A group of squid swimming in clear blue water. The squid are dark brown with prominent blue eyes and long, pointed snouts. They are scattered throughout the frame, swimming in various directions. The water is bright blue with some light reflections on the surface.

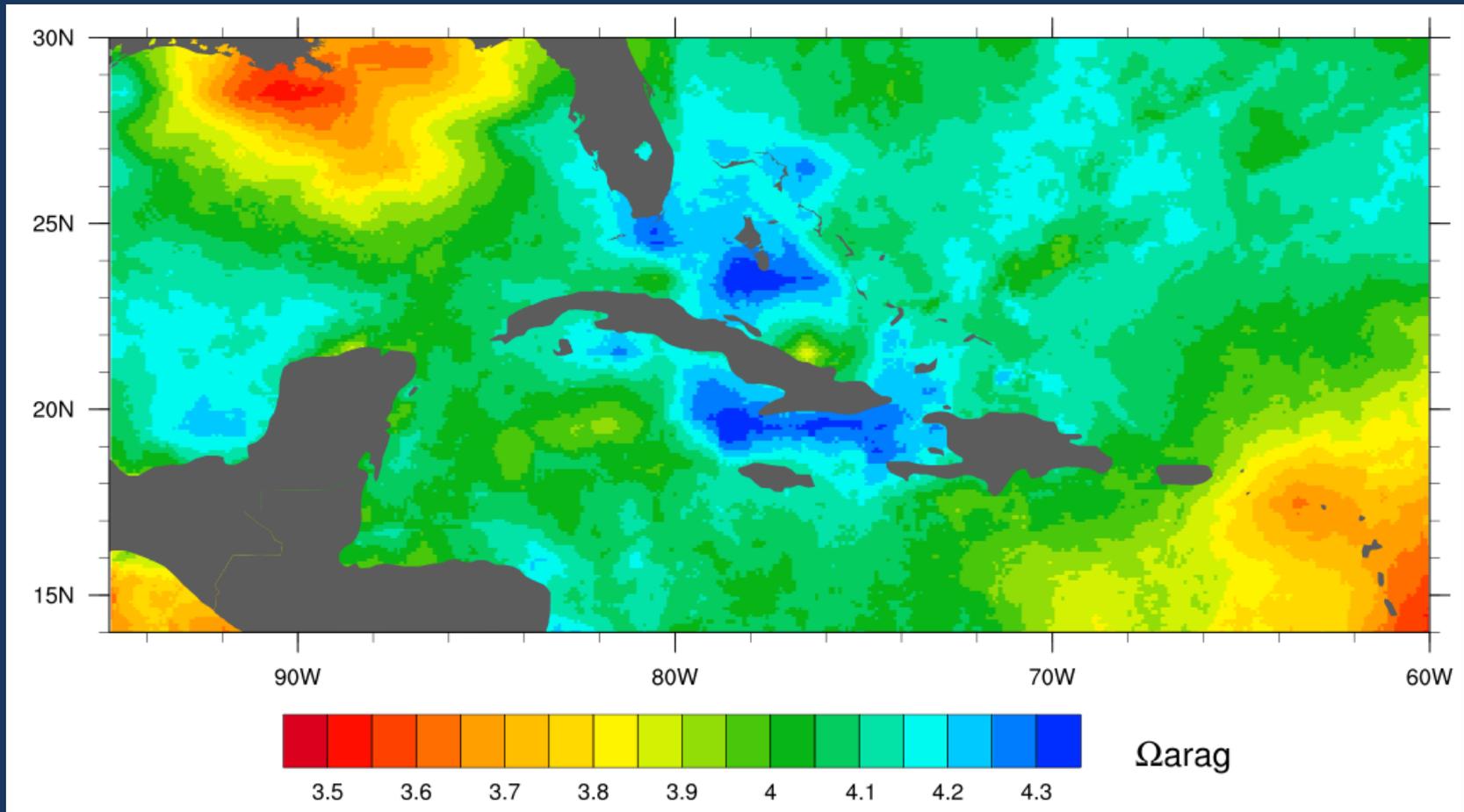
# Update on Some AOML Coral Activities not Covered Elsewhere Today

- Ruben van Hooidonk
- Kevin Helmle
- Paul Jones
- Xaymara Serrano
- Pamela Fletcher
- Lew Gramer
- Mike Jankulak

