

Carbon dynamics in La Parguera Bioluminescent Bay

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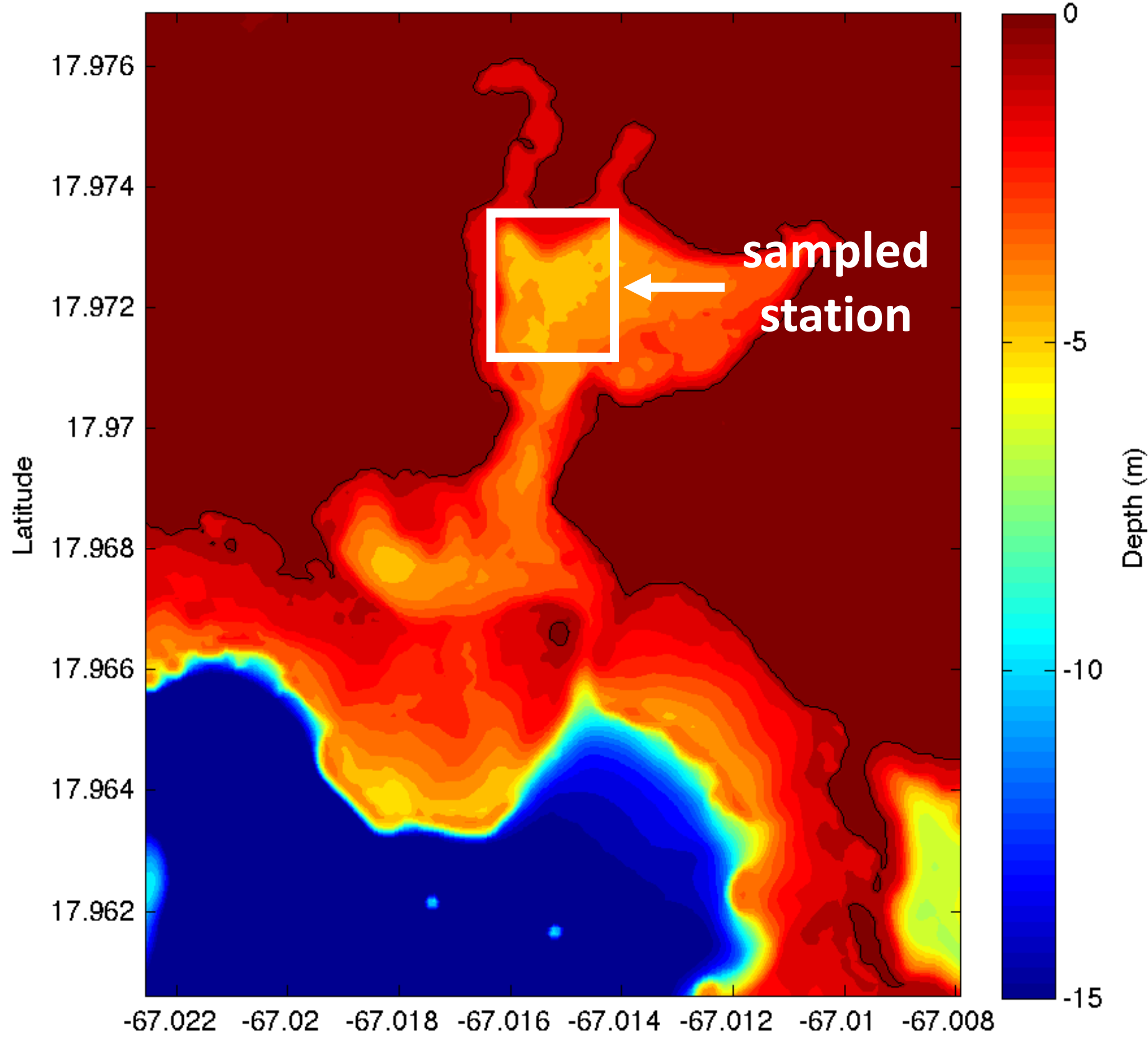
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Bioluminescent Bay Background

Bathymetry for Project Site: Bahía Fosforescente



WHAT IF?

