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SPRUCE experiment data infrastructure development

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The SPRUCE experiment (http://mnspruce.ornl.gov) is the primary component of the Terrestrial Ecosystem Science Scientific Focus Area of ORNL's Climate Change Program, focused on terrestrial ecosystems and the mechanisms that underlie their responses to climatic change. The experimental work is to be conducted in a Picea mariana [black spruce] – Sphagnum spp. bog forest in northern Minnesota, 40 km north of Grand Rapids, in the USDA Forest Service Marcell Experimental Forest (MEF). The site is located at the southern margin of the boreal peatland forest. It is an ecosystem considered especially vulnerable to climate change, and anticipated to be near its tipping point with respect to climate change. Responses to warming and interactions with increased atmospheric CO_2 concentration are anticipated to have important feedbacks on the atmosphere and climate, because of the high carbon stocks harbored by such ecosystems. Both direct and indirect effects of these experimental perturbations will be analyzed to develop and refine models needed for full Earth system analyses.
The Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) provides data management support for the SPRUCE experiment including data infrastructure design, development, long-term storage and dissemination.
This presentation is going to show how the whole data infrastructure was designed, discuss major problems that are common for remote observational systems and unique for this particular implementation. It will demonstrate the dataflow starting from the sensors and ending at the archiving/distribution points, discuss types of hardware and software used, and examine considerations that were used to choose them.