

COSPAR Activities in Planetary Protection 2011



John D. Rummel
East Carolina University
Greenville, North Carolina
USA

Panel Leadership

- Chair: John Rummel (ECU) re-appointed until 2014 Assembly
- Vice Chairs:
 - Gerhard Kminek (ESA) continues until 2012 Assembly
 - Cassie Conley (NASA) appointed until 2014 Assembly
 - Victoria Hipkin (CSA) appointed until 2014 Assembly

Proposals for COSPAR Sessions in 2012

The Panel agreed to use the same scheme for half-day sessions at Mysore as the one that was used in Bremen. Three half-day sessions have been proposed, per the attached Event Proposals. The Panel will also work with SC B to sponsor an event focused on active natural satellites in the solar system.

PPP1 - COSPAR Planetary Protection Policy and Implementation Guidelines

MSO: J.D. Rummel DSO: G. Kminek

The session will report on recent planetary protection colloquia, workshops, and agency activities affecting the COSPAR planetary protection policy and implementation guidelines. Proposed revisions for the policy and implementation guidelines will be reported to the Planetary Protection Panel prior to addressing the COSPAR Bureau and Council.

PPP2 - Planetary Protection Mission Implementation and Status

MSO: J. Andrew Spry DSOs: G. Schwehm, M. Viso

This session will report on the planetary protection implementation and status of ongoing and planned missions. The session will focus on techniques and procedures applied to spacecraft, instruments and other hardware in order to meet planetary protection requirements. Papers are desired which describe the strategies used for spacecraft integration to achieve the contamination level constraints required by planetary protection policy, and/or navigation strategies for meeting planetary protection requirements, and/or the planetary protection compliance status of missions in the operations phase.

PPP3 - Planetary Protection Research and Development

MSO: P. Stabekis DSO: P. Rettberg

The session will report on planetary protection research and development activities to support policy revisions and in preparation for new mission concepts.

2010 Resolutions for Bureau and Council

- **Technical Corrections (Awaiting Action)**
 - Minor modifications of the existing policy that do not change its scope or the nature of the requirements imposed on missions
 - To include recommendations from Vienna and Pasadena workshops, as well as “timeframe” argument from Princeton
- **Resolution on Public Communication from Princeton (Awaiting Action)**
- **Workshop Proposals**
 - A workshop on Development of Foundational Ethical Principles Applicable to Planetary Protection and Space Exploration, to take place in 2011 (3,000 Euros)
 - A colloquium on Establishing risk levels for a Mars Sample Return mission, to take place in 2012 (1,000 Euros)

Resolutions for Consideration by the Bureau

1) A Resolution on Technical Changes to the COSPAR Policy of July 2008

was developed, to include the following provisions that neither change the scope nor the nature of the requirements to be imposed on missions:

- the precise definition of Categories II, III, and IV, as clarified at the *Vienna Workshop on Planetary Protection for Outer Planet Satellites and Small Solar System Bodies*
- the inclusion of a greater number of satellites and small bodies in the “Category-Specific Listing of Target Body/Mission Types” found in the Appendix to the current policy
- the required calculation of contamination probabilities to support Category II assignment of certain satellites and small bodies as clarified at both *Vienna Workshop on Planetary Protection for Outer Planet Satellites and Small Solar System Bodies* and the *Pasadena Workshop on Planetary Protection for Titan and Ganymede*
- guidelines on the preparation of an organic inventory for missions to bodies where such an inventory is required, to be included in the Appendix to the current policy
- a clarification of the trajectory biasing requirement for Mars to include a timeframe for the requirement, and a simplification/correction of the Category IVb requirement for Mars
- a clarification of the requirement for containment of unsterilized samples returned from Mars to the Earth.
- an amplification of the reporting requirement to recommend that COSPAR members inform COSPAR when establishing planetary protection requirements for planetary missions
- replace the term “bioload” with the term “bioburden” where found in the policy.

Consideration of this resolution was continued until the March 2011 Bureau meeting.



