The MERCURY NEWSLETTER

by the Mercury Exploration Assessment Group (MExAG)



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STAY IN THE LOOP

- https://www.lpi.usra.edu/mexag/
- **y** @ExploreMercury
- MEXAG list-serv:

https://www.lpi.usra.edu/mexaq/iofi/

Community forum:

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.

FOURTH ANNUAL MEXAG MEETING DEBRIEF

The fourth Annual Meeting of the MExAG took place virtually over 6-8 February 2024 and was a wonderful success!

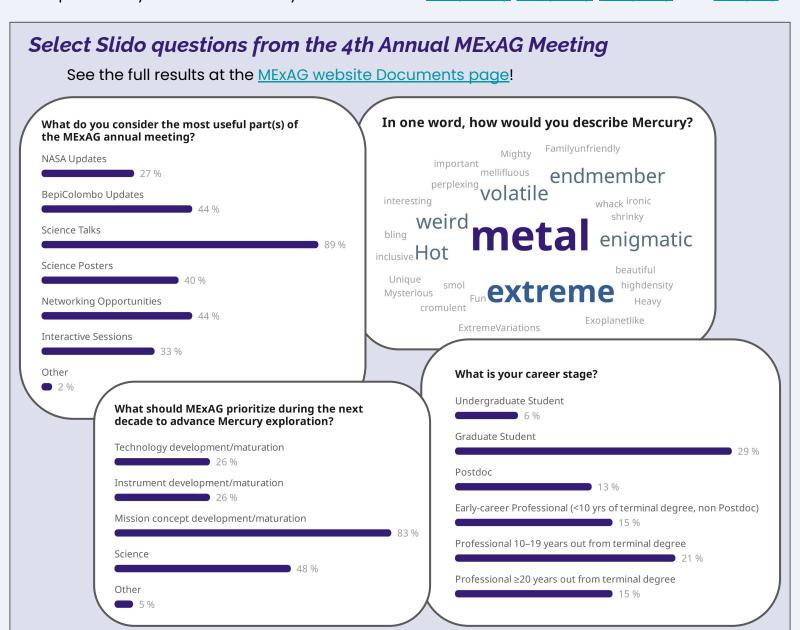
- By the numbers:
 - 207 registered participants
 - o 24 science, technology, and community talks
 - 20 poster presentations <u>available here at the</u> meeting website.
 - 690 hours of shared Mercury science,
 community, and technology engagement –
 nearly a third of a Mercury year!
- The Annual Meeting heard updates from the NASA Planetary Science Division, including on Open Science and the Planetary Data Ecosystem, as well as from the BepiColombo mission.
- The community discussed future observations below, at, and above the surface. The Steering Committee is working to distill these conversations.
- Slido collected community input on future priorities for MEXAG. Select questions are presented below, and the full results on the <u>MEXAG website Documents page</u>.
- Findings from the meeting were presented to the NASA Planetary Advisory Committee and are uploaded to the MEXAG website Documents page.

A massive thank you to all presenters and participants! This meeting would not have been possible without the support and interest of the Mercury community or without the hard work and organization from LPI and the MExAG Steering Committee. We are already looking forward to MExAG25!

MERCURY SCIENCE and EXPLORATION NEWS

• The Mercury 2024 meeting, which will be held 4–7 June 2024 in Japan, is the third meeting in the Mercury series, which began in 2018 and continued in 2022. The meeting will cover all scientific aspects of the planet Mercury, and the timing was chosen to be between JpGU and the BepiColombo Science Working Team #23 to enable participation in multiple meetings.

- MEXAG will begin advertising Mercury-related job opportunities submitted by the community in the MEXAG newsletter, listserv, and Twitter! <u>Fill out this form</u> to submit an advertisement.
- Applications will be solicited in late April for multiple Steering Committee positions, with nominal three-year terms, starting in July 2024. 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.
- NASA's Science Mission Directorate has released <u>ROSES 2024!</u> Planetary programs that are particularly relevant to Mercury science include <u>C.11 (DDAP)</u>, <u>C.3 (SSW)</u>, <u>C.6 (SSO)</u>, and <u>C.2 (EW)</u>.



