- Buoy measurements
- $\text{CO}_2 \text{ Atm.} \& \text{ SW}$
- pH
- Carbonate saturation state ($\Omega$)
  “active accretion or dissolution of calcium carbonate minerals”
Atmospheric CO$_2$

PIR $\sim$ 280 ppm
Mauna Loa - Feb 2016 = 404 ppm
Parguera - Feb 2016 = 408 ppm

Mitigation scenarios – 450-500 ppm by 2100

$\text{CO}_2,_{\text{Atm. \ increase}}$
Mauna Loa - 3.0 ($\pm$ 0.1) ppm year$^{-1}$

2015 was the 4$^{th}$ consecutive year that grew more than 2 ppm
Seawater CO₂

- High SST and CO₂,SW
- Local rainfall
- Influx of the low-salinity Amazon and Orinoco River plumes
- Low pH

CO₂,SW increase 1.05 (± 0.42) ppm year⁻¹

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

Other sources of CO₂?
Sea-air CO$_2$ flux

- Biology plays an important role
- Persistent net source of CO$_2$ 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 \((\Omega_{\text{arg}})\)

"active accretion or dissolution of calcium carbonate minerals"

\[ y = -0.015 \times x + 0.002 \]

\(\Omega_{\text{arg}}\) shows a decrease of \(0.003\ \text{yr}^{-1}\)

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