

Opportunity Title: Coupled Water-Cycle Retrieval: Linking Precipitation and Soil Moisture Across NASA Microwave Missions

Opportunity Reference Code: 0348-NPP-NOV26-JPL-EarthSci

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

Description About the [NASA Postdoctoral Program](#)

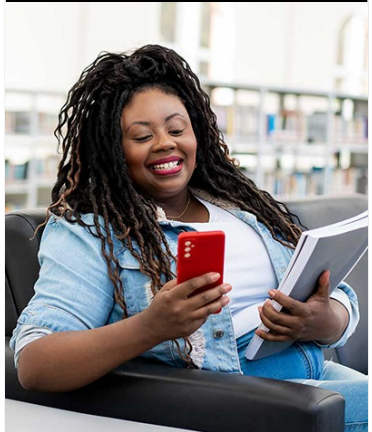
The [NASA Postdoctoral Program \(NPP\)](#) offers unique research opportunities to highly-talented scientists to engage in ongoing NASA research projects at a NASA Center, NASA Headquarters, or at a NASA-affiliated research institute. These one- to three-year fellowships are competitive and are designed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

Description:

Soil moisture and precipitation are two views of the same land-atmosphere exchange: rainfall drives soil moisture dynamics, and the land surface retains a measurable memory of precipitation. This research opportunity invites a participant to investigate that coupling in both directions in support of NASA's microwave remote sensing missions.

In the forward direction, physically based inversion of soil-water-balance processes turns satellite soil moisture into an independent constraint on precipitation — a "natural rain gauge" complementary to atmospheric retrievals such as GPM, particularly over regions where ground radar and gauge networks are sparse. In the reverse direction, high-resolution precipitation fields (e.g., MRMS) provide spatially distributed validation for fine-scale soil moisture products where consistent in situ networks do not exist — a critical need as NISAR-era products reach resolutions that conventional validation cannot address.

The participant may research and analyze one or more of the following topics: physically based retrieval of precipitation from spaceborne soil moisture observations (SMAP and downscaled active-passive products); characterization of soil-system memory and its spatial variability; use of precipitation coherence as a validation and uncertainty-quantification



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pathway for high-resolution soil moisture from NISAR and future L-band missions (e.g., ROSE-L); and propagation of physics-traceable soil moisture uncertainty into precipitation estimates. Machine learning approaches are welcome as tools within this framework — for example, learning the space–time variability of soil–water–balance parameters — while retrievals remain anchored in governing physics.

The participant will collect and analyze data from multiple NASA missions, collaborate with scientists engaged in SMAP algorithm heritage and NISAR-era high-resolution soil moisture development at JPL, and participate in multi-mission integration research spanning SMAP, NISAR, and ROSE-L. This opportunity offers hands-on experience with operational satellite retrieval algorithms, physics-based forward modeling, and mission-scale validation practice, complementing the participant's background and advancing knowledge directly relevant to NASA's Earth science objectives.

Relevant missions and datasets: SMAP, NISAR, GPM, MRMS, CYGNSS, ROSE-L.

Field of Science: Earth Science

Advisors:

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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);
- 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 Candidates should hold a Ph.D. (or complete one before the start date) in hydrology, civil or environmental engineering, remote sensing, geophysics, electrical engineering, atmospheric science, or a related field. Training that

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bridges land-surface hydrology and microwave remote sensing is the strongest preparation.

Favorable skills and experience include: spaceborne microwave observations of the land surface (e.g., SMAP, GPM, CYGNSS, NISAR) and their retrieval products; soil-water-balance physics and land-surface hydrologic processes; inverse methods for retrieving geophysical variables from satellite measurements; uncertainty quantification and validation of satellite products; machine learning applied within physically constrained frameworks rather than as black-box prediction; scientific computing (e.g., Python); and peer-reviewed publications.

Experience in all areas is not expected; a strong foundation in the underlying physics matters most.

Point of Contact [Mikeala](#)

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