

PAC Findings/Recommendations
December 5-6, 2022
Submitted January 9, 2023 by Serina Diniega (PAC Chair)

1) Mission review process

Finding: For the scientific community, the Psyche launch postponement and consequent delay of VERITAS has resulted in a crisis in confidence in NASA and loss of trust in the institutions that support NASA missions. Of particular concern to the PAC, and discussed in the Psyche IRB report, is that critical issues impacting flight readiness were not identified sooner in the SRB review process. The PAC appreciates NASA's transparency and understands that internal reviews of NASA processes relevant to the Psyche postponement are ongoing, and looks forward to a report on those findings in the future.

Recommendation: The PAC supports the IRB recommendations on the SRB review process, including that NASA/SMD should strengthen the SRB process to ensure that the timing of SRB inputs is well-matched to project stages, serious issues impacting critical factors are identified, and responses to concerns are thoroughly reviewed. In particular, the PAC emphasizes the importance of ensuring that "red" and "green" status codes are not averaged to "yellow" to reduce the severity of a score.

2) VERITAS delay decision

Finding: The PAC recognizes that VERITAS will provide important new science results about Venus that are complementary to other recently selected Venus missions. The decision to delay VERITAS's launch has been met with significant disappointment in the planetary science community and raised concerns and fears regarding the potential need for additional mitigation measures impacting VERITAS and other NASA efforts in the future. The PAC also notes the negative impact of standing down a selected mission due to external issues on potential PIs and on scientists' participation in future missions. However, the PAC recognizes that the circumstances surrounding the Psyche delay had created great stress on JPL personnel and on the PSD budget that must be mitigated in some way. We thank PSD and the IRB chair for the detailed presentation of the broader issues that led to the decision to stand down VERITAS.

Recommendation: Both the PAC and the AGs strongly support launch of VERITAS on its new schedule, or sooner, should the situation allow. We request that the process for restarting VERITAS and the metrics that will be used to support this decision be clearly defined and communicated to the community as soon as possible. Finally, we strongly support the importance of competitive selections in the Discovery program. As a result, the PAC recommends that the launch of VERITAS should be prioritized over a possible new Discovery mission selection. In the event that the budget is a limitation in future years, Planetary Science and Astrobiology Decadal Survey guidelines for dealing with budget shortfalls should be followed.

3) DSN update

Finding: The PAC appreciates the critical support supplied by the Deep Space Network, including extensive coverage of spacecraft operations provided through recent large activities (including the Artemis launch). The PAC has questions remaining about how projected supply/demand for downlink is estimated, especially as NASA is adding additional lunar and small spacecraft through Artemis and other programs. Crewed missions are especially demanding and ride-along SmallSats/CubeSats, while small in budget, often have significant requirements for DSN capability and large operational footprints. The development of the Near Space Network (NSN) and Lunar Exploration Ground Sites (LEGS) antennas will mitigate some of the increased demand, but during demand 'spike' periods, impacts to missions may still occur. Current and future missions may encounter DSN conflicts with ride-alongs and multiple missions on the same launch, and a number of mitigation options may need to be applied simultaneously across impacted missions that are in different mission classes.

Recommendation: The PAC recommends that NASA study how conflicts regarding resource allocation are occurring on present missions, including between human exploration and planetary mission needs. The PAC also recommends that NASA continues to study options for expanding the DSN capabilities as soon as possible to rapidly alleviate the current scheduling issues and provide robust capability for new missions. In assessment of future supply/demand needs, the DSN should engage with the wider planetary science community to ensure a consistent and robust process is used to anticipate DSN needs for proposed missions. The PAC requests to be updated on a regular basis, at least annually, on the status of DSN upgrades and the alleviation of supply/demand disparities.

4) Sample Data Curation

Finding: As NASA prepares to return samples from more planetary bodies, it is important that the sample analysis data management/curation needs are assessed well in advance, and that capabilities are developed to enable effective sharing of scientific results and procedural information. Additionally, it is important that researchers have adequate information so that their work can comply with federal regulations regarding public accessibility (similar to the requirement that spacecraft data is to be stored in PDS).

Recommendation: The PAC recommends that PSD take steps to incorporate data generated by the sample analysis community into the developing Planetary Data Ecosystem (PDE). If broad data repositories are to be created and/or required for ingestion and sharing of sample data, information about their planned design, when they are expected to come online, and mechanisms for training should be shared with the community so that these resources can be planned for and utilized. Finally, ongoing efforts undertaken under NASA program-led efforts (i.e., MEP, MSR, and Lunar Science) should involve and coordinate with broad sample-focused community organizations (i.e., ExMAG) to maximize scientific value of returned samples.

