



Planetary Protection at NASA: Overview and Status

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NASA Planetary Protection Officer

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2012 NASA Planetary Science Goals



Goal 2: Expand scientific understanding of the Earth and the universe in which we live.

2.3 Ascertain the content, origin, and evolution of the solar system and the potential for life elsewhere.

2.3.1 Inventory solar system objects and identify the processes active in and among them.

2.3.2 Improve understanding of how the Sun's family of planets, satellites, and minor bodies originated and evolved.

2.3.3 Improve understanding of the processes that determine the history and future of habitability of environments on Mars and other solar system bodies.

2.3.4 Improve understanding of the origin and evolution of Earth's life and biosphere to determine if there is or ever has been life elsewhere in the universe.

2.3.5 Identify and characterize small bodies and the properties of planetary environments that pose a threat to terrestrial life or exploration or provide potentially exploitable resources.

NASA Planetary Protection Policy



- The policy and its implementation requirements are embodied in NPD 8020.7G (*NASA Administrator*)
 - Planetary Protection Officer acts on behalf of the Associate Administrator for Science to maintain and enforce the policy
 - NASA obtains recommendations on planetary protection issues (requirements for specific bodies and mission types) from the National Research Council's Space Studies Board
 - Advice on policy implementation to be obtained from the NAC Planetary Protection Subcommittee
- Specific requirements for robotic missions are embodied in NPR 8020.12D (*AA, SMD*)
 - Encompasses all documentation and implementation requirements for forward and back-contamination control
- Future requirements for human missions are being studied with a broad science and exploration focus (Initial recommendations for Mars developed in 2001; Further refined in 2005; NPR planned responding to human exploration initiatives)

Role of PPS



- Provides expert advice to NASA on planetary protection, as part of the NASA Advisory Council
 - Reviews mission activities and makes recommendations on implementation options
 - Considers and advises on specific points of policy that are below the resolution of international policy set by the Panel on Planetary Protection of the Committee on Space Research
 - Provides guidance regarding programmatic direction and issues of importance/relevance to future missions and implementation of planetary protection requirements

Recent Recommendations



- Nov. '11 meeting, held jointly with ESA PPWG
 - Recommendations
 - Renew formal international collaboration
 - Evaluate biological potential of the circum-Mars environment
 - Capture planetary protection lessons learned from MSL
 - Continue joint meetings with ESA
- May '12 meeting
 - Recommendation
 - NASA should develop a NPR for human extraterrestrial missions at a level corresponding to the current COSPAR planetary protection policy
 - Observations and information
 - Beneficial to involve the PPO in Mars Program Planning Group efforts
 - Concurred with JAXA's proposed classification of the Hayabusa-2 mission as Planetary Protection Category V, unrestricted Earth return
 - Expressed concern regarding resources and staffing of the Planetary Protection Office

Recommendations from Nov. 2011

- PPS/PPWG Joint Recommendation on enhanced cooperation in Planetary Protection
 - ... recommend that NASA and ESA renew the LoA and further explore mechanisms for more closely coordinating their required planetary protection activities ...
- Recommendation requesting “lessons-learned” report about the MSL Project
 - ... recommend that NASA and ESA ensure the transmission of lessons-learned from ongoing missions ... the preparation of an extensive “lessons-learned” report ...
- Assessing the biological/PP status of the circum-Mars environment
 - ... forms an ad-hoc sub-group with two members from the PPS and PPWG, respectively, to put the Melosh et al analysis and its implications in the context of categorizing sample return missions to Phobos and Deimos ...
- Continued joint NASA–ESA advisory committee activities
 - ... recommend that the committees continue joint activities in planetary protection, including the exchange of meeting minutes and regular joint advisory meetings ...

Lessons-learned details

- Among other topics the report should include:
- issues with spacecraft materials and contamination control that may affect measurements made either in situ or after return
- key elements of a bioburden accounting software package that can be developed jointly for use in the MSR campaign
- a publication on the use of the ATP assay as related to the NASA Standard Assay, to facilitate adoption of this assay for bioburden accounting on MSR elements
- research needed to improve the assessment of proposed landing sites in the context of concerns for liberation of fluids from hydrated or frozen ground in the presence of an RTG

As transmitted from the Science Committee to the NAC...



