The COSPAR Panel on Planetary Protection

Plenary Meeting

20 October 2021

COSPAR Panel on Planetary Protection Plenary Meeting Agenda : *20 October 2021*

M L P PP ML

Introduction and purpose of the meeting - *(A. Coustenis)*
COSPAR items & introduction of new members - *(J-C. Worms)*
Information points/activity report since the last meeting - *(PPP Leads)*
Briefings from agency representatives - *(TBA)*
Other briefings from observers/ invited guests - *(TBA)*

Break (15 mns)

Status on Venus exploration PP-related matters and discussion
Status on Mars exploration PP-related matters and discussion
- Briefing from the NASEM/CoPP - *(J. Alexander & A. Hendrix)*
- Mars Program from the European side - *(G. Kminek)*
AOB

Break (15 mns)

MP P PP ML

Executive session *(members only)*

All times in CET and indicative…

COSPAR planetary protection policy

A special case among the Commissions and Panels in the COSPAR structure is the Panel of Planetary Protection (PPP) which serves an important function for space agencies pursuing the exploration of the planets. The primary objective of the COSPAR PPP is to develop, maintain, and promote the COSPAR policy and associated requirements for the reference of spacefaring nations and to guide compliance with the Outer Space Treaty ratified today by 110 nations, to protect against the harmful effects of forward and backward contamination, i. e.

The conduct of scientific investigations of possible extraterrestrial life forms, precursors, and remnants must not be jeopardized.

In addition, the Earth must be protected from the potential hazard posed by extraterrestrial matter carried by a spacecraft returning from an interplanetary mission.

This policy must be based upon the most current, peer-reviewed scientific knowledge, and should enable the exploration of the solar system, not prohibit it.

COSPAR Panel on Planetary Protection Members

Chair: Athena **Coustenis** (planetology)

Vice-Chairs: Niklas **Hedman** (UNOOSA, space law) & Gerhard **Kminek** (ESA, Earth sciences)

- Nine members appointed by space agencies:

l L P	Jing l (engineering)
l L P	Christian p l (astrobiology)
l	Petra (microbiology, astrobiology)
l P M	Praveen K (engineering scientist)
ÿ P	Eleonora l l n (planetologist)
l P P	Masaki n n (space plasma physics)
P L P	James l (plasma physics, astrobiology)
P	Karen Mjpnl l p (astrobiology, microbiology)
l pp	Sarah **Gallagher** (X-ray astronomy) On-going appointment

- Ten scientists / experts

Olivier **Grasset** (FR, geodynamics, planetology)

Peter **Doran** (USA, Hydrogeology, Extreme Environ^{ts})

Olga **Prieto-Ballesteros** (ES, geology, astrobiology)

Kanyan **Xu** (CN, microbiology, biochemistry)

Maria-Paz **Zorzano** (ES, astrobiology, biophysics)

Alex **Hayes** (USA, planetology)

Vyacheslav K. ÿ l (Russia, microbiology, medicine)

Akiko **Nakamura** (JP, experimental physics)

François **Raulin** (FR, chemistry, planetology)

Maxim **Zaitsev** (RU, astrochem, organic chemistry)

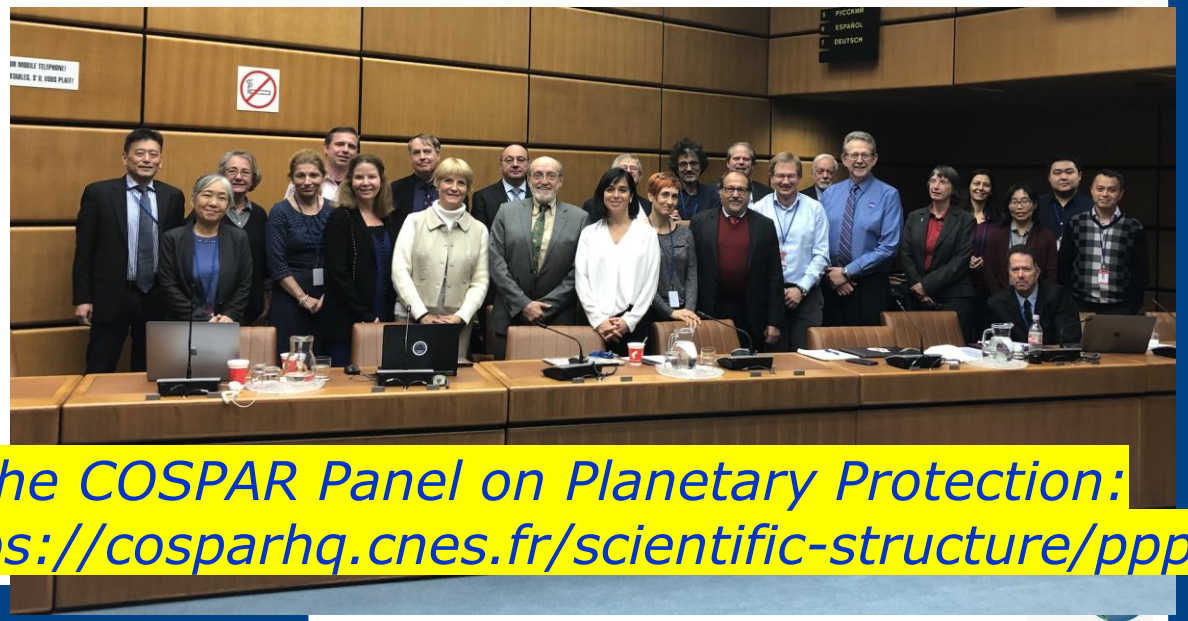
- n n Colleen l , NASEM SSB & ASEB Board Director


