

OPAG Report: Findings and Statements

November 15-16, 2022 Community Meeting

OPAG thanks NASA PSD Director Lori Glaze for her support in enabling outer planet exploration and promoting future opportunities. OPAG is very appreciative of Dr. Glaze for taking the time to respond to numerous questions from the OPAG community during our November meeting. OPAG is also very thankful to the speakers for their useful reports, and to the LPI staff for their immense help and support during the meeting.

OPAG is encouraged by NASA voicing their support for forming the joint OPAG/SBAG/NOW Ocean Worlds Working Group (OWWG) as a grass roots vehicle to communicate the goals and needs of the Ocean Worlds (OW) community to NASA. The OWWG should reflect the intellectual diversity that bridges planetary science, earth science, and astrobiology, and cover the rich diversity of targets that provide unique opportunities for mission and technology development. In this way, the OWWG will enable the OW community to prioritize their R&A needs, organize mission development and strategic planning efforts, and identify supporting technology development priorities. There has already been significant development of OW priorities in both the Roadmap to Ocean Worlds¹ and the 100+ community white papers² that fed into the recent Planetary Science and Astrobiology Decadal Survey, and that provide a foundation for the OWWG efforts. This working group will also provide the necessary community infrastructure to hear, share, and document new ideas as the science and technologies continue to evolve. The OWWG will communicate their findings through OPAG, SBAG, and NOW to the PAC. A subgroup of OPAG/SBAG/NOW leadership are currently working to select inaugural chairs of the OWWG.

Findings.

1. OPAG strongly supports the Europa Clipper Mission and commends JPL and NASA for working together to make Clipper the highest priority planetary flagship mission as it moves to launch in October 2024.

OPAG is appreciative of Lori Glaze's and NASA HQ's efforts to prioritize Europa Clipper to preserve schedule margin as instrument deliveries and integration proceed. We are supportive of NASA's efforts to resolve issues regarding Center workforce as highlighted in the Psyche IRB Report to minimize impact to current and future missions.

2. OPAG is supportive of NASA's plan to fund focused studies for Uranus Orbiter and Probe (UOP), in order to methodically prepare for and clear a path to Phase A, with funding for UOP in the FY25 budget. OPAG encourages NASA to start work in FY23 on topics including but not limited to:

- Exploration of trajectories and launch capabilities (to arrive at Uranus well before the equinox in 2049);
- Characterization (e.g., models, observations) of the radiation and ring particle environmental risks for close orbits of Uranus.

¹ <https://doi.org/10.1089/ast.2018.1955>

² <https://nap.nationalacademies.org/read/26522/chapter/28>

3. OPAG is strongly supportive of continuing investment in outer planets-related R&A programs, and encourages NASA to:

- Expand the Dual Anonymous Peer Review (DAPR) process to include the technology programs (MatISSE, PICASSO, etc.);
- Make the Precursor Science Investigations for Europa (PSI-E) program a recurring call (we suggest every 2 years) to support the Europa Clipper mission and to draw in additional science expertise.

4. OPAG encourages NASA to consider updating New Frontiers lists based on scientific, as opposed to schedule-based, considerations.

OPAG is concerned that, depending on the timing of future AOs, rigid assignment of mission themes to specific New Frontiers opportunities may not follow the scientific intent of the Origins, Worlds, and Life (OWL) decadal survey. Focusing on science would mean that targets that are linked to time-constrained mission opportunities would not be locked into a particular NF# list, thus allowing for more launch flexibility.

The New Frontiers budget has historically enabled missions to the outer solar system with moderate-size payloads and long flight times. However, several scientifically compelling targets (e.g., Neptune/Triton, Uranus, and KBOs) require the use of gravity assists (e.g., Jupiter) to reduce flight time, and/or include launch vehicle requirements in order to fit into a New Frontiers envelope. Given that the required gravity assists are only periodically available, these requirements present a significant challenge when it comes to the exploration of particular outer planets targets. If schedules and/or budgets require shifting of pre-planned launch readiness dates (LRDs) even slightly, trajectories to certain targets can suddenly become unavailable. Similarly, shifting LRDs can also make trajectories to certain compelling targets suddenly available (e.g., Triton is unexpectedly accessible within the current NF5 LRD range).

A specific example is the case of the Triton Ocean World Surveyor (OWS), which was recommended by OWL for inclusion in the NF7 list but not the NF6 list. As stated in OWL, this recommendation was based not on its scientific priority but on the fact that the assumed LRD range for NF6 did not include the required gravity assists to permit an appropriate trajectory. Given that the date range for NF6 assumed by OWL is almost certainly not going to be the actual LRD range, the justification for excluding OWS from NF6 is already likely obsolete.

Statements of Concern.

