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Updates on geologic mapping of Kuiper (H06) quadrangle

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1. Introduction

Kuiper quadrangle 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 [2] 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 MESSENGER data.

2. Data and Methods

The main basemap used for mapping is the MDIS (Mercury Dual Imaging System) 166 m/pixel BDR (map-projected Basemap reduced Data Record) monochrome mosaic compiled using NAC (Narrow Angle Camera) and WAC (Wide Angle Camera) 750 nm-images. In order to better distinguish the surface morphologies, MDIS mosaics illuminated with high solar incidence angle, both from east (HIE) and west (HIW) [3] have been considered. Moreover, to characterized the spectral features and topography of the surface, we used MDIS global color mosaics [4] and DLR stereo-DEM [5]. Because Kuiper quadrangle is located in the equatorial region, the map was produced in an equirectangular projection. Then, the quadrangle has been mapped using ArcGIS at an average scale of 1:400k for a final output of 1:3M.

3. Current results

So far, the western and norther part of quadrangle have been mapped (Fig.1). The preliminary geological map shows a prevalence of crater materials (i.e. crater floor, crater ejecta). Craters were grouped into three classes, on the basis of their degradation degree [6]:

-*C3 craters*. They represent fresh craters with sharp rim and extended bright and rayed ejecta;
-*C2 craters*. Moderate degraded craters whose rim is eroded but clearly detectable. Extensive ejecta blankets are still present;
-*C1 craters*. Very degraded craters with an almost completely obliterated rim. Ejecta are very limited or absent.

Different plain units were also identified and classified as:
- *Intercrater plains*. Densely cratered terrains, characterized by a rough surface texture. They represent the more extended plains on the quadrangle;
- *Intermediate plains*. Terrains showing a gently rolling surface with a moderate density of superposed craters. Intermediate plains are limited in extension and widespread all over the mapped part of the quadrangle;
- *Smooth plains*. Poorly cratered terrain with a planar surface. The most extended smooth plain has been detected on the surrounding of Rudaki crater. In the remaining cases, the plains are limited in extension and confined on the floor of the largest craters.

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) *Thakur system*, a 1500 km-long system including several scarps with a NNE-SSW trend, located at the edge between the Kuiper and Beethoven (H07) quadrangles;
ii) *Victoria system*, located between Kuiper and Victoria quadrangle (H02). It encompasses faults with a prevalent N-S and NNW-SSE trend, for a total length of 3500 km.

4. Conclusion and future work

At this stage, about 70% of Kuiper quadrangle has been mapped. Once the mapping activity is accomplished, the geological map will be merged

with the other mapped quadrangles [6,7,8,9,10,11] and integrated into the global 1:3M geological map of Mercury [1], which is being prepared in support to ESA/JAXA (European Space Agency, Japan Aerospace Agency) BepiColombo mission.
The following step regards specific targets of interest, detected during the mapping activity, which can be studied at higher resolution, integrating geomorphologic and spectral analysis. One of these targets will be Renoir basin that shows a variety of geologic units and features on its floor, suggesting a crater's complex evolution.

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References

[1] Galluzzi et al.: *Mercury: Current and Future Science of the Innermost Planet*. Abstract#6075, 2018.
[2] De Hon et al.: *IMAP* #1233, 1981.
[3] Chabot et al.: *LPS XLVII*. Abstract#1256, 2016.
[4] Denevi et al.: *LPS XLVII*. Abstract#1264, 2016.
[5] Preusker et al.: *Planetary and Space Sci*., 142, 26-37.
[6] Galluzzi et al.: *Journal of Maps*, 12, 226–238, 2016.
[7] Mancinelli, et al.: *Journal of Maps*, 12, 190–202, 2016.
[8] Guzzetta et al.: *Journal of Maps*, 13, 227–238, 2017.
[9] Wright et al.: *Mercury: Current and Future Science of the Innermost Planet*. Abstract#6062, 2018.
[10] Malliband : *Mercury: Current and Future Science of the Innermost Planet*. Abstract#6091, 2018.
[11] Lewang et al.: *LPS XLIX*, Abstract#1846, 2018.

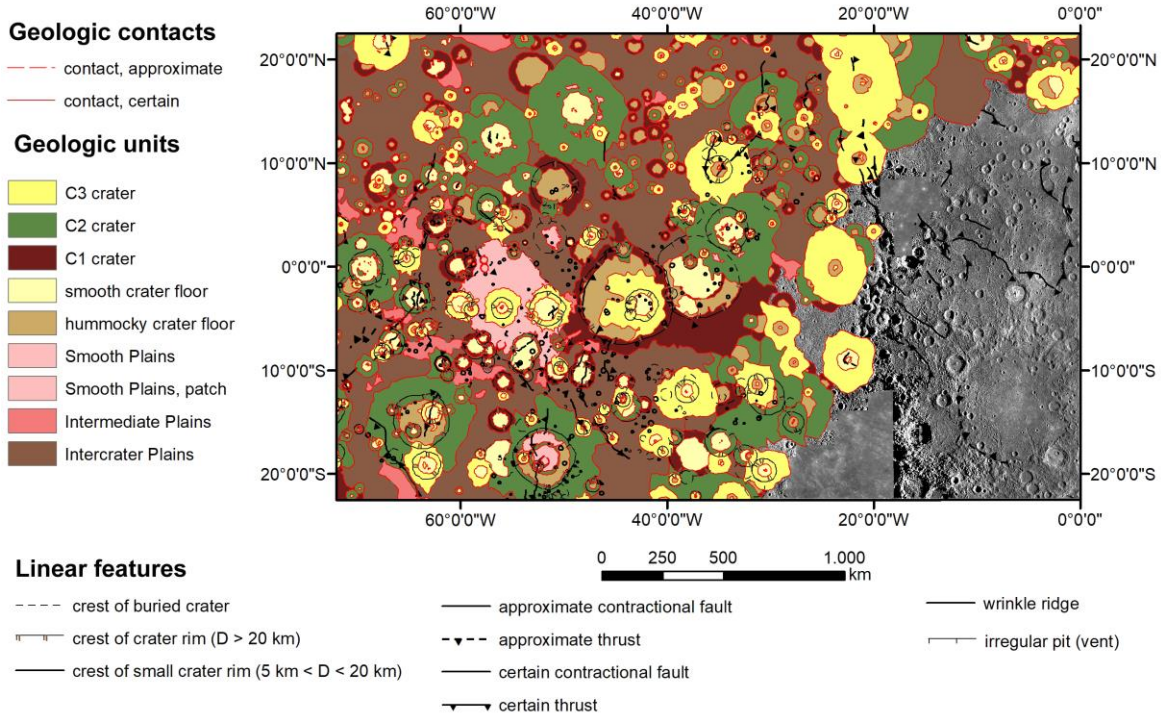

Fig.1 Current status of 1:3M geological map of Kuiper quadrangle (H06), Mercury. The basemap is a BDR mosaic of MESSENGER MDIS.