

An aerial photograph of a coastal town situated on a narrow, elongated peninsula. The town is densely packed with buildings and is bordered by a wide, sandy beach on one side. The water surrounding the peninsula is a vibrant turquoise color, transitioning to a deeper blue further out. The sky is a clear, pale blue with a few wispy clouds. The overall scene is serene and picturesque, highlighting the natural beauty of the coastal environment.

MANAGEMENT & RESPONSE

Some Data Needs for Modeling Nutrient Loading Influence on Florida *Karenia* Blooms

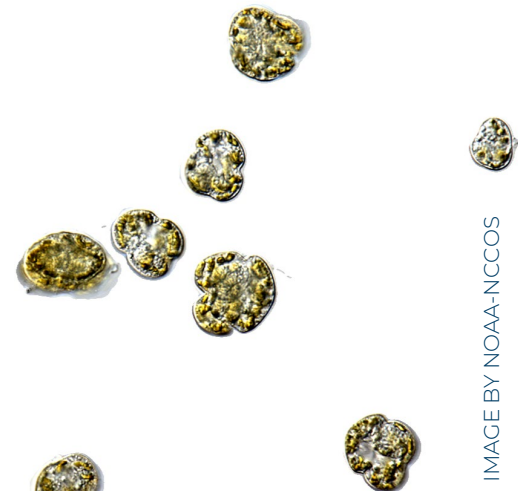
Rick Bartleson

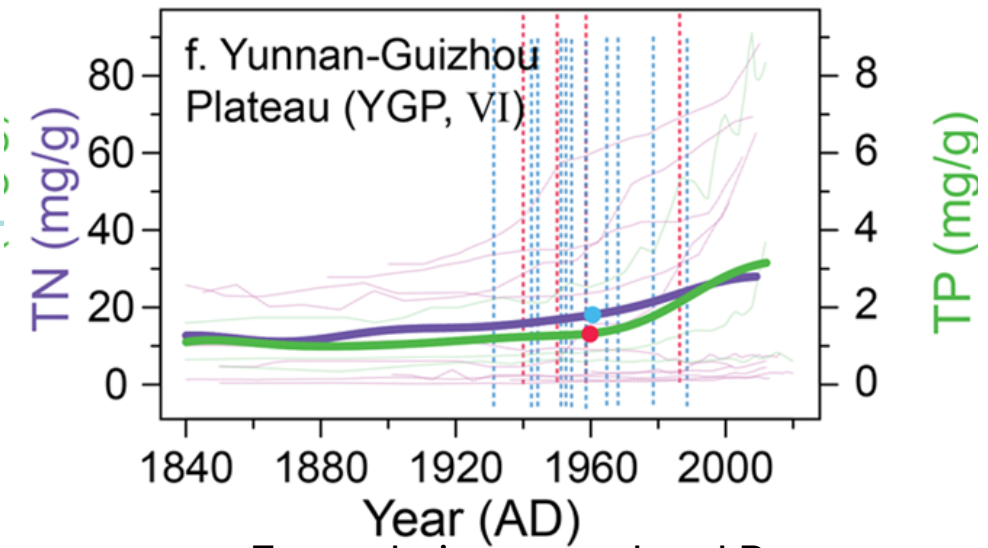
Research Scientist

Sanibel Captiva Conservation Foundation Marine Lab

James Douglass, Puspa Adhikari, Hidetoshi Urakawa, Mike Parsons,
Marlin Smith, Trevor Tubbs