“Workshop on Ethical Considerations for Planetary Protection in Space Exploration”

Princeton, New Jersey

*John Rummel
Margaret Race
Gerda Horneck*

8-10 June 2010



Look at Current PP Policy – and Beyond

- ✓ For 4 decades - science only; governments
- ✓ OST clear about protection; now and in face of new activities (exploration and use).
 - Focus on Article IX ('harmful contamination') and Article VI (constraints apply to Parties and other legal entities)
- ✓ Consensus General Principle for PP going forward
 - Main goal: protect Moon and other celestial bodies from 'harmful contamination' (not just biological) regardless who does the activity

POLICY

COSPAR,

Referring to COSPAR Resolutions 26.5 and 26.7 of 1964, the Report of the Consultative Group on Potentially Harmful Effects of Space Experiments of 1966, the Report of the same Group of 1967, and the Report of the COSPAR/IAU Workshop of 2002,

notes with appreciation and interest the extensive work done by the Panel on Standards for Space probe Sterilization and its successors the Panel on Planetary Quarantine and the Panel on Planetary Protection and

accepts that for certain space mission/target body combinations, controls on contamination shall be imposed in accordance with a specified range of requirements, based on the following policy statement:

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. Therefore, for certain space mission/target planet combinations, controls on contamination shall be imposed, in accordance with issuances implementing this policy. (DeVincenzi et al. 1983; COSPAR PP Workshop 2008; ESA PPWG 2008)

“Umbrella” policy statement for overall COSPAR policy on contamination

COSPAR,

- *referring* to COSPAR Resolutions 26.5 and 26.7 of 1964....
- *notes* with appreciation and interest the extensive work done by the Panel... and its successors... and the Panel on Planetary Protection,
- *acknowledges* that
 - life, including extra-terrestrial life, has special ethical status and deserves appropriate respect because it has both intrinsic and instrumental values, and
 - non-living things, including extraterrestrial things, likewise have value and deserve respect appropriate to their instrumental, aesthetic or other value to human or extraterrestrial life
- *and accepts* that for certain space mission/target body combinations undertaken for scientific, exploration or other purposes by any entity, [controls on contamination *and restrictions on modifications of the natural state of solar system bodies* shall be imposed in accordance with a specified range of requirements based on the policy statements associated with each specific policy.]

Recommendations in plenary

- Policy Statement for *current policy* on biological planetary protection

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.

Inherent in the conduct of scientific, exploration and other activities—whether by robotic or human missions—is the need to consider and appropriately protect potential extraterrestrial life. Therefore, for certain space mission/target planet combinations, controls on contamination shall be imposed, in accordance with issuances implementing this policy. (DeVincenzi et al. 1983; COSPAR PP Workshop 2008; ESA PPWG 2008, etc.).

Recommendations in plenary

- Policy Statement for *parallel* policy* on non-living aspects of the Moon and other celestial bodies....

Inherent in the conduct of scientific, exploration, and other activities—whether by robotic or human missions—is the need to consider and appropriately protect the Moon and other celestial bodies. Therefore, for certain space mission/target planet combinations, controls on contamination and environmental disturbance shall be imposed, in accordance with issuances implementing this policy.

* to be determined....

Draft recommendations for COSPAR action on Public Dialogue

RECOMMENDATION 1: COSPAR should encourage its members and associated states to initiate and sustain a broad-reaching public dialogue about the ethical aspects of space exploration and planetary protection and to conduct public engagement and public consultation efforts at national and/or regional levels concerning ethics in space exploration.

RECOMMENDATION 2: COSPAR policy regarding space exploration and the preservation of outer space environments should take into account and reflect the international trend toward sincere consultation with a broad range of publics about the ethical and policy issues associated with space exploration, as has been put into practice for consultation about developments in biotechnology, nanotechnology, neuroscience, and so on, in both Europe and the United States and Canada.

Draft recommendations for COSPAR action on Public Dialogue

RECOMMENDATION 3: Toward addressing the challenges of assessing and incorporating public opinion in policy and planning, COSPAR should ask its Panels on Planetary Protection and Space Exploration to hold a workshop on public engagement, consultation, and participation in public policy making, involving relevant experts. The purpose of this workshop is to inform members about the premises, principles, and purposes of public engagement activities, and to disseminate best practices.

Resolution on Enhancing Awareness of the COSPAR Planetary Protection Policy

COSPAR

Noting that:

- the scientific exploration of the Solar System continues to be a compelling subject for international mission planning and a source of critical knowledge about Earth's neighbors in space; and
- an important goal of Solar System exploration is to address questions related to organic chemical evolution and the origin of life; and
- that COSPAR, through the active program of its Panel on Planetary Protection, maintains a Planetary Protection Policy that serves as the international consensus standard for conducting Solar System exploration in compliance with Article IX of the UN Space Treaty of 1967,

Therefore, COSPAR:

- resolves to take steps to enhance the effective promulgation of its Planetary Protection Policy:
 - to increase awareness of COSPAR's role in this critical area;
 - to ensure that the Policy and its provisions are known and accessible to space agencies to support their efforts in planning future Solar System exploration missions;
 - to encourage space agency representatives to participate actively in the work of COSPAR's Panel on Planetary Protection;
 - to enable more comprehensive reporting by space agencies on the results of Solar System exploration missions with regard to their planetary protection aspects, and access to those results by other agencies and the public; and
- resolves initially to provide startup funding to build its internet presence and useability, presentation and print materials, and promulgation through agency visits and presentations at international scientific meetings, in the amount of 16,000 euros; and
- resolves initially to provide startup funding to enhance its internet presence and usability, presentation and print materials, and promulgation through agency visits (as coordinated via the President of COSPAR) and presentations at international scientific meetings; and
- resolves to maintain this effort for an initial period of 5 years (for a total of 6 years); and
- resolves to provide for a review of this activity and its results at the end of 5 years to determine whether it should be continued, and if so what the annual funding level should be for its continuation.

