



Visualizing experimental whole-ecosystem warming treatments on vegetation and ecosystem phenology at the SPRUCE experiment

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SPRUCE (Spruce and Peatland Responses Under Changing Environments) is a long-term, multi-factor, manipulative experiment situated in a Boreal peatland forest in the Upper Midwest of the US. The experiment is unique in that the five levels of warming (from 0 to +9 °C) are being applied to intact communities of native plants, including woody shrubs and mature trees. The dominant plant species at SPRUCE are representative of key genera that are found worldwide across the vast circumpolar boreal forest, or taiga, which covers much of the northern hemisphere land surface from 45° to 70° N. Knowledge of the environmental controls on the phenology of these species is limited to historical observations and natural variation and may not provide a strong basis for making predictions about phenology under warmer climates that take us beyond those records. Automated, half-hourly observations made by elevated cameras at the SPRUCE facility in 2017 were combined in a simulcast movie to allow researchers to better understand the dynamics warming processes on environmental phenomenon (e.g., snow cover) and seasonal dynamics (greenness, growth, flowering) for tree and shrub vegetation for the SPRUCE study sites. Visual images may be manipulated at variable speeds or paused to compare and contrast conditions across ambient plots and experimental enclosures.