



Invading *Phragmites australis* stimulates methane emissions from North American tidal marshes

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Most studies concerned with invasive plant species focus on effects on biodiversity, while only few have investigated how the greenhouse gas balance of an ecosystem or, in particular, how methane emissions are affected by invasion driven shifts in plant species composition. In this study, conducted in brackish marsh sites of the Chesapeake Bay, United States, we investigated the effect of the none-native grass *Phragmites australis* invading native shortgrass communities on methane emissions. In situ gas flux measurements using static chambers were used to quantify methane emissions along transects of progressive invasion by *Phragmites*. Methane emissions were several fold higher in *Phragmites* stands than in adjacent native communities and increased with progressive invasion of *Phragmites*. Results of a mesocosm experiment support our field observations and show consistently higher methane emissions from mesocosms planted with *Phragmites* even at different hydrological conditions. Because tidal marshes, as blue carbon ecosystems, sequester soil carbon rapidly and emit methane slowly compared to other wetland ecosystems, they are increasingly recognized as having a high carbon value. Our results indicate that the replacement of native marsh communities by *Phragmites* may considerably change the green house gas balance of these ecosystems and thus lower their carbon sequestration value.