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
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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

Methods & Sampling

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.

Data 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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Data Files

File
linear_extension.csv (Comma Separated Values (.csv), 20.90 KB) MD5:db7ed3980bfa779332a61f9f73b88b4d Primary data file for dataset ID 776448

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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	calipers
Dataset-specific Description	Used to measure coral growth
Generic Instrument Description	A caliper (or "pair of calipers") is a device used to measure the distance between two opposite sides of an object. Many types of calipers permit reading out a measurement on a ruled scale, a dial, or a digital display.

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Project Information

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

Website: https://research.fit.edu/marine-paleolab/research-projects/eastern-tropical-pacific/

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 Nino-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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