

Astrobiology News October 2020: Salt Water on Mars

No, I'm not talking about oceans where you might think of investing in beach-front property on Mars (akin to the old aphorism, "If you believe that one, I have some swampland in Florida to sell you!") I'm talking about an interesting finding by one of my colleagues at the Planetary Science Institute, Norbert Schorghofer. Dr. Schorghofer is a Senior Scientist whose many research interests include field work on Earth as well as theoretical modeling of conditions on asteroids, the Moon, and Mars. A paper he published earlier this year considers whether there are any environments on Mars' surface where liquid water could subsist, even briefly.¹ The important question of liquid water on present-day Mars has been debated for decades!

Although Dr. Schorghofer's models are extremely detailed, a couple of general concepts are probably familiar from science class or to anyone who has driven a car on icy roads in the winter. First, water tends to sublime (change directly from ice to vapor) on the surface of Mars, due to Mars' low atmospheric pressure, which is actually close to the minimum pressure necessary for liquid water to exist. Ice is either present in the cold regions or absent in warm regions on Mars - it's very difficult to find icy regions on Mars where the temperature rises above the melting point! Second, salt lowers the freezing point of water. (Those of us who live in cold climates are very familiar with the trucks that salt the roads!)

So might there be a "sweet spot" on Mars where water might hang around, at least for a few hours? Dr. Schorghofer's research indicates there just might be! Picture a large boulder in the mid-latitude range on Mars that casts a shadow in winter. Water ice accumulates in the boulder's shadow during winter, but temperatures rise from a frigid minus 125 degrees Celsius to near the melting point of zero degrees Celsius in just a few hours, as the ice is exposed in spring! Over such a short period, not all of the ice sublimates. In fact, on salt-rich ground, water ice melts at minus 10 degrees Celsius and briny (salty) water will form until all the ice has melted or sublimated. Pockets of briny water are a potentially habitable niche for life on present-day Mars - at least, perhaps, for microbes!

Like Mars? There are currently at least two active "Planet Four" projects² on the Zooniverse citizen-science platform that could really use your help! Candice Hansen of the Planetary Science Institute is a member of both research teams. Once again, if you use the Zooniverse platform, either individually, as a family, or as part of a group or class project, would you mind taking just a few minutes to fill out a [pre-participation](https://forms.gle/x5TezWJEqAZnLb39A)³ and/or [post-participation](https://forms.gle/opYzTKSxK3PFJtv9A)⁴ survey if you haven't done so already? These will help us evaluate and improve the Zooniverse experience for everyone! If you'd like to learn more about Zooniverse and how citizen science invites

¹ <https://www.psi.edu/news/marsliquidwater>

² See <https://www.zooniverse.org/projects/mschwamb/planet-four> & <https://www.zooniverse.org/projects/mschwamb/planet-four-ridges>

³ Pre-survey: <https://forms.gle/x5TezWJEqAZnLb39A>

⁴ Post- survey: <https://forms.gle/opYzTKSxK3PFJtv9A>

everyone “into the scientist’s land,” but you missed my webinar to the Institute on Religion in an Age of Science (IRAS) last month, you can still check it out - it’s archived on the IRAS website.⁵

Until next month,

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⁵ <https://www.iras.org/>