

Aquaria temperatures throughout a heat temperature coral study conducted at Brewer's Bay, St. Thomas, The U.S. Virgin Islands in June of 2017

Website: <https://www.bco-dmo.org/dataset/840932>

Version: 1

Version Date: 2021-02-17

Project

» [Immunity to Community: Can Quantifying Immune Traits Inform Reef Community Structure?](#) (Coral Immune Traits)

Contributors	Affiliation	Role
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Abstract

Aquaria temperatures throughout a heat temperature coral study conducted at Brewer's Bay, St. Thomas, The U.S. Virgin Islands in June of 2017. The coral species used in the experiments were *Orbicella faveolata* and *Porites astreoides*.

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Coverage

Spatial Extent: Lat:18.34403 Lon:-64.98435

Temporal Extent: 2017-06-29 - 2017-06-30

Methods & Sampling

Location: Brewer's Bay (18.34403, -64.98435), St. Thomas, The U.S. Virgin Islands

Aquaria temperature was recorded twice a day in the mid morning and mid afternoon.

Data Processing Description

BCO-DMO Data Manager Processing notes:

* Data submitted in file "Caspase 2 temp BCO DMO submission.xlsx" sheet 1 extracted to csv

* Time format altered so it can be described accurately. A space added between "A" or "P" and an "M" added to each values so for example "10:12A" changed to "10:12 AM"

* An additional column added to the dataset for the ISO Date Time in ISO 8601 format in UTC time using date and time provided in local time zone "Atlantic Standard Time (GMT-4)"

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Related Datasets

IsReferencedBy

Mydlarz, L., Brandt, M. (2021) **Coral pulse amplitude modulation (PAM) throughout a heat temperature study conducted in aquaria at Brewer's Bay, St. Thomas, The U.S. Virgin Islands in June of 2017.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-02-17 <http://lod.bco-dmo.org/id/dataset/840941> [[view at BCO-DMO](#)]
Relationship Description: Pulse amplitude modulation (PAM) from the same experiment.

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Parameters

Parameter	Description	Units
CORE	Coral fragment ID	unitless
BUCKET	Bucket ID	unitless
SPECIES	Coral species (Orbicella faveolata or Porites astreoides)	unitless
TREATMENT	Treatment ("Control" or "Heat")	unitless
DATE	Local sample date (Atlantic Standard Time,GMT-4) in format yyyy-mm-dd	unitless
TIME	Local sample time (Atlantic Standard Time, GMT-4) in format HH:MM AM/PM	unitless
TEMP	Bucket temperature	degrees Celsius
ISO_DateTime_UTC	ISO DateTime (UTC time zone) in ISO 8601 format yyyy-mm-ddTHH:MMZ	unitless

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Instruments

Dataset-specific Instrument Name	YSI Handheld meter
Generic Instrument Name	Water Temperature Sensor
Generic Instrument Description	General term for an instrument that measures the temperature of the water with which it is in contact (thermometer).

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Project Information

Immunity to Community: Can Quantifying Immune Traits Inform Reef Community Structure? (Coral Immune Traits)

Coverage: US Virgin Islands

NSF abstract:

Coral diseases have increased significantly throughout the past 30 years. Climate change and other detrimental environment factors are likely to blame. Unhealthy coral reefs cannot support the fish and other life that make the reef a vibrant and diverse ecosystem. Corals reefs in the Caribbean Sea are disease hotspots and many reefs have experienced population collapses due to outbreaks of disease. Importantly, coral species vary in their susceptible to disease, but the reasons behind this variation are unknown. This project will quantify coral susceptibility to disease by examining coral immunity using several novel approaches and experiments. Seven species of coral that differ in disease susceptibility, growth rates, growth form and reproductive strategies will be used. Immune responses of each species of coral will be measured by exposing the corals to bacterial immune stimulators. Susceptibility to white plague disease, a prevalent disease affecting many species of corals, will also be measured by exposing the corals to active white plague disease and calculating disease transmission rates. The immune response and disease transmission data for each coral species will be used to develop a predictive model to determine how different coral communities will respond to disease threats under climate change scenarios. This project will support graduate students at University of Texas, Arlington (Hispanic-serving Institution) and University of Virgin Islands (Historically Black University) and many undergraduate students at all three institutions (Mote Marine Laboratory). This research will be highlighted at outreach events at all three institutions which take place regularly and include Earth Day Texas in Dallas, TX, Mote's Living Reef Exhibit and Aquarium in Sarasota, FL and "Reef Fest" and Agricultural fairs in the U.S. Virgin Islands.

Environmental changes, such as ocean warming, have led to an increase in the prevalence of coral diseases, causing region-wide population collapses in some locations. However, not all coral species, or even populations within species, are affected by disease equally. Some species are host to many different types of diseases, but have limited mortality. Other species suffer significant disease-related mortality. How and why disease susceptibility differs among species and the effects of this differential susceptibility on reef community structure and composition are currently unknown. This project will use immune-challenge experiments that will quantify novel components of the innate immune system of corals, coupled with the application of a trait-based model, to fulfill three goals: 1) Determine variability of coral immune traits in seven common coral species found on Caribbean reefs, 2) Determine the variability in resistance to white plague disease transmission in the same coral species 3) Develop a predictive model of coral community assemblage that incorporates immune traits. Quantification of coral immunity will also incorporate unique approaches, such as combining full transcriptome sequencing with protein activity assays for a gene-to-phenotype analysis. Data will be mapped onto immune pathways for comprehensive pathway evaluation between coral species and these will serve as trait inputs into a "traitspace" model. These traits will provide continuous data within the model, which will create a probability density function (PDF) for the trait distributions of each species. These PDFs will then be used to determine the probability of species under different disease exposure scenarios. Model analyses will determine which traits influence community structure and characterize how disease exposure and the immune response will predict community assemblages through space and time. The completion and application of a trait-base model that incorporates extensive immunity parameters (none of which have been applied to trait models within coral ecosystems) is a distinct product from this project.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1712134
NSF Division of Ocean Sciences (NSF OCE)	OCE-1712240
NSF Division of Ocean Sciences (NSF OCE)	OCE-1712540

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