

PROJECT AWARD YEAR AND TITLE: 2015

Cracking the Code of a Northern Forest Carbon Cycle: An Integrated Analysis Using Data, Models and Assessment of Uncertainties

PRINCIPAL INVESTIGATORS: Scott Ollinger

University of New Hampshire scott.ollinger@unh.edu

Andrew Richardson

Northern Arizona University and rew.richardson@nau.edu

David Hollinger

USDA Forest Service Northern Research Station david.hollinger@usda.gov

COLLABORATOR: Sarah Garlick

Hubbard Brook Research Foundation, VT

Project Impacts

NSRC-FUNDED RESEARCH FINAL REPORT

Cracking the Code of the Northern Forest Carbon Cycle



This study resulted in one of the most complete carbon budgets for a northern hardwood forest ecosystem. Understanding forest carbon cycles informs priorities related to climate change, resource management, and environmental policy. In the Northern Forest region, scientists and decision makers need the ability to quantify net balance between carbon uptake and loss (carbon sequestration), knowledge of carbon fluxes within individual components of ecosystems and associated uncertainties, and analytical tools to project carbon cycle estimates over time and diverse landscapes. Active exchange of information is important among scientists, stakeholders, and members of the public most closely tied to the region's forested landscapes.

NSRC researchers advanced the understanding and ability to predict northern forest growth, carbon dynamics, and response to climate. They conducted field measurements in a 100-year-old forest at the Bartlett Experimental Forest in New Hampshire's White Mountains. Their measurements supplemented CO₂ flux data from instruments on a 110-foot tower. The resulting dataset provided estimates of annual carbon sequestration of 120 to 133 grams per meter². Variation in carbon uptake by trees was related to the nitrogen content of foliage, length of time between soil thaw and leaf-out, and amount of diffuse sunlight versus direct radiation. The most important sources of uncertainty involved belowground processes such as amount and fate of carbon allocated to mycorrhizal fungi. Aging forests in the Northern Forest region still represent a moderate carbon sink, and reducing uncertainties will require increased attention to belowground processes.

Researchers discussed the relevance of this research with 300 stakeholders and members of the public at a "science café."

