



Planetary Protection at NASA: Overview and Status

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2014 Science Goals



SMD Questions

- How did our solar system originate and change over time?
- How did the universe begin and evolve, and what will be its destiny?
- How did life originate, and are we alone?

PSD Objectives

- Explore and observe the objects in the solar system to understand how they formed and evolve
- Advance the understanding of how the chemical and physical processes in our solar system operate, interact and evolve
- Explore and find locations where life could have existed or could exist today
- Improve our understanding of the origin and evolution of life on Earth to guide our search for life elsewhere
- Identify and characterize objects in the solar system that pose threats to Earth, or offer resources for human exploration

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
- NASA Policy Instruction "*NASA Policy on Planetary Protection Requirements for Human Extraterrestrial Missions*" signed by SMD and HEO AAs; in process of entry into NODIS

Elements of Planetary Protection



Compliance



- Compliance with planetary protection in US to date has been self-regulation and oversight by NAC
- Per the NRC, this must be decoupled prior to MSR

PPO:

Regulates compliance with policy, including providing requirements and independent verification, with oversight from advisory body (PPAC/PPS)

Projects/Missions:

Implement requirements to support compliance with policy using typical project management practices

Policy



U.N.



ICSU

International Council for Science



Bureau and Council



Space Studies Board

- National Scientific Organizations develop recommendations on **policy and requirements**, and forward to National Space Agencies and COSPAR
- Public comment and discussion of recommendations facilitated through Panel on Planetary Protection
- Consensus of Panel forwarded to Bureau and Council for review/acceptance

Coordination outside of NASA



UN-COPUOS

IAA

COSPAR

US-NRC/SSB

- State **Policy**
- OSTP

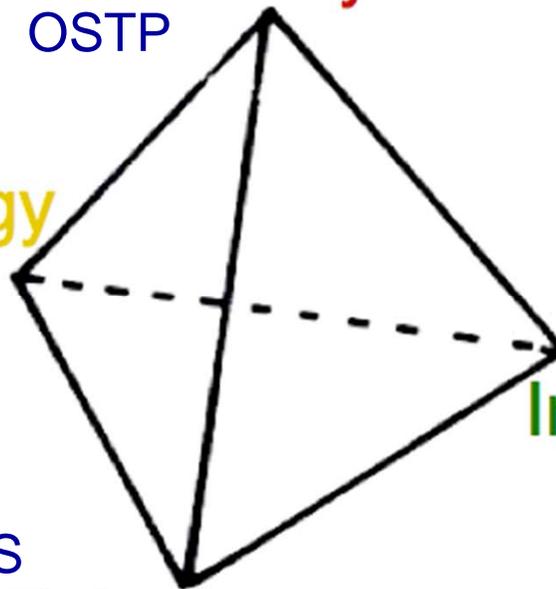
Space Agencies:
ESA Letter
of Agreement

- CDC **Technology**
- USDA
- DHS
- EPA

- NSF
- NIH
- USGS
- DOE **Science**

Implementation

- FAA
- Commerce



Planetary Protection within NASA



- International Relations
- Legislative Affairs
- General Council

- Science Mission Directorate
- Human Exploration & Operations
- Space Technology

Technology

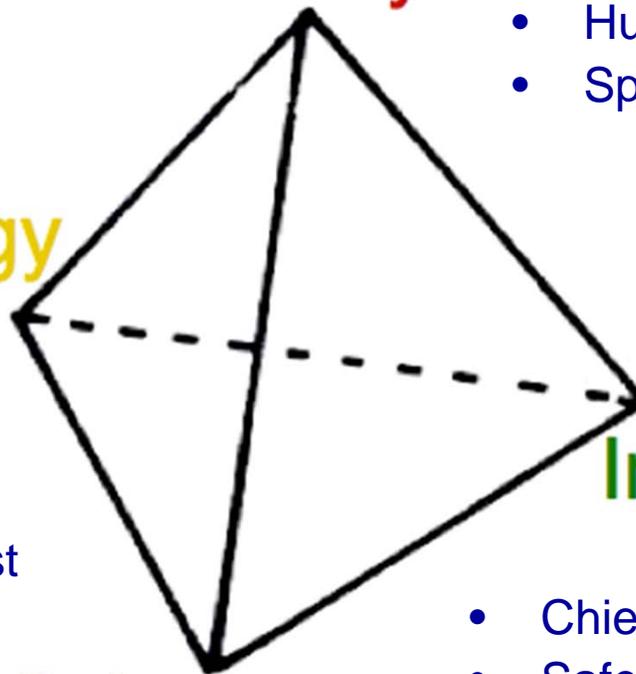
- Chief Engineer
- Chief Scientist
- Chief Technologist

