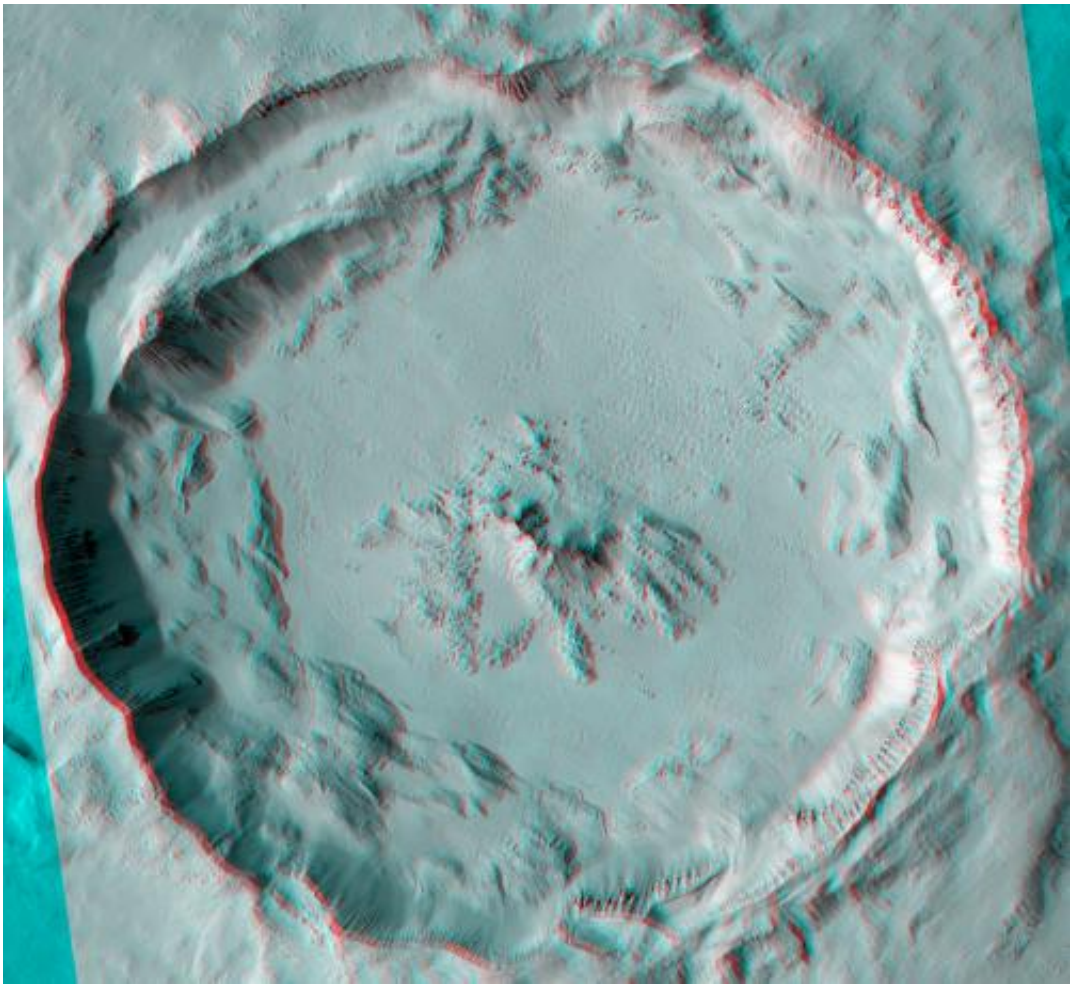
Researchers link Martian surface "oddities" with subsurface water and impact craters

