

Hourly temperature data from deployments between 2012 and 2018 from three of the Phoenix Islands

Website: <https://www.bco-dmo.org/dataset/863421>

Data Type: Other Field Results

Version: 1

Version Date: 2022-01-11

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 includes hourly temperature data from deployments of HOBO pendant temperature loggers at three of the Phoenix Islands (Kiribati: Kanton Island, Rawaki Island, and Nikumaroro Island) between 2012 and 2018. These data were published in Fox et al., 2021 (DOI: 10.1029/2021GRL094128).

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Coverage

Spatial Extent: N:-2.76065 E:-170.71316 S:-4.69979 W:-174.54745

Temporal Extent: 2012-06-08 - 2018-05-19

Methods & Sampling

HOBO pendant temperature loggers were deployed on the fore reef slope of each island with a sampling resolution of 1 hour. The depth of the loggers are as follows:

Kanton 2012 to 2015-09-05 = 11 meters and afterward 15 meters

Nikumaroro = 8 meters

Rawaki = 11 meters

Data Processing Description

BCO-DMO Processing:

- Adjusted field/parameter names to comply with BCO-DMO naming conventions
- Added a conventional header with dataset name, PI names, version date

- Missing data identifier 'NA' replaced with 'nd' (BCO-DMO's default missing data identifier)
- Combined "Month", "Day", and "Year" columns into another "Date" column per BCO-DMO standards

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Data Files

File
PIPA_temperature.csv (Comma Separated Values (.csv), 6.04 MB) MD5:bf76c863a24e0918002590643d60e5bc
Primary data file for dataset ID 863421

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Related Publications

Fox, M. D., Cohen, A. L., Rotjan, R. D., Mangubhai, S., Sandin, S. A., Smith, J. E., ... Obura, D. (2021). Increasing Coral Reef Resilience Through Successive Marine Heatwaves. *Geophysical Research Letters*, 48(17). doi:10.1029/2021gl094128 <https://doi.org/10.1029/2021GL094128>
Results

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Parameters

Parameter	Description	Units
Island	name of island	unitless
Latitude	latitude of site North	decimal degrees
Longitude	longitude of site East (West is negative)	decimal degrees
Date	date of measurement in YYYY-MM-DD	unitless
Hour	hour of day (24 hours)	unitless
Temperature	water temperature	degrees Celsius

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Onset HOBO Pendant Temperature/Light Data Logger
Generic Instrument Description	The Onset HOBO (model numbers UA-002-64 or UA-001-64) is an in-situ instrument for wet or underwater applications. It supports light intensity, soil temperature, temperature, and water temperature. A two-channel logger with 10-bit resolution can record up to approximately 28,000 combined temperature and light measurements with 64K bytes memory. It has a polypropylene housing case. Uses an optical USB to transmit data. A solar radiation shield is used for measurement in sunlight. Temperature measurement range: -20 deg C to 70 deg C (temperature). Light measurement range: 0 to 320,000 lux. Temperature accuracy: +/- 0.53 deg C from 0 deg C to 50 deg C. Light accuracy: Designed for measurement of relative light levels. Water depth rating: 30 m.

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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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