

PLENARY SESSION 1. CARBON FLUXES IN COASTAL WETLANDS: WHAT IS STATE-OF-THE-ART?

Chairs:

Chris Osburn (NCSU)

Z. Aleck Wang (WHOI)

Maria Tzortziou (CUNY)

Kevin Kroeger (USGS)



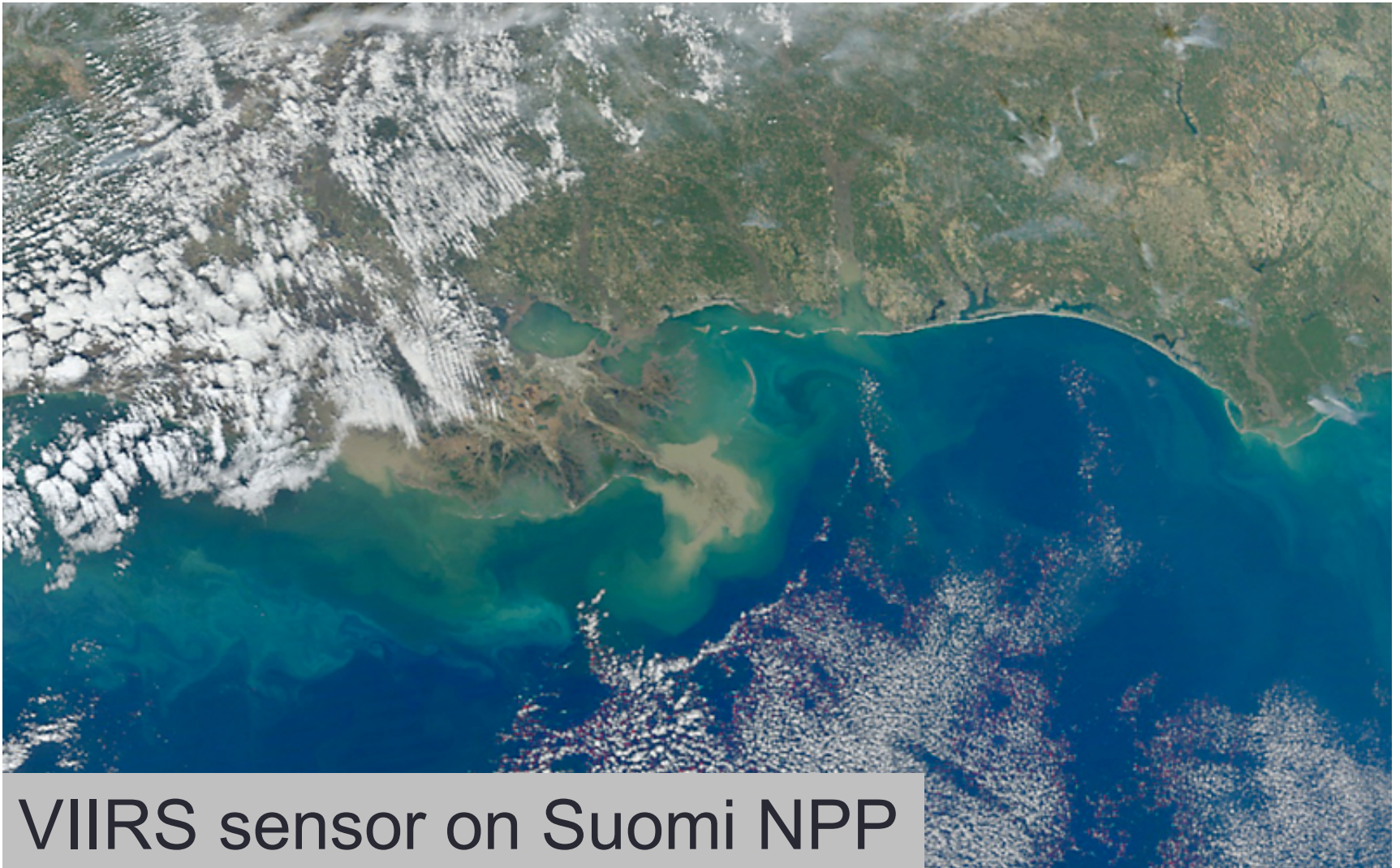
Marine, Earth, & Atmospheric Sciences

NC STATE UNIVERSITY

Overview of the Session

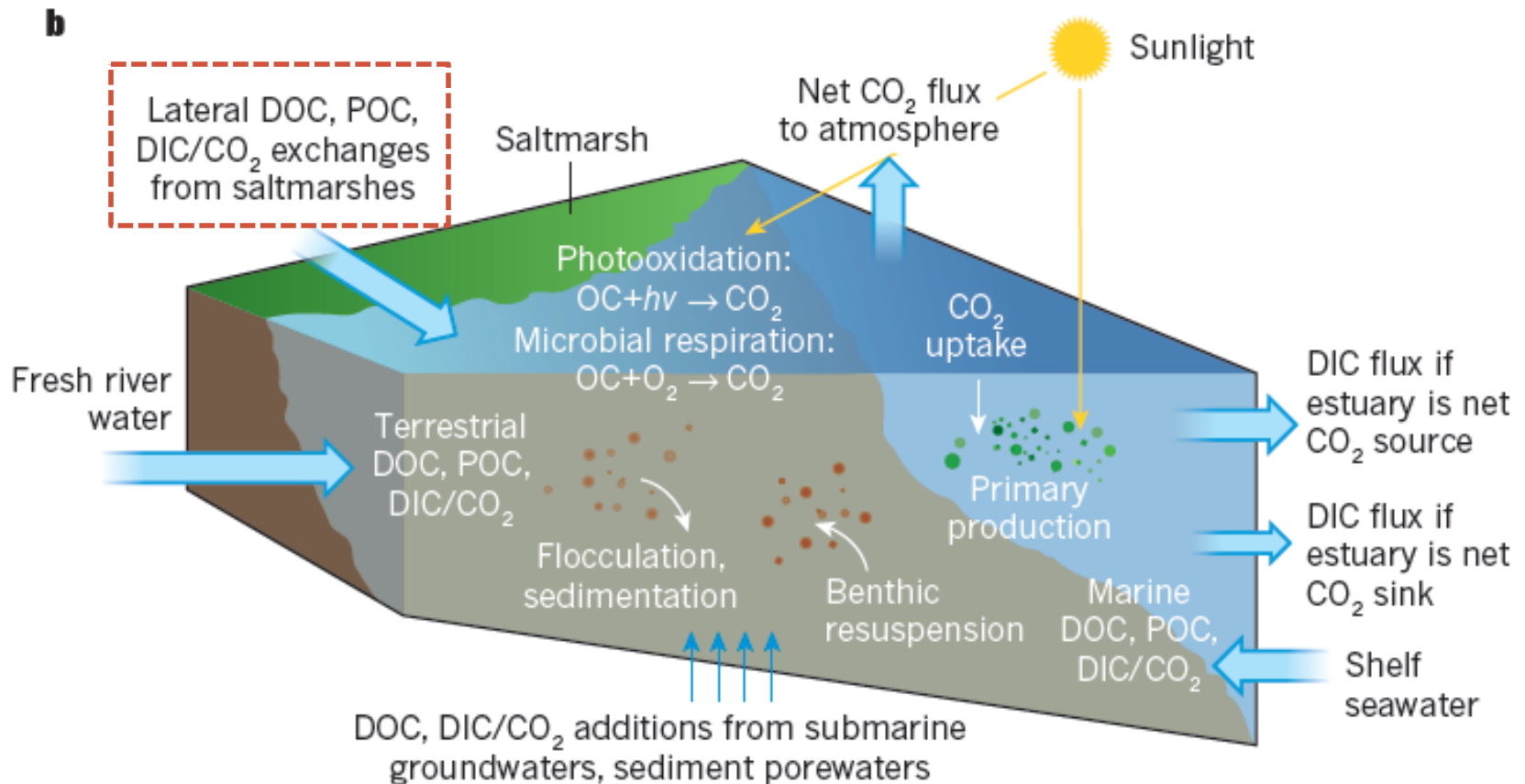
- **The Big Picture:**
 - Importance of the terrestrial-marine linkage
 - Loss of **blue carbon** from coastal wetlands
- **Plenary talks**
 - Ray Najjar – “Carbon budget of eastern North American tidal wetlands and estuaries”
 - Lisamarie Windham-Myers – “Coastal wetland carbon accounting: Using U.S. syntheses to build up the baseline”
- **Lightning talks**
 - Lateral fluxes and exchanges
 - Internal cycling
 - Vertical fluxes and exchanges
 - Modeling
- **Poster session**

