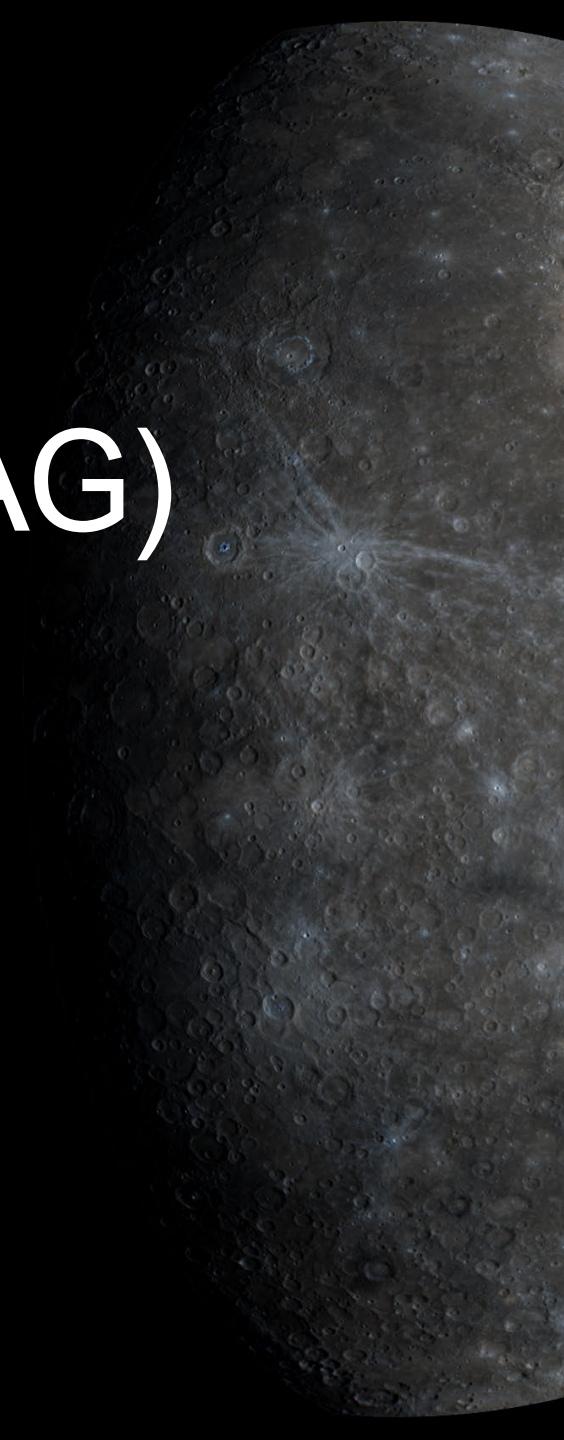


Mercury Exploration Assessment Group (MExAG)

March 1, 2023

Steven A. Hauck, II, MExAG Chair

Case Western Reserve University



MExAG Steering Committee



Steven A. Hauck, II
Case Western Reserve U.
Chair



Carolyn Ernst
JHU APL
Vice-Chair



Ronald J. Vervack, Jr.
JHU APL
Exosphere Discipline Member



Stephen Parman
Brown University
Geochemistry Discipline Member



Christian Klimczak
U. of Georgia
Geology Discipline Member



Catherine L. Johnson
UBC & PSI
Geophysics Discipline Member



Gina DiBraccio
NASA GSFC
Magnetosphere Discipline Member



Ariel Deutsch
NASA ARC
Early Career Member



Ryan Dewey
University of Michigan
Early Career Member



Suzanne Imber
U. of Leicester
International Liaison



Shoshana Weider
NASA HQ
NASA Liaison

Four Steering Committee positions will be open for nominations later this spring.

MExAG Activities

- **Goals Document:** On target to complete the first MExAG Science Goals Document in Q2 2023
- **MExAG23:** Feb 1–3, 2023 (virtual, 3 hr/day)
 - >130 total participants with 90–110 each day
 - ~1/3 international
 - 47 presentations
 - >50% of presenters were early career researchers
 - Breakout discussions to kick-off development of upcoming Community and Technology Goals Documents
 - Extended discussions of IDEA, support of early career researchers.
 - Produced three new Findings

Finding: Discovery Program

- MExAG is disappointed that problems with the Psyche mission have led to substantial negative consequences for other PI-led missions. The MExAG community supports the principle that each competitively selected, PI-led mission should have the opportunity to proceed through the development process, including reviews and key decision points, on its own merits to achieve the science for which it was selected.
- Further, MExAG notes that within the context of the recommended program for missions in the most recent Decadal Survey, *Origins, Worlds, and Life*, it is the only AG community for which Discovery is the sole potential avenue for exploration in the next decade. This fact, compounded by the long cruise times for missions to Mercury, means that any delays or reductions in the Discovery AO cadence will disproportionately impact opportunities for exploration of the innermost planet and the health of the Mercury community.

