

# Spatial and temporal dynamics of oxygen and density in the water column of the Florida Big Bend Area

Mike Santema

06-FSU-01: Integrated Research for the Northeast Gulf of Mexico Big Bend Region

PIs: Eric Chassignet and William Dewar

Funded by NOAA-NGI Grant #023320



# Introduction

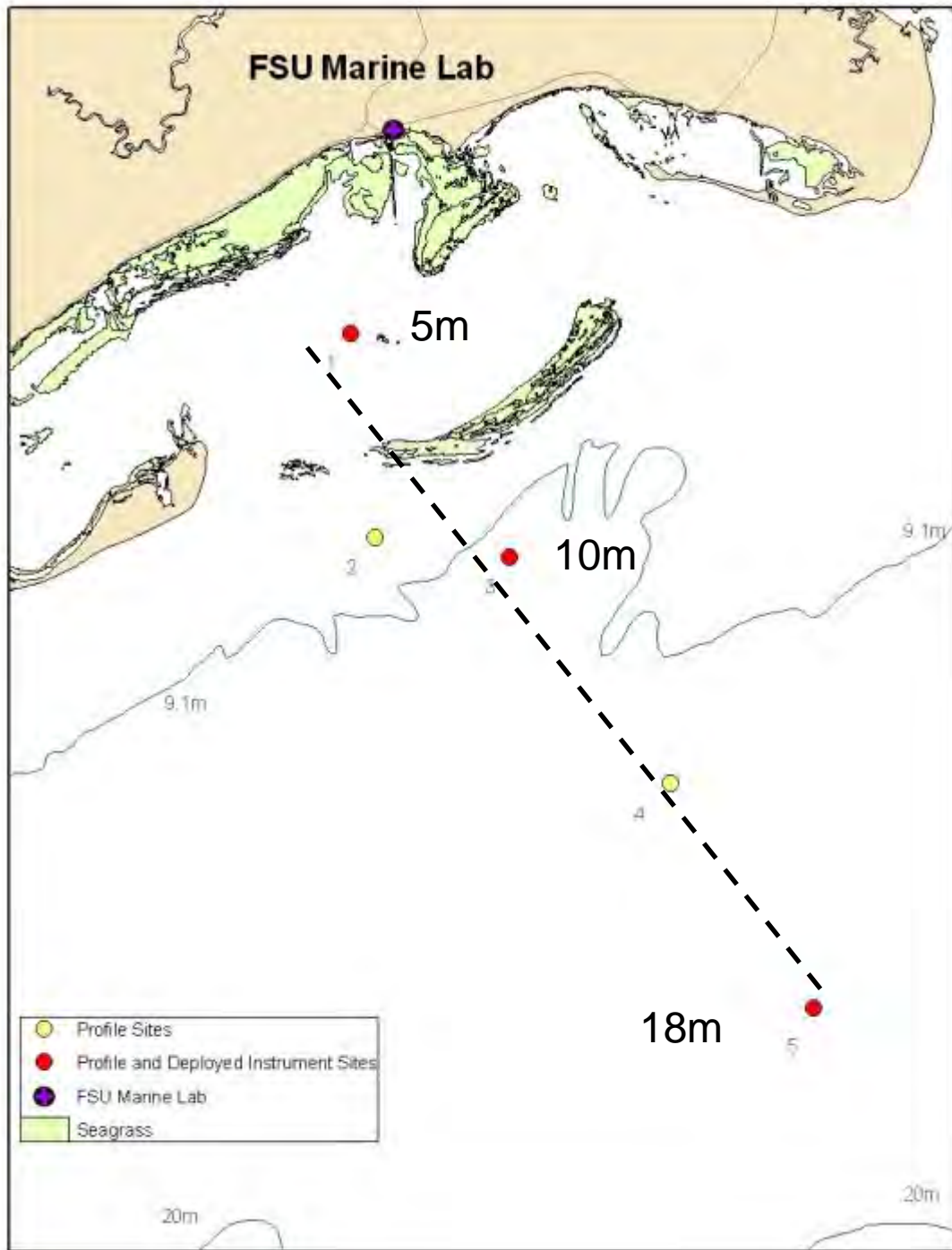
- Currents in the Big Bend region are mainly influenced by wind and tides
- The broad, shallow region of West Florida Shelf dominated by sand and seagrass beds
- Warm, highly biologically active region with moderate nutrient loads
- Important economic region for fish, shrimp, oysters, and other harvested invertebrates
- High concentrations of O<sub>2</sub> reflect healthy ecosystems

# Objectives

- Determine O<sub>2</sub> dynamics in the water column as important proxy for primary production and aerobic respiration
- Observe primary factors that control O<sub>2</sub>
- Assess whether there are indications for development of hypoxic zones
- Outline conditions prior to oil spill

