Water temperature during coral calcification experiments conducted on Oahu, Hawaii from November of 2014 to November of 2015

Website: https://www.bco-dmo.org/dataset/708280

Data Type: experimental

Version: 1

Version Date: 2017-07-13

Project

» Will corals recover from bleaching under ocean acidification conditions? (RAPID Hawaii)

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Abstract

Water temperature during coral calcification experiments conducted on Oahu, Hawaii from November of 2014 to November of 2015

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Coverage

Spatial Extent: **N**:21.46278 **E**:-157.693 **S**:21.335 **W**:-157.81028

Temporal Extent: 2014-11-17 - 2015-11-27

Dataset Description

This dataset contains temperature records for eight aquaria between Nov 17th, 2014 to Nov 27th, 2015 which were used in coral calcification experiments conducted on Oahu, Hawaii.

Datasets relevant to this experiment:
* salinity
* pH
* TA
* coral calcification

Acquisition Description

Salinity and temperature data were collected in each aquarium with a YSI 85 conductivity meter about twice weekly at 18:00 hr HST (UTC-10). Precision and accuracy for temperature were estimated as +-0.1 °C, whereas precision for salinity was +-0.1 PSU and accuracy was estimated as +-0.3 PSU or better.

Tank treatments:

Below, "High" or "Low" pH refers to target pH levels. "Fed" or "Unfed" refers to whether the tank was fed zooplankton not.

Tank t1: High pH, Unfed
Tank t2: High pH, Fed
Tank t3: Low pH, Unfed
Tank t4: Low pH, Fed
Tank t5: High pH, Fed
Tank t6: Low pH, Unfed
Tank t7: Low pH, Fed
Tank t8: High pH, Unfed

Location information:

The coral collection sites were the reef around HIMB and the reef adjacent to Kaiona Beach Park in Waimanalo (about 1 mile north of the Makai Pier). The lat/long for the approximate center of the sampling area at each site are as follows, and the sampling at each site was located within about +/- 200 m of that central point:

Kane'ohe Bay: 21.4336 N, -157.7861 W
Waimanalo Bay: 21.3272 N, -157.6811 W

The tank experiments were conducted at the Point Lab on Coconut Island, which is ~18 km from the sampling area in Waimanalo Bay and adjacent to the sampling area in Kane'ohe Bay. The high pH treatment was ambient Kane'ohe Bay seawater chemistry (pH ~7.9-8.0) whereas the target for the low pH treatment was ~0.25 units below ambient.

Processing Description

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* modified parameter names to conform with BCO-DMO naming conventions
* added ISO Date format generated from Date and Time values
* date and time (local HST) changed to format yyyy-mm-dd

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Parameters

Parameter	Description	Units
date_HST	Local date; Hawaii Standard Time (HST;UTC-10) in format yyyy-mm-dd	unitless
time_HST	Local time; Hawaii Standard Time (HST;UTC-10) in format HH:MM	unitless
ISO_DateTime_UTC	ISO timestamp based on the ISO 8601:2004(E) standard in format YYYY-mm-ddTHH:MM:SS[.xx]Z (UTC)	unitless
t1	Temperature in aquarium "t1"	degrees Celsius
t2	Temperature in aquarium "t2"	degrees Celsius
t3	Temperature in aquarium "t3"	degrees Celsius
t4	Temperature in aquarium "t4"	degrees Celsius
t5	Temperature in aquarium "t5"	degrees Celsius
t6	Temperature in aquarium "t6"	degrees Celsius
t7	Temperature in aquarium "t7"	degrees Celsius
t8	Temperature in aquarium "t8"	degrees Celsius

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Instruments

Dataset-specific Instrument Name	YSI 85 conductivity meter
Generic Instrument Name	Conductivity Meter
Generic Instrument Description	Conductivity Meter - An electrical conductivity meter (EC meter) measures the electrical conductivity in a solution. Commonly used in hydroponics, aquaculture and freshwater systems to monitor the amount of nutrients, salts or impurities in the water.

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Deployments

RAPID_Hawaii_2014_2015

Website	https://www.bco-dmo.org/deployment/708337
Platform	shoreside Oahu
Start Date	2014-11-17
End Date	2015-11-27
Description	Coral collections at Kaneohe and Waimanalo Bays, Oahu, HI. Calcification experiments done in aquaria.

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Project Information

Will corals recover from bleaching under ocean acidification conditions? (RAPID Hawaii)

Coverage: Oahu, HI; Hawaii Institute of Marine Biology

Following the second hottest month on record since the 1940s, water temperatures on O'ahu reached 30 degrees C. The result of this ~2 degree C increase above summer mean temperatures has been a severe bleaching event across the entire length of the Hawaiian Archipelago, with as many as 75% of the dominant coral species in Kane'ohe Bay losing color or bleaching completely white. This event exceeds the magnitude of the only major bleaching event previously documented for Hawaii in 1996. Although tragic, this event provides a rare natural experiment to understand the impact of coral bleaching on the ability of Hawaiian corals to recovery from high temperature stress in the context of climate change and ocean acidification. The proposed will leverage previous work by the PIs to compare recovery following this event and the 1996 mass bleaching event to the recovery rates of Hawaiian corals under future climate change scenarios. Results from this work will provide data on coral resistance and recovery potential from bleaching events of the future. Coral reefs are among the most diverse ecosystems on the planet, housing an estimated 25% of marine species. But, that diversity appears particularly susceptible to the effects of global change. Massive coral bleaching poses a substantial threat to the integrity of coral reef habitat in US waters, and is predicted to be the major source of mortality for reefs under future climate scenarios. Although previous work on the recovery of corals from bleaching sets the groundwork for this project, it remains to be seen how recovery from bleaching will be impacted by climate change and ocean acidification. To address this fundamental question, we take advantage of the natural difference in baseline temperature and pCO2 conditions between Kane'ohe Bay and Waimanalo Bay, HI, both of which are currently impacted by the massive bleaching event in the Hawaiian Archipelago. This natural experiment makes possible a rare opportunity to test three basic questions about the rates of recovery of bleached and unbleached corals under future climate change scenarios: 1) Will ocean acidification slow rates of recovery from bleaching?; 2) Does zooplankton feeding minimize the impact?; and 3) Do corals acclimated to warmer, more acidic baseline conditions (Kane'ohe Bay) recover more quickly under future conditions than corals from present day mean oceanic conditions (Waimanalo Bay)? This research addresses broad scientific questions relating to the ability of corals to acclimate or adapt to both local environments and future climate conditions, and to help identify coral populations that may be resilient to the predicted impacts of climate change on the reefs of the future.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1514859
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