Spatial variability of inorganic carbon export from intertidal salt marshes

JOSEPH TAMBORSKI[1], MATTHEW CHARETTE[1], BARRET KURYLYK[2], PAUL HENDERSON[1], MEAGAN EAGLE GONNEEA[3], KEVIN KROEGER[3], ZHAOHUI ALECK WANG[1]

[1]Department of Marine Chemistry & Geochemistry, Woods Hole Oceanographic Institution, Woods Hole, MA, 02543 (jtamborski@whoi.edu)

[2]Centre for Water Resources Studies, Dalhousie University, Halifax, NS B3H 4R2

[3]Woods Hole Coastal and Marine Science Center, U.S. Geological Survey, Woods Hole, MA 02543

Intertidal salt marsh respiration generates dissolved inorganic carbon that is exported to the coastal ocean by tidal drainage. The relative magnitude and spatial variability of carbon export remains poorly understood, despite recognition that these ecosystems are an important "blue carbon" sink. We constrained the spatial and temporal variability of DIC export from an intertidal salt marsh of the U.S. northeast region (Winter 2018, Spring 2019). Temporal variability was constrained from a surface water tidal time-series that combines tidal creek DIC concentrations, high-frequency surface water flux measurements and a hydrodynamic model to capture the net, lateral DIC export from tidal marsh drainage over time. To constrain spatial variability in DIC export, we collected a transect of sediment cores from the tidal creek towards the interior of the marsh platform. Disequilibrium between ^{224}Ra and its sediment-bound parent ^{228}Th indicate significant porewater exchange within the upper few centimeters of the marsh platform, with the greatest ^{224}Ra flux closest to the tidal creek. ^{224}Ra fluxes combined with shallow porewater DIC concentrations constrain the magnitude of DIC export to 30 – 1200 mmol m^{-2} d^{-1} during winter 2018, with the greatest area-normalized fluxes occurring away from the tidal creek due to higher porewater DIC concentrations. Results will be compared between the tidal time-series and ^{224}Ra:^{228}Th disequilibria to elucidate spatial variability in DIC flux over winter and spring seasons.