

Opportunity Title: Computational, Analytical and Experimental Thermodynamics to Investigate the Presence, Stability, and Implications of Organic Matter in Ocean Worlds

Opportunity Reference Code: 0290-NPP-JUL25-JPL-PlanetSci

Organization National Aeronautics and Space Administration (NASA)

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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 7/1/2025 6:00:59 PM Eastern Time Zone

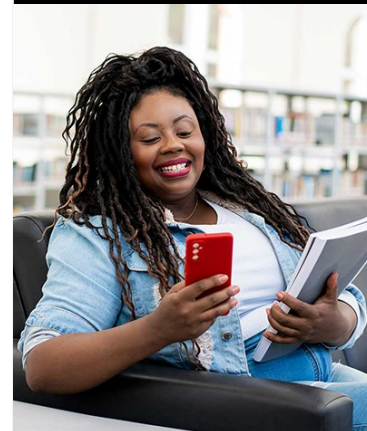
Description About the [NASA Postdoctoral Program](#)

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:

Ocean worlds such as Europa, Enceladus, Titan and Ceres are exciting, potentially habitable worlds in our own solar system. A large mass fraction of these bodies could be composed of organic matter, based on recent geophysical and geochemical models, and experiments quantifying the stability of organic matter that was likely to be present in the building blocks of these worlds. Our group is developing thermodynamic tools and experiments to predict the concentrations and identity of the complex organic molecules that could exist in the deep oceans, residual brines and rocky interiors of these worlds. We are interested in how planetary-scale processes such as differentiation, thermal evolution and tidal dissipation affect water, rock and organic chemistry over time, as well as nutrient and energy availability for life as we know it.

We seek a Postdoctoral candidate who would perform research to characterize the inventory and stability of organic compounds representative of that in the interiors of ocean worlds. Particularly, we are interested in obtaining thermodynamic properties such as densities and heat capacities of insoluble organic matter through experimental, analytical and computational methods. These quantities feed into our group's thermodynamic and geophysical numerical models. In addition, we are interested in investigating the consequences of the presence of organic matter in the interiors of ocean worlds: what does the presence of organic



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matter in ocean worlds mean for the structure and evolution of these bodies? Could the destabilization of this matter in rocky interiors release soluble components useful to, and usable by, potential life in the ocean? What observational signatures of evolution would be expressed by that organic matter?

The Postdoc would use a suite of experimental, analytical and numerical techniques, including pressurized calorimeters, Raman and infrared spectrometers, and thermodynamic and geophysical models to accurately constrain the physical and chemical properties of organic matter, minerals and geologic fluids plausibly present in ocean world oceans. The Postdoc would be directly advised by JPL scientists and is expected to collaborate, publish and present their research widely.

Field of Science:

- Planetary Science

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Applications from 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:

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

Qualifications A PhD in Planetary Science, Earth Science, Geochemistry, Cosmochemistry or a related field is required by the start. Wet chemistry lab experience is essential. Experience or previous training in thermodynamics and programming (Python/Matlab/R), and analytical techniques (Raman, infrared spectroscopy) are desirable. Experience with cryogenics and high pressure vessels are beneficial, but mandatory training will be provided.

Point of Contact [Mikeala](#)

Eligibility Requirements • **Degree:** Doctoral Degree.