Florida Gulf Coast University





Example increased sed P
w/eutrophication, Ji et al. 2023



Example hypoxic sulfur event

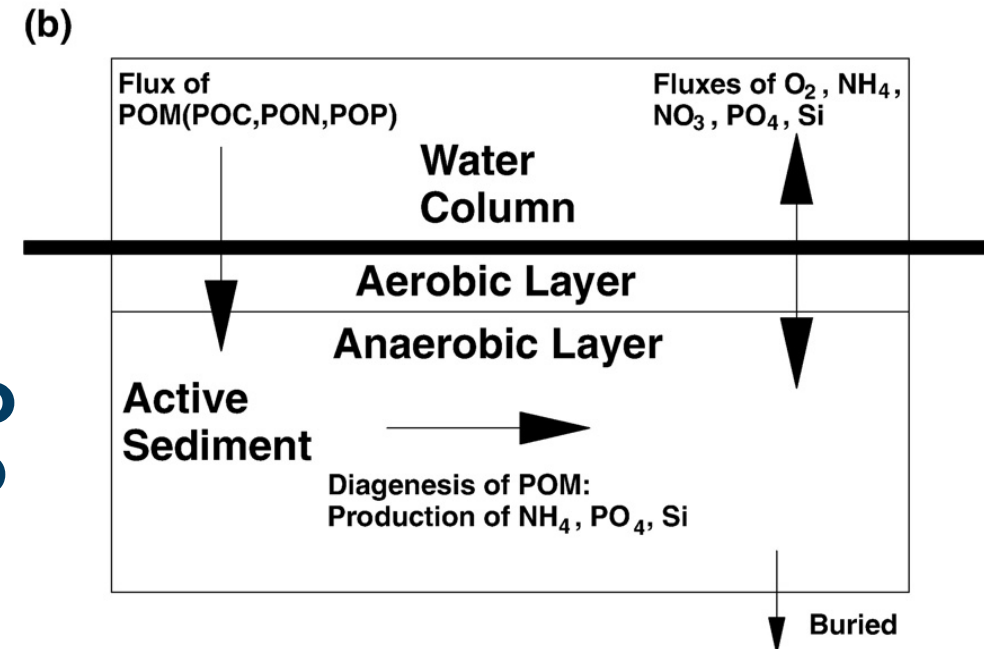
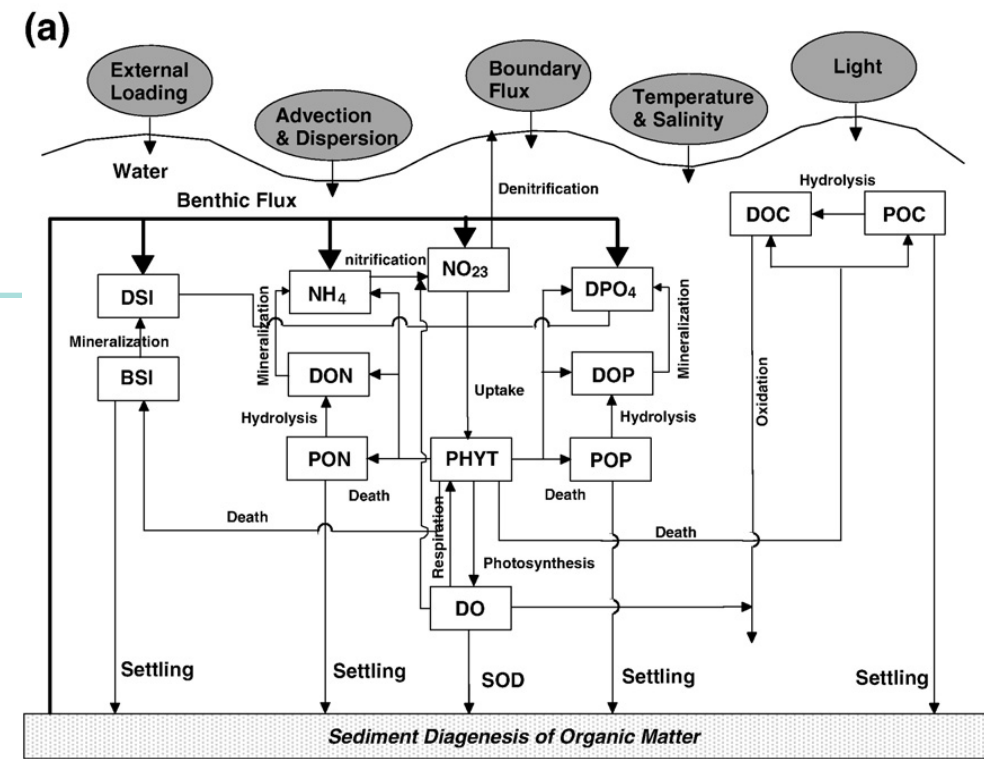
BACKGROUND

Problem statement: can reducing nutrient loads decrease bloom severity? Need model improvements and more data

***Karenia* models have been missing loading rates from land and processes affecting sediment nutrient fluxes**

How far out do excess nutrients extend into Gulf?

