

Findings from the Planetary Science Subcommittee Meeting of September 3-4, 2014

Finding: Asteroid Redirect Mission Assistance from PSD

Although the PSS agrees with the PSD's position that the Asteroid Redirect Mission (ARM) is not a science mission, it also recognizes that it is PSD's task to find and characterize appropriate target NEOs. While the NEOO program is making substantial progress in this effort, the PSS calls attention to the SBAG finding about ARM, which states:

"The portion of the ARM concept that involves a robotic mission to capture and redirect an asteroid sample to cis-lunar space is not designed as an asteroid science mission and its benefits for advancing the knowledge of asteroids and furthering planetary defense strategies are limited and not compelling. Limits in the current knowledge and large uncertainties in the properties of near-Earth asteroids contribute significantly to schedule and cost risk, and to the risk of mission failure....Current surveys, observing programs, and other projects are not positioned to sufficiently bridge this knowledge gap within the allotted schedule."

The SBAG ARM Special Action Team report

(http://www.lpi.usra.edu/sbag/documents/SBAG_ARM_SAT_Full_Report.pdf) provides detailed scientific and technical information about the current knowledge of properties of near-Earth asteroids, the limits of that knowledge, and the significant associated uncertainties. Relevant PSD assessment/analysis groups, SBAG and CAPTEM, stand ready to provide additional inputs to inform ARM mission planning. ***The PSS finds that further advantage can and should be taken of communication and knowledge transfer between the HEOMD and SMD at this critical time, using these PSD resources.***

Finding: Need for a Near-Earth Object Space-Based Survey

An advanced space-based survey optimized for finding and characterizing near-Earth objects (NEOs) would serve multiple Agency goals, consistent with NASA's Asteroid Grand Challenge. As stated in the 2011 Target NEO workshop report

(<http://targetneo.jhuapl.edu/archives/2011files/TargetNEOWorkshopReport.pdf>), such a survey would *"inform planning for a human mission to a NEO and assist the Agency in meeting other important goals for Human Space Flight, science, in situ resource utilization, and planetary defense communities at large... Such an asset can be a benefit to SMD, ESMD, and SOMD interests, and is the next step to provide a robust and sustainable exploration program."*

Such a mission is consistent with PSS's own assessment based in part on reports from the cognizant PSD assessment/analysis groups and community inputs. In particular, ***the PSS finds 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 essential for the broadly needed advancement of NEO knowledge.***

Finding: Planetary Mission Senior Review Assessment

The process of the Senior Review allows PSD to objectively evaluate their portfolio. The PSS commends the Planetary Mission Senior Review Panel, program officers, project leaders, and members for contributing to the Senior Review Process. The involved missions as a whole were uniformly regarded as uniquely valuable assets for continuing to carry out high priority scientific investigations, often by altering operations and /or by focusing on new themes. We particularly applaud the Review Panel for their efforts to help identify further opportunities and

to steer the goals of some of the extended missions to maximize science return. These Senior Review results again emphasize the importance of extended missions in achieving PSD science goals, while balancing the additional science to be harvested from them with new mission opportunities. The need to take full, considered advantage of existing missions as resources and national investments, as part of the overall PSD mission strategy, cannot be overstated. ***PSS finds the recent Senior Review exemplary in demonstrating the associated decision making process.***

Finding: Status of the PSD Research and Analysis Program Reorganization

The PSD Research and Analysis Program is critically important to PSD goals. Given its importance and the recent reorganization, PSS finds that regular updates of the status of the PSD R&A Program are needed, both to the PSS and to the community at large. In particular, outcomes from the large Solar System Workings program will be important to report and evaluate. Reports from PSD assessment/analysis groups listed community concerns about ensuring that strategic balance is maintained within the programs. While these concerns remain, the PSS acknowledges the efforts of PSD program managers and all those involved in implementing the startup of the reorganized R&A Program proposal submission and review process. A special note of appreciation is warranted for the initiative taken to obtain panel reviewer reactions to the new process and quantitative information on proposal statistics for comparison to the prior system. From the survey it is apparent that for the first program elements through the new process, the panel experience has been similar to previous years and generally positive. ***The PSS finds additional efforts to track and report on the progress of the reorganized R&A Program are both desirable and necessary for informing both PSD and the community.***

