In situ temperature data from August 2019 to May 2020 from one HOBO temperature logger deployed at Emerald Reef in Southeast Florida, USA

Website: https://www.bco-dmo.org/dataset/918364
Data Type: Other Field Results
Version: 1
Version Date: 2024-01-24

Project
» Collaborative Research: Assessing the changing symbiotic milieu on Caribbean coral reefs under climate change: magnitude, tradeoffs, interventions, and implications (Symbiont Shifts on Reefs)

Contributors	Affiliation	Role
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Abstract
This dataset contains in situ temperature data from August 2019 to May 2020 from one HOBO temperature logger deployed at Emerald Reef at 7.8 meters depth in southeast Florida. Coral cores were collected from this reef and underwent experimental heat stress. In situ temperature data were used to inform seasonal temperature variation on this reef. The publication based on these data is Buzzoni, et al. (2023) (DOI: 10.1007/s00338-023-02428-x).

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Coverage

Location: Emerald Reef off Key Biscayne, SE Florida (USA)
Spatial Extent: **Lat**:25.4064 **Lon**:-80.06028
Temporal Extent: 2019-08-18 - 2020-05-18

Methods & Sampling

As part of this study, coral cores were collected from tagged colonies of three coral species in either April 2019 or October 2019 from Emerald Reef in Southeast Florida, USA. Cores were then maintained in aquaria in the Marine Technology and Life Science Seawater complex at the University of Miami's Rosenstiel School of

Marine, Atmospheric, and Earth Science and subjected to experimental heat stress. See related dataset for results fo the qPCR assays conducted as part of the heat stress experiments (https://www.bco-dmo.org/dataset/918220).

At the Emerald Reef site, a temperature logger (Onset HOBO U22-001 Pro v2) was deployed at 7.8 meters depth by hammering a rebar stake into the reef substrate, then securing the logger around the rebar close to the benthos using zipties. The logger was deployed from August 2019 to May 2020. These in situ temperature data were used to inform seasonal temperature variation on this reef.

BCO-DMO Processing Description

- Imported original file "temperature_HOBO.csv" into the BCO-DMO system.
- Converted the original date and time columns into a single date-time column in ISO 8601 format (Local time (EST))
- Added a date-time column for UTC times zone in ISO 8601 format.
- Converted the longitude values from positive to negative (to indicate West direction).
- Renamed fields/columns to comply with BCO-DMO naming conventions.
- Saved the final file as "918364_v1_fl_reef_temps.csv".

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Data Files

File	
918364_v1_fl_reef_temps.csv	(Comma Separated Values (.csv), 122.34 KB) MD5:bce458b4bb4d6ecc3fa0c0a8720168f9
Primary data file for dataset ID 918364, version 1	

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Related Publications

Buzzoni, D., Cunning, R., & Baker, A. C. (2023). The role of background algal symbionts as drivers of shuffling to thermotolerant Symbiodiniaceae following bleaching in three Caribbean coral species. Coral Reefs, 42(6), 1285–1295. https://doi.org/10.1007/s00338-023-02428-x
Results

DaisyBuzzoni. (2023). *DaisyBuzzoni/seasonal_shuffling: Github repository release associated with Buzzoni et al (2023), Coral Reefs.* (Version V1.0) [Computer software]. Zenodo. https://doi.org/10.5281/ZENODO.10067604 https://doi.org/10.5281/zenodo.10067604
Software

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Related Datasets

IsRelatedTo

Buzzoni, D., Cunning, R., Baker, A. (2024) **Results from qPCR assays to quantify the abundance and photochemical performance of symbionts relative to coral cells in three coral species collected from colonies in southeast Florida in April and October 2019 before, during, and after heat stress tests.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-01-22 doi:10.26008/1912/bco-dmo.918220.1 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
ISO_DateTime_EST	Date and time when the measurement was taken in ISO 8601 format (Eastern Standard Time)	unitless
ISO_DateTime_UTC	Date and time when the measurement was taken in ISO 8601 format (UTC)	unitless
Temp	Water temperature measured by HOBO temperature logger attached to benthos at study site (3 decimal places). Measurements were recorded every 2 hours, thus 12 measurements exist for each date.	degrees Celsius
Latitude	Latitude of HOBO logger deployment location; positive values = North	decimal degrees
Longitude	Longitude of HOBO logger deployment location; negative values = West	decimal degrees

