

Underwater field photos of *Acropora hyacinthus* sampled in Moorea, French Polynesia in 2019

Website: <https://www.bco-dmo.org/dataset/852423>

Data Type: Other Field Results

Version: 1

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Project

» [RAPID: Collaborative Research: Studies of recovery from bleaching in *Acropora hyacinthus*: epigenetic shifts, impacts on reproductive biology and carry-over effects](#) (Moorea coral bleaching)

Contributors	Affiliation	Role
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Coverage

Spatial Extent: N:-17.46576169 E:-149.7961685 S:-17.48641792 W:-149.8455917

Temporal Extent: 2019-04 - 2019-10

Methods & Sampling

Standardized underwater photographs

Photographs were taken in 2019 of the degree of bleaching of corals in Mo'orea, French Polynesia. Sampling sites were LTER1 and LTER2 on the north side of the island.

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Parameters

Parameters for this dataset have not yet been identified

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Diving Mask and Snorkel
Generic Instrument Description	A diving mask (also half mask, dive mask or scuba mask) is an item of diving equipment that allows underwater divers, including, scuba divers, free-divers, and snorkelers to see clearly underwater. Snorkel: A breathing apparatus for swimmers and surface divers that allows swimming or continuous use of a face mask without lifting the head to breathe, consisting of a tube that curves out of the mouth and extends above the surface of the water.

Dataset-specific Instrument Name	
Generic Instrument Name	Measuring Tape
Generic Instrument Description	A tape measure or measuring tape is a flexible ruler. It consists of a ribbon of cloth, plastic, fibre glass, or metal strip with linear-measurement markings. It is a common tool for measuring distance or length.

Dataset-specific Instrument Name	
Generic Instrument Name	Underwater Camera
Generic Instrument Description	All types of photographic equipment that may be deployed underwater including stills, video, film and digital systems.

Dataset-specific Instrument Name	
Generic Instrument Name	Underwater Writing Slate
Generic Instrument Description	Underwater writing slates and pencils are used to transport pre-dive plans underwater, to record facts whilst underwater and to aid communication with other divers.

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Project Information

RAPID: Collaborative Research: Studies of recovery from bleaching in *Acropora hyacinthus*: epigenetic shifts, impacts on reproductive biology and carry-over effects (Moorea coral bleaching)

Coverage: Moorea, French Polynesia; Auburn University; University of California, Santa Barbara

NSF Award Abstract:

Coral reefs provide strong economic and ecological benefits, yet they are declining worldwide largely due to extreme heat events that cause bleaching, a disturbance of the essential relationship between the algae that live inside the coral and the coral. There is currently a mass coral bleaching event in Moorea, French Polynesia

where up to 90% of corals show some level of bleaching in response to heat stress. This location is ideal to study adaptation and acclimation thanks to the facilities and sampling of the Moorea Coral Reef (MCR) Long Term Ecological Research (LTER) site. This project explores how strong natural disaster events shape genetic differences in populations through time. By using historical environmental data it may be possible to identify modifications of the genome linked to past bleaching events. This knowledge will help establish models to predict reef recovery after disturbance and will be useful for choosing colonies with the best chance of survival in restoration efforts. This project also investigates how the bleaching history of the parents impacts characteristics of the next generations, such as reproductive output, larval, survival and heat tolerance. This project will provide training and involvement in research for three senior PhD students and at least five undergraduates. Coral restoration efforts rely on understanding how corals might adapt to environmental stress.

The mass coral bleaching event currently occurring in French Polynesia (April 2019) offers an opportunity to test hypotheses regarding mechanisms of rapid response to large scale disturbances. This project investigates potential epigenetic and genetic mechanisms involved in either resisting stress or recovering from bleaching. The research leverages the Moorea Coral Reef (MCR) LTER, which integrates the high resolution oceanographic metrics and data on long-term community dynamics into the study of rapid adaptation of *Acropora hyacinthus*. Genetic and epigenetic signatures of a natural selection event (bleaching) are tracked in the field to test the impact of bleaching history on reproductive and carry-over effects in larval and juvenile corals. Both physiological and molecular methods, such as 2bRAD genotyping and reduced representation bisulfite sequencing, are employed to investigate correlations between phenotypes and genetic and epigenetic differences in the genome. This work explores associations between selection on genetic variation and epigenetic variation as well as the potential role of DNA methylation in phenotypic change across a generation in association with coral bleaching. In this era of global change, there is mounting evidence that rapid evolutionary processes are occurring at time scales relevant to ecological processes. Therefore, capitalizing on a system with rich long-term ecological data, such as that associated with the MCR LTER, is ideal to investigate mechanisms of rapid adaptation.

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-1935308

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