# Outline

- Methods
  - Field sites
  - Sensors
- Results
  - Stratification
  - $O_2$
- Conclusions



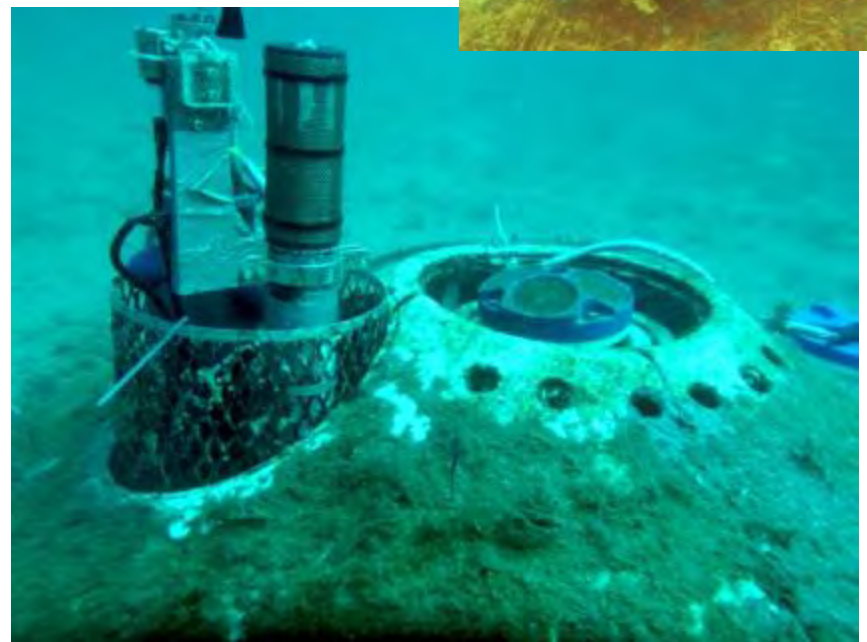
# YSI 6600 Multi-probe sonde

- Dissolved oxygen
- Salinity
- Pressure

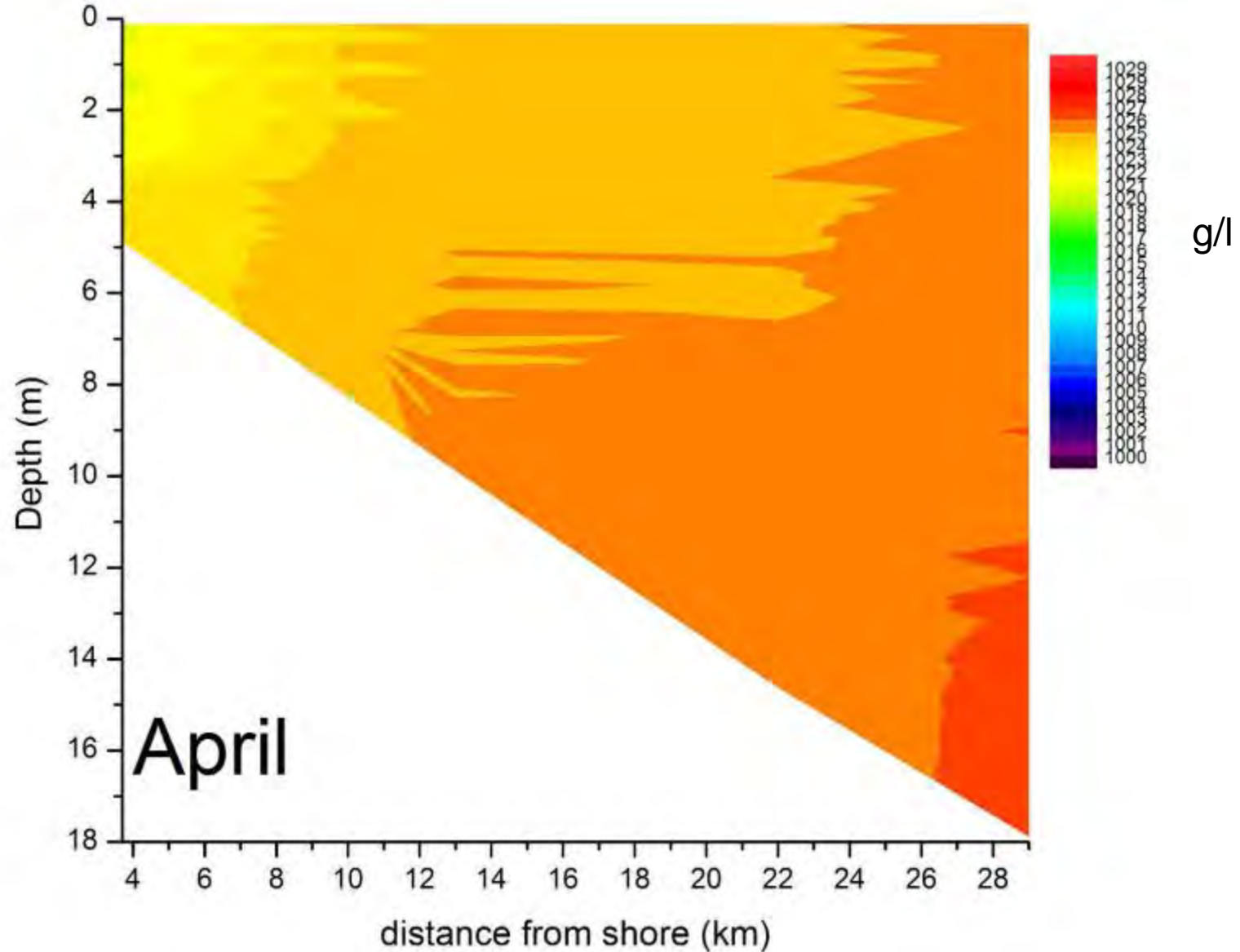
Used in vertical profiles

Also moored at bottom long-term:

15 min resolution

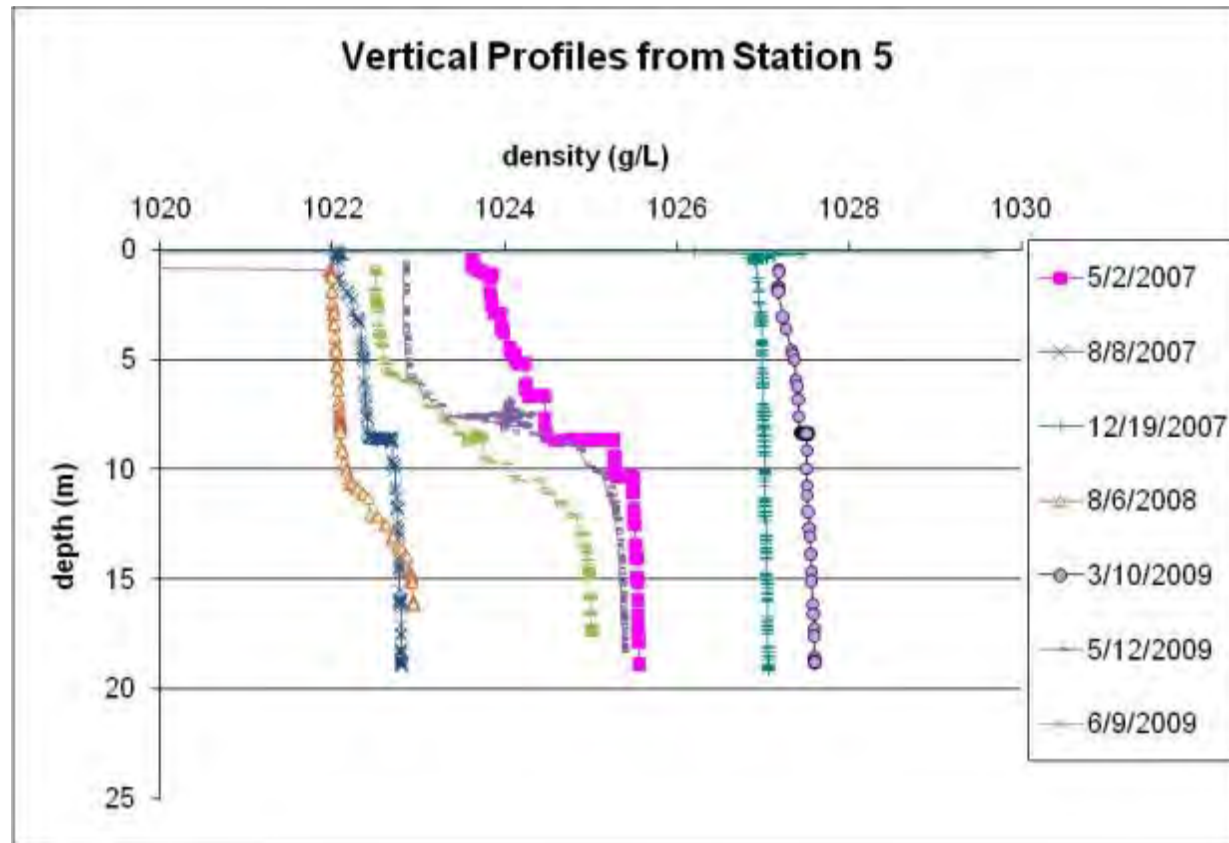


# Typical Density Distribution



# Density

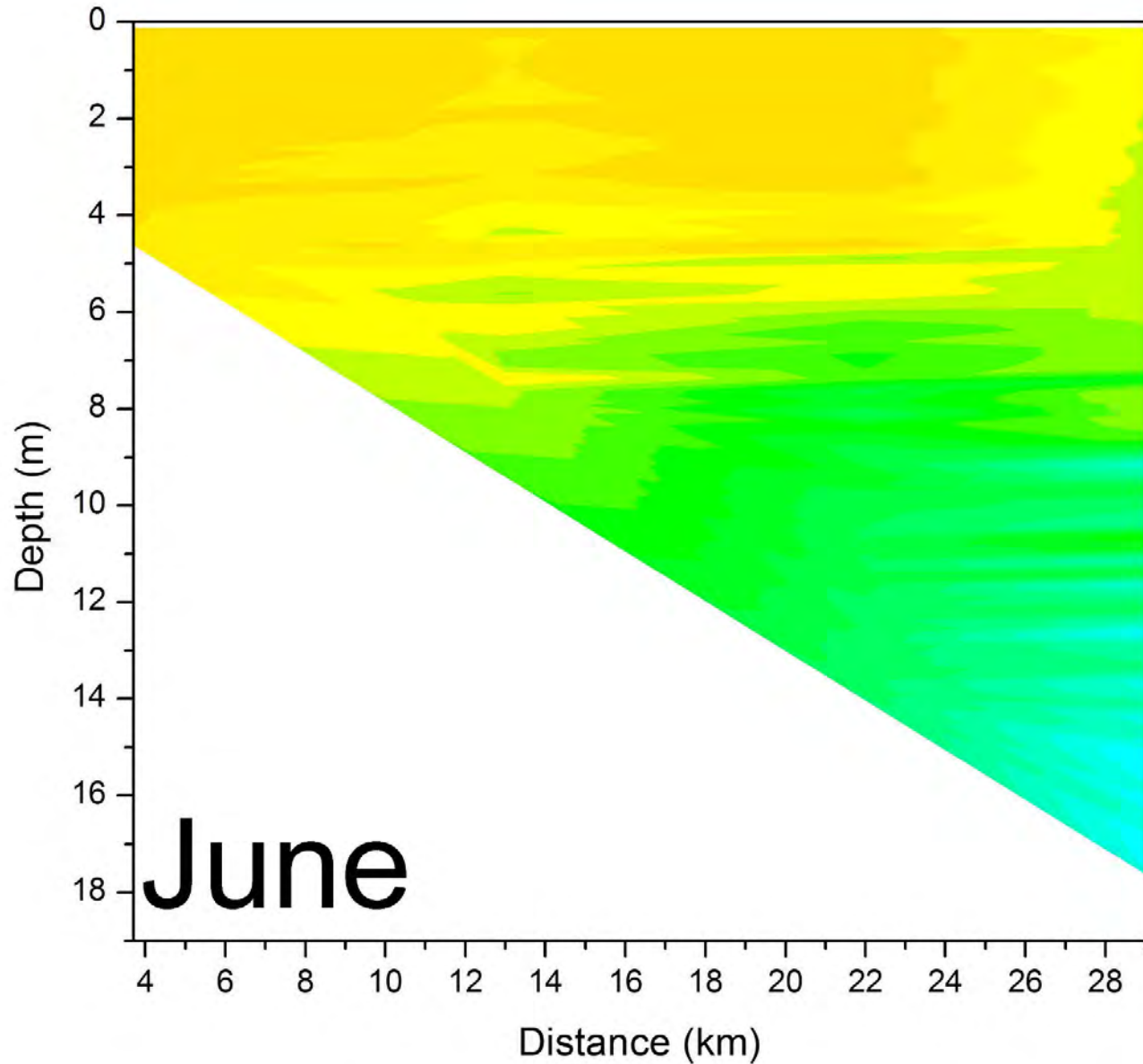
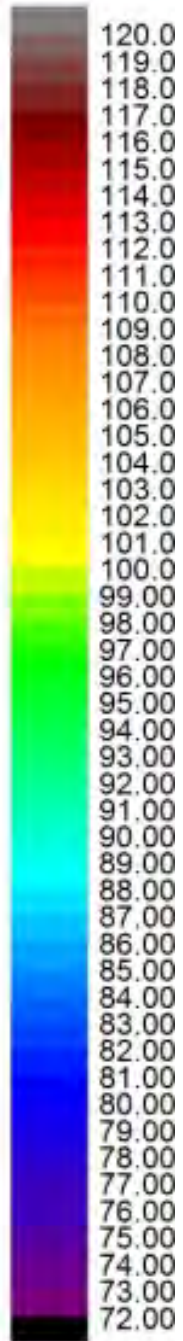
- Notable pycnoclines:
- 4/4/07
- 5/2/07
- 8/8/07
- 8/6/08
- 1/22/09
- 6/9/09





