Tidal Wetlands: Lateral fluxes

Linking in-situ and satellite measurements of CDOM to DOC dynamics

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Measurements across a range of tidal marshes along the Eastern US coastline


Monie Bay brackish marshes, MD


Kings Creek freshwater marshes, MD


Watchapreaque, Atlantic coast


Otter creek marshes


Sweet Hall freshwater marshes, VA

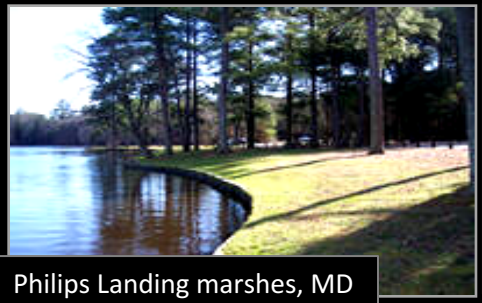

Muddy Creek (phragmites), MD


Taskinas brackish marshes, VA


Pelham Bay wetlands, LIS


Parker's brackish marshes, MD


Jack bay brackish marshes, MD


Philips Landing marshes, MD


Piermont marsh, NY


Kirkpatrick brackish marshes, MD

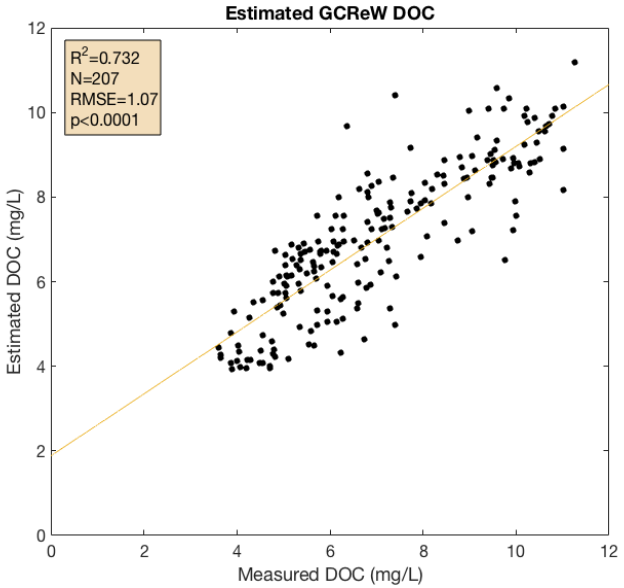

Jug Bay freshwater marshes, MD


Wetipquin marshes, MD


Blackwater Refuge marshes, MD

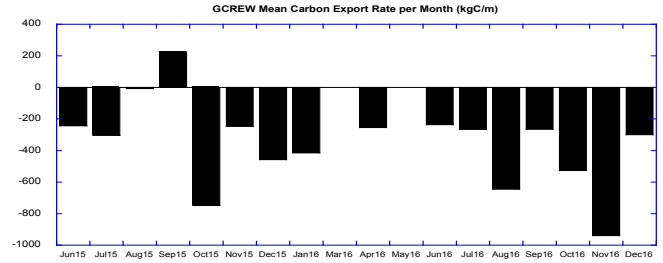
Continuous measurements of marsh-estuarine biogeochemical exchanges

- EXO2 water quality sonde for measurements of **water physicochemical/optical properties**: f_DOM, f_Chl a,, DO, conductivity, temperature, pH, turbidity, depth
- Sontek ADCP flow meter, for measurements of **water flow** and estimates of fluxes



DOC= $f(f_{DOM}, \text{Temp}, \text{pH}, \text{DO})$
$0.041 \cdot f_{DOM} + 0.044 \cdot \text{Temp} + 0.825 \cdot \text{pH} + 0.113 \cdot \text{DO} - 2.29$

