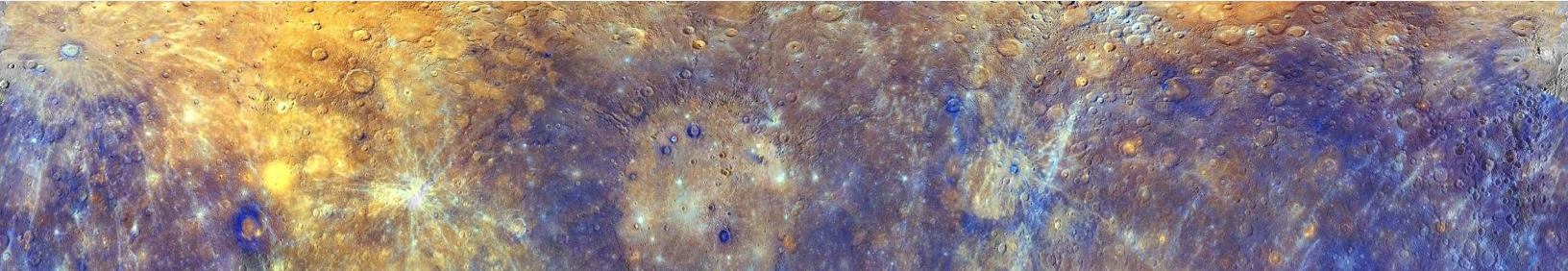


# The MERCURY NEWSLETTER

by the Mercury Exploration Assessment Group (MExAG)



## TABLE OF CONTENTS

### THIRD ANNUAL MEXAG MEETING DEBRIEF

### MERCURY SCIENCE and EXPLORATION NEWS


### MERCURY EARLY CAREER SPOTLIGHT


### UPCOMING MEETINGS with MERCURY-RELATED CONTENT

### RECENT MERCURY-RELATED PUBLICATIONS


## STAY IN THE LOOP

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

 @ExploreMercury

 MExAG list-serv:

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

 Community forum:

[mercury-planet-list@googlegroups.com](mailto:mercury-planet-list@googlegroups.com)

## KEEP US IN THE LOOP

Please send Mercury community announcements and calendar items for inclusion in our next quarterly newsletter to [mexag.sc@gmail.com](mailto:mexag.sc@gmail.com).

## THIRD ANNUAL MEXAG MEETING DEBRIEF

The third Annual Meeting of the MExAG took place virtually over 1-3 February 2023 and was a wonderful success!

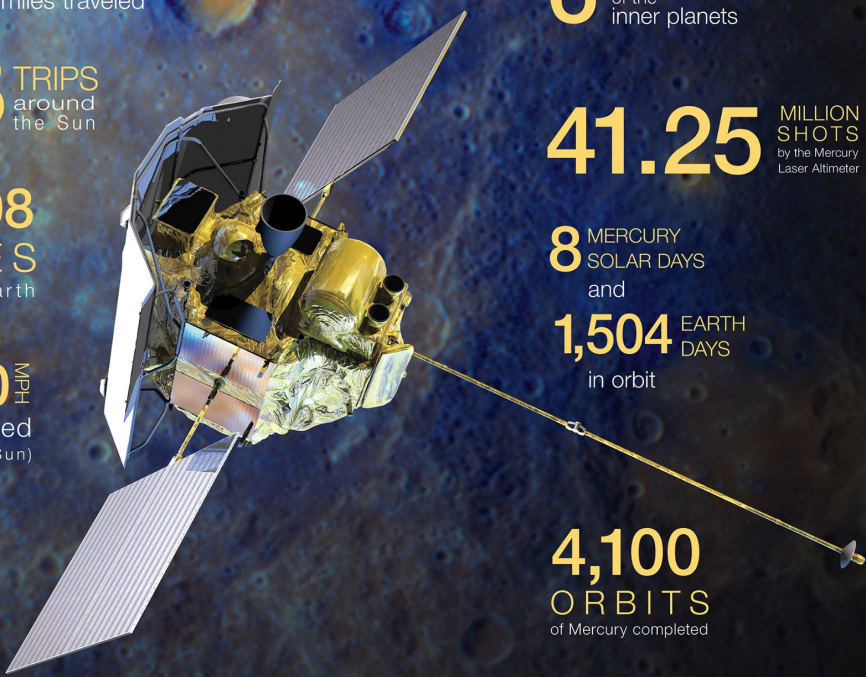
- By the numbers:
  - **146 registered participants**
  - **22 science, technology, and community oral presentations**
  - **19 poster presentations:**  
<https://www.hou.usra.edu/meetings/mexag2023/eposterindex.cfm>
  - **>600 hours of shared Mercury science, community, and technology engagement**
- The Annual Meeting heard updates from the NASA Planetary Science Division; the *Origins, Worlds, and Life* Decadal Survey; the Inclusion, Diversity, Equity, and Accessibility (IDEA) Working Group; and the BepiColombo mission.
- The community discussed technological updates, mission concepts, and community priorities. The Steering Committee is working to distill these conversations.
- Findings from the meeting will be presented to the NASA Planetary Advisory Committee on 1 March and will be uploaded to the [MExAG website](#).

