PSS FINDINGS – Spring 2015

Finding: Science Priorities for Mars Exploration Program

PSS applauds the increasing connectivity between HEOMD and SMD, but PSD should advocate for its core science priorities identified in the Planetary Decadal Survey to be achieved in the anticipated mission architecture for Mars. Specifically, it is important to understand how steps towards successful sample return will be balanced with filling critical knowledge gaps, mapping resources, and technical demonstrations in preparation for humans at Mars.

Finding: Sample Use Policy for Sample-Return Missions

The Discovery and New Frontiers missions AO language stating that the mission plan "shall demonstrate that at least 75% of the returned sample shall be preserved for future studies" should apply to all sample return missions, robotic and human. Deviations from this policy must be justified (e.g. renewable sampling, planetary protection requirements). OSTP-mandated collection management policies for NASA collections should, at the subcollection level (e.g., Apollo samples, Stardust, future samples returned by a human mission), explicitly discuss balancing long-term sample preservation and usage.

Finding: Need for an Agency-Level NEO Survey Mission

Based on input from the community with NEO expertise, PSS reiterates its finding that the elevation of an NEO Space-Based Survey Mission to the level of an Agency priority, and the pursuit of its new start, are needed to advance NEO knowledge and essential for NASA's Asteroid Initiative. An advanced space-based survey optimized for finding and characterizing near-Earth objects (NEOs) would serve multiple Agency goals, consistent with NASA's Asteroid Initiative and Asteroid Grand Challenge. Specifically, a NEO survey telescope addresses 5 of the 10 priority questions listed in Table 3.1 of the Decadal Survey, such as "What solar system bodies endanger and what mechanisms shield Earth's biosphere?", and is identified on page 3-13 as the most expedient method for detecting NEOs for purposes of quantifying the impact hazard to Earth; numerous other examples can be identified in the Decadal Survey as well. Along with achieving the Planetary Decadal Survey science, such an asset would advance exploration, planetary defense, and resource utilization goals.

Finding: Assessment of Reorganized R&A

The PSS applauds the initiation of an NRC study on the reorganized PSD R&A structure's effectiveness in achieving programmatic goals. We encourage continuing and regular dialog with the planetary science community about the R&A reorganization. As part of this ongoing dialog with the community, the PSS requests, across the full range of R&A programs within PSD, selection statistics, release of titles and abstracts of selected proposals, total funding levels ($) by program, selection rates by panel score for new program elements, and statistics on time required for determining selectable and selected proposals relative to proposal submission or review.

Finding: Status of Lunar Reconnaissance Orbiter and Opportunity missions

The PSS reiterates its support for the results of the most recent Planetary Mission Senior Review, which found that both Lunar Reconnaissance Orbiter and the Mars Exploration Rover Opportunity extended missions were highly ranked and remain uniquely valuable assets that continue to carry out high priority scientific investigations. We are concerned that the President's budget calls for their termination and we encourage NASA PSD to seek ways to continue the operation of these important planetary missions.

Finding: Radioisotope Power Source

The re-start of domestic production of Pu-238 is a significant achievement. In the near term there must be a focus on getting all steps of the production line working to generate fuel at a sustainable level that enables mission planning and development. Also important in the near term is publication of the Nuclear Power Assessment Study (NPAS) report. In the longer term, the PSS encourages continued PSD investment to build on MMRTG technology (to increase efficiency of Pu-238 usage and boost end-of-life mission power) and to pursue technology development for radioisotope thermoelectric generators and Stirling generators.

Finding: Value of NASA Analysis/Assessment Groups

The PSS is concerned that analysis/assessment groups (AGs) have recently been excluded from the NAC structure, leading to their possible dissolution. Maintaining the functionality of these valuable groups in some form that allows timely interaction with the greater scientific community is critical. The existing set of planetary AGs serve as a valuable means of obtaining community input and scientific expertise on key issues for the Planetary Science Division and HEOMD.

Moreover, the AGs provide a forum for the scientific community to discuss issues and priorities directly with NASA in a timely fashion. The PSS finds that the AGs in their current form have provided critical feedback to NASA, including both PSD and HEOMD, on a wide range of issues such as the Asteroid Redirect Mission, Decadal Survey white papers, the development of mission announcements of opportunity, and the research and analysis reorganization.

Finding: Increase Launch Cadence of Discovery Missions to 24 Months

Recent efforts to increase the cadence of Discovery calls to 36 months are greatly appreciated. The PSS finds that PSD should follow the Decadal Survey recommendations of prioritizing R&A followed by a return to the 24-month Discovery launch cadence. The Planetary Decadal Survey recommended the following prioritization of planetary science programs: research and analysis, followed by competed missions (with lower cost lines coming first), then flagships. The first decade of Discovery-class missions illustrates the benefits of having frequent calls, including providing a means of addressing new high-priority scientific topics, encouraging the development of new scientists with mission experience who can serve as PIs for larger missions, supporting focused investigations by the research community, and providing scientific data on a diverse set of bodies throughout the solar system.

Finding: Long-term Enabling Technology Development Efforts

The PSS encourages the Planetary Science Division (PSD) to coordinate technology investments to ensure appropriate resources are available for both coordination and funding of identified technology gaps. The Space Technology Mission Directorate (STMD) has specific objectives for technology development that focus on priorities with relevance across directorates. The more specific PSD programs (e.g., PICASSO and MATISSE) are focused on developing instrument technologies. However, opportunities for development of the critical technologies needed to enable future planetary missions are lacking. Specific examples of technologies that fall in a gap between STMD and PSD include development of the increased efficiency Advanced Stirling Radioisotope Generator (ASRG) that will enable deep space exploration, high temperature/pressure thermal control and power technologies that enable long-term survival in the Venus surface environment, and submersible technologies that enable exploration of oceans on the icy satellites. The coordination and identification of needs for exploration and planetary science missions requires constant and proactive coordination between the “mission customers” and STMD, in addition to directorate-specific resources to address these gaps.

Finding: International Collaborations

The PSS encourages NASA to consider innovative agency-level policies that enable collaborative international development for unique projects that are of high priority to both NASA and other agencies that would otherwise be out of reach for individual agencies. Projects like Cassini-Huygens have demonstrated that close international collaboration greatly increases mission capabilities, resources, and scientific achievements. Such cooperation could enable high-priority missions identified by the Planetary Decadal Survey that will not be able to go forward with NASA alone, for example flagship missions that were studied for Uranus, Venus, and Enceladus.