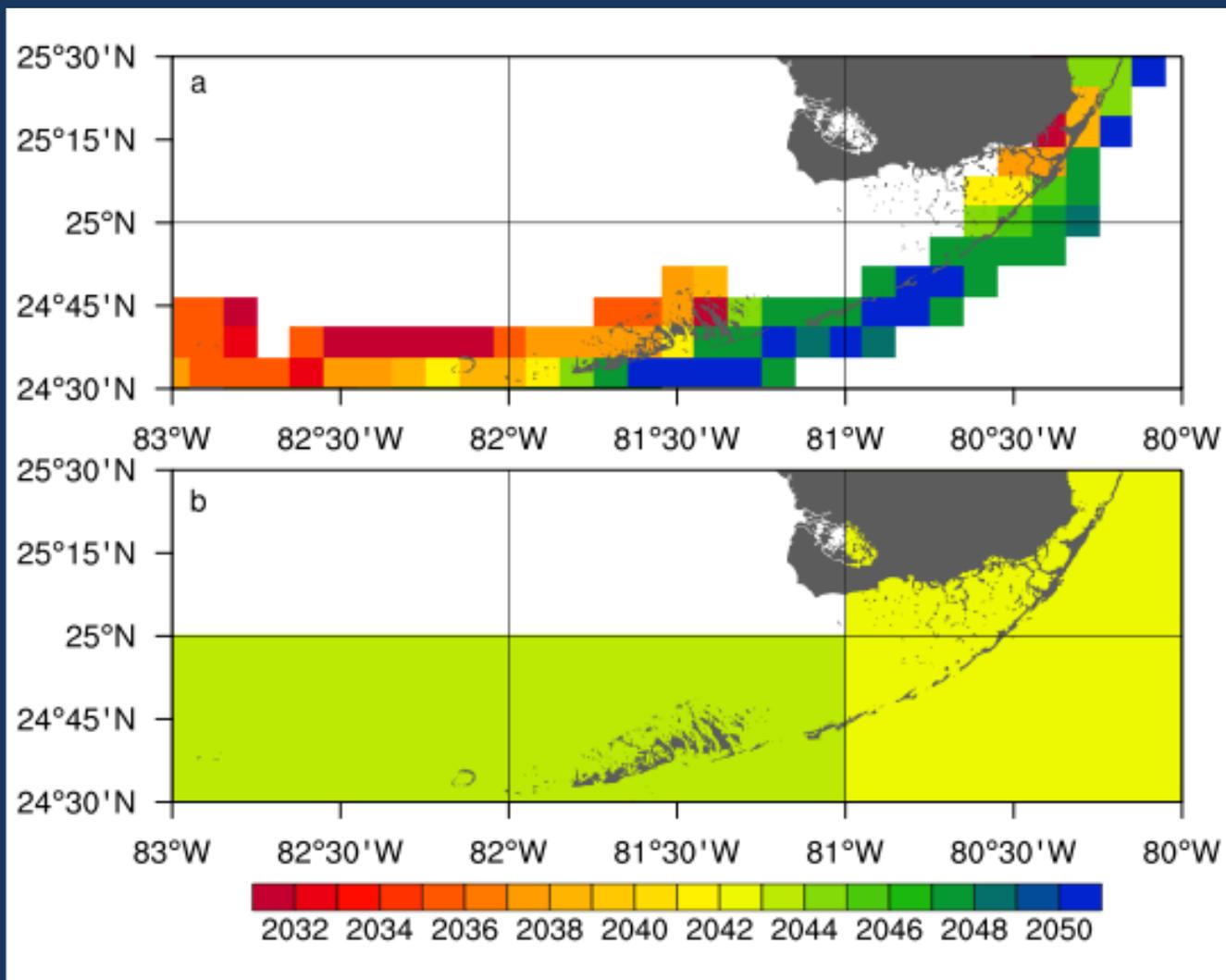
An Overview by Jim Hendee

The AOML-SEFSC Workshop

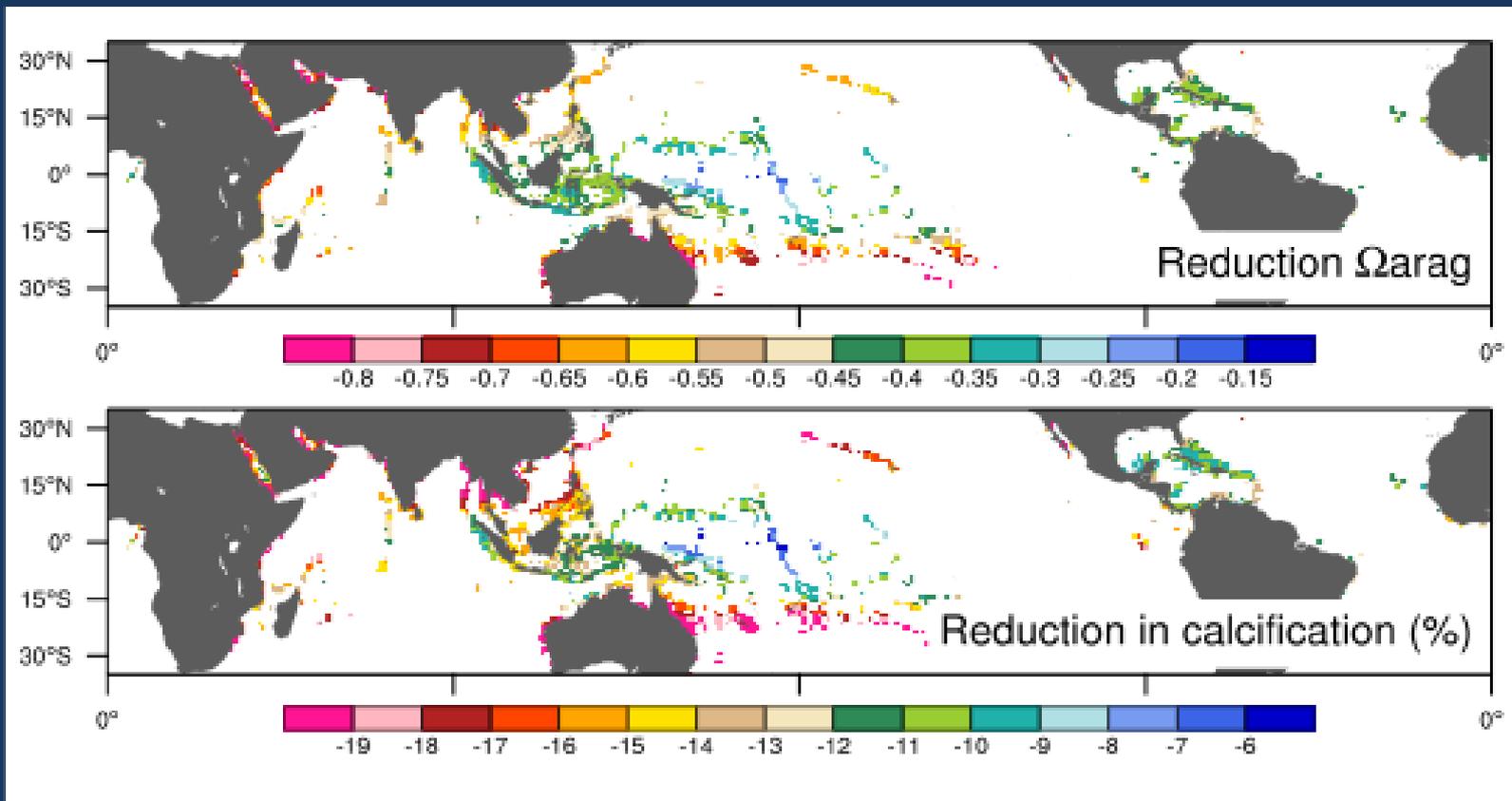
May 29, 2014



**Monitoring Ocean Acidification:** Surface aragonite saturation state for 2013-09-11  
Products are being developed to monitor ocean acidification through the application of a variety of modeled and remotely sensed environmental parameters. These OA products will provide high resolution monthly estimates of total alkalinity, surface pressure of CO<sub>2</sub>, pH and aragonite saturation state.



