EUTROPHICATION, SEDIMENTS, AND TURBIDITY IN COASTAL SYSTEMS

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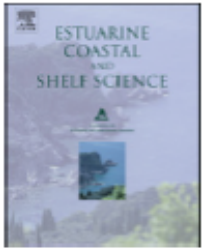
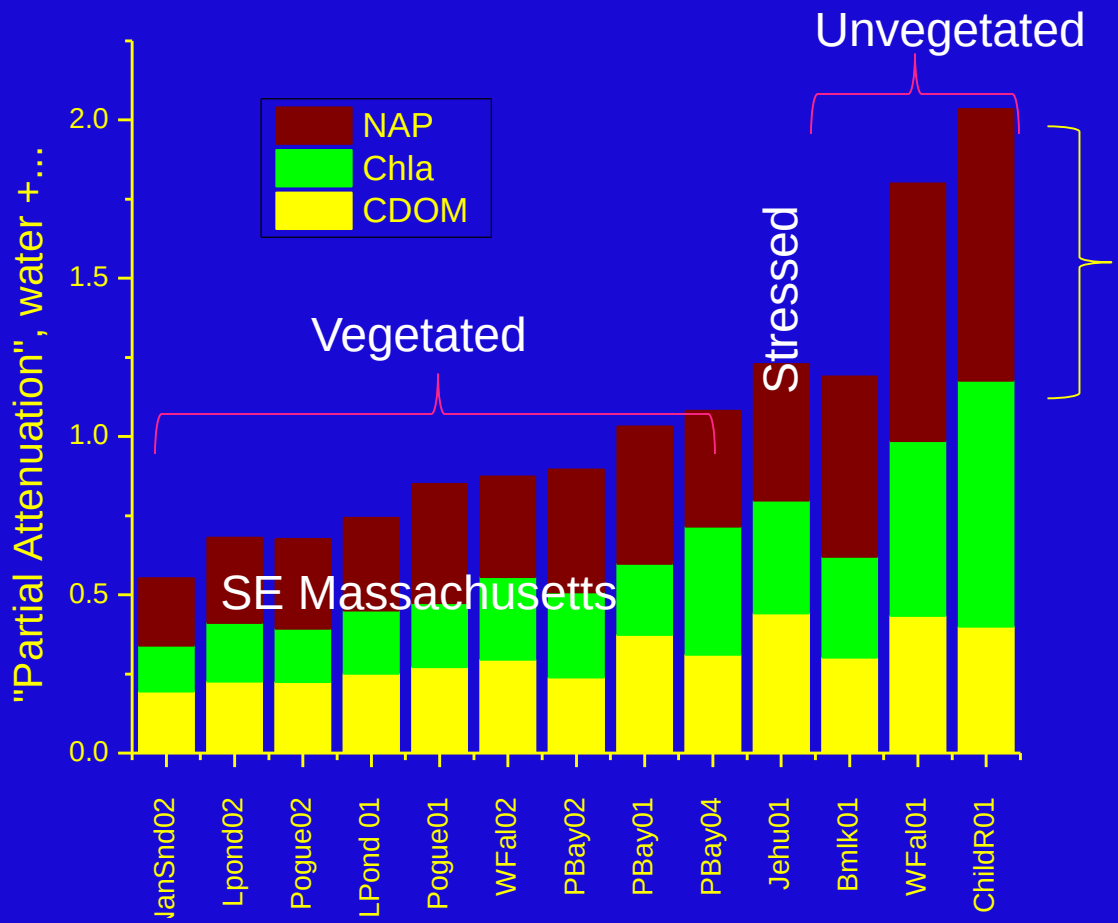


Influence of near-bottom re-suspended sediment on benthic light availability

Troels Møller Pedersen [a], Charles L. Gallegos [b], Søren Laurentius Nielsen [a,*]

[a] Roskilde University, Department of Environmental, Social and Spatial Change, P.O. Box 260, DK-4000 Roskilde, Denmark
[b] Smithsonian Environmental Research Center, P.O. Box 28, Edgewater, MD 21037, USA

