Spring-neap sediment dynamics within a macro-tidal salt marsh tidal creek: preliminary findings

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The purpose of this research project is to assess how the dynamics of sedimentation change in response to changes in energy between neap and spring tidal cycles. The differences in tidal prism and energy between neap and spring tidal cycles will be used as a proxy for energy extraction due to in-stream tidal power devices. This presentation will focus on some preliminary findings relating to sediment dynamics within a salt marsh tidal creek near Starrs Point within the Cornwallis River estuary in August and September of 2009. A total of 18 tides were sampled over a full range of neap to spring conditions. Sediment transport was measured using a shallow water Acoustic Doppler Current profiler (1Hz rate, 2MHZ frequency, bin size 5 cm) and co-located Acoustic Doppler Velocimeter and Optical Backscatterance Probe (16 Hz rate, 1 min burst every 5 min). A temperature and salinity probe was deployed at the mouth of the creek to monitor incoming tidal conditions. Preliminary analysis of the data indicates that 16 tides were successfully sampled and velocities ranged from 1–15 cm/s with peaks of 20–25 cm/s both near the bed on the flood tide and near the surface on the ebb. At total of 118 suspended sediment samples were collected using an automated ISCO water sampler that was deployed off a small platform on the marsh. Sediment deposition was measured using surface mounted sediment traps and will be processed for disaggregated inorganic grain size analysis using a Coulter Multisizer 3 and organic matter determination. Initial inspection of the data indicates that deposition ranged from 0.4064 g per filter to 4.6543 g. On average, spring tides recorded the highest amounts of deposition (1.6505 g per filter) compared to neap tides (1.0662 g) however these data were both spatially and temporally variable.

Atlantic Geology, 2010, Volume 46, Number 1