The Big Picture: Terrestrial-Marine linkage

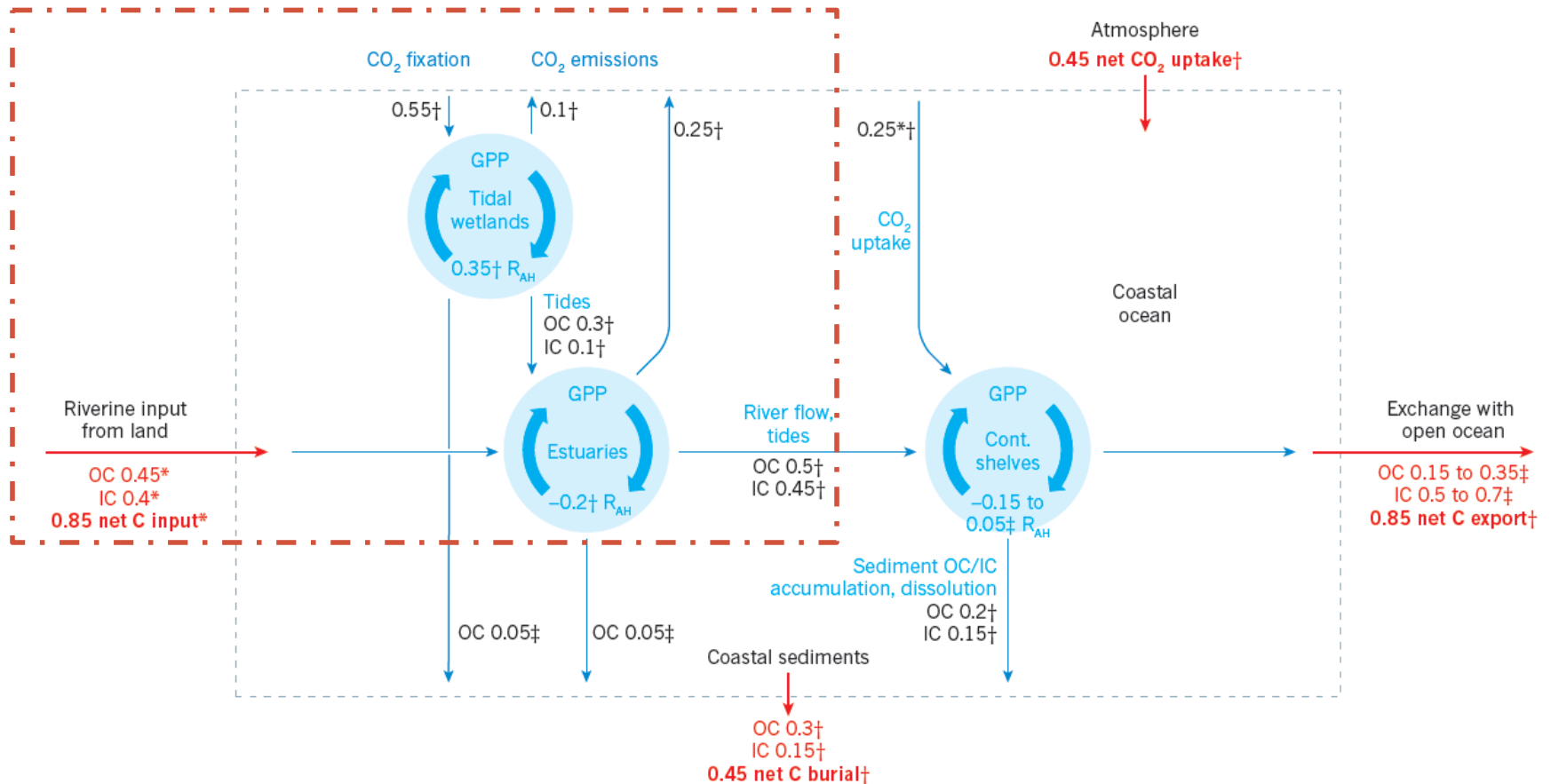


VIIRS sensor on Suomi NPP

The Big Picture: Terrestrial-Marine linkage



