



Planetary Protection The COSPAR Perspective

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COSPAR

- **COSPAR was chartered by the International Council for Science in 1958 to promote at an international level scientific research in space. We do so by providing forums of all sizes, from large Assemblies, to smaller Symposia, to meetings of our various Panels. And also through our peer-reviewed scientific journals. We consider that our mission is first and foremost service to the international space science community, in pursuit of a vibrant international space research effort, conducted without impediment from geopolitical tensions or differences.**
- **In the beginning, COSPAR provided an opportunity for scientists from the Soviet Union and western scientists to meet, to share scientific results, to form bonds of respect and trust that served as a bridge between nations engaged in the Cold War.**
- **In the ensuing years, space research has spread to many nations throughout the world, and COSPAR's mission of service to the international space science community is evermore important. We are living in an era when the capabilities to pursue scientific space research are spreading throughout the world. Opportunities abound to cooperate, to maximize resources, to pursue evermore complex and challenging projects, to spread the development of technology to all nations, and to employ the contributions of all their talents to exploit the wealth of data that national and international missions have delivered.**



COSPAR

- **The national scientific organizations of 43 nations are members of COSPAR. Thirteen international scientific unions, with overlapping interests, are members of COSPAR. 10,000 scientists from around the world participate in COSPAR Assemblies, Symposia, other sponsored meetings and studies, and publish in our journals.**
- **COSPAR considers that its mission is not only to promote and facilitate international cooperation among scientists. It is also to assist the space agencies on which the scientists depend. We also consider part of our mission is to mobilize and make available the international science community, to assist the mission of UN Committee on the Peaceful Use of Outer Space (COPUOS).**



Planetary Protection

- **The oldest and most enduring cooperation between COSPAR and COPUOS has been the development of the international standard for planetary protection – the modern term that describes:**
 - **The need to protect Earth's biosphere from extraterrestrial materials carried by a spacecraft returning from an interplanetary mission.**
 - **The need to ensure that scientific investigations related to the search for extraterrestrial life are not compromised while we explore our solar system.**



The History of Planetary Protection

- **Even before the launch of Sputnik in 1957, the international scientific community expressed concern about space exploration possibly contaminating planetary bodies, jeopardizing their biological exploration, and posing risks to Earth's biosphere.**
- **In 1958, COPUOS made initial attempts to deal with interplanetary contamination and spacecraft sterilization.**
- **In 1958, the International Council for Science (ICSU) established an ad-hoc Committee on Contamination by Extraterrestrial Exploration (CETEX). CETEX recommended establishing a code of conduct for space missions and research. In accepting the CETEX recommendations ICSU established the Committee on Space Research (COSPAR) to coordinate worldwide space research.**



The History of Planetary Protection

- In 1961, ICSU declared that all countries launching space experiments that could have an adverse effect on other scientific research should provide ICSU and COSPAR with the information necessary to evaluate the potential contamination.
- In 1962, COSPAR organized a Consultative Group on Potentially Harmful Effects of Space Experiments to help conduct these evaluations.



The History of Planetary Protection

- **In 1964 at the Sixth Session of COPUOS, the role and competence of the COSPAR Consultative Group was recognized.**
 - The Secretary General was requested to circulate to Member States the COSPAR report that made specific proposals concerning space experiments that might involve potentially harmful effects.
 - All Member States proposing to carry out experiments in space were urged to give full consideration to the problem of possible interference with other peaceful uses of outer space, as well as possible harmful changes in the natural environment caused by space activities
 - Member States were encouraged to seek analysis of the qualitative and quantitative aspects of those experiments from the COSPAR Consultative Group, and to give due consideration to the results of this analysis.
- **All of these actions at the beginning of the space age are the foundation for the key role COSPAR has played in the international coordinated development of a planetary protection policy. A role that has continued to this day.**



The Outer Space Treaty

- **In 1967, the Outer Space Treaty was negotiated. The goals for planetary protection in the Outer Space Treaty are included in Article IX, which has three main points:**
 1. **“The exploration and use of outer space, including the Moon and other celestial bodies, by States Parties to the Treaty, are guided by the principle of cooperation and mutual assistance and shall conduct all their activities in outer space with due regard to the corresponding interests of all other States Parties to the Treaty.”**
 2. **“States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter, and where necessary shall adopt appropriate measures for that purpose.”**
 3. **There should be extensive consultations among the State Parties to ensure that there is no harmful interference.**



The Outer Space Treaty

- **The three requirements of Article IX: (1) Not to interfere with each other. (2) Not to contaminate forward or backward. (3) And to consult. Are the same requirements that COPUOS urged its Member States to comply with in 1964 by working with COSPAR to the determine the potentially harmful effects of space experiments.**
- **Indeed, it is difficult to imagine how Article IX could be implemented without COSPAR. Implicit in the requirement not to contaminate, and not to interfere with each other, is the requirement that there must be some common, agreed-upon standard for planetary protection. If each State Party has a different standard, it is possible and probably likely, when exploring the same planetary body, that there will be interference. And does any one State Party wish to accept responsibility for the biological contamination of Earth as a result of using a standard not accepted by other States Parties?**



