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MARTIAN HABITABILITY

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Abstract

Due to the reported Mars surface environmental conditions (Klein, 1978) (oxidative stress, high UV radiation levels, etc.) the possibility for life development in the surface of the red planet is very small. The identification of water-ice on the subsurface on Mars by the Thermal Emission Spectrometer onboard of the Mars Odyssey (Kieffer and Titus, 2001) and from the High Energy Neutron Detector (Litvak, et al., 2006) has important astrobiological connotations, because in addition to be a potential source for water, these locations are shielding habitats against the harsh conditions existing on the planet, like UV radiation (Gomez, et al., 2007; Gomez, et al., 2012).

Martian habitability potential could change in particular located micro-niches. Salt deliquescence and hard environmental parameters modification could be relevant for life under protected niches. An example could be endolithic niches inside salt deposits used by phototrophs for taking advantage of sheltering particular light wavelengths. Similar acidic salts deposits are located in Río Tinto extreme environment with shelter life forms which are difficult to localize by eye. Techniques for its localization and study during space missions are needed to develop. Extreme environments are good scenarios where to test and train those techniques and where hypothetical Astrobiological space missions could be simulated for increasing possibilities of micro niches identification.

Here we will report some experiments of bacteria exposition to Martian surface conditions in Mars Simulation chamber. Bacteria were shelter and exposed included in simulated salty endolithic micro niches. High percentage of bacteria resistance and adaptation to harsh extreme those conditions was reported (Gómez, F. et al., 2010). These results were used to develop and implement a Habitability Index to study Martian habitability during the next MSL mission to Mars landed on August 2012 on the surface of the red planet.

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