Benthic coverage data collected from 2012 to 2014 in the Federated States of Micronesia and the Caroline Islands (Disturb Impacts Coral project)

Website: https://www.bco-dmo.org/dataset/684031
Data Type: Other Field Results
Version: 1
Version Date: 2017-03-09

Project
» The impact of a large episodic disturbance on an invasive (outbreak) coral: Will Typhoon Maysak promote or suppress an invasive Montipora sp. Coral on reefs of Ulithi Atoll, Federated States of Micronesia? (DisturbImpactsCoral)

Contributors	Affiliation	Role
Bernardi, Giacomo	University of California-Santa Cruz (UCSC)	Principal Investigator
Crane, Nicole	Cabrillo College	Co-Principal Investigator, Contact
Ake, Hannah	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Benthic coverage data collected from 2012 to 2014 in the Federated States of Micronesia and the Caroline Islands (Disturb Impacts Coral project)

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Coverage

Spatial Extent: **N**:7.058531 **E**:-146.976536 **S**:5.933554 **W**:-158.368892
Temporal Extent: 2012-06-28 - 2014-07-14

Dataset Description

Benthic cover data for 2012, 2013 and 2014.

Data associated with publication: Crane NL, Nelson P, Abelson A, Precoda K, Rulmal J Jr, et al. (2017) PLOS ONE.

Methods & Sampling

Surveys were conducted using snorkel on the reef crest and the reef table, in shallow sites at depths between 1.5 and 3 meters. Benthic community structure was evaluated using 0.25m quadrats placed randomly on the reef crest area at each site. Quadrat locations were selected by using a random number generator to set the distance between quadrats and direction of swim within the reef crest corridor. Percent cover of key organisms was determined within each quadrat (counts were used for larger mobile invertebrates and giant clams). Each quadrat was documented photographically. A total of 10 functional group categories were used to assess benthic cover: stony coral, octocorals, hydrocorals, macroalgae, algal turfs, encrusting algae, cyanobacteria, bare substrate and non-coral sessile and mobile invertebrates. Stony corals and hydrocorals were categorized into one of 12 morphological groups and identiLied to genus when possible. Instances of disease, paling, and bleaching within each quadrat were noted. Stony coral colony sizes were measured by recording maximum length, width, height, nearest live coral neighbor and coral functional group for each coral that intercepted the 50 m Lish transect lines.

Data Processing Description

BCO-DMO Data Processing Notes:
-nd was added to all blank cells
-site, date, researcher, and quad columns were added to incorporate the information contained in the header of the file

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Data Files

File
benthic.csv (Comma Separated Values (.csv), 259.03 KB) MD5:46d1177393eee3d47112f3fcb7b21ae6 Primary data file for dataset ID 684031

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Related Publications

Crane, N. L., Nelson, P., Abelson, A., Precoda, K., Rulmal, J., Bernardi, G., & Paddack, M. (2017). Atoll-scale patterns in coral reef community structure: Human signatures on Ulithi Atoll, Micronesia. PLOS ONE, 12(5), e0177083. doi:10.1371/journal.pone.0177083
Results

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Parameters

Parameter	Description	Units
site	Site where species were sampled	unitless
date	Date of sampling; YYYY/MM/DD	unitless
researcher	Researcher that collected the data	unitless
quad	Quadrat where species were sampled	unitless
liveCoral_noCabbage	Percent coverage of live coral (not including cabbage coral)	percent

