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
Continuous measurements of marsh-estuarine biogeochemical exchanges

- EXO2 water quality sonde for measurements of **water physicochemical/optical properties**:
  - f_DOM, f_Chla, DO, conductivity, temperature, pH, turbidity, depth

- Sontek ADCP flow meter, for measurements of **water flow** and estimates of fluxes

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

Estimated monthly DOC export from GCREW tidal marsh.
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**

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![Map and graphs showing CDOM and DOC measurements](image-url)
Monthly composites of the distribution of DOC in the Chesapeake Bay from MERIS -2009
The algorithms **capture the impact of wetland DOC export on estuarine color**, retrieving much higher DOC (also, higher $a_{\text{CDOM}}$ and lower $S_{\text{CDOM}}$) 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.