Finding: Decadal Survey Mission Assessment Process

- The Decadal Survey applied independent cost and risk (TRACE) assessments of the mission concepts. However, the extraordinarily brief TRACE outcomes presented in Appendix C of *Origins, Worlds, and Life* lacks documentation of the specific drivers of cost and risk in their assessments. These drivers are vital for NASA and the planetary science community to identify technologies in need of investment.
- MExAG encourages NASA to ensure that all future assessments of cost and risk of mission concepts associated with the Decadal Survey be disclosed with at least the same level of detail as any pre-Decadal Survey mission study programs. Decadal Survey related mission studies and their results should be disclosed consistent with all Open Science expectations at NASA, without exception.

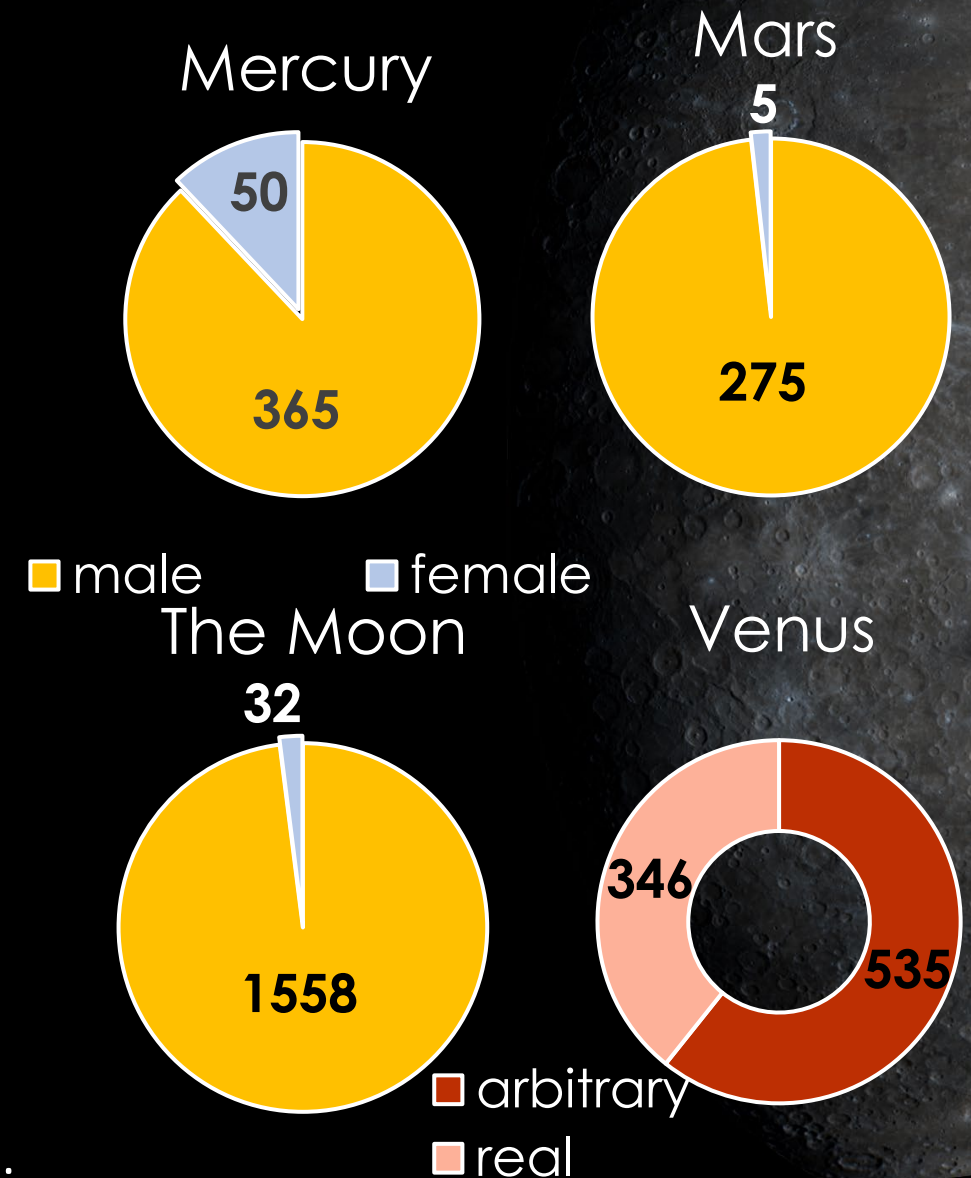
Finding: Gratitude for Decadal Survey

- The MExAG community is extraordinarily thankful for the incredible efforts of everyone who served on the Decadal Survey and produced such a detailed and comprehensive strategy for astrobiology and planetary science in the coming decade.

