



National Aeronautics and
Space Administration

NASA SCIENCE

Planetary Science Advisory
Committee (PAC)

Lori S. Glaze, Ph.D.

NASA Planetary Science Division Director

March 4, 2024



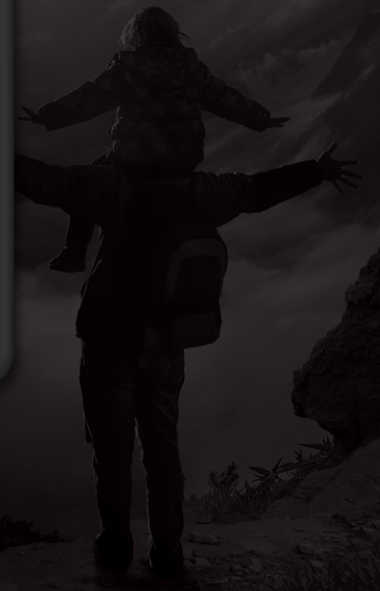
PSD Personnel Updates



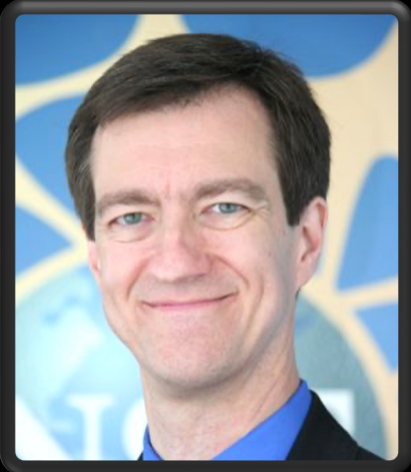
Michael Meyer (Retired)



Jeff Grossman (Retired)



PSD Personnel Updates



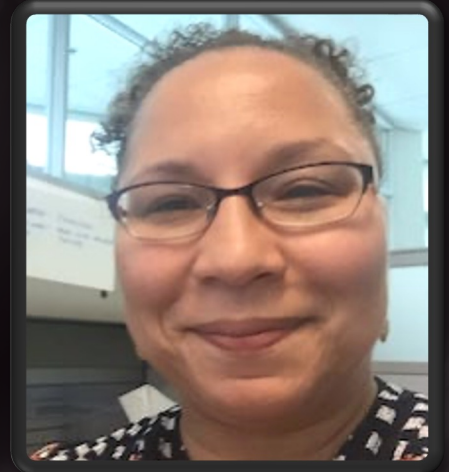
*Tom Statler, Lead Scientist for
Solar System Small Bodies*



