

PAC Findings and Recommendations

Meeting: July 9-11, 2024

Submitted: July 29, 2024 by Hope Ishii, PAC Chair

1. Interaction between Moon to Mars and Mars Sample Return programs

Finding: The Mars Sample Return (MSR) program faces nearly intractable budget and schedule problems, and NASA must therefore take advantage of all possible means of support in order to enable the mission. Although the Moon to Mars (M2M) program capitalizes on momentum for human exploration of Mars, many commonalities (e.g., first round trip to/from Mars, first launch from another planet, technology development) between the M2M program and robotic precursors, including the MSR program, are not clearly defined. The PAC finds that neglecting the linkages between robotic and human exploration, including the first demonstration of a round trip to Mars by the MSR program, is detrimental to both programs.

Recommendation: The PAC recommends that PSD produce MSR program documentation, in a format digestible by the M2M program, that contains requirements and outcomes that may benefit the M2M Inspiration, Science, and National Posture objectives. The PAC recommends that PSD works with the M2M program to explicitly include the many benefits of MSR in its architectures, thus utilizing the resources and visibility of the Human Exploration Program to benefit MSR. Additionally, the PAC respectfully suggests that MSR be elevated to an agency-level priority in recognition of A) the resources being allocated by other spacefaring nations to the goal of returning samples from the red planet, and B) the relationship between our National Posture objectives and the extraordinary achievement of becoming the first to return samples from Mars.

2. Pipeline-supporting programs and inclusion plans

Finding: The PAC supports NASA's investments in workforce training and pipeline expansion. Programs like the NASA Early Career Awards, Here to Observe (H2O), InSightSeers, and PI Launchpad that encourage, amplify and train the pipeline of aspirational scientists and mission-PIs are especially applauded. NASA leadership has communicated that inclusion is a core NASA value and beneficial to NASA's ability to recruit and engage the best talent, an outcome that directly impacts the agency's ability to achieve national priorities. The PAC has been informed that required inclusion plans, piloted in over a dozen programs in ROSES-2022 through ROSES-2024, are likely to become a required component in (mission and/or R&A) proposals to PSD programs in the future. As such, training on inclusion plan development and implementation is valuable for all career stages. Access to this type of training for those early in their careers, in

particular, will enable them to be better prepared to operate in alignment with NASA's core values throughout the arc of their careers.

Recommendation: The PAC recommends that PSD leverage existing training forums to provide guidance to the community on inclusion plan development and implementation. Examples of existing training forums include (mission-focused) PI Launchpad, early career training workshops, NASA supported networking/mentoring events, and various online IDEA and proposal forums and resource repositories. It is important that NASA continue to maintain and utilize all available resource mechanisms (town halls, weblinks, etc.) to explain NASA's proposal expectations and policies and to provide guidance on the best ways to meet NASA inclusion plan goals and metrics. Additionally, we emphasize that it is important that PSD training mechanisms are available to all members of the community at all career stages.

Note: The PAC aims for consensus with Findings, but there remained a dissenting member for this Finding.

3. Deep Space Network utilization and support

Finding: The Deep Space Network (DSN) is a critical resource for planetary missions; however the projected demand greatly outstrips the current and planned capacity. The DSN should continue to communicate clearly with stakeholders on the process and guidelines for prioritizing requests as a function of mission class, operational needs, and scientific return. The PAC heard that NASA's Space Communications and Navigation (SCaN) program's plan for better matching planned capacity to projected demand involves future missions being designed to operate in ways that conserve DSN resources, but that is predicated on those missions having advance understanding of those design practices.

Recommendations:

1. The PAC recommends that PSD, SMD and SCaN work to develop resources to help major stakeholders, including mission PIs and mission providers, to incorporate best practices for data transfer methods, scheduling, and general use of shared resources for optimum utilization of the already strained DSN resources. Strategic planning during mission architecture and concept of operations formulation could more efficiently leverage DSN capacity, reducing the gap between planned capacity and demand. The PAC also suggests that PSD consider including a review of a proposed mission's DSN utilization plan as part of the proposal process and/or review current missions' DSN utilization plans to identify opportunities for better optimization.

2. Working with other mission directorates, the PAC recommends that PSD strongly advocate for funding support for the critical maintenance needs of the current DSN infrastructure and development of additional capacity to meet projected future needs.

