INSPIRES

Team Profiles

Melissa Pastore

Postdoctoral Associate
University of Vermont
Research Interests: Global change ecology, ecosystem ecology, plant ecophysiology, biogeochemistry

Melissa Pastore is a first-year postdoctoral associate in the Rubenstein School of Environment and Natural Resources and with the Gund Institute at the University of Vermont. Co-advised by E. Carol Adair (Biogeochemistry and Global Change Lab) and Aimée Classen (Ecosystem Ecology Lab), Pastore has been a research assistant in their labs since September 2020, where she joined the NSF-funded INSPIRES project.

As a global change ecologist, Pastore tackles big global change issues (e.g., elevated CO_2, warming, rainfall change, nitrogen pollution) and how they affect the functionality of ecosystems, especially the ecosystem services that humans rely on, for instance, carbon storage. Although Pastore has worked mostly in coastal marsh and grassland ecosystems, she grew up in the northeast and has always loved temperate forests. Pastore has also studied the effects of winter climate change on ecosystems like changes in snowpack and soil freeze-thaw cycles.

While working in the forest is new for Pastore, she finds herself asking similar questions. What are the drivers of carbon storage? How will climate change affect carbon cycling? From identifying large scale patterns across landscapes (e.g., carbon storage) to exploring the underlying plant mechanics (e.g., leaf level physiology) and microbial processes (e.g., microbial respiration), Pastore brings her integrated, cross-scale research approach to INSPIRES. With this approach, Pastore hopes to improve model predictions of future carbon storage by providing process-level knowledge that researchers don't understand well enough yet to incorporate into models. These underlying plant and microbial mechanisms often operate at smaller scales and over different time scales than the observed patterns in carbon storage.

Pastore collects soil in Duxury, VT, for a laboratory freeze-thaw experiment and to put out soil and air temperature sensors. Photo by Kenna Rewcastle.

As part of Theme 1 of INSPIRES, which focuses on advanced sensing, Pastore and project team members are planning a big project this summer: "It's all about how microclimate can effect carbon storage in these mountainous regions that have really complex topography. Usually, when you go upslope, if you're hiking up a mountain, you think of temperatures getting colder as you move up the mountain. In contrast, in these regions at nighttime after sunset, there is radiative cooling of the earth's surface which forms this dense cold air that actually drains down slopes into valleys, creating temperature inversions where the bottom of these depressions is actually the coldest. There's been a lot of interest in whether these cold air pools can act

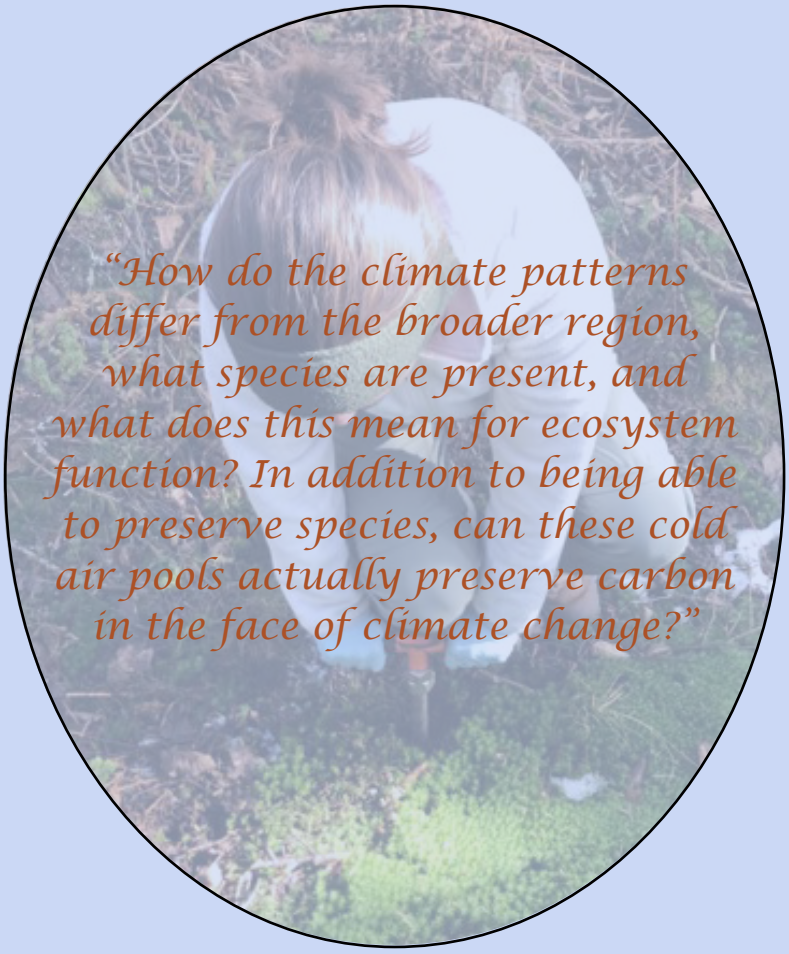
as microrefugia for species in the face of climate change because their climate is so decoupled from the broader landscape," explains Pastore.

Project team members will set up high frequency sensors, monitor, and take measurements in Vermont, New Hampshire, and Maine this summer in these different valleys where cold air pooling is happening across New England.

Pastore will be mentoring an intern this summer with this cold air pooling project. Pastore loves working with students and derives energy from the experience, which is her focus as she actively looks for a tenure track position. INSPIRES has given her a glimpse of what that job will look like, as she collaborates with researchers from different institutions with different approaches and has the space to design her own projects and research program within INSPIRES' broader framework.

"It's so exciting to hear all these different perspectives, and people with different areas of expertise coming together to work on these shared problems," states Pastore. "I think that's really powerful."

Pastore approaches her work with an inquiring mind:



INSPIRES interviews and profiles by Stefania Irene Marthakis, University of Maine Center for Research on Sustainable Forests

crsf.umaine.edu/inspires

National Science Foundation

THE UNIVERSITY OF MAINE

University of New Hampshire

The University of Vermont

Smart Data for Resilient Forests

INSPIRES: Leveraging Intelligent Informatics and Smart Data for Improved Understanding of Northern Forest Ecosystem Resilience is an NSF-supported project that leverages unique expertise from the University of Maine, University of New Hampshire, and University of Vermont to construct a digital framework to better assess, understand, and forecast this complex forest at a resolution relevant to scientists, land managers, and policymakers.

♦*INSPIRES is supported by the National Science Foundation under Grant No. 1920908*♦