(Chen & Li 2025 – Diatoms, *Synechococcus*, P,N, sediment, but no benthic algae, no sediment P data, no hypoxic flux...) also Testa et al. 2013



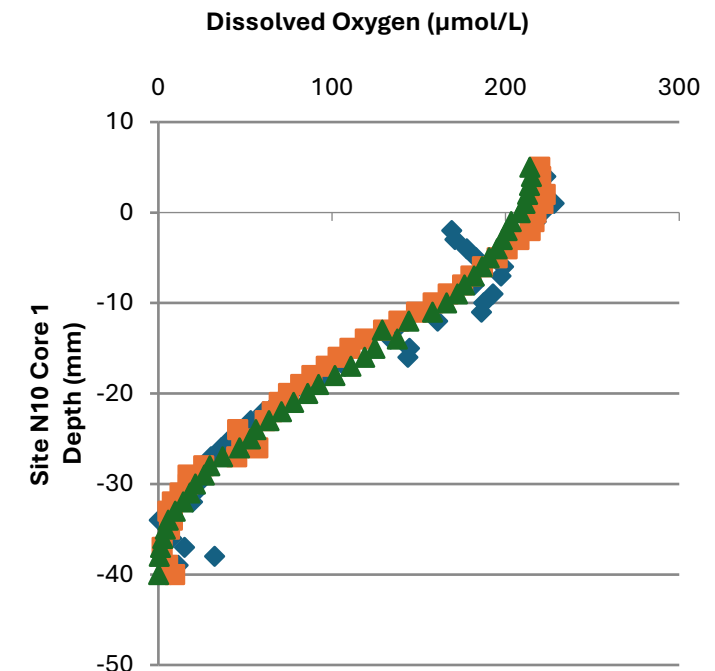
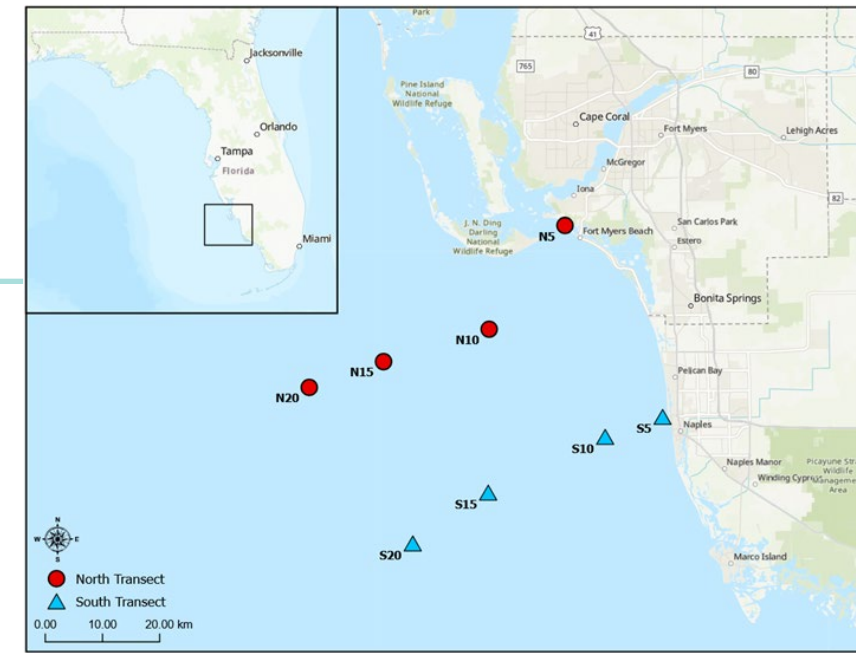
IMPLEMENTATION

Transects water column and sediment to 20 m.