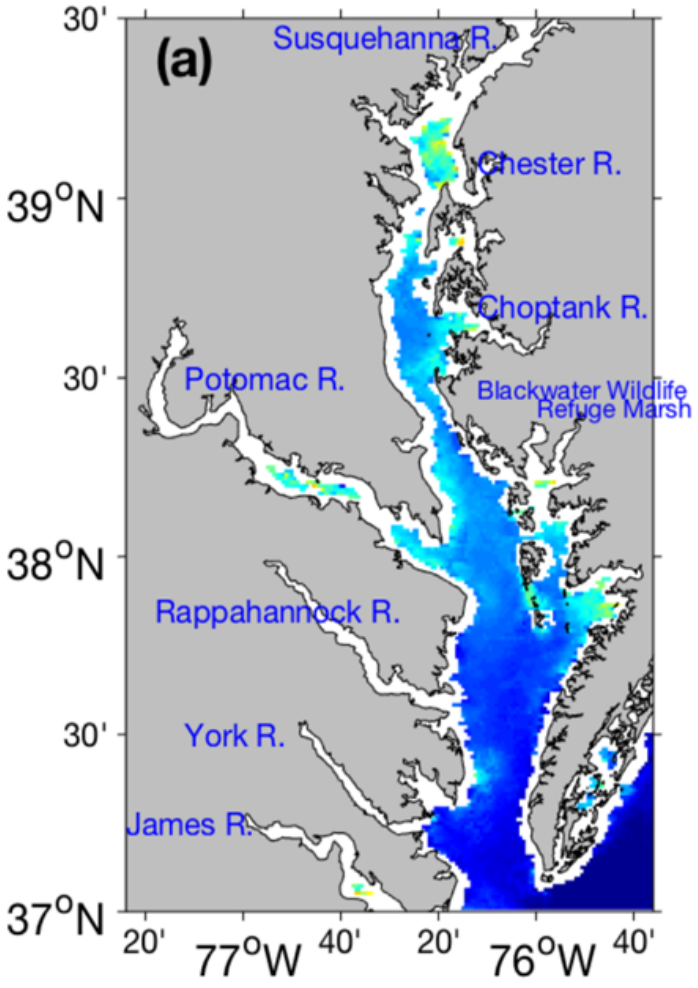
Estimated monthly DOC export from GCREW tidal marsh.



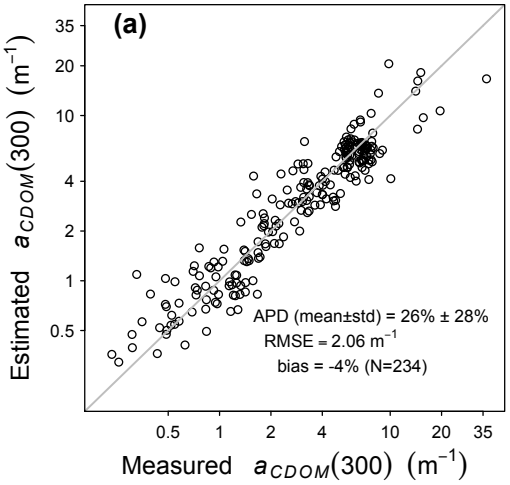
Smithsonian Global Change Research Wetland (GCREW), west Chesapeake Bay

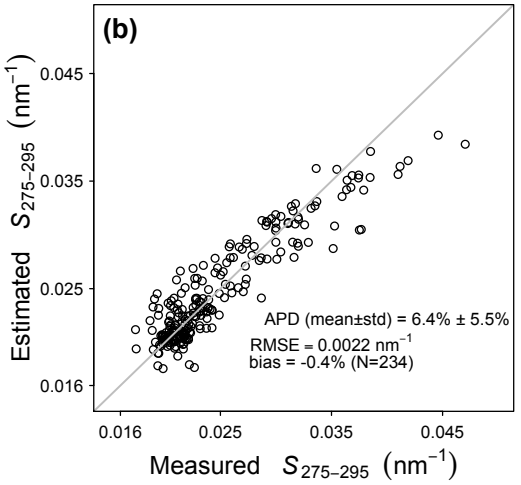
Remote Sensing of DOC and CDOM in wetland-estuarine interfaces

Challenges:
- Bio-optical complexity of estuarine margins
- Coarse spatiotemporal resolution of OC sensors