July 27 2012, By Jeff Renaud

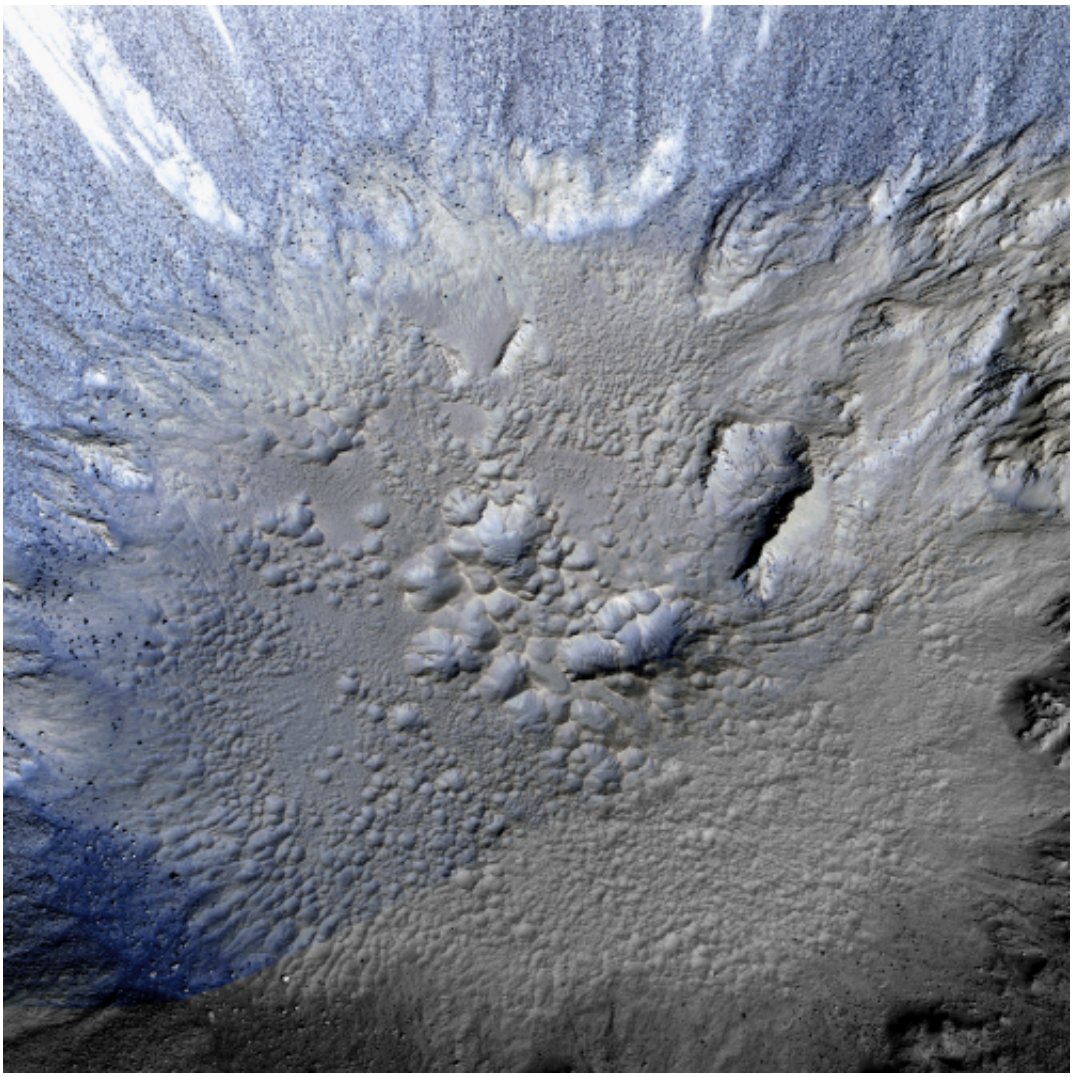


3D Image (Wide) of Tooting Crater

(Phys.org) -- Investigating extremely detailed images of Mars produced

by the High Resolution Imaging Science Experiment (HiRISE) camera – the largest ever carried on a deep space mission – researchers from Western University have discovered further evidence linking subsurface volatiles, such as water or ice, to previously recognized (but thought to be rare) pits, which commonly arise on the floors of Martian impact craters.

Livio Tornabene, an adjunct research professor in Western's Department of Earth Sciences and an investigator at the Centre for Planetary Science and Exploration, says deciphering the origin of these pits assists planetary geologists like he and CPSX Acting Director Gordon Osinski in understanding how impact craters affect the hydrological and climatic history of Mars.

