

The effects of wind speed, river discharge, and tides on the settling rate of marine sediments in Castine Harbor and Smith Cove, Penobscot Bay, Maine

Physical environmental forces such as wind, tides, and precipitation increase the suspended sediment concentration in water. Increasing suspended sediment concentration leads to settling and deposition of particles. To understand the effects that these three environmental factors have on the settling rate, the average wind speed, average tidal range, and precipitation totals were monitored concurrently for six weeks with the settling rate of sediment in Castine Harbor and Smith Cove, Penobscot Bay, Maine. Settling rates were estimated weekly using cylindrical sediment traps at both deployment locations and environmental data were collected from online resources. Results show that during two of the six collection periods, Castine Harbor showed a significantly higher settling rate than Smith Cove. A multiple linear regression model revealed the predictive power of the two most influential environmental factors: the average wind speed and tidal range. A model consisting of the average wind speed and average tidal range was highly correlated to the observed settling rate however, this model was only able to predict 27.3% of the variability in the settling rate. I interpret the settling rate to be correlated to the measured factors, and likely controlled by a complex interaction of the monitored and other unmonitored environmental forces. Understanding the environmental conditions that increase sediment concentrations is required for constructing strongly predictive models which can reveal sediment deposition and settling rate patterns.