

Findings from the 15th Small Bodies Assessment Group (SBAG) Meeting

SBAG is excited about the current and future opportunities for the exploration of small bodies across the Solar System. Investigations of the Solar System's numerous and diverse small bodies provide unique scientific insights into the formation and evolution of the Solar System, yield critical information to advance planetary defense objectives, and contribute to achieving NASA's human exploration goals. The SBAG community is encouraged to make every effort to share with the public the excitement, importance, and value gained by exploring our Solar System through a wide variety of missions, projects, and investigations.

RESPONSE: NASA continues to support small-body science and exploration as a window onto our Solar System's origin and evolution, as well for understanding hazards to our planet and resources for the future in space. We share in the community's excitement over recent discoveries and future opportunities, and endorse SBAG's encouragement to share our discoveries and vision with the public.

Discovery Program

SBAG reiterates the importance of the Decadal Survey recommendation of a ≤ 24 month average launch cadence for Discovery missions and urges NASA to strive to achieve this Decadal Survey priority. 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 recommended cadence of five missions in a decade. In addition, the selection of two missions from the 2014 AO would leverage the considerable investment of time and resources in development of the AO, preparation of proposals, and evaluation of the submissions. SBAG sees the open nature, objective peer review, and competitive selection of Discovery missions as crucial to enable the exploration of the Solar System and views an active and healthy Discovery Program, as recommended by the Decadal Survey, as a key priority.

RESPONSE: SMD has selected two Discovery missions for flight. Note that these missions are also to small bodies. PSD is committed to achieving as fast a cadence as possible for Discovery mission launches in the future, given the resources made available for the program. We are making every effort to achieve an average interval between launches not longer than 36 months.

Asteroid Redirect Mission

SBAG supports and appreciates the continued engagement of the small bodies community by the Asteroid Redirect Mission (ARM), through mechanisms such as the recent Formulation Assessment and Support Team (FAST). **SBAG supports the plan as presented by the ARM team to create opportunities for hosted payloads on the ARM spacecraft and to have a competitively selected Investigation Team, both of which would maximize the science return of the mission.**

RESPONSE: In September 2016 NASA released the ARM Umbrella for Partnerships (ARM-UP) Broad Agency Announcement, along with two appendices: Appendix A was a call for proposals for Hosted Payloads on ARRM, and Appendix B was a call for proposals for membership on the ARM Investigation Team (Phase 1). Proposals in response to both calls were due on November 3; these proposals are currently under review.

Deep Space Network Support for Rosetta

The Rosetta mission has provided a wealth of information that is revolutionizing our understanding of comet evolution and behavior. The Deep Space Network (DSN) has played a critical role in providing the necessary communications with the spacecraft, especially at key times when the mission's success required high-throughput data downlinks. The mission's final approach to the comet in September of 2016 is precisely such a time, when the spacecraft will provide its highest resolution images and the navigation data will provide the best constraints on the comet's mass distribution. **Therefore, SBAG urges the DSN to consider the unique science opportunity offered by the final stage of the Rosetta mission when scheduling DSN assets to support this short duration but critical time period, to maximize the science data returned from the mission.**

RESPONSE: NASA provided DSN support for Rosetta's end of mission, which occurred in a controlled descent impact on the surface of Comet 67P/Churyumov-Gerasimenko on October 1 at Earth Received Time approximately 11:20 UTC, communicating over DSS-63 (70m antenna in Spain). Critical commanding took place over DSS-43 (70m antenna in Australia) to prepare it for end of mission. JPL Radio Science monitored for S- and X-band signals during and after landing.

Rosetta Data Analysis Program

Data Analysis Programs (DAPs) enhance the scientific return of NASA's planetary missions by involving a larger segment, with broader expertise, of the scientific community in the analysis and interpretation of data sets designed and collected by mission teams. Now that Rosetta is nearing its end of mission and a significant amount of data from comet 67P/Churyumov-Gerasimenko are publically archived and available, it is time for greater community participation in the investigation in order to maximize the science results made possible by the Rosetta comet escort mission. **SBAG encourages the establishment and funding of a Rosetta Data Analysis Program to be released as soon as possible, but no later than the ROSES 2017 AO.** A Rosetta DAP would be a timely and focused effort, consistent with the Focused Program category defined in the Planetary Science Division's Research and Analysis Program, to support investigations that utilize the unique and newly available set of Rosetta observations of 67P/Churyumov-Gerasimenko.

RESPONSE: PSD's plan to institute a Rosetta Data Analysis Program (RDAP) was announced through an informational amendment to ROSES-2016 in September 2016. RDAP proposals will be solicited for the first time in the ROSES-2017 NRA call for proposals.

Arecibo

SBAG gratefully acknowledges the continued support for the Arecibo Observatory by NASA's Planetary Science Division (PSD) and appreciates PSD's expressed willingness to continue support of Arecibo's planetary radar capabilities at the present level, in partnership with NSF. As discussed in previous findings, SBAG strongly believes that Arecibo is a critical national asset that provides a highly valuable resource for scientific investigations as well as a key capability for planetary defense. Any disinvestment in Arecibo facilities and maintenance could have major scientific and security implications. **SBAG urges NSF and NASA to continue to work**

together to preserve the capabilities of Arecibo at a level that reflects the scientific and security interests of the United States.

RESPONSE: NSF is in the process of preparing an Environmental Impact Statement (EIS) (see draft at https://www.nsf.gov/mps/ast/env_impact_reviews/arecibo/arecibo_drafteis.jsp) to evaluate the potential effects of proposed changes to operations at Arecibo, as required by law to inform its decisions on the matter. NASA is a participating agency in NSF's EIS process, and has provided information to NSF concerning NASA's use of Arecibo for planetary radar. NSF issued a Dear Colleague Letter in September 2016 announcing its intent to release a solicitation for proposals involving continued operations of Arecibo (<https://www.nsf.gov/pubs/2016/nsf16144/nsf16144.jsp>), and, at NSF's request, NASA has updated its statement on support for planetary radar (<https://science.nasa.gov/researchers/sara/library-and-useful-links/psd-radar>).