

Opportunity Title: ICAR – Investigating Ocean Worlds: a systems level approach to understanding organic carbon cycles

Opportunity Reference Code: 0044-NPP-NOV26-ABProg-Astrobio

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0044-NPP-NOV26-ABProg-Astrobio

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

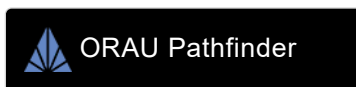
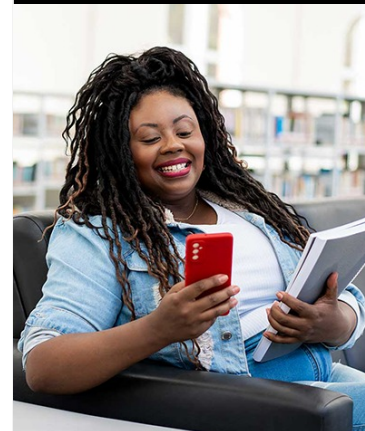
Description About the [NASA Postdoctoral Program](#)

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 2023-2032 Planetary Science and Astrobiology Decadal Survey has prioritized missions to seek evidence for life at ocean worlds in the outer solar system and those mission concepts feature organic analysis as a primary means of detecting life. To optimize the science yield of such missions, it is critical to understand processes that govern maturation of organic matter prior to sampling and analysis. In this project, accordingly, we will seek to address the question: How do the physical, chemical and (potential) biological processes active on ocean worlds shape the nature of the organic "signal", including evidence for life, that is presented to an observing spacecraft?

On Earth, abundant solar energy fuels a tremendous influx of biologically derived organic carbon to the ocean, yet compounds typically sought as evidence of life comprise only a tiny fraction of the dissolved organic carbon (DOC) pool. On ocean worlds, this 'needle-and-haystack' paradigm may be accentuated: the organic content of chondritic and cometary materials from which ocean worlds form constitutes a potentially vast reservoir of abiotic carbon, which could be both challenging and immensely informative for life detection efforts. In parallel, any ocean world biological productivity will almost certainly fall orders of magnitude below that on



Whether you are just starting your career or already at a senior level, ORAU offers internships, fellowships, research opportunities, and contract positions that can provide you with invaluable experience. Download the ORAU Pathfinder mobile app and find the right opportunity to propel you along your career path!

Visit ORAU Pathfinder [↗](#)



Opportunity Title: ICAR – Investigating Ocean Worlds: a systems level approach to understanding organic carbon cycles

Opportunity Reference Code: 0044-NPP-NOV26-ABProg-Astrobio

Earth, leading to lower concentrations of target compounds and/or longer residence times - increasing the role that abiotic degradation could play in obscuring evidence of biogenicity.

Our study will investigate organic maturation across three domains of an ocean world's hydrosphere:

- the **subseafloor domain**, where fluid circulation through silicates can both liberate chondritic organics and modify/react oceanic DOC.
- the **ocean domain**, where suspended particulates could serve to concentrate organics and catalyze their reactions.
- the **cryosphere domain**, where partitioning of organics across phase boundaries and post-depositional modification could alter and fractionate the organic "signal" presented to observing spacecraft.

Each of these domains are interconnected by flows of heat, fluid, and chemicals. It is for this reason that our study will implement a "systems-level" approach consistent with the team's strong grounding in Earth-based oceanography and polar research together with planetary science and astrobiology. Within each investigation, our interdisciplinary approach will encompass: physical modeling of heat, fluid, and mass transport; the use of both modelling and laboratory studies to explore the corresponding implications for chemical reactivity and fluxes; and an evaluation of the implications for biology as both a sink and a source term for organic carbon cycling - again via a combination of modeling and laboratory experimentation.

Field of Science: Astrobiology

Advisors:

Christopher German
cgerman@whoi.edu
(508) 289-2853

Andrew Fisher
afisher@ucsc.edu
(831) 459-5598

Susan Lang
sqlang@whoi.edu
508-289-3660

Kirtland Robinson
kjrobin1@asu.edu
(315) 243-0946

Opportunity Title: ICAR – Investigating Ocean Worlds: a systems level approach
to understanding organic carbon cycles

Opportunity Reference Code: 0044-NPP-NOV26-ABProg-Astrobio

Everett Shock
eshock@asu.edu
(480) 965-0631

Julie Huber
jhuber@whoi.edu
(508) 289-2556

Jeffrey Seewald
jseewald@whoi.edu
(508) 289-2966

Sanjoy Som
sanjoy@bmsis.org
206-775-8787

Wanying Kang
wanying@mit.edu
617-849-3275

Brandy Toner
toner@umn.edu
(612) 624-1362

Tucker Ely
tucker@39alpharesearch.org
805-603-0223

Noah Randolph Flagg
noahrflagg@uky.edu
510-847-6532

Peter Girguis
pgirguis@oeb.harvard.edu
617-496-8328

Melisa Diaz
Diaz.237@osu.edu
978-760-5054

Marc Neveu

Opportunity Title: ICAR – Investigating Ocean Worlds: a systems level approach
to understanding organic carbon cycles

Opportunity Reference Code: 0044-NPP-NOV26-ABProg-Astrobio

marc.f.neveu@nasa.gov
(555) 555-5555

Sarick Matzen
smatzen@uic.edu
919-830-7265

Kevin Hand
kevin.p.hand@jpl.nasa.gov
919-830-7265

Eligibility is currently open to:

- 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

Point of Contact [Mikeala](#)

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