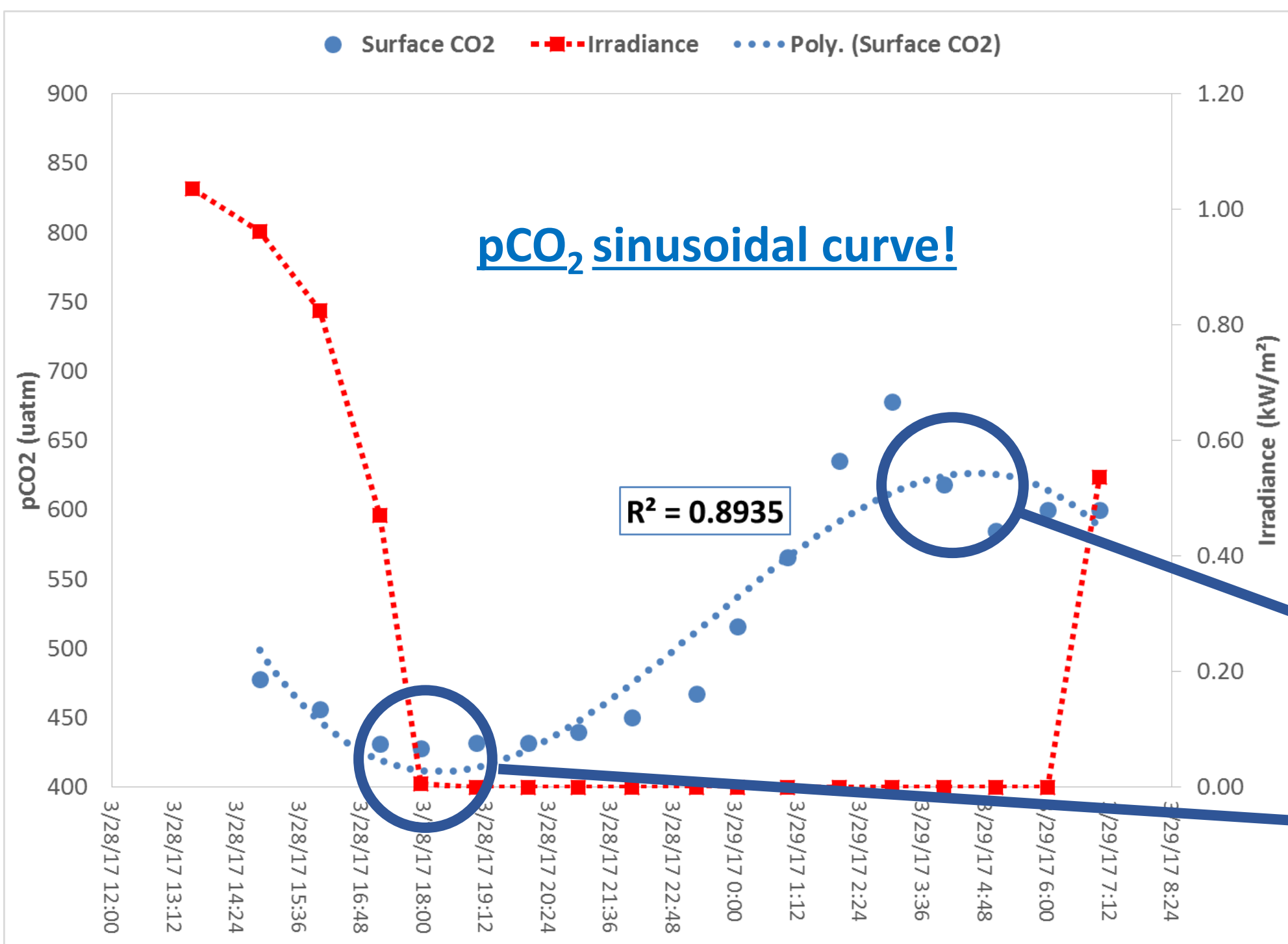
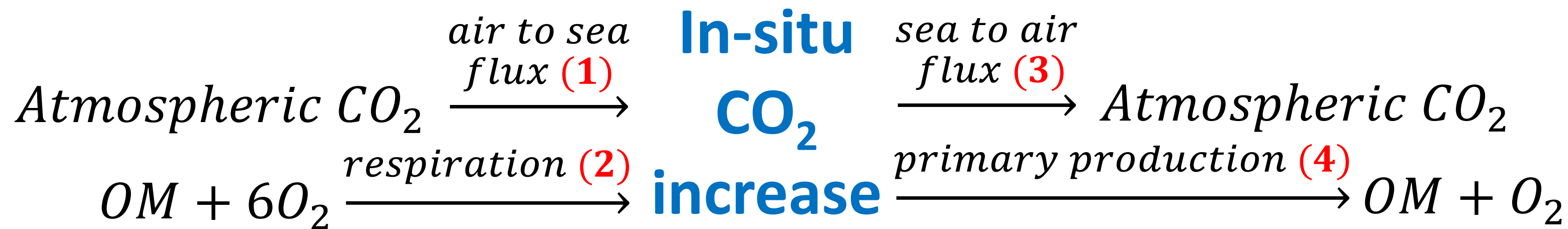
Bay area (m ²)	200,000
In-situ production (P) average (kg C/day)	473.20
In-situ respiration (R) average (kg C/day)	1061.00
Net metabolism (kg C/day)	-587.80
Mangrove fringe width for P = R (m)	ca. 17
Mangrove fringe width (ave, m)	ca. 35

References:

1. Cintrón 1969 - Seasonal Fluctuations in a tropical bay (M.S. thesis)
2. González 1965 - Primary productivity of the neritic and offshore waters of western PR (report)
3. Odum et al 1959 - Measurements of Productivity of Turtle Grass Flats, Reefs, and the Bahía Fosforescente of Southern Puerto Rico
4. Golley et al 1962 - The Structure and Metabolism of a Puerto Rican Red Mangrove Forest in May
5. Vega 2008 - Estimating PP of red mangroves in southwestern PR from Remote Sensing and field measurements (M.S. thesis)

- Does mangrove carbon square up the metabolism deficit?
- How much of this carbon is exported out of The Bay to the nearshore?

