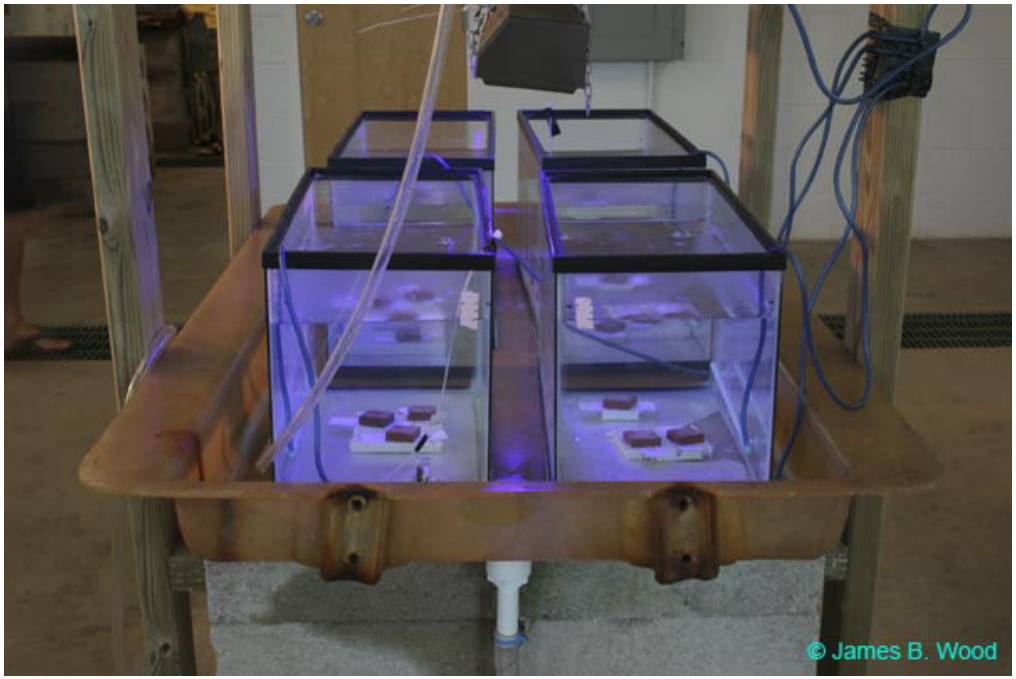
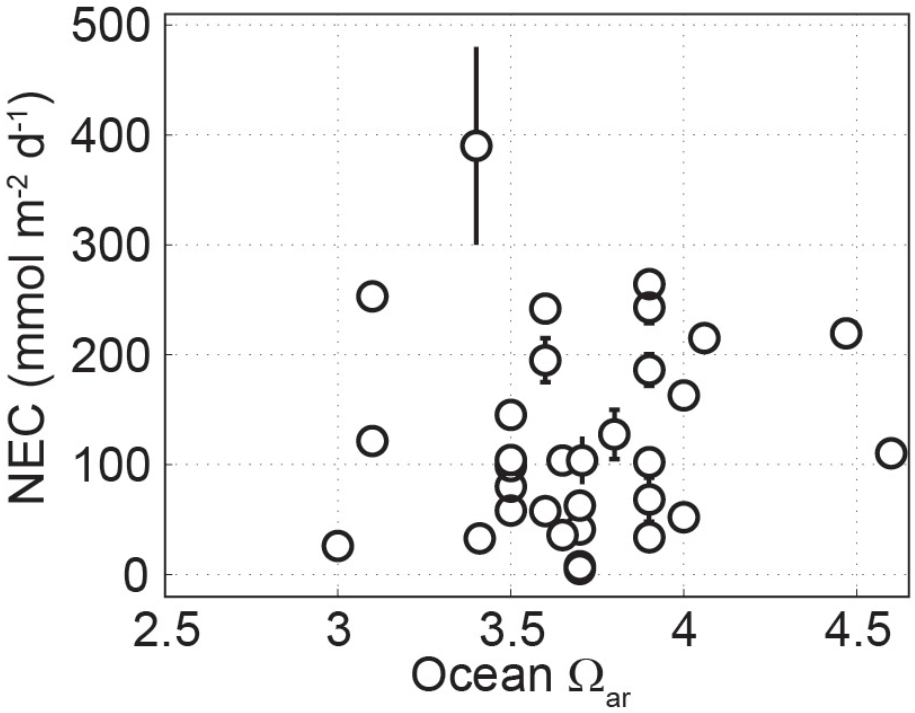
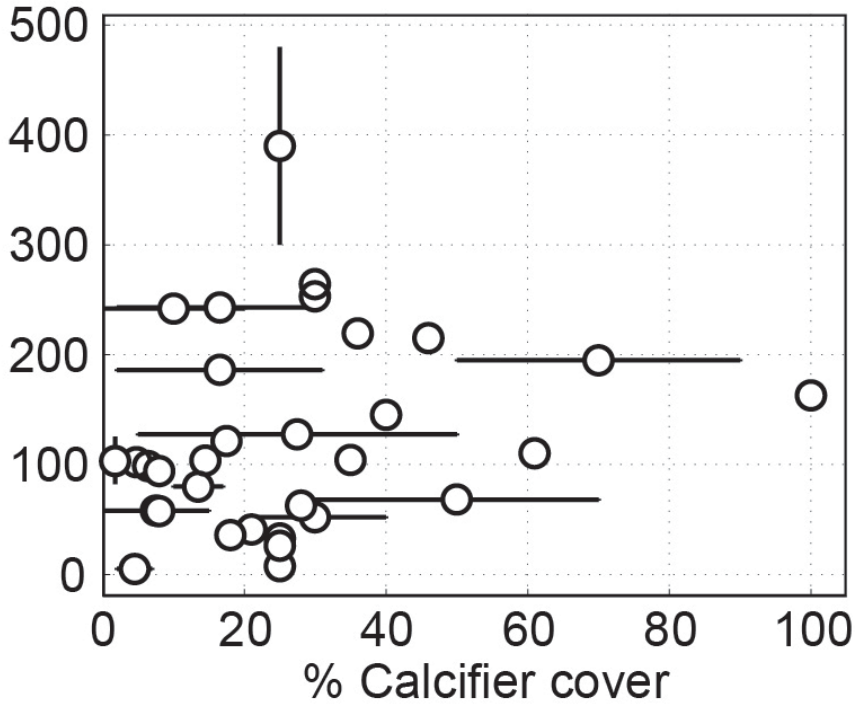


Ocean Acidification and Coral Reefs an ecosystem perspective

Andreas Andersson, Rusty Brainard, Hannah Barkley, Tom DeCarlo, Chris Langdon, Matt Long, Tom Oliver, Katie Shamberger

