Preliminary findings from geological mapping of the Hokusai (H5) quadrangle of Mercury

Conference or Workshop Item

PRELIMINARY FINDINGS FROM GEOLOGICAL MAPPING OF THE HOKUSAI (H5) QUADRANGLE OF MERCURY.

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Introduction: Quadrangle geological maps from Mariner 10 flybys only cover 45% of the surface of Mercury at 1:5M scale, e.g. [1]. This study will use orbital data from NASA's MErcury Surface, Space ENvironment, GEochemistry, and Ranging (MESSENGER) satellite, to produce a map at 1:2M scale of the Hokusai quadrangle (0–90° E; 22.5–66° N) (Fig. 1), which is in the hemisphere unmapped by Mariner 10. This geological map will aim to be compatible with other new quadrangle maps [2] and to complement a global map now in progress [3].

Features: Hokusai contains prominent features already being studied, such as Rachmaninoff basin [4] and volcanic vents [5]. Our fine-detail study of the region has identified additional important geological features.

Rustaveli, 83° E, 52°N. Rustaveli is a 200.5 km diameter peak-ring basin. It is an important, but so far understudied, feature in Hokusai quadrangle. Its widespread, un-degraded ejecta deposit, clear crater rim and well preserved terraces show it to be one of the youngest impact basins on Mercury of its size. Its peak-ring is deeply flooded, or buried entirely in places, by a smooth infill we believe to be due to post-impact volcanism. Rustaveli's peak-ring is elongated approximately E-W. One possible explanation is that the impact was oblique. The western portion of Rustaveli's crater rim is polygonal [6]. This could be due to slumping of the terraces along joints in the target material (most likely smooth volcanic plains) during crater modification [7].

'Unity' Rupes, 85° E, 27°N. This feature, informally referred to as 'Unity' Rupes, is a ~320 km scarp consistent with a SE dipping thrust fault. The main scarp has associated, smaller scarps to the SW and NE. Cross-cutting of craters by scarp segments may allow for estimates of the amount of shortening [8].

Valleys. Valleys similar to those reported elsewhere on Mercury by *Byrne et al.* [9] appear at the southernmost extent of the Northern Plains in Hokusai. We suggest they are partially flooded catenae consistent with an ancient basin hypothesised in *Prockter et al*. [3].

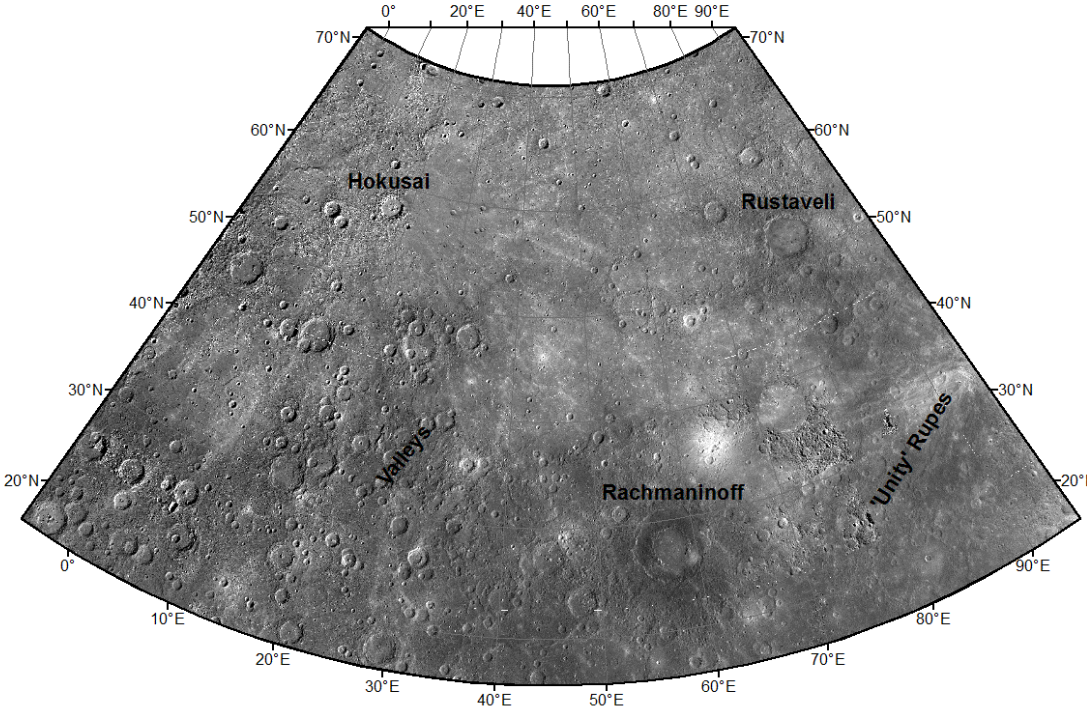

Fig. 1. Basemap of Hokusai quadrangle with 5° overlap with surrounding quadrangles. The locations of features mentioned in this abstract are marked. The bright crater Hokusai in the NW gives its name to the whole quadrangle. This map has an average ground resolution of 166 metres per pixel. Basemap tile credit: MESSENGER Team NASA/John Hopkins University Applied Physics Laboratory/ Carnegie Institution of Washington.

References: [1] Grolier M. J. and Boyce J. M. (1984) *USGS Miscellaneous Investigation Series Map I—1660, 21*. [2] Galluzzi V. et al. (2015) *Geophys Tes Abs, 17,* EGU2015-13857. [3] Prockter L. M. et al. (2016) *LPS XLVII,* Abstract #1245. [4] Blair D. M. et al. (2013) *JGR: Planets, 118,* 47-58. [5] Thomas R. J. et al. (2014) *Geophys. Res. Lett., 41,* 6084-6092. [6] Weihs G. T. et al. (2015) *PSS, 111,* 77-82. [7] Eppler D. T. et al. (1983) *GSA Bulletin, 94,* 274-291. [8] Galluzzi V. et al. (2015) *Geol. Soc., London, Special Publications, 401,* 313-325. [9] Byrne P. K. et al. (2013) *JGR: Planets, 118,* 1303-1322.