Observations: March 28 and March 29, 2017

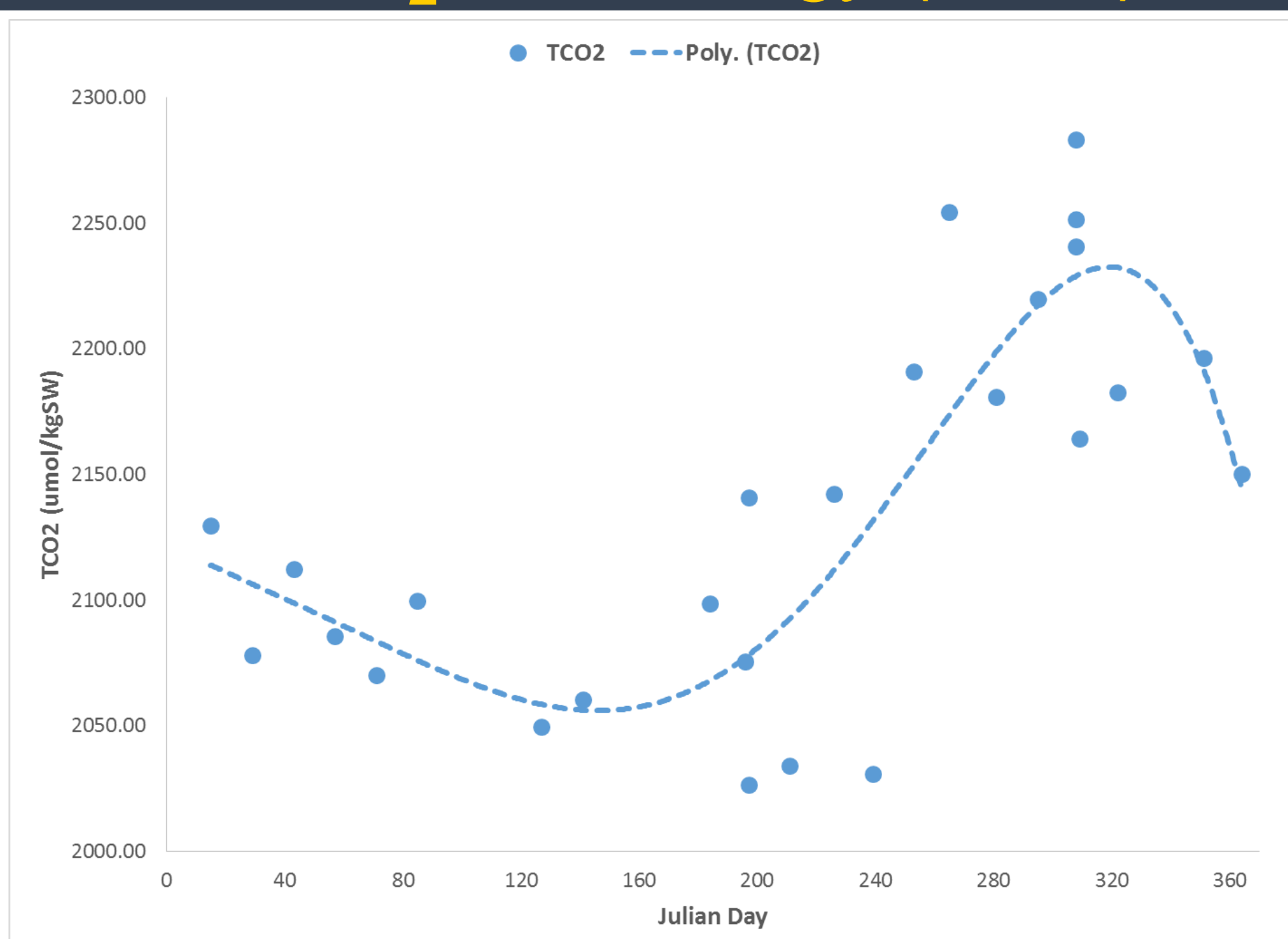


- Sea-air exchange (eq. 1 & 3) driven by wind speed.
- Respiration (eq. 2) barely varies throughout the day.
- Photosynthesis (Eq. 4) only occurs during daytime.
- Respiration (eq.2) dominates throughout the year.
- Metabolism (eq. 2 & 4) has a larger role than sea-air exchange (eq. 1 & 3).

pCO₂ max just before sunrise
pCO₂ minimum at sunset

Irradiance modulates carbon metabolism.

Total CO₂ climatology (9 am)



What's next?

- High resolution 24 hour samplings
- Possible models:
 1. Photosynthesis: modelled using Chl. a + irradiance
 2. Respiration: modelled using organic carbon (P & D)
 3. Carbon export rates to nearshore waters (fluxes: FVCOM)

Acknowledgements

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