Implementation

- Chief Health and Medical Officer
- Safety and Mission Assurance

Science

Policy



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
- Serves as a mechanism for interagency coordination within the US Government and internationally
 - Ex Officio membership from a range of US Gov't organizations, as well as other national/regional space agencies

Recent Recommendations



- May 2012 meeting
 - Recommendation
 - Develop a NPR for human extraterrestrial missions at a level corresponding to the current COSPAR planetary protection policy **NPI completed; next steps in work**
 - 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 **briefing tomorrow**
 - Concern expressed regarding resources and staff support for the PPO **tomorrow**
- Nov. 2012 meeting
 - No formal recommendations
 - Observations and information
 - Concern expressed regarding inclusion of planetary protection issues in the Office of Chief Engineer study on lessons learned from MSL **briefing today**
- Apr. 2013 meeting
 - Recommendations
 - Include PPO early in mission planning and design **in work**
- Nov. 2013 PPS meeting
 - None from PPS; Science Committee recommendation forwarded by NAC

NAC Recommendation/Response



Reporting Line of the Planetary Protection Office 2013-03-03 (SC-03)

Recommendation:

The Council recommends that the Planetary Protection Office (PPO) be moved so as to be out of any Mission Directorate and located with a reporting line that assures the PPO's independence and freedom from conflict of interest.

NASA Response:

NASA concurs in part. NASA's planetary protection activities are conducted in the context of well-elaborated international principles and policies established through the Committee on Space Research (COSPAR) and the National Academy of Sciences. At present, NASA's scientific and technical expertise applicable to planetary protection functions resides in SMD and situating these functions in this office optimizes access to these resources. NASA is in the early stages of planning for future human missions to Mars, in cooperation with the Human Exploration and Operations Directorate, and will revisit this rationale and the organizational location of the planetary protection functions within the Agency as this effort progresses.