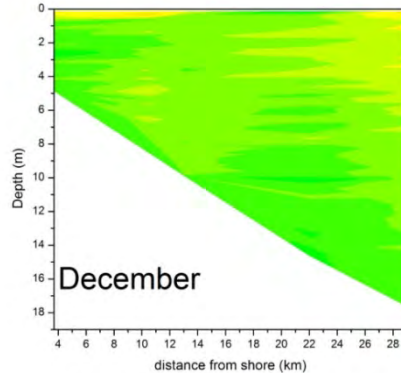
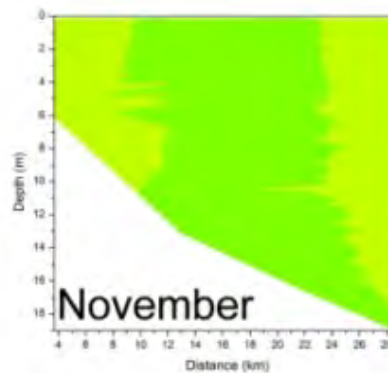
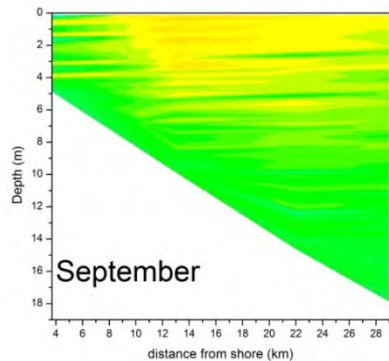
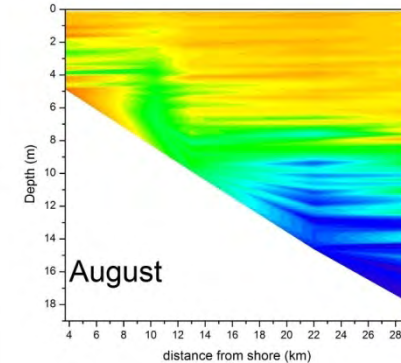
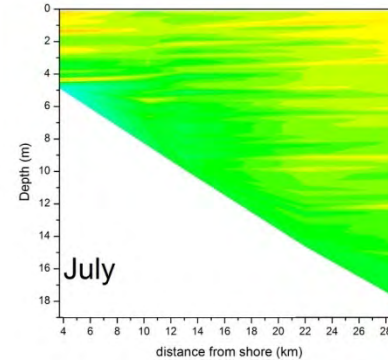
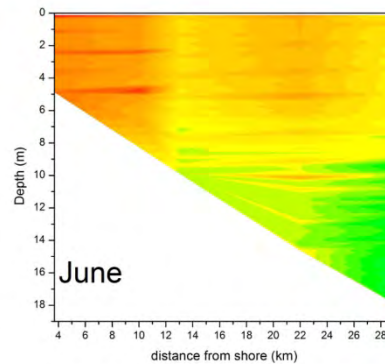
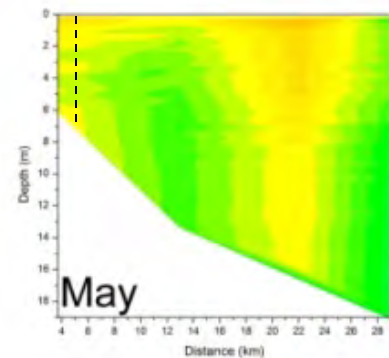
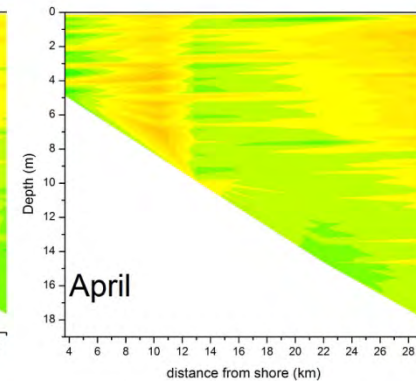
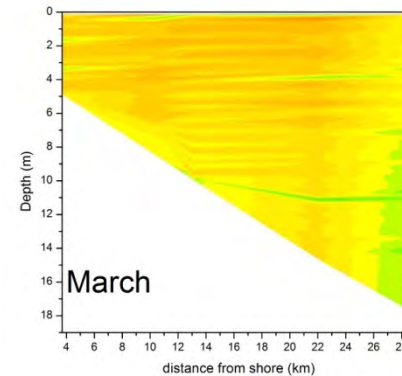
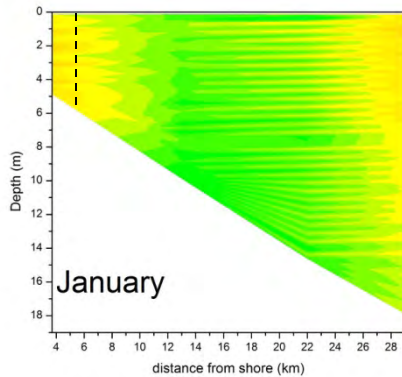
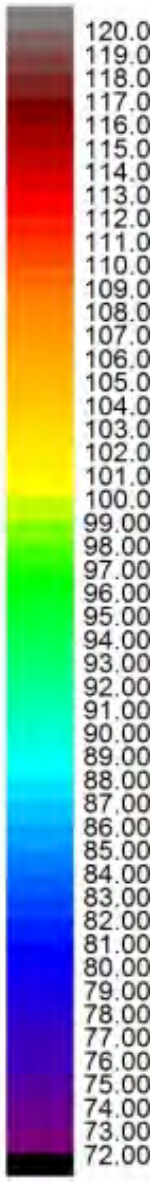
# [O<sub>2</sub>] during pycnoclines