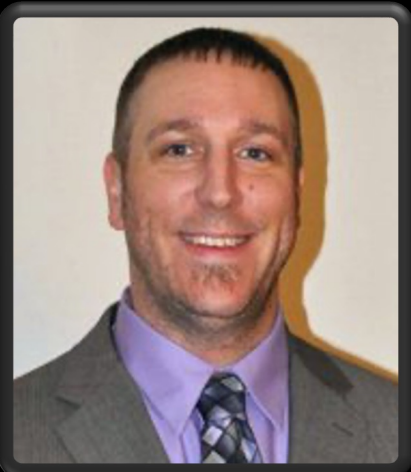
*Nick Lang, Program
Scientist*



*Laura Ratliff, MEP
Mission Generalist*



*Kanisha Armintia, Research
Program Specialist*



*Aaron Burton,
Program Scientist*



*Katie Robinson,
Program Scientist*

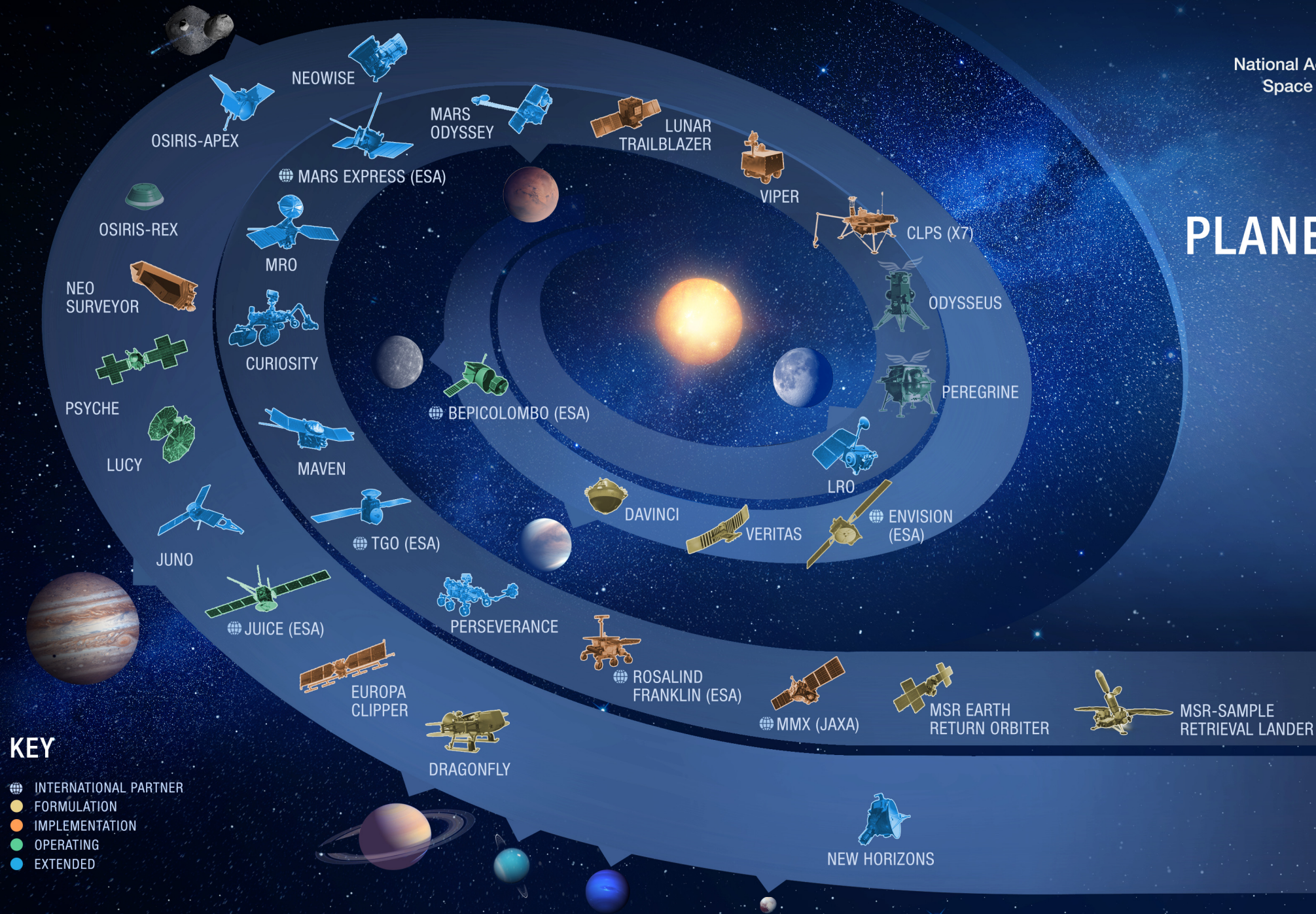


*Darcia Stewart, Project
Program Specialist*





PLANETARY FLEET

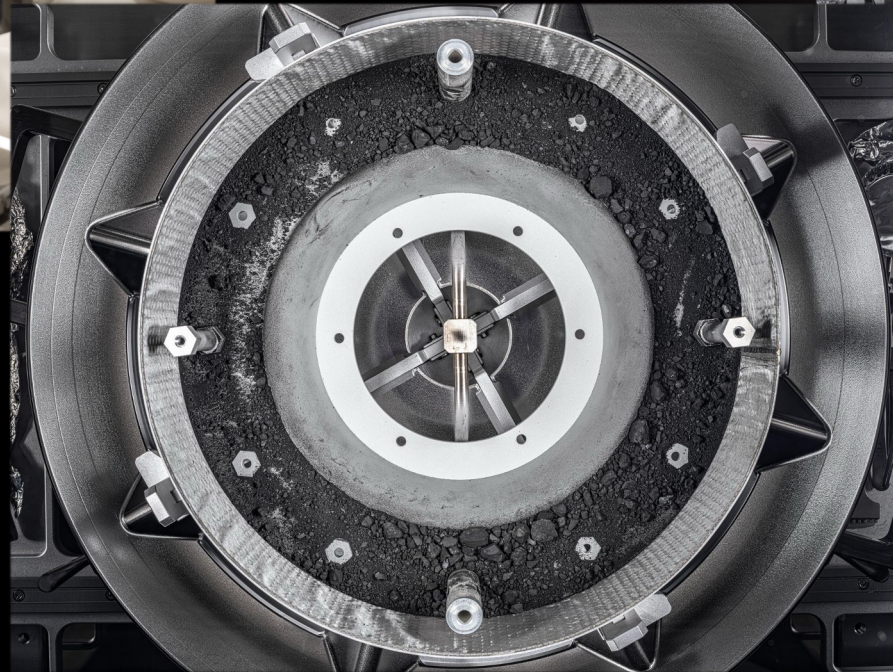
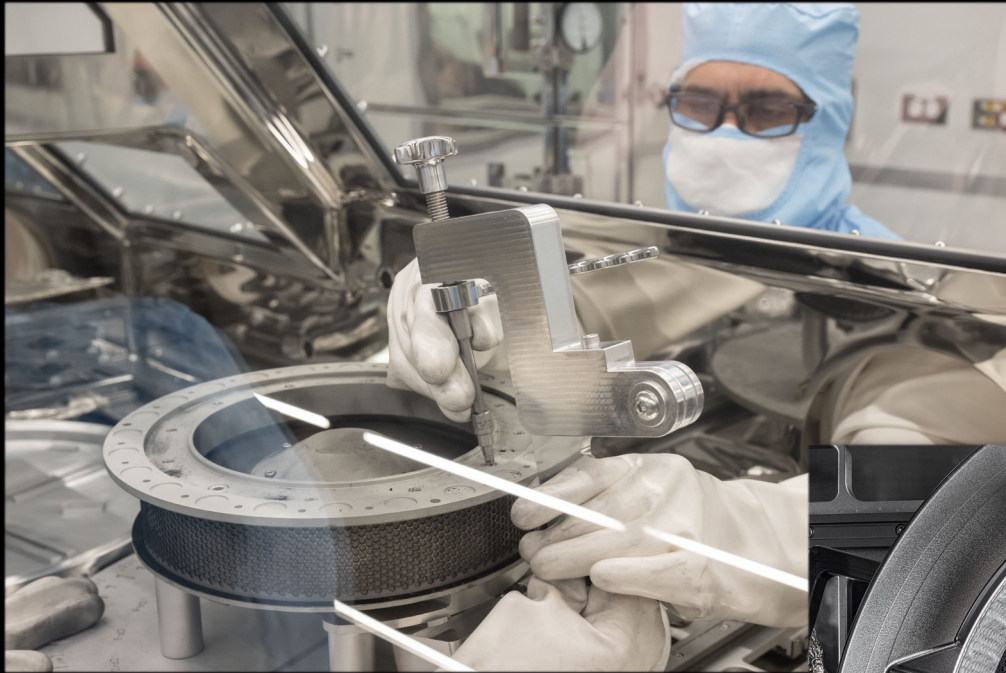




Mission Updates



OSIRIS-REx: 121.6 grams!





Europa Clipper

Assembly, Test, and Launch Operations (ATLO) Progress

- All planned installations at JPL are complete
- Two of three system-level functional tests successfully completed (third in April)
- Final environmental test (System Thermal Vacuum testing) has begun and concludes in March
- First Clipper undergraduate research opportunity (Inspiring Clipper: Opportunities for Next-generation Scientists; ICONS): 39 projects and >3500 applicants
- 2,629,938 names submitted as part of the Message in a Bottle Campaign!

Spacecraft ships to KSC:
May 2024

Launch period opens:
October 2024

Jupiter Orbit Insertion: April 2030



High-Gain Antenna after radome removal in cleaning orientation

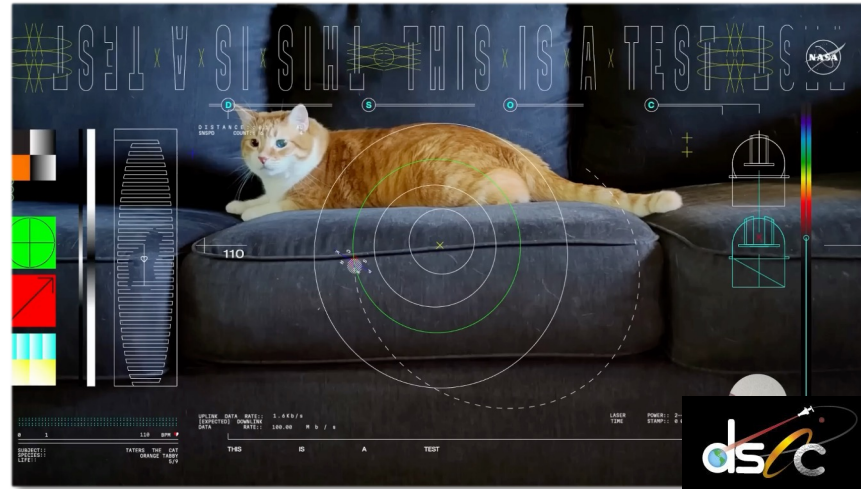
Random vibe testing (Y axis)