Ongoing Actions

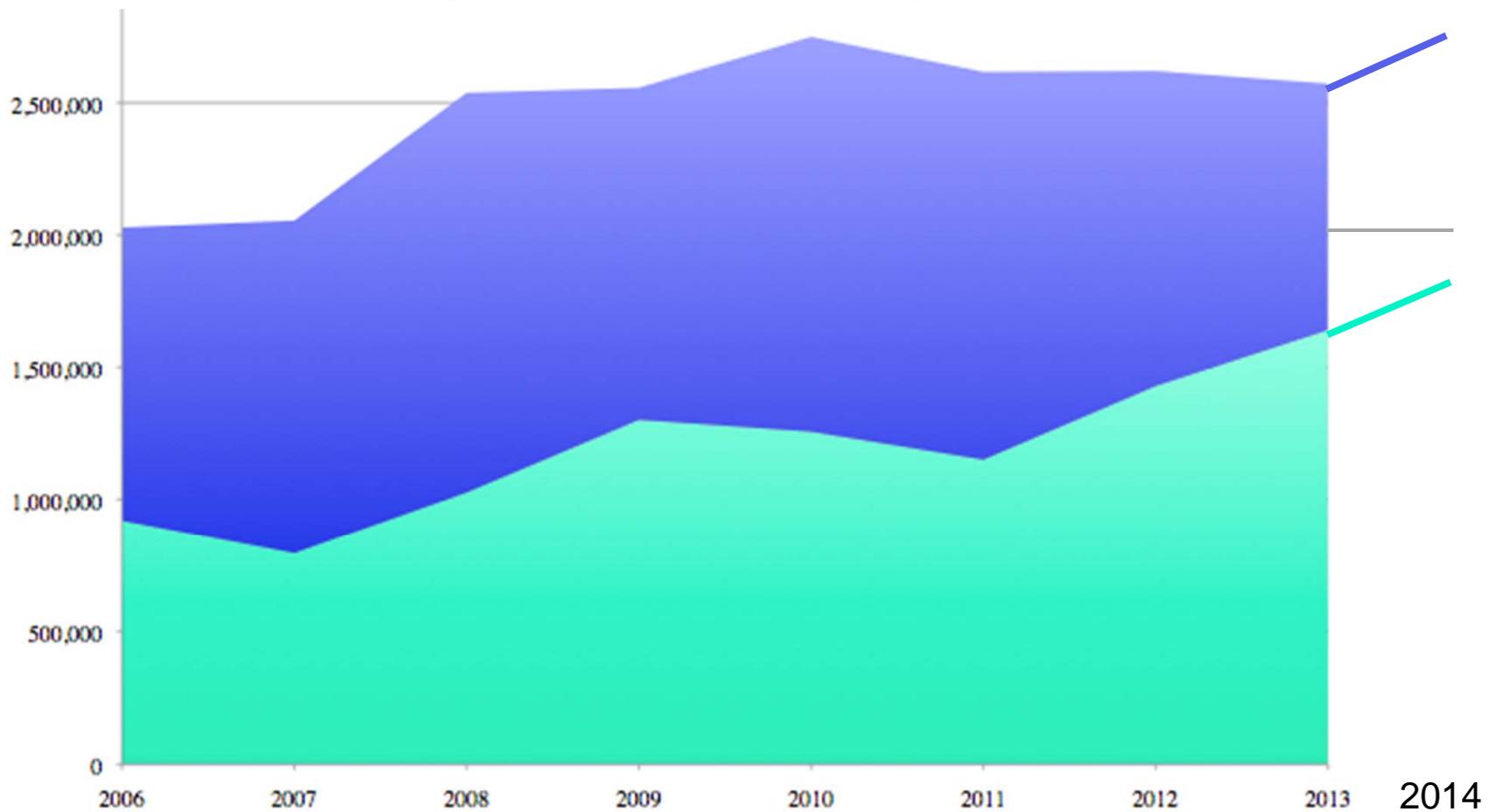


- Responses to MSL Lessons Learned Report
 - Science Committee/NAC made one recommendation already
 - SMD takes lead on further responses **initiated**
 - Ensure appropriate requirements flowdown **model implementation on InSight**
 - Revise/coordinate documentation to address planetary protection effectively **B. Pugel, lead**
 - Expand training options **A. Spry, lead**
 - Improve cross-directorate coordination **J. Johnson, HEO; B. Adde; PPCG**
- SMD leading response to Chief Scientist/Technologist/Engineer recommendations
 - Explore opportunities for interaction with SMA
- Internal SMD improvements
 - Ensure appropriate separation of implementation activities in PSD from regulatory/oversight activities of PPO
 - Develop and support Office of Planetary Protection operating plan **B. Pugel**
 - Work closely with missions in development to ensure appropriate incorporation of best practices and process improvements **later today**