- PPS/PPWG Joint Recommendation on enhanced cooperation in Planetary Protection
 - transmitted verbatim
- Recommendation requesting “lessons-learned” report about the MSL Project
 - transmitted verbatim in March 2012, with additional caveat:
“NASA’s withdrawal from the Mars Sample Return campaign previously scheduled to be initiated during the 2018 Mars launch opportunity makes the recording of lessons from the MSL project experience all the more important. The now likely very long hiatus in U.S. Mars surface operations threatens an especially severe loss of accumulated knowledge and experience.”
- Assessing the biological/PP status of the circum-Mars environment
 - referred to NASA PPO for implementation of NASA contribution
- Continued joint NASA–ESA advisory committee activities
 - referred to NASA PPO as subsidiary to item 1

Formal NASA Response



Planetary Protection



National Aeronautics and
Space Administration
Office of the Administrator
Washington, DC 20546-0001



May 31, 2012

Dr. Steven W. Squyres
Chairman
NASA Advisory Council
Washington, DC 20546

STEWS
Dear Dr. Squyres:

Enclosed is NASA's response to a recommendation from the NASA Advisory Council meeting held on March 8-9, 2012, at NASA Headquarters. Please do not hesitate to contact me if the Council would like further background on the response. I appreciate the Council's thoughtful consideration leading to the recommendations and welcome its continued findings, recommendations, and advice concerning the U.S. civil space program.

I look forward to working closely with you and members of the Council in the future.

Sincerely,

A handwritten signature in black ink, appearing to read 'C. Bolden, Jr.', written over a horizontal line.

Charles F. Bolden, Jr.
Administrator

Formal NASA Response



Planetary Protection



Enclosure:

2012-01-06 (SC-02) Enhanced Cooperation in Planetary Protection

NASA Response:

NASA concurs. NASA will begin the process to renew the 2007 ESA-NASA Letter of Agreement at the appropriate time to provide a sufficient margin for extension prior to its scheduled expiration (December 31, 2013).

Enclosure:

2012-01-07 (SC-03) Mars Science Laboratory (MSL) Planetary Protection Lessons Learned Report

NASA Response:

NASA concurs. NASA will work to capture the planetary protection lessons learned for MSL on a non-interference basis, ensuring that this lessons-learned activity does not interrupt or affect mission critical operations.

What's actually happening (Nov. '11)...

- PPS/PPWG Joint Recommendation on enhanced cooperation in Planetary Protection
 - ongoing – initiated renewal for the Letter of Agreement; joint meetings planned as determined
- Assessing the biological/PP status of the circum-Mars environment
 - ongoing – see ESA presentation tomorrow morning
- Recommendation requesting “lessons-learned” report about the MSL Project
 - bioburden accounting tool under development at Goddard – funded by NASA PPO
 - ATP data collected; some analysis funded at low level by Mars Exploration Program PP lead
 - planetary protection included in a study led by the NASA Chief Engineer to capture overall lessons-learned from MSL

May '12 topics transmitted to Science Committee and NAC



- To Science Committee
 - Recommendation
 - NASA should develop a NPR for human extraterrestrial missions at a level corresponding to the current COSPAR planetary protection policy
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- To NAC in July and again in November '12
 - Recommendation
 - Adopt Planetary Protection Procedural Requirements Document for Human Extraterrestrial Missions

Major Reason for Action Now



The 2012 NRC study on Space Technology Roadmaps were informed of NASA policy, but in the report the following statement was made:

"Similarly, it was observed that NASA planetary protection policies are limited to robotic missions. Until those policies are updated to provide guidance on human exploration, in compliance with recent COSPAR planetary protection policies, it would be premature to invest in new technologies relevant to planetary safety in TA07."

What's actually happening (May '12)...

- Recommendation to NAC was tabled at the July '12 meeting pending additional information
- Supporting material supplied to NAC before the Nov. '12 meeting
 - white-paper on reasons for the recommendation
 - draft NPR incorporating COSPAR guidelines
 - proposal to request a joint NRC-ESF study on refining requirements in support of COSPAR guidelines
- Original recommendation accepted and transmitted to the Human Exploration and Operations Committee
- Draft NPR transmitted to responsible HEOMD official
- Discussions initiated with NRC and ESA regarding support for a joint study