Psyche

Operating Status

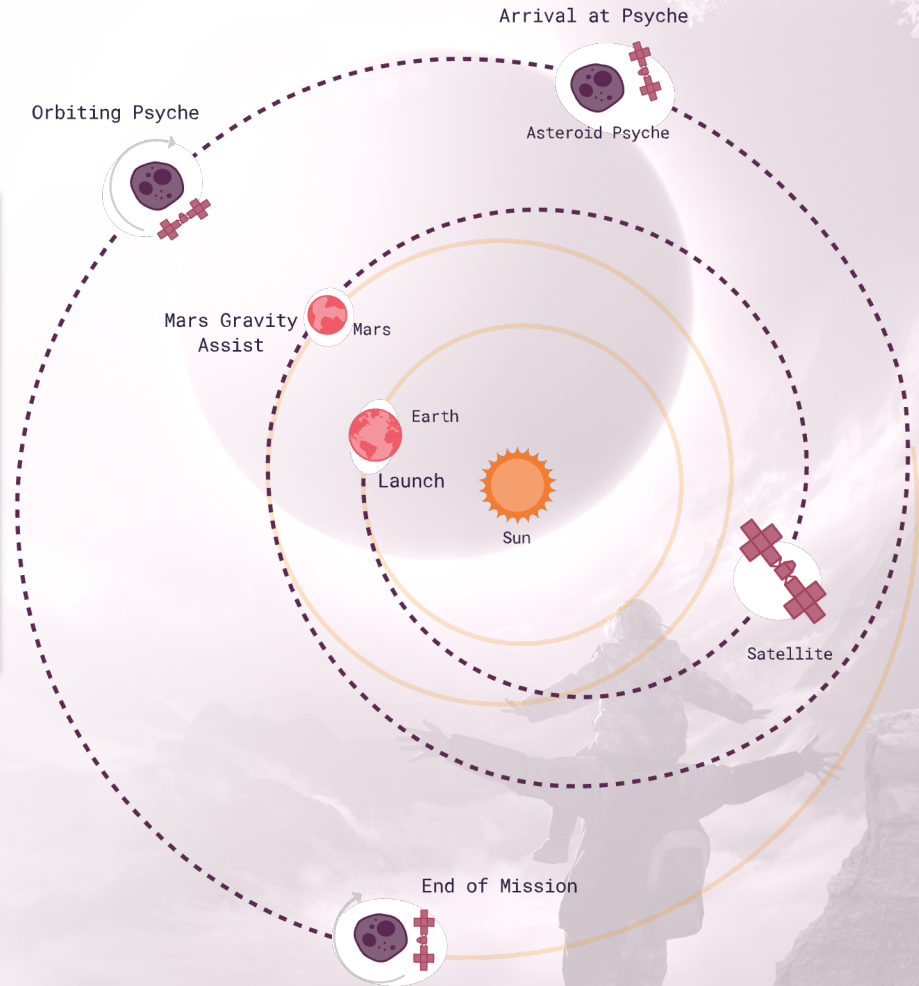
- Spacecraft's initial checkout is complete – spacecraft and instruments are healthy!
 - Some thruster calibrations are still ongoing
- Deep Space Optical Communications (DSOC) is operating well
 - First demonstration of optical communications beyond the Earth–Moon system



'Taters' video streamed from nearly 19 million miles away by DSOC (on Psyche) on Dec 11

Future Timeline

- Mars flyby: March–May 2026
- Psyche Orbit Insertion: August 2029
 - Orbital mission: ~26 months





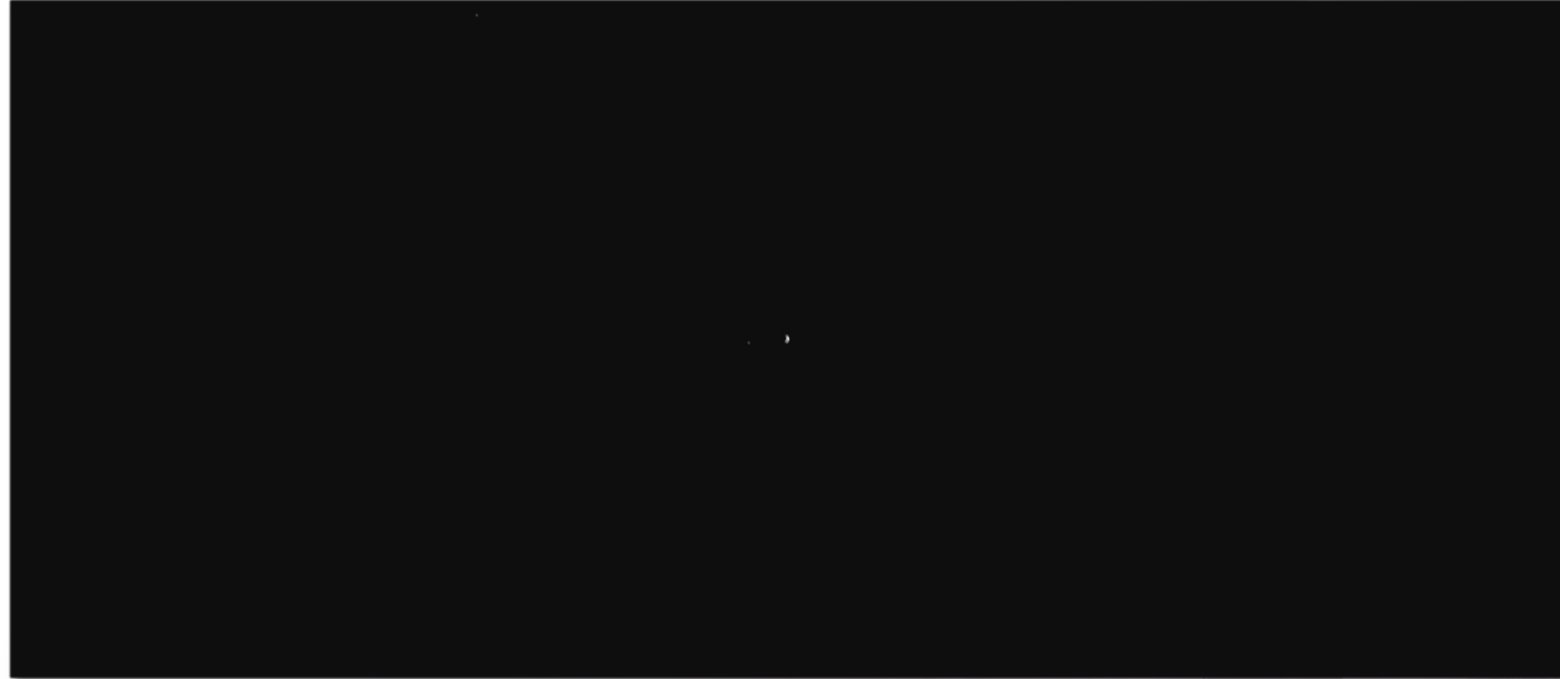
Lucy

Recent News

- Dinkinesh Flyby (November 1)
 - First view of a secondary (Selam) that is itself a contact binary
 - Preliminary analysis: larger body is ~0.5 miles at its widest and the smaller is ~0.15 miles across
- Successful first deep-space maneuver (January 31st, 2024)

Coming Up

- December 2024: second Earth gravity assist
- April 2025: Donaldjohanson (main belt asteroid) flyby
- August 2027: First trojan asteroid flyby (Eurybates)