Planetary Protection Budget



Solicitation planned for PPR in ROSES 2014
Programmatic needs being assessed



External Activities



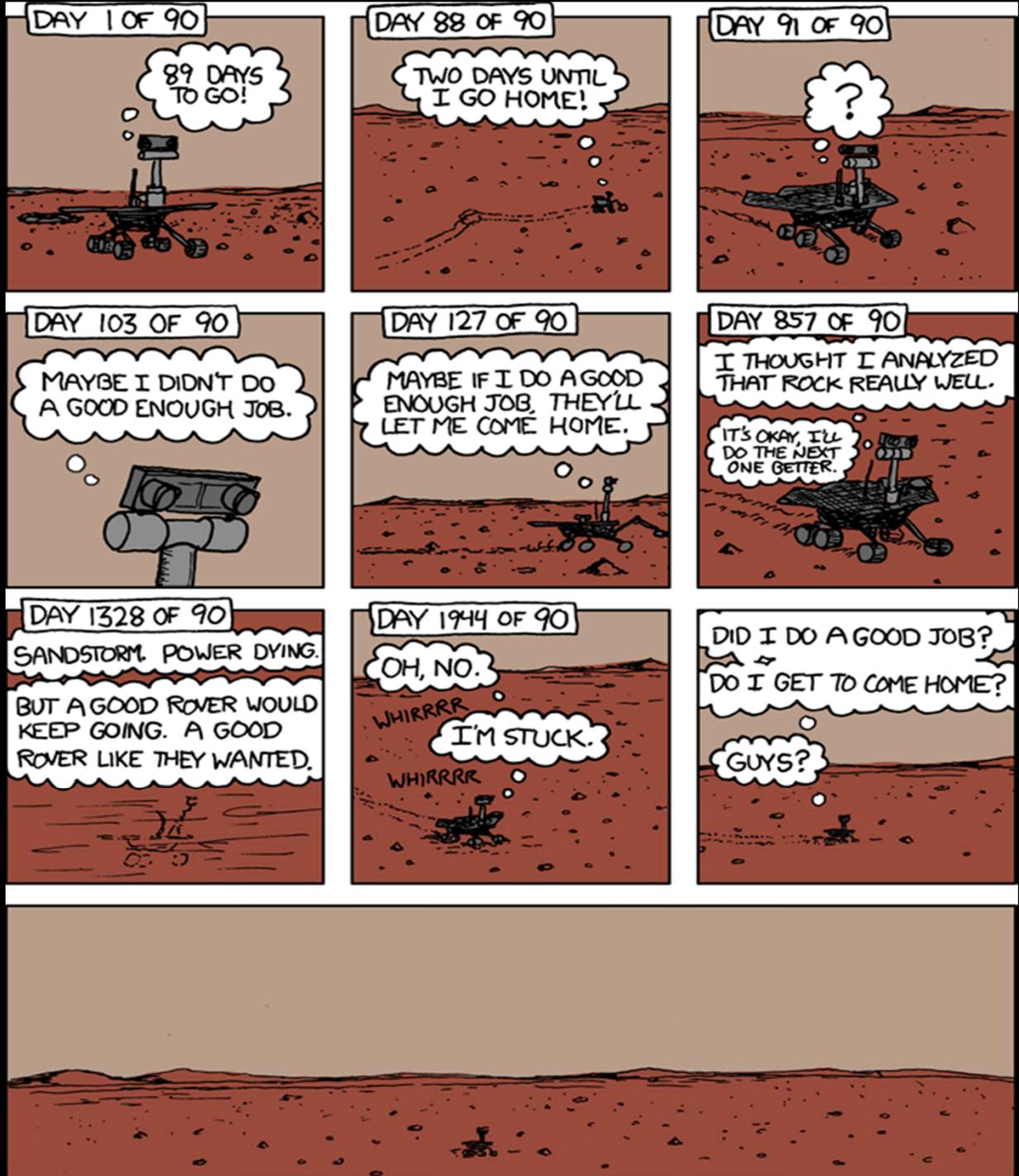
- Planetary protection included in H.R. 4412 markup
 - Section 206 proposes to have the NRC perform a study evaluating planetary protection concerns for human missions to various planetary bodies: most are already covered in existing policy
 - Initiated interactions with NASA OIIR to support informational inputs (B. Adde)
- Multiple interviews and media articles
 - Following up with HEO/EPO staff
- Panel discussion on planetary protection at Humans 2 Mars meeting
 - Good dialogue with audience on facilitation of human missions
- ESA coordination
 - Updated Letter of Agreement transmitted to ESA
 - Continuing participation in ESA PPWG
 - Continuing support for joint courses and research developments

Current and Upcoming Missions



- Several missions in operation and in preparation have planetary protection considerations to watch
 - Cassini Extended Mission under consideration at the Senior Review: *planetary protection is ongoing requirement until uncontrolled trajectory achieves Saturn impact with required probability*
 - InSight Mars mission (Discovery Program) just passed CDR: **excellent implementation of planetary protection requirements flowdown and compliance**
 - Refinement of planetary protection requirements for the Mars 2020 mission (Mars Exploration Program) pending instrument selection: **other aspects discussed this afternoon**
 - The Europa Clipper and other outer planets mission concepts have significant planetary protection technology development needs: **potential synergism with broader PSD implementation efforts**

Questions?



Lots To Do
Before Then...