We report on results attempting to validate OSOM against real world data collected around RIS during summer/stratified periods. We know the summer water flux into NB from RIS through the East Passage is approximately 2500–4000 m³/s, and that flux likely includes waters from the following sources: 1. The coastal current 2. Martha’s Vineyard Sound 3. Buzzards Bay (BB) 4. Deep water RIS inputs. We will use the Ocean State Ocean Model (OSOM) to understand how waters move into and between RIS, NB, and BB, but first we have to validate OSOM for RIS before we can use it to develop reliable conclusions.

We compare real world data collected during deployments of moored acoustic doppler current profilers (ADCP) sensors (2008 and 2010) and numerical model data generated using OSOM (an implementation of the Regional Ocean Model System, ROMS). We also compare real world drifter data with OSOM modeled drifters. Current velocity for both ADCP data and model-generated data are converted to “residual,” meaning the tidal component of the velocity is removed leaving water flow due to seasonal influences. This conversion makes it possible to compare data from the same time periods in different years.

Methodology

We compare real world data collected during deployments of moored acoustic doppler current profilers (ADCP) sensors (2008 and 2010) and numerical model data generated using OSOM (an implementation of the Regional Ocean Model System, ROMS). We also compare real world drifter data with OSOM modeled drifters. Current velocity for both ADCP data and model-generated data are converted to “residual,” meaning the tidal component of the velocity is removed leaving water flow due to seasonal influences. This conversion makes it possible to compare data from the same time periods in different years.

Real World Results

ADCP-Measured Northward Current
(Location: BIE, Jun 2010 – Aug 2010)

Velocity Profile

Northward Flow vs. Tidal Range

Real World Drifter Movements
(May 2016 – Jun 2016)

For model data, we start with 2006 because the necessary boundary condition and forcing files have already been created for that year. We generate data at the same locations as the ADCP deployments (marked as red and blue dots in the map above). Plots:

A. Time series of currents
B. Period-averaged currents at different depths
C. Daily-averaged currents plotted against the daily tidal range

Conclusions

1. Preliminary model-validation results are mixed but promising. The model matches real world sensor data well in some locations, but poorly in others.
2. Experimental and computer-model results suggest periods of very slow flushing in Buzzards Bay and limited exchange of water between Buzzards Bay and Rhode Island Sound.
3. These preliminary results confirm that water movement within and between RIS, NB, and BB is a valid area for investigation using computer modeling and the results will have significant implications for the health of southern New England estuaries.

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