

20 Years of sea-levels, accretion, and vegetation on two Long Island Sound salt marshes.

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The long-term 1939-2013 rate of RSLR (Relative Sea-Level Rise) at the New London, CT tide gauge is ~2.6 mm/yr, near the maximum rate of salt marsh accretion reported in eastern Long Island Sound salt marshes. Consistent with recent literature RSLR at New London has accelerated since the 1980s; inter-annual variability can be high, but over the last three decades rates have averaged ~4.5 mm/yr, more than double the first 40 years of the New London record. Marsh surface elevation has been followed for 10 years with a SET array at the Barn Island system on Little Narragansett Bay and 20 years using an accretion pin array at Mamacoke Marsh on the Thames River. From 2003 – 2013 accretion averaged 2.3 mm/yr on the Barn Island marshes while RSLR increased 5.4 mm/yr. The increased hydroperiod is driving vegetation change at Barn Island, particularly in areas that started with lower “elevation capital”. Over two decades Mamacoke accretion closely matched RSLR: 4.7 vs 4.9 mm/yr, with no significant shifts in vegetation. For the 1<sup>st</sup> 12 years at Mamacoke, accretion was slower than RSLR: 3.2 vs 8.1 mm/yr. From 2006 to 2014, however elevation increase averaged 7.0 mm/yr while sea level rose just 7 mm. By 2014 accretion rates across the marsh ranged from 1.3 to 16.1 mm /yr. Preliminary core analysis confirms highly organic peat, but reveals sand concentrations at 2–4 cm in some areas, suggesting that Hurricanes Irene (2011) and Sandy (2012) may have contributed to Mamacoke’s rapid elevation gain between 2006 and 2014. With an expected increase in storm surges associated with climate change and the location of Mamacoke marsh about 8 km north of the mouth of the river, the marsh may receive periodic pulses of sediment that allow the system to keep up with the current rate of sea level rise. Accretion rates on the marsh landscape were variable, however, which may result in a mosaic of vegetated patches interspersed with newly ponded areas, and an overall wetter marsh landscape.