Height, width, and mass of the coral Pocillopora damicornis in Pacific Panama, 2018-2019

Website: https://www.bco-dmo.org/dataset/776346
Data Type: experimental
Version: 2
Version Date: 2019-10-24

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
Height, surface area, and mass of Pocillopora damicornis in Pacific Panama at five time periods between March 2018 and March 2019.

Table of Contents

Coverage

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

Temporal Extent: 2016 - 2018

Dataset Description

Height, surface area, and mass of Pocillopora damicornis in Pacific Panama at five time periods between March 2018 and March 2019.

Acquisition Description

Before deployment, Pocillopora coral fragments' maximum height and width were measured using calipers. Buoyant weight was measured by attaching the coral fragment to a line and scale. Each coral was lowered into the water and mass was measured to find buoyant weight. The corals were placed on cement blocks and left in-situ for 12 months in the Gulfs of Panama and Chiriqui. After the time period, the colonies were collected and the same procedures were followed to measure final mass, height, and width of the colonies. Changes in height and mass were calculated in Microsoft excel.

See related data for 2016-2018 coral growth: https://www.bco-dmo.org/dataset/747484

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
- replaced version 1 (2019-09-09) with version 2 (2019-10-24): new FinalMass and ChangeMass values

[table of contents | back to top]

Parameters

Parameter	Description	Units
UIN	unique identifying number (site specific)	unitless
Gulf	locations in Pacific Panama: Chiriqui and Panama	unitless
Site	experimental site: Pedro is Pedro Gonzalez and Canales is Canales de Tierra	unitless
Latitude	latitude in decimal degrees north	decimal degrees
Longitude	longitude in decimal degrees east	decimal degrees
GrowthPeriod	duration of deployment: Syy-Syy = spring of 2018 to 2019	unitless
CoralID	identification of each coral sample	unitless
InitialHeight_Perp	the height of the coral frag when deployed in March 2018	millimeters (mm)
FinalHeight_Long	the height of the coral colony after it was retrieved in March 2019	millimeters (mm)
ChangeHeight_Long	the difference in heights of the colony over the course of a year	millimeters (mm)
Initial_Max_Width	the largest width of the colony in 2018	millimeters (mm)
Final_Max_Width	the largest width of the colony in 2019	millimeters (mm)
Initial_Trunk_Diam	the width of the trunk of the coral frag in March 2018	millimeters (mm)
Final_Trunk_Diam	the width of the trunk of the coral colony in March 2019	millimeters (mm)
InitialMass	the buoyant weight of the coral frag in March 2018	grams (g)
FinalMass	the buoyant weight of the coral frag in March 2019	grams (g)
ChangeMass	the difference between the final and initial weights of the colonies	grams (g)
Notes	comments	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	weight
Generic Instrument Name	Scale
Dataset-specific Description	A rigged scale that allows one to measure the weight of an object in the water; buoyant weight was measured.
Generic Instrument Description	An instrument used to measure weight or mass.

[table of contents | back to top]

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 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.

[table of contents | back to top]

Funding

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

[table of contents | back to top]