B31H-2189 Modeling forested wetland methane dynamics: insights from 5 flux towers and observations from a western Kentucky wetland

Wednesday, 13 December 2023

10:30 - 14:50

Poster Hall A-C - South (Exhibition Level, South, MC)

Abstract

Accurately determining the methane (CH_4) flux in forested wetlands is vital for understanding their role in climate change, evaluating wetland health, and advancing our understanding of Earth's carbon cycle. The impact of climate and environmental change on forested wetlands is profound due to changes in hydrological patterns and exposure to temperature extremes, highlighting the importance of precisely modeling CH_4 dynamics in these areas. However, existing attempts to understand CH_4 fluxes and pathways in forested wetlands have been limited by the intricate nature of these ecosystems. This research aims to bridge this gap and enhance the accuracy of modeling CH_4 emission dynamics in forested freshwater wetlands by integrating emissions data from temperate bald cypress (*Taxodium distichum*) trees and their knees – unique woody structures that develop above the bald cypress roots -- into the CH_4 modeling systems. The Peatland Ecosystem Photosynthesis Respiration and Methane Transport model (PEPRMT), a process-based biogeochemical model, is being modified and used to estimate forested wetlands CH_4 fluxes for this landscape class. Currently, data from five eddy covariance flux towers, situated in various parts of the United States, along with observational data from cypress swamps near Murray State University (MSU) in western Kentucky, are being collected to calibrate and validate the model. We are modifying the model to better represent the emissions from forested wetlands into the model's carbon cycle by refining the simulation algorithms and input parameters to better capture methane exchange dynamics between these wetlands and the atmosphere. This

improved representation of net CH_4 emissions from forested wetlands will enhance the accuracy of assessing methane emissions in their present state and increase our ability to assess potential climate change scenarios for forested wetland ecosystems in the future.

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