Finding: Need for a Senior Review of PSD-Supported Facilities

Many of the projects supported within the PSD use facilities supported by the division as part of either research or technical development. These facilities are listed in ROSES 2014, Appendix C1, Planetary Science Research Program Overview, and include (but are not limited to): Regional Planetary Image Facilities, NASA Ames Vertical Gun Range, Planetary Aeolian Facility, NASA Venus In situ Chamber, and Reflectance Experiment Laboratory. As both the facilities and the need for their services evolve with time, it is necessary to periodically evaluate their physical status, operations, uses, and plans. ***The PSS finds that a Senior Review of PSD-supported facilities is needed at this time to assess the return on PSD investments and to ensure they are receiving the support needed to maintain critical capabilities.*** PSS also encourages PSD to begin collecting information on funding, personnel, and usage of facilities toward enabling this Senior Review, and to make the schedule for the completion of the review available.

Finding: Planetary Cartography and Geological Mapping Representation on PSS

The PSS recognizes the importance of planetary cartography and geological mapping as an integral part of planetary science. We find that the Cartography program at USGS would benefit greatly from additional long-term monitoring and planning activities by the planetary science community. Such an activity would recognize the cross-disciplinary nature of the cartography program and its importance and value to planetary science. ***The PSS finds that establishment of a dedicated Analysis Group is needed, with membership from the USGS Cartography***

program, the Planetary Cartography and Geologic Mapping Working Group (PCGMWG – a review panel that meets annually to review the USGS cartography program), the Geologic Mapping Subcommittee of the PCGMWG, and the science community engaged in cartographic research and development using planetary science data. This interdisciplinary CRAG (Cartography Research & Analysis Group) should meet several times annually and should report regularly to the PSS, as do the other PSD AGs.

Finding: Paths to New PSD Missions

Continued forward motion on missions on all possible fronts is essential to the health and survival of planetary science within NASA. The PSS commends NASA and PSD for the significant progress made on future planetary missions. In particular, the recent PEA for Europa Instrument Investigations, has provided needed progress toward fulfilling that Decadal Survey mission priority. The PSS also commends PSD for the release of the Discovery Draft Announcement of Opportunity (AO) with the current schedule of release for the final AO in late September or early October 2014. The lack of a target date for the next New Frontiers opportunity is a concern, though the PSS recognizes the agency directives and the funding challenges PSD has faced for the past few years. As an additional strategic mission option, the PSS encourages the use of international partnerships as an excellent, proven way of amplifying the scope and science results of a mission otherwise implemented by an individual space agency. For example, the combination of an ESA M-class mission with a New Frontiers level contribution from NASA would give ESA and NASA the equivalent of a small flagship.

Regarding next steps, the PSS finds that the PSD must soon settle on a Europa mission architecture that meets the preponderance of the Vision and Voyages goals and push forward with a plan to get the mission to the launchpad. In the case of Discovery- following the current competition, the PSS finds it is important to maintain a more regular cadence of opportunities in line with the original plan for these missions and Decadal Survey priorities. As for New Frontiers missions- the selection of two missions for flight within the decade 2013-2022 was recommended by Vision and Voyages. As such, we find PSD needs to initiate the next opportunity for this essential program as soon as is practical. In addition, ESA is in the process of defining M-class missions. PSD should quickly define the level of partnership NASA is willing to consider and move aggressively to take advantage of opportunities these may provide in fulfilling Decadal Survey goals.

Finding: Need for Participating Scientist and Guest Investigator Programs

The PSS recognizes and appreciates the PSD positive response to our previous meeting Finding regarding the need for a Dawn at Ceres Guest Investigator (GI) Program in ROSES 2014, which has now been realized. Both GI and Participating Scientist (PS) opportunities maximize the science return from planetary missions and provide valuable opportunities for increased involvement in planetary missions. *PSS finds the planned establishment of GI and/or PS programs for other upcoming missions and mission special phases, such as Hayabusa-2, both strategically-targeted and scientifically advantageous uses of PSD science resources.*