The COSPAR Panel on Planetary Protection

- In the ensuing years COSPAR has endeavored to fulfill its responsibility to develop an agreed-upon standard for planetary protection, which guides States Parties in ensuring that they are in compliance with Article IX.
- The COSPAR Consultative Group on Potentially Harmful Effects of Space Experiments has evolved into the current Panel on Planetary Protection.
- In 1967, COSPAR issued a policy that prescribed limits on the probability that a planet would be contaminated during the so-called period of biological exploration. This policy guided planetary protection measures until 1983.
- In subsequent years, many specific requirements were established for missions and were incorporated into a comprehensive revision of the Cospar Planetary Protection Policy in 2011.
- In fact, the COSPAR Planetary Protection Policy undergoes continuous revisions, either as a response to new discoveries, or a specific request from a space agency.



The Current Situation

- Over the many decades that we have been exploring space, the COSPAR process of ensuring compliance with Article IX has worked very well. In part, because there were only a few nations with the capability to undertake missions to planetary bodies, and they have been the leaders in demanding that we neither forward contaminate planetary bodies, nor back contaminate Earth.
- The situation today is more complex. There are a growing number of nations with the capability to explore planetary bodies. There are a growing number of planetary bodies for which we need to be concerned about planetary protection. For many years the focus of planetary protection was Mars. Now we have missions to the icy moons of Jupiter and Saturn, which contain subsurface oceans that may contain life. To date we have been concerned only with robotic missions. But human exploration of Mars is becoming a more realistic possibility. Sample return from Mars, a long-standing goal of the planetary science community, is now in the plans.



The Emerging Challenges

- Perhaps the most significant change that is now occurring is the introduction of non-governmental entities, private companies, with plans for and the capability for missions to planetary bodies. In general these missions are not for science, but for commercial purposes.
- Article VI of the Outer Space Treaty is specific that the States Parties to the Treaty are responsible for their non-governmental entities and must ensure that they comply with Article IX.
- It is also important to note that Article IX is concerned with both the “exploration and use of outer space”, and thus the legitimate needs of non-governmental entities need to be taken into account by COSPAR in establishing the international standards for planetary protection.
- There should be no issue with regard to the Moon and most asteroids, which have no planetary protection constraints. Mars may be more challenging.



The Reconstituted COSPAR Panel on Planetary Protection

- **When I became President of COSPAR in August 2014, I was troubled by several aspects of the way in which COSPAR operated, and I set out to correct what I considered to be deficiencies. Among other items, we developed a Strategic Statement and formal Management Procedures, which documented responsibilities and operational processes.**
- **One issue that troubled me in particular was the Panel on Planetary Protection (PPP), which operated like any other COSPAR panel, but unlike any other panel effectively had statutory responsibilities to**
 - **determine the international standards for planetary protection to guide compliance with Article IX of the Outer Space Treaty.**
- **I was also troubled that the COSPAR mandate from COPUOS to determine the international standards for planetary protection had very little formal documentation behind it, other than historical precedence.**



The Reconstituted COSPAR Panel on Planetary Protection (PPP)

- **We have thus been engaged over the last few years in reconstituting the PPP, to introduce a formality that ensures that all parties that comply with the COSPAR Planetary Protection Policy have a proper say in the formation of the Policy, and that the reconstituted PPP is fully supported by COPUOS.**
- **Although we started consideration of reconstituting the PPP mainly to be sure that COSPAR is properly supporting the needs of space agencies, we are creating a structure that should also be able to support the needs of non-governmental entities.**



The Reconstituted COSPAR Panel on Planetary Protection (PPP)

- **One of our goals for the reconstituted PPP has been to establish a closer working relationship with the UNOOSA and COPUOS. This goal has been achieved:**
- **One of the Vice Chairs of the reconstituted PPP is to be Niklas Hedman, Chief, Committee, Policy and Legal Affairs Section of the UN Office for Outer Space Affairs.**
- **At the COPUOS meeting, 7-15 June 2017 in Vienna, the following language was included in the final report to the UN General Assembly:**

The Committee also 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. The Committee further noted the position held by COSPAR that the involvement of the Office for Outer Space Affairs in the reconstituting and functioning of the Panel on Planetary Protection would help ensure that the needs of all States parties pursuing the exploration and use of planetary bodies were served satisfactorily.



The Terms of Reference (ToR) for the Reconstituted PPP

- **The Terms of Reference (ToR) for the Reconstituted PPP:**
- **SCOPE AND OBJECTIVES OF THE PANEL ON PLANETARY PROTECTION**

The Panel on Planetary Protection (PPP) is concerned with biological interchange in the conduct of solar system exploration, including: (1) possible effects of contamination of planets other than the Earth, and of planetary satellites within the solar system by terrestrial organisms; and (2) contamination of the Earth by materials returned from outer space carrying potential extraterrestrial organisms. The primary objective of the Panel within COSPAR is to develop, maintain, and promulgate clearly delineated policies that provide specific requirements as to the standards that must be achieved to protect against the harmful effects of such contamination. These policies must be based upon the most current, peer-reviewed scientific knowledge, and should be based upon the principle that COSPAR planetary protection policies should enable the exploration of the solar system, not prohibit it. It is not the purpose of the Panel to specify the means by which adherence to the COSPAR planetary protection policy is achieved; the best and most cost effective means to adhere to the COSPAR planetary protection requirements 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. However, the Panel should make every effort, through symposia, workshops, and topical meetings at COSPAR Assemblies, to provide an international forum for the exchange of information on the best practices for adhering to the COSPAR planetary protection requirements. Through COSPAR the Panel will inform the international community, e.g., the Committee on the Peaceful Uses of Outer Space (COPUOS) of the United Nations, as well as various other bilateral and multilateral organizations, of policy consensus on planetary protection.



