THE MORPHOMETRIC ANALISYS OF THE FEATURES OF MARTIAN CRATERS (10 – 20 km). I.A. Ushkin[1], G. G. Michael[2]. 1. Moscow State University, Vorobjovy Gory, 119899, Moscow, Russia, gray_pigeon@mail.ru . 2. ESA, Noordwijk, the Netherlands. greg.michael@rssd.esa.int.

In our work [1] we got data for 87 large martian craters with diameters from 110 up to 411 km (Fig.1). In the present work the morphometric parameters for 180 small martian craters (with diameters from 10 up to 20 km) [2] have been determined: depth of a crater- ΔH, height of a rim – h, with the help of profiles constructed on the basis of supervision of space vehicle MGS [3].The comparison with similar morphometric parameters of small lunar craters [5] also is fulfilled. An attempt of an estimation of thickness of layer of regolith of the planet as result of distribution of approach from the work of Melosh [4].

The following extreme parameters of sizes 10-20 km are received: the maximal values of them are those: <ΔH> =1668 m, <h> =612 m. Their minimal values the following: <ΔH> =54 m, <h>~0 m. Figure 2 show one of characteristic half profile. Comparison of the received results with morphometry of lunar craters [5] has been lead.

As result of generalization of calculations we obtained the following dependence (Fig.3): A degree of degradation – crater's depth.

ΔH(RD)= -139,8*RD+878,2 for the Mars,

ΔH(RD)= -620*RD+3300 for the Moon.

And a degree of degradation - height of a rim (Fig.4):

h (RD)=-17,4*RD+168,6 for the Mars,

h (RD)=-67*RD+545 for the Moon

The height of lunar crater rim [5] for the same degree of degradation is more than for the height of martian crater rim.

Graphic generalization of results in the following conclusion: for the same degree of degradation such morphometric characteristics of lunar craters as depth and height of a rim are expressed more strongly, than at martian craters. It is a result of stronger gravitation on Mars (as speech here goes about large craters for which its role is especially important), and also active atmospheric processes.

Estimation of thickness of layer of regolith.

Geological targets are not homogeneous and isotropic and have no ideally flat surface. In real situations we deal or with layered targets, or with the targets consisting from casual of rocks with various mechanical properties, but influence of these roughnesses of a relief on process of formation of a crater till now is badly investigated.

The most investigated case - a layered target: the soft layer lays on strong material (it is investigated at the end of 60-th [4]). It has been found, that the morphology of a resulting crater strongly depends on the relation of diameter of a crater on a crest of a rim (D) and thickness of a layer. Process of an estimation of thickness a layer of regolith of a planet on this method (more detailed description of it can be found in [4]) is reduced first of all to correlation of a crater with one of four characteristic morphological attributes – presence of the central hill, a flat bottom, a concentriccrater and normal morphology.

In our work we got the senses for layer of regolith such as: maximum thickness of layer of regolith is more 3 km and minimum thickness of layer of regolith is less than 1,2 km.

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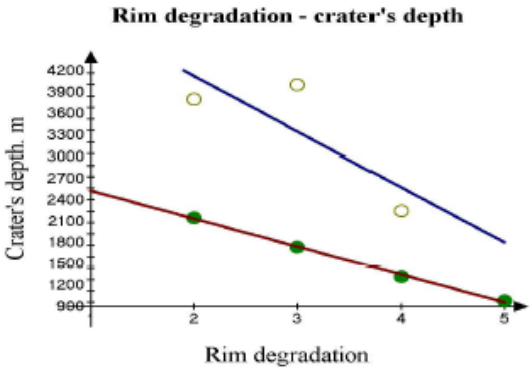

Figure 1. Dependence "rim degradation – crater's depth" for diameters 110-411 km (brown line – for Mars, blue line – for the Moon)

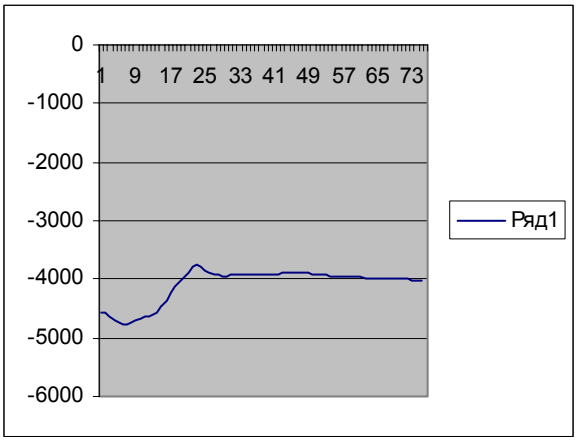

Figure 2 Characteristic half profile (coordinates: latitude 60,9º , longitude 157,2º; diameter – 12 km)

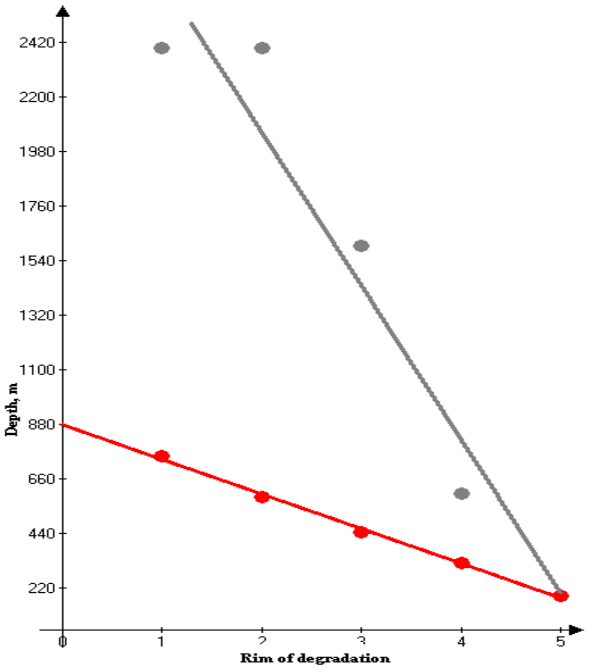

Figure 3. Dependence "rim of degradation – crater's depth" (red line – for Mars, gray line – for the Moon)

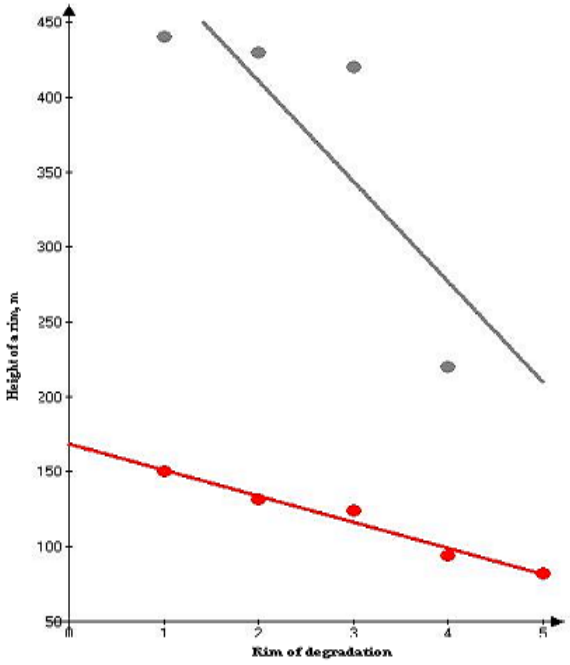

Figure 4. Dependence "rim of degradation – height of a rim" (red line – for Mars, gray line – for the Moon)