

NEW MERCURY MAPS AND GLOBE

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ABSTRACT:

We present first hypsometric full maps of the Mercury's hemispheres, which form the basis for a globe. The development of a Mercury globe continues a series of globes of the terrestrial planets, including globes of Venus, Mars and the Moon (Fig. 1, 2, 3), created by Sternberg Astronomical Institute with support of Space Research Institute (Rodionova and Brekhovskikh, 2013). In anticipation of Bepi Colombo's mission (scheduled for launch in 2017) the development of Mercury globe acquires particular relevance.

1. MERCURY STUDY BASED ON MESSENGER DATA

Only parts of Mercury's surface were investigated based on Mariner 10 data until recently. The new images received by MESSENGER (2011-2015) encouraged the scientific community to explore Mercury's surface in more detail. For example, morphometric analysis of small craters proves that the regolith on Mercury is significantly thicker than on the Moon (Kreslavsky and Head, 2015); study of multi-ring objects shows that the frequency of concentric basins is greater in the western hemisphere (Rodionova and Blue, 2014); study of kilometer-scale topographic roughness of Mercury shows the dichotomy between the smooth northern plains and more heavily cratered terrains (Kreslavsky et al., 2014).

Multi-ring basins and ray systems were identified by global mosaics with resolution 220 m/px (http://messenger.jhuapl.edu/the_mission/mosaics.html) produced from MESSENGER'S MDIS (Mercury Dual Imaging System) Wide Angle camera images. Recognizing of smooth plains was based on the results presented in the work by Denevi et al. (2013).

MESSENGER's orbit was highly elliptical, therefore digital elevation models (DEMs) have been created for several parts of the planet and using different techniques (<http://ode.rsl.wustl.edu/mercury/index.aspx>; <http://europlanet.dlr.de/node/index.php?id=524>). For our work we used the global DEM (22000 m/px) derived from limb measurements (Elgner et al., 2014).

2. MAPPING OF MERCURY

The globe which we developed will be the first globe of Mercury based on a global DEM, which allowed us to create maps with contours and hypsometric scale (Fig. 4, 5). The choice of colour design was made according to previously published maps of Mercury (Blank map of Mercury, 1992; Maps of extraterrestrial territories, Mercury, 2008). All major objects, including large craters (> 100 km in diameter), are signed in English using the Planetary nomenclature (planetarynames.wr.usgs.gov/SearchResults?target=MERCURY).



Figure 1. Hypsometric globe of Venus



Figure 2. Hypsometric globe of Mars



Figure 3. Hypsometric globe of Moon

