

Geological mapping of the Kuiper quadrangle (H06) of Mercury

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Kuiper quadrangle (H06) is located at the equatorial zone of Mercury and encompasses the area between longitudes 288°E – 360°E and latitudes 22.5°N – 22.5°S. The quadrangle was previously mapped for its most part by De Hon et al. (1981) that, using Mariner10 data, produced a final 1:5M scale map of the area. In this work we present the preliminary results of a more detailed geological map (1:3M scale) of the Kuiper quadrangle that we compiled using the higher resolution of MESSENGER data.

The main basemap used for the mapping is the MDIS (Mercury Dual Imaging System) 166 m/pixel BDR (map-projected Basemap reduced Data Record) mosaic. Additional datasets were also taken into account, such as DLR stereo-DEM of the region (Preusker et al., 2016), global mosaics with high-incidence illumination from the east and west (Chabot et al., 2016) and MDIS global color mosaic (Denevi et al., 2016).

The preliminary geological map shows that the western part of the quadrangle is characterized by a prevalence of crater materials (i.e. crater floor, crater ejecta) which were distinguished into three classes on the basis of their degradation degree (Galluzzi et al., 2016). Different plain units were also identified and classified as: (i) intercrater plains, represented by densely cratered terrains, (ii) intermediate plains, which are terrains with a moderate density of superposed craters, and (iii) smooth plains, which are poorly cratered volcanic deposits emplaced mainly on the larger crater floors.

Finally, several structures were mapped all over the quadrangle. Most of these features are represented by thrusts, some of which appear to form systematic alignments. In particular, two main thrust systems have been identified: i) the “Thakur” system, a 1500 km-long system including several scarps with a NNE-SSW orientation, located at the edge between the Kuiper and Beethoven (H07) quadrangles; ii) the “Santa Maria” system, located at the centre of the quadrangle. It is a 1700 km-long system encompassing faults with a prevalent NNW-SSE orientation.

Once the mapping activity is accomplished, the geological map of Kuiper quadrangle will be integrated into the global 1:3M geological map of Mercury (Galluzzi et al., 2017).

References

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