PPP
Members
COSPAR
COSPAR Executive
Director

Scope and Objectives of the COSPAR Panel on Planetary Protection

- It is not the purpose of the Panel to specify the means by which adherence to the COSPAR Planetary Protection Policy and associated guidelines is achieved; this is reserved to the engineering judgment of the organization responsible for the planetary mission, subject to certification of compliance with the COSPAR planetary protection requirements by the national or international authority responsible for compliance with the UN Outer Space Treaty.
- The Panel provides, through workshops and meetings also at COSPAR Assemblies, an international forum for the exchange of information on the best practices for adhering to the COSPAR planetary protection requirements. Through COSPAR the Panel informs the international community, including holding an active dialogue also with the private sector.

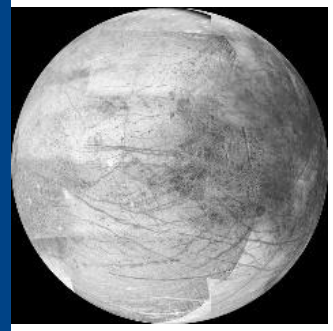
- Since its restructuring in mid-2018, the Panel has had **ïjj l p** (July 2018; Jan. & Dec. 2019, June & Nov. 2020, Jan. 2021 @ the COSPAR GA, 15 Feb., 18 May 2021…) and about 30 telecons between PPP Leads and parts of the Panel & COSPAR Leads.
- COSPAR is constantly reviewing its Policy in view of recent scientific findings and needs.



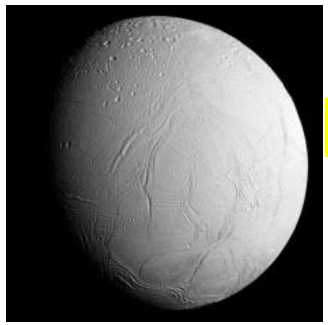
The COSPAR Panel on Planetary Protection: https://cosparhq.cnes.fr/scientific-structure/ppp

Planetary Protection of the Outer Solar System (PPOSS)

- Project led by the European Science Foundation, funded by the EC with DLR/Germany, INAF/Italy, Eurospace, Space Technology/Ireland, Imperial College London (UK), China Academy of Space Technology and NAS-SSB
- Recommended a revision of the planetary protection requirements for missions to Europa and Enceladus, based partly on the NAS-SSB 2012 Icy Bodies Report
- The ESA PPWG submitted a written assessment of the PPOSS recommendation to COSPAR
- COSPAR was involved throughout the multi-year-long process and at the end updated the requirements for missions to Europa and Enceladus



Credit: NASA/JPL/Galileo



Credit: NASA/JPL/Cassini

Published in Space Res. Today *208, 10-22 (Aug. 2020)*

"Planetary protection: New aspects of policy and requirements", 2019.

