

Analysis Sheds New Light on Mercury's South Pole

Led by GSFC scientists Stefano Bertone and Erwan Mazarico, a team including members from JHU-APL and PSI used MESSENGER spacecraft data and NASA Center for Climate Simulation (NCCS) cloud computing resources to create the first high-resolution topographic map of Mercury's south pole.

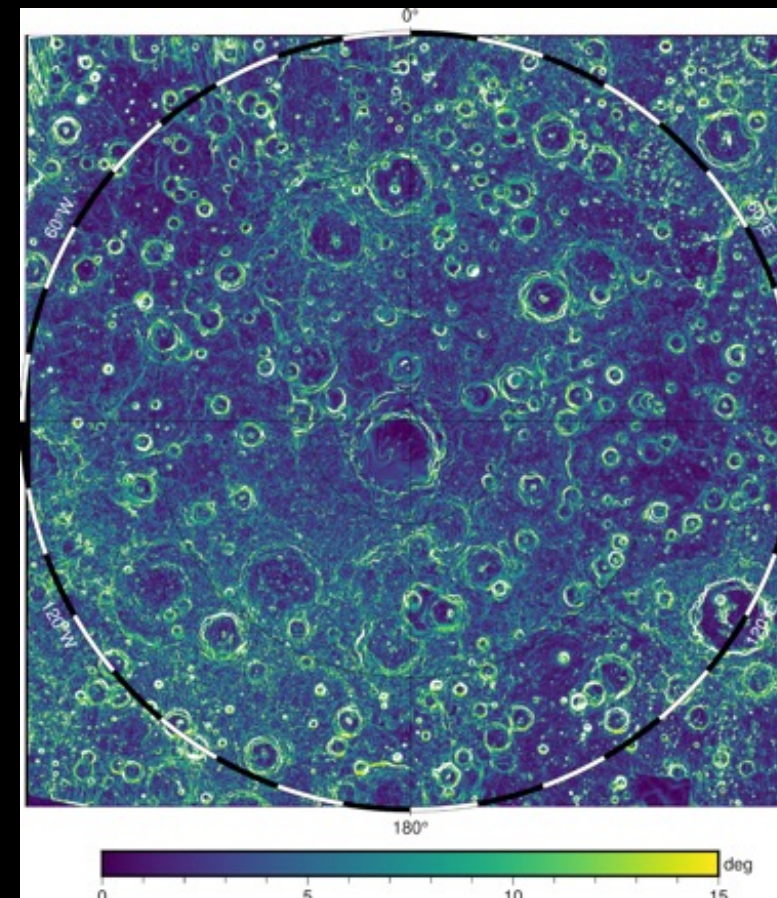
With no laser altimetry available over Mercury's southern hemisphere, the team used images from MESSENGER's Mercury Dual Imaging System-Narrow Angle Camera, from which it is significantly more challenging to obtain high-resolution topographic information.

For this task, the scientists applied the Shape-from-Shading (SfS) technique, which takes camera images and a digital elevation model and returns as output a topographic map enhanced by the terrain information in the images.

The increased resolution and detail in the new topographic map represent a key step for advancing knowledge of potential water ice and other volatiles in Mercury's south polar region, contributing to our global understanding of their origin and evolution.

The same approach at GSFC is now being applied for the Moon, to retrieve even higher-resolution topographic information (meter-level) at selected sites close to the lunar south pole, in support of Artemis exploration and science.

S. Bertone, E. Mazarico, M. Barker, et al., 2023, *Planetary Science Journal* 4, 21.
Press release: <https://www.nccs.nasa.gov/news-events/nccs-highlights/mercury-south-pole>



Topographical slopes computed for Mercury's south polar region from NASA's new 250 meter-per-pixel resolution digital elevation model based on Shape-from-Shading techniques. The new NASA model shows many detailed features and smaller craters, which are key to determining reliable Sun illumination and thermal conditions at the surface. Figure from Bertone et al., 2023.