MERCURY EARLY CAREER SPOTLIGHT



Sophia Zomerdijk-Russell

PhD Student
Department of Physics, Imperial College London, United Kingdom
Google Scholar, ORCID, LinkedIn, @SophiaZ_R on Twitter

Sophia investigates how Mercury's dayside magnetosphere is influenced by external factors, and how BepiColombo could probe Mercury's interior with electromagnetic induction techniques.



Stephan Loveless

PhD Candidate
Department of Geology, University of Georgia, GA, USA
Gooale Scholar, LinkedIn, Website

Stephan's work consists of modeling the subsurface fault architecture of shortening landforms on Mercury and assessing the planet's deformation at a global scale due to planetary contraction.



Emma Caminiti

PhD Student LESIA, Paris Observatory, France LinkedIn, ORCID

Emma combines data analysis from MESSENGER/MASCS and experimental work to better understand the spectral properties and evolution of the surface of Mercury.

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 <a href="mailto:mexags:me

UPCOMING MEETINGS with MERCURY-RELATED CONTENT

<u>55th Lunar and Planetary Science Conference</u>

11-15 March 2024 (Virtual + The Woodlands, TX)

Don't miss these Mercury-focused sessions:

Mercury: Science from the Innermost Planet (Oral)

Mercury: Science from the Innermost Planet (Poster)

Mercury: Science from the Innermost Planet (Virtual poster)

Tuesday

12 March, 09:55 CST

Tuesday

12 March, 18:30 CST

Wednesday

13 March, 18:30 CST

MExAG is organizing a meetup at <u>Grogan's Mill on Tuesday, 12 March, 12:00-13:00 CST</u> – don't miss out!

EGU 2024 General Assembly	14-19 April 2024 (Vienna, Austria)
Japan Geoscience Union Meeting 2024	26-31 May 2024 (Virtual + Chiba, Japan)
Mercury 2024 Abstract deadline expected early/mid April	4-7 June 2024 (Kyoto, Japan)
AOGS2024	23-28 June 2024 (Pyeongchang, South Korea)
Europlanet Science Conference 2024 Abstracts due 15 May	8-13 September 2024 (Berlin, Germany)

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RECENT MERCURY-RELATED PUBLICATIONS

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

2024 (as of February, new additions highlighted)

