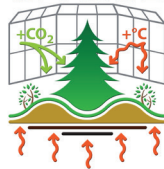




SPRUCE:

Spruce and Peatland Responses Under Changing Environments

SPRUCE



What Is SPRUCE?

The SPRUCE experiment is a whole-ecosystem experiment in an ombrotrophic bog (i.e., a raised bog that receives all water and nutrients from direct precipitation) located in the Marcell Experiment Forest of northern Minnesota. SPRUCE studies how peat bogs may react to warming temperatures and higher atmospheric carbon dioxide and is the primary component of the Terrestrial Ecosystem Science Scientific Focus Area.

Research Questions



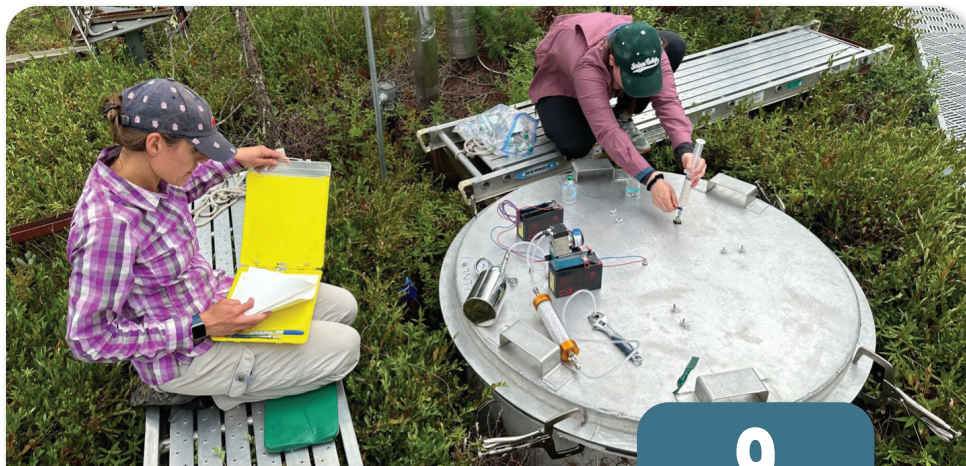
Will future warming release 10,000 years of accumulated carbon from peatlands that store one-third of Earth's terrestrial carbon? At what rate?



Are peatland ecosystems and organisms vulnerable to atmospheric and environmental change? What changes are likely?

Why Study Peatlands?

Peatlands cover only 3% of Earth's land surface but contain about 30% of the global soil carbon pool. If global temperatures warm as projected at higher latitudes, these peatlands could release large amounts of greenhouse gases such as carbon dioxide and methane that could accelerate global warming. The ability to predict stored carbon's fate in response to environmental disruption remains hampered by a limited understanding of the controls of carbon turnover and the composition and functioning of peatland ecosystems.



Research Design

SPRUCE installed large, open-topped above-ground enclosures in the peatland where scientists can manipulate temperature and carbon dioxide levels. Soil and air temperatures within these enclosures cover multiple levels of warming from ambient to +9°C. Simultaneously, atmospheric carbon dioxide levels within half of the enclosures are elevated up to 800 to 900 parts per million to reflect current expectations for levels that could be associated with end-of-century temperatures. The experimental system provides a unique platform for testing the mechanisms controlling the vulnerability of organisms, biogeochemical processes, and ecosystem functions to important environmental change variables.

9

YEARS
OPERATING

10



ABOVEGROUND
ENCLOSURES

Research Location

SPRUCE research is being conducted on an 8.1-hectare peatland of the Marcell Experimental Forest in northern Minnesota. The remote landscape includes a mix of uplands, bogs, fens, lakes, and streams.



More Information

SPRUCE

mnspruce.ornl.gov



ESS Program

ess.science.energy.gov



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