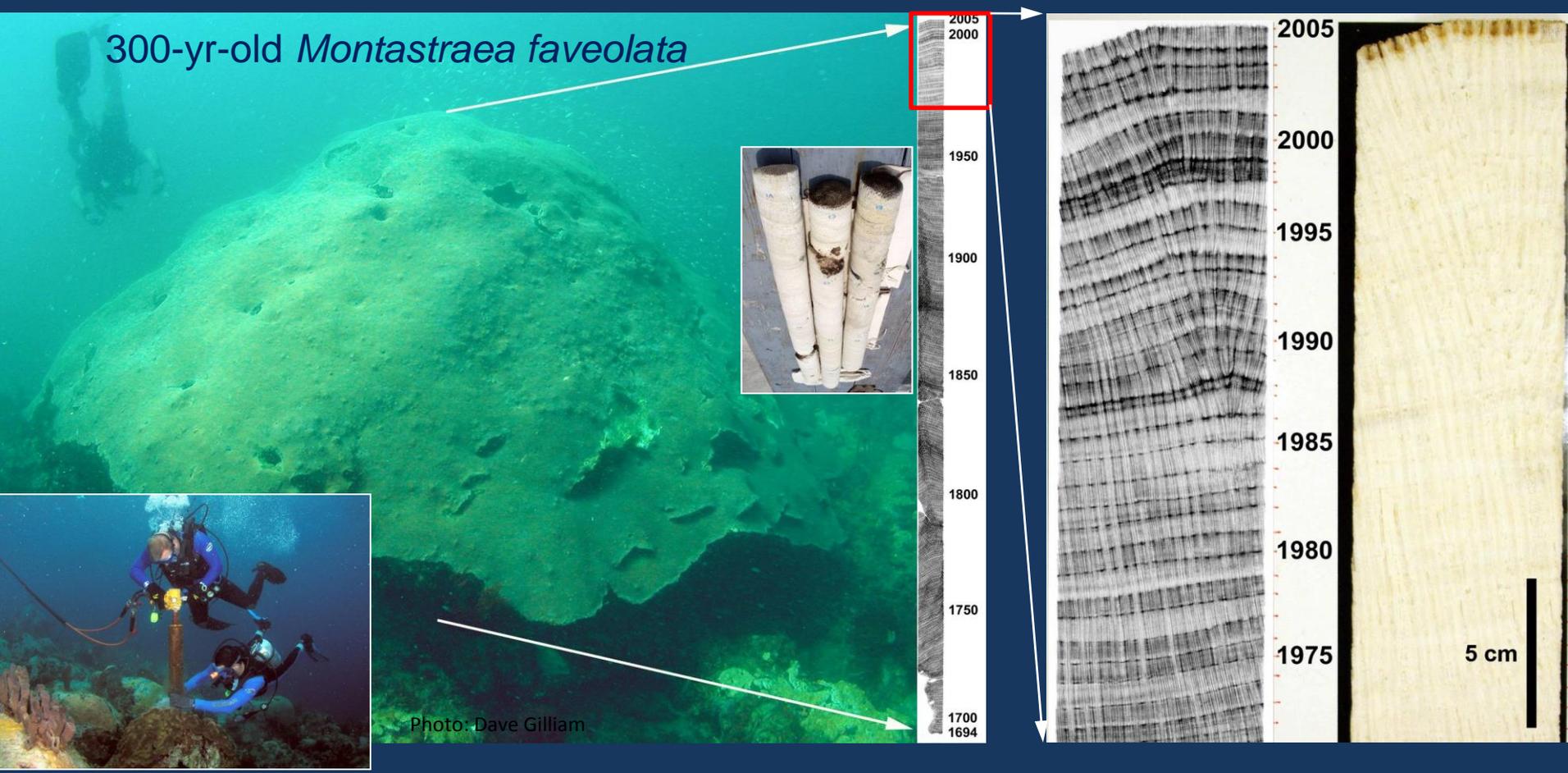
**Modeling Climate Change Impacts on Coral Reefs:** Using a regional climate model coral bleaching is projected on coral reef locations in the Caribbean. This is a significant improvement in spatial resolution compared to projections made with global circulation models. Figure (a) shows the year when bleaching is projected to occur annually using a regional climate model, figure (b) shows the year when bleaching is projected to occur annually derived from a global model.



**Modeling Ocean Acidification Impacts on Reefs:** Using global circulation models the reduction in aragonite saturation state until bleaching is projected to become annual is modeled (top plot). Using an observed relationship between reduction in aragonite saturation state and reduction in calcification, OA impacts on coral reef calcification is modeled (bottom plot).

