Opportunity Title: Studies of the Alteration History and Habitability of Mars
Opportunity Reference Code: 0342-NPP-NOV26-GSFC-PlanetSci

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0342-NPP-NOV26-GSFC-PlanetSci

How to Apply All applications must be submitted in Zintellect

Please visit the NASA Postdoctoral Program website for application instructions and requirements: How to Apply | NASA Postdoctoral Program (orau.org)

A complete application to the NASA Postdoctoral Program includes:

1. Research proposal
2. Three letters of recommendation
3. Official doctoral transcript documents

Application Deadline 11/1/2026 6:00:59 PM Eastern Time Zone

Description **About the NASA Postdoctoral Program**

The NASA Postdoctoral Program (NPP) offers unique research opportunities to highly-talented scientists to engage in ongoing NASA research projects at a NASA Center, NASA Headquarters, or at a NASA-affiliated research institute. These one- to three-year fellowships are competitive and are designed to advance NASA's missions in space science, Earth science, aeronautics, space operations, exploration systems, and astrobiology.

Description:

The sedimentary rock record of Mars details a past that was fundamentally different than the hyperarid and frigid conditions that prevail today. Instead, the red planet used to be more akin to modern Earth, with a hydrologic cycle and a landscape carved by rivers and lakes. The key to unraveling the processes that help shaped ancient Mars lies in the sedimentology, mineralogy, and geochemistry. Specifically focusing on the alteration products, those formed during water rock interactions, can provide key evidence for this water lain and habitable past. Additionally, on Earth, these alteration products can be associated with biosignatures, thus, developing a more complete reference frame of alteration history and biological influence is critical for the search for potential biosignatures in the geological record of Mars.

The goal of this research is to use data from the martian rovers, i.e., Curiosity and Perseverance, together with terrestrial analog samples to help decipher the complex history of alteration and habitability on ancient Mars. This work will include laboratory analyses using the facilities at NASA Goddard Space Flight Center, focusing on geochemistry and mineralogy. Proposals are also invited to set up experiments to explore potential environmental conditions, test water mixing models, and constrain the

influence of biology on mineral alteration. Studies focusing on clay minerals are of particular interest.

References:

McLennan, S.M., Grotzinger, J.P., Hurowitz, J.A. and Tosca, N.J., 2019. The sedimentary cycle on early Mars. Annual Review of Earth and Planetary Sciences, 47(1), pp.91-118.

Thorpe, M.T., Bristow, T.F., Rampe, E.B., Tosca, N.J., Grotzinger, J.P., Bennett, K.A., Achilles, C.N., Blake, D.F., Chipera, S.J., Downs, G. and Downs, R.T., 2022. Mars Science Laboratory CheMin data from the Glen Torridon region and the significance of lake-groundwater interactions in interpreting mineralogy and sedimentary history. Journal of Geophysical Research: Planets, 127(11), p.e2021JE007099.

Rampe, E.B., Bristow, T.F., Morris, R.V., Morrison, S.M., Achilles, C.N., Ming, D.W., Vaniman, D.T., Blake, D.F., Tu, V.M., Chipera, S.J. and Yen, A.S., 2020. Mineralogy of Vera Rubin ridge from the Mars science laboratory CheMin instrument. Journal of Geophysical Research: Planets, 125(9), p.e2019JE006306.

McAdam, A.C., Sutter, B., Archer, P.D., Franz, H.B., Wong, G.M., Lewis, J.M.T., Clark, J.V., Millan, M., Williams, A.J., Eigenbrode, J.L. and Knudson, C.A., 2022. Evolved gas analyses of sedimentary rocks from the Glen Torridon clay-bearing unit, Gale crater, Mars: Results from the Mars Science Laboratory Sample Analysis at Mars instrument suite. Journal of Geophysical Research: Planets, 127(9), p.e2022JE007179.

Hurowitz, J.A., Tice, M.M., Allwood, A.C., Cable, M.L., Hand, K.P., Murphy, A.E., Uckert, K., Bell III, J.F., Bosak, T., Broz, A.P. and Clavé, E., 2025. Redox-driven mineral and organic associations in Jezero Crater, Mars. Nature, 645(8080), pp.332-340.

Field of Science: Planetary Science

Advisors:

Amy McAdam
amy.mcadam-1@nasa.gov
(301) 614-6585

Applications with citizens from Designated Countries will not be accepted at this time, unless they are Legal Permanent Residents of the United States. A complete list of Designated Countries can be found at: https://www.nasa.gov/oiir/export-control.

Eligibility is currently open to:

- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);

Opportunity Title: Studies of the Alteration History and Habitability of Mars
Opportunity Reference Code: 0342-NPP-NOV26-GSFC-PlanetSci

- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

Questions about this opportunity? Please email npp@orau.org

Point of Contact Mikeala

Eligibility Requirements

- **Degree:** Doctoral Degree.