Resolution on Enhancing Awareness of the COSPAR Planetary Protection Policy								
Supporting Budget Data: 6-year Program								
All amounts in Euros								
Item	Milestone(s)	2011	2012	2013	2014	2015	2016	Totals
Develop and Maintain PPP Website	Establish Website with pointer from COSPARHQ	500						500
	Establish reporting mechanism on new Website	1,500						1,500
	Test Website and populate with previous mission reports	500						500
	Distribute website information and maintain site	1,000	1,500	1,500	1,500	1,500	1,500	8,500
Prepare and distribute "Wiki" version of COSPAR Planetary Protection Policy - Update	Provides source data to track policy changes (begin 1963); identify appropriate student; fund effort	5,000	500	500	500	500	500	7,500
Develop and distribute COSPAR Planetary Protection Materials	Develop scope and sequence of materials to be distributed	1,000		500		500		2,000
	Provide paper item 1		1,000		1,000		1,000	3,000
	Provide paper item 1		1,000		1,000		1,000	3,000
	Provide paper/non-paper item 2	1,000		1,000		1,000		3,000
Make awareness visits to appropriate space agencies (coordinate with Bureau)	Initial visits	3,000	1,500		1,500			6,000
	Follow-on visits			2,000		2,000	2,000	6,000
Identify and visit appropriate international meetings to speak about COSPAR role	UN OOSA; UN Convention on Biodiversity; Environmental Law, Bioethics, AAAS, various others	2,000		2,000		2,000		6,000
Annual report preparation preparation and distribution	Complements biannual full report by COSPAR	500		500		500		1,500
Allowance for Program Adjustment/Reserve			500	500	500	500	500	2,500
Totals:		16,000	6,000	8,500	6,000	8,500	6,500	€ 51,500

Additional Recommendations on Ethical Dimensions and Planetary Protection Policy

1. COSPAR should set up a group / workshop to further explore the ethical values (intrinsic and instrumental) for the different classes of target objects in our solar system and provide guidance for balancing the different interests.
3. In cases of scientific uncertainty, the Precautionary Principle calls for further investigations before interference that is likely to be harmful to Earth and other extraterrestrial bodies, including life, ecosystems, and biotic and abiotic environments. [How much uncertainty?]
3. COSPAR should elaborate management guidelines and draft regulations in interaction with other organizations such as IISL, UN-COPUOS and others to establish a framework for environmental stewardship. This should apply additionally to the accepted regulations for preventing harmful planetary contaminations, which currently only consider biological and organic chemical contaminations.

Recommendations (cont.)

3. (cont.) This could include the establishment of an intergovernmental mechanism and/or body that provides management of space exploration and use. COSPAR should propose management guidelines, in interaction with other organizations such as IISL and others, to the UN COPUOS for UN General Assembly consideration. This is similar to the process whereby the UN COPUOS transmitted guidelines developed by the Inter-Agency Debris Coordination Committee to the UN General Assembly. COSPAR guidelines could provide a basis to determine fault for damage in outer space.

Ethical Considerations Workshop: PPP Synthesis Discussion

Toward a convention on “harmful contamination” of Outer Space and its prevention

- **Eventual** goal: Define, extend, and implement international law based on an elaboration of Article IX of the UN Outer Space Treaty
 - Adopted in the manner of the Convention on Biodiversity
 - Comprehensive structure to include scientific input on one end, and enforcement on the other

Study this possibility over the next several years and return with specifics

- **Initial step:** Advocate expanded framework for COSPAR Planetary Protection policy/policies to address other forms of “harmful contamination”
 - Maintain the current policy on biological planetary protection virtually intact, under expanded framework/umbrella for overall protection policy
 - Add parallel policy construct to provide guidance on requirements/best practices for protection of non-living/non-life-related aspects of Outer Space

