



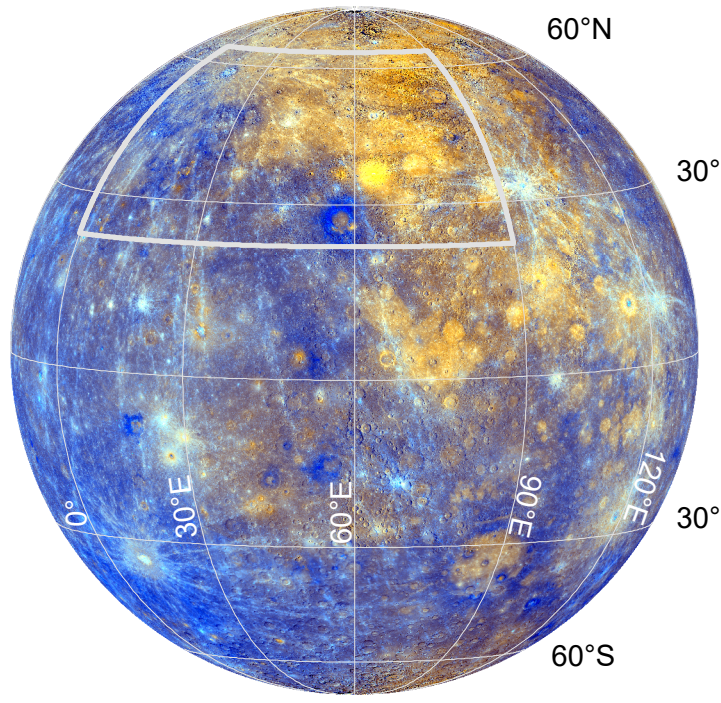
Geological map of the Hokusai Quadrangle (H05), Mercury

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H01 - Borealis Borea					
H05 - Hokusai Apolonia		H04 - Raditadi Liguria		H03 - Shakespeare Caduceata	
H02 - Victoria Aurora					
H10 - Derain Pieria		H09 - Eminescu Solitudo Crophori	H08 - Tolstoj Phaethontias	H07 - Beethoven Solitudo Lycanias	H06 - Kuiper Tricrena
H14 - Debussy Cyllene		H13 - Neruda Solitudo Persephones	H12 - Michelangelo Solitudo Promethei	H11 - Discovery Solitudo Hermæ Trismegisti	
H15 - Bach Australia					

- Geological units**
- sp** Smooth plains
Sparsely cratered plains. Probably volcanic where areally extensive.
Small patches perched within impact crater terraces/ejecta probably impact melt.
 - ip** Intermediate plains
Patches of smooth material confined by high-standing plains intermediate in roughness between smooth and intercrater plains.
Probably intercrater plains that has been partially inundated by smooth material of volcanic/impact origin.
 - icp** Intercrater plains
Heavily cratered plains with a rough, hummocky texture.

- Crater materials (three degradation classes)**
- C₃** C₃ crater—well-preserved
Fresh craters with sharp rims and internal peaks. Textured ejecta blankets. Albedo rays can be present.
 - C₂** C₂ crater—degraded
Craters with somewhat subdued rims, peaks and ejecta blanket textures. No albedo rays.
 - C₁** C₁ crater—heavily degraded
Craters with heavily subdued/incomplete rims and no ejecta.

- Surface features**
- d** Degraded catenae
Rims of smooth-floored secondary crater chains.
 - cfs** Smooth crater floor
Smooth, sparsely cratered material confined to craters.
Probably impact melt in C₂/C₃ craters. Probably volcanic in C₁ craters.
 - cfh** Hummocky crater floor
Rough or cratered material confined within craters. Probably original crater floor texture in C₂ craters. Probably degraded wall and floor material in C₂/C₃ craters.

- Structures**
- Graben**
Found within volcanic crater fills
 - Ridge**
Found within volcanic crater fills
 - Wrinkle ridge**
Contractional landform common within smooth plains
 - Wrinkle ridge ring**
Contractional landform located above buried impact crater

- Faults**
- Thrust—confident identification**
 - Thrust—uncertain identification**

- Crater rims**
- Rim crest of crater (diam. ≥ 20 km)**
 - Rim crest of crater (5 < diam. < 20 km)**
 - Rim crest of subdued or buried crater**
 - Irregular pit**
 - Putative volcanic vent**

- Geological contacts**
- Certain—confident location**
 - Approximate—uncertain location**

Coordinate system
Projection: Lambert Conformal Conic
Central meridian: 45° E
Standard parallel 1: 30° N
Standard parallel 2: 58° N
Sphere radius: 2440 km

Basemaps
Main map: MESSENGER MDS map projected Basemap Reduced Data Record (BDR)
Resolution: 256 pixels per degree (~166 meters/pixel)
Data source: https://ode-imaging.jpl.nasa.gov/data/messenger/msgrmds_4001/BDR/H05/
Mercury globe: MESSENGER MDS Enhanced Color Global Mosaic
Resolution: 64 pixels per degree (~665 meters per pixel)
Data source: https://astrogeology.usgs.gov/search/map/Mercury/Messenger/Global/Mercury_MESSENGER_MDS_BASEMAP_EnhancedColor_Mosaic_Global_665m

