Poster #45

Representing Northern Peatland Hydrology and Biogeochemistry with ALM

Xiaoying Shi[1], Daniel M. Ricciuto[1], Peter E. Thornton[1], Paul J. Hanson[1], Xiaofeng Xu[2], Jiafu Mao[1], Jeffrey Warren[1], Steve Sebestyen[3], Natalie A. Griffiths[1], Richard J. Norby[1], Anthony P. Walker[1], and David J. Weston[1]

[1] Climate Change Science Institute /Environmental Science Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA
[2] Biology Department San Diego State University, San Diego, CA, 92182-4614, USA
[3] USDA Forest Service Grand Rapids, Minnesota

Contact: Xiaoying Shi [shix@ornl.gov]

Northern peatlands are likely to be important in future carbon cycle-climate feedbacks due to their large carbon pool and vulnerability to hydrological change. To produce an enhanced ALM_SPRUCE capable of being using for accurate simulations of high-carbon wetland hydrologic and carbon cycle responses for application to plausible future climate conditions. Firstly, we introduce a new configuration of the land model (ALM) of Accelerated Climate model for Energy (ACME), which includes a fully prognostic water table calculation for a vegetated peatland. Secondly, we couple our new hydrology treatment with vertically structured soil organic matter pool, and the addition of components from methane biogeochemistry. Thirdly, we introduce a new PFT for mosses and implement the water content dynamics and physiology of mosses. We inform and test our model based on SPRUCE experiment to get the reasonable results for the seasonal dynamics water table depths, water content dynamics and physiology of mosses, and correct soil carbon profiles. Then, we use our new model structure to test the water cycle and carbon cycle will respond to different warming scenarios.