



Figure 1: Thermal stability predictions for surface water ice (red) and coronene (blue) based on new models.



Mercury's Polar Water-Ice Deposits

High-resolution DEMs, illumination, and thermal models support extensive, stable surface ice in four large craters near Mercury's north pole.

- We generated and compared the highest resolution models (125 m/pixel) available for Kandinsky, Tolkien, Tryggvadóttir, and Chesterton craters with Arecibo Observatory radar data, Mercury Dual Imaging System (MDIS) images, and Mercury Laser Altimeter (MLA) data to identify surficial ice or volatiles.
- We found that areas of high radar backscatter within the craters are well correlated with areas predicted to host surface and shallow subsurface ice.
- We also identified a radar backscatter signature consistent with heterogeneities potentially associated with ice purity, mantling of the ice, or uneven ice abundances.
- The results and predictions from this study provide compelling motivation for new measurements of these craters during BepiColombo's orbital mission beginning in 2025.

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Figure 2: MLA data in the permanently shadowed region of each crater mapped over MDIS images.