

Title:

Mars as a Representative Habitable World and Prebiotic Environment

Contact:

Aaron Engelhart, enge0213@umn.edu

Existing Authors:

Aaron Engelhart (co-lead, University of Minnesota), Kennda Lynch (co-lead, LPI), Penelope Boston (NASA Ames), Jennifer Blank (NASA Ames/BMSIS), Alberto Fairén (Centro de Astrobiología), Mary Beth Wilhelm (NASA Ames), Charity Philips-Lander (Southwest Research Institute)

Brief Description of White Paper Content:

This contribution will consider Mars and other habitable worlds as potential environments in which prebiotic chemistry is ongoing. Chemical analyses of the Martian surface have led to an enhanced understanding of the geochemical environment afforded by this planet. As a relatively accessible environment that is potentially hospitable for life, Mars represents an accessible environment with potential implications for other celestial bodies, such as Titan, Enceladus, and other exoplanets. This white paper will consider lessons learned from Mars exploration and their impacts on exploration of Mars, as well as the implications of the data obtained regarding exploration of other celestial bodies as potential prebiotic environments.

Status of White Paper:

The initial team for this white paper assembled following Mars Extant Life: What's Next? in Carlsbad, NM in November 2019. We formed a Slack workspace shortly after and are working on our manuscript there.

What we're looking for in terms of involvement/collaboration:

We have a good base of contributors and can still welcome more at this stage. We're also particularly interested in how our white paper topic can dovetail with others, with you either as a contributor or cosignatory. Some of the concepts we're going to consider in our white paper could have overlap or synergies with those related to extant or past life.

A few examples: **Planetary protection** for prebiotic chemistry would probably look a lot like planetary protection for biochemical signatures, perhaps with some tweaks (a low chiral excess of organics, for example, could be a uniquely pre-biosignature, versus homochiral organics, which would be a biosignature). This represents an example of how prebiotic chemistry could afford a powerful potential means of **de-risking sample return**. The same samples analyzed for biosignatures could be analyzed for signatures of prebiotic chemistry/protobiosignatures as well. Thus, a mission that sought to collect extant or past biosignatures could serve a dual purpose in searching for extant or past protobiosignatures.

We're eager to interact and talk more – please do reach out!