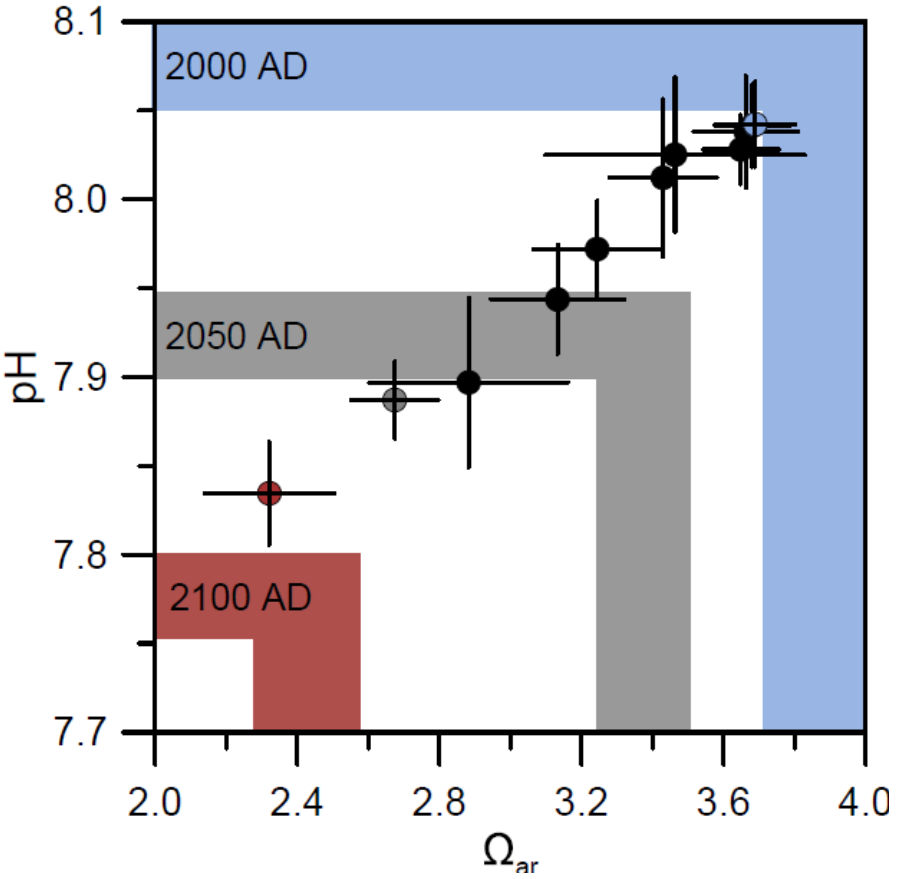
Do we detect sensitivity to ocean acidification on the ecosystem scale?