# Corals record past growth rates and environmental conditions

- From coring to X-raying to chronology

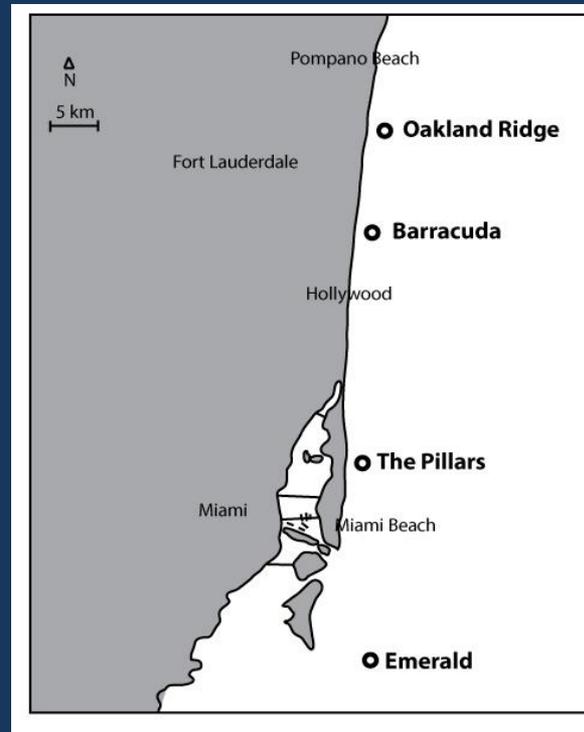


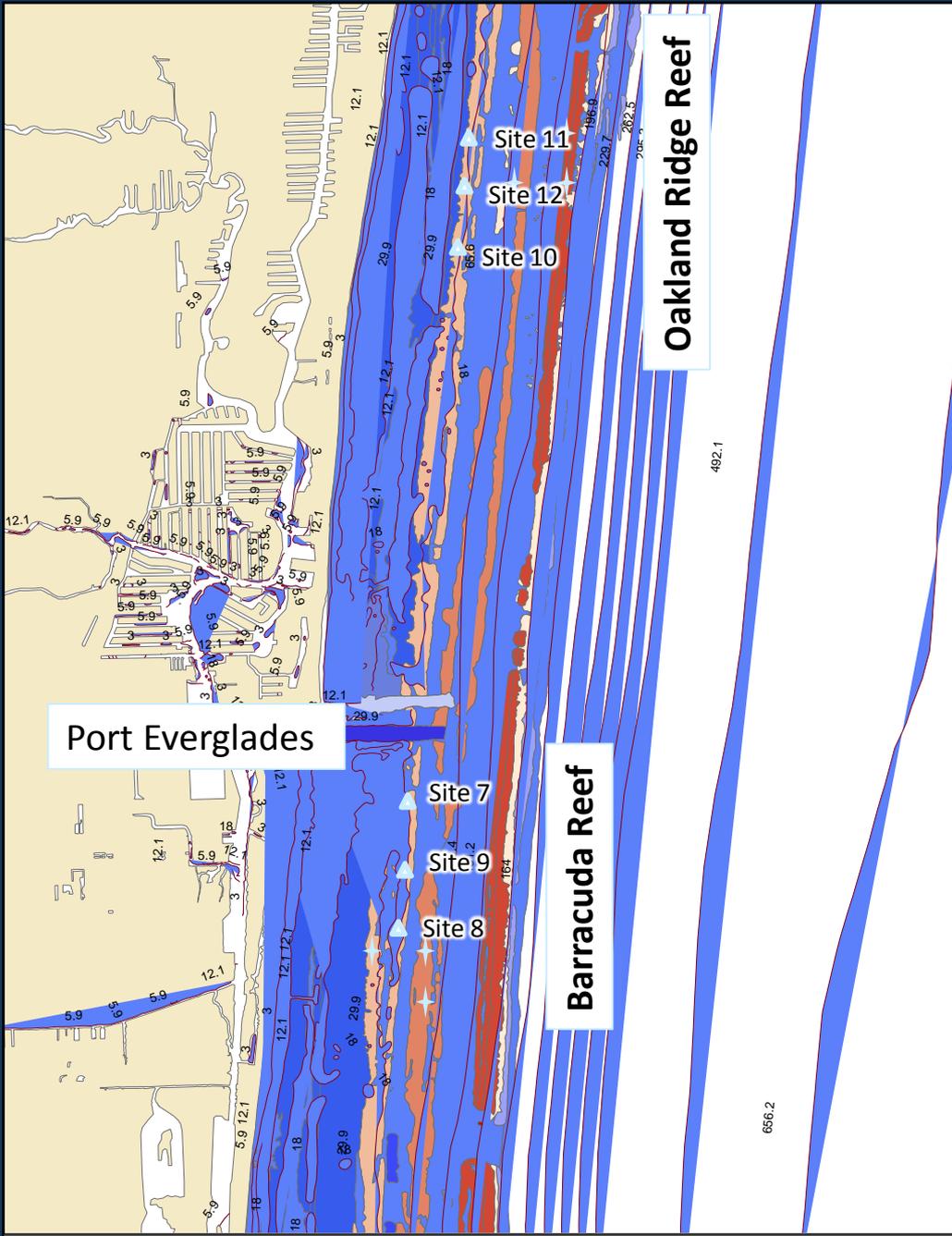
# Controlled Tank Experiments

- In collaboration with NSU's Center of Excellence for Coral Reef Ecosystems Research
- Assess coral health metrics under controlled conditions and during recovery:
  - Tissue condition, zooxanthellae, productivity, and growth
- Establish thresholds for environmentally variables of land-based sources of pollution:
  - Nutrients
  - Sedimentation/turbidity



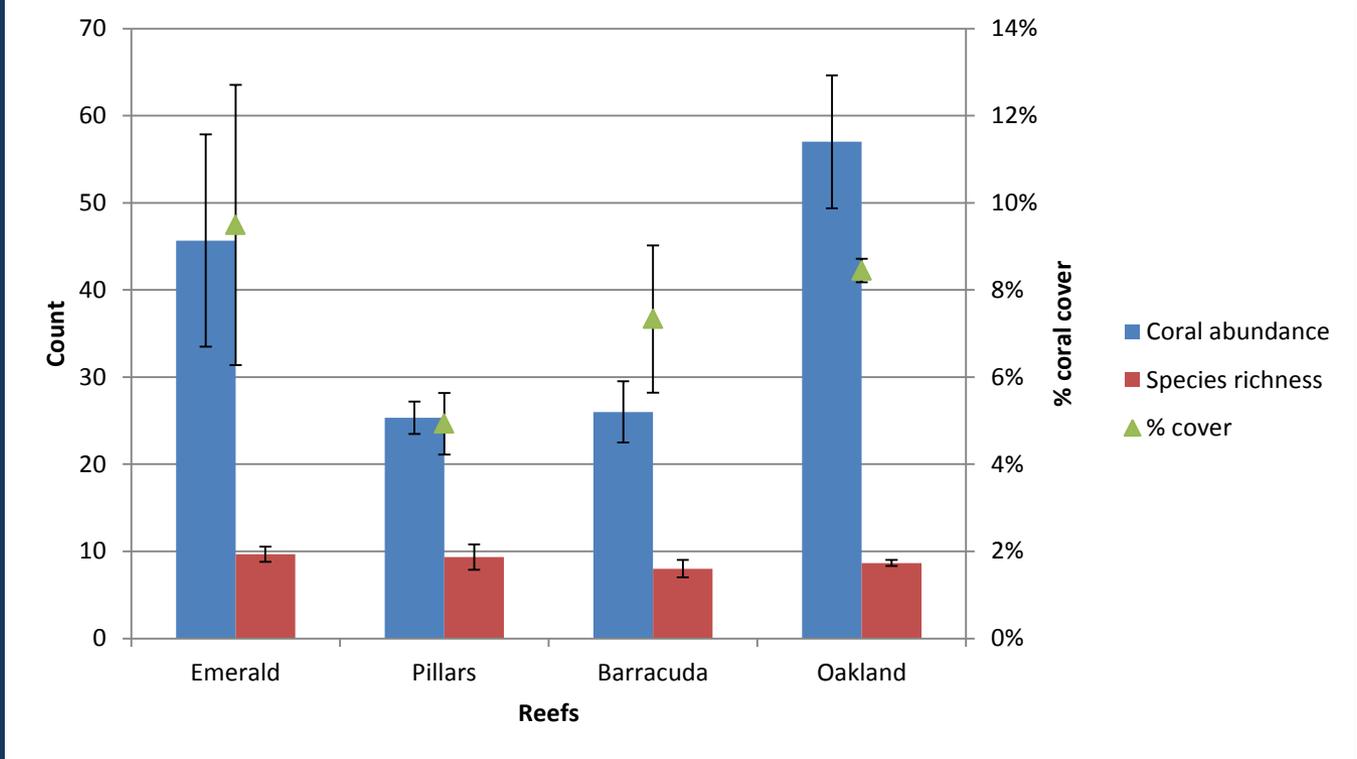
## Reefs Surveyed for Numeric Nutrient Criteria Benthic Analysis