- Andolfo, S., Genova, A., & Del Vecchio, E. (2024), **Precise Orbit Determination of the MESSENGER Spacecraft**, Journal of Guidance, Control, and Dynamics, 47. https://doi.org/10.2514/1.G007690.
- Beddingfield, C. B., Crane, K., Klimczak, C., & Cartwright, R. (2024), Mercury's Lobate Scarps Reveal that Polygonal Impact Craters Form on Contractional Structures, The Planetary Science Journal, 5, 52. https://doi.org/10.3847/PSJ/adlfff.
- Carli, C., Ferrari, S., Maturilli, A., Serventi, G., Sgavetti, M., et al. (2024), Laboratory Emissivity Spectra of Sulphide-Bearing Samples, New Constraints for the Surface of Mercury: Oldhamite in Mafic Aggregates, Minerals, 14, 62. https://doi.org/10.3390/min14010062.
- Christou, A. A., Egal, A., & Georgakarakos, N. (2024), **The Taurid Resonant Swarm at Mercury**, Monthly Notices of the Royal Astronomical Society, 527, 4834. https://doi.org/10.1093/mnras/stad3516.
- Connell, S. A., Applin, D. M., Turenne, N. N., Cloutis, E. A., Kiddell, C., et al. (2024), **The Iris CubeSat mission: Science payload description for a pathfinder geological space weathering investigation**, Acta Astronautica, 216, 381. https://doi.org/10.1016/j.actaastro.2024.01.009.
- Deutsch, A. N., Neumann, G. A., Kreslavsky, M. A., Pokorný, P., Martinez Camacho, J. M., Trang, D., Izenberg, N. R., Denevi, B. W., Galiano, A., & Filacchione, G. (2024), Temperature-related Variations of 1064 nm Surface Reflectance on Mercury: Implications for Space Weathering, The Planetary Science Journal, 5, 8. https://doi.org/10.3847/PSJ/ad0e6d.
- Fränz, M., Rojo, M., Cornet, T., Hadid, L. Z., Saito, Y., et al. (2024), **Spacecraft Outgassing Observed by the BepiColombo Ion Spectrometers**, Journal of Geophysical Research (Space Physics), 129, e2023JA032044. https://doi.org/10.1029/2023JA032044.
- Krüger, H., Thompson, M. S., Kobayashi, M., Mangano, V., Moroni, M., et al. (2024), **Understanding the Dust Environment at Mercury: From Surface to Exosphere**, The Planetary Science Journal, 5, 36. https://doi.org/10.3847/PSJ/ad11f5.
- Lai, S. H., Yang, Y.-H., & Ip, W.-H. (2024), Magnetohydrodynamic Perspective on the Disappearance of Mercury's Bow Shock by Helios Data Exploration, The Astrophysical Journal, 961, 83. https://doi.org/10.3847/1538-4357/ad0a8a.
- Nevsky, D., Lavrukhin, A., & Alexeev, I. (2024), Mercury's Bow Shock and Magnetopause Variations According to MESSENGER Data, Universe, 10, 40. https://doi.org/10.3390/universe10010040.
- Raymond, S. N., Kaib, N. A., Selsis, F., & Bouy, H. (2024), **Future trajectories of the Solar System:** dynamical simulations of stellar encounters within 100 au, Monthly Notices of the Royal Astronomical Society, 527, 6126. https://doi.org/10.1093/mnras/stad3604.
- Teubenbacher, D., Exner, W., Feyerabend, M., Narita, Y., Schmid, D., et al. (2024), **Solar wind entry into Mercury's magnetosphere: Simulation results for the second swingby of BepiColombo**, Astronomy and Astrophysics, 681, A98. https://doi.org/10.1051/0004-6361/202347789.
- Wright, J., Zambon, F., Carli, C., Altieri, F., Pöhler, C. M., et al. (2024), **A geostratigraphic map of the Rachmaninoff basin area: Integrating morphostratigraphic and spectral units on Mercury**, Earth Space Sci. 11, e2023EA003258. https://doi.org/10.1029/2023EA003258.
- Xu, R., Xiao, Z., Wang, Y., & Cui, J. (2024), Less than one weight percent of graphite on the surface of Mercury, Nature Astronomy,. https://doi.org/10.1038/s41550-023-02169-5.
- Yazıcı, I. S., Cheng, H. C. J., Crane, K. T., & Klimczak, C. (2024), **Straight impact crater rim segments on Mercury**, Journal of Maps, 20, 2308687. https://doi.org/10.1080/17445647.2024.2308687.
- Zhong, J., Xie, L., Lee, L.-C., Slavin, J. A., Raines, J. M., Dewey, R. M., Ip, W.-H., Saito, Y., & Wei, Y. (2024), North-South Plasma Asymmetry Across Mercury's Near-Tail Current Sheet, Geophysical Research Letters, 51, e2023GL106266. https://doi.org/10.1029/2023GL106266.

