Modeling the Hydrological dynamics of the SPRUCE S1 Bog

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Northern peatlands store ~ 30% of the global soil carbon, though only representing ~ 3% of the Earth's land surface. Community Land Model (CLM) component of the Community Earth System Model (CESM) doesn't currently represent vegetated wetlands. To address this limitation, we incorporated key structural and process changes in the CLM. The model with new modifications is informed and tested by SPRUCE experiment. The initial efforts with CLM_SPRUCE have focused on model modifications needed to represent the isolated hydrologic cycle of the bog environment, as well as the characterization of the bog topography into raised hummocks and sunken hollows having distinct hydrologic dynamics and vegetation communities. Our results from the hydrological efforts show that seasonal hydraulic dynamics are reasonable and comparable to the observations. The warming experiments indicate that the responses of hydrological cycle to warming will be significant. These modelling efforts provide a predictive capacity for more realistic seasonal hydrological dynamics to reduce the uncertainties for the northern peat carbon exchange.