



Laboratory modeling of subsurface life in martian-like environments

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Environments of modern Mars prohibit liquid water existence in surface layer of soil because of extremely low atmospheric pressure. On the other hand large amount of water ice present in surface layer. Our laboratory modeling has demonstrated that terrestrial nonextremophile microorganisms can reproduce even under extremely low atmospheric pressure (0.01–0.1 mbar). Necessary conditions for metabolism and reproduction are the sublimation of ground ice through a thin upper layer of soil leading to liquid water films production and short episodes of warm temperatures in the vapor diffusion layer. On the other hand mm-size layer of martian soil is able to protect hypothetical martian microorganisms against harmful UV radiation. We also consider possible energy sources and nutrients for microorganisms in subsurface layers such as products of atmospheric photochemical processes, radiolysis of water ice by cosmic rays, radionuclides decay, accretion of interplanetary and interstellar dust particles and comet impacts. We make a conclusion that subsurface life may exist on Mars and martian-like exoplanets