

Opportunity Title: Imaging Spectroscopy for Tropical Ecosystem & Biogeochemical Research

Opportunity Reference Code: 0345-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:

Overview

The Earth's terrestrial biosphere is a dynamic system where vegetation physiology, soil biogeochemistry, geomorphic evolution, and anthropogenic management intersect to drive global carbon, water, and nutrient cycles. Tropical forests in particular account for 40% of Earth's terrestrial biomass, yet they exhibit enormous structural, functional, and biogeochemical heterogeneity across landscape and cross-basin scales. Understanding these complex ecosystem dynamics requires measurements that go beyond traditional multi-spectral imaging. Imaging spectroscopy—capturing the full contiguous spectrum from the Visible to Shortwave Infrared (VSWIR, ~380–2510 nm)—provides the spectral fidelity necessary to quantify plant functional traits, crop stress, soil properties, and canopy stoichiometry across variable, complex terrain.

In alignment with NASA's Earth Science strategy and the PAN tropical investigation of bioGeochemistry and Ecological Adaptation (PANGEA) scoping field campaign, this Postdoctoral Program opportunity invites research focused on advancing imaging spectroscopy retrievals, multi-sensor integration, critical zone biogeochemistry scaling, and geomorphic analysis across tropical and terrestrial ecosystems.



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Research Focus

This NPP opportunity invites research proposals that utilize high-fidelity imaging spectroscopy data—integrated with active remote sensing, topographic models, and ecohydrological observations—to address critical questions in terrestrial ecosystem function, biogeochemical cycling, tropical landscape dynamics, biodiversity, and precision agriculture. We are particularly interested in candidates who seek to develop use cases, analytical pipelines, or campaign planning tools leveraging multi-mission NASA retrievals, including:

- **Plant Functional Traits & Canopy Stoichiometry:** Mapping canopy biochemistry (e.g., foliar N, P, Ca, Leaf Mass per Area [LMA], chlorophyll, non-photosynthetic vegetation, and N:P stoichiometric ratios) to understand ecosystem response to climate stressors, edaphic controls, and functional trait turnover.
- **Geomorphic Gradients & Critical Zone Biogeochemistry:** Investigating how landscape evolution as evaluated by hillslope morphology, erosional gradients, and geomorphic transience regulate rock-derived nutrient (P, Ca, Mg, K, and bedrock N) distributions across landscape to cross-basin scales.
- **Agricultural & Agroecosystem Dynamics:** Quantifying crop physiological status, nutrient use efficiency, water stress, and land cover/land use dynamics across tropical social-ecological systems to enhance food security models.
- **Multi-Sensor Integration & Biogeochemical Scaling:** Developing data-fusion algorithms that combine VSWIR spectroscopy with active radar/lidar, thermal, and atmospheric retrievals to scale plot- and tower-based flux measurements to pan-tropical scales, constraining uncertainties in Earth System Models (ESMs).
- **Airborne Campaign Planning & Predictive Mapping:** Conducting spatial scoping, observational gap analyses, predictive mapping of canopy chemistry, and flight-line optimization strategies to directly guide target site selection and campaign design for future PANGAEA airborne deployments across tropical America and Africa.

Data and Methodology

The project will leverage NASA's imaging spectroscopy archives, complementary multi-mission satellite and airborne platforms, and high-resolution digital topography. Candidates should have interest in using:

- **VSWIR Imaging Spectroscopy:** High-fidelity data spaceborne spectrometers such as EMIT on the ISS, PACE, and commercial platforms supported through the Commercial Satellite Data Acquisition program. Research should help pave the way for future global VSWIR missions such as NASA's EAGLE-VSWIR and ESA's CHIME. Airborne

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datasets whenever relevant including AVUELO and upcoming AVIRIS acquisitions in tropical regions.

- **High-Resolution Topography & Active Sensors:** Utilizing spaceborne and airborne lidar (GEDI, LVIS, small-footprint lidar) to extract fine-scale digital elevation models and calculate geomorphic parameters, alongside active SAR/radar platforms (NISAR, UAVSAR (AfriSAR-2), BIOMASS) for structural biomass and inundation profiling.
- **Complementary Multi-Mission Datasets:** Integrating spectroscopy retrievals with thermal/evapotranspiration metrics (ECOSTRESS), canopy SIF retrievals (OCO-2/3, TROPOMI), and surface hydrology stage measurements (SWOT) or inundation (NISAR).

Research methodologies may include advancing foliar trait retrieval algorithms, atmospheric correction over dense humid tropical canopies, machine learning and dimensionality reduction for handling big data, landscape evolution modeling, and data-model integration to advance science and derive actionable information from NASA Earth observations.

Field of Science: Earth Science

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

Point of Contact [Mikeala](#)

Eligibility	• Citizenship: LPR or U.S. Citizen
Requirements	• Degree: Doctoral Degree.