**sedimentation,
sediment nutrients,
sediment core O₂
flux, SGD tracers,
sediment organic
content and stable
C,N isotopes
Benthic communities
rRNA genetic samples**



Marlin Smith Thesis 2025



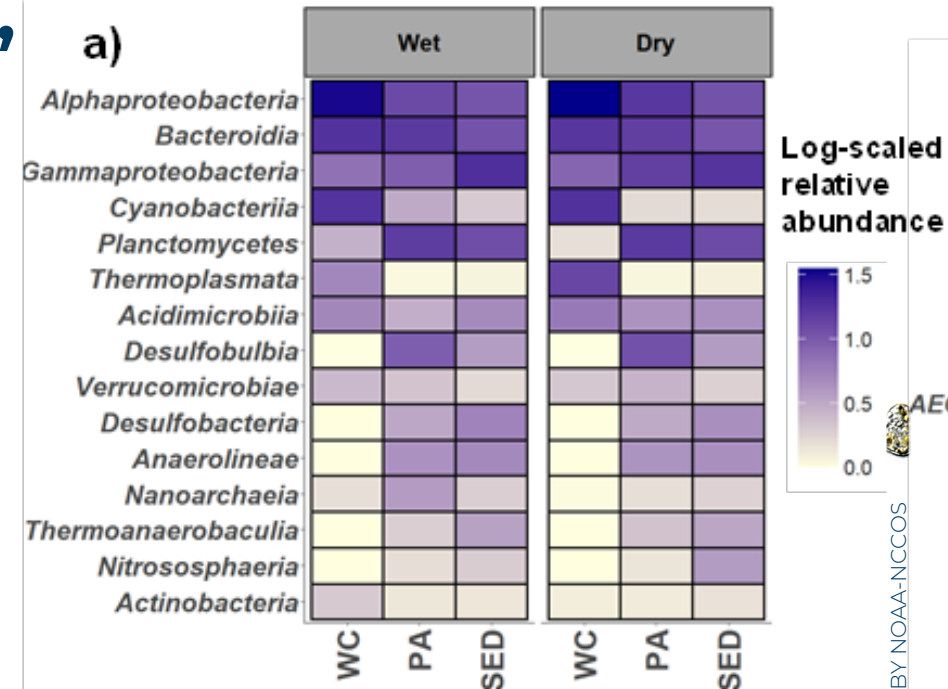
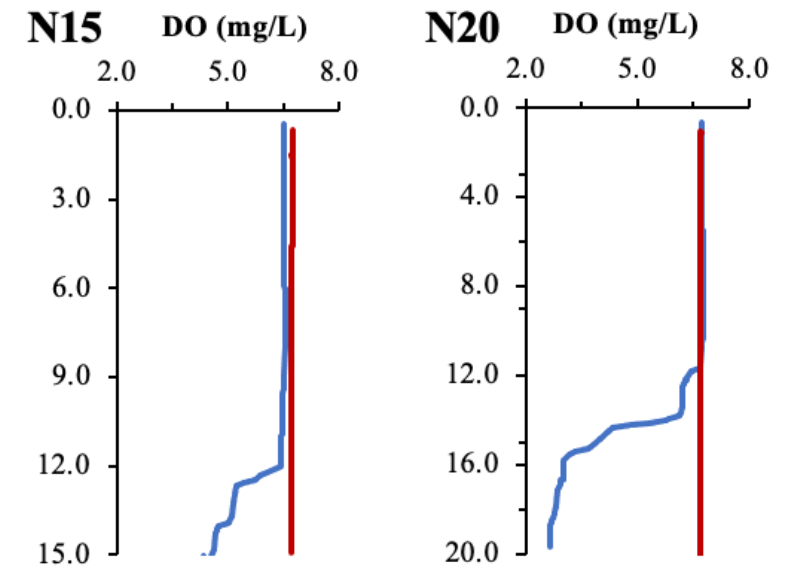
IMPLEMENTATION

Water column

rRNA genetic samples, and stable C,N isotopes

water column profiles, particle counts, nutrient samples, % CaCO₃, CDOM, temperature, pH, salinity and modeling.

