Relative abundance of suspension-feeding invertebrates and algae in pacific Panama, 2016-2018

Website: https://www.bco-dmo.org/dataset/746588
Data Type: experimental
Version: 2
Version Date: 2018-09-20

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
This dataset includes relative abundances of suspension-feeding invertebrates and algae in pacific Panama during four time periods between March 2016 and March 2018. [2019-09-11/njc]

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Coverage

Spatial Extent: **N**:8.63174 **E**:-79.02817 **S**:7.40309 **W**:-81.75907
Temporal Extent: 2016-03 - 2018-03

Dataset Description

This dataset includes relative abundances of suspension-feeding invertebrates and algae in pacific Panama during four time periods between March 2016 and March 2018.

Acquisition Description

Settlement tiles were deployed at six sites in Pacific Panama, three sites in the Gulf of Panama and three sites in the Gulf of Chiriqui. Settlement tiles were adhered to the top and to the bottom of 10 cement blocks at each site. The tiles were deployed for approximately six months and then collected. Photographs were taken of the tiles. The relative abundance of broad taxonomic groups was recorded on a scale from 1 to 5 by examining the photographs and the tiles in the laboratory.

In 2019, the same procedure was applied but the tiles were deployed for about 12 months before collection. Averages of the functional group abundances were calculated.

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
Site	experimental site	unitless
Period	time period for settlement tile deployment	unitless
ID	tile ID number	unitless

Latitude	latitude; north is positive	decimal degrees
Longitude	longitude; east is positive	decimal degrees
Orientation	orientation of tile on cement block: T=top; B=bottom	unitless
Cirripedia	relative abundance of Cirripedia on settlement tiles: 1 (not present); 2 (covers75%).	unitless
Spirorbid	relative abundance of Spirorbid polychaetes on settlement tiles	unitless
Serpulid	relative abundance of Serpulid polychaetes on settlement tiles	unitless
Total_Polychaete	relative abundance of total Polychaete on settlement tiles	unitless
Vermetid	relative abundance of Vermetid gastropods on settlement tiles	unitless
Other_gastropod	relative abundance of other gastropod on settlement tiles	unitless
Total_Gastropods	relative abundance of total gastropods on settlement tiles	unitless
Coral_byrozoan	relative abundance of coral byrozoans on settlement tiles	unitless
Tubulipora_bryozoan	relative abundance of Tubulipora bryozoans on settlement tiles	unitless
Aggregate_byrozoan	relative abundance of aggregate byrozoans on settlement tiles	unitless
Other_bryozoan	relative abundance of other bryozoans on settlement tiles	unitless
Total_bryozoan	relative abundance of total bryozoans on settlement tiles	unitless
Smooth_ascidian	relative abundance of smooth ascidians on settlement tiles	unitless
Other_ascidian	relative abundance of other ascidians on settlement tiles	unitless
Total_ascidian	relative abundance of total ascidians on settlement tiles	unitless
Corallinales	relative abundance of Corallinales algae on settlement tiles	unitless
Macro_algae	relative abundance of macroalgae on settlement tiles	unitless
Film_algae	relative abundance of film-type algae on settlement tiles	unitless
Tot_algae	relative abundance of total algae on settlement tiles	unitless
Notes	comments pertaining to other organism seen on tiles	unitless

Gulf	Gulf from which samples were collected	unitless
Weight	initial weight of the settlement tiles	grams
Weight_48hr	the weight of the settlement tiles after being in-situ for the time period then dried in an oven for 48 hours	grams

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Camera
Dataset-specific Description	Used to record settlement on the tiles.
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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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 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
NSF Division of Ocean Sciences (NSF OCE)	OCE-1535203

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