

Three graduate positions investigating plant-microbe-mineral feedbacks in permafrost systems

We are seeking three graduate students broadly interested in Arctic System Science to work on a collaborative project investigating the vulnerability of Arctic permafrost to decomposition following thaw. In this NSF Office of Polar Programs funded project (“Permafrost–climate feedbacks: How interactions among plants, microbes, and minerals affect biogeochemical projections in a changing Arctic”), we will combine laboratory, growth chamber, and modeling approaches to better understand how plants, microbes, and soil minerals interact to contribute to the permafrost–climate feedback. See a more detailed description [here](#). Students involved in this project will gain expertise in their particular sub-discipline (see below for details) and will learn how to work as part of a larger team on a project that requires integration across disciplines, particularly Arctic biogeochemistry, microbial ecology, and Earth Systems modeling.

We have the following positions available. See below for more detail.

PhD assistantship in **Terrestrial Biogeochemistry**, [Hicks Pries Lab](#) (Dartmouth)

PhD assistantship in **Microbial-Explicit Modeling of Permafrost Soils**, [Grandy Lab](#) (UNH, and in collaboration with [Will Wieder @ NCAR](#))

Master’s (or PhD) teaching assistantship **Microbial Ecology**, [Ernakovich Lab](#) (UNH)

Position 1: PhD Assistantship in Terrestrial Biogeochemistry

The **Hicks Pries Lab** is seeking a **Ph.D. student** to begin in the summer of 2021. The student would be part of the Ecology, Evolution, Ecosystems, and Society (EEES) graduate program at Dartmouth College. This is a collaborative research project that includes a microbial ecologist and biogeochemist at the University of New Hampshire (UNH) and an earth system modeler at the National Center for Atmospheric Research. The objective of the research is to understand how the mineralogy of and microbial communities in thawing permafrost interact with root carbon inputs to affect soil carbon losses.

We are looking for a PhD student to:

1. Participate in field sampling with the research team (a one-time trip).
2. Carry out lab incubations that manipulate microbial communities and use stable isotopes to trace the fate of organic carbon.
3. Assist with related research at UNH when needed.
4. Participate in regular meetings with the research team to plan experiments and communicate results.



5. Take the lead on at least 1 manuscript that is part of the collaborative research project and will be planned with input from the research team.
6. Develop and take the lead on their own project r Professor Hicks Pries as a grad student expected to result in 1-2 manuscripts. sampling permafrost with a SIPRE soil corer.

The PhD student will also:

1. Travel to UNH for collaborations and to learn new skills.
2. Mentor undergraduate students through Dartmouth's WISP and UGAR programs.
3. Develop teaching expertise through teaching assistantships.
4. Develop science communication skills through participation in outreach programs such as JSEP or SEPA (optional).

Qualifications:

1. A strong interest in the research project.
2. A Bachelor's degree in a relevant field by June 2021. Post-baccalaureate experience or a Master's degree in a relevant field is *strongly encouraged*
3. Have experience working in teams.
4. Be willing to work outside under potentially adverse conditions (e.g., cold, wet, long hours during the Arctic sampling trip).
5. Have relevant experience in at least some of the following areas: a) field sampling, b) soils, c) laboratory work including sample processing, extractions, gas fluxes, running various instruments, or working with stable isotopes, and d) computer programming, mathematical modeling, statistics or data analysis.

Funding: The Dartmouth Ecology, Evolution, Environment, and Society (EEES) graduate program guarantees all accepted students a year-round stipend plus health insurance for five years. This position includes an NSF-funded research assistantship (RA) plus EEES programmatic support in exchange for serving as a teaching assistant (TA) for one or two 10-week quarters each year. EEES TA positions are assigned based on student interest and expertise, build capacity in teaching and leadership, and offer opportunities to meet potential undergraduate research assistants.

Interested? The formal EEES application deadline is in early December. Prospective students are encouraged to email Dr. Caitlin Hicks Pries at [caitlin.hicks.pries AT dartmouth.edu](mailto:caitlin.hicks.pries@dartmouth.edu) to learn more about the project and receive a link to the application form as soon as possible. Selected applicants will be asked to chat via zoom or phone prior to officially applying to EEES.

Position 2: PhD Position in Microbial-Explicit Modeling of Permafrost Soils

The **Grandy Lab** at the **University of New Hampshire** (UNH) seeks a PhD student to be part of an NSF-funded collaborative project to understand microbial mediation of permafrost–climate feedback. The research project investigates how interactions involving microbes, minerals, and vegetation affect the vulnerability to warming of carbon in permafrost soils. This student position specifically involves incorporation of new experimental data into a microbial-explicit soil carbon and nitrogen model to

better predict permafrost soil carbon cycle trajectories over the next century. The student will incorporate system feedbacks into our microbial-explicit soil biogeochemical model, MIMICS-CN. Our aim is to develop a predictive understanding of how the permafrost soil carbon cycle will change during the next century.

