A GLOBAL GEOLOGICAL MAP OF MERCURY. Mallory J. Kinczyk[1], Louise M. Prockter[2], Paul K. Byrne[1], Brett W. Denevi[3], Lillian R. Ostrach[4], James A. Skinner[4]. [1]Planetary Research Group, North Carolina State University, Raleigh, NC 27695. [2]The Lunar and Planetary Institute, Houston, TX 77058. [3]The Johns Hopkins University Applied Physics Laboratory, Laurel, MD 20723. [4]U.S. Geological Survey, Astrogeology Science Center, Flagstaff, AZ 86001.

Introduction: One of the principal outcomes of the MErcury Surface, Space ENvironment, GEochemistry, and Ranging (MESSENGER) mission was the collection of a global dataset of images. This dataset has allowed for the comprehensive analysis of the geological evolution of Mercury on a global scale. Numerous studies have investigated Mercury's tectonic [1], volcanic [2,3], and cratering [4,5] histories through mapping with these data. The next logical step is to create a global geological map to aid in the scientific analysis of a variety of geological formations across Mercury's surface, as well as the development of the first global stratigraphic column, and to place observations made with MESSENGER data into the context of earlier studies with Mariner 10 images.

Map Status: A global map was developed at the 1:15M scale [6] (**Fig. 1**) by the MESSENGER science team. We now have additional support to rework the map as part of the US Geological Survey (USGS) Scientific Investigations Map (SIM) series. Maps published following the USGS SIM guidelines incorporate detailed community feedback that result in products consistent with the methods used for other planets and moons. This effort will result in a product that will provide a robust basis for future scientific investigations and exploration efforts, such as the upcoming ESA/JAXA BepiColombo mission.

In our global USGS SIM product, geomorphologic units are defined based on texture, color, and topographic relief. Major units include impact crater facies of large craters and basins [e.g., 7–9], smooth plains [10], and intercrater plains [11]. Other datasets that have previously been compiled will be incorporated into the map including tectonic landforms [1], hollows [2], and pyroclastic vents [4,5].

Ongoing work: Current efforts are focused on improving mapped unit boundaries based on the final MESSENGER PDS data release [12], and determining whether additional map units are warranted [13]. Upon completion, the map will go through a rigorous peer-review process and a review by the USGS, before publication in the 2021 time frame.

References: [1] Byrne, P.K. et al. (2014) *Nature Geosci., 7,* 301–307. [2] Thomas, R.J. et al. (2014) *J. Geophys. Res. Planets, 119,* 2239–2254. [3] Jozwiak, L. M. et al. (2018) *Icarus, 302,* 191–212. [4] Susorney, H. C. M. et al. (2016) *Icarus, 271,* 180–193. [5] Kinczyk, M. J. et al. (2016) *LPS, 47,* #1573. [6] Prockter, L.M. et al. (2016) *LPS, 27,* #1245. [7] Prockter, L.M. et al. (2009) *LPS, 40,* #1758. [8] Buczkowski, D.L. et al. (2015) *LPS, 46,* #2287. [9] Hynek, B.M. et al. (2016) *LPS, 47,* #2312. [10] Denevi, B.W. et al. (2013) *J. Geophys. Res. Planet, 118,* 891–907. [11] Whitten, J.L. et al. (2014) *Icarus, 241,* 97–113. [12] Chabot, N.L. et al. (2016) *LPS, 47,* #1256. [13] Denevi, B.W. et al. (2016) *LPS, 47,* #1624.

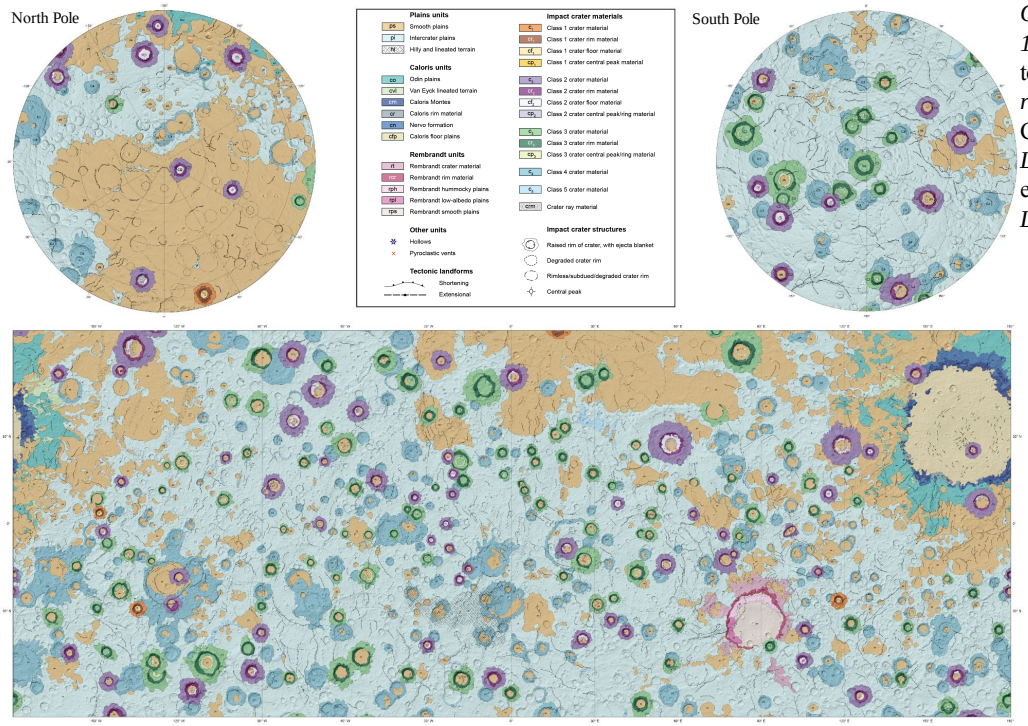

Fig. 1. Draft version of the global geological map of Mercury at 1:15M scale, showing major plains units and classified craters ≥90 km in diameter.