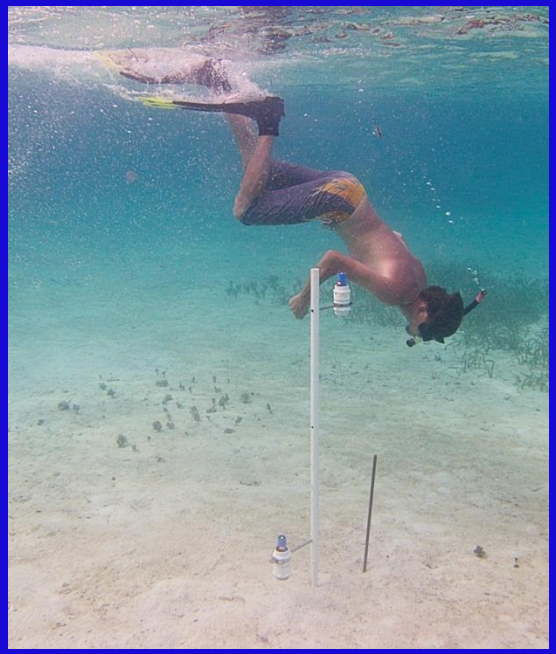
Increased Light Attenuation and Loss of Seagrass is a Common Consequence of Eutrophication

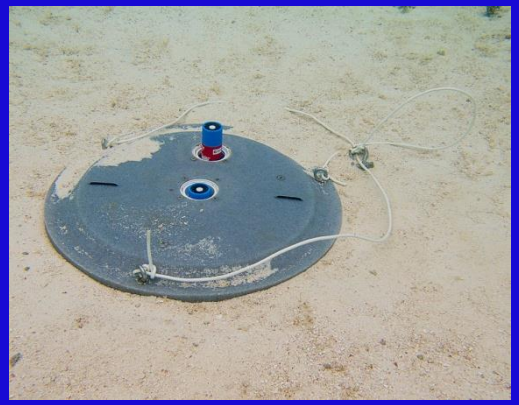


- In eutrophic bays “non-algal” particulates are an equal or dominant contributor to light attenuation with chlorophyll
- In SE Massachusetts, nutrient loading is via groundwater, not rivers
- Seagrass loss occurs due to smothering by macro algae

Comparison of light attenuation in the water column and at the sediment-water interface