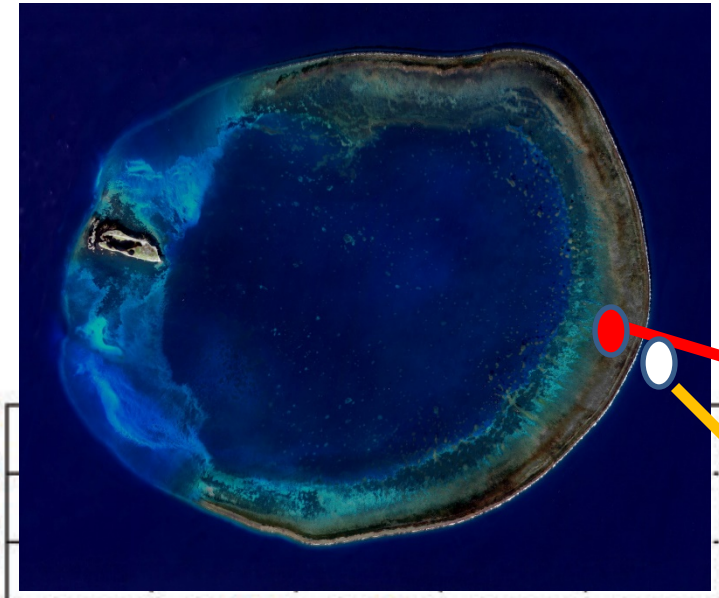
DeCarlo et al., JGR 2017

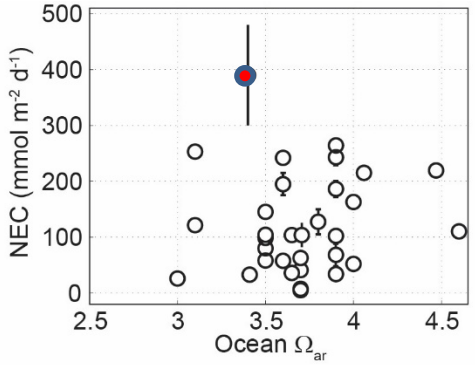
reef pH & Ω_{ar} ≠ ocean

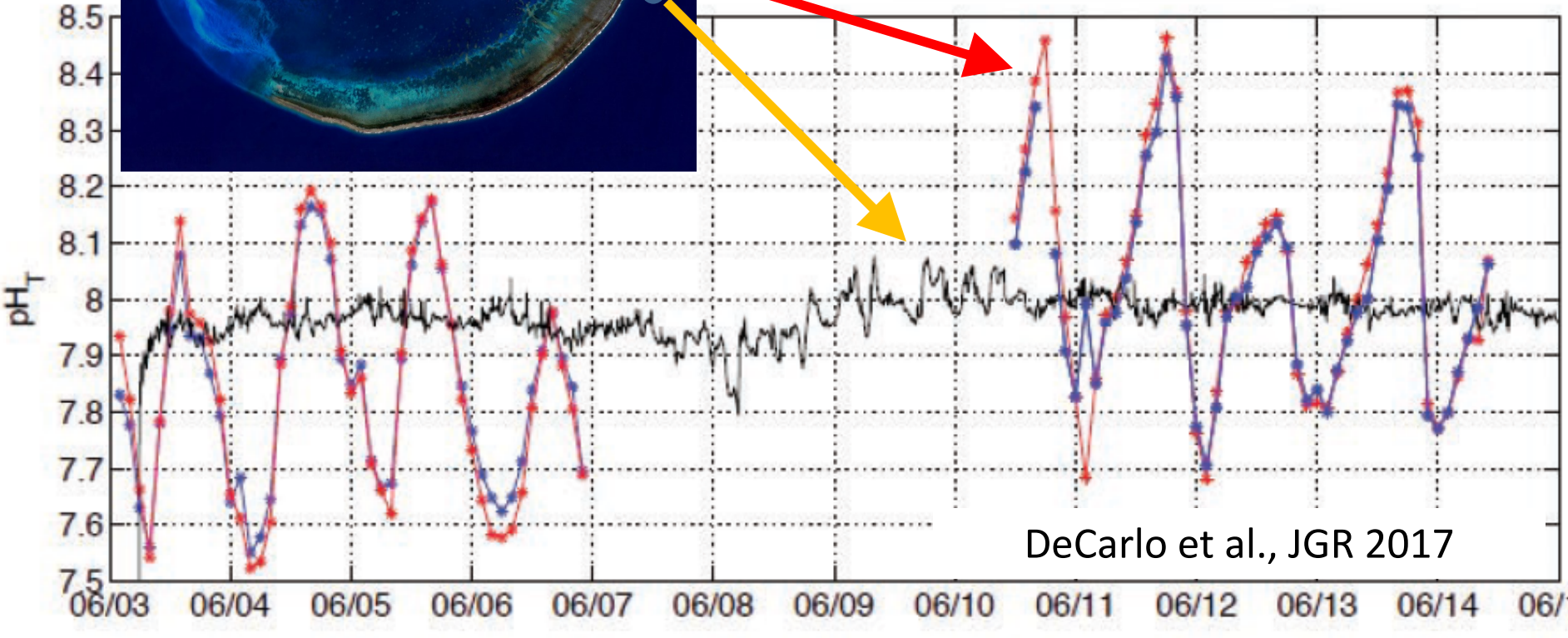


Shamberger et al., GRL 2014
Barkley et al., 2015 Sci. Advances

On Dongsha, reef calcification occurring at elevated pH & Ω_{ar}