Decline in proposal submissions. OPAG is concerned about the recent drop in NASA PSD ROSES proposal submissions and encourages NASA to continue to monitor and evaluate the potential causes behind this decrease. Furthermore, OPAG is interested in whether the No Due Date (NoDD) program is working as intended and whether various aspects (e.g., the turnaround time) can be improved.

Concerns about NF-5 draft AO parameters. At the November 2022 OPAG community meeting, the NF5 community announcement was discussed, and the OPAG steering committee had already submitted comments on that announcement to HQ. Since then, the draft AO was released (Jan 10 2023), and OPAG continues to be extremely concerned about aspects of the draft AO that limit

capabilities for OP missions. In addition to encouraging individual responses to HQ, OPAG will be holding an online community meeting on Feb 16, 2023 to gather input from community members, to inform OPAG's formal response to HQ on the draft AO.

Statements of Support.

Support of selected missions and ensuring expected cadence for the next Discovery. *Competed missions are a critical component of the planetary science endeavor*, and OPAG strongly supports VERITAS as a selected mission. OPAG furthermore encourages and supports NASA in its best efforts to continue with the cadence of Discovery calls as recommended by the OWL.

Radioisotope Power Systems (RPS). OPAG recognizes and appreciates NASA's ongoing investment in and support for the RPS Program. As the outer planets community relies heavily on RPS technologies, OPAG appreciates receiving continued updates to the community about (1) NASA's commitment on the number and types of RPSs (specifically radioisotope thermoelectric generators, RTGs) to be fabricated and fueled, and how these are assigned to future missions, and (2) details on the characteristics of these power systems, including their expected mass, size, electric and thermal power outputs (at beginning and end of life), and number of General Purpose Heat Source (GPHS) modules they use for mission planning purposes. We request continued updates as PSD plans evolve on new missions from Flagship through New Frontiers to Discovery class. The community also appreciates the significant improvements and streamlining to the Environmental Assessment (EA) and National Environmental Policy Act (NEPA) approval processes.

Deep Space Network issue. OPAG remains concerned about the aging Deep Space Network, particularly as we enter the JWST and Artemis era. OPAG strongly supports NASA's efforts to maintain and improve deep space communication capabilities.

Unfunded Co-Is on international missions (including JUICE). The community continues to be concerned about the lack of funding support for US-based Co-Is on international missions, including (but not limited to) JUICE. OPAG encourages NASA to develop a transparent and equitable path forward for a JUICE Participating Scientist Program that ensures unfunded US Co-Is are eligible to apply.

Facilities. While funding facility maintenance and development is a concern in general and should be decided on a case-by-case basis, OPAG encourages a rigorous process of knowledge capture when a facility stands down, to ensure that the capability can be revived after a sizable time gap. A notable example of OPAG interest is the capability to manufacture thermal protection systems (TPS) needed for atmospheric entry missions; specifically, woven TPSs—such as HEEET (Heatshield for Extreme Entry Environment Technology) and 3MDCP (3d mid-density carbon-phenolic)—require specialized weaving and resin infusion facilities that become dormant between productions. OPAG is concerned about having plans in place beyond fulfilling current production needs, to strategically preserve and maintain these facilities and retain the experience to operate them during dormant periods, including the retention of processing knowledge. (A related counter example from the past is the partial loss of knowledge-base, manufacturing and testing capabilities of carbon-phenolic after the Galileo mission.)

SIMPLEx. OPAG supports releasing the next SIMPLEx AO at the soonest possible time. SIMPLEx-class missions enable innovative measurements that address high-value science goals for the planetary science community, including OPAG. SIMPLEx missions may also be critical entry points for new mission PIs and broaden access to space-based measurements. Discovery and New Frontiers proposals are significantly greater undertakings than most competed missions supported by other SMD divisions, and PSD's SIMPLEx program fills an important gap to enable new innovations and to allow more planetary scientists to gain mission management experience.

UOP. OPAG encourages transparency in the selection of lead center(s) for the Uranus mission.

OPAG endorses the Cross-AG WG Inclusion Plan recommendation:

“We believe Inclusion Plans could be a useful way to increase EDIA in planetary science. However, the labor of not only implementing these plans, but also of developing them and gathering relevant resources, needs to be provided by NASA and/or paid to the community. NASA should work with the community to explore ways to develop resources (including funding) to educate the community. This should include education of why inclusion plans are important and ways they could be implemented. Resources also need to even the playing field between PIs who have access to DEIA experts (perhaps through a University office) and those who do not.”

OPAG concurs with the recent SBAG finding on planetary radar:

“SBAG recommends that NASA continue to work with NSF and other agencies to develop a concerted plan for new national resources for planetary radar. This path follows the Decadal Survey recommendation to “develop a plan for ground-based planetary radar capabilities comparable to or exceeding those of the Arecibo Observatory necessary for achieving planetary defense objectives”. As well as serving the needs of planetary defense and the broader area of small body science, new radar resources will enable further scientific studies of objects throughout the Solar System.”