

Planetary Protection and the astrobiological exploration of Mars: Proactive steps in moving forward

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Future efforts towards Mars exploration should include a discussion about the effects that the strict application of Planetary Protection policies is having on the astrobiological exploration of Mars, which is resulting in a continued delay in the search for Martian life. As proactive steps in the path forward, here we propose advances in three areas. First, we suggest that a redefinition of Planetary Protection and Special Regions is required for the case of Mars. Particularly, we propose a definition for special places on Mars that we can get to in the next 10-20 years with rovers and landers, where try to address questions regarding whether there is present-day near-surface life on Mars or not, and crucially doing so before the arrival of manned missions. We propose to call those special places 'Astrobiology Priority Exploration' regions (APEX regions). Second, we stress the need for the development of robotic tools for the characterization of complex organic compounds as unequivocal signs of life, and particularly new generations of complex organic chemistry and biosignature detection instruments, including advances in DNA sequencing. And third, we advocate for a change from the present generation of SUV-sized landers and rovers to new robotic assets that are much easier to decontaminate such as microlanders: they would be very small with limited sensing capabilities, but there would be many of them available for launch and coordination from an

orbiting platform. Implementing these changes will help to move forward with an exploration approach that is much less risky to the potential Mars biosphere, while also being much more scientifically rigorous about the exploration of the "life on Mars" question – a question that needs to be answered both for astrobiological discovery and for learning more definitive lessons on Planetary Protection. © 2019 COSPAR