

# Monitoring Ocean Acidification in Caribbean Coral Reefs

## CariCOOS Ocean Acidification Monitoring Program



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## Objectives

### Monitoring priority tasks:

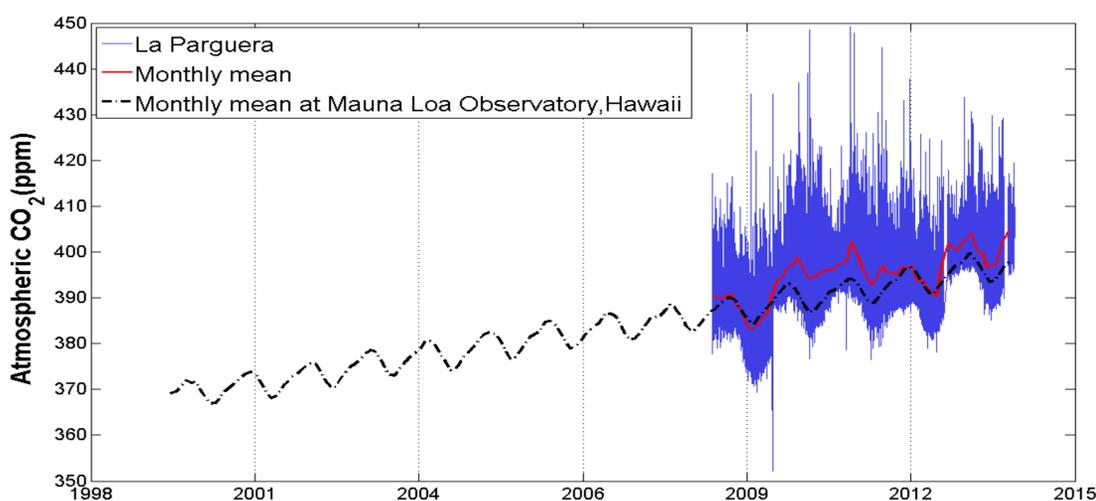
1. Provide high frequency long-term estimates of aragonite carbonate saturation state ( $\Omega_{arg}$ ), an index of how “easy” is for calcifying organisms to build their skeleton and shells (calcification).
2. Identify potential areas of refugia from OA effects (e.g. seagrasses).
3. Monitor the status and trends of OA in coastal areas, including fine-temporal resolution discrete field water sampling and CTD casts.
4. Inform policy makers, resource managers and the general public in support of OA management efforts.



**Fig. 1.** The MapCO<sub>2</sub> buoy provided OA data at the reef ecosystem of La Parguera.

## OA Monitoring

### Local atmospheric CO<sub>2</sub> concentration is consistent with the global trend.



**Fig. 2.** Time series record of atmospheric [CO<sub>2</sub>] from 2000 to 2014 at Mauna Loa Observatory, HI and from 2009 to Feb 2014 at La Parguera, PR.

