Visual substrate classification along transects from the nearshore reefs in Guam during 2014 (Reef Resilience in Guam project)

Website: https://www.bco-dmo.org/dataset/640007
Data Type: Other Field Results
Version: 2
Version Date: 2016-06-17

Project
» Documenting bleaching susceptibility and resilience in Guam, Micronesia (Reef Resilience in Guam)

Contributors	Affiliation	Role
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Abstract
Visual survey of substrate types along transects 10 m x 5 contiguous segments. Substrates were classified along the transects at 50 cm intervals from the nearshore reefs in Guam during 2014.

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Coverage

Spatial Extent: **N**:13.54853 **E**:144.81 **S**:13.24061 **W**:144.63631
Temporal Extent: 2014-01-15 - 2014-08-13

Methods & Sampling

At each of 15 sites, a 50m transect was laid out along the depth contour. Ten-meter segments were processed, equating to five 10m transects per site. The beginning and end points of transects were marked underwater and the transects were revisited three times within one year.

The benthic composition was assessed using the Point Intercept Method, whereby the substrate immediately below the transect line was identified every 0.5m along five 10m transects. Standard categories of benthic composition included both living and abiotic components.

Data Processing Description

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- replaced data_recorder = UNK with unknown
- added site, zone, lat and lon columns
- reformatted date from m/d/yyyy to yyyy-mm-dd
- moved Achang_Deep to site column and ACH-D to site_code column (they were reversed)

version 2 (2021-01-28): revised some locations, replaces version1 (2016-06-17)

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Data Files

File
substrates.csv (Comma Separated Values (.csv), 152.63 KB) MD5:692c8a25ad2cee5b8a99f601e4769691 Primary data file for dataset ID 640007

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Related Datasets

IsSupplementTo

Kim, K., Baker, D. M., Raymundo, L. J. (2021) **Coral health survey from the nearshore reefs in Guam during 2014 (Reef Resilience in Guam project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-01-28 doi:10.26008/1912/bco-dmo.639879.1 [view at BCO-DMO]

Kim, K., Baker, D. M., Raymundo, L. J. (2021) **Coral surveys from the nearshore reefs in Guam during 2014 (Reef Resilience in Guam project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2016-03-08 doi:10.26008/1912/bco-dmo.639899.1 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
date_local	survey local date	yyyy-mm-dd
site	survey location near Guam Island	unitless
site_code	site code	unitless
zone	part of reef surveyed	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
data_recorder	initials of person recording data	unitless
transect_pos	location along transect	meters
substrate_code	substrate code: CCA: crustose coralline algae DC: old dead coral FMA: fleshy macroalgae LHC: live hard coral OT: other (sponges, etc) PVM: pavement RKC: recently-killed coral ROC: rock RUB: rubble SA: sand SC: soft coral SI: silt	unitless

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Fluorometer
Dataset-specific Description	Diving PAM Underwater Fluorometer (Walz), an instrument for studying in situ photosynthesis of underwater plants.
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

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Deployments

Guam_Reef_Surveys_2014

Website	https://www.bco-dmo.org/deployment/639854
Platform	shoreside Guam
Start Date	2014-01-15
End Date	2014-08-15
Description	Coral reef bleaching was surveyed/studied near Guam in 2014 as part of the project "Documenting bleaching susceptibility and resilience in Guam, Micronesia" (NSF OCE-1418673).

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Project Information

Documenting bleaching susceptibility and resilience in Guam, Micronesia (Reef Resilience in Guam)

Coverage: Nearshore waters of Guam (13.5000° N, 144.8000° E)

Note: This project is funded by an NSF RAPID award.