The Big Picture: Terrestrial-Marine linkage

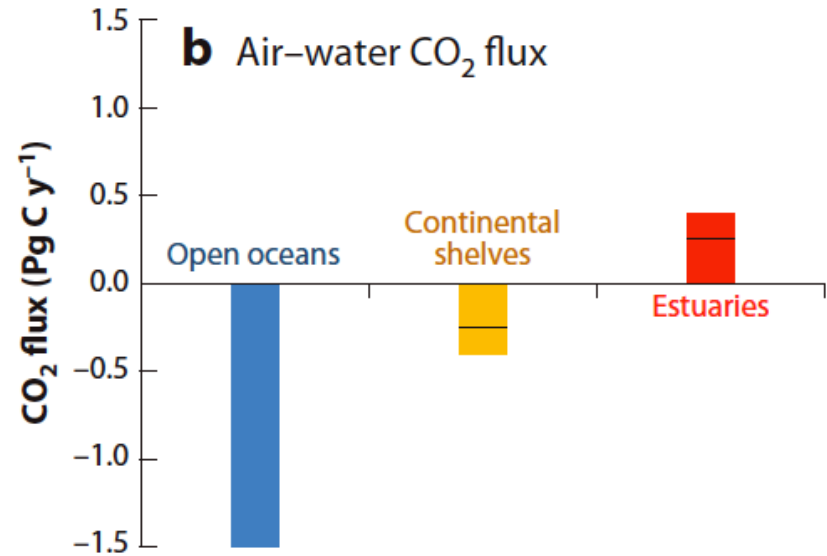
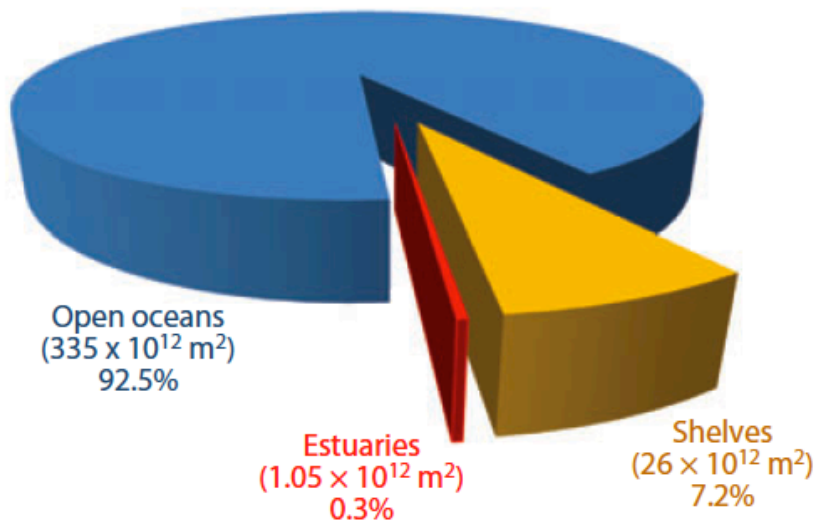


Units are Pg C yr⁻¹ (1 Pg = 10¹⁵ g)