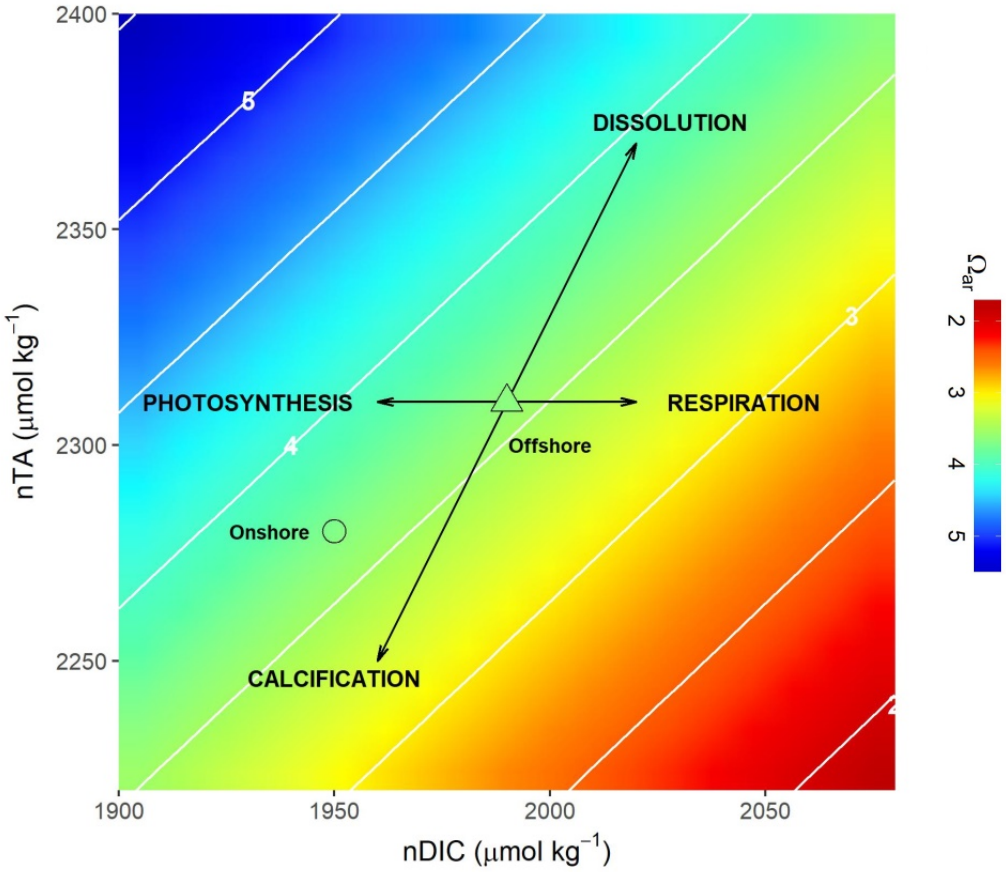




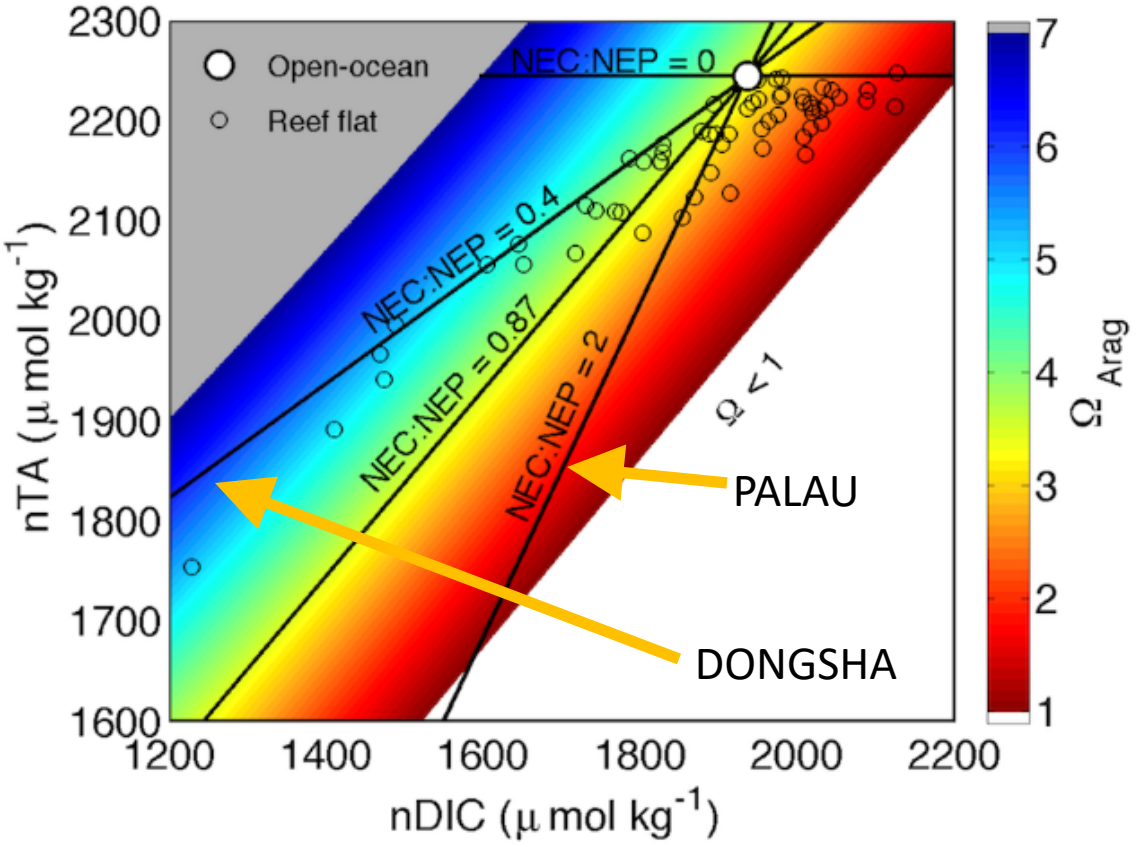


DeCarlo et al., JGR 2017

Community metabolism ↔ coral reef CO_2 system

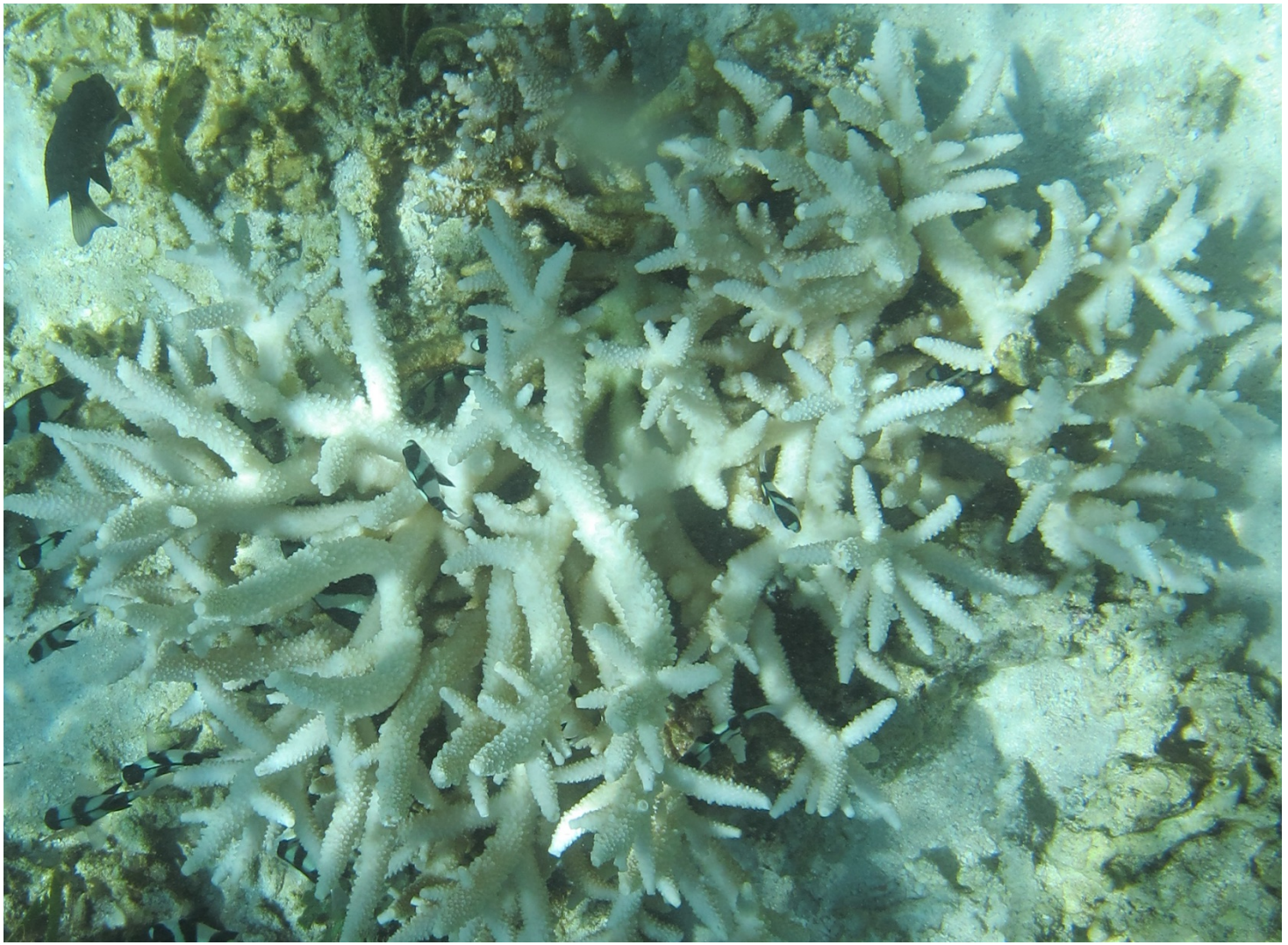


Community metabolism ↔ coral reef CO_2 system

