



Precision Monitoring of Water Level in a Salt Marsh with Low Cost Tilt Loggers

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Several salt pannes and pools in the Sage Lot tidal marsh of Waquoit Bay system, MA were instrumented with newly developed Arm-and-Float water level gauges (utilizing accelerometer tilt logger) permitting to record water level fluctuations with accuracy of 1 mm and submillimeter resolution. The methodology of the instrument calibration, deployment, and elevation control are described. The instrument performance was evaluated. Several month long deployments allowed us to analyze the marsh flooding and draining processes, study differences among the salt pannes. The open channel flow flooding-draining mechanism and slower seepage were distinguished. From the drain curve the seepage rate can be quantified. The seepage rate remains approximately constant for all flooding draining episodes, but varies from panne to panne depending on bottom type and location. Seasonal differences due to the growth of vegetation are also recorded. The analysis of rain events allows us to estimate the catch area of subbasins in the marsh. The implication for marsh ecology and marsh accretion are discussed. The gradual sea level rise coupled with monthly tidal datum variability and storm surges result in migration and development of a salt marsh. The newly developed low cost instrumentation allows us to record and analyze these changes and may provide guidance for the ecological management.