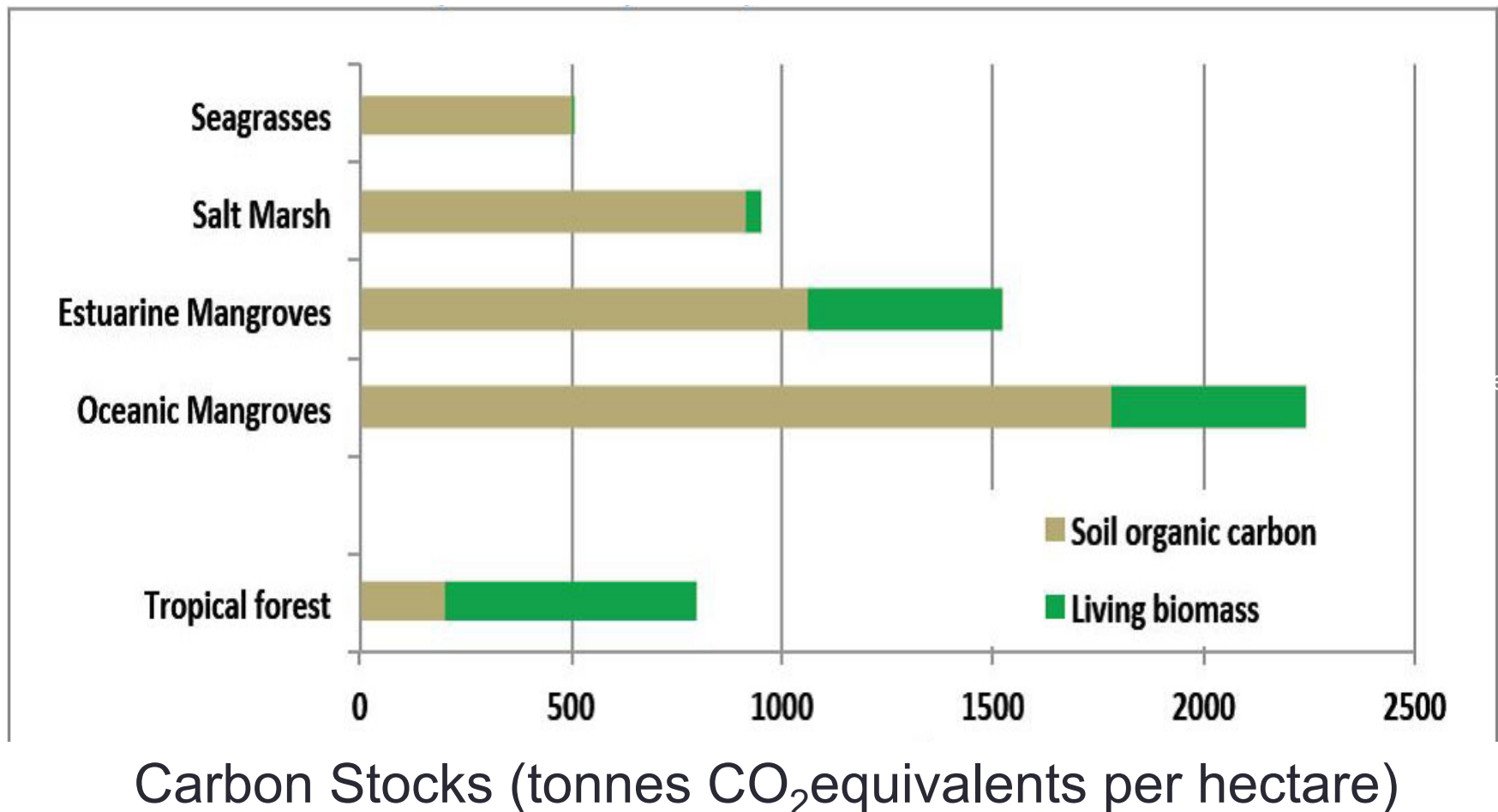
Bauer et al. (2015)

The Big Picture: Terrestrial-Marine linkage

a Surface area



What is the role of vegetated coastal ecosystems in that sliver?