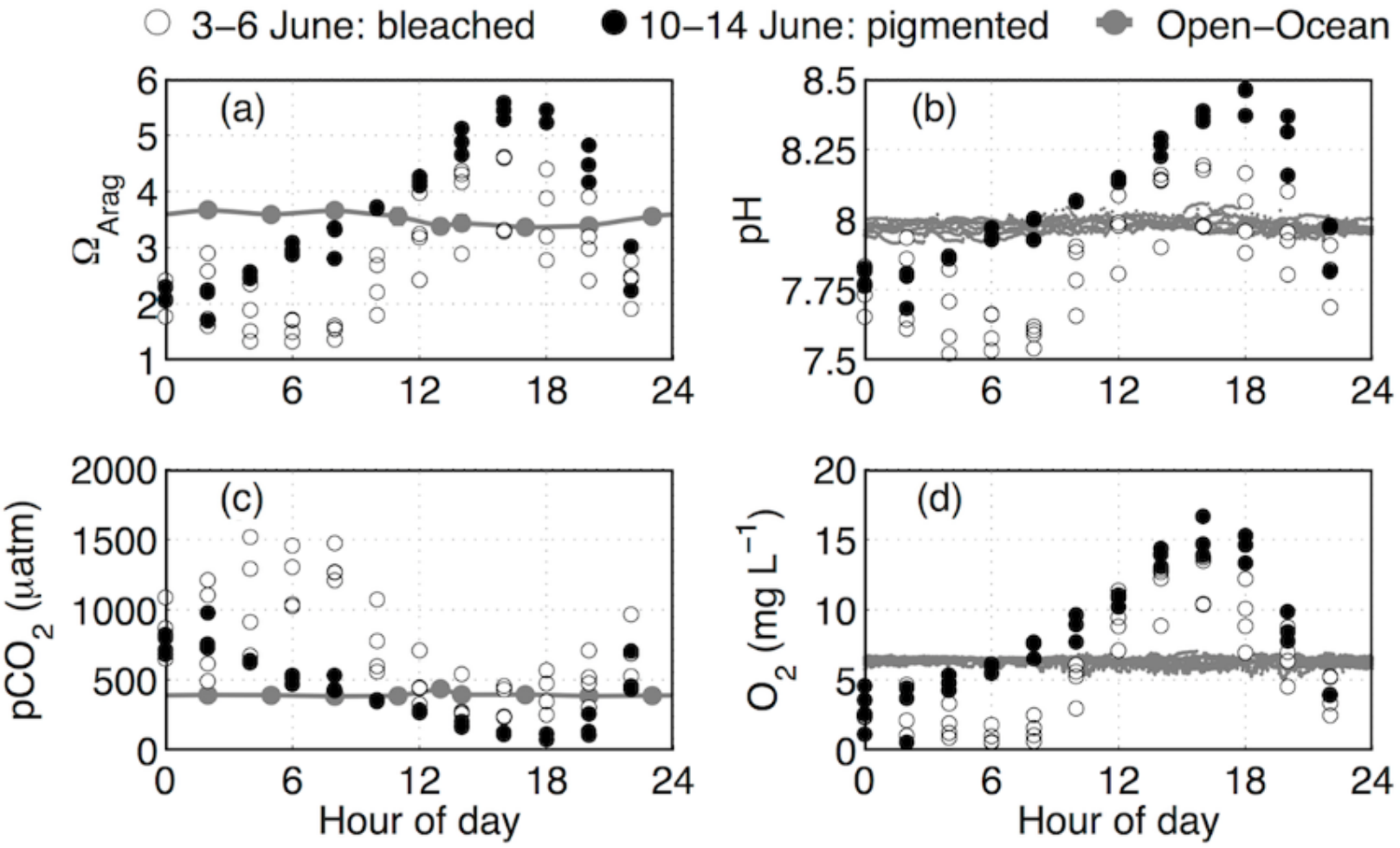


DeCarlo et al., JGR 2017, Cyronack et al., Plos One 2018

Thermal stress affects community metabolism

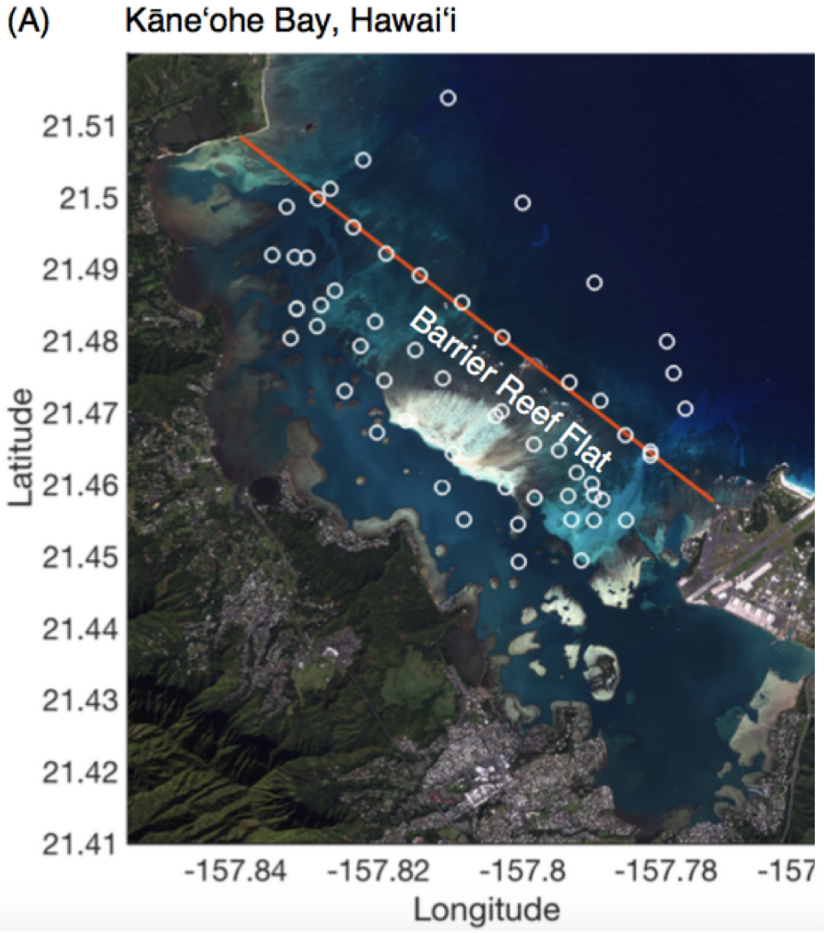


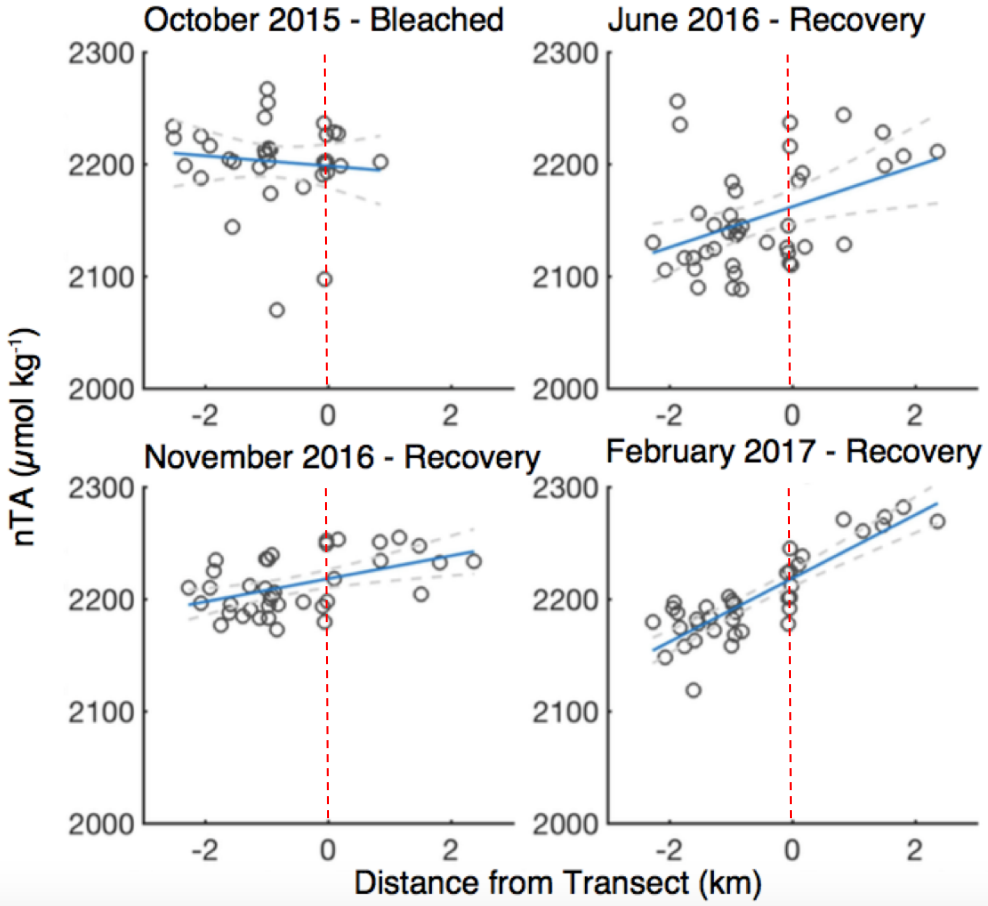
Thermal stress affects coral reef CO_2 system



