Simulation of Marsh Growth Under Rising Sea Levels

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**Abstract:**

A method for computation of the rise of a marsh surface is presented that includes the effects of tidal and sea level variations, aggregation and deposition of cohesive suspended sediments, and the density and organic matter content of the marsh soil. An effective suspended sediment concentration in the flooding waters is obtained by calibration. Measurements of historical surface elevations can be used to include the effects of subsidence and consolidation. A demonstration of the model shows that the effects of deviations in sea level can have long lasting effects on marsh elevations.

**Subject Headings:** Seas and oceans | Suspended sediment | Computing in civil engineering | Tides | Density (material) | Floods | Calibration | Simulation models

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Rising sea levels lead to higher storm waves, and increasing probabilities of dike failure by wave overtopping. Salt marsh-dependent species are vulnerable to impacts of sea-level rise (SLR). Site-specific differences in ecogeomorphic processes result in different SLR vulnerabilities. SLR impacts to Ridgway’s rail (Rallus obsoletus) of Southern California (SC) and San Francisco Bay (SF), U.S.A. could foreshadow SLR effects on other coastal endemic species. We use field-based observations to propose a relationship between vegetation growth and tidal range and to adapt two numerical models of marsh evolution to explicitly consider the effect of tidal range on the response of the marsh platform channel network system to accelerating rates of sea level rise.