

Upward vertical growth of *P. damicornis* measured from a dye line, 2018-2019

Website: <https://www.bco-dmo.org/dataset/776448>

Data Type: Other Field Results

Version: 1

Version Date: 2019-09-09

Project

» [Collaborative Research: Climate Change, Mesoscale Oceanography, and the Dynamics of Eastern Pacific Coral Reefs](#) (Coral Climate ETP)

| Contributors | Affiliation | Role |
|-------------------------------------|---|---------------------------|
| Aronson, Richard B. | Florida Institute of Technology (FIT) | Principal Investigator |
| Toth, Lauren T. | United States Geological Survey (USGS) | Co-Principal Investigator |
| Copley, Nancy | Woods Hole Oceanographic Institution (WHOI BCO-DMO) | BCO-DMO Data Manager |

Abstract

Upward vertical growth of *P. damicornis* measured from a dye line, 2018-2019.

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Coverage

Spatial Extent: N:8.6312 E:-79.0283 S:7.4033 W:-81.759

Temporal Extent: 2018 - 2019

Dataset Description

Upward vertical growth of *P. damicornis* measured from a dye line, 2018-2019

Acquisition Description

Fragments of *Pocillopora* were dyed using alizarin dye and placed in-situ to grow. After 12 months, the corals were collected and cleaned by placing them in a plastic bag to allow the tissue to die/decompose. The dead tissue was washed off to reveal the coral skeleton. Colonies were labeled based on main branches and largest sub-branches. The collected coral were measured from the outside at the edge of the dye line to the top of the branch using digital calipers. Colonies were sawed apart by a diamond edge saw to reveal the inner dye line and measured from the dye line to the top of the branch using the same digital calipers.

Processing Description

BCO-DMO Processing Notes:

- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions

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Parameters

| Parameter | Description | Units |
|-------------|--|-----------------|
| Gulf | Chiriqui and Panama | unitless |
| Site | experimental site: PedroG is Pedro Gonzalez; Canales is Canales de Tierra | unitless |
| Lat | Latitude in decimal degrees north | decimal Degrees |
| Long | Longitude in decimal degrees east | decimal degrees |
| Time_Period | S (spring); F (Fall) | Years |
| Coral_ID | Name given to the coral | unitless |
| Branch | Main branch in the colony | unitless |
| Subbranch | Large branch extension off of the main branch | unitless |
| Outside | Measurement of linear growth from a dye line located on the branch; measured from the outside | millimeters |
| Inside | Measurement of linear growth after the branch was sawed in half to reveal the dye line inside of the structure | millimeters |

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Instruments

| | |
|---|---|
| Dataset-specific Instrument Name | Fisher Scientific Traceable Electronic Digital Caliper; manufacturer – Control Company; model # - 14-648-17, FB70250, 32599 |
| Generic Instrument Name | unknown |
| Dataset-specific Description | Used to measure coral growth |
| Generic Instrument Description | No relevant match in BCO-DMO instrument vocabulary. |

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Project Information

Collaborative Research: Climate Change, Mesoscale Oceanography, and the Dynamics of Eastern Pacific Coral Reefs (Coral Climate ETP)

Website: <http://www.fit.edu/research/portal/project/420/climate-change-mesoscale-oceanography-and-the-dynamics-of-eastern-pacific-coral-reefs>

Coverage: Pacific Panamá

Coral reefs are under threat around the world, and climate change is the main reason they are declining. Knowing how local conditions on a reef exaggerate or mask the impacts of climate change make it possible to predict which reefs are most likely to survive longer and, therefore, which reefs deserve the greatest effort and funding for conservation. Reefs off the Pacific coast of Panama are vulnerable to the impacts of global climate change but are also strongly influenced by small-scale currents and other local conditions. The goal of this study is to see how those local differences affect coral growth and the ability of the corals to build reefs. Climate change appears poised to shut down reef growth off Pacific Panama within the next century. Considering that sea-level rise is accelerating at the same time, if coral reefs shut down they will not be able to protect populated shorelines from storm damage and erosion. In addition to its scientific insights, this project will provide undergraduate and graduate training, provide research training for underrepresented groups, advance women in scientific careers, and contribute important information for management and policy. The results will be incorporated into innovative curricular materials for K through 12 classes in Title-I schools in Florida aligned with Next Generation (Common Core) standards, and standards for Climate and Ocean Literacy. An annual film festival will be organized for K through 12 students to explore themes in marine science through videography. Global climate change is now the leading cause of coral-reef degradation, but the extent to which mesoscale oceanography overprints climatic forcing is poorly understood. Previous studies in Pacific Panama showed that reef ecosystems collapsed from 4100 to 1600 years ago. The 2500-yr hiatus in reef-building occurred at locations throughout the Pacific, and the primary cause was increased variability of the El Niño-Southern Oscillation. This study will determine the influence of contemporary variability in mesoscale oceanography in the eastern tropical Pacific (ETP) on variability in the condition of local coral populations. Insights from the living populations will be combined with paleoecological and geochemical studies of reef frameworks to infer past conditions that were inimical or beneficial to coral growth and reef accretion. Three primary hypotheses will be tested in Pacific Panama: H1. Mesoscale oceanography is manifested in gradients of reef condition, coral growth, and coral physiological condition. Physiographic protection from upwelling currents and thermocline shoaling confers positive effects on coral growth rate and physiology. H2. The impacts of mesoscale oceanographic regimes on the

growth and condition of reef-corals were felt at least as far back as the mid- to late Holocene. H3. Physiographic protection from upwelling currents and thermocline shoaling conferred positive effects on vertical reef accretion in the past and shortened the late-Holocene hiatus. Specific research approaches to test these hypotheses will include collecting high-resolution, oceanographic time series to characterize contemporary environments along gradients of physical conditions; collecting ecological and geochemical data on the condition of living coral populations; and extracting cores from the reef frameworks and analyzing the coral assemblages taxonomically, taphonomically, and geochemically to assess patterns of biotic and paleoenvironmental variability. Strong spatial and temporal variability in the physical drivers of reef development make the ETP an excellent model system in which to examine the response of coral reefs to climate change over a range of physical regimes. This research will provide a unique opportunity to tease apart the controls on reef development across multiple spatial and temporal scales. The climatology underlying the late-Holocene hiatus was similar to probable scenarios for the next century, implying that climate change could be driving reef ecosystems of the ETP (and elsewhere) toward another collapse. Understanding how the hiatus unfolded along oceanographic gradients will increase our power to predict the future responses of reefs to a rapidly changing climate.

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Funding

| Funding Source | Award |
|--|-----------------------------|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-1535007 |

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