This work is part of a larger project, and the student will interact with scientists from UNH, Dartmouth and the National Center for Atmospheric Research (NCAR) to address critical knowledge gaps about how carbon stored in frozen permafrost will affect the Earth's carbon cycle. This position will work closely at UNH with microbial ecologist Dr. Jessica Ernakovich and also with Dr. Will Wieder at NCAR in Boulder, CO. Extended stays in Boulder to collaborate with Dr. Wieder and NCAR colleagues will be encouraged. The student will earn a PhD degree in the highly-ranked, interdisciplinary Natural Resources and Earth System Science PhD program.

Qualifications: The candidate should have some undergraduate or postgraduate training and demonstrated interest in environmental science, but I will consider candidates with varied backgrounds (e.g. engineering, physics, or computational biology) given the strong modeling component of this program. Prior modeling experience is not required for students who are enthusiastic to develop their modeling skills.

Start Date: Start date flexible but ideally Fall Semester 2021.

To Inquire about the position: Send an informal or formal statement of research interests and curriculum vitae to Stuart Grandy (stuart.grandy@unh.edu), Subject: permafrost_phd. Suitable candidates will be interviewed and then encouraged to apply officially. For more information on this position contact Stuart.

About the Grandy Lab: The position will be housed in Professor Stuart Grandy's Lab (unh.edu/grandylab), which examines how soil organisms interact with their environment to regulate productivity and ecosystem processes such as nutrient cycling, organic matter turnover, and trace gas emissions (see publications: [A Stuart Grandy - Google Scholar](#)). We have a successful record of training early career scientists and supporting their post-graduate school professional interests. I am happy to provide multiple student and postdoc references. We highly value the experiences, backgrounds and work-life interests different members bring to create a community of enthusiastic and collaborative early career scholars.

Position 3: Master's Assistantship in Microbial Ecology (option of PhD)

The **Ernakovich Lab** at the **University of New Hampshire** (UNH) seeks a master's student to study microbial mediation of the permafrost-climate feedback on a recently-funded project entitled "*Permafrost-climate feedbacks: How interactions among plants, microbes, and minerals affect biogeochemical projections in a changing Arctic.*" This research project investigates how processes mediated by microbes, minerals, and their interactions with vegetation affect the vulnerability of carbon in permafrost soils. The student will work on laboratory incubations and use stable carbon isotopes (^{13}C) and Illumina microbial sequencing to understand whether additions of easy-to-degrade organic matter alter microbial growth strategies and act to destabilize permafrost organic matter. This work will be part of a larger project, and the student will interact with students, postdocs and project scientists from Dartmouth and the National Center for Atmospheric Research, as well as other students at UNH, doing

laboratory, growth chamber, and modeling studies to address critical knowledge gaps about how carbon stored in frozen permafrost will affect the Earth's carbon cycle.

The student will earn a master's degree in [Natural Resources – Ecosystem Science](#). Program requirements can be found [here](#). Pending future funding and the student's interest, UNH also has an excellent interdisciplinary Natural Resources and Earth System Science [PhD program](#). The student's tuition and stipend will be paid through a teaching assistantship in the Department of Natural Resources.

Qualifications: The candidate should have an undergraduate degree and/or postgraduate training in ecology, environmental science, biology, chemistry, microbiology or closely related field.

Start Date: Position available starting Fall Semester 2021.

To inquire about the position: Send a statement of research interests and curriculum vitae to Jessica Ernakovich (jessica.ernakovich@unh.edu), Subject: NREN_MS. Please attach all application materials as word documents or PDFs with the candidate's name included in the file name. Review of Applications will begin immediately, and suitable candidates will be interviewed and then encouraged to apply officially. For more information on this position, contact Jessica.

About the Ernakovich Lab: Our lab seeks to find links between the soil microbiome and ecosystem function. We do this with a mix of tools, including sequencing, stable isotopes, and the application of ecological theory to microbial systems. We are particularly interested in microbial responses in systems with high disturbance; our current focal areas are permafrost thaw and agricultural systems. We are committed to training and collaboration at all academic levels, from undergraduate to postdoctoral. Our lab currently has two undergraduates, three master's students, one PhD student, and will soon be joined by two postdoctoral scholars. The Ernakovich lab has joined intellectual forces with the Frey and Grandy labs, which enables us to have broader discussions (weekly to biweekly) around big picture questions involving soil systems and global change. The Ernakovich lab values the experiences different members bring and encourages balance and connectedness. We encourage applicants with diverse and non-traditional backgrounds to apply.