Percent coral cover from photographic surveys conducted along Jarvis Island in 2015-2017

Website: https://www.bco-dmo.org/dataset/775830
Data Type: Other Field Results
Version: 1
Version Date: 2019-09-30

Project
» Skeletal Records of Coral Reef Bleaching in the Central Equatorial Pacific (Coral Bleaching Skeletal Records)

Contributors	Affiliation	Role
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Abstract
This dataset contains percent coral cover which was collected from photographic surveys conducted along triplicate 50 m transects spanning 5 m to 25 m depth on the east and west side of Jarvis Island (0.37°S, 159.99°W) in 2015, 2016, and 2017.

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Coverage

Spatial Extent: **N**:-0.36776 **E**:-159.97881 **S**:-0.37394 **W**:-166.00823
Temporal Extent: 2015-11 - 2017-04

Dataset Description

These data were published in Barkley *et al.,* 2018 (Figure 2).

This dataset contains percent coral cover which was collected from photographic surveys conducted along triplicate 50 m transects spanning 5 m to 25 m depth on the east and west side of Jarvis Island in 2015, 2016, and 2017. Jarvis Island is an uninhabited coral reef ecosystem within the US Pacific Remote Islands Marine National Monument (0.37°S, 159.99°W).

Methods & Sampling

Repeat transect surveys were conducted at Jarvis during the height of the bleaching event (November 2015), at six months (May 2016), and again at sixteen months (April 2017) post-bleaching. Three 50 m surveyed at each of three depths (shallow: 5-14 m, mid-depth: 15-19 m, and deep: 20-25 m) on the west (all depths: 0.369 ºS, 160.008 ºW) and east sides (shallow: 0.374 ºS, 159.983 ºW, mid and deep: 0.367 ºS, 159.979 ºW) of the island. Each replicate 50 m transect was laid approximately 5 m apart in the cross-shore direction, and a photograph of a 0.5m x 0.5m quadrat taken every meter.

Percent coral cover which was collected from photographic surveys on the east and west side of Jarvis Island, aboard:

- NOAA ship Hi'ialakai (2–5 April 2017),
- R/V Machias (12–15 November 2015)
- NOAA ship Oscar Elton Sette (17–23 May 2016)

Research activities and sample collection were conducted under U.S. Fish and Wildlife Service Pacific Reefs National Wildlife Refuge Complex Research and Monitoring Special Use Permits:

- 12521-10001 (effective date: 15 Jan 2010; expiration date: 30 May 2010),
- 12521-12001 (effective date: 7 Feb 2012; expiration date: 31 Dec 2012),
- 12521-12005 (effective date: 29 Aug 2012; expiration date: 30 June 2014),
- 12521-14001 (effective date: 1 Jan 2015; expiration date: 31 Dec 2015), and
- 12513-15001 (effective date: 11 Nov 2015; expiration date: 31 Dec 2015)

and in compliance with Presidential Proclamation 8336.

Data Processing Description

Photographs were analyzed using Coral Point Count with Excel extensions (Kohler and Gill 2006). Benthic cover of each photograph was evaluated by randomly overlaying ten points on each image and identifying the type of cover beneath, with 500 points identified per transect and 1500 points identified per depth. In 2015, random points that fell on live coral were identified as healthy (pigmented tissue) or bleached (non-pigmented living tissue), with the bleached cover calculated as the total number of random points located on bleached tissue divided by the total number of points identified as live (healthy + bleached) coral. In 2016 and 2017, no corals in the transects were still bleached, and were therefore identified as either live or dead.

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Data Files

File
cover_data.csv (Comma Separated Values (.csv), 2.88 KB) MD5:a10acf38f554f613db0bf427a0ad4813 Primary data file for dataset ID 775830

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Related Publications

Barkley, H. C., Cohen, A. L., Mollica, N. R., Brainard, R. E., Rivera, H. E., DeCarlo, T. M., … Luu, V. H. (2018). Repeat bleaching of a central Pacific coral reef over the past six decades (1960–2016). Communications Biology, 1(1). doi:10.1038/s42003-018-0183-7
Results

Kohler, K. E., & Gill, S. M. (2006). Coral Point Count with Excel extensions (CPCe): A Visual Basic program for the determination of coral and substrate coverage using random point count methodology. Computers & Geosciences, 32(9), 1259–1269. doi:10.1016/j.cageo.2005.11.009
Software

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Parameters

Parameter	Description	Units
transect_ID	identifier for each transect survey	unitless
year	year in which transect surveys were conducted	unitless
latitude	latitude of the start of the transect survey; north = positive	decimal degrees
longitude	longitude of the start of the transect survey; east = positive	decimal degrees
depth_bin	depth bin of transect survey	meters (m)
pcnt_cover	observed live coral cover	percentage (%)
pcnt_cover_bleached	observed bleached coral cover	percentage (%)

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Deployments

HA1701-01

Website	https://www.bco-dmo.org/deployment/780542
Platform	NOAA Ship Hi'ialakai
Start Date	2017-03-26
End Date	2017-04-29
Description	HA1701, Leg 1

Machias_2015

Website	https://www.bco-dmo.org/deployment/780708
Platform	R/V Machias
Start Date	2015-11-12
End Date	2015-11-15

SE1602-02

Website	https://www.bco-dmo.org/deployment/780633
Platform	NOAA Ship Oscar Elton Sette
Start Date	2016-05-11
End Date	2016-05-31
Description	SE1602, Leg 2

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Project Information

Skeletal Records of Coral Reef Bleaching in the Central Equatorial Pacific (Coral Bleaching Skeletal Records)

Coverage: Central Equatorial Pacific

NSF Award Abstract:
Ocean warming kills corals and efforts are underway to identify and protect coral reefs that may withstand the projected 21st century rise in tropical ocean temperatures. Coral reefs in the central equatorial Pacific (CEP) have been exposed to episodes of extreme warmth every 3-7 years for centuries, if not millennia, yet remain highly productive ecosystems. Initial data obtained by the investigator from stress signatures archived in the skeletons of long lived coral species, suggests that CEP reefs lose their symbiotic algae or bleach, sometimes severely, during warm episodes. The observation that CEP reefs bleach repetitively yet remain productive implies uncommon resilience to ocean warming. The investigator will use laboratory experiments and field observations to validate skeletal records of historical bleaching. A successful outcome will provide novel and valuable insights into the resilience of the CEP reefs and a new tool with which to identify thermally tolerant coral reef ecosystems across the tropics. Additionally, this project includes mentorship of a postdoc and six undergraduate or high school students, outreach through presentations and media, and expansion of publically available software for coral stress band analysis.

Ocean warming projections indicate severe impacts to coral reefs will occur on an annual basis within the next few decades. Consequently, a coordinated effort is underway to identify reefs that might survive these changes. The investigator will test the hypothesis that such reefs exist at the epicenter of influence of the El Niño-Southern Oscillation (ENSO), where strong inter-annual temperature variability creates conditions conducive for the development of thermal resilience. The project uses laboratory-based bleaching experiments and actual stress signatures accreted by wild corals during the 2015 El Niño to validate signatures of historical bleaching archived in the skeletons of massive reef building corals. In addition the investigator will use new, long cores from the CEP to build a robust dataset of historical bleaching back to the 1800's. A successful outcome will increase confidence in the interpretation of skeletal stress bands as quantitative bleaching proxies and enable the reconstruction of the history of coral reef bleaching and recovery in the CEP.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1737311

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