

ABOUT THE CAUSE OF ASYMMETRY OF PLANETS SURFACE ON MARS
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Many planets of Solar system, among them Earth, Mars, and Moon have obvious morphological asymmetry of a surface. Most brightly this asymmetry is expressed on Mars, surface of which is dismembered by means tectonic border at two hemispheres. There are the tectonics passive – southeast “continental” hemisphere, and the tectonics active northwest – “sea” hemisphere. Surface of a passive hemisphere is raised above a level of active hemisphere on 4-5 km. She is richly covered by large craters which have diameter of tens - hundreds km. Surface of a sea hemisphere is mainly represented by smooth plains. Quantity of her craters is not large [1]. Craters of continental and sea hemisphere differ not only by quantity, but by a different structure and formation time [2] and also by function of sizes distribution [3, 4].

The specified features of distribution of Mars craters may be explained by fall on planet of two different types of cosmic bodies [3]. The first are asteroids and comets of Solar system, and the second – comets of Galaxy. First bodies type is falling quite regularly all time and forming craters mainly in an equatorial zone of Mars. Second bodies type bombards a planet through each 20÷37 million years in rather short epochs (~1-5 million years) of Sun stay in jet streams and spiral branches of Galaxy [4].

Owing to inclination of the ecliptic plane to the galactic plane on corner 60°, the area bombarded by comets moves over planet surface with the period of orbital movement of Sun in Galaxy ~223 million years [4]. In consequence of modern position of Sun on galactic orbit three last bombardments of Solar system by galactic comets took place basically in southern hemisphere of planets. In particular, on Mars, as we suppose, it has resulted in abrupt asymmetry of his southeast and northwest hemisphere.

Galactic comets basically are consisted of water ice and other frozen gases. Comets nucleuses have density ~1 g/sm³, and their

diameter, weight and energy accordingly are 0.1÷3.5 km, 10⁹÷10¹⁴ kg and 10²⁰÷10²⁵ J [7]. During one bombardment ~10⁴-10⁶ galactic comets may fall on Mars and Earth. In result on planets without a gas environment or with very rarefied atmosphere as at Mars, a surface sites bombarded by galactic comets completely are sated with large craters. The craters density here reaches theoretical limit is 100 craters in diameter of ≥10 km on area 1 million km² [3].

In gas environments of planets a nucleuses of galactic comets intensively evaporate. They lose of mass and are decreasing in size [7]. As a result of this process a comets craters even on Mars with his strongly rarefied atmosphere have diameters systematic less, than on Moon completely deprived of gas atmosphere (fig.).

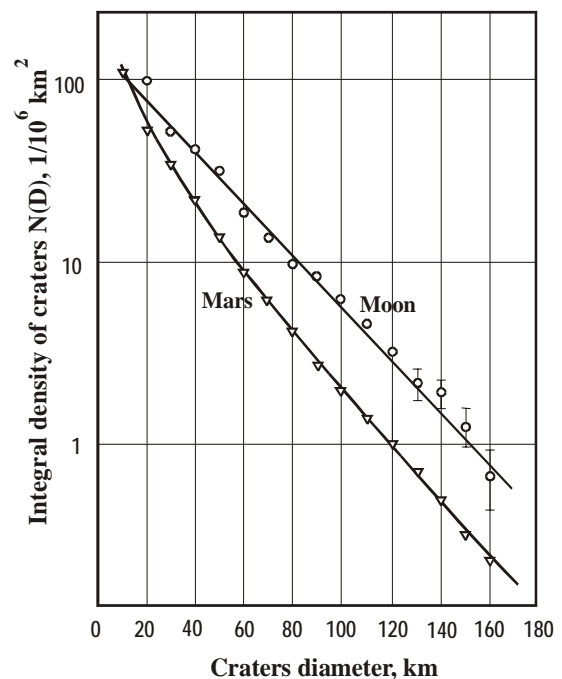


Fig. Comparison of integrated craters distributions for continental hemispheres of Mars and Moon completely sated by comets craters. Distributions of craters are constructed on the data [6].

The differences in craters distributions of Mars and Moon in the field of the big sizes can be explained by reduction of a comets

nucleuses diameter approximately on 300 m owing to their evaporation in a Martian atmosphere. Surplus on Mars of small craters in comparison with Moon is produced by destruction of a comets nucleus in an planet atmosphere [7].

Much more dense, than at Mars, gas environments of Earth and Venus are practically impenetrable for galactic comets [3]. In dense atmosphere of these planets galactic comets inevitably perish with formation of a hypersound shock wave to which the basic energy of galactic comets is given. At this case after of achievement by a wave of solid planetary surface a huge kinetic comet energy goes not on creation of a crater, and may be spent mainly for warming up and fusion of big local zones of rocks deeply under impact place [7]. On the Earth these zones directly display themselves as magmatic cameras. Under thin ocean plates such cameras may exist during of hundreds millions years. This cameras deliver big volumes of a lava on surface of modern ocean bottom and participate in construction of submarine mountains [8].

Mars in this respect, obviously, differs from Earth and Venus. The big part of comets energy here is spent for craters formation, and her essentially smaller part is transferring to shock wave. Besides in conditions of Mars a influence of shock waves on a lithosphere, apparently, is not so concentrated as on Earth and on Venus and a shock waves energy basically goes into heating Martian astenosphere. Thus laves outpouring on a Martian surface, as supervision testify, has the subordinated character and obviously concedes to scales of this phenomenon on Earth and Venus.

Whereas a falls of comets are very intensive, and a conduction cooling of an astenosphere has very small speed, this should create strong swell of Martian surface which has undergone comets bombardment.

According calculations which are similar executed in [8], for an explanation by this mechanism of an difference in heights of continental and sea hemisphere of Mars, it is necessary to assume that astenospheric

layer of significant thickness should be under continental hemisphere. Thickness of this layer may be $\sim 100\div 250$ km in dependence on a degree of his substance smelting. This estimation coincides with size of a layer astenosphere under continents of the Earth [9]. Occurrence on Mars such astenosphere may be connected to his bombardments by galactic comets in cenozoic.

So at moving the Sun in Galaxy comets bombard serially [10] as southern as well as northern hemisphere of Mars, the astenospheric layer may migrate in a body of a planet, both its continental and sea hemisphere through half of galactic year may exchange place.

This opportunity pulls together Mars and Earth especially, because on our planet continental plates gather periodically together, forming supercontinents near South Pole [11], exceptionally into epochs when comets bombard her southern hemisphere.

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