DeCarlo et al., JGR 2017

Alkalinity tracks coral reef bleaching and recovery in Kaneohe Bay



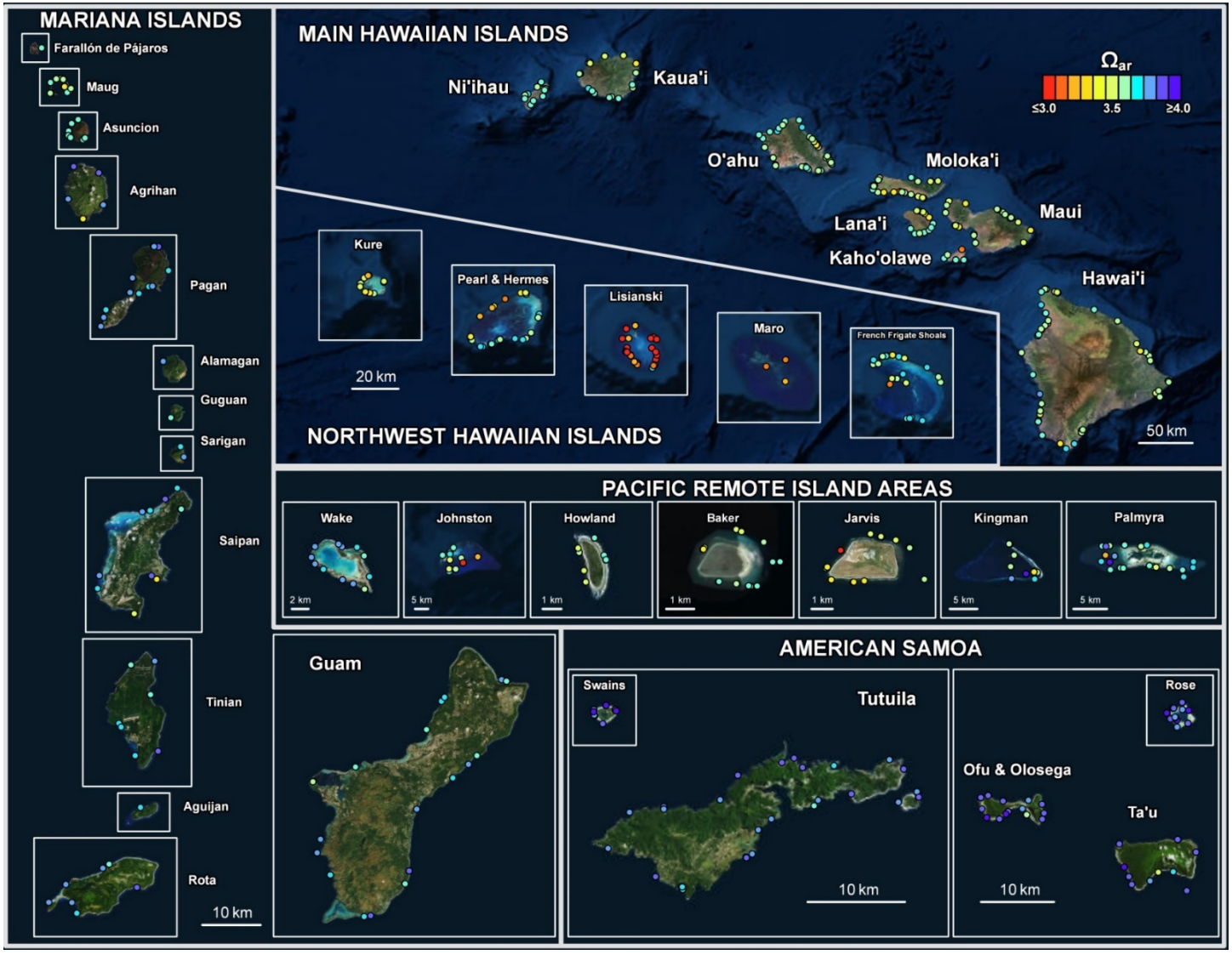


Courtney et al., L&O Lett., 2017

How to track impacts of ocean acidification on the ecosystem scale?

