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# Three not adequately understood lunar phenomena investigated by the wave planetology

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The lunar science notwithstanding rather numerous researches of the last 50 years still debates some important issues. Three of them concern an origin of mascons, the deepest but low ferruginous South Pole-Aitken depression, a strange character of the frequency-crater size curve. Prevailing approaches are mainly based on impacts having made the present geomorphology of the Moon. However practically are ignored the fact of antipodality of basins and marea, a complex character of the frequency-crater size curve obviously implying an involvement of different sources and reasons responsible for crater formation. Attempts to find impactor sources in various sometimes very remote parts of the Solar system are too artificial, besides they do not explain very intensive, like lunar cratering of Mercury. Saturation of the lunar surface by ~70-km diameter craters is very strange for random impacts from any source; to find a time interval for this saturation is difficult if not possible because it affects formations of various ages. Lunar basins and marea completely contradict to a classical frequency- crater size curve. Their presumed ( and measured) different ages make dubious existence of one specialized impactor source. So, if one accepts an impact process as the only process responsible for cratering (ring forms development) then the real mess in crater statistics and timing never will be overcome. The wave planetology [1-3 & others] examined by many planets and satellites of the Solar system proved to be real. In a case of the Moon it can help in answering the above questions. First of all it should be admitted that the complex lunar crater (ring forms) statistics is due to a superposition and mixing of two main processes (a minor involvement of volcanic features is also present): impacts and wave warping. “Orbits make structures” – this is to say that keplerian elliptic orbits and thus periodically changing accelerations is the reason of warping waves affecting celestial bodies. In rotating bodies (but all bodies rotate!) this warpings are decomposed in 4 ortho- and diagonal directions. Interfering these directions give ring (polygonal) forms often observed in crater walls. Sizes of these ring forms depend on the warping wavelengths. The fundamental wave 1 gives ubiquitous tectonic dichotomy (in the lunar case, the near subsided and the far uplifted – bulged hemispheres – segments). The wave 2 divides these segments in uplifted and subsided tectonic sectors (The SPA basin is one of these sectors). All this already complex lunar morphology is complicated by tectonic granulation. Sizes of granules are inversely proportion to orbital frequencies. As the Moon as a satellite has two frequencies thus it has two sizes of granules. The larger one is due to common with Earth a yearlong orbit, the smaller one due to a monthly orbit. These two sizes (70-100 and 600-1000 km) complicate the classic impact curve by a surplus of craters of these sizes (the 70-km crater saturation is easily explained). The wave nature of basin formation explains why some of them are with mascon and others without. Uplifted ones (thus more eroded and seemingly older) acquired additional angular momentum and do not need additional dense roots. Subsided ones loosing in planetary radius need additional dense masses (mascons) to restore angular momentum. So, two varieties of basins are links of one wave chain (the wave nature is also proved by their “mysterious’ antipodality). The low-Fe of SPA is due to its belonging to the uplifted far side segment mantle of which is lighter (that is richer in Mg, with increased Mg/Fe) than mantle of the subsided near side segment where Fe-rich mare basalts are typical. References: [1]. Kochemasov G.G. Concerted wave supergranulation of the

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