B14B-03 - Controls of Methane Emission Fluxes from Freshwater Wetlands at the Global Scale.

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Online Only

Abstract

We investigated the climatic and ecohydrological controls of the monthly methane emission fluxes from freshwater wetlands across the globe. Fluxes of methane, photosynthetically active radiation (PAR), soil temperature (TS), atmospheric pressure, latent heat flux (LE), wind speed (WS), friction velocity, vapor pressure deficit (VPD), soil water content (SWC), water table depth, and precipitation were obtained from 32 FLUXNET wetland sites. Multivariate pattern recognition techniques of principal component and factor analyses were utilized to classify and group climatic and ecological variables based on their similarity as drivers, examining their interrelation patterns across the different sites. Partial least squares regression models were developed to estimate the relative linkages of methane emission fluxes with the climatic and ecohydrological drivers. When the wetlands were flooded (i.e., positive water table depth relative to the ground), PAR, LE, VPD, and TS had the strongest controls on the methane emission fluxes. However, in the absence of flooding (i.e., negative water table depth), the methane emission fluxes were mainly controlled by SWC and WS. For the wetland sites with unavailable water table depth data, PAR, TS, and WS had the strongest controls on the methane emissions and subsequent transport. Our findings provided important knowledge and insights for predicting and managing methane emissions in freshwater wetlands at a global scale.

Full Abstract

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