Monthly Mean at Mauna Loa, HI

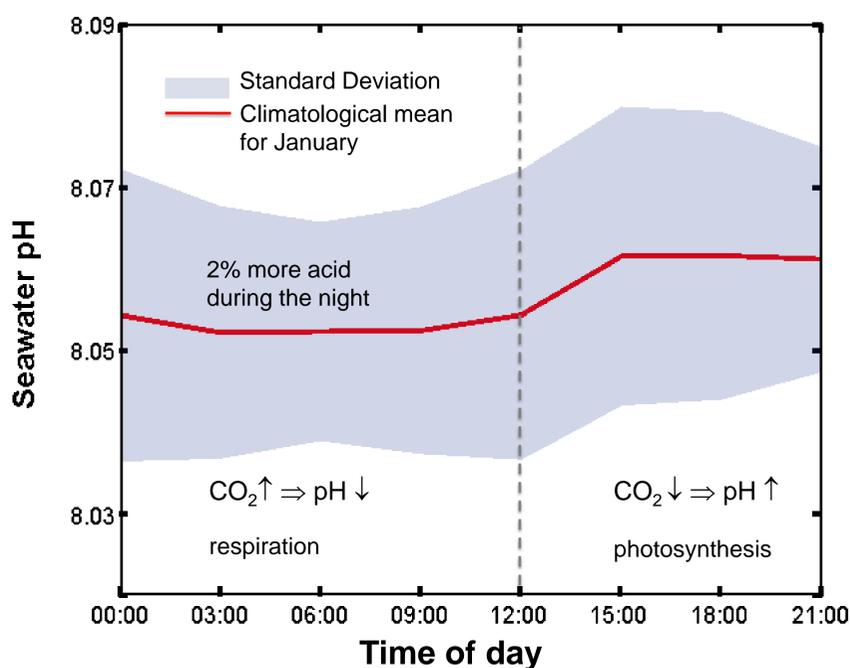
1959 CO<sub>2,atm</sub> = 315 ppm

2014 CO<sub>2,atm</sub> = 397 ppm

Monthly Mean at La Parguera, PR

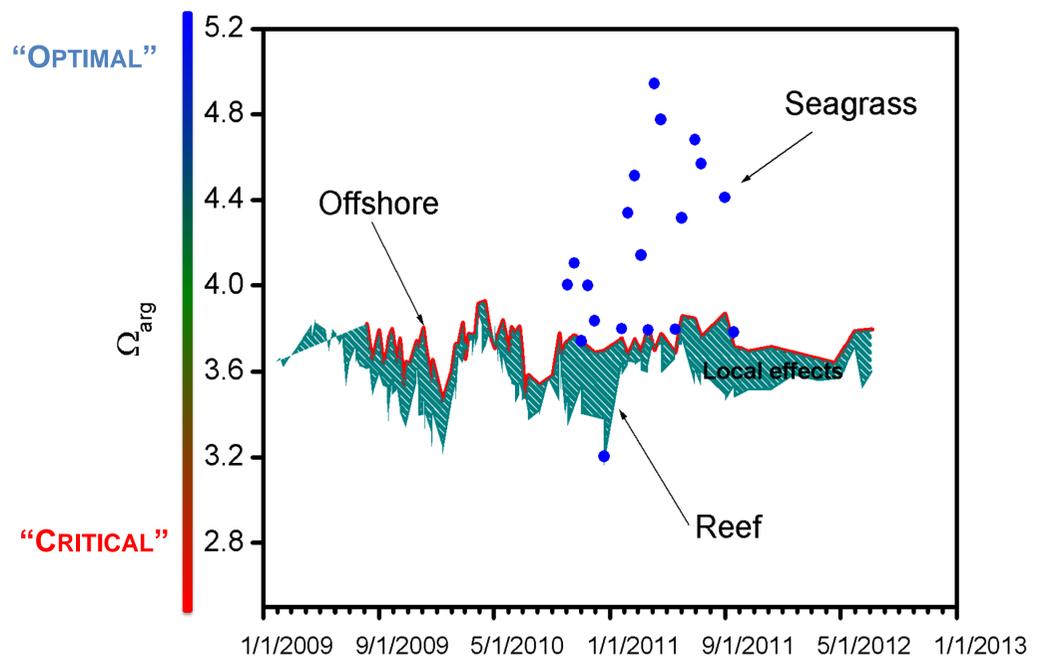
2014 CO<sub>2,atm</sub> = 395 ppm

### pH diurnal variation at the Reef January



**Fig. 3.** Climatological mean monthly distribution of surface seawater pH from 2009 to 2014 at Enrique forereef. Net changes in pH are strongly influenced by metabolism processes (e.g. photosynthesis, respiration and calcification).

### Data suggests a potential role for seagrasses in providing a refuge from OA effects.



**Fig 4.** Time series of  $\Omega_{arg}$  at Enrique forereef (green line) compared to the offshore (red line) and seagrass on the backreef of Enrique (blue circles). Values decrease considerably due to the “local effects” (hatched green area).

## Future Work

- Continuation of this monitoring effort will support meeting the requirements for the designation of La Parguera as a Class III Climate Monitoring Station by the National Coral Reef Monitoring Program.
- Publication of “real time” pH and CO<sub>2</sub> data via CariCOOS web page.