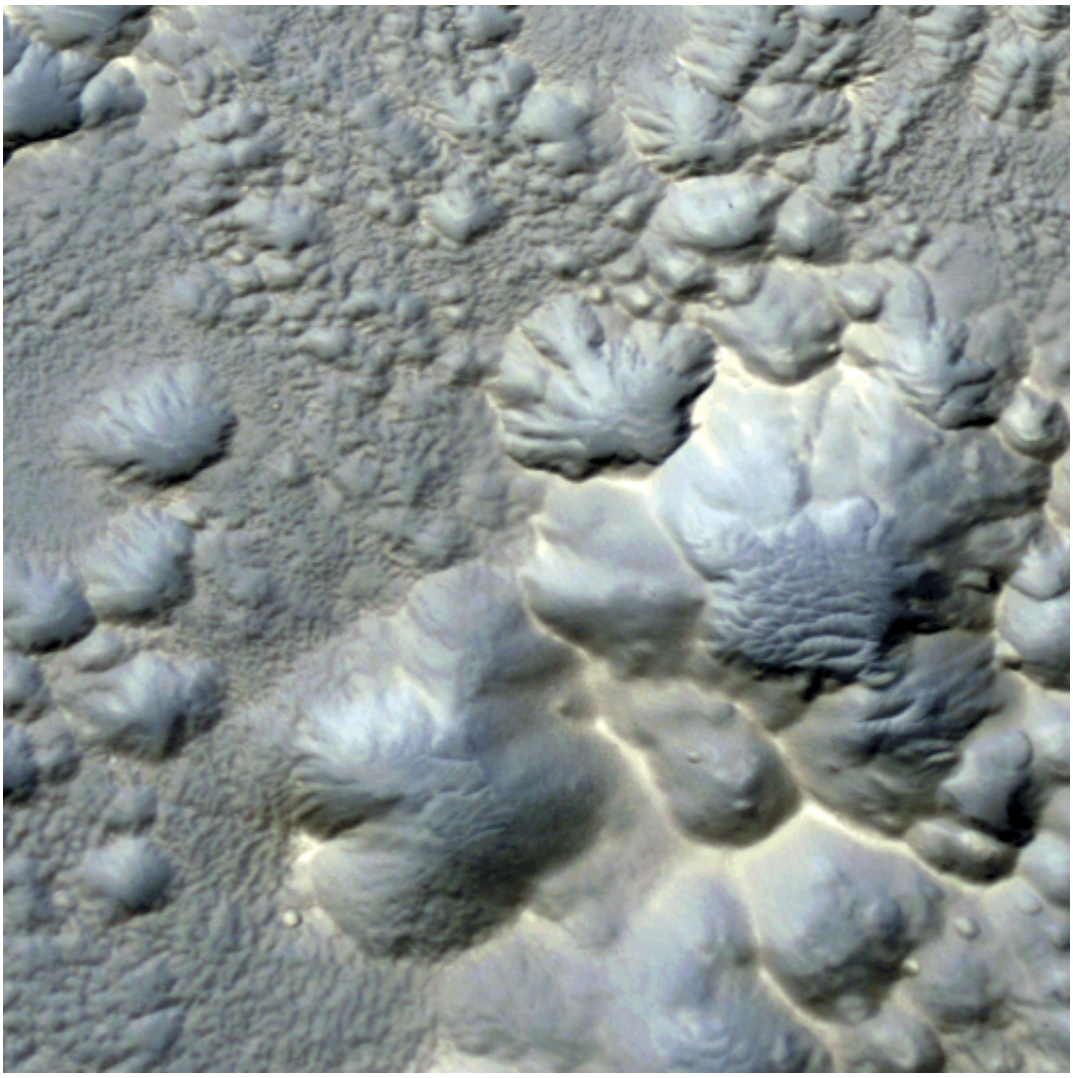


3D Model (Closeup) of Zumba Crater. Credit: NASA/JPL/UA

The pits range from a few meters to three kilometres in diameter and are observed in more than 200 well-preserved Martian craters, which range from one to 150 kilometres in diameter. The pits possess only slightly raised rims and no sign of definable ejecta deposits around them, which would normally result from smaller impacts of heavenly debris and thus make them distinguishable from other common Martian features. Their attributes and occurrence in Martian craters of all sizes and the range of preservation suggests that the phenomena may have formed throughout

Mars' geologic history.

"These images present evidence that there is a connection between volatiles like water and ice in the subsurface of Mars and the impact process," explains Tornabene, a former HiRISE operator and ongoing member of its science team. "A meteor impact obviously delivers a lot of energy and heat to the surface of Mars, so if you have frozen water present underground then heat delivered by the impact is going to react with it."



3D Model (Extreme Closeup) of Zumba Crater - Pits on floor of crater. Credit:

Tornabene adds that one of the difficulties with studying Mars' surface is that while it's not as geographically active as Earth, it still has some activity.

"Unlike the moon, it's hard to prove if craters on Mars formed the phenomenon or did they come later as a consequence of other geologic processes that occurred after the impact crater formed," says Tornabene, noting the closest comparison to these pits on Earth form when lava interacts with groundwater or icy substrates.

More information: "Widespread crater-related pitted materials on Mars: Further evidence for the role of target volatiles during the impact process" (www.sciencedirect.com/science/ … ii/S0019103512002047) is featured in the August 2012 issue of *Icarus*.

Provided by University of Western Ontario