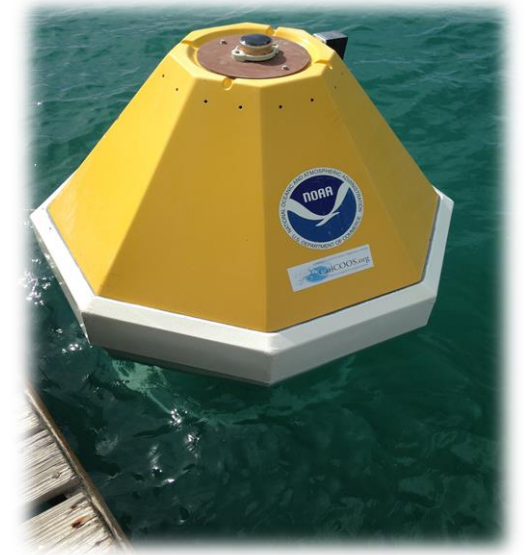
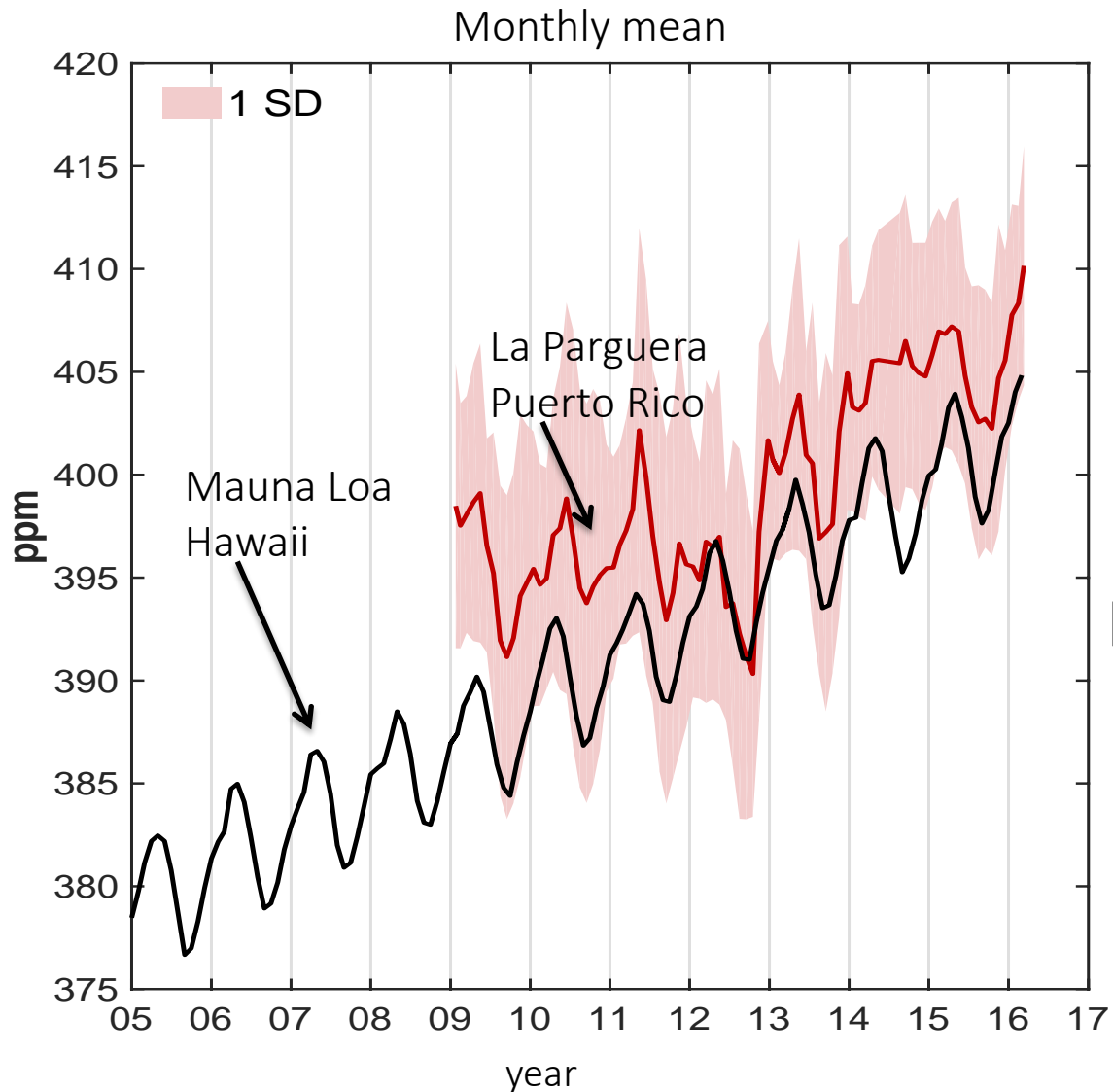


