

SPACE STUDIES BOARD

*Committee on Astrobiology and Planetary Science*

**CAPS Report to the Space Studies Board**

*Fall Virtual Meeting  
November. 14th, 2021*

A personal view by  
Christopher H. House and Martha S. Gilmore,  
Co-Chairs



# Standards of Evidence for Life Detection Workshop

(Organized by NEXUS & NFOLD Research Coordination Networks)

Virtual Workshop Monday, July 19<sup>nd</sup> to Thursday, July 22<sup>nd</sup>

- Co-chairs: Victoria Meadows and Heather Graham
- 125 discussion participants (95 US, 15 Asia/Pac, 15 Euro)
  - 25% exoplanet/observers, 57% solar system/planetary science, 18% early Earth/paleobiology
  - 50% pre-tenure/50% post-tenure, 10% grad students, 20% post-doc, 20% early career, 20% mid-career, 30% senior. Male/Female parity
- 215 asynchronous/observing participants

Report in Early Fall, 76-page draft report written and posted for public comment



# STATEMENT OF TASK

The National Academies of Sciences, Engineering, and Medicine's Committee on Astrobiology and Planetary Sciences will convene to conduct an independent review of the White Paper on Standards of Evidence for Life Detection and issue a short report addressing the following questions:

- Does the white paper include a clear and transparent description of the process?
- Does the report accurately reflect the scientific literature? Are there any crucial content areas detrimentally underrepresented in the report?
- Are the assumptions valid and reasonable?
- Are the conclusions valid and supported?
- Are there potential limitations or data gaps that would substantially impact the conclusions?

# Committee Membership

## Co-Chairs

MARTHA S. GILMORE, Wesleyan University

CHRISTOPHER H. HOUSE, Pennsylvania State University

## Members

ERIK ASPHAUG, University of Arizona

BETHANY L. EHLMANN, California Institute of Technology

KATHERINE H. FREEMAN, Pennsylvania State University

ALEXANDER G. HAYES, Cornell University

SARAH M. HÖRST, Johns Hopkins University

EDWIN S. KITE, University of Chicago

RAMANARAYANAN KRISHNAMURTHY, [Scripts Research Institute](#)

Rotated off:

R. Breaker, J. Kasting, M. Saunders

MELISSA A. McGRATH, SETI Institute

[ALISON MURRAY](#), [Desert Research Institute](#)

CLIVE R. NEAL, University of Notre Dame

[BETH ORCUTT](#), [Bigelow Laboratory for Ocean Sciences](#)

[MATTHEW PASEK](#), [University of South Florida](#)

[KARYN ROGERS](#), [Rensselaer Polytechnic Institute](#)

NITA SAHAI, University of Akron

DAVID J. STEVENSON, California Institute of Technology

New members are underlined, and  
one-year appointments for current task are in blue.



# Recap of CAPS meeting November 10<sup>th</sup> to November 12th

- Update from the NASA Planetary Science Division
- Status update on Psyche Mission
- Status update on VIPER Mission
- Eight Talks to inform our CAPS short report regarding the white paper from the Standards of Evidence for Life Detection Workshop



NASA's Psyche spacecraft is in the midst of system integration and test at JPL. This image was taken on Aug. 18, 2021, less than a year from launch in August 2022. *Credits: NASA/JPL-Caltech*

# Astrobiology/Planetary Science Updates

- Decadal Survey is on-track to be completed in Spring 2022
- Mars 2020 (Perseverance) has cored several rocks for later MSR
- Three space missions to Venus selected:

DAVINCI  
VERITAS  
EnVision (ESA)

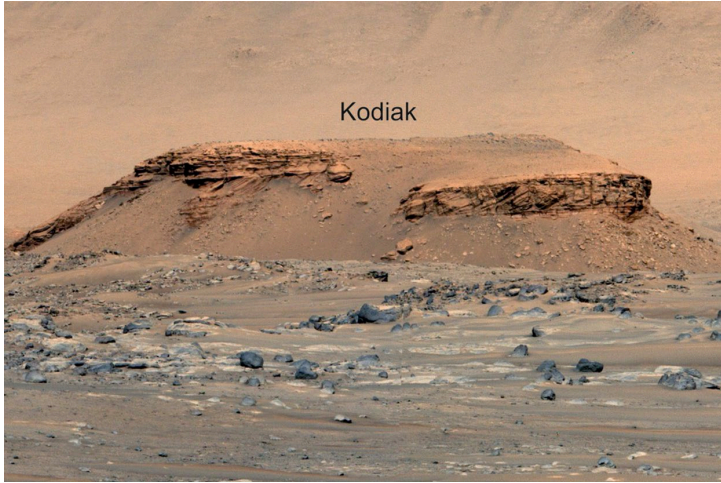


- OSIRIS-REx on its way home—Due back in September 2023
- Lucy launched October 16<sup>th</sup>, 2021, first Trojan flyby in August 2027



