V20 - *23COASTAL* Estimating Greenhouse Gas Fluxes in Brackish Tidal Wetlands As a Function of Plant Community

Tuesday, January 7, 2025

1:00 PM - 2:00 PM

Abstract

Greenhouse gas emissions (nitrous oxide, methane, and carbon dioxide) trap heat in the atmosphere, contributing to rising temperatures and climate change. Since wetlands are natural emitters and consumers of these gases, our study aimed to determine the spatial variation of soil gas fluxes. We installed 15 enclosures in three assemblages with five enclosures characterized by plant community in a brackish tidal wetland along Young's Bay and the Wallooskee River in Astoria, Oregon, in July 2024. The plant communities were mudflat, bulrush, and cattail. We estimated soil gas fluxes by 1) collecting gas samples at each enclosure at four time points and 2) analyzing soil cores near each enclosure in the lab. Soil incubations were performed to estimate the fluxes under fully anaerobic conditions. We aimed to 1) determine whether gas fluxes varied according to plant community type and 2) assess whether gas flux estimates from lab assays were related to field gas flux measurements. Our results showed no clear relationship between plant community and gas emissions, but significant differences were found between enclosure groups for N_2O using our field flux measurements and for CH_4 and CO_2 for our lab assay measurements. We did not find correlations between field-measured fluxes and results from soil assays for any of the gases. The lack of difference by plant community suggests that variations in gas flux may be better detectable over a broader area than by fine-scale differences in plant communities. We did not find a significant correlation between the estimated flux measurements using our soil samples and the field flux measurements. Our soil analysis method may not be effective in predicting field fluxes, as lab assays likely created conditions that did not fully replicate the field settings. By better understanding how wetlands release gases we can better understand their role in climate change.

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