- Buoy measurements
- CO₂ Atm. & SW
- pH
- Carbonate saturation state (Ω)
“active accretion or dissolution of calcium carbonate minerals”



MapCO₂ buoy
Enrique reef

Atmospheric CO₂



PIR ~ 280 ppm
Mauna Loa - Feb 2016 = 404 ppm
Parguera - Feb 2016 = 408 ppm

Mitigation scenarios – 450-500 ppm by 2100

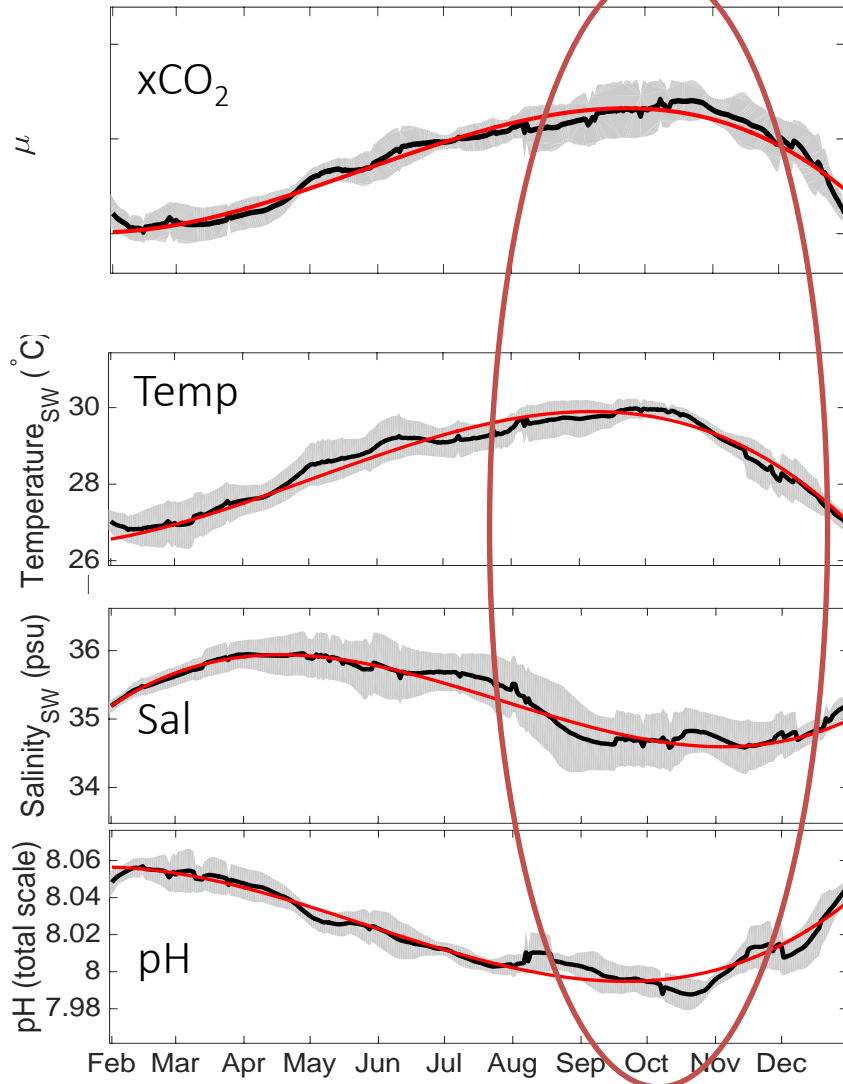
CO_{2,Atm.} increase
Mauna Loa - 3.0 (± 0.1) ppm year⁻¹

