

Opportunity Title: Arctic Carbon Cycle Dynamics and the Permafrost Carbon

Feedback: CARVE, ABoVE, and Arctic CO₂ and CH₄ Syntheses

Opportunity Reference Code: 0090-NPP-MAR26-JPL-EarthSci

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0090-NPP-MAR26-JPL-EarthSci

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 4/2/2026 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 Arctic is warming dramatically, yet we lack the sustained observational time series and accurate physical models to know with confidence how the Arctic ecosystems and carbon cycle will respond to direct forcings from climate change and/or to poorly understood climate feedbacks from disturbances, such as fire and permafrost thaw. Fundamental elements of the Arctic hydrologic-carbon-climate system are poorly quantified and the sensitivity of the Arctic carbon cycle to climate change during the remainder of the 21st century is highly uncertain.

Permafrost soils are warming even faster than Arctic air temperatures. The efficient penetration of heat from the surface to these depths threatens to mobilize massive reservoirs of organic C that have been sequestered for tens of millennia. There are an estimated 1400 – 1850 PgC (1 PgC = 1×10^{15} gC) stored in permafrost across the Arctic, with ~500 PgC stored in the most vulnerable top 100 cm (for comparison, there have been ~350 PgC released from all fossil fuel combustion since 1850).

The importance of Arctic-Boreal C dynamics is underscored by the potential for a large permafrost carbon feedback (PCF) where rapidly changing climate conditions accelerate the microbial decomposition of the large quantities of old organic C stored in the region's frozen soils (permafrost) and the release of the greenhouse gases CO₂ and methane (CH₄). A critical carbon cycle science challenge is to detect and quantify the PCF. Despite intense research, the timing, magnitude,



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location and form of the PCF remain highly uncertain due to the many poorly understood or unconstrained mechanisms and parameters that control permafrost thaw and subsequent organic matter decomposition.

We apply the full suite of JPL's measurement and modeling capabilities to understand and quantify carbon cycling in northern high latitude ecosystems. This research uses data acquired by satellites (SCIAMACHY, GOSAT, OCO-2, OCO-3, TropOMI), airborne measurements from NASA's CARVE and ABoVE investigations, and numerous ground-based atmospheric CO₂, CH₄ and CO measurements. This research will also enable Observing System Simulation Experiments (OSSEs) in support of future missions, including CO₂M, MERLIN and GOSAT-GW. NPP researchers will have the opportunity to utilize data from and participate in

- ABoVE Airborne Campaigns from 2017-2024 conducted over Alaska and northwestern Canada
- International activities to synthesize Arctic CH₄ and CO₂ data in conjunction with the Permafrost Carbon Research Network and the NASA-ESA Arctic Methane and Permafrost Challenge (AMPAC)
- The Global Carbon Project's 'Regional Carbon Cycle Assessment and Processes', Phase 2 (RECCAP-2) and anticipated Phase 3
- Upcoming activities associated with NASA's FORTE and Arctic-COLORS field campaigns
- Advance planning for a Pan-Arctic Carbon Budget Closure Experiment as a focus of the 5th International Polar Year (2032-22)
- Developing methods to detect the permafrost carbon feedback
- Data assimilation and analysis studies designed to characterize scale-dependence and spatiotemporal variability in the processes that control Arctic CO₂ and CH₄ fluxes

Successful candidates will have expertise in atmospheric physics and chemistry, carbon cycle science, airborne instruments, atmospheric remote sensing, or the equivalent. They will join JPL's Carbon Cycle Science group and the ABoVE Science Team, with the opportunity to engage in related activities at JPL. The final research plan will be tailored to the expertise and future goals of each candidate.

References

CARVE: The Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE) was one of NASA's first Earth Ventures Suborbital (EV-S1) investigations. CARVE was a 5-year, ~\$30 million mission designed to quantify correlations between atmospheric concentrations of CO₂ and CH₄ with surface-atmosphere carbon fluxes and surface state control variables (soil moisture, freeze-thaw state, inundation state, surface soil temperature) and elucidate the sensitivities of Arctic carbon cycle processes to climate change. CARVE conducted nearly 200 sorties and flew ~1100 science flight hours from 2012-2015. Flight lines covered most of Alaska and extended into the Mackenzie Delta region of Canada's Northwest Territories. Dr. Miller was the CARVE PI.

See <http://science.nasa.gov/missions/carve/> for additional details.

ABoVE: NASA's Arctic Boreal Vulnerability Experiment is a ~10-year, ~\$100

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million community field experiment conducted by the Terrestrial Ecology Program. ABoVE fieldwork began in 2016 and will feature intensive airborne campaigns in 2017 and 2019. Dr Miller is the ABoVE Deputy Science Lead and lead for the ABoVE airborne campaigns. See <http://above.nasa.gov/index.html> for additional details

Permafrost Carbon Network: <http://www.permafrostcarbon.org/>

RECCAP: <https://www.globalcarbonproject.org/reccap/>

5th International Polar Year (2032-2033):[https://council.science/our-work/international-polar-year-2032-](https://council.science/our-work/international-polar-year-2032-2033/#:~:text=The%205th%20IPY%20(2032%2D33,chain%20of%20credible%20scientific%20evidence)

[2033/#:~:text=The%205th%20IPY%20\(2032%2D33,chain%20of%20credible%20scientific%20evidence](https://council.science/our-work/international-polar-year-2032-2033/#:~:text=The%205th%20IPY%20(2032%2D33,chain%20of%20credible%20scientific%20evidence)

FORTE: <https://cce.nasa.gov/forte/index.html>

Arctic-COLORS: https://cce.nasa.gov/cce/arctic_colors_report.html

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.

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

Point of Contact [Mikeala](#)

Eligibility Requirements

- **Degree:** Doctoral Degree.