Beat: Miscellaneous

Mercury has ice within its permanently shadowed polar craters, NASA finds

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USPA News - Despite being in close proximity to the sun, a NASA spacecraft studying Mercury has found evidence to support a long-held hypothesis the planet harbors abundant water ice and other frozen volatile materials within its permanently shadowed polar craters. Instruments aboard the Messenger spacecraft have been able to study Mercury in unprecedented detail since it arrived there in March 2011.

The instruments have since measured the excess hydrogen at the planet`s north pole, measured the reflectivity of the planet`s polar deposits at near-infrared wavelengths, and enabled the first detailed models of the surface and near-surface temperatures of the planet`s north polar regions. The very hot planet would seem to be an unlikely place to find ice, but the tilt of Mercury`s rotational axis is less than 1 degree, and as a result, there are pockets at the planet`s poles that never see sunlight. This had been suggested by scientists for decades, but until now there was no strong evidence to confirm the hypothesis. In 1991, the Arecibo radio telescope in Puerto Rico detected radar-bright patches at Mercury`s poles, many of which corresponded to the locations of large impact craters mapped by NASA`s Mariner 10 spacecraft in the 1970s. But because Mariner saw less than 50 percent of the planet, planetary scientists lacked a complete diagram of the poles to compare with the radar images. Images from the Messenger spacecraft taken in 2011 and earlier this year confirmed all radar-bright features at Mercury`s north and south poles lie within shadowed regions on the planet`s surface. These findings are consistent with the water ice hypothesis, according to scientists, who published their findings in Thursday`s online edition of Science Express. "The new data indicate the water ice in Mercury`s polar regions, if spread over an area the size of Washington, D.C., would be more than 2 miles (3.2 kilometers) thick," said scientist David Lawrence from the Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, Maryland. The new observations from the Messenger spacecraft support the hypothesis that ice is the major constituent of Mercury`s north polar deposits. These measurements also reveal ice is exposed at the surface in the coldest of those deposits, but buried beneath unusually dark material across most of the deposits. In the areas where ice is buried, temperatures at the surface are slightly too warm for ice to be stable. Gregory Neumann, of NASA`s Goddard Flight Center in Greenbelt, Maryland, suggested that both the dark and bright deposits may be the result of impacts from comets or volatile-rich asteroids. "[They are] the same objects that likely delivered water to the innermost planet," he explained. "For more than 20 years, the jury has been deliberating whether the planet closest to the sun hosts abundant water ice in its permanently shadowed polar regions," said Messenger principal investigator Sean Solomon of Columbia University`s Lamont-Doherty Earth Observatory in Palisades, New York. "Messenger now has supplied a unanimous affirmative verdict."

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