2015 was the 4th consecutive year that grew more than 2 ppm

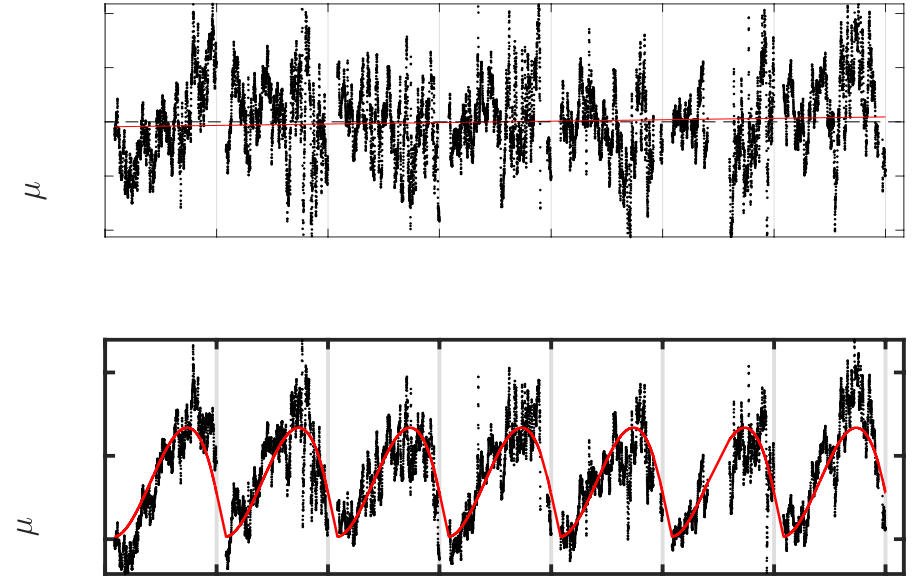


Seawater CO₂

Monthly mean



- ✓ High SST and CO_{2,SW}
- ✓ Local rainfall
- ✓ Influx of the low-salinity Amazon and Orinoco River plumes
- ✓ Low pH