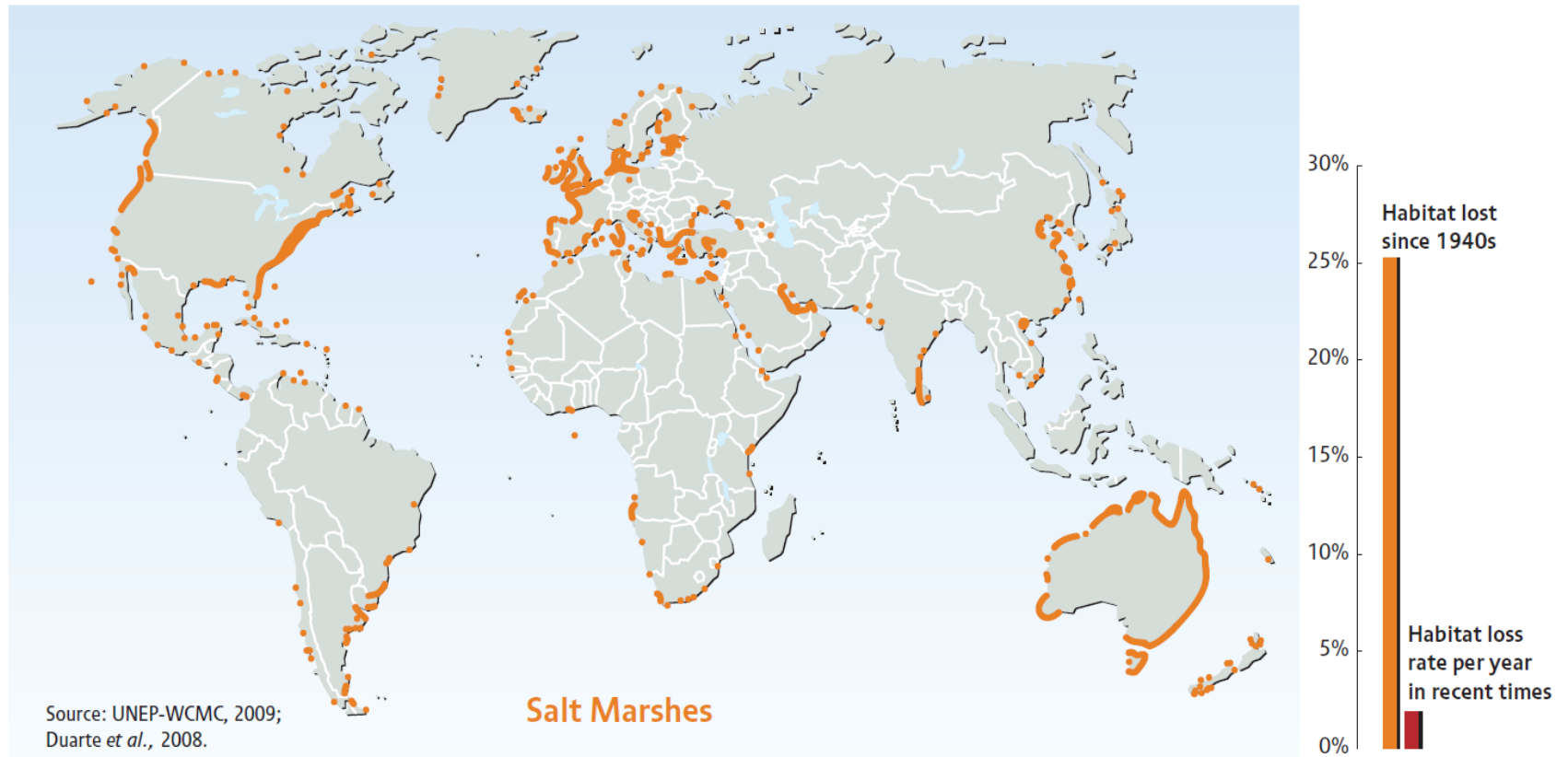
Blue carbon?

- **Roughly 50% of the CO₂ sequestered (taken up) by Earth's biologic systems is cycled into the seas and oceans**
 - **Green** carbon = uptake by photosynthetic organisms and storage in biomass and soils
 - **Blue** carbon = uptake and storage in marine realm (55% of **green** carbon)
 - **Storage is mostly as organic matter**
$$(6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow{h\nu} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2)$$
- **70% of the carbon stored in the marine realm is stored in mangroves, salt marshes, and sea grass beds**
 - **0.5% of sea bed!**
 - **Storage for millennia rather than decades or centuries (e.g. rainforests)**

Key Problem

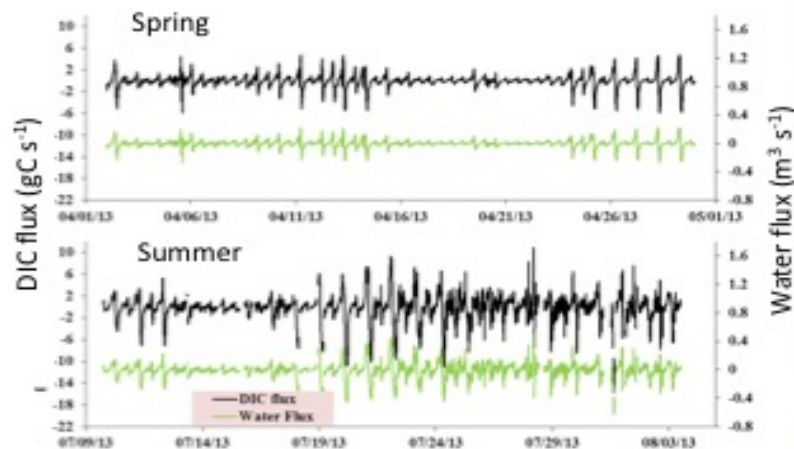
- We are losing the blue carbon sink faster than green carbon sink
- **Salt marsh** areal loss rate is $1-2\% \text{ yr}^{-1}$
- **Tropical forest** areal loss rate is $\sim 0.5\% \text{ yr}^{-1}$