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Instruments

Dataset-specific Instrument Name	Onset HOBO U22-001 Pro v2 Water Temperature Data Logger
Generic Instrument Name	Onset HOBO Pro v2 temperature logger
Generic Instrument Description	The HOBO Water Temp Pro v2 temperature logger, manufactured by Onset Computer Corporation, has 12-bit resolution and a precision sensor for ±0.2°C accuracy over a wide temperature range. It is designed for extended deployment in fresh or salt water. Operation range: -40° to 70°C (-40° to 158°F) in air; maximum sustained temperature of 50°C (122°F) in water Accuracy: 0.2°C over 0° to 50°C (0.36°F over 32° to 122°F) Resolution: 0.02°C at 25°C (0.04°F at 77°F) Response time: (90%) 5 minutes in water; 12 minutes in air moving 2 m/sec (typical) Stability (drift): 0.1°C (0.18°F) per year Real-time clock: ± 1 minute per month 0° to 50°C (32° to 122°F) Additional information (http://www.onsetcomp.com/) Onset Computer Corporation 470 MacArthur Blvd Bourne, MA 02532

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Project Information

Collaborative Research: Assessing the changing symbiotic milieu on Caribbean coral reefs under climate change: magnitude, tradeoffs, interventions, and implications (Symbiont Shifts on Reefs)

Coverage: Coral reefs of the Caribbean and Western Atlantic

NSF Award Abstract:
Climate change represents an existential threat to coral reef ecosystems worldwide, with coral bleaching driven by continued ocean warming presenting the most pressing challenge to the persistence of these ecosystems over the next few decades. Given the severity and urgency of this threat it is critical to investigate mechanisms by which some corals might survive warming, assess the degree to which this is happening on reefs, and apply these discoveries to inform conservation interventions that might improve survival trajectories wherever possible. This project aims to fulfill these objectives by testing whether reef corals in the Caribbean are undergoing shifts in their algal symbionts in favor of more heat-tolerant types, what the consequences of these shifts might be for coral reef ecosystems, and the way in which we might use this information to help

conserve them. Scientific objectives will be leveraged to improve the effectiveness of reef restoration efforts in the Caribbean by applying findings to ongoing intervention trials which aim to seed outplanted corals (both adult fragments raised in nurseries, and sexually derived coral recruits) with heat tolerant algae that are climate-resistant. It also takes advantage of emerging opportunities at two major public aquariums to highlight the plight of coral reefs to engaged public audiences primed to receive this message and learn about the role of science in both understanding and mitigating the problem. Finally, numerous high school, undergraduate, and graduate students will receive mentorship during this project, helping to train the next generation of marine scientists.

This project tests whether continued climate warming is causing heat-tolerant algal symbionts (such as *Durusdinium trenchii*) to become increasingly common on coral reefs in the Caribbean. Understanding the changing symbiotic "milieu" in the region, the processes underlying the spread of *D. trenchii*, and the consequences of this spread, are very timely questions that have the potential to help us understand future reef states. This project will: (1) Manipulate coral symbioses in the laboratory, including a number of Caribbean coral species never before attempted, to assess in a standardized way their relative ability to acquire heat-tolerant symbionts; (2) Outplant corals with manipulated symbiont communities to reefs to assess real-world ecophysiological tradeoffs to heat tolerance, such as reduced growth rate; (3) Introduce heat-tolerant symbionts to coral colonies in the field using tissue implants in order to understand environmental controls on the persistence or loss of introduced symbionts; (4) Evaluate transgenerational feedbacks in the symbiotic milieu by investigating the roles of temperature and *D. trenchii* availability on the acquisition and establishment of these symbionts in newly settled coral larvae; and (5) Quantify changes in the incidence and relative abundance of heat-tolerant symbionts in the Caribbean over the last ~20 years using unique archived samples dating back to 1995-2002 from Florida, Bahamas, Belize, and Bermuda.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1851392
NSF Division of Ocean Sciences (NSF OCE)	OCE-1851305

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