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# Exchanges and photo-biogeochemical transformation of dissolved organic compounds in Eastern US tidal marsh ecosystems.

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The role of tidal marshes as sources, sinks and/or transformers of biologically important nutrients, carbon and pollutants has been studied in various marsh-estuarine environments and geomorphological settings. Although there is no consensus on the magnitude and direction of marsh-estuary net (particulate and dissolved) organic fluxes, most previous studies suggest that salt marshes export dissolved organic carbon (DOC) to the surrounding estuarine waters. There has been less attention, however, to the influence of transformations on marsh-exported organic carbon composition or "quality". Yet, carbon composition affects a wide variety of estuarine processes, including microbial respiration and photochemistry. Our objectives in this study were to quantify the photo-reactivity and bio-availability of dissolved organic carbon compounds exported from tidal wetlands of the Chesapeake Bay and determine their effects on the optical properties of colored organic matter (CDOM). We quantified DOC bioavailability with two assays of microbial mineralization: the traditional batch incubation approach in which a suspension of DOM and microbial cells (1 $\mu$m filtrate) was incubated in bottles for 7 d, and a continuous-flow bioreactor approach in which DOC (0.2 $\mu$m filtrate) was passed through a microbial community that had been pre-established on glass beads from the same source water. Photochemical degradation was measured after a 10h exposure to filtered xenon irradiance simulating midday surface exposure. We measured decreases in CDOM absorption and fluorescence spectra, DOC concentrations, changes in molecular weight distribution, and increases in dissolved inorganic carbon (DIC) and CO2. Results provide important insights on the transformation, fate and cycling of marsh-exported organic compounds, and the role of tidal marsh systems as major regulators of short-scale biological, optical and biogeochemical variability in highly dynamic coastal margins and catchment areas.