Salt marsh habitat loss

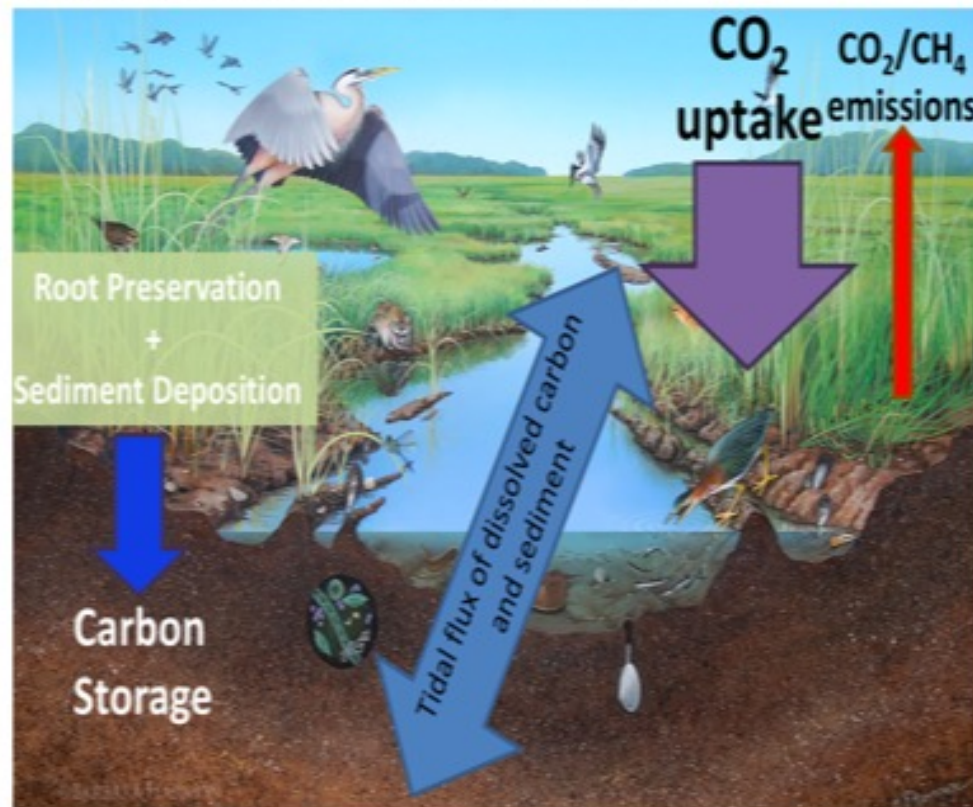


New methods in tidal C fluxes; Essential for quantification of Net Ecosystem C Balance

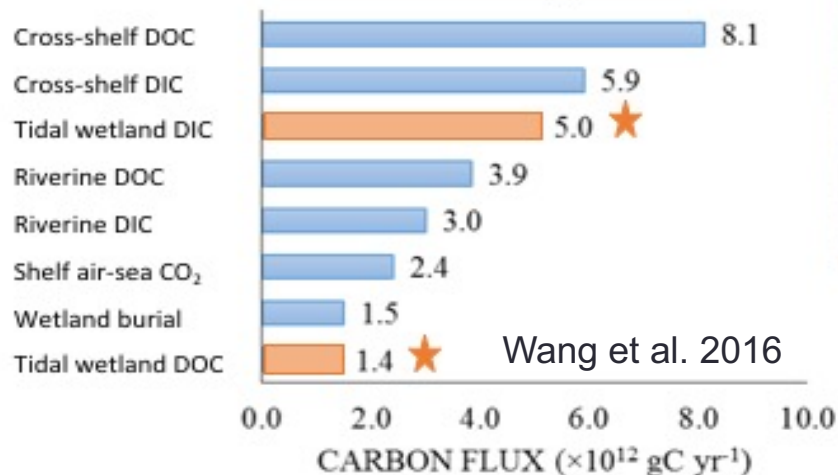
a. Instantaneous flux data



b. Net C budget for tidal wetlands



c. US East Coast shelf C budget



Multiyear NECB requires an unusual breadth of expertise and techniques, as well as a substantial level of extended effort.