Shallow groundwater reservoirs may have been common on Mars

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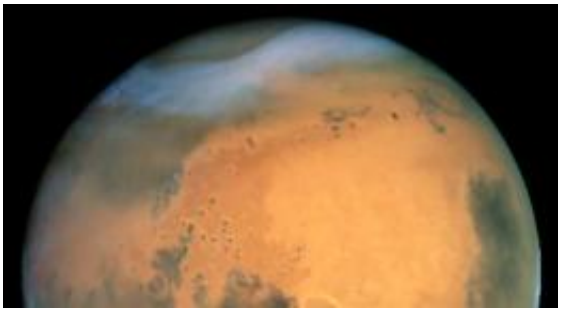

Mars, as seen by the Hubble Space Telescope. Image credit: NASA

(PhysOrg.com) -- An international research team led by the Planetary Science Institute has found evidence for reservoirs of liquid water on Mars at shallow crustal depths of as little as tens of meters.

J. Alexis Palmero Rodriguez, research scientist at PSI, and the research team came to this conclusion after studying collapsed terrains that occur within some of the solar system's largest channels.

Investigations of similar but vastly larger zones of collapse located where these channels initiate have led previous investigations to postulate that the upper crust of Mars contained vast aquifer systems concealed underneath a global frozen layer kilometers in thickness. However, these zones of large-scale collapse are rare on Mars and their formation most likely took place under exceptional hydrogeologic conditions.

The PSI-led team's work documents the distribution of groundwater within crustal zones located beyond these regions.

Citing geologic evidence found in the planet's largest system of channels located in southern circum-Chryse and results from thermal numerical modeling, Rodriguez and his co-authors propose in an article published in *Icarus* that groundwater reservoirs may have been common within the Martian upper crust.

The numerical model implies that where fine-grained, unconsolidated sedimentary deposits existed on top of an icy permafrost layer, melting of ground ice and the development of subsurface aquifers could have taken place at shallow depths.

Extrapolations of their results to the present Martian conditions imply that groundwater may currently exist underneath thermally insulating fine-grained sedimentary deposits approximately 120 meters in thickness. Thus, despite large differences in hydrogeologic histories, average surface temperatures, and internal heat flows of Earth and Mars, some areas of Mars might be similar to typical permafrost on Earth, where shallow aquifers are confined by thin layers of icy permafrost.

These reservoirs could mean the presence of accessible water near the Martian surface, Rodriguez said, which could greatly reduce the costs of future manned exploration of the planet. In addition, it could mean habitable environments may exist at shallow depths, he said.

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