

# GEOLOGICAL MAPPING OF THE DEBUSSY QUADRANGLE (H-14) PRELIMINARY RESULTS

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**Introduction:** Geological mapping of Mercury is crucial to build an understanding of the history of the planet and to set the context for BepiColombo's observations [1]. Geological mapping of the Debussy quadrangle (H-14) is now underway as part of a program to map the entire planet at a scale of 1:3M using MESSENGER data [2]. The quadrangle is located in the southern hemisphere of Mercury at 0° – 90° E and 22.5° – 65° S. This will be the first high resolution map of the quadrangle as it was not imaged by Mariner 10.

**Data and Methods:** Mapping began in October 2017 using the MESSENGER 166 mpp mosaic as a base map supplemented with additional images from MESSENGER's Mercury Dual Imaging System.

Line work is currently underway. Craters larger than 5 km have been outlined. Ejecta, where observed, is being traced for craters larger than 20 km. Craters are classified based on crater degradation on both 3 class [3] and a 5 class [4] schemes. Tectonic features are shown by linework and extensive plains are being mapped as Inter crater or Smooth plains.

**Features of Debussy Quadrangle:** There are several large-scale features within the Debussy quadrangle that are of particular interest during mapping:

**Rembrandt Basin:** This 720 km diameter impact crater is the largest well-preserved basin in Mercury's southern hemisphere [5]. Smooth volcanic plains (lavas), which postdate the impact, partially fill the basin. Rembrandt hosts many of the features characteristic of large basins including wrinkle ridges, grabens, and ghost craters[6].

**Enterprise Rupes:** The cooling and contraction of Mercury has led to the formation of thrust faults [7]. Enterprise Rupes cuts across Rembrandt basin. It can thus play an important part in building understanding of the tectonic history of the planet [5]. The interaction of the lobate scarps with other landforms illustrates the structural controls that pre-existing landforms can have on the morphology of scarps [8]. Other rupes in the quadrangle include the east-west trending Belgica Rupes and the north-south Nautilus Rupes.

**References:** [1] Benkhoff J. et al. 2010 *Planet. Space Sci.* 58:2-20 [2] Galluzzi V. and BC Mapping team. 2017. 5th BepiColombo SWT Meeting. [3] Kinczyk M.J. et al. 2016. *LPSC.* 47: 1573. [4] Galluzzi V. et al. 2016. *J. Maps,* 12: 227-238. [5] Ferrari S. et al. 2015. *GSL Special Publications.* 401: 159-172. [6] Whitten J.L. et al. 2015. *Icarus.* 258: 350-365. [7] Watters T.R. et al. 2004. *GRL.* 31: L04701. [8] Ruiz J. et al. 2012. *Icarus.* 219: 511-514.