A long term, large scale approach

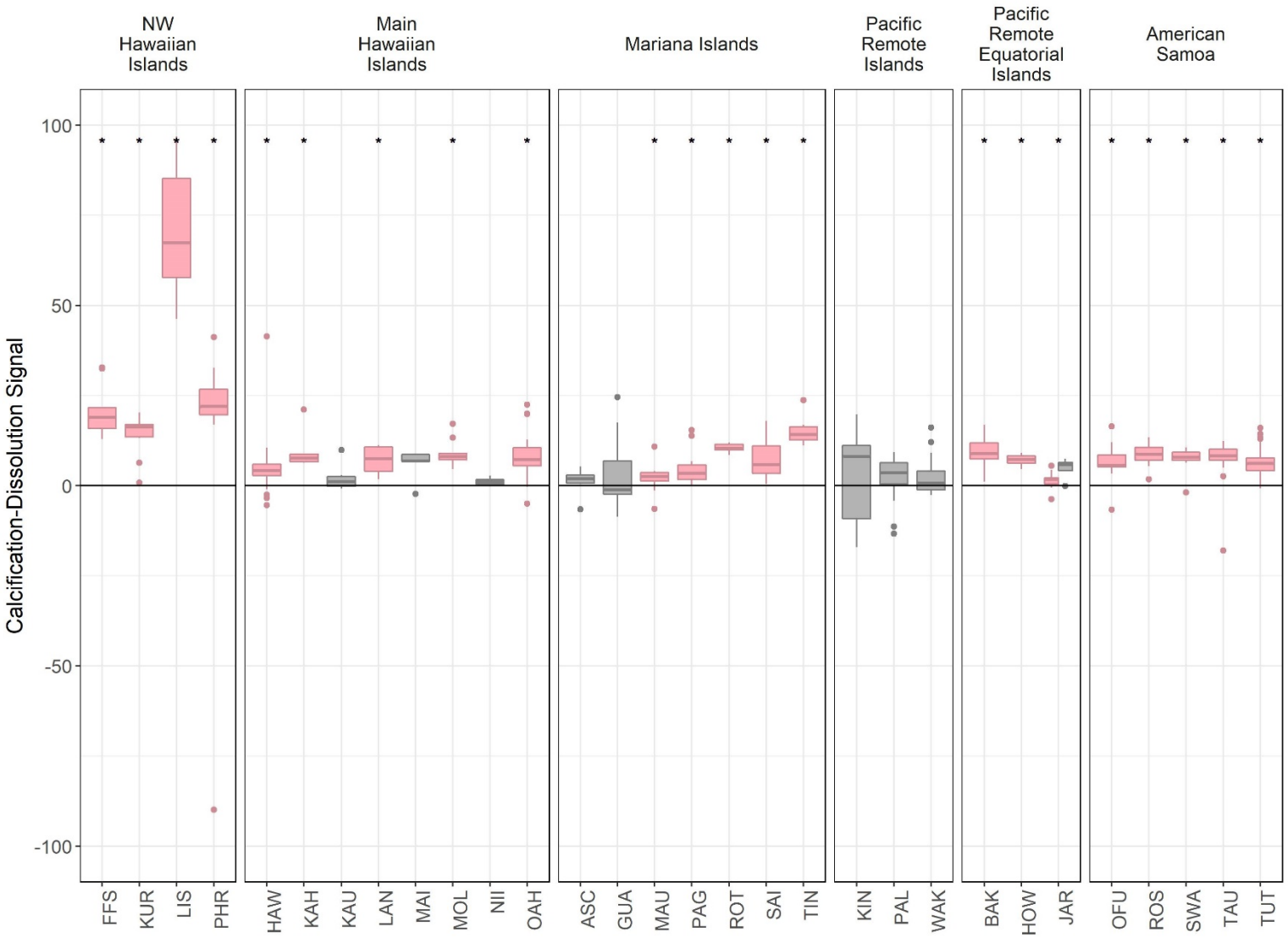
Ecosystem Science Division at NOAA's Pacific Island Fisheries Science Center



Thomas Oliver, Hannah Barkley, Chip Young, Jeanette Clark, Noah Pomeroy, Rusty Brainard