**Legend:**

- ▲ Coral/Algal benthic survey sites
- Inner Reef (~30ft deep)
- Mid Reef (50-60ft deep)
- Outer Reef (>90ft deep)
- ★ Water quality sampling sites



## Synergistic effects of **eutrophication** and **elevated SST** in the early life stages of two Caribbean corals

(Drs. Xaymara Serrano, Jim Hendee, Margaret Miller and Andrew Baker)

Corals which regularly experience elevated conditions of dissolved inorganic nitrogen (DIN) appear less 'resistant' to thermal stress by **~2-2.5°C below the upper bleaching limit** (Wooldridge, 2009)

A link between **algal symbiont density** and **bleaching severity** has been hypothesized as the one of the causes (Cunning and Baker, 2013)

We aim at understanding the synergistic effects of these two stressors **for life stages that are relatively understudied.**

- Results are expected to provide empirical evidence that supports the implementation of environmental policies which improve water quality and increase reef resilience.

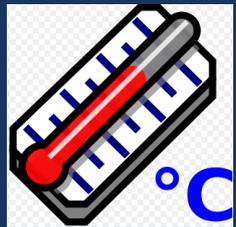
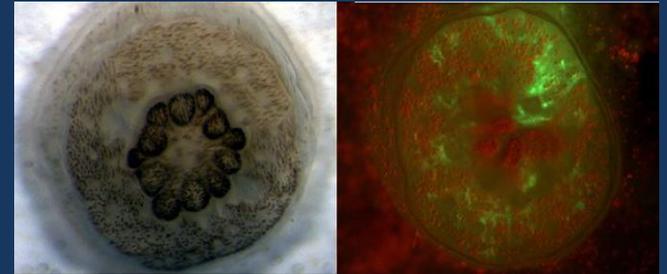


# Proposed experimental design

Larval collection  
and rearing



Verify settlement and  
uptake of algal symbionts



Temperature  
stress



Parameters assessed:  
Survival, growth, symbiont identity  
+ density, coral genetic identity,  
photosynthetic efficiency, chl a  
concentration



## Extending the Coral Reef Early Warning System (CREWS) in the Caribbean

- New CREWS buoys
  - Belize (2)
  - Dominican Republic (2)
  - Barbados (1)
  - Trinidad and Tobago (2)
- Collaborative with the Caribbean Community Climate Change Center (C5)
- Jon Fajans, All-Reef Monitoring, Inc.
- John Halas, Environmental Moorings Int., Inc.
- Matt Previte, Yellow Springs Instruments, Inc.
- Local host country site maintainers

# A typical YSI Buoy for the CREWS/C5 Network

## Above-water Sensors

Standard meteorological: wind speed, gusts and direction, air temperature, barometric pressure, precipitation, and relative humidity.

## Underwater Sensors

Sea temperature and salinity, plus sensors to answer specific research questions.





Jim Hendee, Pamela Fletcher, Mike Jankulak, Lew Gramer

# New Coral Health and Monitoring Program (CHAMP) Data and Information Site

<http://www.coral.noaa.gov/champportal>

The screenshot displays the CHAMP Portal web interface. On the left, a hierarchical tree lists stations and sensors, categorized by geographic regions such as Caribbean, Florida Keys, Pacific, and Unknown. The central part of the page features a world map with numerous red location markers indicating the positions of various monitoring stations. On the right side, there is a text-based welcome message and introductory information about the site's structure and data access. The browser's address bar shows the URL [triton.aoml.noaa.gov:8080/champportal/](http://triton.aoml.noaa.gov:8080/champportal/). The browser tabs include 'CHAMP Portal', 'Inbox (60) - jim.hendee@noaa.g...', 'NOAA Stuff - Google Drive', and 'National Oceanic and Atmospe...'. The browser's address bar also shows 'Google' and search icons.

