

Percent coral cover - Jarvis island

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)

Program

» [Paleo Perspectives on Climate Change](#) (P2C2)

Contributors	Affiliation	Role
Cohen, Anne L	Woods Hole Oceanographic Institution (WHOI)	Principal Investigator
Soenen, Karen	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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).

Acquisition Description

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 °S, 160.008 °W) and east sides (shallow: 0.374 °S, 159.983 °W, mid and deep: 0.367 °S, 159.979 °W) 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.

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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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](https://doi.org/10.1038/s42003-018-0183-7)

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](https://doi.org/10.1016/j.cageo.2005.11.009)

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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	R/V 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 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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Program Information

Paleo Perspectives on Climate Change (P2C2)

Website: <https://www.nsf.gov/pubs/2017/nsf17582/nsf17582.htm>

NSF Synopsis of Program: The goal of research funded under the interdisciplinary P2C2 solicitation is to utilize key geological, chemical, atmospheric (gas in ice cores), and biological records of climate system variability to provide insights into the mechanisms and rate of change that characterized Earth's past climate variability, the sensitivity of Earth's climate system to changes in forcing, and the response of key components of the Earth system to these changes. Important scientific objectives of P2C2 are to: 1) provide comprehensive paleoclimate data sets that can serve as model test data sets analogous to instrumental observations; and 2) enable transformative syntheses of paleoclimate data and modeling outcomes to understand the response of the longer-term and higher magnitude variability of the climate system that is observed in the geological and cryospheric records.

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Funding

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

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