Height, surface area, and mass of Pocillopora damicornis in Pacific Panama from spring 2016 - spring 2018

Website: https://www.bco-dmo.org/dataset/747484
Data Type: Other Field Results
Version: 1
Version Date: 2018-10-05

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
Leichter, James J.	University of California-San Diego (UCSD-SIO)	Co-Principal Investigator
Toth, Lauren T.	United States Geological Survey (USGS)	Co-Principal Investigator
Biddle, Mathew	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Height, surface area, and mass of Pocillopora damicornis in Pacific Panama from spring 2016 - spring 2018.

Table of Contents

Coverage

Spatial Extent: **N**:8.6312 **E**:-79.0283 **S**:7.4033 **W**:-81.759
Temporal Extent: 2016-03 - 2018-03

Dataset Description

Height, surface area, and mass of *Pocillopora damicornis* in Pacific Panama between March 2016 and March 2018.

Acquisition Description

Fragments of Pocillopora were collected from the reef and epoxied to PVC discs. The corals were photographed and the buoyant weight was measured for the “initial” time. The corals were returned to the reef for approximately six months and collected again. They were photographed and the buoyant weight was measured for the “final” time. In the lab, the initial and final surface areas were measured from photographs taken looking down onto the corals by digitally tracing the outlines of the colonies using the software package iSolution.

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

[table of contents | back to top]

Parameters

Parameter	Description	Units
Gulf	Location where each coral was collected.	unitless
Site	Location within Gulf where coral was collected.	unitless
Latitude	latitude where each coral was collected in decimal degrees north	decimal degrees

Longitude	longitude where each coral was collected in decimal degrees east	decimal degrees
GrowthPeriod	Time period coral was growing on the reef. S16_F16 (March 2016–September 2016); F16_S17 (September 2016–March 2017); S17_F17 (March 2017–September 2017); F17_S18 (September 2017–March 2018).	unitless
CoralID	coral identifying number	unitless
InitialHeight_Perp	perpendicular height at the first time period.	millimeters (mm)
InitialHeight_Long	Longitudinal height at the first time period	millimeters (mm)
FinalHeight_Perp	Perpendicular height at the final time period	millimeters (mm)
FinalHeight_Long	Longitudinal height at the last time period	millimeters (mm)
ChangeHeight_Perp	Change in perpendicular height between time periods	millimeters (mm)
ChangeHeight_Long	Change in longitudinal height between time periods	millimeters (mm)
Initial_surface_area	Surface area at the first time period	square centimeters (cm2)
Final_surface_area	Surface area at the final time period	square centimeters (cm2)
InitialMass	Mass at the first time period	grams (g)
FinalMass	Mass at the final time period	grams (g)
ChangeMass	Change in mass between time periods	grams (g)
InitialFieldHeight	Height at the first time period measured in the field	millimeters (mm)
FinalFieldHeight	Height at the final time period measured in the field	millimeters (mm)
ChangeFieldHeight	Change in height between the time periods measured in the field	millimeters (mm)

Diff_InitH_FieldvPic	Difference in height between field measurements and photos at the first time period	millimeters (mm)
Diff_FinH_FieldvPic	Difference in height between field measurements and photos at the final time period	millimeters (mm)
Diff_Change_FieldvPic	Difference in change in height between field measurements and photos	millimeters (mm)
Notes	Additional notes about the sample	unitless
UIN	Unique Identifying Number	unitless
Time	numerical growth period.	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	photographed
Generic Instrument Name	Camera
Dataset-specific Description	The corals were photographed and the buoyant weight was measured for the “initial” time.
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

Dataset-specific Instrument Name	weight
Generic Instrument Name	Scale
Dataset-specific Description	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
NSF Division of Ocean Sciences (NSF OCE)	OCE-1535203

[table of contents | back to top]