

Marsh soil responses to nutrients: belowground structural and organic properties

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Coastal marsh responses to nutrient enrichment apparently depend upon soil matrix and whether the system is primarily biogenic or minerogenic. Deteriorating organic rich marshes (Jamaica Bay, NY) receiving wastewater effluent had lower belowground biomass, organic matter, and soil strength, larger rhizomes, and greater carbon dioxide emission rates than stable marshes. The deteriorating marshes maintained soil volume through production of larger diameter rhizomes and swelling of waterlogged peat, and kept pace with sea level rise. In contrast, marsh responses to 12 years of fertilization in a minerogenic marsh system (North Inlet, SC) were an increase in organic matter, an increase in rhizomes, a decrease in fine roots, and an increase in carbon dioxide emission rates. Other marshes in this system were influenced by nutrient inputs associated with residential development. These marshes had significantly larger rhizomes, more organic matter, and higher carbon dioxide emission rates compared to marshes at the mouth of the system, which is dominated by exchange with bay waters. The results suggest sediment inputs in minerogenic systems may have a mitigating effect on coastal marsh response to nutrient inputs.