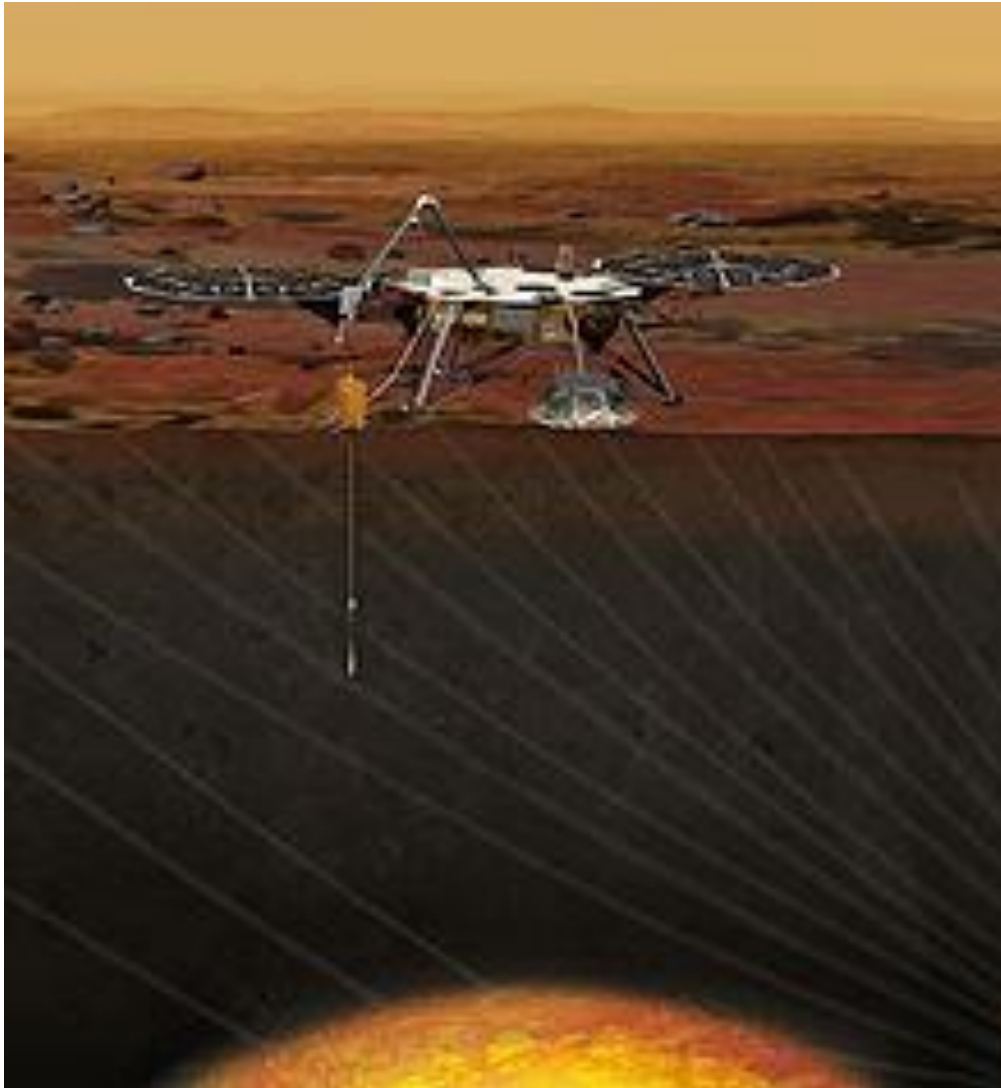
Updates to Policy and Requirements



- NRC Study on Assessment of Planetary Protection Requirements for Spacecraft Missions to Icy Solar System Bodies released in April '12
 - Recommended a decision tree approach to determining planetary protection category, rather than a Coleman-Sagan formulation
 - Follow-on workshop held by the SSB in July 2012 to assess current NASA practice in the context of the report
 - Workshop participants included study team members and other experts
 - Concluded that current practice is consistent with NRC recommendations
 - Formal NASA response to the NRC is in preparation
 - A publication describing current practice in the context of the NRC report is in preparation