Description from NSF award abstract:
Coral reef ecosystems are experiencing unprecedented levels of environmental stress. Guam, Micronesia is currently experiencing an island-wide coral bleaching event unprecedented in recent decades. The available evidence suggests that the severity and extent of this event is linked to extended high sea surface temperature and a delay in the onset of the rainy season. Initial surveys of coral reefs around the island indicate that the impacts are broad in both geographic extent and the number of coral species affected. This project will support a quantitative examination of the patterns of mortality and recovery of corals from this event in the context of reef resilience, or their ability to recover. Specifically, the project will examine whether: (a) exposure differences between the east and west sides of the island result in differential recovery, and (b) do sites that showed lower bleaching severity during initial surveys show higher recovery post-bleaching? It is predicted that differential bleaching is due, in part, to genetic differences in both the coral host and its symbiotic algae and identifying unique host-symbiont combinations that are less sensitive to extreme temperature anomalies will be a primary goal of this project. These hypotheses and predictions will be

addressed by returning to a select subset of reef sites over time by a rapid response team using survey methods as employed at the NSF funded Moorea Coral Reef Long Term Ecological Research (LTER) site which includes permanent transects and fixed quadrats, and computer software to document changes in the percent cover of corals over time. Additionally, long-term monitoring of tagged colonies in the genera Acropora and Pocillopora, specifically for their recovery, and for detailed genetic analyses to examine host and symbiont genetic diversity, will help determine which combinations of host-symbiont genotypes are exhibiting recovery versus mortality.

The proposed work will reveal which specific sites, environmental conditions, and genotypes are associated with resilience to coral bleaching and will allow establishment of a system whereby long-term recovery can be documented and also compared to the Moorea LTER data on coral reef resilience. Such data sets are rare or non-existent in Micronesia and the ability to identify resilient populations can provide information to help prioritize management efforts and evaluate the performance of existing marine parks and preserves.

Further description from PI:

Survey Methods: The investigators will address these hypotheses and predictions by returning to a select subset of sites visited by the rapid response team and using survey methods as employed at the Moorea Coral Reef LTER (i.e., http://mcr.lternet.edu). On each coast, the investigators will select reef sites that have shown high (n=2) and low (n=2) levels of bleaching for a total of 8 sites. At each of the sites, they will establish permanent transacts (five 10 m transects) with fixed quadrat (0.25 m2) locations (n=40 total) for quarterly photomonitoring (see Edmunds 2013). The investigators will also deploy temperature loggers along the transects for the duration of the proposed study. Photographed quadrats will be analyzed using CPCe software as described in Adam et al (2011) to document changes in benthic cover.

To examine individual colony responses more closely, a subset of colonies from specific genera will be tagged at each site and re-assessed periodically for one year. At present, the investigators are considering *Acropora* spp and *Pocillopora* spp, as these are ecologically important, highly impacted by this event, and common to many of the sites being surveyed at present. The tagged colonies will be identified to species, and their health status documented: i.e., bleached, fully pigmented, re-sheeting, partial mortality, full mortality. The investigators will also look for signs of disease at the same time.

Genetic Analyses: The species selected above will be sampled for genetic analysis, to identify zooxanthellae clades present in each colony (see Gates 2011), examine host genetic diversity (e.g., Combosch & Voller 2011), and determine which combinations of host-symbiont genotypes are exhibiting recovery vs. mortality. As the event is coming to a close, and the investigators are already seeing mortality in certain species, they may be unable to sample certain highly susceptible colonies, but they will work under the assumption that surviving colonies represent the most resilient host-symbiont genotypes and certain colonies with partial mortality will allow sampling of remaining tissue.

The investigators will determine if there are associations between resilient genotypes and site-specific environmental conditions, obtaining secondary data on sea surface temperatures along the east vs. west coasts, rainfall, and wave height from NOAA and the National Weather Service. They will also document degree of exposure and distance to point sources of terrestrial inputs at each site.

Bibliography

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Combosch, D.J., Vollmer, S.V., 2011. Population Genetics of an Ecosystem-Defining Reef Coral *Pocillopora damicornis* in the Tropical Eastern Pacific. Plos One 6. DOI: 10.1371/journal.pone.0021200

Edmunds, P of Moorea Coral Reef LTER. 2013. MCR LTER: Coral Reef: Long-term Population and Community Dynamics: Corals. knb-lter-mcr.4.29 (http://metacat.lternet.edu/knb/metacat/knb-lter-mcr.4.29/lter).

Gates, R of Moorea Coral Reef LTER. 2011. MCR LTER: Coral Reef: Population Dynamics: Time-series of *Symbiodinium* populations in corals of Moorea. knb-lter-mcr.15.11 (http://metacat.lternet.edu/knb/metacat/knb-lter-mcr.15.11/lter).

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1418673

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