Wetland DNDC - A forested wetland soil carbon model. (S07-trettin084420-Poster)

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Abstract:

We have developed a new, forested wetland biogeochemical model, Wetland-DNDC, which has been constructed by integrating hydrological and forest biogeochemical processes at the watershed scale. Two existing models, FLATWOOD, a distributed hydrological model, and PnET-N-DNDC, a forest biogeochemical model, were used as the basis for this new model. The model is distinct from other soil biogeochemical models providing a hydrology submodel for groundwater flow, subsurface flow, and snow and ice melting processes to control runoff and water table fluctuation. The hydrologic regime controls soil redox potential (i.e., Eh) which is calculated based on the Nernst equation. These developments enabled Wetland-DNDC to simultaneously predict SOC decomposition, methane production/oxidation, and nitrification/denitrification in the saturated and unsaturated zones of a wetland. As a watershed model, Wetland-DNDC can run at landscape or regional scale with subdivided grid cells. The new model is capable of predicting spatially differentiated water table dynamics, water influx and efflux, forest growth, SOC dynamics, net carbon exchange, and trace gas emissions for forested wetlands. Wetland-DNDC has been validated against data sets from two forested wetland sites in Minnesota and Florida.

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