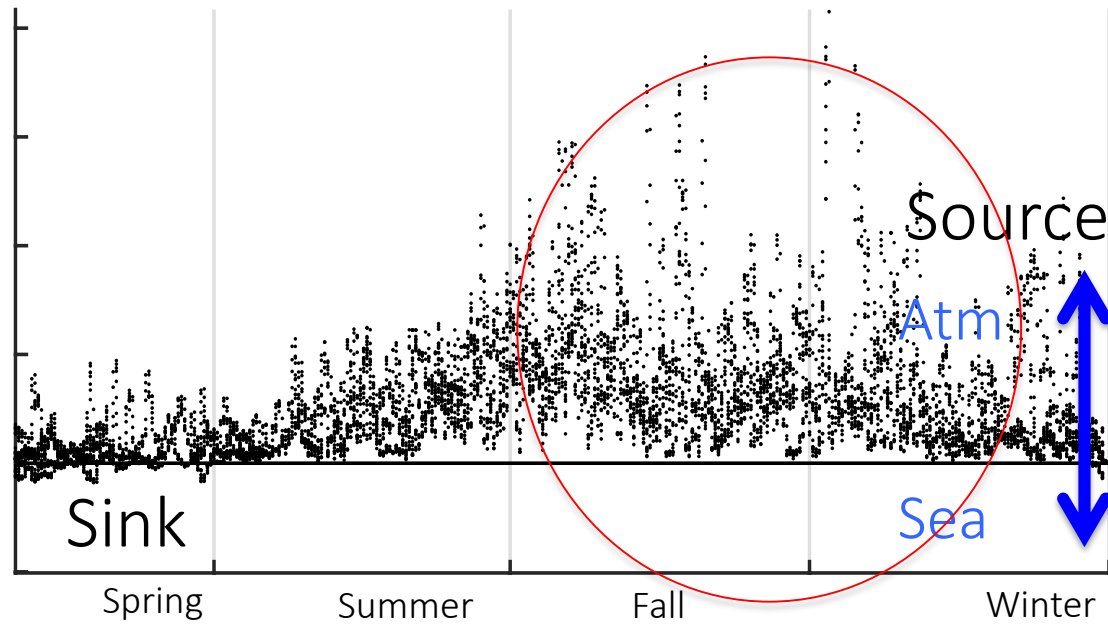


CO_{2,SW} increase
1.05 (± 0.42) ppm year⁻¹

...but...CO₂ solubility inversely correlated with temperature

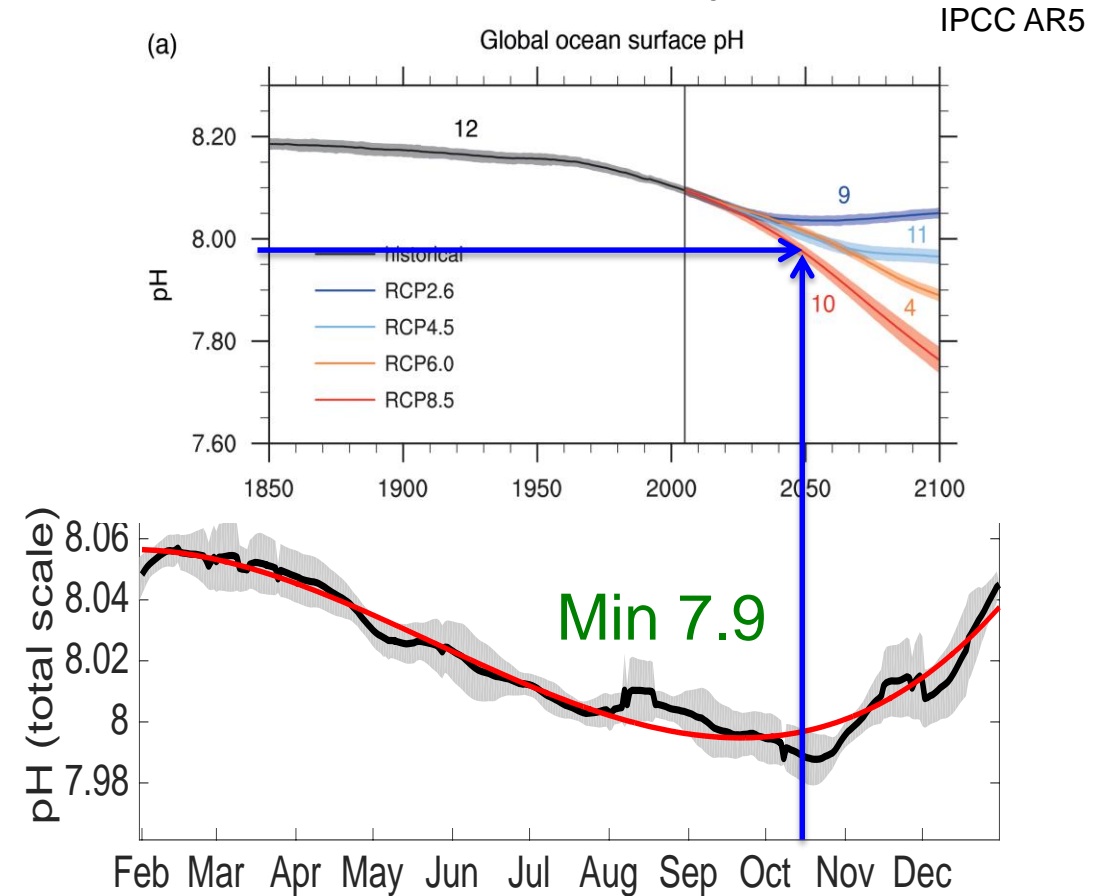
Other sources of CO₂?

Sea-air CO₂ flux



- ✓ Biology plays an important role
- ✓ Persistent net source of CO₂ to the atm.

