



Creation of a new global geomorphological catalog of Mercury's craters based on the latest MESSENGER data

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Catalogs of impact craters – not only a layers of objects in GIS but complete databases containing the morphometric and geomorphological characteristics – can help to solve such fundamental problems as the estimation of parameters of populations of impactors that collided with the surface of the planet throughout its history, as well as to clarify the processes of crater formation in the Solar System.

Currently, there are few global catalogues of Mercury that includes big craters only. For example: 1) global digital GIS-catalogue of Mercury's craters created by the Braun University, USA. It is based on modern data gathered by MESSENGER and, along with approximately 9000 objects; it includes coordinates and diameters of large craters (> 20 km), exclusively. At the same time, it doesn't contain any geomorphological information; 2) the other source is a geomorphological catalogue that was composed by Sternberg Astronomical Institute (SAI), which, while containing geomorphological information, was created in accordance to data of Mariner 10 and was presented as a text in a table. The SAI's catalogue includes craters with a size of 10 km and larger.

Creation of a new global catalog of Mercury's craters based on the latest MESSENGER data is a comprehensive work. The catalog will consist of two subdirectories: 1) the geomorphological catalog of craters with a size of 10 km and larger; 2) the morphometric catalog of craters with a size less than 10 km. We use MESSENGER MDIS global mosaic of Mercury with resolution ~166 m/pixel and several MESSENGER DEMs – the first global Mercury DEM with resolution 665 m/pixel and four DEMs on Mercury quadrants with resolution ~222 m/pixel (which will be used for formation of a database of craters with diameters less than 10 km).

In addition to the required elements of any catalog (coordinates of craters and their diameters), we will be able to add full geomorphological description of craters, reduced to code designations (to simplify the implementation of the catalog in the GIS) and morphometric characteristics. For instance: 1) the diameter of the interior feature (flat floor, central peak, or inner ring); 2) depth and relative depth of each crater; 3) max and min slopes; 4) the average level of inclination of the external; 5) internal slopes of crater; 6) the ratio of volume of the crater rim to the volume of the bowl. The most of listed parameters can be calculated both for craters and for the surrounding

surface.

By using this catalog, we will be able to quickly get statistics and create thematic maps, for example, maps of crater density on regions of interest.

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