Panels (P)
Planetary Protection Policy (PPP.1)

NEXT STEPS IN PLANETARY PROTECTION FOR HUMAN SPACEFLIGHT

Julie Mitchell, julie.l.mitchell@nasa.gov
NASA/JSC, Houston, Texas, United States

Planetary protection is defined as: a) the prevention of contamination of extraterrestrial bodies by terrestrial microorganisms, and b) biohazard containment of returned samples from bodies in the Solar System that could harbor life.[1] While the majority of interplanetary missions to date have involved robotic exploration, future missions will include human explorers. Current planetary protection requirements do not address the unique challenges associated with human exploration. The purpose of this abstract is to review planetary protection efforts for crewed missions and provide a forward plan for implementing them at the systems level.

Article IX of the UN Outer Space Treaty of 1967 provides the definition of planetary protection, outlined above.[1] COSPAR holds the international standard in line with this treaty[2], while NASA's Planetary Protection Policy (NPD 8020.7G) outlines the U.S. implementation of the COSPAR standard. [3,4] NPI 8020.7 groups future human spaceflight planetary protection studies as follows: 1) microbial monitoring, 2) contamination mitigation and control, and 3) environmental effects. Additionally, a NPI 8020.7 outlines a five-step plan for forward work: 1) a literature review, 2) community inputs, 3) completion of recommended studies, 4) developing a draft NPR, and 5) implementation with NASA teams. The literature review was published in 2016.[5] Inputs from the community were gathered at the Planetary Protection Knowledge Gaps for Human Extraterrestrial Missions, held in 2015.[6] Johnson and Race (2016) outlined notional requirements and prioritized studies needed before final requirements can be produced. This prior work sets the stage for completing the necessary studies and finalizing planetary protection requirements for human spaceflight.

We propose a continuation of the systems engineering approach adopted thus far. The challenges associated with the implementation of notional requirements will be quantified in detailed discussions with internal stakeholders. The status and results of high-priority studies that have been completed since 2016 or are ongoing will be incorporated into discussions with stakeholders. In this way, we plan to bridge the gap between the science behind planetary protection and the engineering development that will implement it, allowing finalized planetary protection requirements to be developed for future human space missions.

References: 1. UN. (1967) The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space. 2. COSPAR Planetary Protection Policy (2002-2011). 3. NASA (2013) NPD 8020.7G. 4. NASA (2014) NPI 8020.7. 5. J. Johnson and M. Race. (2016) A Path to Planetary Protection Requirements... 6. M.S. Race, et al. (2016) Planetary Protection Knowledge Gaps for Human Extraterrestrial Missions.