invasiveCoral	Percent coverage of invasive coral (not included in live percentage)	percent
deadCoral	Percent coverage of dead coral	percent
bleachedCoral	Percent coverage of bleached coral	percent
turfAlgae	Percent coverage of turf algae	percent
macroalgae	Percent coverage of macroalgae	percent
otherInverts	Percent coverage of other invertebrates	percent
acroporaThicket	Percent coverage of Acropora thicket	percent
tableCoral	Percent coverage of Acropora table coral	percent
mounding1_simple_UnID	Percent coverage of unidentified simple coral	percent
mounding1_Porites_lobata	Percent coverage of Porites lobata	percent
mounding1_Astreopora	Percent coverage of Astreopora	percent
mounding1_Leptastrea	Percent coverage of Leptastrea	percent
mounding2_complex_UnID	Percent coverage of unidentified complex coral	percent
simpleBranching_UnID	Percent coverage of unidentified branching simple coral	percent
simpleBranching_AcroporaSpp	Percent coverage of simple branching Acropora spp	percent
simpleBranching_Porites_rus	Percent coverage of Porites rus	percent
simpleBranching_Porites_cylindrica	Percent coverage of Porites cylindrica	percent
simpleBranching_Pocillopora_eydouxi	Percent coverage of Pocillopora eydouxi	percent
simpleBranching_Pocillopora_meandrina	Percent coverage of Pocillopora meandrina	percent
simpleBranching_PocilloporaSpp	Percent coverage of Pocillopora spp	percent
simpleBranching_Heliopora	Percent coverage of simple branching Heliopora	percent
simpleBranching_Millepora	Percent coverage of simple branching Millepora	percent
complexBranching_UnID	Percent coverage of unidentified complex branching coral	percent
complexBranching_Pocillopora_damicornis_varicosa	Percent coverage of Pocillopora damicornis or varicosa	percent
complexBranching_AcroporaSpp	Percent coverage of complex branching Acropora Spp	percent
complexBranching_Millepora	Percent coverage of complex branching Millepora	percent
complexBranching_Stylaster_Distichopora	Percent coverage of Stylaster and Distichopora	percent
encrusting_UnID	Percent coverage of unidentified encrusting coral	percent
encrusting_Pocillopora	Percent coverage of encrusting Pocillopora	percent
encrusting_Porites_solida	Percent coverage of encrusting Porites solida	percent
encrusting_Leptastrea	Percent coverage of encrusting Leptasrea	percent
encrusting_nonInvasive_MontiporaSpp	Percent coverage of non invasive encrusting Montipora spp	percent

encrusting_Isopora	Percent coverage encrusting Isopora	percent
encrusting_Astreopora	Percent coverage of encrusting Astreopora	percent
encrusting_Millepora	Percent coverage of encrusting Millepora	percent
lettuce_foliose_UnID	Percent coverage of unidentified lettuce or foliose coral	percent
sheeting_UnID	Percent coverage of unidentified sheeting coral	percent
solitary_Fungia	Percent coverage of solitary Fungia	percent
solitary_other	Percent coverage of other solitary species	percent
columnar_UnID	Percent coverage of unidentified columnar coral	percent
columnar_Isopora	Percent coverage of columnar Isopora	percent
uncategorized_invasiveMontipora	Percent coverage of uncategorized invasive Montipora	percent
sheeting_invasiveMontipora	Percent coverage of sheeting invasive Monitpora	percent
foliose_invasiveMontipora	Percent coverage of foliose invasive Montipora	percent
columnar_invasiveMontipora	Percent coverage of columnar invasive Montipora	percent
dead_stoneyCoral	Percent coverage of dead stoney coral	percent
diseased	Percent coverage of diseased coral	percent
softCoral_UnID	Percent coverage of unidentified soft coral	percent
leatherCoral	Percent coverage of leather coral	percent
corallimorph	Percent coverage of corallimorph	percent
zooanthid	Percent coverage of zooanthid	percent
encrusting_fleshyRedAlgae	Percent coverage of encrusting fleshy red algae	percent
fleshyBrownMacroalgae	Percent coverage of fleshy brown algae (general)	percent
fleshyBrownMacroalgae_turbinaria	Percent coverage of turbinaria	percent
fleshyBrownMacroalgae_stypopodium	Percent coverage of stypopodium	percent
fleshyRedMacroalgae	Percent coverage of fleshy red algae (general)	percent
fleshyGreenMacroalgae	Percent coverage of fleshy green algae (general)	percent
fleshyGreenMacroalgae_microdictyon	Percent coverage of microdictyon	percent
fleshyGreenMacroalgae_Dictyosphaera_cavernosa	Percent coverage of Dictyosphaera cavernosa	percent
filamentousGreenMacroalgae	Percent coverage of filamentous green macroalgae	percent
calcareousGreenMacroalgae_halimeda	Percent coverage of calcareous halimeda	percent
calcareousRedMacroalgae	Percent coverage of calcareous red macroalgae	percent
rhodoliths_freeCoralline	Percent coverage of rhodoliths	percent
turfAlgae_solidSubstrate	Percent coverage of turf algae on solid substrate	percent