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RECENT MERCURY-RELATED PUBLICATIONS

2023 (since November, new additions highlighted)

- Buoninfante, S., Milano, M., Negri, B., Plainaki, C., Sindoni, G., & Fedi, M. (2023), **Gravity evidence for a heterogeneous crust of Mercury**, Scientific Reports, 13, 19854. https://doi.org/10.1038/s41598-023-46081-4.
- Guo, J., Lu, S., Lu, Q., Slavin, J. A., Sun, W., Ren, J., Wang, X., Lin, Y., Hajra, R., & Wang, R. (2023), Three-Dimensional Global Hybrid Simulations of Mercury's Disappearing Dayside Magnetosphere, Journal of Geophysical Research (Planets), 128, e2023JE008032. https://doi.org/10.1029/2023JE008032.
- Leblanc, F., Sarantos, M., Domingue, D., Milillo, A., Savin, D. W., Prem, P., Benkhoff, J., Zender, J., Galli, A., Murakami, G., Sasaki, S., Thompson, M., & Raines, J. (2023), **How Does the Thermal Environment Affect the Exosphere/Surface Interface at Mercury?**, The Planetary Science Journal, 4, 227. https://doi.org/10.3847/PSJ/ad07da.
- Pisello, A., Bisolfati, M., Poggiali, G., Tolomei, P., Braschi, E., Brucato, J. R., & Perugini, D. (2023), Mid-Infrared (MIR) Spectroscopy of Silicate Glasses as Analogs for Mercury's Surface: The Influence of Grain Size, Minerals, 13, 170. https://doi.org/10.3390/min13020170.
- Pommier, A., Tauber, M. J., Pirotte, H., Cody, G. D., Steele, A., Bullock, E. S., Charlier, B., & Mysen, B. O. (2023), **Experimental investigation of the bonding of sulfur in highly reduced silicate glasses and melts**, Geochimica et Cosmochimica Acta, 363, 114. https://doi.org/10.1016/j.gca.2023.10.027.
- Renggli, C. J., Stojic, A. N., Morlok, A., Berndt, J., Weber, I., Klemme, S., & Hiesinger, H. (2023), Mid-Infrared Spectroscopy of Sulfidation Reaction Products and Implications for Sulfur on Mercury, Journal of Geophysical Research (Planets), 128, e2023JE007895. https://doi.org/10.1029/2023JE00789510.22541/essoar.168394756.67443674/v1.
- Robidel, R., Quémerais, E., Chaufray, J. Y., Koutroumpa, D., Leblanc, F., Reberac, A., Yoshikawa, I., Yoshioka, K., Murakami, G., Korablev, O., Belyaev, D., Pelizzo, M. G., & Corso, A. J. (2023), Mercury's Exosphere as Seen by BepiColombo/PHEBUS Visible Channels During the First Two Flybys, Journal of Geophysical Research (Planets), 128, e2023JE007808. https://doi.org/10.1029/2023JE007808.
- Rodriguez, J. A. P., Domingue, D., Travis, B., Kargel, J. S., Abramov, O., Zarroca, M., Banks, M. E., Weirich, J., Lopez, A., Castle, N., Jianguo, Y., & Chuang, F. (2023), Mercury's Hidden Past: Revealing a Volatile-dominated Layer through Glacier-like Features and Chaotic Terrains, The Planetary Science Journal, 4, 219. https://doi.org/10.3847/PSJ/acf219.
- Stepanova, I. E., Yagola, A. G., Lukyanenko, D. V., & Kolotov, I. I. (2023), **On Constructing Analytical Models of the Magnetic Field of Mercury from Satellite Data**, Izvestiya Physics of the Solid Earth, 59, 979. https://doi.org/10.1134/S1069351323060216.
- Suzuki, Y., Yoshioka, K., Murakami, G., & Yoshikawa, I. (2023), **The relation between the surface composition anomaly and distribution of the exosphere of Mercury**, Earth, Planets and Space, 75, 174. https://doi.org/10.1186/s40623-023-01929-x.

Additional Mercury Publications?

Let us know! Send a note to mexag.sc@gmail.com for inclusion in our quarterly newsletter.