Study suggests much more water on the moon than thought (Update)

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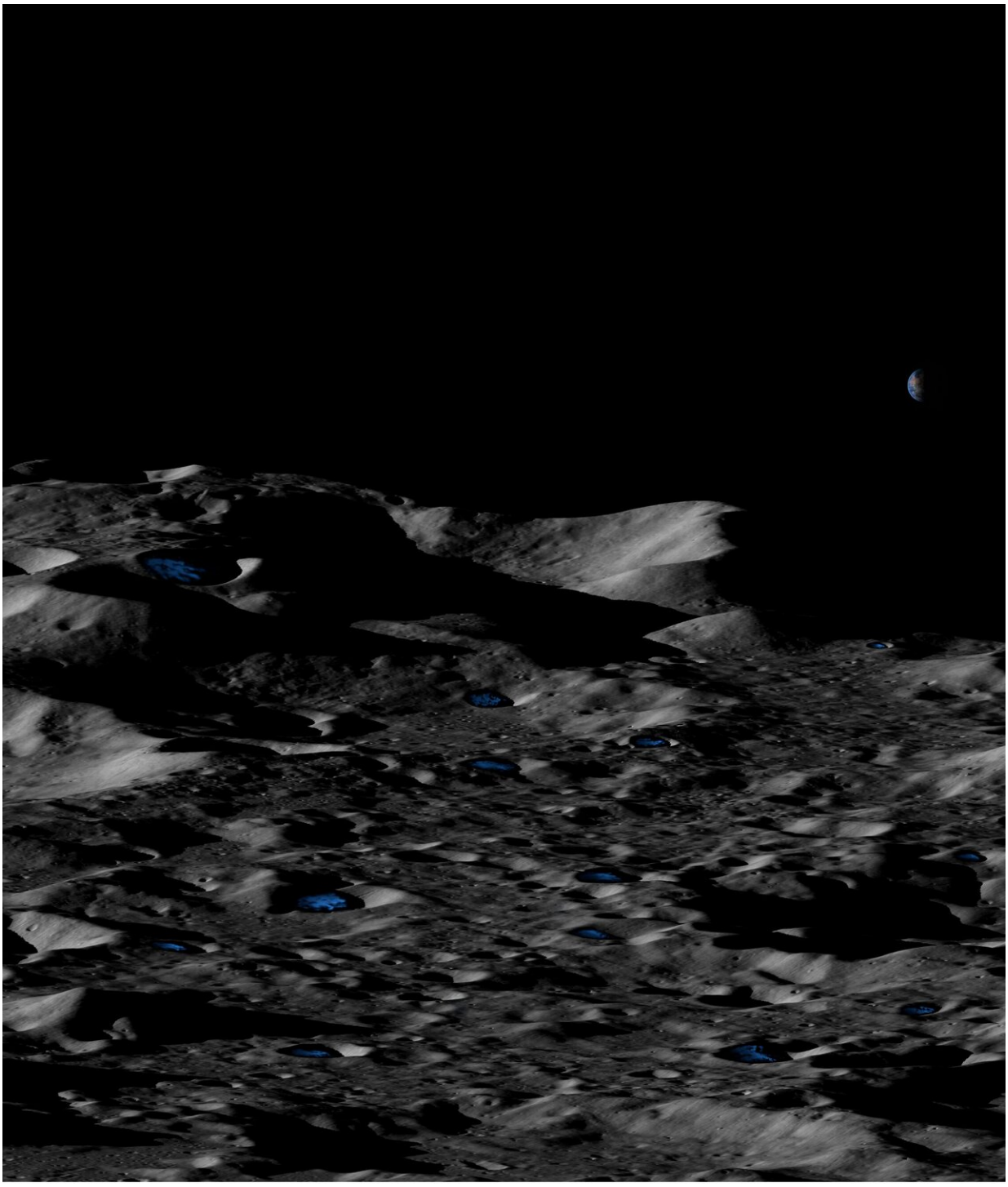

Conceptual illustration of permanently shadowed, shallow icy craters near the lunar south pole. Credit: UCLA/NASA

A trio of researchers at the University of California has found evidence that suggests there is far more ice on the surface of the moon than has been thought. In their paper published in the journal *Nature Geoscience*, Lior Rubanenko, Jaahnavee Venkatraman and David Paige describe their study of similarities between craters on Mercury and craters on the moon and what they found.

Prior researchers using data from the Arecibo Observatory and also NASA's MESSENGER spacecraft found evidence of ice on Mercury. As part of this new effort, the researchers studied depth/diameter ratios of 2,000 craters on the planet using Mercury Laser Altimeter data. In so doing, they found that permanently shadowed craters became less shallow in higher latitudes—an indication of ice.

Back in 2009, as part of the LCROSS mission, researchers allowed an empty stage of the Lunar Reconnaissance Orbiter (LRO) launch vehicle to crash into the floor of a crater close to the moon's south pole. Testing of the debris cloud by sensors aboard the Shepherding Spacecraft, showed evidence of water and ice, along with other material.

The researchers with this new effort believed it was likely that there was more ice on the moon than was shown during the LCROSS impact study—likely existing in shadowed craters similar to those that had been seen on Mercury. To find out, they carried out a parallel crater study, similar to the one they had conducted for Mercury. In this case, they studied 12,000 craters on the moon using data from the LRO. They report that they found "a similar morphological trend" in craters on the south side of the Moon, near the pole. They suggest this indicates that such craters likely harbor thick ice deposits along with other materials similar to those that are believed to exist on Mercury. The researchers suggest that if this is indeed the case, then there could be up to 100 million metric tons of ice in such craters, which they note is double the amount of previous estimates based on data from the LCROSS impact

study. The researchers conclude by suggesting that future Moon missions include the use of probes that can be used to study the shaded craters to confirm their suspicions.

More information: Lior Rubanenko et al. Thick ice deposits in shallow simple craters on the Moon and Mercury, *Nature Geoscience* (2019). DOI: 10.1038/s41561-019-0405-8