Highlight: Representation in naming conventions

- Annie Lennox (Open University) compared features named for people.
- Representation is poor across all bodies.
- 12% named for women on Mercury, 2% on Moon and Mars.
- 39% of named features on Venus are for real persons.
- Study focuses on gender and acknowledges that imbalances along other axes exist as well.
- Current naming conventions:
 - put weight on **historical celebrity status**
 - were written during a time when diversity within the sector was extremely poor
 - exclude representing individuals of **political**, military or religious significance
 - do not allow for name repetition even on different bodies

Features Named for a Person



Summary and Upcoming Mercury Events

- New Discovery Program Finding: Support for competitively selected PI-led missions to proceed through development process and reviews to achieve science for which they were selected. Delay in Discovery AO disproportionately impacts opportunities to explore Mercury
- New Decadal Survey Process Finding: Results from cost and risk assessments should be released in detail in all future Surveys.
- LPSC 2023, 13–17 March 2023
- Mercury 2024, To be held in Japan
- BepiColombo:
 - Mercury Flyby 3, 20 June 2023

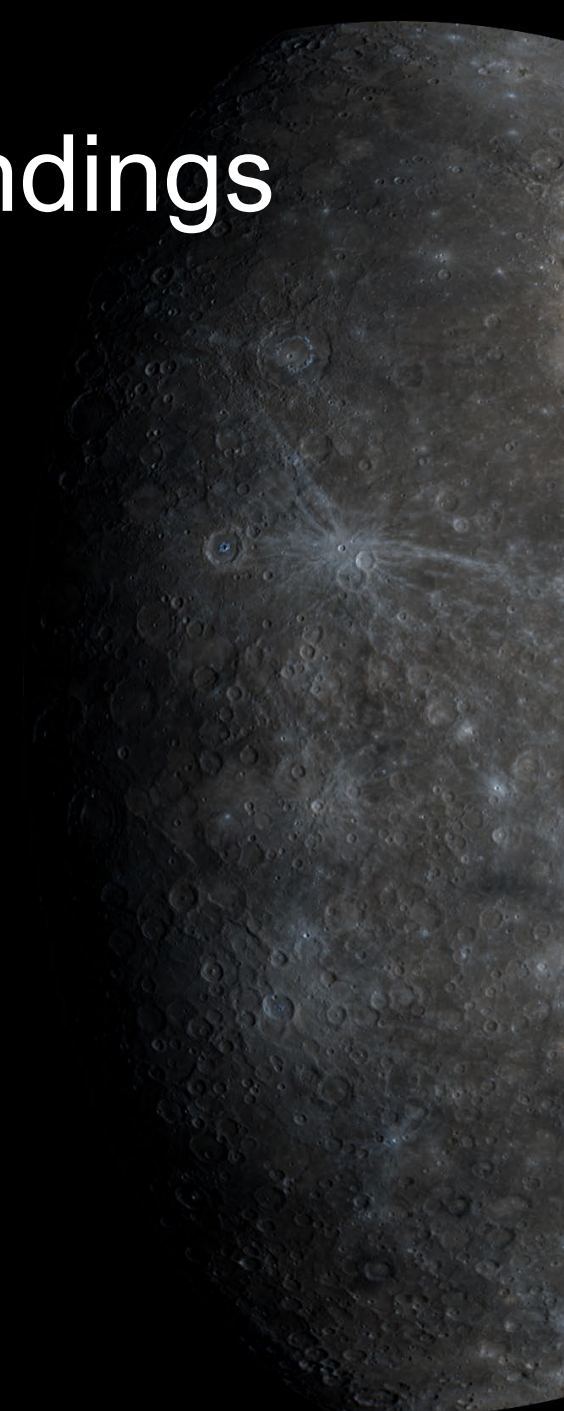
MExAG: <https://www.lpi.usra.edu/mexag>

Twitter: [@ExploreMercury](https://twitter.com/ExploreMercury)

MExAG



Additional MExAG Notes and Open Findings



Ongoing Finding: Ground-based Observatories

- Ground-based optical, infrared, and radio/radar observations play a critical role in the study of Mercury. MExAG encourages NASA to work with key facilities to address procedural/logistical obstacles that create serious challenges for proposals to observe Mercury, particularly during the coming years when support for – and coordinated science with – the BepiColombo mission is vital to provide increased science context.
- MExAG encourages NASA to:
 - Work with optical telescope facilities on which NASA acquires time (e.g., Keck Observatory) and their Telescope Allocation Committees (TACs) to ease the scheduling of twilight-time observations for Mercury. Many telescopes require half-night or even full night proposals; however, Mercury is only available for 1-2 hours at the beginning or end of the night, substantially disadvantaging observers of the innermost planet.
 - Engage with Goldstone and Green Bank Telescope, to ensure that there are equitable opportunities for planetary science observations, particularly now that Arecibo is no longer an option.
 - Allow observers to obtain letters of endorsement from NASA for Mercury observations in support of the BepiColombo mission during the upcoming flybys and orbital mission.

Decadal Survey – Highlighted Recommendations

- R&A constitute 10% of PSD budget.
- Technology be 6–8 % of PSD budget.
- New NF concepts due to new discoveries be evaluated before NF-7.^a
- Plutonium-238 needs be evaluated against mission portfolio and increased as needed.^a
- Expanding support for ground-based telescope observations and planetary astronomers.^a
- Reviewing current radar infrastructure to meet community needs, including replacing capabilities lost with Arecibo.^a

MExAG

^a MExAG has presented findings to the PAC in 2021 & 2022 consistent with these recommendations.