A massive thank you to all of our invited speakers, presenters, and participants! This meeting would not have been possible without the support and interest of the incredible Mercury community or without the hard work and organization from LPI and the MExAG Steering Committee. We are already looking forward to MExAG24!

## MERCURY SCIENCE and EXPLORATION NEWS

- NASA is planning a two-day symposium in early 2024 to celebrate the anniversaries of the Discovery (30<sup>th</sup> anniversary) and New Frontiers (20<sup>th</sup> anniversary) programs.
  - NASA welcomes submissions for papers due by 1 May 2023.
  - [More information can be found here.](#)
  - Below are some of the accomplishments of the Discovery-class MESSENGER mission, launched nearly twenty years ago in 2004.
- The MExAG Steering Committee has adopted a new process for selecting Chairs and Vice Chairs, which clarifies the expectations of the Vice Chair and Chair roles at the end of their respective tenures. The document is [available at this link.](#)
- Applications will be solicited in late April for multiple Steering Committee positions with nominal three-year terms starting in July 2023. The Steering Committee serves the MExAG community through the organization of community meetings, documents outlining scientific and exploration goals of the community, and community findings to be presented to NASA.

### MESSENGER: BY THE NUMBERS



**8.73** BILLION  
miles traveled

**32.5** TRIPS  
around the Sun

**291,008**  
IMAGES  
returned to Earth

**91,730** MPH  
average speed  
(relative to the Sun)

**0** MILES  
from the surface  
at closest approach




**10** TERABYTES  
of science data  
publicly released

**6** FLYBYS  
of the inner planets

**41.25** MILLION  
SHOTS  
by the Mercury Laser Altimeter

**8** MERCURY SOLAR DAYS  
and  
**1,504** EARTH DAYS  
in orbit

**4,100** ORBITS  
of Mercury completed

MESSENGER was selected as the 7th Discovery Program mission in July 1999.

MESSENGER's in situ and remote measurements revolutionized our understanding of the innermost planet and its space environment as well as advanced science of Venus and the inner heliosphere.

Although the mission ended with planetary impact in 2015, NASA continues to support analysis of MESSENGER data through grant programs such as the [Discovery Data Analysis Program \(DDAP\)](#).

*Credit: NASA/Johns Hopkins University*

## MERCURY EARLY CAREER SPOTLIGHT



**Allison Glantzberg**  
Early Career Scientist  
Johns Hopkins  
University Applied  
Physics Laboratory,  
USA

Allison analyzes MESSENGER data to search for evidence for water ice and volatile organic compounds at the surface of Mercury's largest northernmost craters.