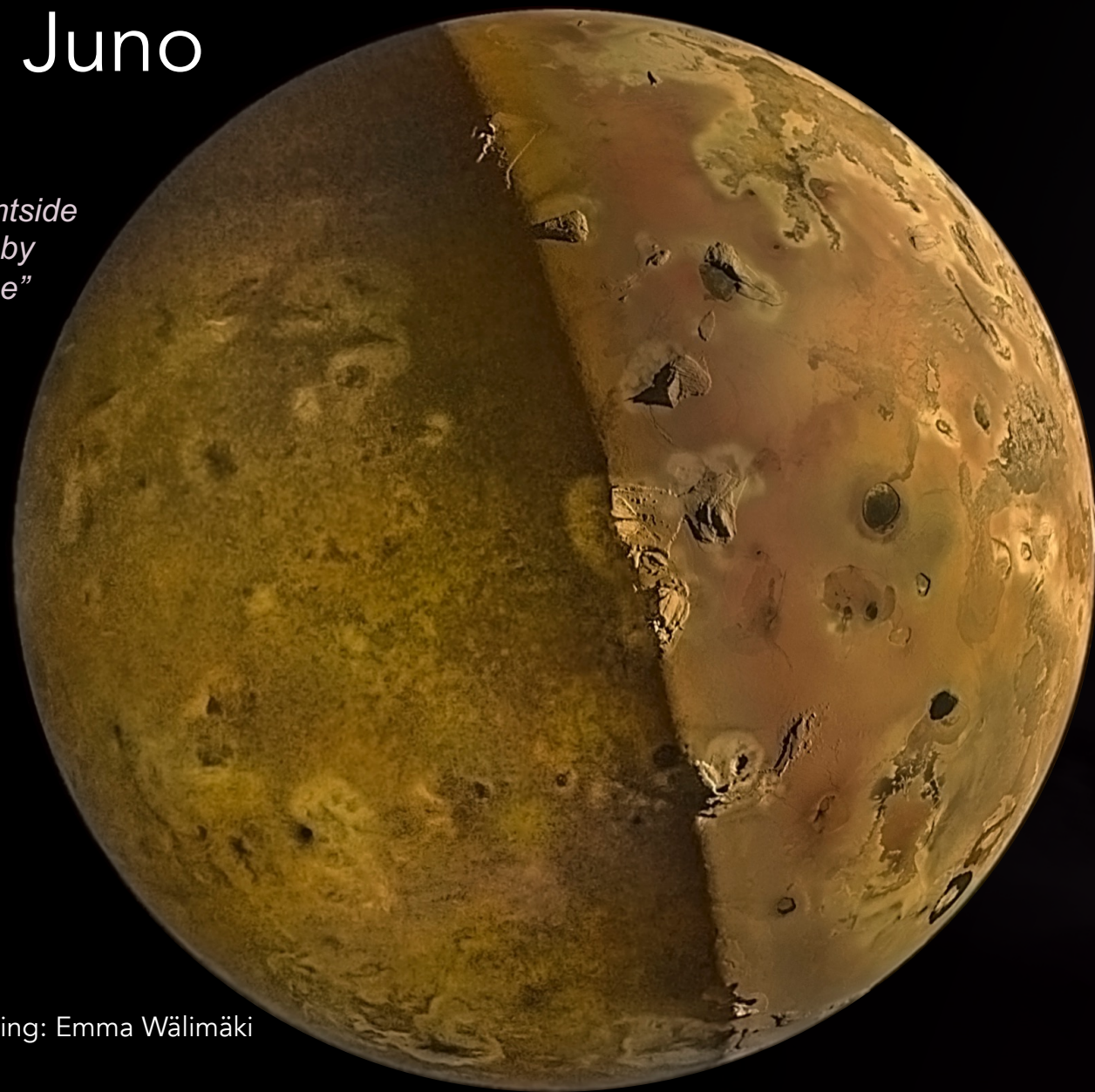


JUNO



Juno

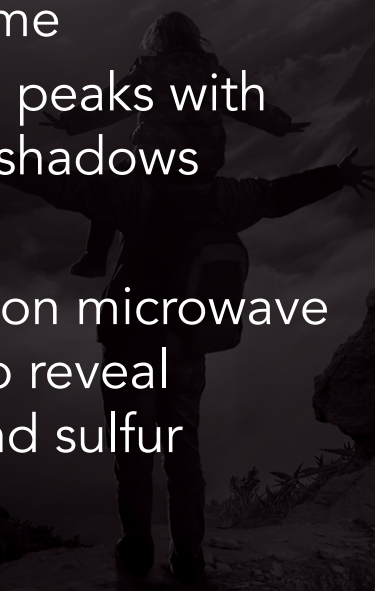
*Io, with nightside
illuminated by
'Jupitershine'*



Processing: Emma Wälimäki

Recent flybys of Io (December 2023 and February 2024) at low altitude reveal spectacular detail

- High-resolution images in IR and visible light reveal surface changes since Galileo and Voyager visits
- Evidence of:
 - an active plume
 - Tall mountain peaks with well-defined shadows
 - Lava lakes
- First high-resolution microwave observations of Io reveal regions of lava and sulfur dioxide ice



Peregrine (Astrobotic)



First launch of ULA's Vulcan Centaur rocket on January 8, carrying Astrobotic's Peregrine lander (Credit: Julia Bergeron)

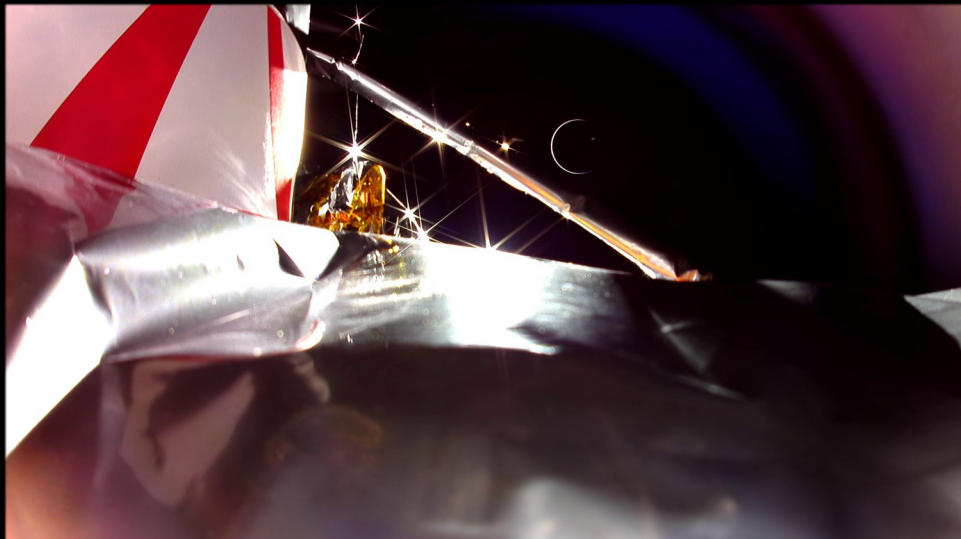


Photo of Earth, with the Sun hidden, taken from the Peregrine lander (Credit: Astrobotic)

Odysseus (Intuitive Machines)



Image captured from Odysseus shortly after separation from SpaceX second stage (Credit: Intuitive Machines)



Image captured from Odysseus on the lunar surface, taken on February 27 (Credit: Intuitive Machines)

