SHORT-TERM, SMALL-SCALE EFFECTS OF TURBULENCE, FLOCCULATION, AND METEOROLOGICAL EVENTS ON SEDIMENT TRANSPORT IN THE BLY CREEK TIDAL CHANNEL, NORTH INLET, SOUTH CAROLINA

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ABSTRACT

Velocity and suspended sediment concentrations were collected during three deployments at a location in Bly Creek, a tidal creek basin comprising a portion of the North Inlet salt marsh near Georgetown, SC. These experiments were performed in order to obtain a better understanding of the relationship between turbulence, flocculation, particle size distributions, and suspended sediment characteristics. A 10 MHz Sontek acoustic Doppler velocimeter (ADV) measured 3-D velocities at a single point and was used to calculate the turbulent characteristics of flow. An optical backscatter (OBS) turbidity sensor was mounted in-sync with the velocimeter to measure the total suspended sediment concentration, while a laser particle size analyzer (LISST) was used to measure the size distribution in the range of 1.25-250 μm.

Friction velocity was calculated using the covariance method, turbulent kinetic energy method, and inertial dissipation method. All three values were similar, providing confidence in the methods when calculating friction velocity. It is shown that flocs increase in size as the mean current flow and friction velocity increase. The effective density and settling velocity of the flocs were found to be in agreement with published data, which lends credibility to the use of the LISST in a shallow tidal channel environment. Various fractal dimensions (*nf*) were applied to the LISST data to determine the effect of particle geometry on settling velocity. Results show that the settling velocity of most of the flocs in suspension does not change with different values of *nf*, indicating that in similar environments, the true shape of the flocs has a minimal effect on the settling velocity measured.