turfAlgae_rubble	Percent coverage of turf algae on rubble	percent
CCA_turf	Percent coverage of crustose coralline algae with turf	percent
CCA	Percent coverage of crustose coralline algae	percent
cyanobacteria	Percent coverage of cyanobacteria	percent
cyanobacteria_covering	Percent coverage of cyanobacteria covering	percent
seagrass	Percent coverage of seagrass	percent
sand	Percent coverage of sand	percent
bare	Percent coverage of bare space	percent
encrusting_sponge	Percent coverage of encrusting sponge	percent
upright_sponge	Percent coverage of upright sponge	percent
encrusting_tunicate	Percent coverage of encrusting tunicate	percent
upright_tunicate	Percent coverage of upright tunicate	percent
anemone	Percent coverage of anenomes	percent
acroporaThicket2	Percent coverage of Acropora thickets	percent
tableCoral_acropora	Percent coverage of table coral (Acropora)	percent
mounding1_UnID2	Percent coverage of unidentified simple coral	percent
mounding2_UnID2	Percent coverage of unidentified complex coral	percent
simpleBranching_UnID2	Percent coverage of unidentified branching simple coral	percent
simpleBranching_Pocillopora_eydouxi2	Percent coverage of Pocillopora eydouxi	percent
simpleBranching_Heliopora2	Percent coverage of simple branching Heliopora	percent
simpleBranching_Acropora2	Percent coverage of complex branching Acropora Spp	percent
complexBranching_UnID2	Percent coverage of unidentified complex branching coral	percent
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sheeting_UnID2	Percent coverage of unidentified sheeting coral	percent
solitary_UnID2	Percent coverage of unidentified solitary coral	percent
columnar_UnID2	Percent coverage of unidentified columnar coral	percent
uncategorized_invasiveMontipora2	Percent coverage of uncategorized invasive Montipora	percent

sheeting_invasiveMontipora2	Percent coverage of sheeting invasive Monitpora	percent
foliose_invasiveMontipora2	Percent coverage of foliose invasive Montipora	percent
columnar_invasiveMontipora2	Percent coverage of columnar invasive Montipora	percent
trochus	Percent coverage of trochus	percent
urchin	Percent coverage of urchins	percent
seaStar	Percent coverage of sea stars	percent
seaCucumber	Percent coverage of sea cucumbers	percent
seaCucumber_Chlorostichopus_notatus	Percent coverage of Chlorostichopus notatus	percent
clam_Tridacna	Percent coverage of Tridacna spp	percent
tube_snail	Percent coverage of tube snails	percent

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Instruments

Dataset-specific Instrument Name	Camera
Generic Instrument Name	Camera
Dataset-specific Description	Used to capture quadrats
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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Deployments

Bernardi_2012

Website	https://www.bco-dmo.org/deployment/684153
Platform	shoreside Micronesia
Start Date	2012-06-28
End Date	2014-07-14

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Project Information

The impact of a large episodic disturbance on an invasive (outbreak) coral: Will Typhoon Maysak promote or suppress an invasive Montipora sp. Coral on reefs of Ulithi Atoll, Federated States of Micronesia? (DisturbImpactsCoral)

Website: http://onepeopleonereef.ucsc.edu

Coverage: Ulithi Atoll, Yap State, Federated States of Micronesia. Western Pacific Ocean, Caroline Islands

Extracted from the NSF award abstract:

Ulithi Atoll, in the Federated States of Micronesia, is the fourth largest Atoll in the world, and was an important staging area for the US Navy 3rd fleet during WWII. The Atoll contains dynamic coral reefs, and communities of people that depend on them. Ulithi has been subjected to a number of human and natural disturbances, including Typhoon Ophelia that hit in 1960. Local fishermen believe that this event started an invasion process by a 'weedy' invasive coral that covers reefs, and removes essential habitat for fish and octopus, potentially threatening these ecosystems. Four years ago, local people invited the investigators to Ulithi to study the reefs and work together to enhance fisheries and reef health. The investigators sequenced the invading coral DNA and identified it as a new species of Montipora. However, its invasion dynamics remain a mystery. In early April 2015, Ulithi was hit again by a major disturbance: super Typhoon Maysak. The Typhoon destroyed most structures on the island, and removed much of the coral formations visible from shore. Using their baseline data of the past four years, the investigators, along with a team of students, seek to map the effect of the Typhoon on the invasive Montipora. Using genomic sequencing, they hope to better understand the role of Typhoon Maysak on the establishment and dispersal of this invasive coral. This project provides a unique opportunity to study the effects of a rare event, and invasion processes, and to broadly disseminate findings, raising awareness about coral reefs, climate change, and unique human-natural coupled systems.

Super typhoon Maysak struck Ulithi Atoll on March 31, 2015, where an invasive/outbreak species of Montipora has affected shallow coral reefs over at least the last 50 years. The research the investigators propose will elucidate the effects of this rare but high impact event on a biological invasion using genomics and reef sampling to investigate Micronesian reefs that were dominated by Montipora before the typhoon, and more 'pristine' reefs where Montipora was absent or in low densities. The investigators will be relating these findings to existing data that were collected from these sites over the past four years. These studies will advance our understanding of biological invasions in coral reef systems, explore the unusual occurrence of a coral species as an outbreak organism, and contribute to our knowledge of how high impact, episodic disturbances - likely to increase in frequency with the advance of global climate change - may affect threated coral reef ecosystems world-wide.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1546374

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