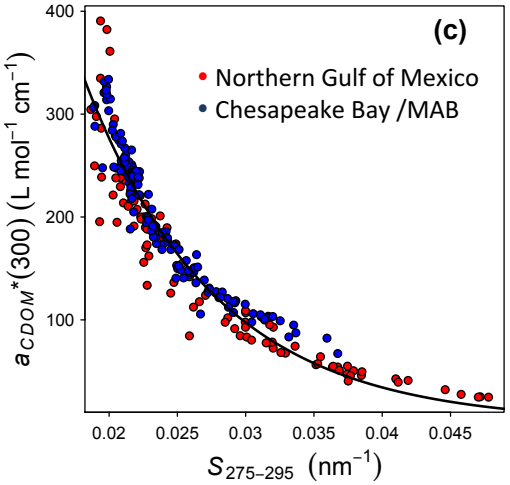


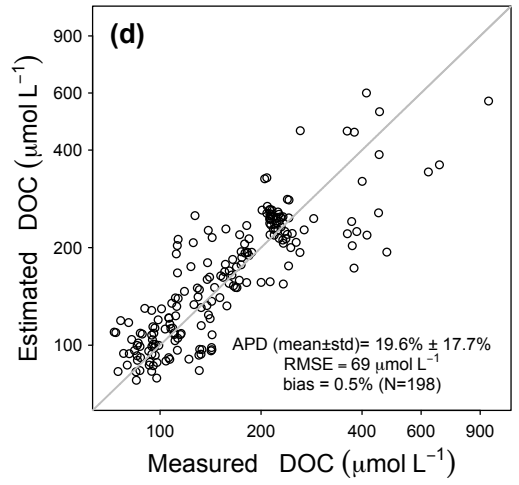
- **Full satellite-measured spectral information** included in algorithms that retrieve both CDOM absorption magnitude and CDOM absorption spectral slope





- Retrieved DOC not based on the highly variable DOC vs a_{cdom} relationship, but the **strong correlation between a^*_{cdom} and S_{cdom}**





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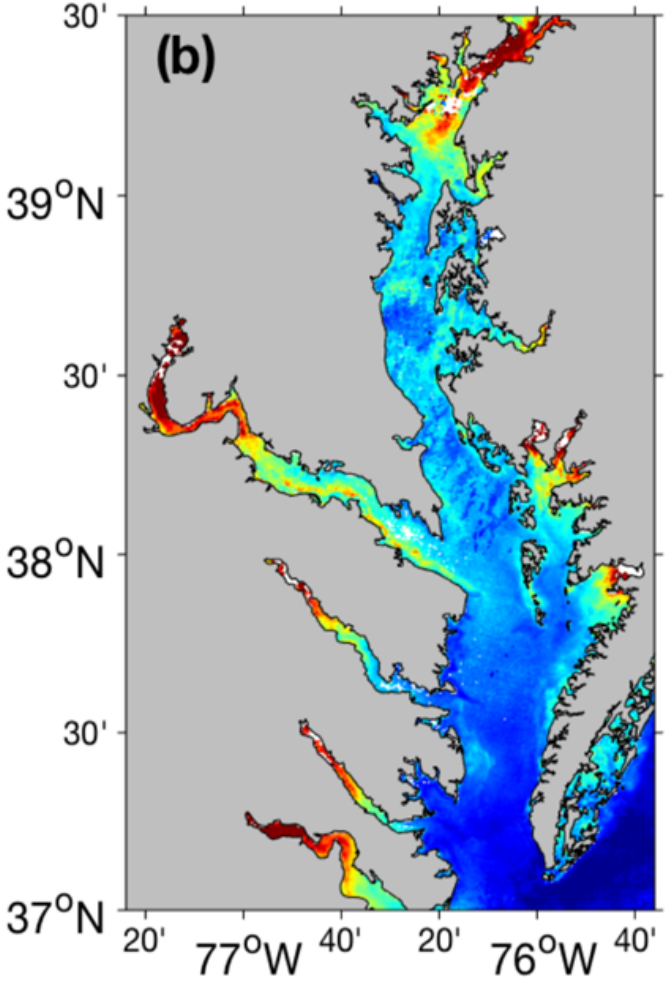
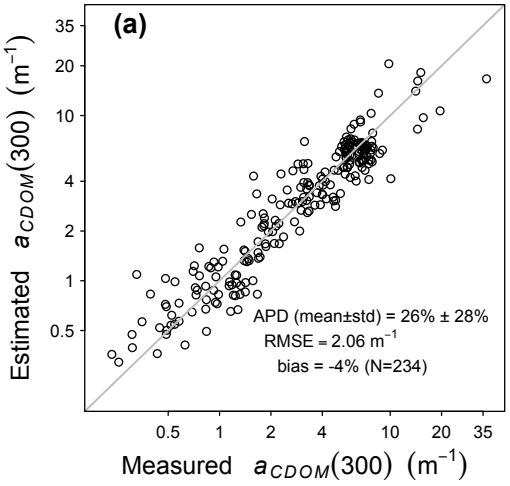
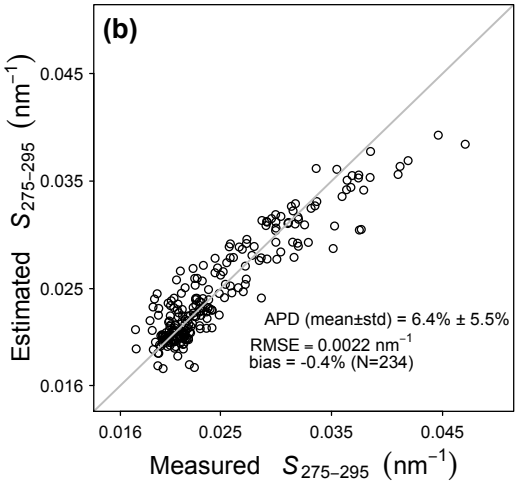