Benthic fluff layer
Rhode River, MD
Develops every summer

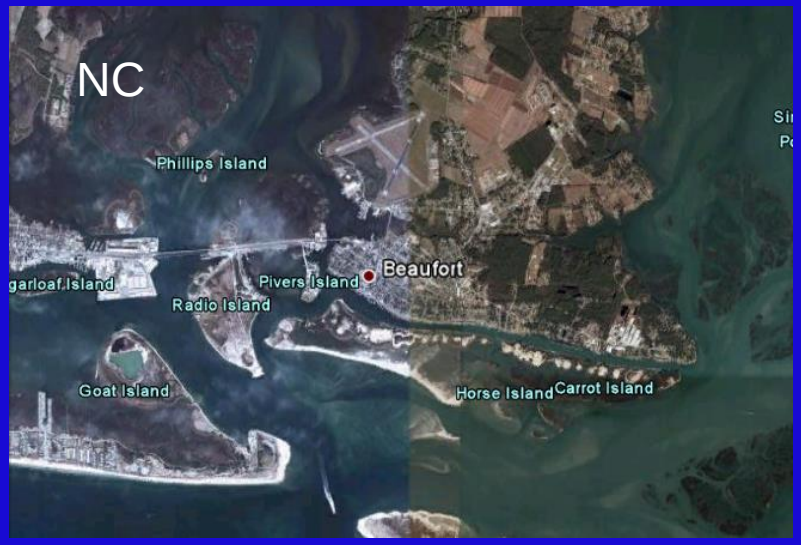


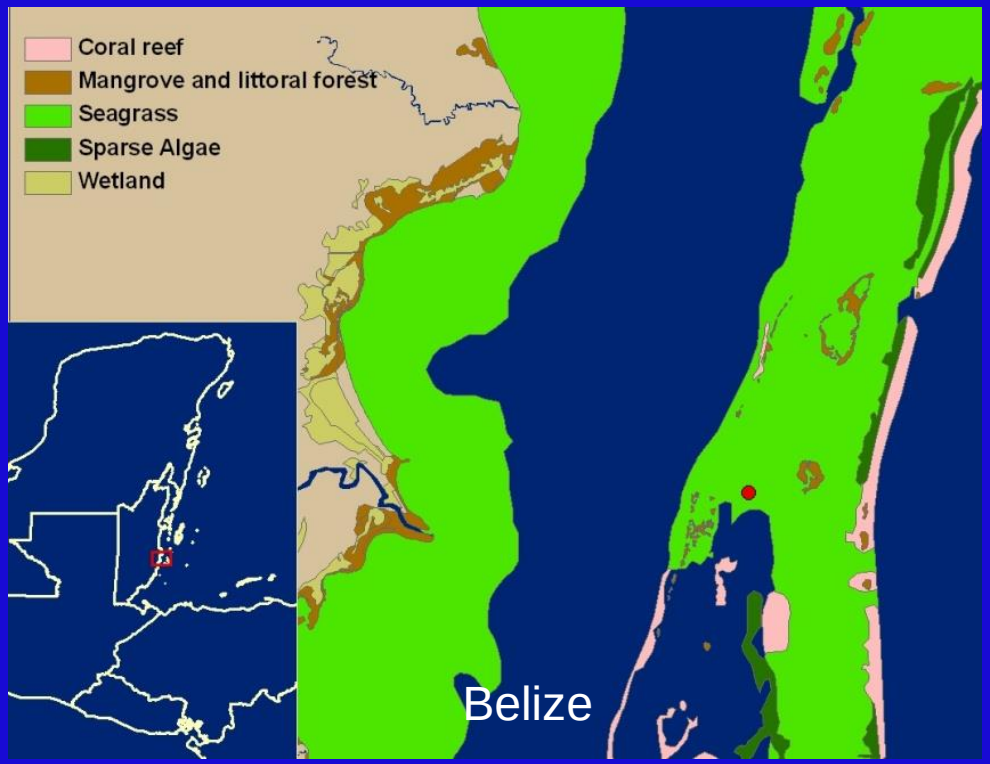


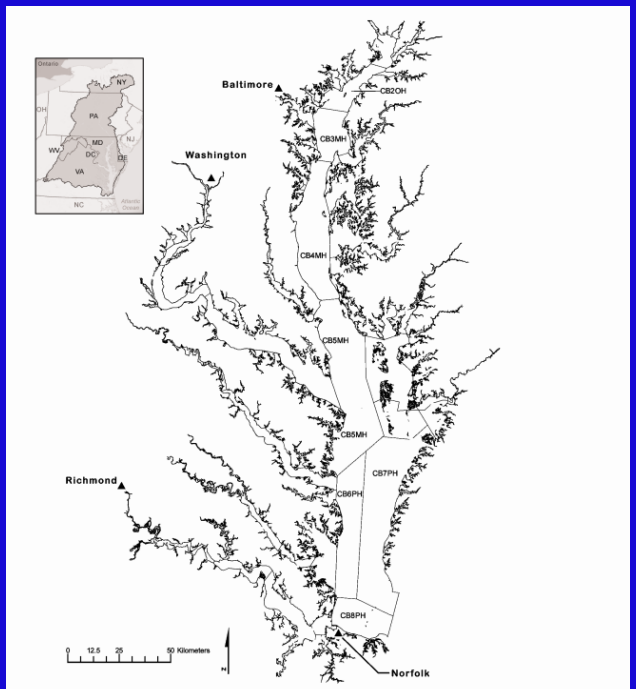
Odyssey PAR loggers

- 0.5 to 1.0 m separation in water column (WC)
- 4.5 cm separation at sediment-water interface
- Flange kept bottom sensor flush with sediment surface

