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Methods and Initial Results for A Model Intercomparison Study in A Northern Peatland

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Whole-ecosystem warming was initiated at the SPRUCE experimental site in northern Minnesota in the summer of 2015. Early *a priori* modeling results indicated large uncertainty in the potential greenhouse gas flux response of this peatland bog ecosystem to warming and elevated CO₂ concentrations depending on the model structural assumptions about nutrient and methane cycling. A new model intercomparison activity was initiated last year to evaluate the performance of wetland models against pre-treatment conditions, to predict carbon fluxes and state variables over the course of the experiment, and to provide guidance to measurement teams about the key processes that are driving the treatment responses and their uncertainties. Here we present a protocol for performing pre-treatment and treatment simulations incorporating uncertainty about future meteorological conditions using standardized model inputs and evaluation metrics. Initial results simulating pre-treatment conditions at SPRUCE from participating modeling teams are also presented. These model results are compared against observations of water table height, vegetation biomass, net primary productivity, and CO₂ and CH₄ flux measurements. A new framework for incorporating model parametric uncertainty is also discussed.