Oral Watershed

Wetland: Processes, Modeling, and Use in Watershed Management

Ecohydrological Controls of Carbon Dioxide Fluxes in Wetlands across the Globe.

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We elucidated the ecohydrological controls of the monthly averaged carbon dioxide (CO2) fluxes in freshwater wetlands across the globe. Observational data from 32 FLUXNET wetland sites were obtained for CO2 fluxes (net ecosystem exchanges), 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. The data were analyzed by employing a data analytics methodology, including Pearson's correlation matrix, principal component, and factor analyses, and partial least squares regression modeling. Our results suggested that the net uptake fluxes of CO2 had been mainly controlled by PAR, TS, LE, and VPD when the wetland surface was not flooded (i.e., negative water table depth relative to the ground surface). However, during flooded conditions (i.e., positive water table depth), LE and VPD had the strongest controls on the CO2 fluxes in these wetlands. Our findings provide new knowledge and insights for robust modeling, predictions, and management of CO2 fluxes and potential carbon storage in freshwater wetlands on a global scale.