The Terms of Reference (ToR) for the Reconstituted PPP

● Panel membership

- The Panel, led by a Chair with the support of two Vice Chairs, consists of appointed members who represent the national or international authority responsible for compliance with the UN Outer Space Treaty of 1967, and the Chairs of COSPAR Scientific Commissions B – Space Studies of the Earth-Moon System, Planets and Small Bodies of the Solar Systems, and F-Life Sciences as Related to Space. **The COSPAR Bureau formally appoints the Panel leadership and members. Panel meetings will be attended by, as active participants, representatives of COSPAR's National Scientific Institutions, International Scientific Unions, and COSPAR Scientific Commissions.**
- The Chair of the Panel may not represent a national or international authority responsible for compliance with the UN Outer Space Treaty of 1967, but is chosen for his or her stature as an established leader of international space science, and ability to oversee the expeditious execution of the Panel's responsibilities in such manner that COSPAR is recognized as fulfilling its responsibilities to provide accepted guidelines on planetary protection to guide compliance with the wording of the UN Outer Space Treaty of 1967 and other international agreements. **The appointment of the Chair is for four years, and is renewable once.**
- The two Vice Chairs of the Panel are as follows: One is chosen for his or her detailed knowledge of planetary protection issues and may concurrently represent a national or international authority responsible for compliance with the UN Outer Space Treaty of 1967. One is appointed by the UN Office of Outer Space Affairs (UNOOSA) to ensure that COSPAR is fulfilling its responsibilities under the UN Outer Space Treaty of 1967. **The appointment of each Vice Chair is for four years and is renewable once.**



The Terms of Reference (ToR) for the Reconstituted PPP

● PANEL OPERATIONS

- The Chair of the Panel will convene all official meetings of the Panel at which major issues concerning planetary protection are to be discussed, and any updates or revisions to the COSPAR Planetary Protection Policy are to be recommended to the COSPAR Bureau and Council. The Chair will determine the agenda for the meeting, soliciting inputs from the Vice Chair(s), members, and other participants in the Panel meeting. **The announcement of an official meeting of the Panel will be made at least two months in advance, and when possible will occur in concert with COSPAR Assemblies, Symposia, and/or Bureau meetings to encourage maximum attendance. In special circumstances, meetings, and the discussions and determination of a consensus position, can be held electronically.**
- The primary objective of the Panel is to develop and maintain the COSPAR Planetary Protection Policy. This is accomplished by having official meetings of the Panel continuously consider and evaluate the best available scientific knowledge of the risks of such contamination and the most expeditious means to avoid such contamination, and to discuss and propose, as needed, updates and revisions of the COSPAR Planetary Protection Policy. **The discussions on the Panel should include experts on planetary protection who are drawn from representatives of COSPAR's National Scientific Institutions, International Scientific Unions, and COSPAR Scientific Commissions (mainly, B – Space Studies of the Earth-Moon System, Planets, and Small Bodies of the Solar System, and F – Life Sciences as Related to Space). Any proposed updates and revisions that are to be submitted to the Bureau and Council for adoption, must be established by consensus of the Panel, including the Vice Chair(s), members, and experts on planetary protection present at, or participating electronically, in the official meeting.**



The Schedule for Reconstituting the PPP

- The new Terms of Reference for the PPP were adopted by the Bureau in March 2017.
- Nominations for the official members of the PPP will be sought in the fall of 2017 and the appointments made by the Bureau at the March 2018 meeting. It is anticipated that the official members will have authority within their organizations to ensure compliance with Article IX of the OST, as well as a broad purview over the impact of planetary protection on the mission of their organization.
- The Chair of the reconstituted PPP will be Athena Coustenis, who will be appointed in March 2018. Niklas Hedman of UNOOSA and Gerhard Kminek will be the Vice Chairs.
- The handover to the reconstituted PPP will occur during the Business Meeting of the PPP at the next COSPAR Assembly in Pasadena in July 2018.



The COSPAR Perspective on Planetary Protection

- **UN COPUOS has endorsed 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.**
- **COSPAR is reconstituting the Planetary Protection Panel to help ensure that the needs of all governmental space agencies and now non-governmental entities pursuing the exploration and use of planetary bodies are served satisfactorily.**
- **And now we must execute and as soon as possible. When the discussion of reconstituting the PPP first began, there was not a particular need for urgency. Now there is considerable pressure to ensure that the COSPAR Planetary Protection Policy is serving all legitimate needs.**