



An area with high density of craters on the lunar surface.

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In previous studies [1, 2] on the lunar surface were detected areas with high density of craters. One such area is located to the north of the Mare Orientale and to the west of the Mare Imbrium in the highland region placed between 0° N and 70° N, and between 160° E and 290° E. In this area there are such large craters as Mach (182 km) and Landau (225 km). According to data from GRAIL mission [3], the crust thickness in this area varies from 30 km in the eastern part up to 60 km in the western part.

We investigated the distribution of the impact craters in this region using the Morphological Catalogue of Lunar Craters [4]. The characteristics, such as crater number, coordinates, diameter and morphological features, for 15000 craters with diameter more than 10 km are contained in this catalogue. All the craters in the catalogue were divided into five class of degradation: from class 1 (youngest craters) to class 5 (oldest, most destroyed craters).

According to our research, the number of craters with a diameter of more than 10 km in the area reaches 4604, accounting for 31% of the total number of craters with a diameter of more than 10 km on the moon. Thus the crater density in this region is 658 craters per 1 million km^2 . This value is much higher than the estimates of the mean crater densities for the lunar highlands (442 craters per 1 million km^2), maria (73 craters per 1 million km^2) and South Pole Aitken basin (393 craters per 1 million km^2) obtained in previous studies [2,5]. The study of the distribution of craters by diameter revealed that the density of craters with a diameter of ≥ 30 km in the same area as a whole on the Moon. At the same time, in this area there is a significant increase in the craters with a diameter of $10 < D < 30$ km: 35 % of the total number of craters on the moon. The main part of them are high-preserved craters: 1, 2 and 3 class of degradation (41, 34, and 40% of the total number of craters of these classes on the entire surface of the moon). It is assumed that the craters classes 1 and 2 were formed at the end of heavy bombardment, which occurred 3.8 - 4 billion. years ago. The reasons for this cluster of high-preserved craters in this area are unclear. Perhaps these craters formed by ejections during the formation of any large crater or basin.

References:

- [1] Rodionova et al., Tr. Gos. Astron. Inst. im. Sternberga, 1989a, vol. LXI, pp. 356–376.
- [2] Rodionova et al., Astron. Vestn., 1989b, vol. 23, no. 1, pp. 50–59.
- [3] <http://ode.rsl.wustl.edu/moon/indexDatasets.aspx>
- [4] http://selena.sai.msu.ru/Home/Moon_Cat/moon_cat.htm
- [5] Rodionova et al. , 2000, Solar System Research. V. 34, No 5, p.390-397.