ABSTRACT

Much effort has been directed at understanding the rate of carbon accumulation, cycling, and long-term storage in wetlands. Studies have ranged from site-specific determinations of soil organic matter accumulation rates to region-wide accumulation rates, and ultimately to global assessments of the total carbon mass stored in wetland soils during the Holocene. Much recent interest has focused on changes in wetland carbon reservoirs during historical times— primarily human induced. The importance of wetland shoreline erosion and drowning as factor in the carbon budget of coastal wetlands is yet to be adequately quantified. This study incorporates new carbon accumulation data from two estuarine marsh sites with additional carbon data collected from the literature to estimate the annual, erosion-induced flux of carbon from wetlands in the Albemarle-Pamlico-Currituck Sound system in eastern North Carolina.

The annual loss of carbon through shoreline erosion (9.3×10^{10} g yr^{-1})is roughly equal to that accumulating at the surface of estuarine wetlands in the Albemarle-Pamlico-Currituck Sound system (7.2×10^{10} g yr^{-1}). If sea-level rise rates, and thus erosion rates, increase over the next century as predicted, wetland carbon loss through erosion will overwhelm accumulation in estuarine wetlands. It is likely that estuarine wetland systems are already shrinking in response to rising sea levels.

Accounting for sources of organic carbon is crucial to the understanding of the functional aspects of an estuary. It is apparent that the erosion of estuarine wetlands is a substantial source of carbon to the Albemarle-Pamlico-Currituck Sound system. As most shoreline erosion is event driven, the export of carbon from the marsh sediments to the estuary probably occurs in large pulses, most likely seasonally. Future efforts assessing the relative importance of allochthonous and autochthonous sources of carbon in estuaries with eroding wetland shorelines should consider this process in attempt to understand the fate of carbon exported in such pulses.