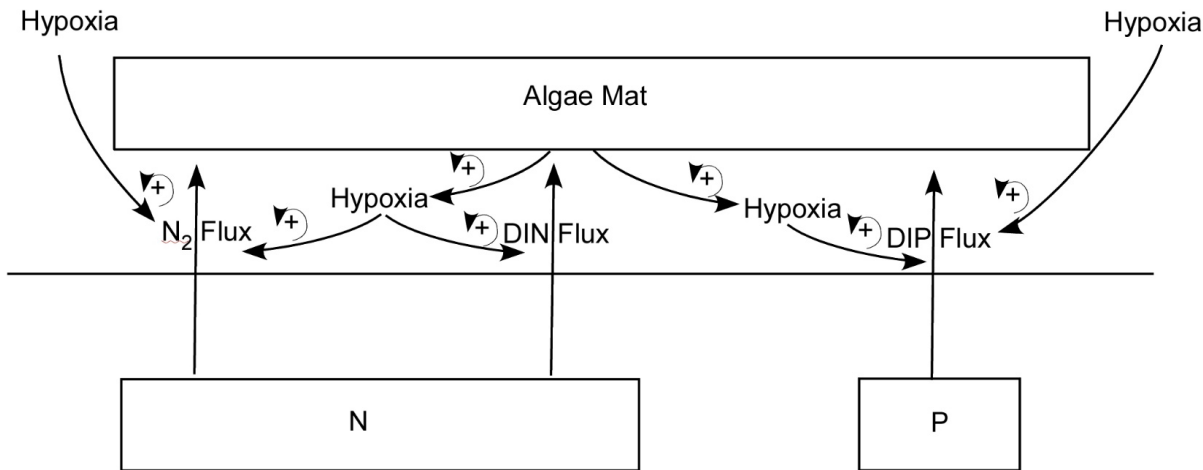
Wet and dry season, pre-post hurricane Ian.



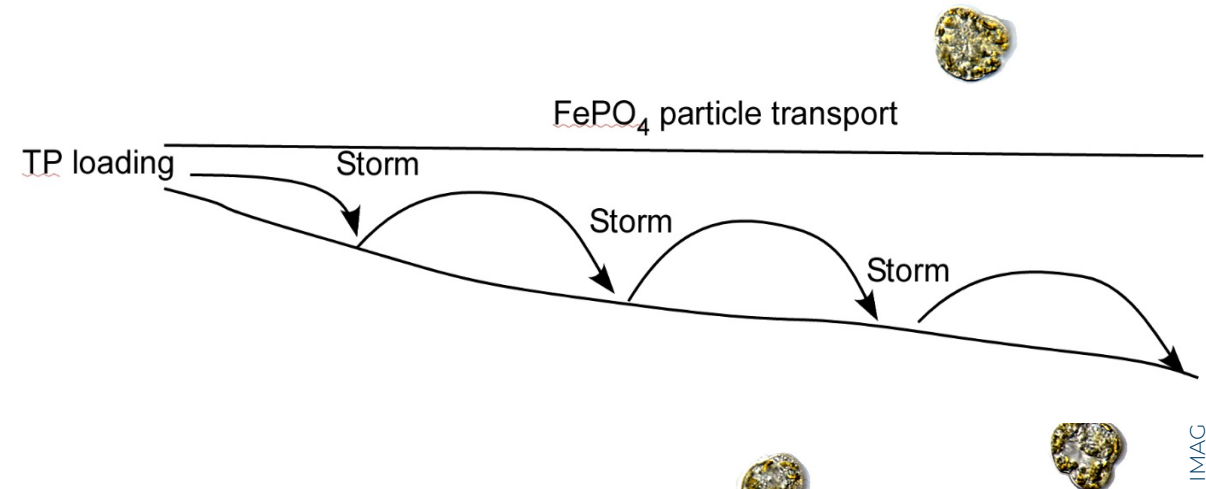
Trevor Tubbs Thesis 2025

PROCESSES, DATA NEEDED

**Oxygen profiles, stratification,
algae influence on flux- and data**



**N/P loading estimates -
excessive loading over time
increases sediment organics and
bound P out into Gulf which can
increase nutrient supply to the
water column. Storm effects..**