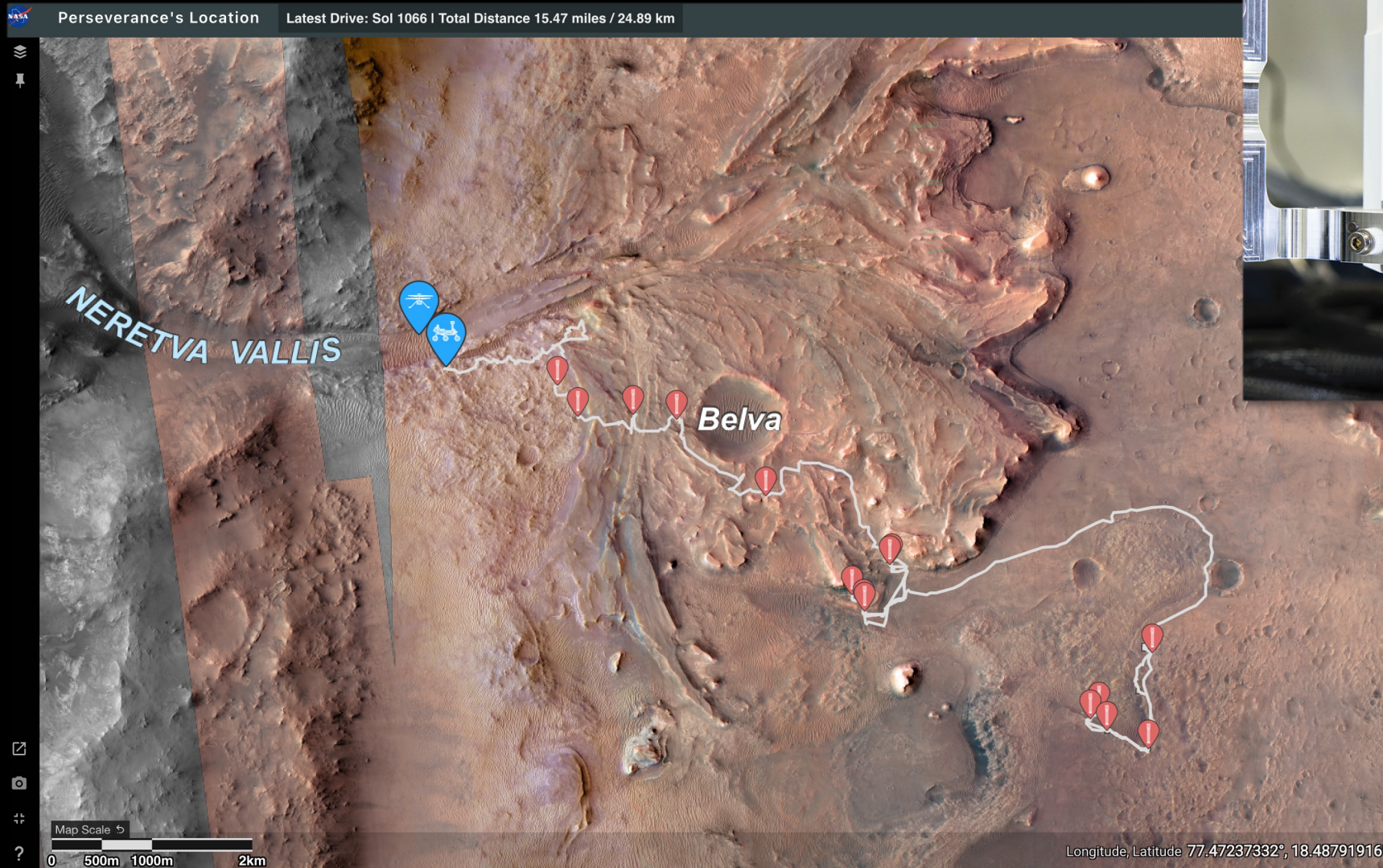


VIPER

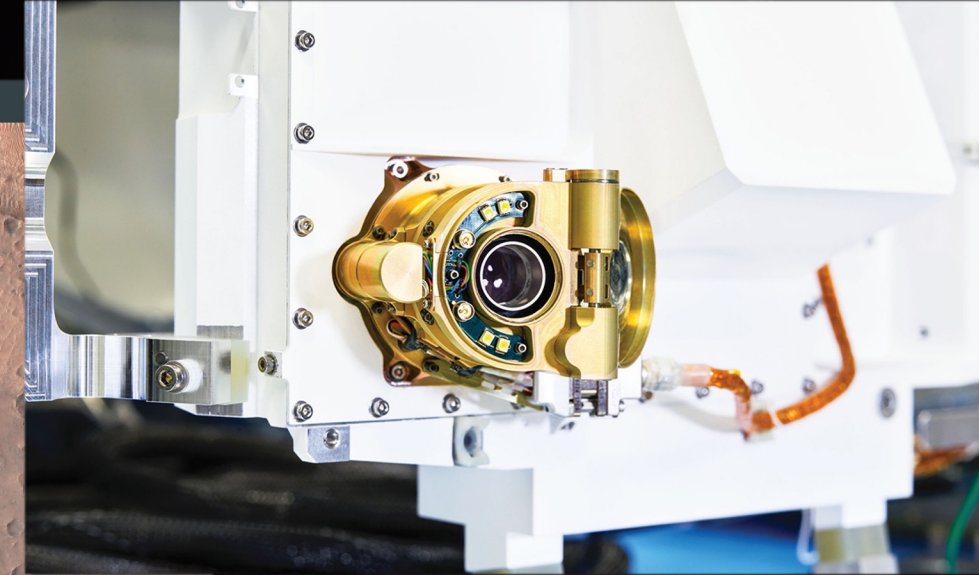
- Delivery will be on Astrobotic's Griffin lander
- Rover assembly progress continues: >80% complete!
- Test Readiness Review planned for late March before qualification test campaign



Perseverance



Location as of February 27, 2024



SHERLOC instrument

Dust cover on one of SHERLOC cameras remains partially open

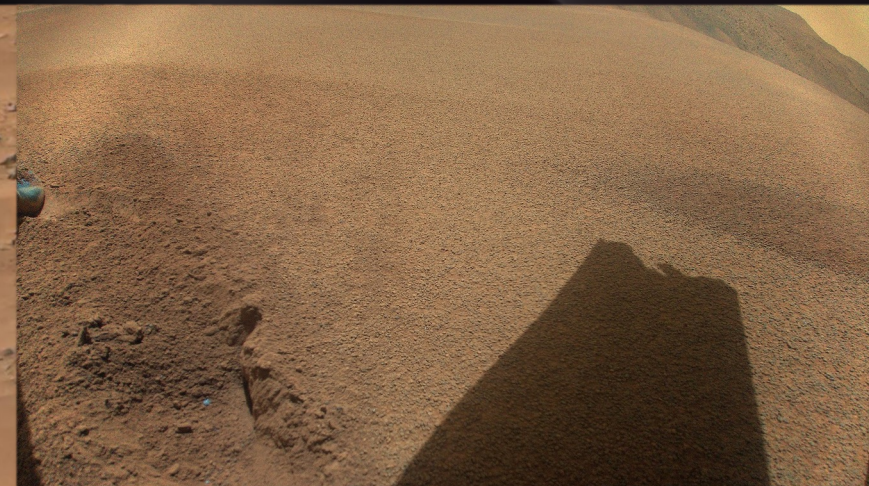
- Engineers are working to stabilize the cover
- In current state some operation modes can not be executed

Thanks Ingenuity!



