# Environmental temperature data collected at Cerro Mundo Bay, San Cristobal, Galapagos from 2022-2024 (Galapagos 2021 project)

**Website**: https://www.bco-dmo.org/dataset/904195
**Data Type**: Other Field Results
**Version**: 2
**Version Date**: 2023-09-03

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



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**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 August 2024. The environmental temperature was recorded every 10 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**: 2022-09-01 - 2024-08-16

### Methods & Sampling

We deployed a data logger by attaching it with cable ties to the seafloor to continuously record environmental temperature in Cerro Mundo, our study site.

We replace the logger every 9 months, before it ran out of  battery, to keep a continuous record of temperature.

**BCO-DMO Curation Notes**

Version 1

* 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

Version 2

* Imported "Cerro Mundo Bay Temperature 2.xlsx" and "Cerro Mundo Bay Temperature 3.xlsx" into the BCO-DMO system
* Added UTC time values to dataset, and retained original GMT-6 (Galapagos) local time
* Renamed "Date" to "DateTime_Local"
* Added "Depth" field with a value of 10 for all cells
* Added latitude and longitude values from sampling site to dataset
* Exported file as "904195_v2_cerro_mundo_temp3.csv"

Submitter provided additional data for 2023-02 to 2024-08.
Adjusted metadata from 15 min intervals to 10 min interval.

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## Data Files

| File | |
|---|---|
| **904195_v2_cerro_mundo_temp.csv** | (Comma Separated Values (.csv), 5.11 MB) MD5:3f6e1487fcab6a5156638bc8866496bb |
| Primary data file for dataset ID 904195, version 2 | |

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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 10 minute intervals | Celsius |
| 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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## Instruments

| | |
|---|---|
| **Dataset-specific Instrument Name** | HOBO Water Temperature pro V2 Data Logger (Onset®) |
| **Generic Instrument Name** | Onset HOBO Pro v2 temperature logger |
| **Dataset-specific Description** | The environmental temperature was recorded every 10 minutes using a HOBO Water Temperature pro V2 Data Logger (Onset®) attached to the seafloor at a 10 meters depth mark. |
| **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

**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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