▪ Application of the algorithm to MERIS that has a good **combination of spatial resolution and spectral information**

▪ **Full satellite-measured spectral information** included in algorithms that retrieve both CDOM absorption magnitude and CDOM absorption spectral slope





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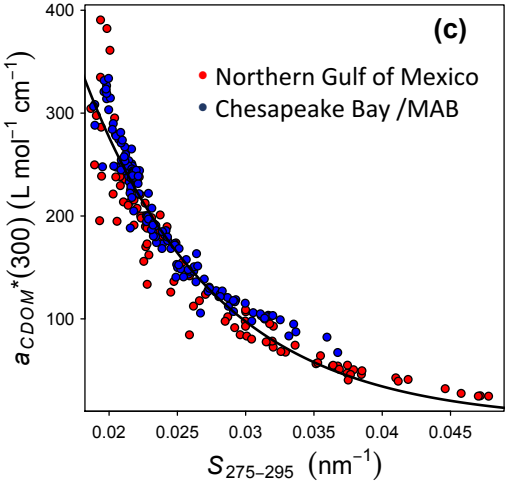
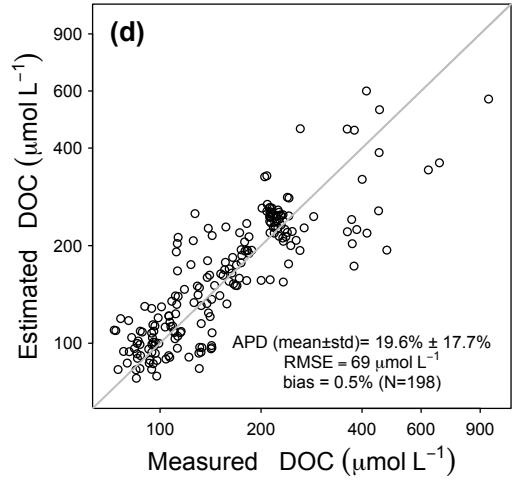
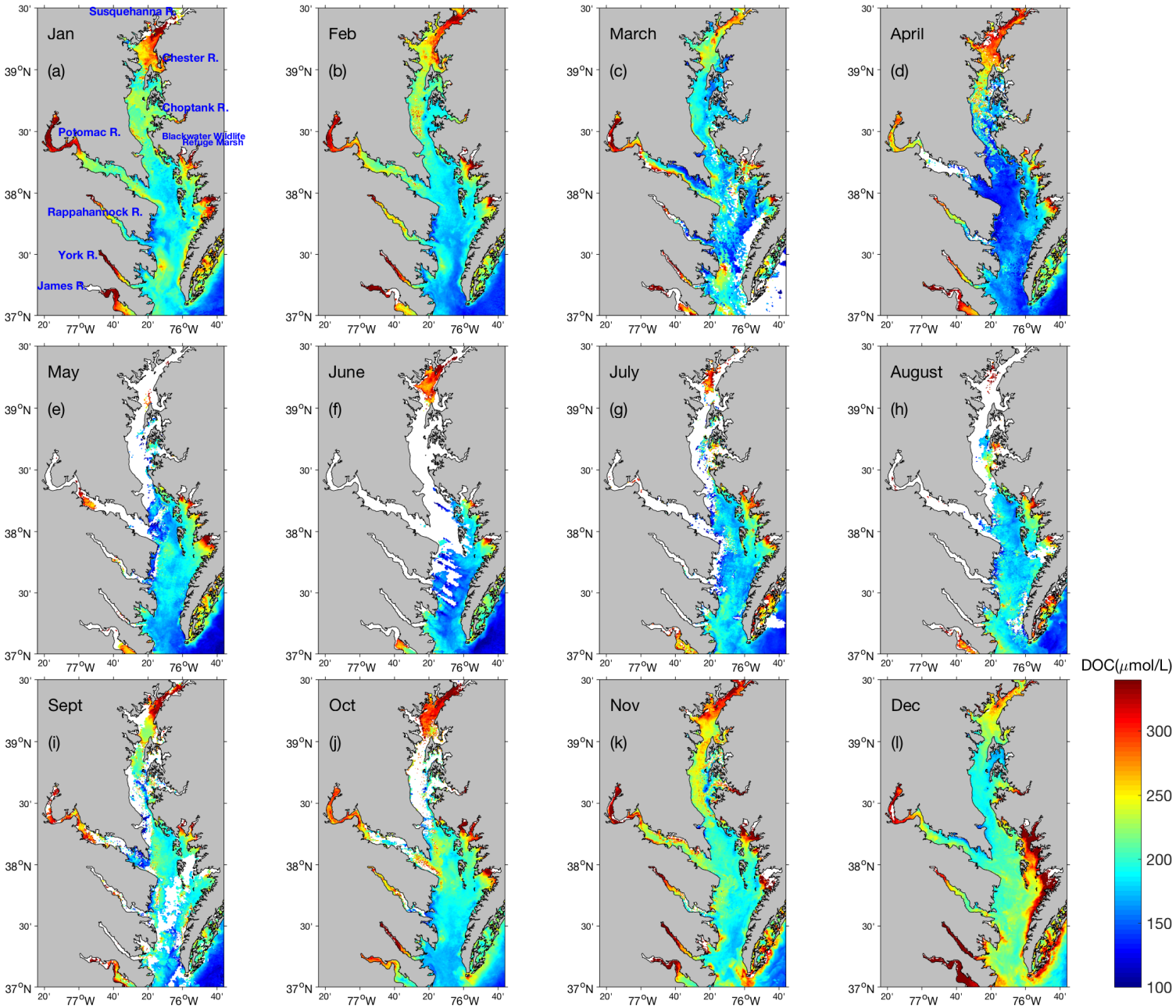
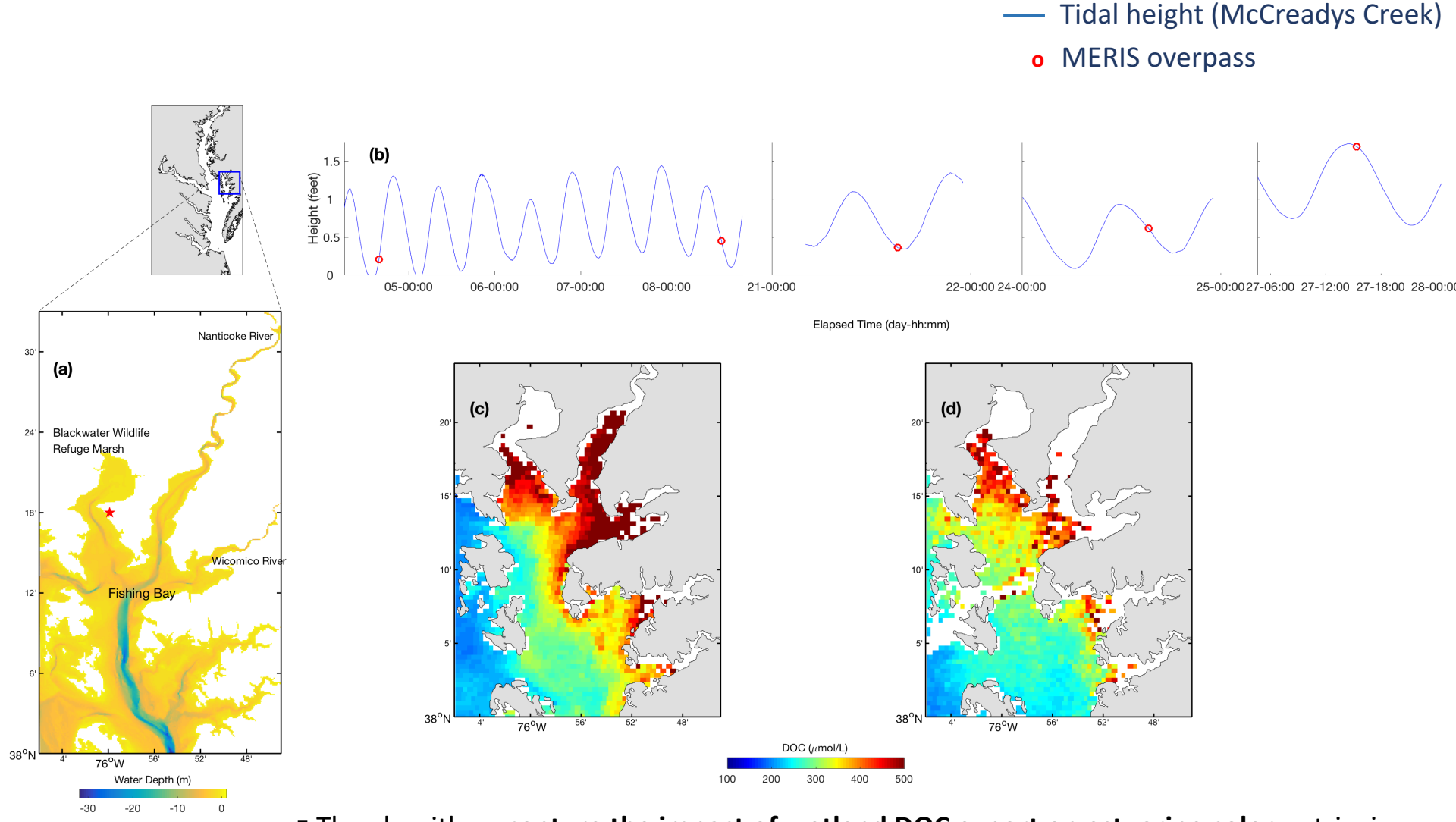




Monthly composites of the distribution of DOC in the Chesapeake Bay from MERIS -2009



Influence of tidal marsh DOC export on estuarine ocean color



- The algorithms **capture the impact of wetland DOC export on estuarine color**, retrieving much higher DOC (also, higher a_{CDOM} and lower S_{CDOM}) at LT compared to HT
- **Information on tides** should be included when interpreting satellite images in waters affected by marshes, especially when looking at composites of multiple images.