Life Sci. Space Res. *23*

The Internl PP Handbook: Dec. 2018

Martian Moon Explorer (MMX)

In 2019 ESA and JAXA studied sample return missions from Martian moons Phobos and Deimos

- ESA, NASA and JAXA supported scientific activities to evaluate the level of assurance that no unsterilized martian material naturally transferred to Phobos (or Deimos) is accessible to a Phobos (or Deimos) sample return mission, followed by an independent review by the NAS-ESF
- Outcome was presented to the ESA Planetary Working Group (PPWG) and to COSPAR, involved from the beginning
- assigned planetary protection category for the MMX mission : outbound Cat III and inbound Cat V: unrestricted Earth return)

Updated planetary protection for the Moon

Category II: All types of missions (gravity assist, orbiter, lander) to a target body where there is significant interest relative to the process of chemical evolution and the origin of life, but where there is only a remote[1] chance that contamination carried by a spacecraft could compromise future investigations

Remote chance implies the absence of environments where terrestrial organisms could survive and replicate, or a very low likelihood of transfer to environments where terrestrial organisms could survive and replicate.

Orbiter and fly-by missions to the Moon*: Category II*. There is no need to provide an organic inventory

Lander missions to the Moon :

Category IIa. All missions to the surface of the Moon whose nominal mission profile does not access areas defined in Category IIb shall provide the planetary protection documentation and an organic inventory limited to organic products that may be released into the lunar environment by the propulsion system (relaxed requirements),

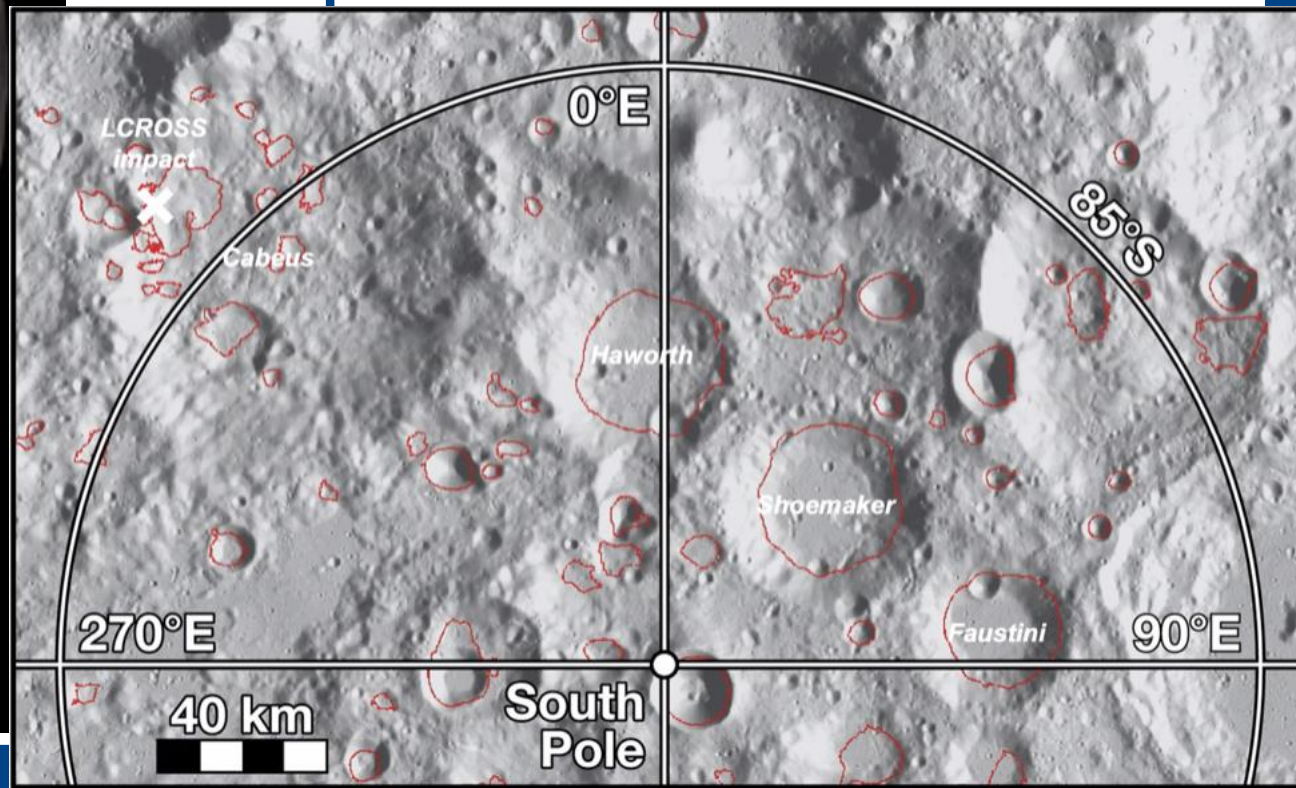
Category IIb. All missions to the surface of the Moon whose nominal profile access Permanently Shadowed Regions (PSRs) and the lunar poles, in particular latitudes south of 79°S and north of 86°N shall provide the planetary protection documentation and full organic inventory

The requirements are for simple documentation only. Preparation of a short planetary protection plan is required for these flight projects primarily to outline intended or potential impact targets, brief Pre- and Post-launch analyses detailing impact strategies, and a Post-encounter and End-of-Mission Report which will provide the location of impact if such an event occurs.