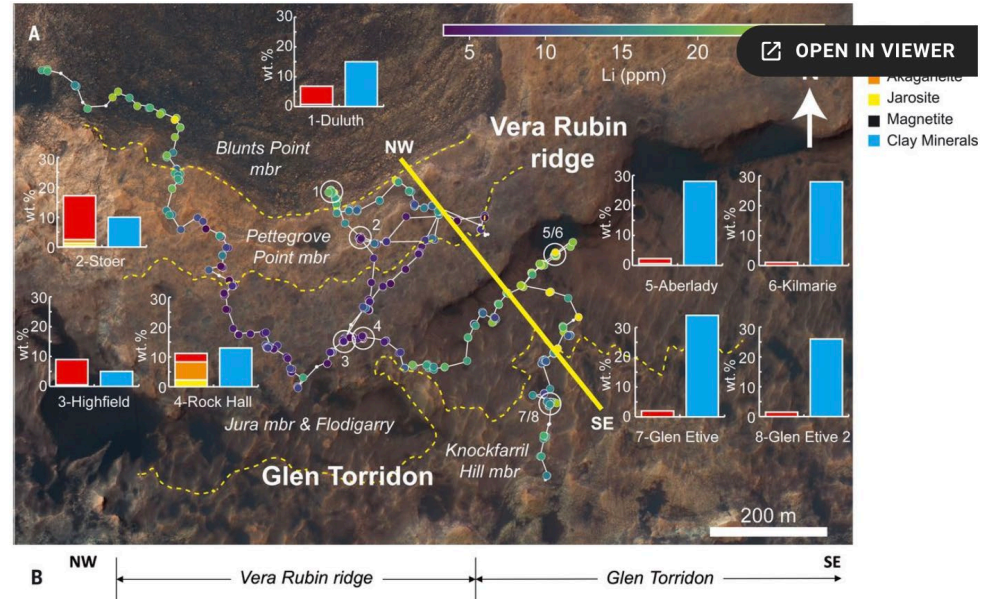


# Astrobiology/Planetary Science Updates



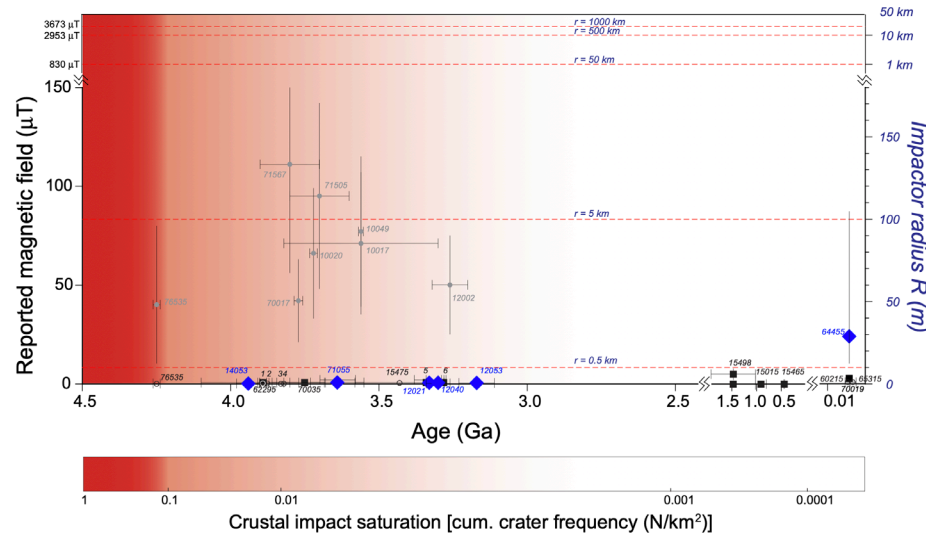
Mangold, N., *et al.* (2021). Perseverance rover reveals an ancient delta-lake system and flood deposits at Jezero crater, Mars. *Science*, 374(6568), 711-717.

Bristow, T. F., *et al.* (2021). Brine-driven destruction of clay minerals in Gale crater, Mars. *Science*, 373(6551), 198-204.



# Astrobiology/Planetary Science Updates

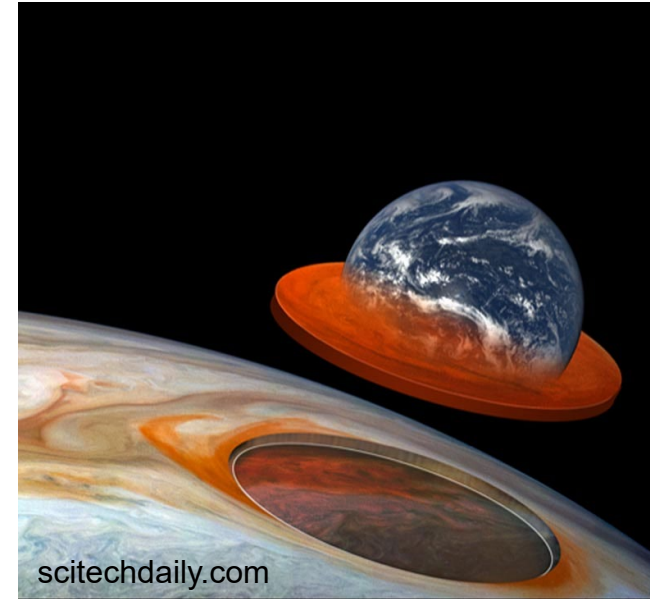
Lunar magnetic and impact history



Tarduno, J. A., et al. (2021). Absence of a long-lived lunar paleomagnetosphere. *Science Advances*, 7(32).

Parisi, M., et al., (2021). The depth of Jupiter's Great Red Spot constrained by Juno gravity overflights. *Science*.

Bolton, S. J., et al. (2021). Microwave observations reveal the deep extent and structure of Jupiter's atmospheric vortices. *Science*.





# Summary

- Planetary Science is healthy with lots of great missions in progress or development and plenty of new exciting results.
- The Decadal Survey of Planetary Science and Astrobiology is proceeding well and is on-track to deliver a report Spring 2022.
- CAPS has been tasked with reviewing the whitepaper on Standards of Evidence for Life Detection, short report done in June.
- CAPS membership currently has extra astrobiology members for this task, and we expect to rebalance membership in Summer 2022.



# Backup