Study Sites



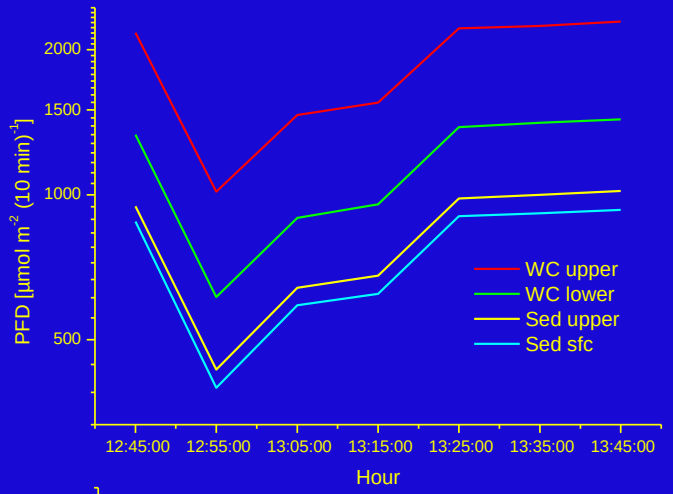


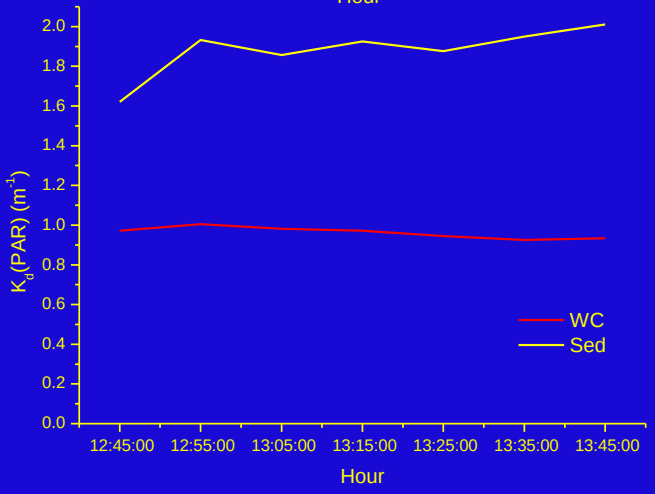


Chesapeake & MD Coastal Bays

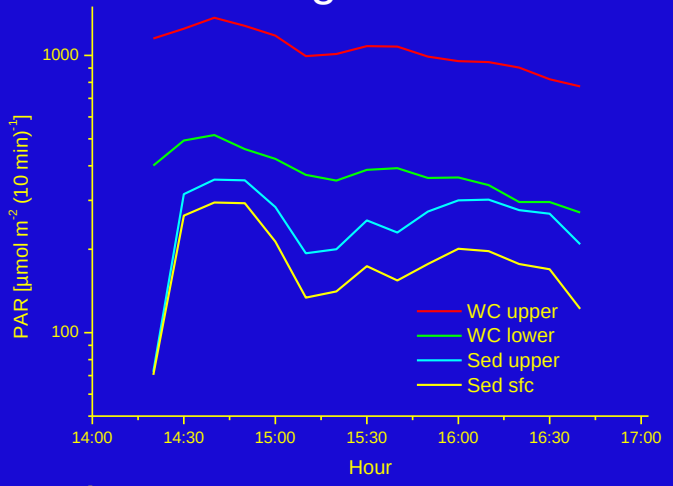
Light Attenuation at the Sediment-Water Interface—Chesapeake Tributaries