Possible
blade
remnant and
impact scar

Ingenuity's
final resting
spot in
'Valinor Hills'



*Image showing the shadow of a
damaged rotorblade*

- Last (72nd) flight was made on January 18
- Although damaged, helicopter remains upright and in communications with ground controllers



Challenges

Mars Sample Return & Budget Status

- Mars Sample Return Independent Review Board Response Team (MIRT) expected to complete review and make recommendations by Q2 of 2024
 - Plans to confirm official mission cost and schedule will be delayed until completion of the review
- FY2024 Budget:
 - NASA is still operating under a continuing resolution
 - House and Senate Committees are trying to finalize appropriations bills
- FY2025 President's Budget Request will be submitted to Congress on March 11
 - Additional information about NASA's FY2025 budget request will be shared soon after, including at the Lunar and Planetary Science Conference during 'NASA Night' (**Monday March 11, 5.35 pm Central**)
 - NASA night will be live streamed on LPI's YouTube channel
 - Questions can be submitted ahead of NASA Night (and will be taken live):
<https://nasa.cnf.io/sessions/cez7/#!/dashboard>
- Repercussions of tight budgets are real and we are already starting to feel the effects





Decadal Survey Progress



Future Mission AOs

- Next New Frontiers (NF) AO final release will be no earlier than 2026
 - NASEM Committee on Astrobiology and Planetary Sciences (CAPS) have been tasked with assessing the target list for the next NF AO (considering the lists for NF5 and NF6)
- Unlikely to be solicitations for Discovery or SIMPLEx in the next two years



Decadal Survey Progress

Integrated Lunar Science Strategy

- PSD/ESSIO work continuing
- Community comments received in late 2023 are being considered; final release expected spring/summer 2024

Future Mars Science Plan

- Document is being finalized and release is targeted for this summer

Technology Development plan

- PESTO team working to create a new Comprehensive Planetary Science Technology Development Plan
 - Feedback from science community is now being reviewed
- Draft will be presented at LPSC (Wednesday March 13)



Community

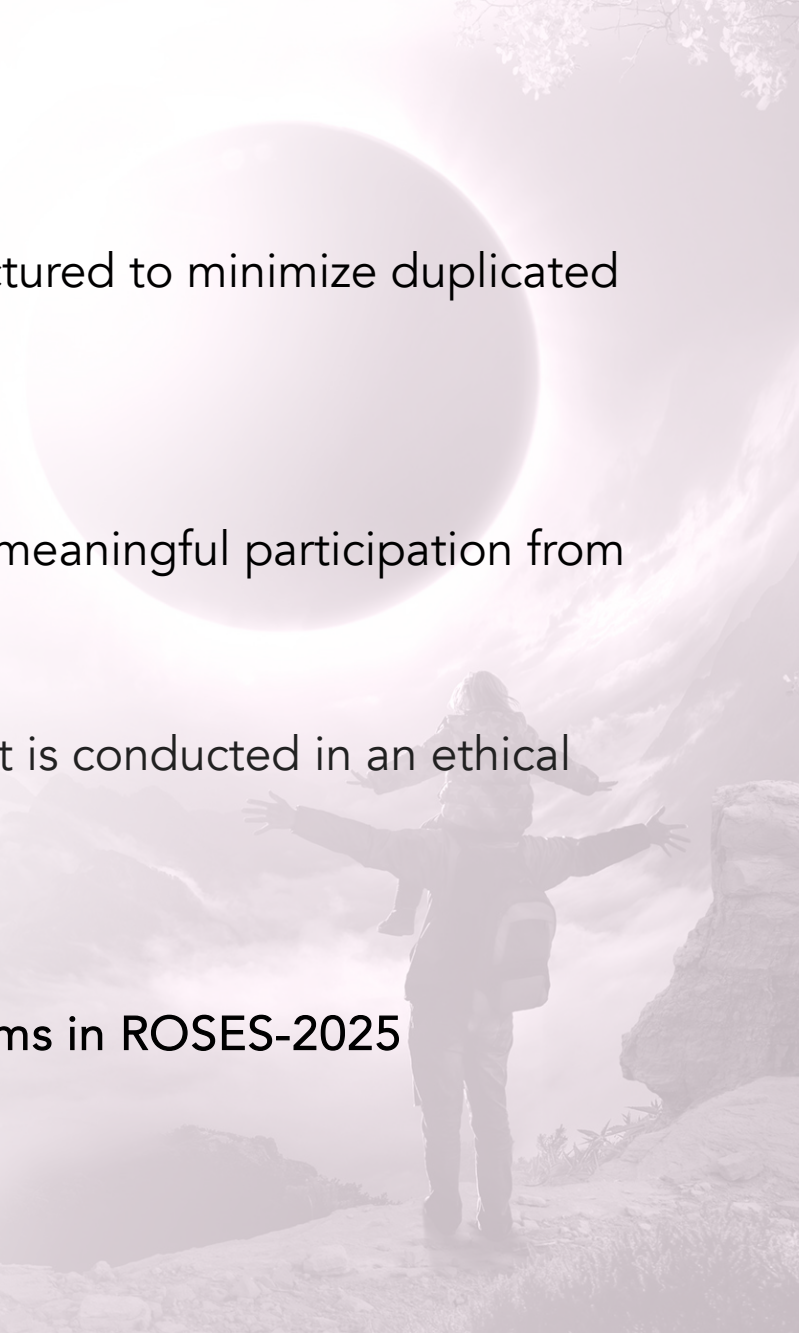
R&A Updates

ROSES 2024

- [C.1 \(Planetary Overview\)](#) and individual program elements have been restructured to minimize duplicated information
- Specific updates (more information in PAC R&A Update):
 - **Section 1.3 (Participation of MSIs, PUIs, and CCs):**
 - Updated and expanded: "PSD strongly encourages proposals with meaningful participation from minority-serving institutions (MSIs)..."
 - **Section 3.14 (Fieldwork):**
 - Updated requirements for proposals involving fieldwork, to ensure it is conducted in an ethical manner (new resources for proposers are provided)
- Continuing in several programs:
 - No Due Dates (NoDD)
 - Dual-Anonymous Peer Review (DAPR) – **will become default for programs in ROSES-2025**

NSSC Awards

- Stricter enforcement is being seen on grant requirements
 - More information provided during PAC R&A Update



Complete NASA's open science curriculum!

Open Science 101:

A community-developed introduction to
core open science skills

- Know how to write a NASA open science and data management plan
- Learn about tools and best practices
- Increase the impact & visibility of your science
- Earn your digital NASA open science badge

All 5 modules now available through a self-paced online course and through in-person and virtual instructor-led workshops.

Take OS101!



<https://go.nasa.gov/40pPQMx>

Open Science 101 Launch Overview

Welcome to Open Science 101



NASA released its free [Open Science 101](#) curriculum Dec 6, 2023, to empower researchers, early career scientists, and underrepresented communities with the knowledge and tools necessary to embrace open science practices.

Since the launch on Dec. 6, 2023, TOPS has reached the following:

404 TOPS Open Science
101 Badges issued

1,913 people enrolled for Open Science 101

8,715 subscribers for
TOPS Newsletter
(+1.6k since 12/6)

585 social media mentions
of "Open Science 101"
(with an estimated reach of
97.2 million)

6,691 views for TOPS
Github Pages

1,124 members for TOPS
LinkedIn Group

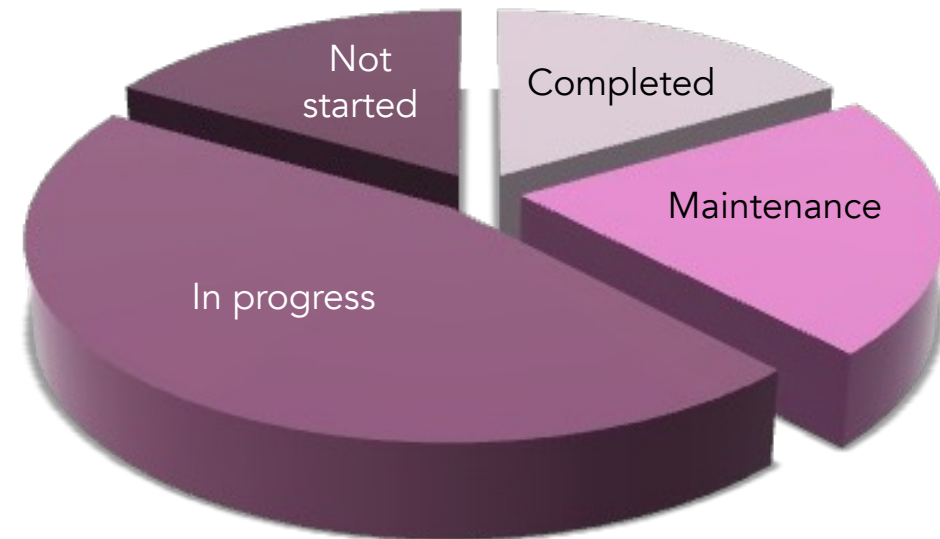


TOPS Promo Video. Credit: NASA

Planetary Data Ecosystem Independent Review Board (PDE IRB) Response Status

PSD has developed a written response and status (as of September 2023) for all 65 recommendations in the [PDE IRB Final Report](#)