[orcid.org/0000-0002-1929-8105](https://orcid.org/0000-0002-1929-8105)



**Patrick Lierle**  
PhD Student  
Center for Space  
Physics  
Boston University,  
USA

Patrick uses ground-based spectroscopy to generate full-disk maps of Mercury's exosphere and constrain the temperatures of alkali metals.

[scholar.google.com/citations?user=k0l9mo4AAAAJ&hl=en&oi=ao](https://scholar.google.com/citations?user=k0l9mo4AAAAJ&hl=en&oi=ao)



**Austin Glass**  
Post-doc  
Climate and Space  
Sciences and Engineering  
University of Michigan,  
USA

Austin conducts research into ion and magnetospheric dynamics in Mercury's near-space environment, including those of the plasma sheet horns and Na<sup>+</sup>.

[linkedin.com/in/austin-glass-b8a9a4171/](https://linkedin.com/in/austin-glass-b8a9a4171/)

If you would like to be highlighted in our Spotlight, or know of an Early Career Researcher focusing on Mercury science and/or exploration, please email us at [mexag.sc@gmail.com](mailto:mexag.sc@gmail.com).

## UPCOMING MEETINGS with MERCURY-RELATED CONTENT

### 54th Lunar and Planetary Science Conference

<https://www.hou.usra.edu/meetings/lpsc2023/>

13–17 March 2023

Hybrid: Virtual + The Woodlands, TX, USA

Registration open and [program available](#).

Don't miss Mercury-focused sessions:

#### Mercury

<a href="#">[W501] Poster (virtual)</a>	Wednesday	15 March, 18:30 CST
<a href="#">[R701] Poster (live)</a>	Thursday	16 March, 18:30 CST
<a href="#">[F802] Oral (live/virtual)</a>	Friday	17 March, 8:20–11:25 CST

Additional sessions with one or more Mercury-focused presentations include:

[\[M106\]](#), [\[T255\]](#), [\[T309\]](#), [\[T321\]](#), [\[T330\]](#), [\[T322\]](#), [\[W527\]](#), [\[R730\]](#)

### EGU 2023 General Assembly

<https://www.egu23.eu/>

23–28 April 2023 (Hybrid: Virtual + Vienna, Austria)

Registration open

### PI Launchpad Workshop 2023

[Applications via NSPIRES](#)

24–27 July 2023 (Ann Arbor, MI, USA)

