

LIST OF RECOMMENDATIONS FROM THE COSPAR PANEL ON PLANETARY PROTECTION

At its open and closed sessions on 23-25 January 2019, the COSPAR Panel on Planetary Protection had presentations of studies regarding in particular two items on the agenda:

- **A) Phobos and Deimos Earth return categorization for the JAXA MMX mission and**
- **B) Outer Solar System**

After discussion at the closed session, the Panel submitted the following recommendations to the COSPAR Bureau for consideration for their March 2019 meeting in Paris.

The list below contains the recommendations validated by the COSPAR Bureau pertaining to the COSPAR Planetary Protection Policy and its associated implementation guidelines. The new text to the implementation guidelines will be inserted and the new version will be uploaded to the COSPAR website.

A) Phobos and Deimos Earth return categorization for the JAXA MMX mission

PPP RECOMMENDATION #1

- Based on the current COSPAR Planetary Protection Policy, the COSPAR PPP recommends that the outbound portion of the MMX mission be classified Planetary Protection Category III.
- Regarding the inbound portion of the MMX mission, two separate studies using several types of analysis, simulations, and laboratory experiments that incorporated current knowledge of Martian moons, were independently reviewed by a joint US National Academy of Sciences and European Science Foundation committee.
- Given the evidence presented and the discussion that followed, the Panel recommends that the inbound (Earth return) portion of the MMX mission, as currently planned by JAXA (ref. GNG-2018003A, 15 Jan. 2019), be classified Planetary Protection Category V, unrestricted Earth return.

B) Outer Solar System

The PPP also reviewed the recommendations made by the PPOSS Team following their updated study on the exploration of the outer solar system. The PPOSS study was funded by the European Commission Horizon 2020 Programme with its main purpose to review and recommend updates to the planetary protection requirements for outer Solar system bodies.

PPP RECOMMENDATION #2

The second paragraph of the Category III/IV/V requirements for Europa and Enceladus text in the Planetary Protection Policy's implementation guidelines should be more specific on relevant organisms and be updated as follows:

The Preliminary calculations of the probability of contamination suggest that bioburden reduction will likely be necessary even for Europa and Enceladus orbiters (Category III) as well as for landers, requiring the use of cleanroom technology and the cleanliness of all parts before assembly, and the monitoring of spacecraft assembly facilities to understand the bioburden and its microbial diversity, including specific relevant organisms. Relevant organisms are Earth organisms potentially present on the spacecraft that can survive the spaceflight environment, the environment at the icy moon and replicate in icy moons subsurface liquid water. Specific methods should be developed to identify, enumerate and eradicate problematic species.

PPP RECOMMENDATION #3

The COSPAR Planetary Protection Policy implementation guidelines should be updated to reflect the period of biological exploration of Europa and Enceladus.

The biological exploration period for Europa and Enceladus is defined to be 1000 years; this period should start at the beginning of the 21st century. Requirements for Europa and Enceladus flybys, orbiters and landers, including bioburden reduction, shall be applied in order to reduce the probability of inadvertent contamination of European or Enceladan subsurface liquid water to less than 1×10^{-4} per mission.

PPP RECOMMENDATION #4

The COSPAR Planetary Protection Policy and its associated implementation guidelines should acknowledge the potential existence of Enhanced Downward Transport Zones at the surface of Europa and Enceladus. The Panel recommends that these zones should be defined and characterized by further specific studies.