Scale: % saturation

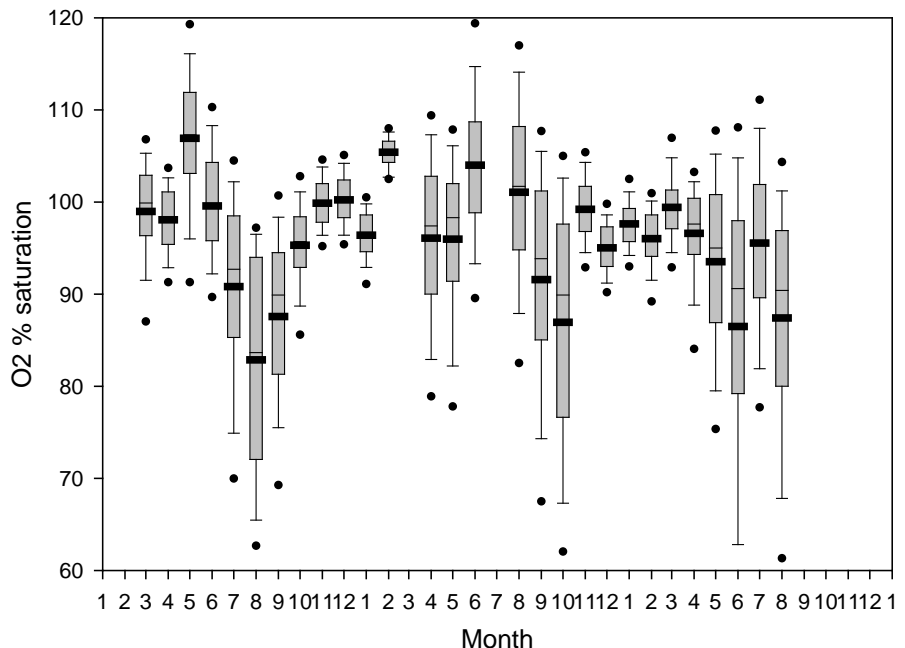


# Seasonal [O<sub>2</sub>] stratification

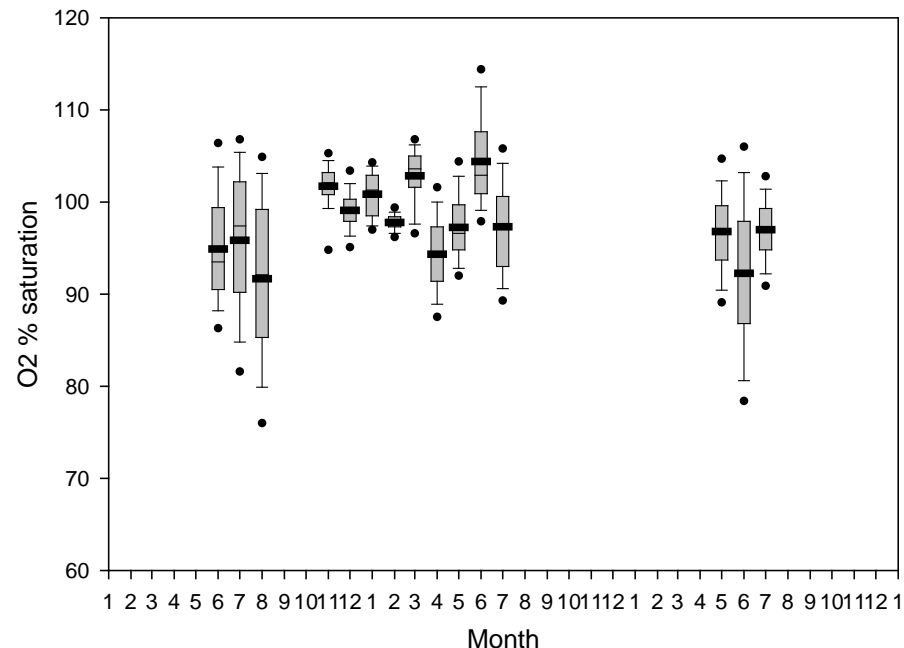
Scale: % saturation



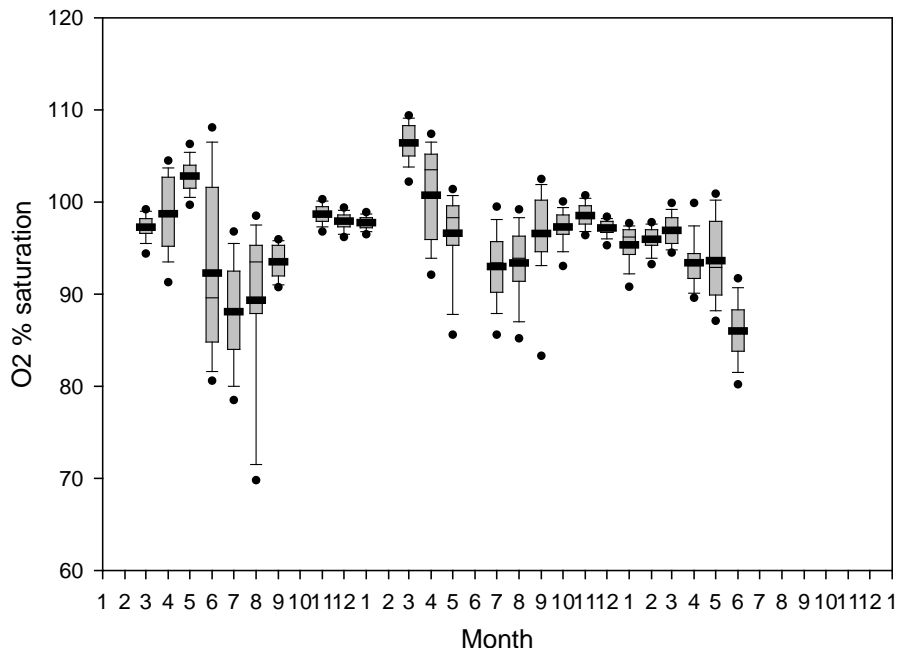
Site 1 O2 distribution



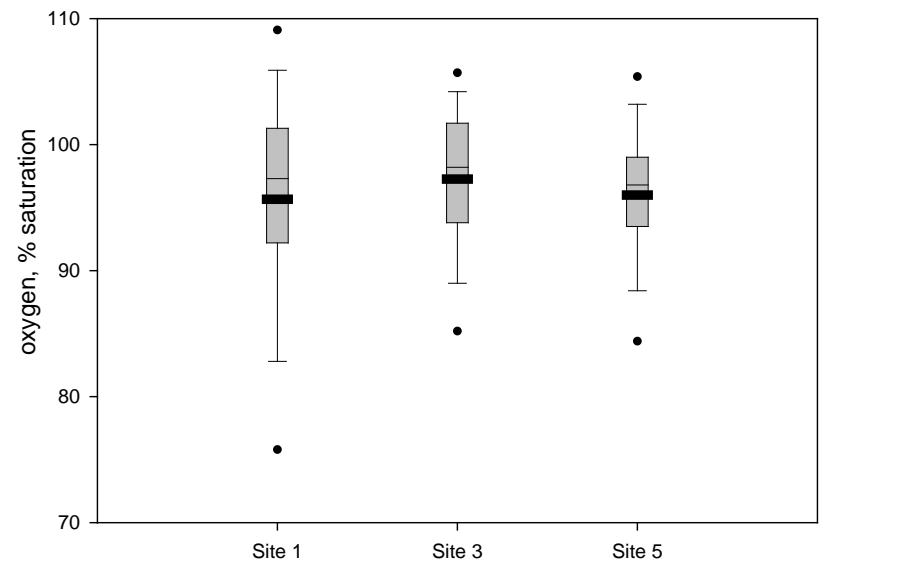
Site 3 O2 distribution



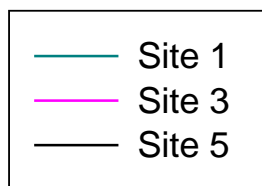
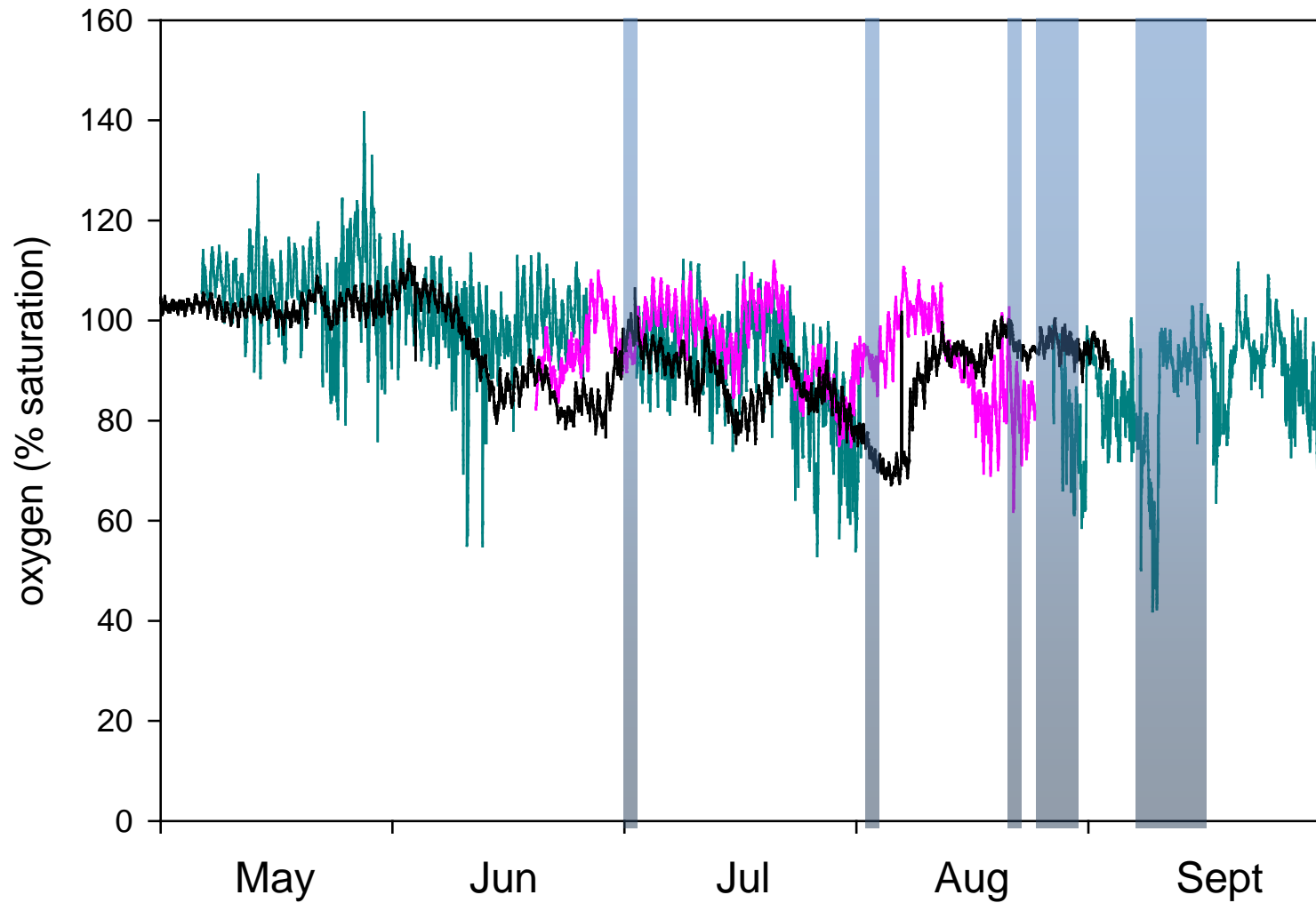
Site 5 O2 distribution



Total Average Oxygen Range



# Oxygen



2008

# Conclusion

- Pycnoclines develop several times during the year, but high  $O_2$  stratification seems limited to the summer.
- $O_2$  stays relatively steady, occasional dips at random points during the year
- $O_2$  fluctuation is greatest at the shallowest site (Site 1)
- If there is a lateral difference in  $O_2$ , it is higher closer to the coast (usually summer)
- $O_2$  shows little pattern in response to storms

# Acknowledgements

Markus Huettel

Current Meter Facility:

Kevin Speer

Stephanie White

Eric Howarth

Peter Lazarevich

Nico Weinders

FSU Marine Lab:

Sonja Bridges

Rosanne Weglinski

Van Vandermeullen

Mike Lavender

Alison Ma

Joel Valdez