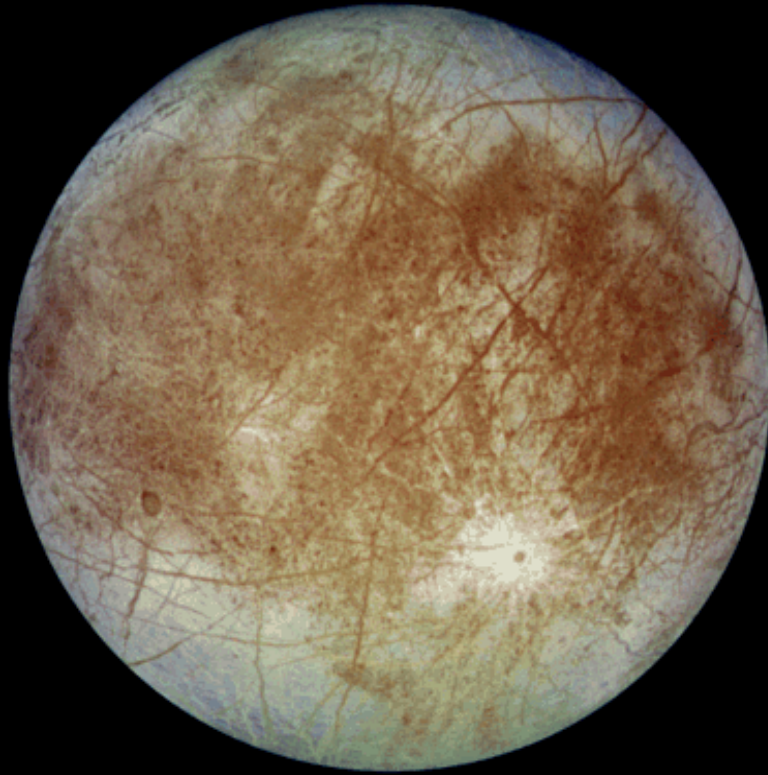
Synthesis Discussion (cont.)

- **Next step?**

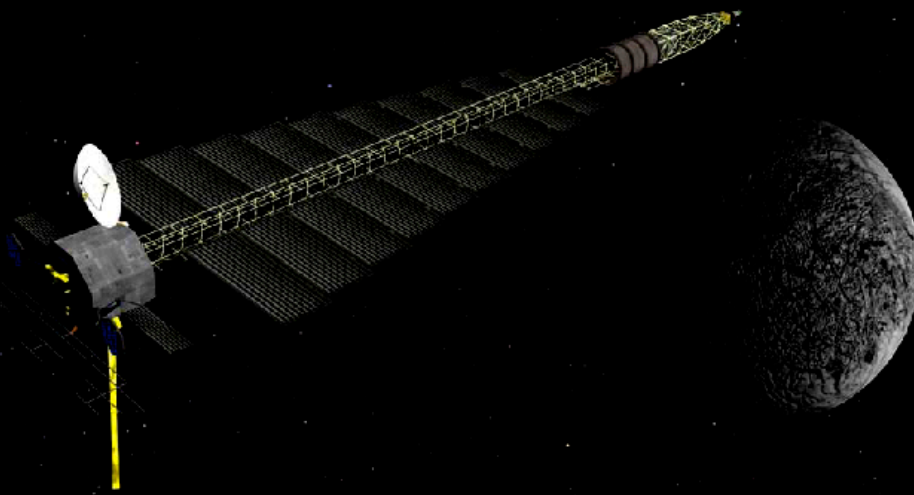
- Elevate the expanded framework within the scope of the UN Treaty, similarly to the way that orbital debris has been handled through UN COPUOS
- Focus on Convention on Liability as an aspect of enforcement that exists

- **Anticipated aspects**

- Screen environmental impact assessments for activities on celestial bodies
- Would be an intergovernmental mechanism for management of space exploration and use
- COSPAR and other groups would have input on management guidelines, through a scientific committee providing advice to the Convention
- Would designate and monitor establishment of planetary parks, and areas for other uses, both protected and not-protected
- Would also have jurisdiction over atmosphere-modification, etc., where science and other uses might be threatened



Questions??



Acronyms

- COSPAR Committee on Space Research (part of the International Council for Science/ICSU)
- ECU East Carolina University
- ESA European Space Agency
- NASA National Aeronautics and Space Administration
- CSA Canadian Space Agency
- SC B Scientific Commission B (COSPAR)
- PPP Panel on Planetary Protection (COSPAR)
- MSO Main Scientific Organizer (COSPAR)
- DSO Deputy Scientific Organizer (COSPAR)
- OST Outer Space Treaty (United Nations Outer Space Treaty of 1967)
- PP Planetary Protection
- IAU International Astronomical Union
- PPWG Planetary Protection Working Group (ESA)
- UN United Nations
- COPUOS Committee on the Peaceful Uses of Outer Space (UN)
- IISL International Institute for Space Law