

Response to Findings from the 13th Meeting of NASA's Small Bodies Assessment Group

The simultaneous spacecraft exploration of Ceres, the Pluto system, and comet Churyumov-Gerasimenko is focusing public attention on small bodies science as never before and *provides a spectacular opportunity to communicate the value of our work*. SBAG encourages the small bodies community to make extra efforts to engage with the public over these active missions, sharing the results of decades of work to build an exciting and healthy future for small bodies exploration.

Asteroid Redirect Mission

SBAG appreciates NASA's efforts to engage and communicate with the planetary defense and small bodies science communities about the Asteroid Redirect Mission (ARM) and the extent to which modifications in mission design have been responsive to concerns from those groups. In particular, the reference target asteroid 2008 EV₅ offers well-documented opportunities and has been extensively studied as the sample return target for ESA's MacroPolo-R candidate mission. SBAG encourages continued engagement between mission planners and the small bodies community as the mission moves forward and supports the plans for the competed Formulation Assessment and Support Team (FAST) and the succeeding Investigation Team (IT). However, it is important to note that for science-driven missions, SBAG continues to support the priorities identified in the Decadal Survey to guide use of Planetary Science Division (PSD) resources and funds.

RESPONSE: NASA greatly appreciates the constructive critiques provided and support shown by the small bodies science community to the Agency's efforts in formulation of ARM. For example, the level of interest shown by volunteers for the FAST (exactly 100 applications!) was fantastic, and the FAST members selected did an incredible job in a short time to respond to the issues they were presented. The FAST report will be published shortly and was a key input to the Asteroid Redirect Robotic Mission (ARRM) Requirements Closure Technical Interchange Meeting (TIM) and ARM strategy discussion in mid-December. While ARM is not a science directed mission, we are pleased to continue a close working relationship with the small bodies science community.

Discovery Program

SBAG sees the continuation of an active and healthy Discovery Program as an utmost priority and as a key program to enable the exploration of small bodies in the Solar System. SBAG is therefore heartened by the Discovery 2014 AO and views this as a major step to achieving the strategy and cadence as recommended in the Decadal Survey. The response from the planetary science community to the Discovery AO has been noteworthy and indicative of the enthusiasm for the fundamental contributions to future scientific exploration of the Solar System that the Discovery Program uniquely provides. *To this end, SBAG reiterates the importance of the Decadal Survey recommendation of a ≤ 24 month average launch cadence as an essential guideline.* Given the large number of compelling and mature concepts submitted to the Discovery 2014 AO, selecting two missions would be a means of addressing the Decadal Survey guidelines and regaining the recommended cadence, given that the previous Discovery AO was released in 2010. In addition, the selection of two missions for the 2014 AO would leverage the considerable investment in development of the AO, preparation of proposals, and evaluation of the submissions.

RESPONSE: The NASA Planetary Sciences Division is committed to achieving as fast a cadence for Discovery mission launches as permitted by the resources made available for the Discovery Program. Currently we are striving to achieve a no more than 36 month launch cadence for future missions.

Hayabusa2 Participating Scientist Program

The Hayabusa2 Participating Scientist Program provides opportunities for the U.S. planetary science community to participate in JAXA's Hayabusa2 sample return mission to asteroid 1999 JU₃. Participation from NASA-funded scientists will include providing input for mission planning, asteroid physical characterization, sample site selection, and sample analysis. This participation is important for small body science and is vital for future cooperation between JAXA's Hayabusa2 and NASA's OSIRIS-REx asteroid sample return missions. It is also important for NASA's Asteroid Initiative since 1999 JU₃ is a possible ARM target and a potentially hazardous asteroid.

After accepting Step 1 proposals, NASA delayed the Step 2 proposal due date (originally May 15, 2015) for the Hayabusa2 Participating Scientist Program. Spacecraft instrument teams and working groups are being organized, and decisions regarding spacecraft mission operations are being formulated for the upcoming encounter. Unfortunately, it is already clear that 2015 Hayabusa2 science team meetings will occur without NASA-funded Participating Scientists as a result of the delay. SBAG is encouraged that a new due date of October 5, 2015 has been set for the Hayabusa2 Participating Scientist Program but remains concerned that this delay is jeopardizing the potential for NASA-funded scientists to effectively provide input into Hayabusa2 mission plans. *SBAG urges NASA to expedite the selection of Hayabusa2 Participating Scientists so that they may be integrated into the Hayabusa2 team in as timely a manner as is possible (i.e., early 2016).*

RESPONSE: The Step-2 proposal deadline for the Hayabusa2 Participating Scientist Program was delayed to allow clarifications to be made to the program element language. These clarifications could only be made after iterative discussions with the Hayabusa2 team leadership at JAXA. On the basis of these discussions and documents obtained from JAXA, a project information package (PIP) was then written, reviewed, revised and finally approved through NASA's internal processes before any solicitation for a program element could be released. As with all of its ROSES NRA program elements, PSD strives to announce and execute them in as timely a fashion as possible. The timing between the SBAG-13 meeting and the revised Step-2 announcement was purely coincidental. The Hayabusa2 spacecraft will not reach its target asteroid until mid-2018 and samples will not be returned to Earth until late 2020. PSD is currently on schedule to complete the review process and announce selections by mid-February 2016. This still allows sufficient time for participating scientists to be incorporated into the team for both operations planning and encounter science.