Updated COSPAR Policy published in Space Res. Today ***211***, *14-20 (Aug. 2021);* https://doi.org/10.1016/j.srt.2021.07.009.

This means for Moon exploration:

Protected PSRs in the South Pole & relaxation of requirements elsewhere



Planetary protection:
For sustainable space exploration and to safeguard our biosphere

- COSPAR maintains a non-legally binding planetary protection policy and associated requirements to guide compliance with the UN Outer Space Treaty. The COSPAR Policy is the only international framework for planetary protection
- COPUOS in its 2017 report noted the long-standing role of COSPAR in maintaining the Planetary Protection Policy as a reference standard for spacefaring nations and in guiding compliance with Article IX of the Outer Space Treaty

Planetary protection categories and requirements are not cast in stone and evolve over time as new information becomes available, i.e. check the latest version at the start of a new project

- *Planetary protection technologies are for cleaning and sterilizing spacecraft and handling soil, rock and atmospheric samples. Precautions are taken against introducing microbes from Earth.*
- *At the same time, when the samples are returned to Earth, there is need to avoid backward contamination and preserve our biosphere Hot topic: sample receiving facilities*

PPP Publications

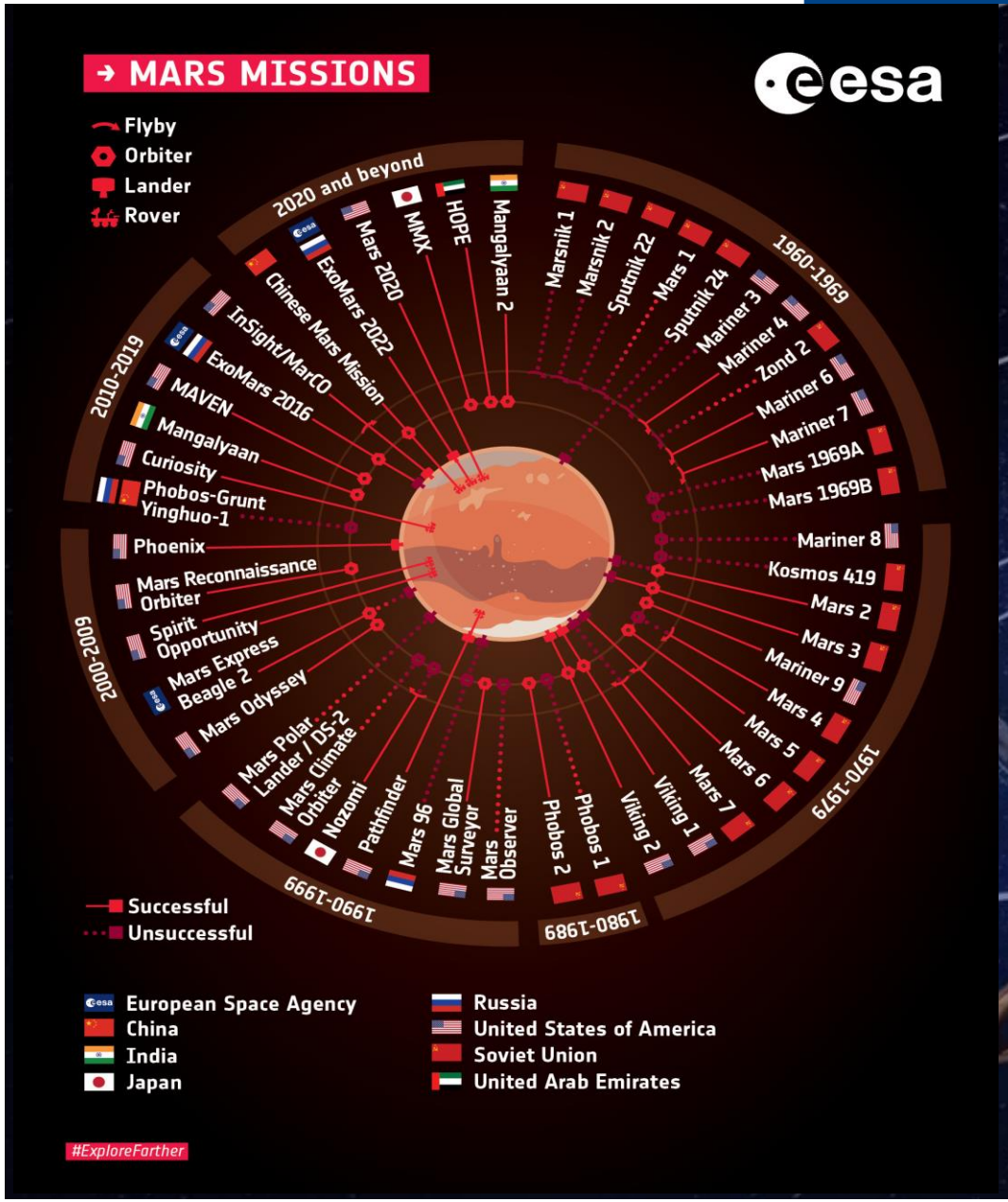
+ Numerous presentations by PPP members in international meetings

