



The SPRUCE Experiment

Testing Peatland Response to a Changing Climate

Background

Although they cover only 3 percent of Earth's land surface, peatlands store about 30 percent of the total carbon stored in soil. Because they store so much carbon, peatlands may be one of the most important ecosystems in terms of gaining insight into global climate change. Despite the importance of these ecosystems and the uncertainty about their response to climate change, large scale experimental manipulations to simulate climatic warming and predicted atmospheric carbon dioxide levels have not been conducted until SPRUCE.

The SPRUCE Experiment

Spruce and Peatland Responses Under Climatic and Environmental Change, or SPRUCE, is an ambitious ecosystem-level experiment that will test the response of high-carbon northern peatland ecosystems to increased temperatures and elevated carbon dioxide. Located at the Northern Research Station's Marcell Experimental Forest near Grand Rapids, MN, the experiment is a collaboration between the U.S. Forest Service and the Department of Energy's Oak Ridge National Laboratory.

Scientists at the U.S. Department of Energy's Oak Ridge National Laboratory conceived the SPRUCE concept and design and have been developing the technology to produce large-scale whole-ecosystem warming conditions for the target black spruce peatland ecosystem. Scientists from the U.S. Forest Service's Northern Research Station, Oak Ridge National Lab and numerous scientists from across the globe are working in collaboration to understand the water, soil, and plant responses to elevated temperature and carbon dioxide.



The SPRUCE Experiment consists of 10 chambers which will allow 5 temperature treatments with and without elevated carbon dioxide. *Credit: USDA Forest Service*

Support

Funding for SPRUCE comes from the U.S. Department of Energy through support of the Oak Ridge National Laboratory's Terrestrial Ecosystem Science and Climate Change Research efforts. The infrastructure (construction, instrumentation, power supply) will cost about \$10 million. Estimated operational cost will be about \$5 million per year for the 10-year life of the experiment.

Status

To date, electrical power has been brought in, boardwalks have been built, center climate towers have been erected and most of the instrumentation has been installed. The contract has been let for the above- and below-ground chamber construction with the construction planned to start in summer 2014 and conclude sometime early winter. Full operation of the experiment begins in spring of 2015.

For more information, visit http://www.nrs.fs.fed.us/disturbance/climate_change/spruce/ and the Oak Ridge National Lab's website: <http://mnspruce.ornl.gov/>