Applications due 14 April

### AOGS2023

<https://www.asiaoceania.org/aogs2023>

30 July to 04 August (Singapore)

Abstracts due 21 February

### DPS-EPSC2023 Joint Meeting

<https://aas.org/meetings/dps55>

1–6 October

Hybrid: Virtual + San Antonio, TX, USA

### AGU Fall Meeting 2023

<https://www.agu.org/Fall-Meeting>

11–15 December

Hybrid: Virtual + San Francisco, CA, USA

## RECENT MERCURY-RELATED PUBLICATIONS

View full list at <https://www.lpi.usra.edu/mexag/publications/>

### 2023 (as of Feb)

- Alberti, T., Sun, W., Varsani, A., Heyner, D., Orsini, S., et al., (2023), **High-energy particle enhancements in the solar wind upstream Mercury during the first BepiColombo flyby: SERENA/PICAM and MPO-MAG observations**, *Astronomy & Astrophysics* 669. <https://doi.org/10.1051/0004-6361/202244662>.
- Bertone, S., Mazarico, E., Barker, M. K., Siegler, M. A., Martinez-Camacho, J. M., Hamill, C. D., Glantzberg, A. K., & Chabot, N. L., (2023), **Highly Resolved Topography and Illumination at Mercury's South Pole from MESSENGER MDIS NAC**, *The Planetary Science Journal*, 4, 21. <https://doi.org/10.3847/PSJ/acaddb>.
- Bott, N., Brunetto, R., Doressoundiram, A., Carli, C., Capaccioni, F., et al., (2023), **Effects of Temperature on Visible and Infrared Spectra of Mercury Minerals Analogues**, *Minerals* 13, 2. <https://doi.org/10.3390/min13020250>.
- Clement, M. S., Chambers, J. E., Kaib, N. A., Raymond, S. N., & Jackson, A. P., (2023), **Mercury's formation within the early instability scenario**, *Icarus* 394, 115445. <https://doi.org/10.1016/j.icarus.2023.115445>.
- Davis, E. E., Winslow, R. M., & Lawrence, D. J., (2023), **Characterizing Interplanetary Coronal Mass Ejection-related Forbush Decreases at Mercury Using MESSENGER Observations: Identification of a One- or Two-step Structure**, *The Astrophysical Journal* 943, 83. <https://doi.org/10.3847/1538-4357/acaca1>.
- Genova, A., Goossens, S., Del Vecchio, E., Petricca, F., Beuthe, M., Wieczorek, M., et al., (2023), **Regional variations of Mercury's crustal density and porosity from MESSENGER gravity data**, *Icarus* 391, 115332. <https://doi.org/10.1016/j.icarus.2022.115332>.
- Gläser, P., & Oberst, J., (2023), **Modeling the thermal environment of Mercury's north pole using MLA. Implications for locations of water ice**, *Icarus* 391, 115349. <https://doi.org/10.1016/j.icarus.2022.115349>.
- Iacovino, K., McCubbin, F. M., Vander Kaaden, K. E., Clark, J., Wittmann, A., Jakubek, R. S., et al., (2023), **Carbon as a key driver of super-reduced explosive volcanism on Mercury: Evidence from graphite-melt smelting experiments**, *Earth and Planetary Science Letters* 602, 117908. <https://doi.org/10.1016/j.epsl.2022.117908>.
- Munaretto, G., Lucchetti, A., Pajola, M., Cremonese, G., & Massironi, M., (2023), **Assessing the spectrophotometric properties of Mercury's hollows through multiangular MESSENGER/MDIS observations**, *Icarus* 389, 115284. <https://doi.org/10.1016/j.icarus.2022.115284>.
- Mura, A., Plainaki, C., Milillo, A., Mangano, V., Alberti, T., Massetti, S., et al., (2023), **The yearly variability of the sodium exosphere of Mercury: A toy model**, *Icarus* 394, 115441. <https://doi.org/10.1016/j.icarus.2023.115441>.
- Pokorny, P., Deutsch, A.N., Kuchner, M. J., (2023), **Mercury's circumsolar dust ring as an imprint of a recent impact**, *The Planetary Science Journal* 4, 33. <https://doi.org/10.3847/PSJ/acb52e>.
- Saha, P., & Mukherjee, G. D., (2023), **Thermal conductivity of iron and nickel during melting: Implication to the planetary liquid outer core**, *Pramana* 97, 1. <https://doi.org/10.1007/s12043-022-02471-3>.
- Teolis, B., Sarantos, M., Schorghofer, N. et al., (2023), **Surface Exospheric Interactions**, *Space Sci Rev* 219, 4. <https://doi.org/10.1007/s11214-023-00951-5>.
- Zomerdijk-Russell, S., Masters, A., Korth, H., & Heyner, D. (2023), **Modeling the time-dependent magnetic fields that BepiColombo will use to probe down into Mercury's mantle**, *Geophysical Research Letters* 50, e2022GL101607. <https://doi.org/10.1029/2022GL101607>.

