Environmental temperature data collected at Cerro Mundo Bay, San Cristobal, Galapagos from 2022-2023 (Galapagos 2021 project)

Website: https://www.bco-dmo.org/dataset/904195
Data Type: Other Field Results
Version: 1
Version Date: 2023-07-11

Project
» Temperature Regulation of Top-Down Control in a Pacific Upwelling System (Galapagos 2021)

Contributors	Affiliation	Role
Bruno, John	University of North Carolina at Chapel Hill (UNC-Chapel Hill)	Principal Investigator
Silva Romero, Isabel	University of North Carolina at Chapel Hill (UNC-Chapel Hill)	Student
Newman, Sawyer	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Increased standing macroalgal biomass in upwelling zones is generally assumed to be the result of higher nutrient flux due to upwelled waters, However, other factors can strongly impact macroalgal communities. For example, herbivory and temperature, via their effects on primary producers and the metabolic demands of consumers, can also influence macroalgal biomass and productivity, respectively. Although there is a fair number of studies looking at the interactive effects of herbivores and nutrients in both tropical and temperate regions, there is a lack of studies looking at these effects in tropical or subtropical upwelling regions. The purpose of this study was to measure the effects that herbivores, temperature, and nutrient availability have on standing macroalgal biomass. We manipulated nutrient availability and herbivory in six field experiments during contrasting productivity and thermal regimes (cool-upwelling and warm, non-upwelling season) on a subtidal nearshore rocky reef. Here, we present a set of temperature (°C) data collected at Cerro Mundo Bay, San Cristobal, Galapagos from September 2022 to February 2023. The environmental temperature was recorded every 15 minutes using a HOBO Water Temperature pro V2 Data Logger (Onset®) attached to the seafloor at a 10 meters depth mark.

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Coverage

Location: Cerro Mundo Bay, San Cristobal, Galapagos Islands
Spatial Extent: **Lat**:-0.87044 **Lon**:-89.5819
Temporal Extent: 2022-09 - 2023-02

Methods & Sampling

Data was collected via a data logger attached with cable ties to the seafloor. It was run to continuously record environmental temperature in the study site, Cerro Mundo.

The logger was replaced every 9 months due to battery limitations in order to keep a continuous record of temperature.

BCO-DMO Processing Description

* Added latitude and longitude values from sampling site to dataset
* Added measurement depth values to dataset
* Added UTC time values to dataset, and retained original GMT-6 (Galapagos) local time

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Data Files

File
cerro_mundo_bay_temperature_2.csv (Comma Separated Values (.csv), 1.28 MB) MD5:d8414647367b9242b9711a2a53f2b312 Primary data file for dataset Cerro Mundo Temperature 2 (904195)

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Parameters

Parameter	Description	Units
DateTime_Local	Datetime in Galapagos Island Time (GMT-6).	unitless
ISO_DateTime_UTC	Datetime of measurement in UTC.	unitless
Temp	Environmental temperature measurement recorded in 15 minute intervals	Celcius
Latitude	Latitude of measurement location in decimal degrees. A negative value indicates South.	decimal degrees
Longitude	Longitude of measurement location in decimal degrees. A negative value indicates West.	decimal degrees
Depth	Depth of temperature measurement.	meters

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Project Information

Temperature Regulation of Top-Down Control in a Pacific Upwelling System (Galapagos 2021)

Coverage: Galapagos Islands

NSF Award Abstract:
Nearly all the animals that inhabit the ocean are "cold-blooded" or ectothermic, meaning their body temperatures match the temperature of the ocean around them. This has important consequences for their physiology and more broadly for the way marine ecosystems function. When ectotherms warm up, their metabolism increases; meaning they breathe more rapidly, and eat more just to stay alive. This is bad news for prey since a warm predator is a hungry predator. But warming also enables prey species to crawl or swim away more quickly when being hunted. Thus, everything speeds up in warm water. Energy flows more quickly from the sun to seaweeds (via photosynthesis), to the herbivores, then on up to the large predators at the top of the food chain. The research team is testing these ideas in the Galápagos Islands to determine how temperature influences marine ecosystems. Ongoing work in this iconic natural laboratory is helping marine ecologists understand the role of temperature and how this and other ecosystems could function in the future

as climate change warms the ocean. Other broader impacts of the project include student training and on-site outreach to tourists and the local community about ocean warming and some of the lesser-known species that inhabit the Galápagos.

The broad goal of this project is to understand the effect that temperature has on patterns and processes in upwelling systems. Specifically, the team is measuring the temperature-dependence of herbivory and carnivory in rocky subtidal habitats of the Galápagos. They are performing field experiments to measure the relative and interactive effects of temperature, herbivory, and nutrient flux on the productivity and standing biomass of benthic macroalgae. Additionally, they are using in situ predation assays across spatial and temporal temperature gradients and mesocosm experiments to determine the relationship between ocean temperature and predation intensity for predator-prey pairings including whelk–barnacle, sea star–urchin, and fish–squid.

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-2128592

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