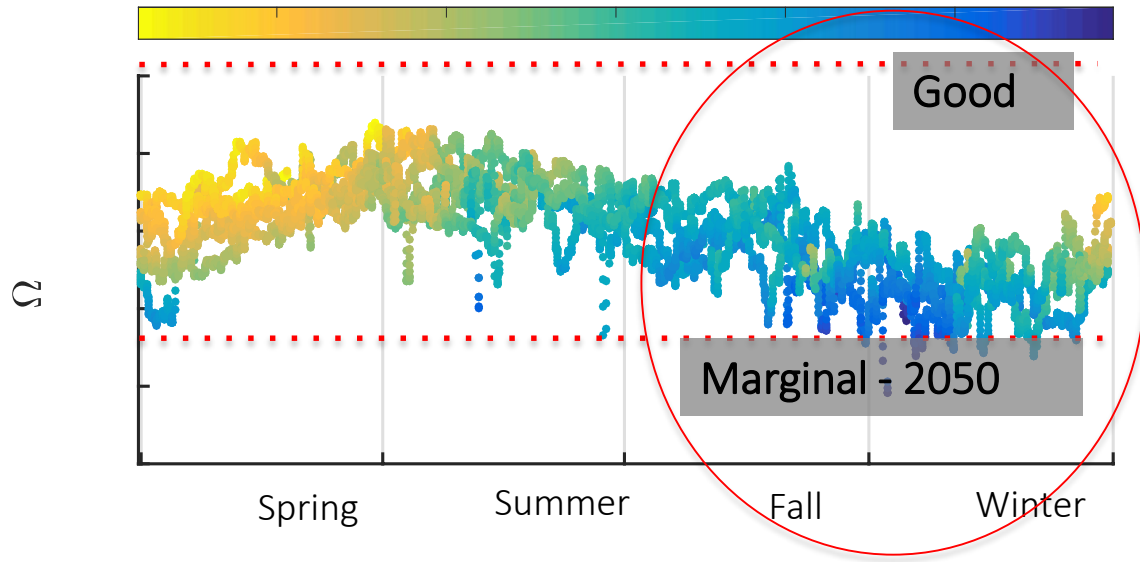
Seawater pH



- ✓ No significant decrease over time
 - ✓ Mean pH = 8.01 ± 0.15
 - ✓ 2100 is expected to decrease 0.3 units
- 100–150% increase in acidity

Carbonate Saturation State (Ω_{arg})

“active accretion or dissolution of calcium carbonate minerals”

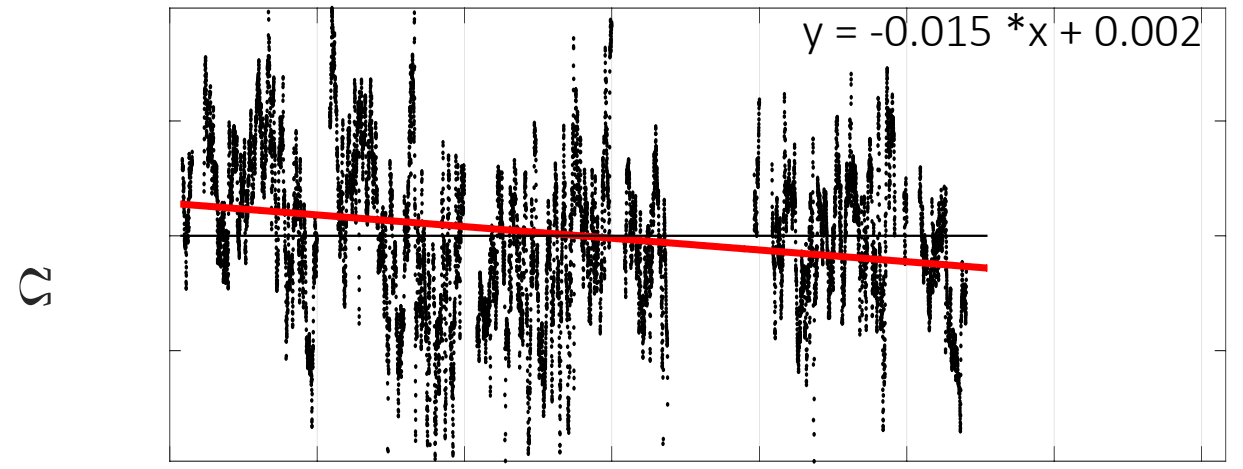


Ω_{arg} lower during summer and fall

Controlled by short-term $pCO_{2,sw}$ dynamics, SST, SSS seasonal changes

Observed Trend

Anomalies from the climatological model
 $p < 0.001$



Ω_{arg} shows a decrease of **0.003 yr⁻¹**

Gledhill et al. (2008) & Qing Jiang et al. (2015) reported **3% per decade**