- Document will be published on PDE webpage soon
- Lunch event at LPSC (Thursday, March 14 at 11.30 am) to discuss current status and solicit community feedback



Status of the NASA response to the 65 recommendations in the PDE IRB Report (as of September 2023)

Biosignatures "IDEAS" Lab

February 6–8

Interact Clarify Ideate Develop Implement

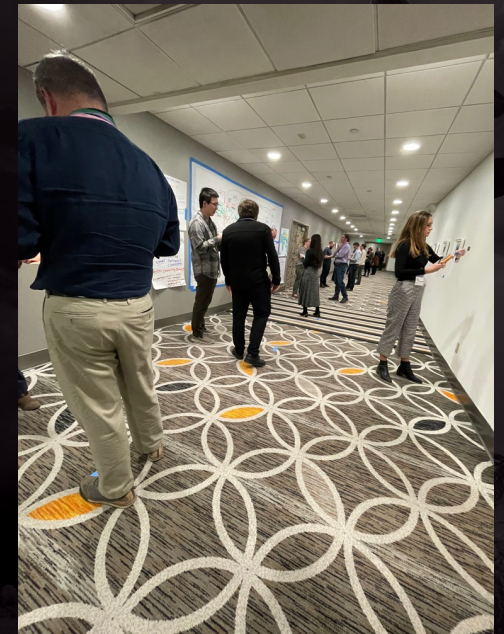
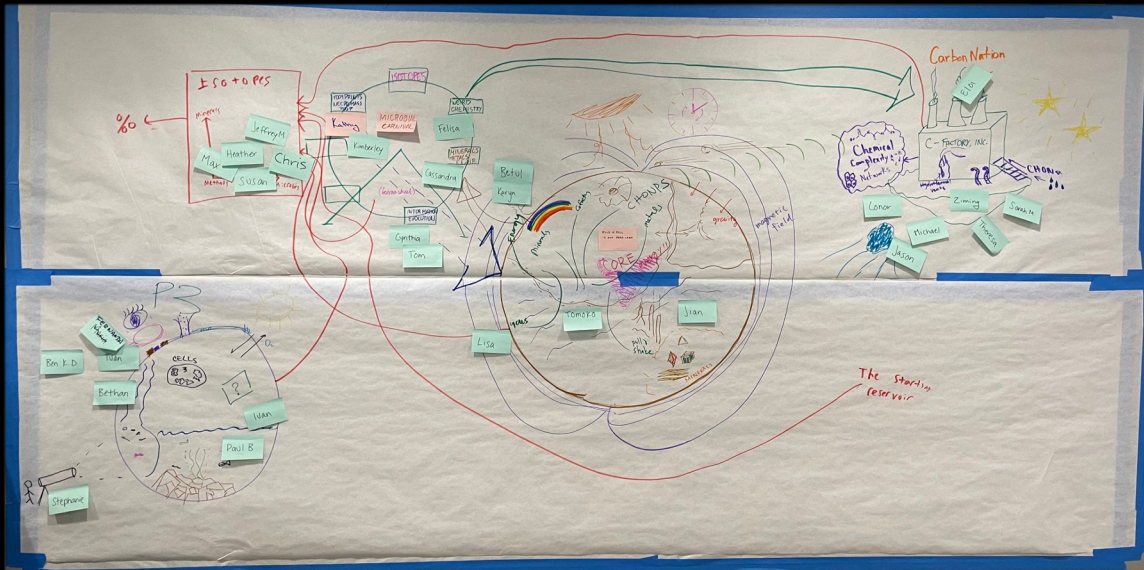
Real time peer review

2 months

Three-day in-person
"sandpit"

Three virtual meeting days
Select project ideas

Selected proposals to
be funded in
Exobiology



CNSA Chang'e-5 Lunar Samples Update

- CNSA opened applications for access to Chang'e-5 lunar samples to international scientists in late 2023
- November 2023, Administrator Nelson certified to Congress NASA's intent to allow NASA-funded researchers to apply to CNSA for access to these samples
 - A limited exemption under the Wolf Amendment
- NSPIRES notification released on November 29, amplified by LEAG and ExMAG
- CNSA received nearly a dozen applications from US proposers
 - NASA civil servant applications will not be considered this round because of lack of time to get an appropriate international loan agreement in place
 - In February NASA requested a status update from all proposers so NASA could provide guidance on next steps
 - Guidance will be given on how NASA funding may be used to support research efforts on Chang'e 5 samples
- A second opportunity for international proposers is expected in summer of 2024
 - NASA intends to certify negotiations with CNSA to allow NASA and NASA-funded researchers to apply to CNSA in this second round of applications



Findings

Finding 1: SRB Process Updates

Finding: The PAC recognizes that the Standing Review Board (SRB) serves a critical process in mission development and appreciated hearing about the large effort within NASA to improve the SRB with regards to both procedures and cultivation of a large and diverse pool of qualified individuals to potentially serve on future SRBs.

Recommendation: The PAC encourages SMD to have more transparency in sharing the planned changes to the SRB processes with the relevant disciplines' science and engineering communities. Towards that end, the PAC recommends sharing the final developed plans and actions within public forums, not just internal NASA forums and memos. Additionally, the PAC agrees with the importance of developing a broad and diverse base of potential SRB members and encourages (1) open calls for nominations and self-nominations for potential SRB members and (2) that opportunities for mentoring/training on the SRB processes and roles are made appropriately open so that many folks, with a range of relevant expertise, can develop the skills needed to serve on future SRBs.

Response: SMD appreciates the PAC's feedback regarding SRB process for SMD and the Agency. The PAC's findings and suggestions help further strengthen and emphasize the importance of the independent assessments of our missions. The opportunity to provide more transparency into our SRB processes is a welcome suggestion and SMD can plan to provide the details of our SRB plans and actions, in concert with the Agency's efforts to strengthen these processes, at a forthcoming SMD Townhall, SMD Division Advisory Committee meetings, or similar public forums. SMD also agrees that the importance of strengthening our SRBs relies, in part, to fostering diversity and a broad base of skill sets within the SRB community. We are currently planning to establish a path that will provide greater reach (as well as training and resources) to individuals who have not previously been involved in SRBs.

Finding 2: MSR & NASA Budget Concerns

Finding: The PAC recognizes the extreme challenge of decision-making in the current uncertain budget environment and expresses our sincere appreciation for the level of transparency shown with respect to PSD budget priorities and the development of NASA's response to the MSR IRB. The PAC continues to support the Decadal recommendations/priorities and the PSD funding priorities laid out by Lori Glaze (initially endorsed in the PAC June 2023 Finding).