5) Inclusion Plan Requirements in ROSES Proposals

Finding: NASA is implementing agency changes that address the Executive Order On Advancing Racial Equity and Support for Underserved Communities Through the Federal Government. One such effort is a potential new requirement for Inclusion Plans in ROSES proposals. This requirement has been piloted in recent years, first in a single ROSES 21 call in Astrophysics, then most recently to several more ROSES 22 calls, including PRISM within Planetary Sciences. The PAC recognizes that this pilot phase is an opportunity for community engagement and education. Furthermore, the PAC notes there are significant knowledge gaps in the community about Inclusion Plans, including where the legal bounds of information and actions that may be part of an Inclusion Plan lie.

Recommendation: Inclusion Plans, if ultimately implemented, would be intended to span all Divisions represented by ROSES program elements. The PAC therefore recommends that SMD-level coordination be provided for Inclusion Plan activities, to ensure consistency across ROSES. The PAC recommends that NASA consider, among other factors, the wide variation in proposal team needs and in resources available to PIs from different institutions. The PAC further recommends that, well-before Inclusion Plans would be utilized to determine proposal selectability, NASA provide sufficient, specific details about the elements of the Inclusion Plan that would be evaluated for scoring. The PAC also recommends NASA provide clear guidance, resources, and ongoing education to the community and prospective PIs as to how to write an effective and actionable Inclusion Plan, including what would be inappropriate and/or outside legal bounds. Such guidance should include avoidance of illegal disclosure of personal identifiable information (PII), especially with respect to any protected class status.

Note: The PAC aimed for consensus with this Finding, but there remained a dissenting member for a few specific phrasings.

6) Community Inclusion with NASA Science Strategy Development

Finding: Significant engagement of the scientific community as NASA forms science strategy and makes important science decisions within the framework of missions, including those with human exploration-driven architectures, is critical for keeping scientific gain as a primary motivation for, and result of, NASA's space exploration. Furthermore, such engagement ensures that broad relevant expertise is included as decisions are made, and that the science community is connected with ongoing missions and future opportunities. A recent good example of this was the Mars 2020/MSR Sample Depot Science Community Workshop, organized by MEP so as to gather community input with regards to the timing, location, and constituent cache of the first sample depot to be placed on the martian surface. Another example are the RCNs in astrobiology research (see Finding 7).

Recommendation: As has been stated before (e.g., *Finding 5 from November, 2021*), the PAC recommends that the NASA Lunar program and MEP communicate regularly and transparently with their relevant communities on their development of exploration and science strategies. Community involvement in development of those strategies is strongly encouraged to ensure alignment with the latest top science priorities and to increase community endorsement.

7) Astrobiology Research Coordination Networks (RCNs)

Finding: The commitment of the collective Research Coordination Networks (RCNs) to establish and improve communication and inclusivity within the Astrobiology community is appreciated and commendable. For example, the seminar series that have been employed by several RCNs have reached a wide cross-section of the community, and allow asynchronous participation. The PAC particularly notes the efforts to involve early career researchers, recognizes the impact of bringing together different communities within Astrobiology and cross-pollinating with existing AGs, and encourages future plans to establish these types of cross-directorate networks.

8) NSF Collaboration and ANSMET (Re-issued - Finding 4 from June, 2022)

Finding: The PAC continues to recognize the critical role of NASA's interagency collaboration and coordination with NSF. For example, over four decades, the U.S. has annually performed meteorite recovery through ANSMET (the Antarctic Search for Meteorites Program). The meteorites recovered by ANSMET are vitally important for planetary research, providing scientists from around the world with samples of planetary bodies not easily obtainable by other means and at relatively 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. ANSMET meteorite recovery is funded by NASA, but relies on logistical support of Antarctic field activities by NSF. Due to the COVID-19 pandemic, the 2020-21, 2021-22, and 2022-23 ANSMET field seasons have been canceled, halting meteorite collection and field work on analogs in Antarctica.

Recommendation: The PAC encourages NASA to pursue conversations with NSF to prioritize support for critical work funded by NASA but requiring NSF coordination and support. In particular, the PAC recognizes the critical nature of the ANSMET field work for planetary science and encourages resuming ANSMET field seasons as soon as practical.