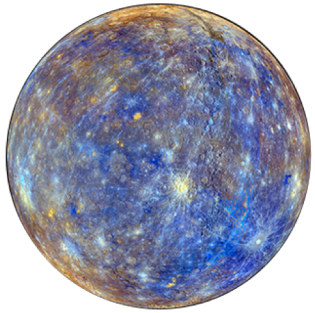


Mercury Exploration Analysis Group (MExAG?)

Presenter: Carolyn Ernst (JHU/APL)

Mercury Community Recent Activity

- Mercury Science Email Listserv now has 141 subscribers
- *Ad hoc* committee was formed in July 2019 to engage the Mercury community
  - Coordinated Mercury community input to produce 9-page report to NASA on high-priority science questions for the Decadal Survey (next slide)
  - Helped to draft a Terms of Reference for an official Mercury AG

- Ad hoc team members
  - Steven A. Hauck, II (CWRU), point of contact
  - David Blewett (JHU/APL)
  - Paul Byrne (NCSU)
  - Nancy Chabot (JHU/APL)
  - Carolyn Ernst (JHU/APL)
  - Catherine Johnson (PSI/UBC)
  - Jim Raines (UMich)
  - Kathleen Vander Kaaden (Jacobs/JSC)
  - Ron Vervack (JHU/APL)

MExAG High-Priority Science Questions

- How did Mercury form?
- How did Mercury differentiate and acquire its interior structure?
- What is the history of Mercury's magnetic field and its generation?
- How do Mercury's surface and interior reflect the evolution of the planet?
- What is the nature of the complex interactions among Mercury's external drivers and the planet's magnetosphere, exosphere, surface, and interior?
- What is the origin, history, and inventory of Mercury's volatiles?

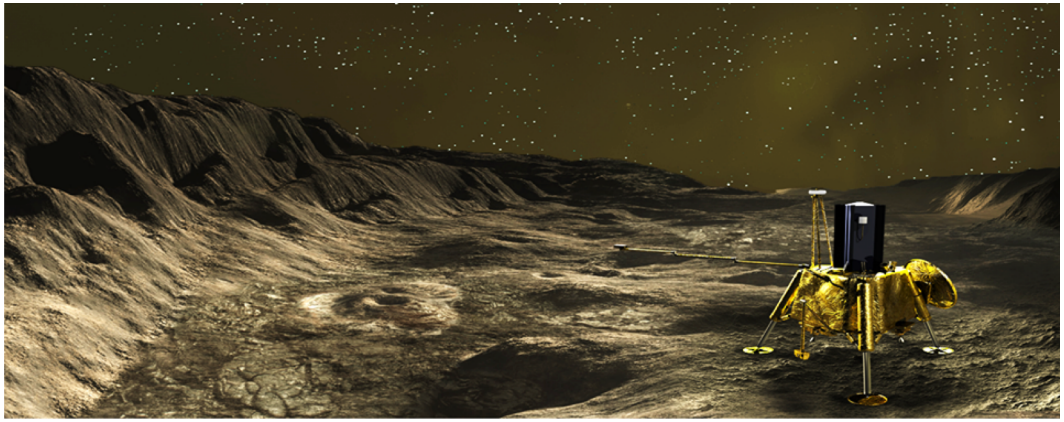
Decadal Support – Soliciting White Papers from the Community

Title	Description	Authorship	Contact
Mercury's Low Reflectance Material - Evidence for Graphite Flotation in a Magma Ocean?	This white paper will identify the unique scientific opportunity to understand planetary evolution by investigating Mercury's low reflectance material.	R. Klima, C. Ernst, N. Chabot, K. Vander Kaaden, S. Besse, M. Fries	Rachel Klima (Rachel.Klima@jhuapl.edu)
Sample Return from Mercury	This paper will discuss the importance of future exploration of Mercury with the ultimate goal being the return of a sample to Earth for laboratory based analyses.	K. Vander Kaaden, F. M. McCubbin, P.K. Byrne, N.L. Chabot, C.M. Ernst, C.I. Johnson, M.S. Thompson	Kathleen E. Vander Kaaden (kathleen.e.vanderkaaden@nasa.gov)
Science Opportunities from Mercury's Ice-bearing Polar Deposits	Mercury's polar deposits offer a unique opportunity to study organics and water ice in the inner Solar System. In this paper, we will discuss the compelling science related to polar ice on Mercury, and outline key next steps in addressing important outstanding science questions.	N. Deutsch, N. L. Chabot, I. Varatharajan, C. Ernst, and any other interested parties	Ariel Deutsch (ariel_deutsch@brown.edu)
The Case for Landed Mercury Science	In this white paper, we detail outstanding questions related to several aspects of Mercury's character and evolution that can be addressed either more fully, or uniquely, by a landed mission. We discuss major outstanding questions of Mercury science that encompass five categories, and suggest how they might be addressed.	P. K. Byrne, D. T. Blewett, N. L. Chabot, S. A. Hauck, E. Mazarico, and K. E. Vander Kaaden	Paul Byrne (paul.byrne@ncsu.edu)