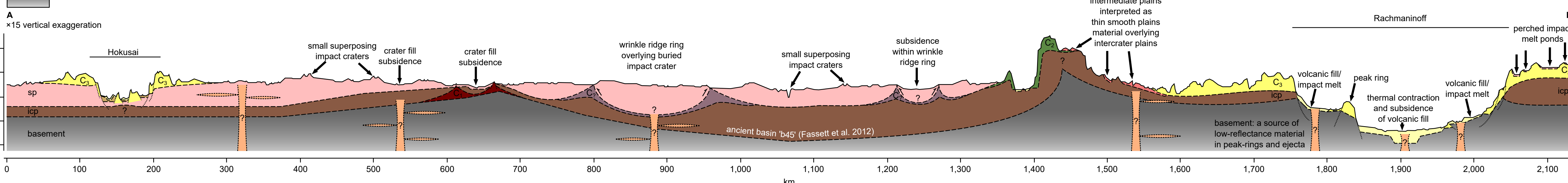
Basemap credits: NASA/Johns Hopkins University Applied Physical Laboratory/Carnegie Institute of Washington

Cross section
Indicative cross section. Surface topography from Stark et al. (2017). Smooth plains thicknesses have been estimated from ghost crater diameters by Ostrach et al. (2015).

Alternative crater classification
An alternative version of this map is available with five crater degradation classes compatible with those of the MESSENGER global geological map of Mercury (Prockter et al. 2016; Kinczyk et al. 2016, 2018).

Nomenclature
From the Gazetteer of Planetary Nomenclature
International Astronomical Union (IAU) Working Group for Planetary System Nomenclature (WGPSN)
Source: <http://planetarynames.wr.usgs.gov/Page/MERCURY/target> (21/01/2020)

- Supplementary cross section key**
- magma plumbing features (arbitrary forms and locations)**
 - crater materials (unclassified)**
 - basement**



References:

Byrne, P. K., Ostrach, L. R., Fassett, C. I., Chapman, C. R., Denevi, B. W., Evans, A. J., Klimczak, C., Banks, M. E., Head, J. W., and Solomon, S. C. (2016). Widespread effusive volcanism on Mercury likely ended by about 3.5 Ga. *Geophys. Res. Lett.*, 43, 7408–7416. doi:10.1002/2016GL069412.

Fassett, C. I., Head, J. W., Baker, D. M. H., Zuber, M. T., Smith, D. E., Neumann, G. A., Solomon, S. C., Klimczak, C., Strom, R. G., Chapman, C. R., Prockter, L. M., Phillips, R. J., Oberst, J., and Preusker, F. (2012). Large impact basins on Mercury: Global distribution, characteristics, and modification history from MESSENGER orbital data. *J. Geophys. Res.*, 117, E00L08. doi:10.1029/2012JE004154.

Kinczyk, M. J., Prockter, L. M., Chapman, C. R., and Susorney, H. C. M. (2016). A morphological evaluation of crater degradation on Mercury: Revisiting crater classification with MESSENGER data. *LPSC 47*, Abstract #1573.

Kinczyk, M. J., Prockter, L. M., Byrne, P. K., Denevi, B. W., Ostrach, L. R., and Skinner, J. A. (2018). A global geological map of Mercury. *Mercury: Current and future science of the innermost planet*, Abstract #6123.

Marchi, S., Chapman, C., Fassett, C., Head, J. W., Botke, W. K., and Strom, R. G. (2013). Global resurfacing of Mercury 4.0–4.1 billion years ago by heavy bombardment and volcanism. *Nature*, 499, 59–61. doi:10.1038/nature12280.

Ostrach, L. R., Robinson, M. S., Whitten, J. L., Fassett, C. I., Strom, R. G., Head, J. W., and Solomon, S. C. (2015). Extent, age, and resurfacing history of the northern smooth plains on Mercury from MESSENGER observations. *Icarus*, 250, 602–622. doi:10.1016/j.icarus.2014.11.020.

Prockter, L. M., Kinczyk, M. J., Byrne, P. K., Denevi, B. W., Head, J. W., Fassett, C. I., Whitten, J. L., Thomas, R. J., Buczkowski, D. L., Hynek, B. M., Ostrach, L. R., Blewett, D. T., Ernst, C. M., and the MESSENGER Mapping Group. The first geological map of Mercury. *LPSC 47*, Abstract #1245.

Stark, A., Preusker, F., Oberst, J., Matz, K.-D., Gwinner, K., and Roatsch, T. (2017). High-resolution topography from MESSENGER orbital stereo imaging – the H5 quadrangle “Hokusai”. *LPSC 48*, Abstract #2287.

Whitten, J. L., Head, J. W., Denevi, B. W., and Solomon, S. C. (2014). Intercrater plains on Mercury: Insights into unit definition, characterization, and origin from MESSENGER datasets. *Icarus*, 241, 97–113. doi:10.1016/j.icarus.2014.06.013.