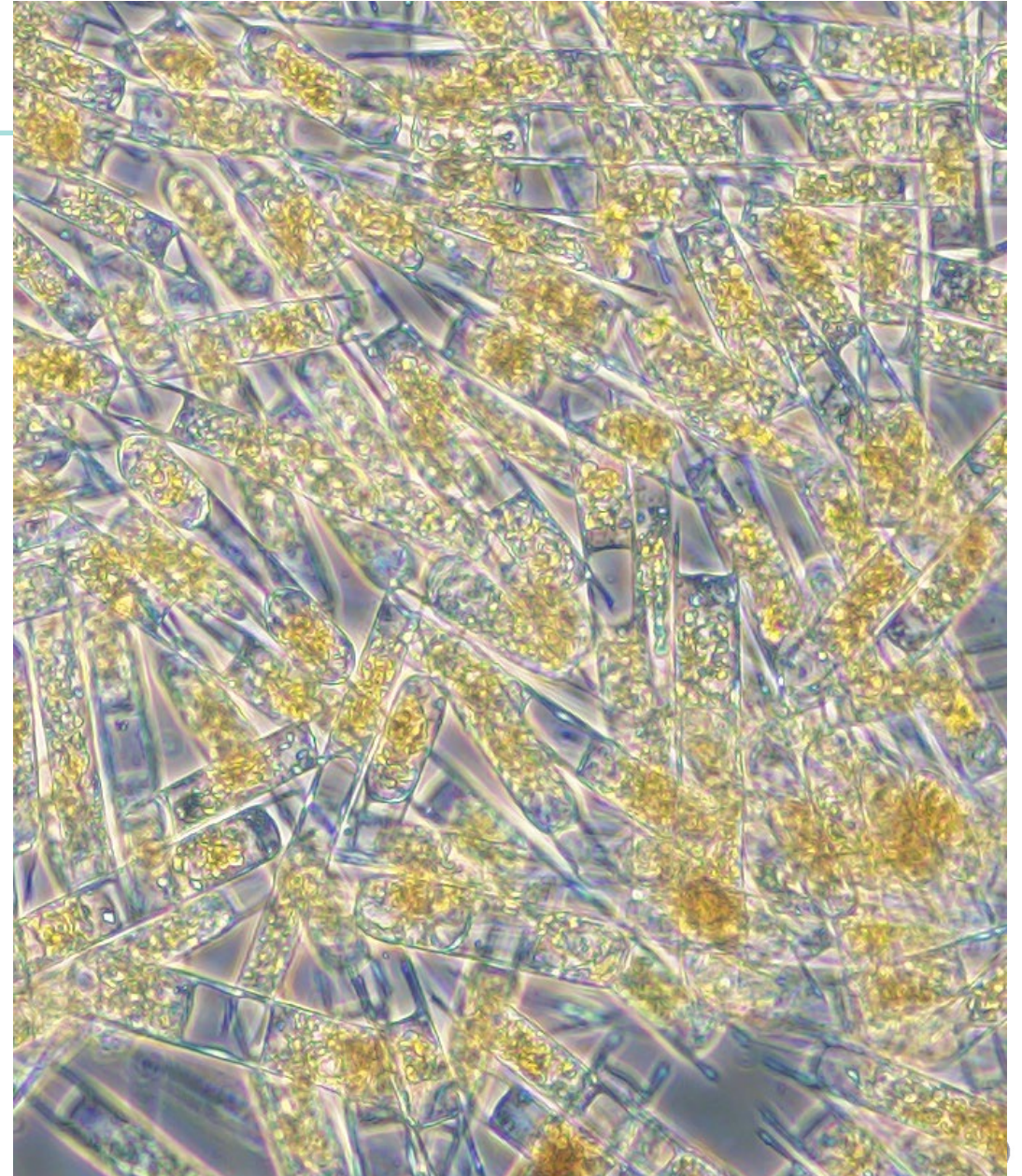
Data and Model Needs

Hemiaulus /Richelia July 2023

**Nitrogen fixation -
Hemiaulus, *Desulfovibrio*
diel measurements**

**Initial plankton
communities and
succession-** 16S rRNA gene
amplicon sequencing

**Include benthic algae and
benthos as state variables.
Measure sediment P and
add hypoxic effects on
sediment flux into models**



ACKNOWLEDGEMENTS

USEPA, PI James Douglass

SCCF members, staff and volunteers

Organizers and hosts UF SeaGrant and USF