Research and Analysis Program and the Health of the Scientific Community

SBAG appreciates and encourages communication between the Planetary Science Division (PSD) Research and Analysis (R&A) program officials and the scientific community via all possible avenues. Valuable venues include town hall meetings, the Assessment Groups, and the SARA office and website. Uncertainty and misinformation can be especially prevalent and damaging during times of constrained budgets or changes of program direction, and *the recent R&A reorganization coinciding with a budget crunch has been a source of considerable anxiety*

in the scientific community. Rumors are best crowded out by facts. Open communication of the status and evolving directions of PSD's R&A programs is vital, along with the metrics used to assess progress in meeting these objectives.

SBAG endorses the pending NRC Space Studies Board activity to assess PSD's R&A reorganization and hopes that it will *address the broader issue of identifying the elements of a healthy scientific community capable of supporting NASA's needs, and what should be done to maintain that community*, and does not merely confine its attention to the traceability between R&A program elements and NASA's strategic goals.

In particular, SBAG is concerned about small PI-led laboratories. These have larger capital costs for equipment compared to many R&A-funded projects, and the equipment can be expensive to maintain and operate, requiring people with highly specialized skills. Among R&A-supported research groups, laboratory groups are thus particularly vulnerable to fluctuations in funding during times of low grant award rates, with loss of key people being highly disruptive. At a time when several missions are working to return samples that will need specialized laboratory analyses to achieve their scientific goals, *it is crucial to maintain within the scientific community a strong cohort of laboratory practitioners and capabilities.*

RESPONSE: We appreciate that there is anxiety in the community, and remain committed to providing clear and reliable information by way of solicitations, NASA Advisory Committee and Subcommittee meetings (e.g. Planetary Science Subcommittee (PSS)), NASA town halls, social media, and other occasions such as the assessment groups meetings (e.g. SBAG). But NASA cannot police the accuracy of rumors. We rely on the community to filter its own discussions, and to be proactive in obtaining the facts to counter misinformation.

The SSB study of PSD's restructured R&A programs is working from a sharply focused statement of task that is directed toward specific recommendations of previous NRC studies. Issues concerning the health of scientific communities, or the amount of support being provided to particular communities, are not included in, and will not be added to, the statement of task. However, these issues may be taken up in the Mid-Decadal review, which is expected to start up later in 2016.

The R&A restructuring was undertaken to remove redundancies that had accumulated over the decades and to realign the core programs directly to our strategic goals as laid out in the NASA 2014 Science Plan. The Planetary Science Division is acutely aware that we are the primary source of funding for planetary researchers. We also recognize that returned samples are indeed rare and invaluable and as such, require dedicated investigators and facilities, and advanced instruments to analyze them. This implies stable and consistent budgets. We believe that full and open competition is absolutely essential for a healthy research community and despite the fact that the top-line budget for the Planetary Science Division has waxed and waned over many years, we have managed to maintain a stable R&A budget. Within R&A however, we cannot guarantee absolute stability of funding for specific disciplines or types of investigations. When NASA finds a need for stable, consistent funding for certain capabilities they are facilitated, e.g. the JSC Astromaterials Curation Office, Ames Vertical Gun Range (AVGR), Planetary Aeolian Lab (PAL), etc. We are in the process of reviewing all NASA-funded planetary facilities and will be soliciting proposals for new facilities through a Cooperative Agreement Notice (CAN) likely in early FY17.

Near-Earth Object Survey Telescope

NASA has asteroid-based activities across multiple directorates as a cornerstone of future objectives for human exploration, planetary defense, resource utilization, and science. ***SBAG reiterates its previous findings that a space-based NEO survey telescope would be a foundational asset to most efficiently achieve the goals of NASA's Asteroid Initiative.*** In 2005, Congress passed the George E. Brown, Jr. Near-Earth Object Survey Act, which set the goal of discovering >90% of NEOs >140 m by 2020 (Public Law 109-155 Sec.321). A dedicated space-based NEO survey telescope would be capable of completing the congressionally recommended survey for NEOs much more quickly than using only ground-based survey systems. As an asset critical to agency-wide objectives, the survey telescope should have cross directorate support from all three of NASA's major space exploration directorates and not just from the resources available to the Planetary Science Division (PSD) of the Science Mission Directorate (SMD), or the Near-Earth Object Observations (NEOO) program within PSD.

RESPONSE: While the great capability a space-based NEO survey telescope would add to the survey effort is not disputed, as also there would be great contribution to scientific understanding of the small bodies population and their relationship to solar system formation, a single observation system – space or ground-based – does not offer the complete solution to the NEO Observations Program needs. Development of the best integrated solution for achieving the G.E. Brown Survey Act objectives is the subject of several coordinated studies in 2016. Several members of the small bodies community are involved in these studies. PSD requests the continued support of the SBAG community as we complete these efforts to find the best overall path for our NEO Observations Program, targeted for before the time the 16th SBAG meeting is convened.

The Value of Open Community Forums

Collectively, the Assessment/Analysis Groups (AGs) represent an opportunity for regular, open, and broad dialogue between all members of the planetary science community. Furthermore, the AG meetings are forums unique from traditional conferences because they address a spectrum of programmatic, technical, and scientific topics, enabling an intersection of people that does not otherwise occur. This dialogue is essential to ensure a complete communications link between the stakeholders of the planetary science community. The classification of the AG meetings as conferences does not accurately capture the full extent or informational structure of the meetings, nor does it provide an accurate framework for the support logistics of the AG meetings. ***SBAG strongly endorses a return of the AG meetings to their previous classification or that an alternate solution is found other than treating AG meetings as scientific conferences.***

RESPONSE: While NASA continues to assess the proper relationship of the AGs to the Agency, we expect that they will remain conferences for the purposes of tracking costs and NASA-funded attendance.