



## GIS-study and new Geomorphologic Mapping of Phobos

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Using raw images and processed orthoimages, obtained from “Mars Express”, we have created a new GIS-catalog of grooves. During analysis, new grooves, not identified in earlier mapping attempts, were detected. For craters study the previously created catalog of craters with  $D > 200$  m [1] was used. The spatial orientation of individual grooves was estimated, which allows us to group them into several sets. All grooves in the catalog were divided into three morphological types: gutters (simple line depressions), chains of contiguous funnels, chains of noncontiguous funnels.

Studying craters we paid attention to its inner and outer morphology. The shape of some craters is different from the isometric. Among them were identified elliptical and polygonal craters. The study of inner morphology showed, that there prevails simple bowl-shaped craters. Also we identified a small population of craters with complex internal morphology [2], which, by analogy with similar lunar craters [3], divided into flat-bottomed, with a central mound and concentric craters. Moreover, based on elevation data, obtained from global digital elevation model [4] and calculation of relative depth, craters with  $D > 2$  km by the stage of degradation were classified.

Focusing on a combination of grooves and craters, we have identified 15 morphological regions. A morphological unit was defined as a region with a certain type of relief, which differs from surrounding areas by the presence, orientation and spatial relations of groove systems and large craters (over 200 m). Each region may have its own geological history and consequently, specific history of regolith exposure.

Finally, two geomorphologic maps of Phobos were created. One map represents the spatial distributions of grooves including their classifications by morphological types. The identified morphological regions are shown, and relief characteristics of these regions are briefly described. Geomorphologic map of craters shows the spatial distribution of craters with  $D > 200$  m. Based on results of morphological analysis of Phobos surface we have suggested new symbols for planetary mapping, based on new classifications of relief features: morphological types of grooves and impact craters. With specially developed symbols classifications of craters by inner and external morphology and by stage of degradation (only for craters with  $D > 2$  km), avalanche features are shown. For grooves without classification and ejecta deposits representation the set of planetary symbols, developed in work [5], was used.

Studies of the Phobos were summarized in a new atlas of Phobos [6], a unique publication with 43 maps, including two maps mentioned above. To continue a series of terrestrial planets maps [7] the wall map of Phobos grooves has been compiled. The new maps and atlas will be presented at the conference. The relief features catalogues that were used for geomorphological study will be available through MExLab Planetary Data Geoportal [8].

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