Upcoming Mercury-related Events

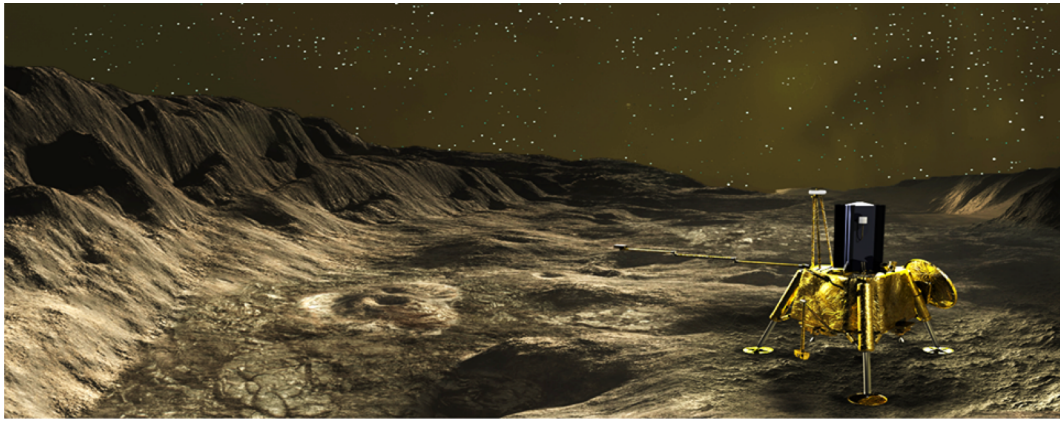
- LPSC 2020 (Canceled)
  - Wednesday (3/18/20), 12–1:15 PM, Waterway 1–3
    - Forum to discuss Mercury exploration, share ideas, and develop collaborations, as well as determine how best to represent Mercury in the upcoming Planetary Decadal Survey
  - Thursday (3/19/20), 6:00 PM, Poster Hall
    - Poster Session: Mercury - The little planet with a BIG personality!
  - Friday (3/20/20), 8:30 AM, Montgomery Ballroom
    - Oral Session: Mercury - The little planet with a BIG personality!
- Mercury 2020
  - From MESSENGER to BepiColombo
  - 2–4 June 2020
  - Orleans, France
  - Registration already capped at 121
  - 7 requests on the waitlist

Mercury Lander Mission Concept Study (1/2)



- PI: Carolyn Ernst (APL)
- DPI: Nancy Chabot (APL); PS: Rachel Klima (APL)
- Design lab lead: Sanae Kubota (APL)
- Interdisciplinary science team with diverse experience spanning Mercury science, instrument development, and mission design and operations
- Concept was shared with and inputs solicited from the Mercury listserv and the Mercury community at large
- Proposal has been made available to the public here
- Initial planning of payload, trajectory, propulsion, mechanical, thermal, etc… are well underway

Mercury Lander Mission Concept Study (2/2)



- Look ahead:
  - Will present status update at Planetary mission Concept Studies Workshop ~~on 3/15/20 prior to the start of LPSC~~ at a virtual workshop to be scheduled, possibly in April.
  - Two abstracts submitted to LPSC
    - A Mercury Lander Mission Concept Study for the Decadal Survey (Ernst et al.)
    - Geochemical Advances in Mercury Science Facilitated by a Landed Mission (Vander Kaaden et al.)
  - ACE Lab engineering design run will take place at APL on 23–27 March, in conjunction with a science team meeting (mix of in-person and WebEx to accommodate canceled travel plans)
  - On compressed schedule, final report due 30 June 2020

Questions for the PAC

The Mercury community appreciates the previous PAC findings supporting the creation of a Mercury AG.

- ➢ What is the timeframe for its creation and an inaugural meeting?

The Mercury community was happy to see such a strong response to the BepiColombo Participating Scientist opportunity in ROSES 2019.

- 1/19 (5%) US-based IDS proposals selected
- 2/28 (7%) US-based GI proposals selected
- ➢ Will there be a future solicitation opportunity for US-based scientists to participate in BepiColombo after these first 3-year appointments?
- ➢ Will there be a way to support a higher participation rate?

URLs

Slide 2 (Report on high-priority science questions):
https://www.lpi.usra.edu/NASA-academies-resources/Mercury-high-priority-questions_final.pdf

Slide 4 (White papers): https://www.lpi.usra.edu/decadal_whitepaper_proposals/#me

Slide 5 (Mercury 2020 meeting):
https://mercury2020.ias.u-psud.fr/main_1st.php

Slide 6 (Mercury Lander Mission Concept Study):
http://lib.jhuapl.edu/papers/mercury-lander/

Slide 7 (Mercury Lander LPSC):
Ernst et al. https://www.hou.usra.edu/meetings/lpsc2020/pdf/1550.pdf
Vander Kaaden et al. https://www.hou.usra.edu/meetings/lpsc2020/pdf/1072.pdf