

**Opportunity Title:** Advance Meta-omics Analysis for Biotechnology and Planetary Protection Efforts

**Opportunity Reference Code:** 0263-NPP-NOV23-JPL-PlanetSci

**Organization** National Aeronautics and Space Administration (NASA)

**Reference Code** 0263-NPP-NOV23-JPL-PlanetSci

**How to Apply** All applications must be submitted in [Zintellect](#)

**Application Deadline** 11/1/2023 6:00:00 PM Eastern Time Zone

**Description Description:**

The chosen postdoctoral candidate will work closely with the BPPG group to devise and validate metagenomic methodologies in alignment with future Planetary Protection (PP) policies for NASA expeditions. This entails employing advance molecular techniques, but not limited to digital Polymerase Chain Reaction (dPCR) and Shotgun Metagenomic Sequencing. The overarching goal is to furnish a validated framework using these advanced techniques, augmenting the NASA standard assay (NSA), which currently only captures a limited microbial spectrum.

One primary challenge lies in analyzing "ultra-low biomass" samples from spacecrafts and associated facilities, considering the variables such as reagent contamination, machine discrepancies, and operator differences that may affect the outcomes. The solution may lie in metagenomics, promising a holistic microbial taxa analysis, albeit currently impeded by the challenges.

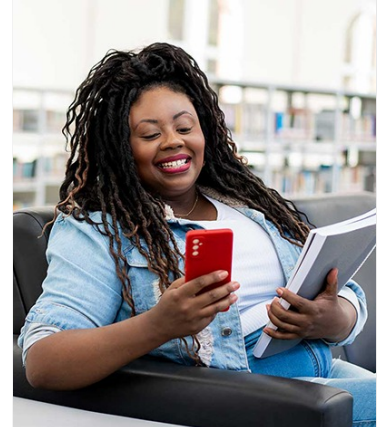
**Task Breakdown:**

**Task 1:** The postdoctoral appointee will focus on addressing these challenges, leveraging absolute quantification methods like dPCR. They will utilize mock microbial communities and nucleic acid spike-ins to rigorously validate ultra-low biomass cleanroom metagenomics sequencing methodologies. This spans from sample acquisition and processing to bioinformatics interpretation. This will cement a benchmark testing framework to evaluate any prospective technological advancements or methodological adjustments.

**Task 2:** Concurrently, the appointee will endeavor to craft a Machine Learning (ML) supervised model targeting the prediction of healthy space microbiomes using publicly sourced ISS metagenomic and genomic datasets. This initiative aims to fill the existing void in standardized metagenomic data interpretation techniques and expand our comprehension of microbiomes' significance in space-borne human health. Comparative analyses will be performed between space data (sourced from ISS and NASA-Genelab) and terrestrial data, aiming to pinpoint pathogens in space environments and devise counteractive strategies.

Qualified candidates are encouraged to apply, bringing their expertise to this pioneering endeavor that stands at the intersection of space exploration and microbiological research.

**Field of Science:**



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- Planetary 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/oijr/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

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