New Discovery Selection

Planetary Protection



InSight
Mars Interior Mapping

Programmatic Concerns

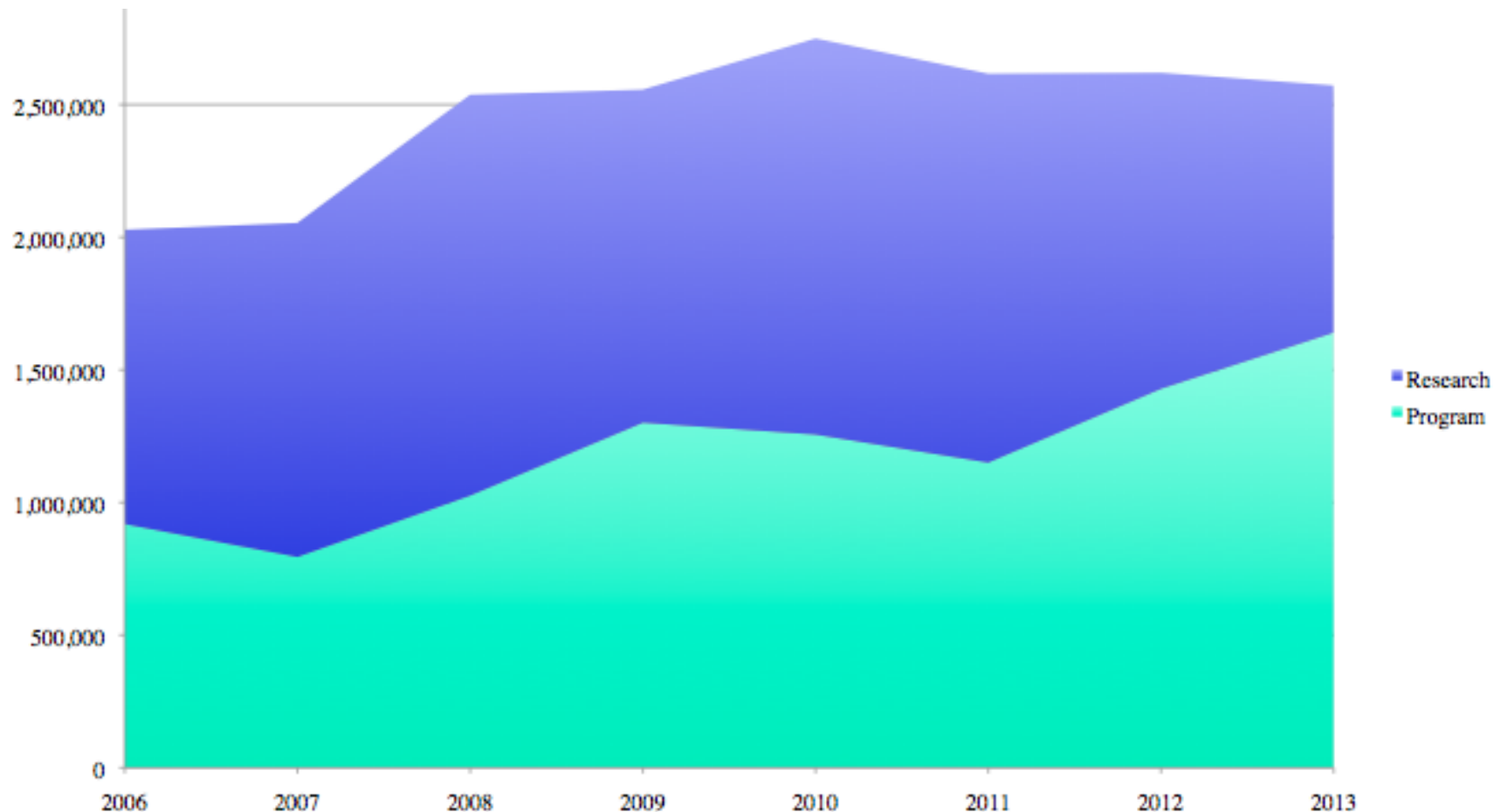


- An increasing number of mission concepts target locations of concern for planetary protection, both Mars and Outer Planets
 - Technology development for planetary protection, beyond basic research, has historically been left to missions: better coordination in planetary protection technology development would facilitate efficient use of resources (PPR is not enough...)
 - Increased coordination between NASA's robotic and human spaceflight efforts in planning for missions to Mars will require additional effort to ensure adequate oversight and consultation on planetary protection
 - Increasing interest in exploration activities by multiple national and private organizations raises a range of concerns: e.g., international cooperation, commercial exploration, and historical/environmental protection

Planetary Protection Budget



Growth in program spending driven by succession planning, increased mission monitoring, and international collaboration (e.g., bioburden tool).



Questions?

