

## **Modeling the response of a tidally-driven salt marsh with a complex channel network**

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A field study was conducted on the main channel of Brockonbridge Marsh, which opens to the Delaware Bay, in Kent County, Delaware. The study lasted 2 weeks during March and April 2013 and encompassed a full neap-spring tidal cycle. Additionally, in the summer of 2013, two extensive surveys of the channel's bathymetry were completed. Of particular interest was understanding how the predominately semi-diurnal tide propagates throughout the marsh, given its complex network of secondary and tertiary channels. In order to measure surface elevation, five pressure gauges and an Aquadopp Profiler (ADCP) were deployed at six various locations, spanning 2.5 km along the channel. The ADCP was deployed on the bottom, facing upward, at the channel's mouth to record the velocity profile. Finally, during the spring phase, the moving-boat method with a second ADCP was used to measure discharge at the mouth. The hydrodynamics of Brockonbridge Marsh are then modeled using a quasi-3D nearshore circulation model, NearCoM, with the surface elevation data at the mouth used as a boundary condition. LIDAR data are combined with the measured bathymetry data to create an accurate 3D depiction of the marsh. The model results are compared to the data collected at all six gauge locations. Furthermore, a mathematical model is offered for computing discharge from the moving-boat data, then is extended to the upward facing ADCP data to provide a correlation between discharge and current profile. These results are finally compared to the discharge values computed from NearCoM.

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