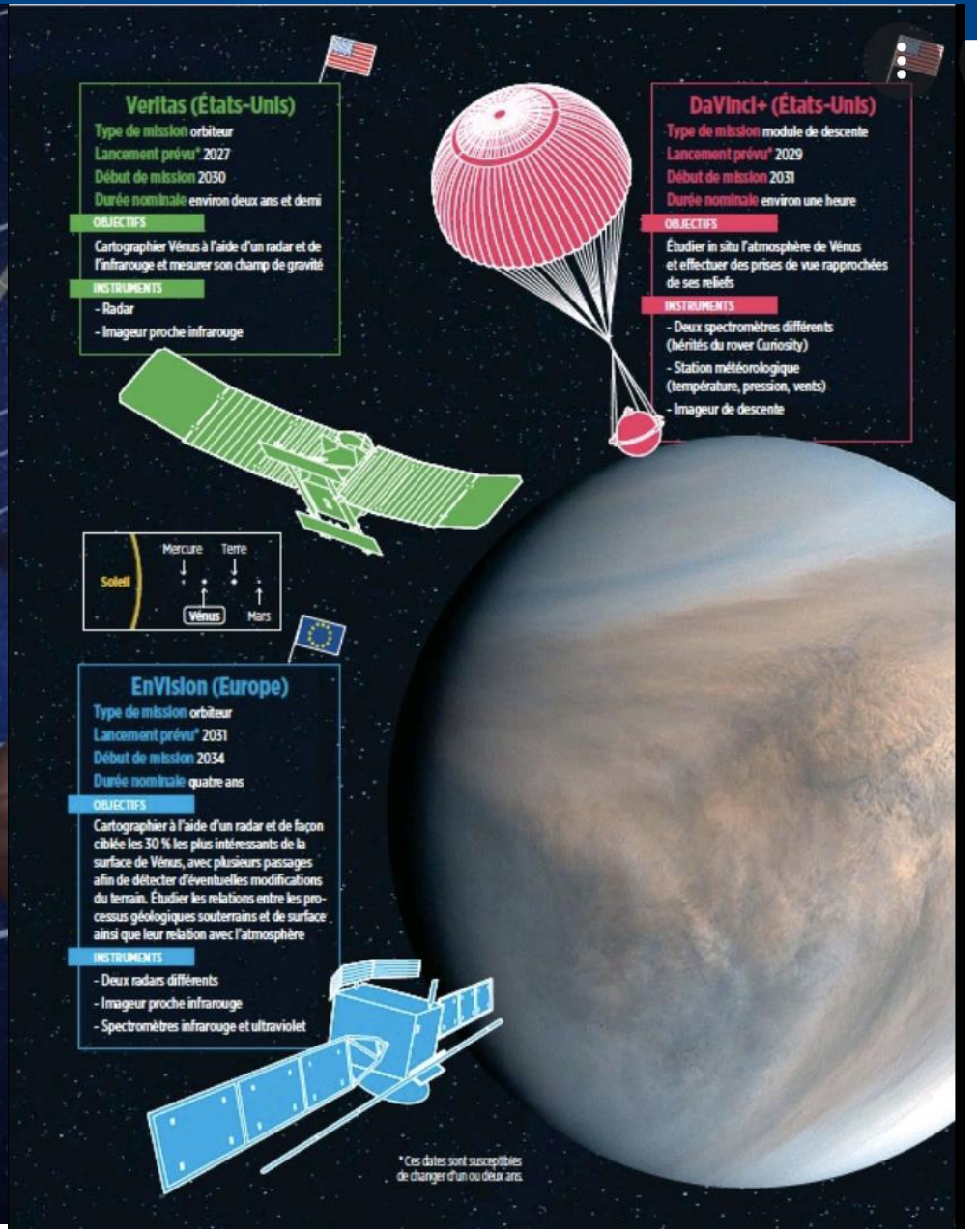
+ inputs to the press in many countries

- Coustenis, A., Kminek, G., Hedman, N., 06/**2019**. The challenge of planetary protection. *ROOM Journal #2(20)*
- Coustenis, A., Kminek, G., Hedman, N., The COSPAR Panel on Planetary Protection., **2019**. The COSPAR Panel on Planetary Protection role, structure and activities. *Space Res. Today* 205, DOI:10.1016/j.srt.2019.06.013.
- Raulin, F., Coustenis, A., Kminek, G., Hedman, N., **2019**. Preface to the special issue "Planetary protection: New aspects of policy and requirements". *Life Sci. Space Res.* 23, 1-2. *See also the whole issue.*
- Fisk, L., Worms, J-C., Coustenis, A., Hedman, N., Kminek, G., **2020**. Introduction to the new COSPAR Policy on Planetary Protection. *Space Res. Today* 208, August 2020.
- The COSPAR Panel on Planetary Protection, **2020**. « COSPAR Policy on Planetary Protection ». *Space Res. Today* 208, August 2020, Pages 10-22. DOI: 10.1016/j.srt.2020.07.009.
- The COSPAR Panel on Planetary Protection, **2020**. « Planetary Protection Policy: For sustainable space exploration and to safeguard our biosphere ». *Research Outreach* 118, 126-129. DOI: 10.32907/RO-118-126129.
- Coustenis, A., Hedman, N., Kminek, G., The COSPAR Panel on Planetary Protection, **2021**. "The COSPAR Panel on Planetary Protection: Recent Activities". *Lunar and Planetary Science Conference no 52,* 15-19 March.
- Coustenis, A., Hedman, N., Kminek, G., & COSPAR Panel on Planetary Protection, **2021**. "The COSPAR Panel on Planetary Protection: Recent Activities". *Global Space Exploration (GLEX),* 14-18 June, St Petersbourg, Russia.
