



Organics, methane, oxidants, and habitability of Mars

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The only organic molecule ever detected on Mars is the methane gas. In the surface, no signs of any organic material have been found either by the Viking/Lander GCMS or remote spectroscopic means. While the source of methane in the atmosphere could be attributed to geo/hydrothermal outgassing, cometary impact, or even biogenic processes, the lack of detection of organics on the surface is puzzling. This is because even if Mars lacked an indigenous source of organics, organic material must have been delivered to the martian surface by meteorites, comets and interplanetary dust particles, from the beginning of the solar system. We propose that a powerful oxidant, hydrogen peroxide, is produced in vast abundance by chemical changes brought about by triboelectric fields generated in the martian dust devils and storms, resulting in the snow-out of hydrogen peroxide "dust" from the atmosphere on to the surface. Once on the surface, hydrogen peroxide, or any superoxides processed from it, could effectively remove any organics present there. Furthermore, it may help scrub the methane gas out of the atmosphere, which would place important constraints on the models of the origin of methane on Mars. The SAM Suite selected to fly on the MSL Project will address these and other issues critical to the existence of surface life and habitability of Mars.