

THE DEPTH/DIAMETER RATIO OF MERCURY CRATERS ACCORDING TO THE TYPE OF UNDERLYING SURFACE. E. A. Feoktistova¹, Zh. F. Rodionova¹, A. Yu. Zharkova^{1,2}, I. Yu. Zavyalov²

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Introduction: We investigated the influence of the type of underlying surface on the depth of Mercury craters. The depth of craters usually changes during the crater's existence after formation: the crater wall can be fault, the crater floor can be flooded with lava [1]. Therefore, we considered only relatively fresh, high-preserved craters. Three types of underlying surface are distinguished on Mercury by analogy with the Moon [2]: highland, plains and the transition zone between highland and plains. 18.5% of the craters of Mercury with $D \geq 10$ are located on the highland, 36.6% on the plains and 45.6% in the transition zone [3].

In our study, we used the data of new Global catalog of Mercury craters which was created by SAI MSU and Moscow State University of Geodesy and Cartography using a global mosaic of images of the Mercury surface according to the MESSENGER spacecraft. [3]. The global mosaic DEM with a resolution of 665 m / pixel, obtained by the MESSENGER probe, was used to create this catalog. The catalog consists of two parts. The first part is a morphological catalog of craters with a diameter of 10 km and more. Currently, the Morphological catalog of Mercury craters includes 12 265 craters ≥ 10 km in diameter. The morphological description of craters was made according to the technique developed at SAI MSU [2]. Craters in the catalog are divided into 5 classes: 1- high preserved rim; 2 - preserved rim; 3- smooth rim; 4 —destroyed rim; 5 - wholly degraded rim according to the degree of preservation.

We considered craters of 1 and 2 degrees of preservation. These craters have a high-preserved structure and do not have faults on the slopes. According to our catalog, the 1st class includes 290 craters with $D \geq 10$ km (or 2.3% of the total number of craters of Mercury [3]), and the 2nd - 1861 craters (15%). We only used craters that have no lava on the crater floor. In total, 189 such craters of the 1st class of preservation and 1322 of the second were investigated.

The diameter of the 1st class craters without lava on the floor does not exceed 60 km, the diameter of the 2nd class craters without lava at the floor does not exceed 50 km (Fig1, 2).

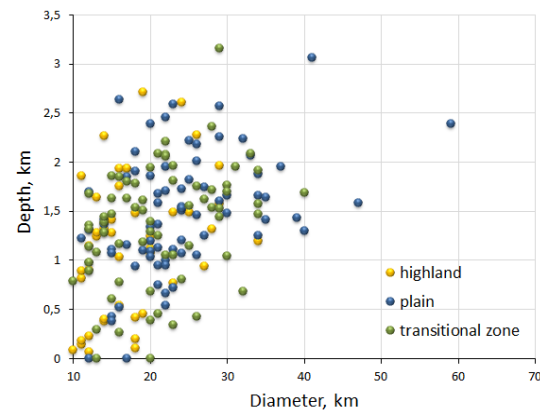


Figure 1. Dependence of the depth of the 1st degree of preservation of Mercury craters on the diameters.

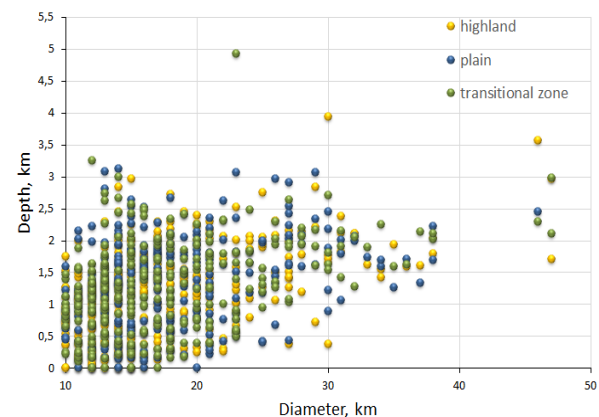


Figure 2. Dependence of the depth of the 2nd degree of preservation of Mercury craters on the diameters.

According to the results obtained, the depth of most of the craters of Mercury of 1 and 2 degree of preservation lies within 0.1 - 3 km, regardless of the type of surface on which this crater is located (Fig. 1, 2). We compared these results with those for lunar craters. For this, lunar craters of the 1st

and 2nd degrees of preservation were selected according to the classification from [3]. The data on the crater depths were obtained from [5 - 7]. We have found that the depth of well-preserved craters on the Moon increases with increasing diameter (Fig. 3). No such dependence was found for the craters of Mercury.

In general, as previously assumed, the depth of well-preserved craters of Mercury is less than the depth of the craters of the Moon with the same diameters.

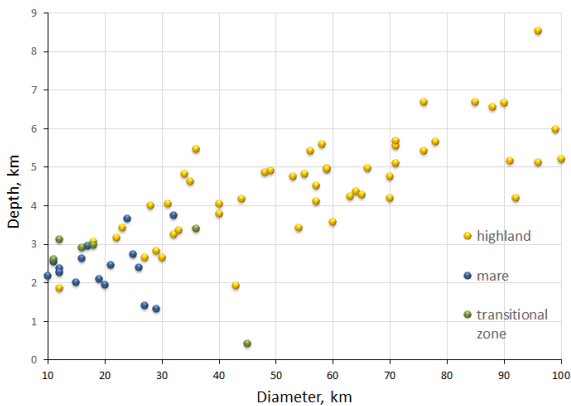


Figure 3. Dependence of the depth of the 1st and 2nd degree of preservation of Moon craters on the diameters

References:

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