AGU PUBLICATIONS

Earth's Future

RESEARCH ARTICLE
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Contributions of organic and inorganic matter to sediment volume and accretion in tidal wetlands at steady state

James T. Morris[1], Donald C. Barber[2], John C. Callaway[3], Randy Chambers[4], Scott C. Hagen[5], Charles S. Hopkinson[6], Beverly J. Johnson[7], Patrick Megonigal[8], Scott C. Neubauer[9], Tiffany Troxler[10], and Cathleen Wigand[11]

Figure 1. Best fits of the power function (– – –) BD = a LOI^b and ideal mixing model (——) BD = 1/[LOI/k_1 + (1 − LOI)/k_2)] to the complete collection of 5075 sediment samples from 33 tidal marshes and mangroves distributed around the United States. The data in Figure 1 are available in Appendix S1, Supporting Information.

Challenge: Soil carbon accretion rates dominate long-term C storage in tidal wetlands

Advances from Morris et al (2016):

1 – bulk density and organic matter are tightly coupled, allowing QA of wetland soil profiles

2 – carbon density (g C cc^{-1}) is thus strongly constrained at ~0.03±0.02 (99% CI)

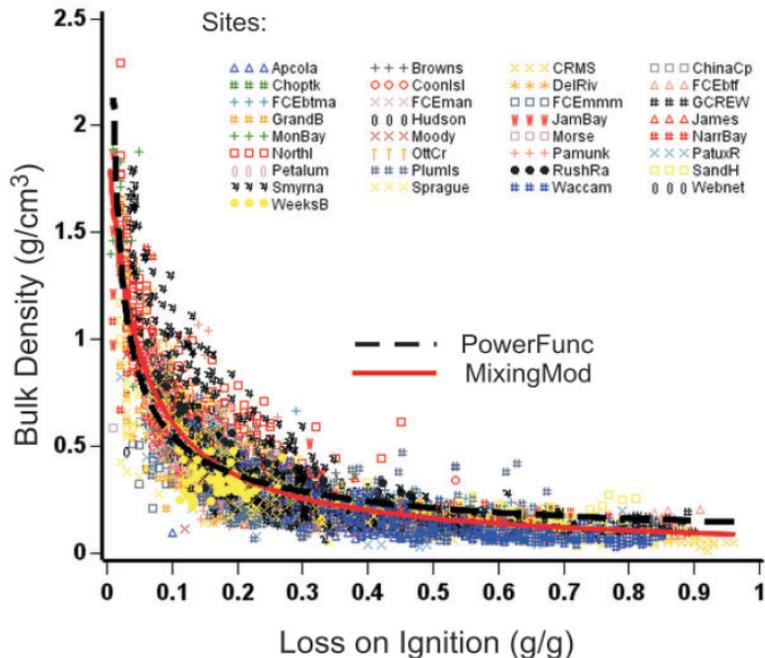3 – maximal accretion rates can be derived by applying upper limits of key drivers (primary productivity and sediment delivery)