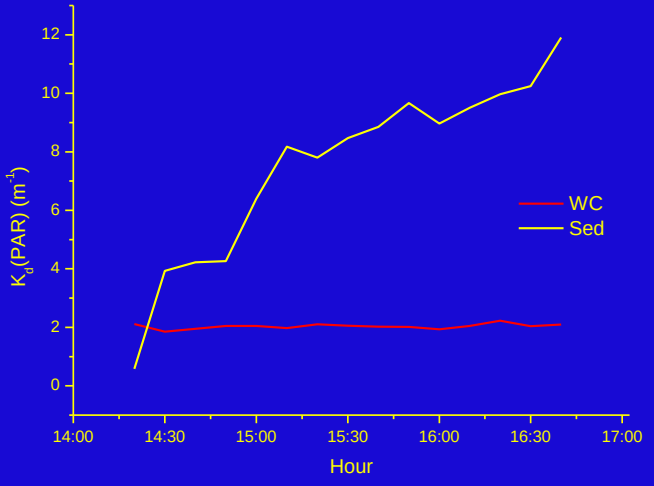
Severn River, MD 3 June 2010





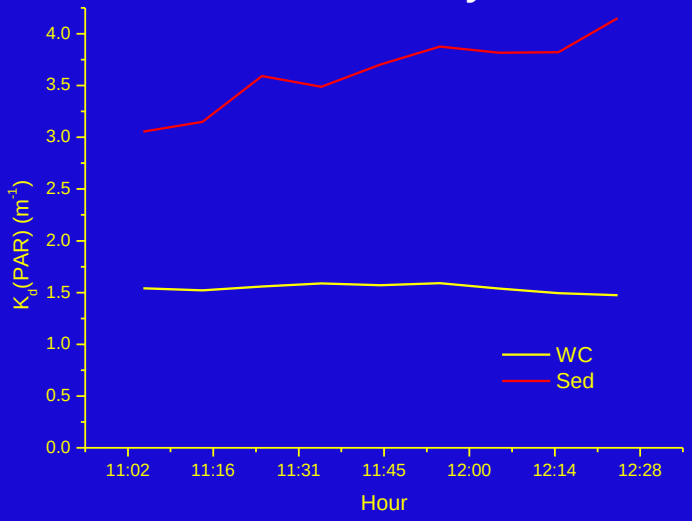
Sellman Cr., Rhode River, MD 19 Aug 2010



