B41J-1426 Towards a generalized model to represent the complexities of methane flux processes in forested wetlands

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08:30 - 12:20

Hall B-C (Poster Hall) (Convention Center)

Abstract

Field-based and modeling approaches are widely applied to capture methane flux from forested wetlands. However, some key governing processes lack important details in current methane models, highlighting a need for a generalized framework suitable for various wetlands. Our work aims to fill this gap by coupling existing models, incorporating missing representations, improving their parameterization, and evaluating the model performance with the eddy-covariance flux datasets. We envision a well-balanced and parsimonious representation of methane flux with a few well-constrained parameters. In this attempt, the process-based PEPRMT model (Peatland Ecosystem Photosynthesis, Respiration, and Methane Transport; Oikawa et al. 2017) has been coupled with the DALEC model (Data Assimilation Linked Ecosystem Carbon; Williams et al., 2005), to better simulate methane flux from wetlands. Currently, the model is being validated at four different AmeriFlux sites from different parts of the United States. Initial evaluation of the results from the revised coupled model, using methane flux data, indicates that the model can replicate the mean magnitude of methane flux but struggles to accurately represent temporal dynamics, likely due to extreme weather events. We are working on a more complete representation of water dynamics and edaphic processes to achieve robust simulating performance. While we are optimistic about developing a generalized process-based biogeochemical model, future research requires more clarification on how extreme weather (e.g., precipitation and temperature) contributes to variations in methane fluxes across forested wetland landscapes.

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