4. Continuity for the ANSMET Program

Finding: The PAC recognizes the continuing critical importance of the ANSMET (Antarctic Search for Meteorites) Program to planetary science research and missions¹. The meteorites recovered by ANSMET are samples of planetary bodies, often not easily obtainable by other means and recovered at low cost compared to sample return missions. Meteorites motivate and provide key information to preparations for, analyses during, and context following current and planned missions to small bodies, moons, and planets. Since its first season in 1976-77, ANSMET has recovered >23,000 meteorites, including many from Mars and the Moon, providing a continuous (annual) supply. ANSMET meteorite recovery is funded by NASA but relies on logistical support of Antarctic field activities by NSF. The COVID-19 pandemic resulted in the cancellation of the 2020-21, 2021-22 and 2022-23 ANSMET field seasons. The PAC greatly appreciates NSF's logistical support of the 2023-24 ANSMET field season, an unqualified success that returned over 200 meteorites from the Antarctic. The PAC has learned that NSF recently decided to halt support for the 2024-25 ANSMET season, raising concerns that critical field areas will be buried in snowfall. It is currently unclear if NSF will support the 2025-26 ANSMET season.

Recommendation: The PAC encourages NASA to re-engage NSF logistical support for ANSMET and, failing that, to explore alternative logistical support to ensure continuity of the ANSMET Program.

5. Nuclear Fission Power for Exploration

Finding: Nuclear fission-based power and propulsion technologies have a singular potential to increase our space exploration capabilities, including significant reductions in flight time and increases in deliverable mass for missions to outer planets. Fission power at multi-kW levels could also benefit in-situ exploration of demanding environments, enabling technologies such as melt probes for ocean worlds investigations and lunar night-time survival. Developing these new nuclear power technologies will require significant time and resources. Early investments and continuous support could mature these technologies soon enough to infuse them into missions targeting the next decadal time frame. The PAC is excited about these possibilities and encourages NASA to continue supporting ongoing industry efforts to develop nuclear fission power systems for both terrestrial and lunar systems. The PAC also expresses support of nuclear power technology development efforts at other government agencies.

No recommendation.

¹ See also prior PAC Findings: December 2022, Finding 2 and June 2022, Finding 4.

6. Cadence for CLPS/Artemis instrument calls

Finding: The community has experienced a considerable amount of uncertainty over the past 18 months regarding the cadence at which specific calls for CLPS/Artemis instruments would be released, and in which order. ROSES 2023 included elements for PRISM, SALSA PRISM, A3DI, A4DI, and LTV Instruments. Of these, only A3DI was ultimately solicited through ROSES 2023 with the remaining elements carried over to ROSES 2024. This is despite community advisory presentations that SALSA PRISM would be solicited through ROSES 2023 (with PRISM-4 deferred to ROSES 2024). While public communication since September 2023 has consistently maintained that SALSA PRISM will be the next solicited opportunity, the remaining opportunities have changed order repeatedly. This, combined with limited (and inconsistent) information about the expected timing, makes it challenging for the community to plan their work and respond to these calls effectively. The community reports that institutions have changed their pre-proposal investments multiple times based on the publicly available information. The PAC finds that a more stable timeline for these calls from ESSIO and release of calls in the order in which they are originally proposed would benefit the planetary science community.

No recommendation.

7. NASA Shared Services Center (NSSC) concerns

Finding: The PAC has heard a number of community concerns that NASA Shared Services Center (NSSC) communication can be inconsistent, unreliable, and sometimes vague with respect to when awards will be made, and the PAC finds that what seems to be predominantly one-way communication is not serving the community needs well. In some cases we have heard that awards are made later than promised and action is only taken to speed things when repeatedly prompted. NSSC tells the community that any action (no cost extensions (NCEs), awards, funding, etc.) takes 45-60 days to process but we hear that the majority of these have been taking at least 60 days and sometimes longer. Transfer of awards between institutions is a particularly long and painful process. Requirements are very detailed and, once paperwork from both institutions has been submitted, it often takes months before notification if something is missing or incorrect. These are generally very minor issues, but they can lead to a large administrative burden and can cause huge delays in getting funding de-obligated from one institution and then re-obligated to another. Given the recent move by NSSC to rigorously hold the planetary community to NCE deadlines, we look forward to hearing what action PSD can take to hold NSSC to their own promised deadlines for awards and to better streamline their processes to reduce the burden on PIs and their institutions.

No recommendation