

larger granule forming waves threw away a lot of material but its small gravity keeps now only two tiny satellites. Moreover, what is important in this wave debris scattering process, the outer zones become enriched in less dense and volatile (Including H₂O) satiated material [5].

The Martian body itself warped by huge waves lost a lot of its mass and is semi-destroyed. In the asteroid belt still larger wave (granule size $\pi R/1$, and in the 1:1 resonance with the fundamental wave!) scattered away almost all primary material and there was no chance to accrete any decent planetary body. In the outer Solar system, large planets with important gravities keep “exuberant” satellite systems and debris rings. The comparative wave planetology, thus, introducing the conception of structuring warping waves, is not surprised by the Moon appearance. What is needed, just to recognize a special position of Earth in the planetary sequence determining its orbital frequency and thus a size of its tectonic granulation(Fig., [5]).

Lunar relief range is about 18 km; it is less than the terrestrial one - 20 km. In the row of terrestrial planets there is a rather well correlation between radii of tectonic granules (Fig.) and surface relief ranges [4-5]. The relief ranges also increase with solar distances of planets. They are Mercury 10 km, Venus 14, Earth 20, Mars ~30 km. However, the Moon being a satellite has two orbits: around Sun and Earth. Two orbits, thus, influence its relief-forming potential. Induced by the terrestrial orbit (1/1 year frequency) 20 km range has to be diminished (smoothed) by the fast 1/1month frequency orbit producing rather small relief range.

In the Figure, there is a relative representation of the wave action in the circumsolar dust (debris) zones before the planets accretion. The inner mercurian zone is richer in denser material than the Martian zone. Earth and Venus' zones are in the middle. Wave's amplitudes rise from Mercury to Mars. Two outer planets-Earth and Mars – have amplitudes able to separate outer rich in volatiles and less dense materials satellites zones from their parental planets zones. Venus comparable by size

and density to Earth cannot create satellite by the wave action – its gravity and smaller wave hinder it. Thus, Earth must have satellite, Venus not. The Moon must be less dense than Earth and rich in volatiles (including H₂O). Its outer regolith shell is dried by cosmos. The rich in volatiles regolith is layered – water helps to do it as well as lunar trembling [8]. The regular row of planets characteristics and densities justifies occurrence of Moon near Earth (and their common origin) to diminish the common density. Two lunar problems: origin of the satellite and a source of water, one scenario can solve. Probably, for the first time.

A number of previous works (just to site some [9-10]) dealt with H, OH distribution on the lunar surface mainly referring to meteoroid impacts or solar wind. The recent

SOFIA experiment showed spectral signature of molecular H₂O [1]. Scientists believe that water ice is on both lunar sides. I try to show that hidden endogenous water must be characteristic for the Moon [5].

Conclusion: The regular row of the inner planets characteristics including relief ranges, wave warping and densities implies wave separation of Moon from Earth on the stage of processing in the dust (debris) cloud. The Moon must be rich in the less dense material and volatiles, including H₂O. Cosmos dries the outer regolith shell of the satellite. “Sister” planets Earth and Venus differ by satellite: Earth has one, Venus not. The reason is in their different orbits. Two lunar problems – origin and source of water – solve one scenario meaning separation of the lunar rich in less dense minerals and volatiles subzone from the Earth zone.

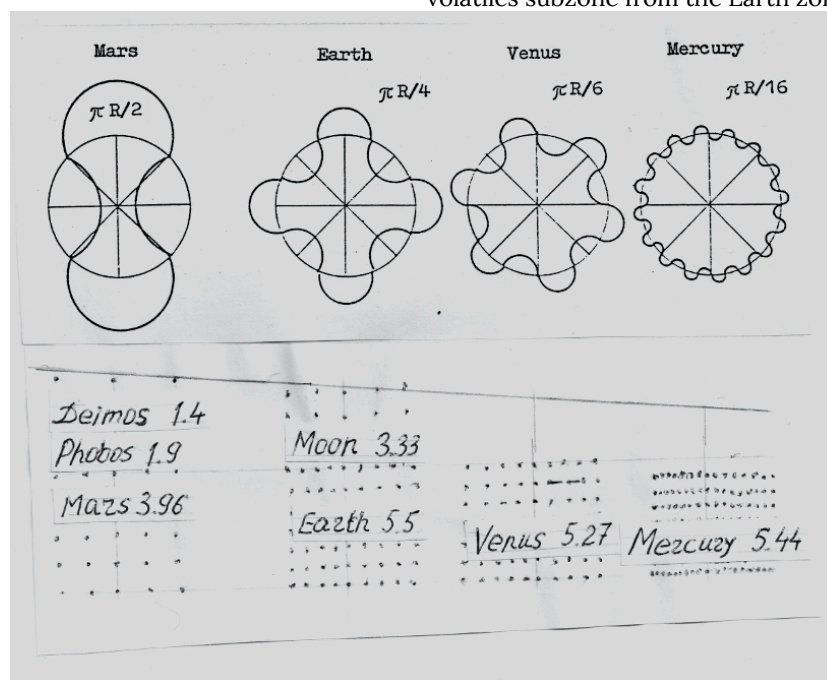


Fig. Graphical representation of the inner planets wave warping (upper section) and their primordial dust (debris) zones with various densities and wave layering (lower section)

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