# RECENT MERCURY-RELATED PUBLICATIONS

## 2022 (since Nov)

- Biber, H., Brötzner, J., Jäggi, N., Szabo, P. S., Pichler, J., Cupak, C., et al., (2022), **Sputtering Behavior of Rough, Polycrystalline Mercury Analogs**, *Planet. Sci. J.* 3, 271.  
<https://doi.org/10.3847/PSJ/aca402>.
- Glass, A. N., Raines, J. M., Jia, X., Sun, W., Imber, S., Dewey, R. M., & Slavin, J. A., (2022), **Observations of Mercury's Plasma Sheet Horn: Characterization and Contribution to Proton Precipitation**, *Journal of Geophysical Research: Space Physics*. <https://doi.org/10.1029/2022JA030969>.
- Guervilly, C., (2022), **Fingering Convection in the Stably Stratified Layers of Planetary Cores**, *Journal of Geophysical Research: Planets* 127, 11. <https://doi.org/10.1029/2022JE007350>.
- He, P., Xu, X., Yu, H., Wang, X., et al., (2022), **The Mercury's Bow-shock Models Near Perihelion and Aphelion**, *The Astronomical Journal* 164, 6. <https://doi.org/10.3847/1538-3881/ac9d89>.
- Kallio, E., Jarvinen, R., Massetti, S., Alberti, T., Milillo, A., Orsini, S., et al., (2022), **Ultra-low frequency waves in the Hermean magnetosphere: On the role of the morphology of the magnetic field and the foreshock**, *Geophysical Research Letters* 49, e2022GL101850.  
<https://doi.org/10.1029/2022GL101850>.
- Killen, R. M., Vervack Jr., R. J., & Burger, M. H., (2022), **Updated Photon Scattering Coefficients (g<sub>g</sub> values) for Mercury's Exospheric Species**, *The Astrophysical Journal Supplement Series* 263, 2. <https://doi.org/10.3847/1538-4365/ac9eab>.
- Kozyrev, A. S., Benkhoff, J., Litvak, M. L., Golovin, D. V., Quarati, F., & Sanin, A. B., (2022), **Localization of cosmic gamma-ray bursts in interplanetary space with MGNS/BepiColombo and HEND/Mars Odyssey experiments**, *Planetary and Space Science* 224.  
<https://doi.org/10.1016/j.pss.2022.105594>.
- Orsini, S., Milillo, A., Lichtenegger, H., Varsani, A., Barabash, S., et al., (2022), **Inner southern magnetosphere observation of Mercury via SERENA ion sensors in BepiColombo mission**, *Nature Communications* 13. <https://doi.org/10.1038/s41467-022-34988-x>.
- Pease, A., & Li, J., (2022), **Liquidus determination of the Fe-S and (Fe, Ni)-S systems at 14 and 24 GPa: Implications for the Mercurian core**, *Earth and Planetary Science Letters* 599.  
<https://doi.org/10.1016/j.epsl.2022.117865>.
- Romanelli, N., DiBraccio, G. A., Slavin, J., Bowers, C., & Weber, T., (2022), **The Search for Magnetotail Twisting at Mercury: Comparing MESSENGER Observations With the Terrestrial Case**, *Geophysical Research Letters* 49, 24. <https://doi.org/10.1029/2022GL101643>.
- Schmid, D., Narita, Y., Plaschke, F., Volwerk, M., Nakamura, R., et al., (2022), **Solar-wind-dependent streamline model for Mercury's magnetosheath. A hydrodynamic magnetosheath model for Mercury**, *Astronomy & Astrophysics* 668. <https://doi.org/10.1051/0004-6361/202245008>.
- Wang, Y., Xiao, Z., Xu, R., Xiao, Z., & Cui, J., (2022), **Dark spots on Mercury show no signs of weathering during 30 Earth months**, *Commun. Earth Environ.* 3, 299.  
<https://doi.org/10.1038/s43247-022-00634-z>.
- Yahalom, A., (2022), **The Weak Field Approximation of General Relativity and the Problem of Precession of the Perihelion for Mercury**, *Symmetry* 15, 1. <https://doi.org/10.3390/sym15010039>.

### Additional Mercury Publications?

Let us know! Send a note to [mexag.sc@gmail.com](mailto:mexag.sc@gmail.com) for inclusion in our quarterly newsletter.