**Stations/Sensors**

- Caribbean
  - Bahamas
    - North Norman's Reef [CMRC3] (20...
    - Rainbow Gardens Reef [CMRC1] (...)
  - Belize
    - Half-Moon Caye, Belize [HCBZ1] (...)
    - South Water Caye, Belize [SWBZ1] (...)
  - Cayman Islands
    - Little Cayman Research Centre [L...
  - Jamaica
    - Discovery Bay [DBJM1] (2007-06-...
  - Puerto Rico
    - Media Luna, La Parguera [LPPR1]...
  - US Virgin Islands
    - Salt River Bay, St. Croix [SRV1] (...)
    - Salt River Bay, St. Croix [SRV2] (...)
- Florida
  - Florida Keys
    - SE Sheff
- Pacific
  - Northern Marianas
    - Lao Lao Bay, Saipan [LLBP7] (201...
- Unknown
  - 'Green' (Lutao) Island, Taiwan [GR...]
  - 'Pratas' (Dongsha) Island, Taiwan ...
  - Addu atoll 'virtual monitoring site'...
  - Agincourt Reef AIMS Station, GB...
  - Akumal, Mexico [AKMX1] (2008-0...
  - Amanave Bay NMFS/CRED SST B...
  - American Samoa - Ofu Coral Reef...
  - Angel's Reef, Tobago [ARTO1] (20...
  - Archipelago Los Roques, Venezu...
  - Ari atoll 'virtual monitoring site', ...
  - Arrecife Alacranes, Sisal, Mexico ...
  - Aunuu Island NMFS/CRED SST B...
  - Baa atoll 'virtual monitoring site', ...
  - Bermuda Coral Reef Watch Satelli...
  - Bocos del Toro, Panama [BTPA1] ...
  - Bonaire NMP, Bonaire [BOBO1] (2...
  - Buccoo Marine Park, Tobago [BUT...
  - Calabash Caye, Belize [CCBZ1] (2...
  - Carysfort Reef, Florida Keys Natio...
  - Cleveland Bay AIMS Station, GBR...
  - Cobourg Park, Australia Coral Re...

**Welcome to the CHAMP Portal web site!**

The Coral Health and Monitoring Program (CHAMP) Portal is a query tool for accessing oceanographic and meteorological data from the CHAMP database. This database defines many "stations" or latitude-longitude pairs, which may be physical observation platforms of some kind (CREWS pylons, SEAKEYS light towers, CCCCC buoys, or other) or "virtual" stations at points of interest for which remotely-sensed parameters are collected and stored.

**Introducing the Parts of the Site**

The site is divided vertically into two sections. The upper section is titled "NOAA/CHAMP Coral Reef Stations" and provides tools for selecting stations/sensors and dates/times of interest (left third), a map to indicate station locations (central third), and an informational area (right third) which contains a tab for this User Guide as well as a tab for drawing Plots of the queried data. The lower section is titled "Data" and contains a spreadsheet-like "grid" of queried data, along with controls for sorting and downloading these data. Both the Plots tab and the Data grid are empty until data have been queried and loaded into the portal.

**Stations and Sensors**

Begin by selecting a station (or stations) of interest. Stations are grouped according to geographic "regions" (e.g. Caribbean, Florida, Pacific) and "subregions" (such as Puerto Rico, Florida Keys, Northern Marianas). A hierarchical "tree" of these regions, subregions and stations will be pre-loaded in the upper-left part of the site which is titled "Stations/Sensors." Portions of this tree may be expanded or hidden using the "+" and "-" controls to the left of each region, subregion or station.

Every station will have a corresponding marker drawn in the Map (the upper middle section of the site) to indicate its location. Stations that have reported data within the last 24 hours will be drawn with green markers; stations that only offer historical data will be drawn with red markers.

In the hierarchical tree, each station is identified with a short description following by a five-character designation in square brackets. This designation is a shorthand station name used by CHAMP as a convenience and is often the same designation used by the National Weather System (NWS) and the National Data Buoy System (NDBC) to refer to the station. The station label concludes with a range of dates for which data are available. If the edges of the Stations/Map boundary are obstructing portions of this information, simply hover your mouse over the station in the tree and the complete details will appear in hover text. Alternatively you can click on any of the map markers to see these station details.

Clicking on a station in this tree will load a list of available parameters or "sensors" for that station. As with the station details, if the full name of the sensor cannot be seen, simply hover your mouse over the sensor and its name will appear in hover text. It is possible to open sensor lists for more than one station at a time, and indeed, to run queries for multiple sensors from multiple stations if desired.

**Selecting Stations+Sensors for Query**

Map data ©2013 MapLink - Terms of Use

Total Rows: 97

Download Data (CSV)





Questions?

(Don't ask!)