Recommendation: The PAC reaffirms support of both the Decadal's prioritization of MSR and the need for balance across the planetary portfolio and community support. The PAC recommends continued focus on both those aims as the MSR budget and NASA's plan become better defined and looks forward to hearing the full NASA response to the MSR IRB in the spring.

Response: PSD thanks the PAC for the broad support of Mars Sample Return and for balance across the entire planetary science portfolio. As described in this PAC presentation, we are still awaiting a FY2024 appropriation. The FY2025 President's Budget Request (PBR) is expected to be released on March 11. We expect to have more information to share regarding the PSD budget outlook, and the results of the MSR Independent Review Board Response Team (MIRT), at the next PAC meeting.

Finding 3: Mental Health & the Planetary Science Community

Finding: The PAC recognizes the impact of mental health on science products and composition of the planetary science community. Studies of the type that Dr. David Trang has undertaken and presented to the PAC are important, especially if contributing to regular monitoring of the health of the community.

Recommendation: The PAC recommends that any NASA workforce survey include an assessment of mental health and that NASA continue to make progress towards addressing the Decadal Survey recommendation for regular workforce assessment.

Response: NASA commends Dr. Trang on his research into the mental health of the planetary science community. PSD requests clarification regarding the recommendation to include an assessment of mental health in any future NASA workforce survey, i.e., is the PAC referring to internal NASA surveys or NASA-created surveys for the external community? An assessment of the mental health of the external community by NASA would likely present several challenges, including the need to obtain clearance from OMB and privacy concerns. Regarding the Decadal Survey workforce assessment recommendation, NASA (SMD) is continuing to explore appropriate mechanisms to conduct such assessments.

Finding 4: Astrobiology Programs (1/2)

Finding: The PAC appreciated hearing about the developing new SMD/PSD Astrobiology leadership division of labor and are glad that the leaders are working well together. Some challenges may remain in leadership organization and implementation of the Astrobiology Research Coordination Networks (RCN) structuring. The recent reorganization of leadership and community structure are sources of uncertainty in the Astrobiology community.

Recommendations: The PAC recommends that:

1. The Staff Scientist for Astrobiology Strategy present more concrete goals and related plans by the Spring PAC meeting. The PAC suggests a movement from 'broad ideas' to specific goals and pathways for achievement, in order to supply the Astrobiology community with useful guidance in this period of restructuring.
2. The Staff Scientist for Astrobiology Strategy develop metrics to assess whether the RCNs, as a whole, are meeting the goals of broadening community involvement and belonging vs. further dividing the community into selective groups.
3. Lessons from the NExSS assessment and other discussions be used to improve the community-building and -connecting results of the RCNs, and that those plans and actions be shared with the community.
4. The Astrobiology program consider centralizing some administrative support for the RCNs so as to more efficiently spread some lessons learned between RCNs and alleviate that effort from the RCN leads, thus also mitigating differences in home-institution-provided support.

Finding 4: Astrobiology Programs (2/2)

Response: The NASA Astrobiology leadership team are in the process of planning several interdisciplinary community activities that are designed to catalyze new interdivisional collaborations and to explore the potential for new interdivisional programs. More information on these efforts will be presented during the Astrobiology update at this PAC meeting (Tuesday afternoon).

NASA agrees that conducting regular assessments of the RCNs, to understand where they are meeting, or failing to meet, their defined metrics of success, is a valuable activity and these assessments will continue. The feedback from the NExSS assessment is currently being used as part of a plan to restructure RCN support (including administrative support). More details will be provided during the Astrobiology update at this PAC meeting.

Finding 5: R&A Updates (1/2)

Finding: The PAC learned of the intent to merge Emerging Worlds (EW), Solar System Workings (SSW), and Solar System Observations (SSO) into a new Solar System Science (SSS) program, with rationale for this change. However, the PAC and Decadal Survey raised concerns about merged programs versus smaller, individualized programs (the DS discussed the newly formed SSW program). The PAC raised additional concerns about impacts of the merger on the available reviewer pool and generated reviews. PS&A DS/OWL, Chap. 17: *"Unsurprisingly, the nature of SSW as the amalgamation of multiple antecedent programs means that it has received a plurality of all PSD R&A proposals each year since its inception: ... This has, in turn, posed a considerable logistical challenge to PSD program officers as they organize multiple review panels and work to avoid often complex conflicts of interest that can limit reviewer availability. Given these constraints, and that SSW review panels are typically grouped by science theme, the value to NASA of a single, expansive program—instead of multiple, thematic programs that together are just as responsive to the NASA's Science Plans as SSW—is not self-evident."*

Recommendations: The PAC recommends that:

1. PSD should delay making this change until (A) the broad community can be informed of the planned change and provide adequate feedback and (B) PSD completes its assessment of the no due date (NoDD) program and determines if NoDD will continue. When informing the community, PSD should very clearly share the rationale, including expected enhanced science value, for merging these programs with the planetary science community.

Finding 5: R&A Updates (2/2)

2. PSD should include an explanation for how they will maintain standards for conflict of interest in reviewer pool and quality of reviews.
3. Following the merge, PSD should maintain a consistent level of opportunities for proposers to the original individual programs, such as maintaining appropriate funding levels within SSS for the individual programs, relative to inflation and to each other. PSD should communicate transparently with the community on this point, such as showing selection rates/funding within SSS by topic in future R&A reports.

Response: PSD thanks the PAC for these recommendations regarding the proposed merger of three R&A programs (Emerging Worlds, Solar System Workings, Solar System Observations) into a single program element. PSD has decided to delay the proposed merger of these R&A Programs to allow for further communication with the broader PSD community. In ROSES-24, the three programs continue to be solicited separately. Proposals submitted to separate programs, however, may be reviewed together in ROSES-24 (a practice already in place) where all conflicts-of-interest requirements (outlined in [SPD-01A](#) and associated policy documents) are followed. Maintaining standards for conflict of interest in the reviewer pool and for quality of reviews is required for all PSD research, regardless of the size of a program. PSD will complete its assessment of the No Due Date (NoDD) program and determine if NoDD will continue before implementing the proposed program merger (which would tentatively be introduced ROSES-25). PSD will continue to communicate the plans for, and results (using several metrics) of, the merger to the broader community.

Finding 6: Accessibility and Inclusion for NASA-Supported Meetings and Facilities

Finding: The PAC heard significant and continued concerns from the community regarding workforce accessibility and inclusion issues for both NASA-supported facilities (such as the MSR sample handling facility) and NASA-supported meetings/workshops. The PAC also heard some great ideas with regards to pertinent considerations for site selection, timing of meetings, and values/issues that come with options such as rotating meeting locations between years. The PAC encourages PSD to continue to listen and consider options for including accessibility and inclusion within facility site selection and meeting/workshop development, within legal bounds and with consideration of the needs of historically underrepresented groups.

No recommendation.

Finding 7: Lunar Reference Frame

Finding: The PAC recognizes NASA's potential influence over planetary mapping standards and that the relevant planetary science communities have weighed in on the question of lunar reference frames. The PAC endorses the MAPSIT/LEAG white paper, including their reasoning and findings (i.e., use of ME over PA lunar reference frame for mapping).

No recommendation.

Through the Eyes of NASA