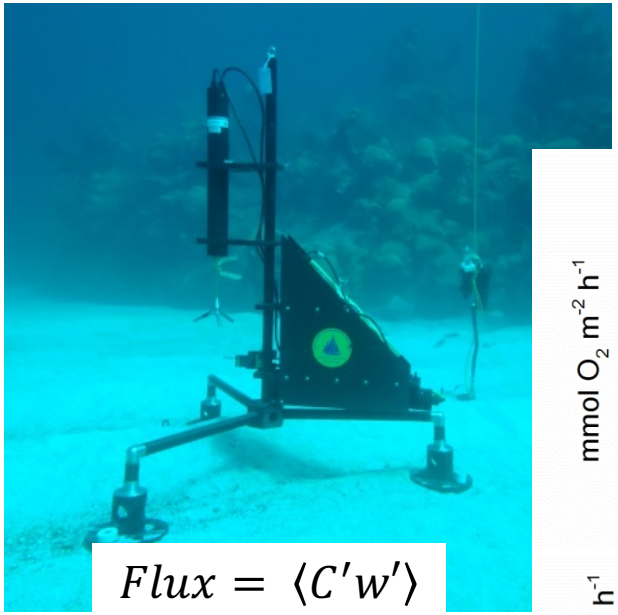
Baseline data: all reefs net calcifying

38 Pacific Islands, 2010-2016

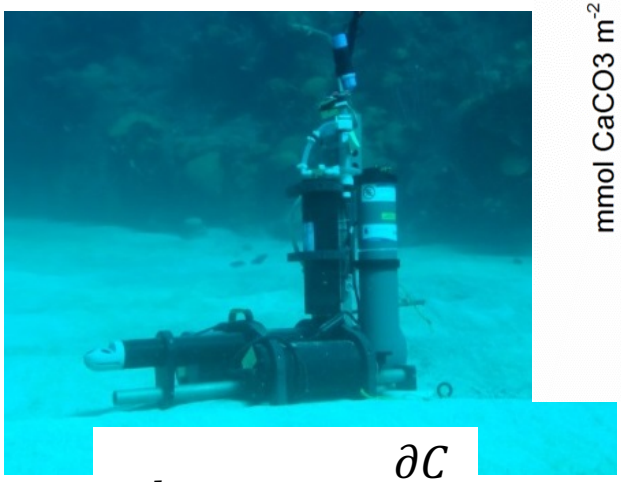


Turbulent Boundary Layer Exchange

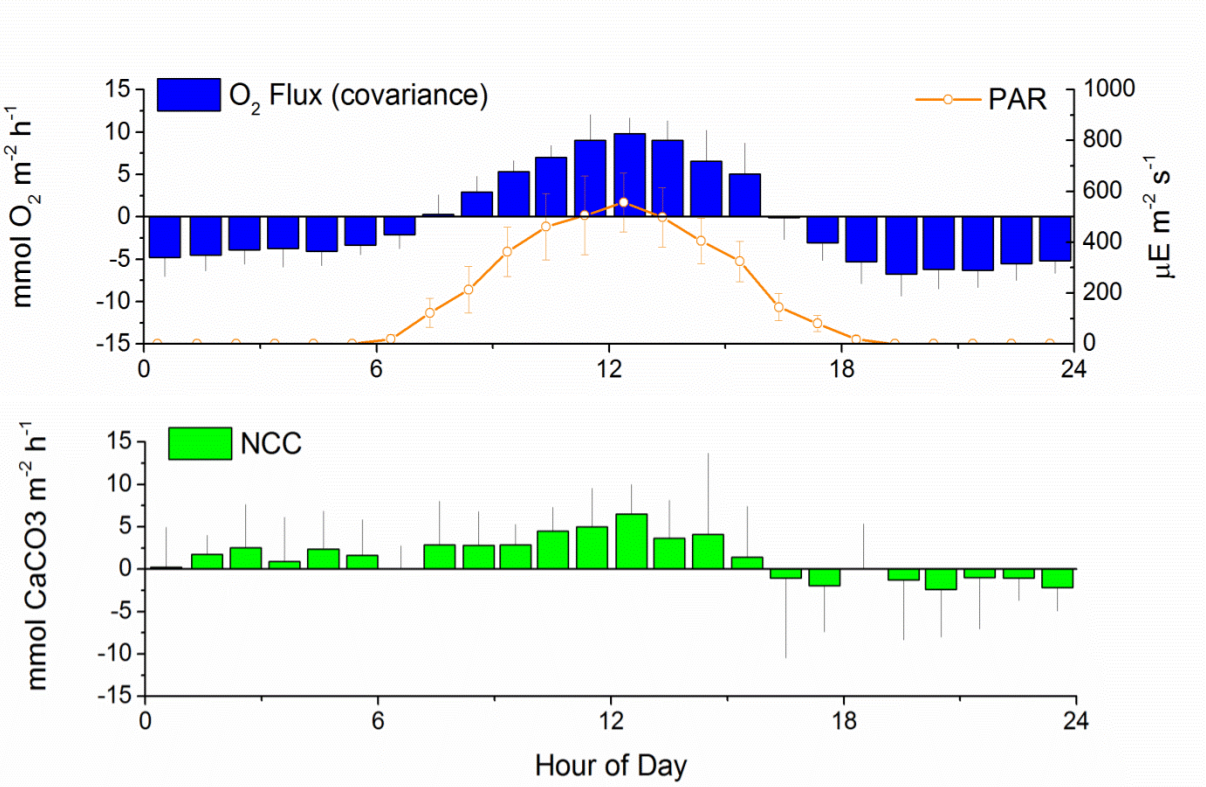
-Eddy Covariance, Gradient-Diffusivity



$$Flux = \langle C'w' \rangle$$



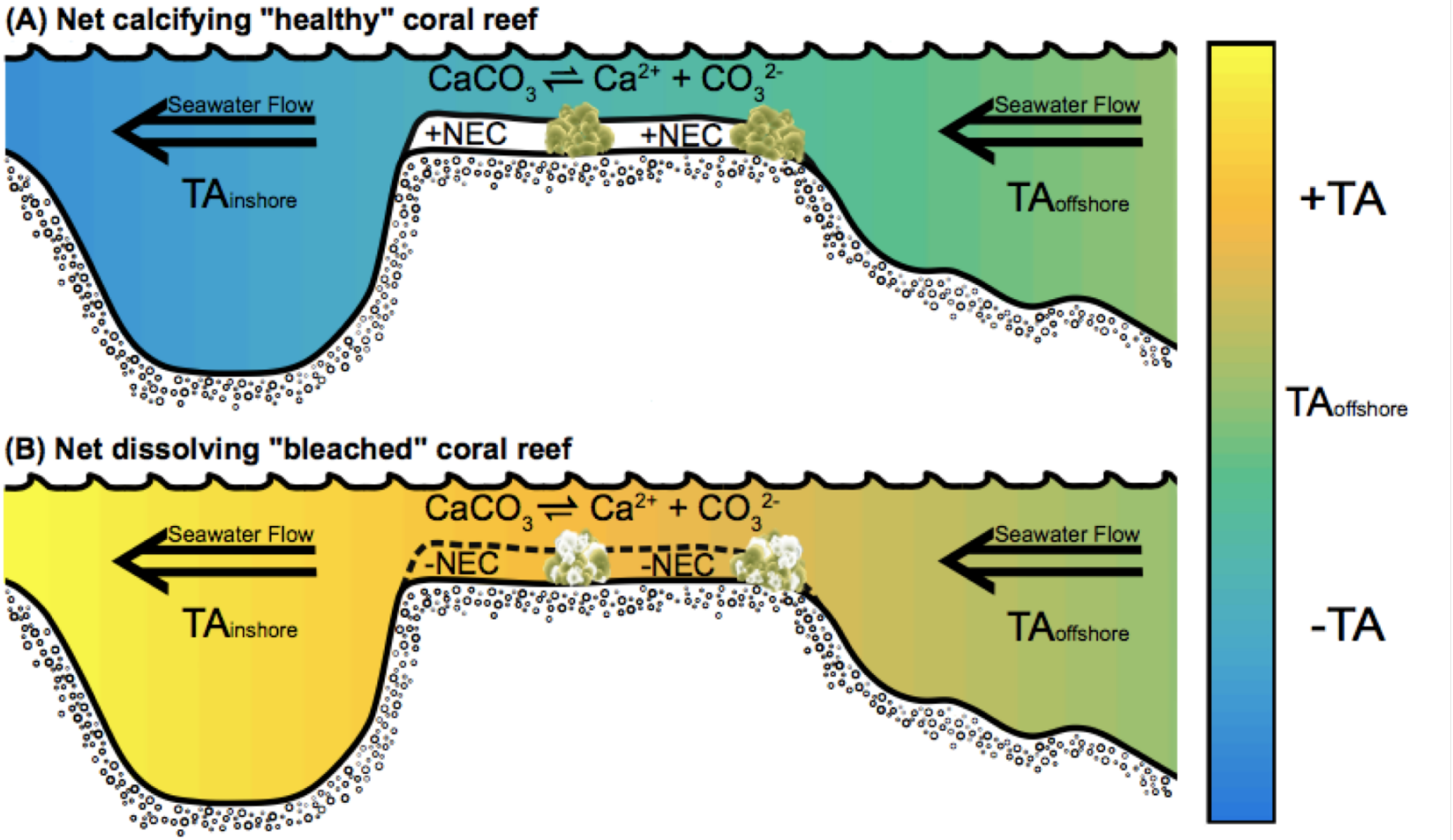
$$Flux = -Kz\,\frac{\partial C}{\partial z}$$



In situ, 10-100m^2, hourly

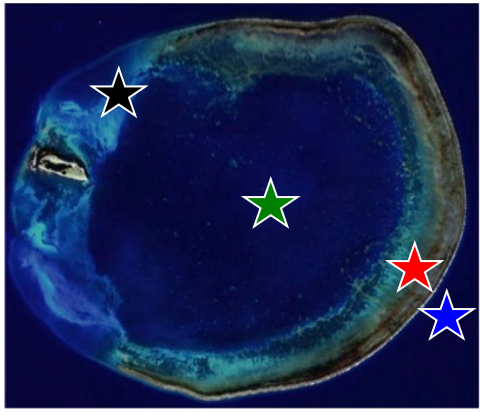
Matt Long

Using the coral reef CO_2 system to index ecosystem health



Courtney et al., L&O Lett., 2017

temperature



DeCarlo et al., SREP 2017