- Coustenis, A., Hedman, N., Kminek, G., The COSPAR Panel on Planetary Protection, **2021**. "To boldly go where no germs will follow: the role of the COSPAR Panel on Planetary Protection". *OpenAccessGovernment,* July 2021
- Fisk, L., Worms, J-C., Coustenis, A., Hedman, N., Kminek, G., the COSPAR PPP, **2021**.Updated COSPAR Policy on Planetary Protection. *Space Res. Today* 211, August 2021. doi.org/10.1016/j.srt.2021.07.009
- Coustenis, A., The COSPAR Panel on Planetary Protection, **2021**. « Fly me to the moon: Securing potential lunar water sites for research ». *OpenAccessGovernment,* Sept. 2021
- Coustenis, A., the COSPAR Panel on Planetary protection, **2021**. « Planetary Protection: an international concern and responsibility ». IAC Publications, Submitted.

https://cosparhq.cnes.fr/scientific-structure/panels/panel-on-planetary-protection-ppp/

FUTURE ITEMS





Combination of space missions by ESA and NASA (38; *Credit L. Glaze*) but more from other countries and agencies: Japan, Russia, India, China, UAE, Canada, other nations, etc…

New items for consideration

- On 18 May, we reached a consensus on the updated Policy for the Moon. The new Policy was validated in June 2021 by the Bureau and published in August 2021. But space exploration continues !
- Then, today we discuss:
  - Reports concerning Martian Exploration
  - Venus exploration future missions
- Any needs to envisage updates of the Policy
- But not in a rushed process. We give thorough consideration to all arguments and scientific inputs and make an informed decision
- In the meantime, there is need for community input on science findings and research reserves : Studies/Survey/Workshop/Focused conference?

CLOSED SESSION