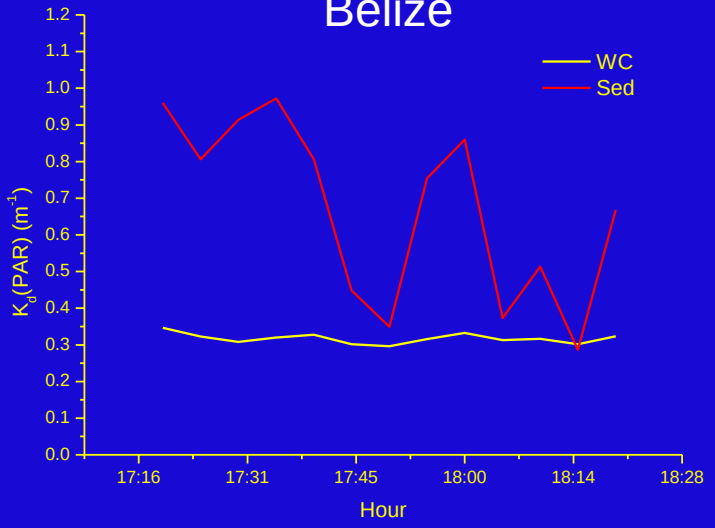


Additional Measurements

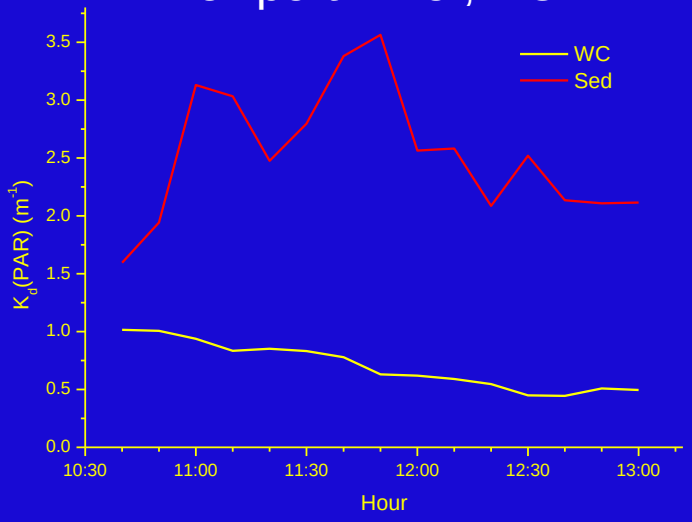
Assawoman Bay, MD



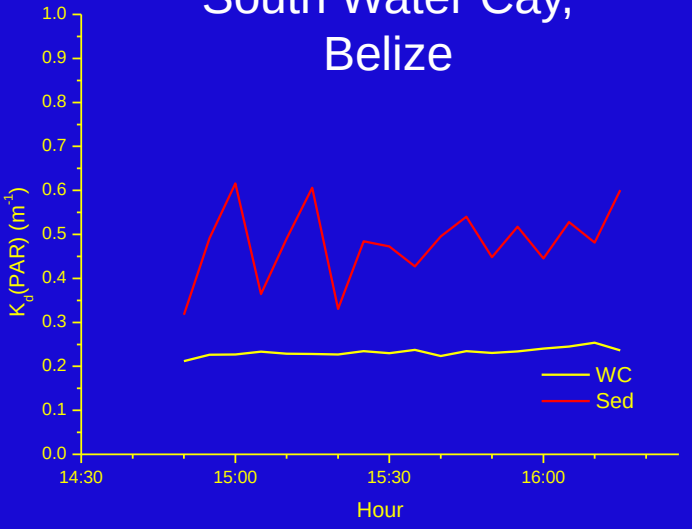
Blue Ground Range, Belize



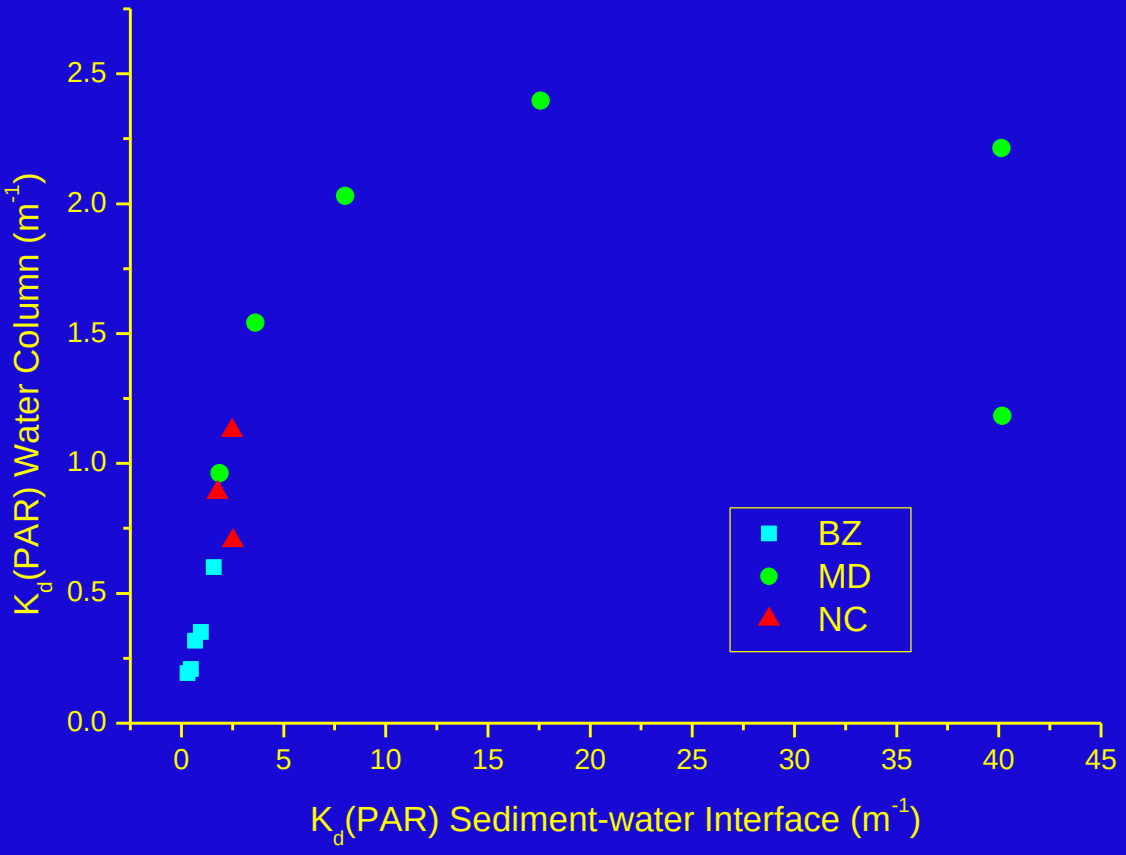
Newport River, NC



South Water Cay, Belize

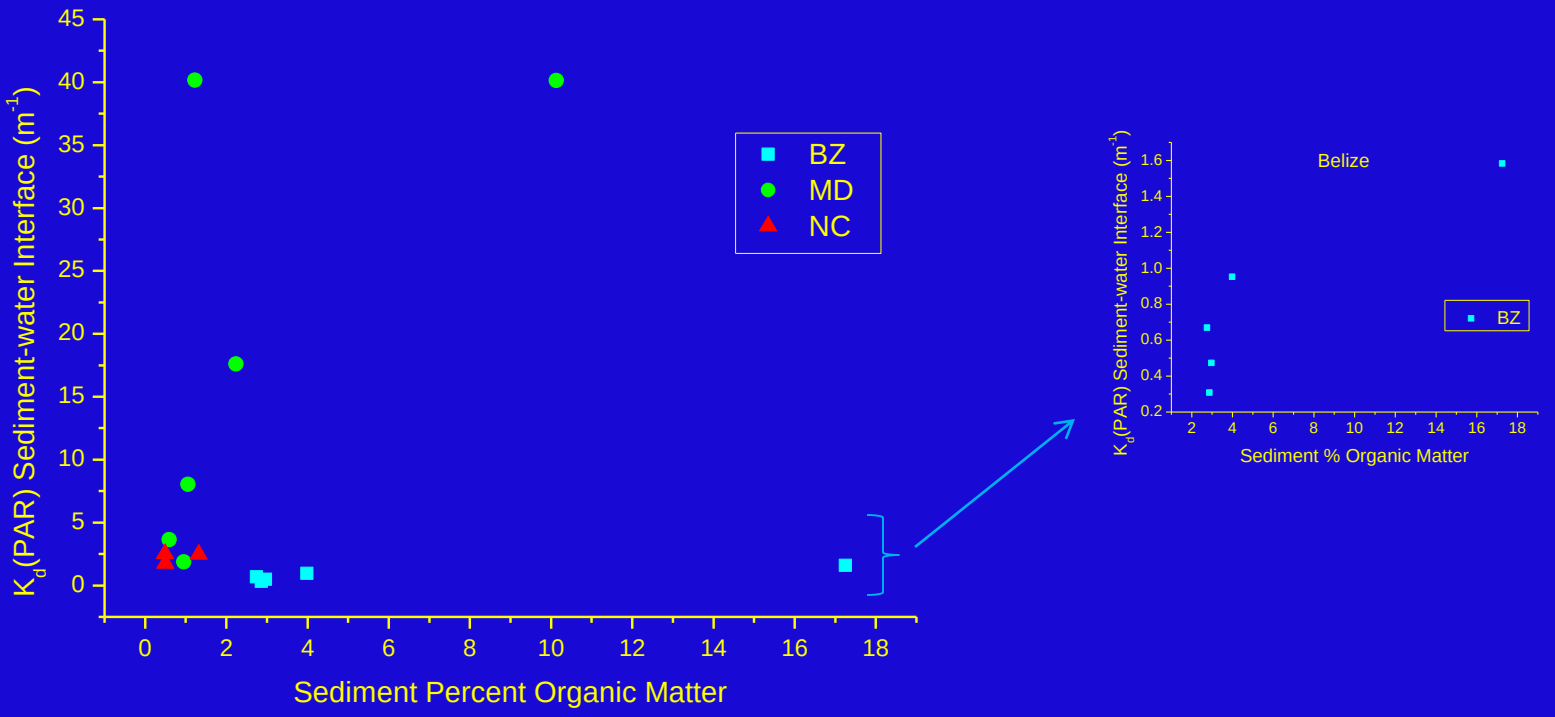


Connection to Trophic Condition



- Strong link between attenuation in water column and at the sediment-water interface
- Causality may be difficult to untangle

Connection to Trophic Condition



- Attenuation at the sediment-water interface appears related to organic content of sediment, but strong regional dependence

Conclusions

- The effect of eutrophication on light attenuation in estuaries is more than just more chlorophyll
- Higher concentrations of suspended sediments appear to result from organic loading to bottom sediments
- Seedlings and emerging shoots may receive less light than estimated from light profiles in the water column due to fluff layers near bottom
- Observations may account for some of the variation in estimated light requirements of SAV in clear vs. turbid waters

Acknowledgements:

NCCOS

Roskilde University

Smithsonian Marine Science

MassDEP Massachusetts Department of Environmental Protection

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Spotlight