The effects of vermetids and sediments on coral growth in Moorea, French Polynesia from June to August 2012 (Vermetids_Corals project)

Website: https://www.bco-dmo.org/dataset/726215
Data Type: experimental
Version: 2017-10-05

Project
» Spatial patterns of coral-vermetid interactions: short-term effects and long-term consequences (Vermetids_Corals)

Contributors	Affiliation	Role
Zill, Julie	University of Hawaii (UH)	Principal Investigator
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Coverage

Spatial Extent: **N**:-17.47279 **E**:-149.78277 **S**:-17.48365 **W**:-149.84698
Temporal Extent: 2012-06 - 2012-08

Dataset Description

A manipulative experiment to determine the growth rate of corals in the presence and absence of sediment and vermetids.

Related Datasets:

- Zill et al 2017 Coral Growth: https://www.bco-dmo.org/dataset/726215 (Current page)
- Zill et al 2017 Sediment Removal Rate: https://www.bco-dmo.org/dataset/726232

Methods & Sampling

In June-August 2012, we conducted a 54-day field experiment on the north shore of Moorea, French Polynesia. We manipulated the presence of the vermetid *Ceraesignum maximum* (formerly *Dendropoma maximum*) and high sedimentation, yielding four fully-crossed treatments. In response to which, we measured the growth of the reef-building coral massive Porites (a species complex mostly composed of P. lobata and P. lutea, see

Veron 1995).

This study was performed in a shallow lagoonal backreef area, where vermetid densities can be quite high (up to >100 per m2: Smalley 1984; Shima et al. 2010). We selected 36 large (approximately 1 meter in diameter), mostly-dead colonies of massive *Porites* to serve as deployment sites for our experimental corals. These colonies occurred at a similar depth along a 150-m transect that was roughly parallel to the reef crest and perpendicular to prevailing water currents. Because differences in water flow could affect vermetid net casting efficacy and sediment removal rates, we quantified relative flow variation among sites using calibrated clod cards (Jokiel & Morrissey 1993). The flat top of each site was home to an average of 5 ± 1 (SD) vermetids in a 400 square centimeter area, ensuring that mucus nets would consistently cover the experimental corals receiving the "+vermetid" treatments. We randomly assigned the four experimental treatments to our sites, from half of which we removed all vermetids to create the "–vermetid" treatments. Our experimental corals were 36 juvenile massive *Porites* colonies that we collected from a nearby location. Each coral was attached to a small plastic base using marine epoxy, and buoyantly weighed (following Davies 1989). They were then assigned to nine blocks of four corals based on similarity in morphology, and outplanted to each deployment site using u-nails.

After 54 days, corals were retrieved, sediments were removed, the corals' final buoyant mass (Davies 1989) and surface area (using the aluminum foil method of Marsh 1970) were quantified to calculate the per-tissue-area change in coral mass.

Data Processing Description

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date

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Data Files

File	
Zilletal_2017_Coralgrowth.csv	(Comma Separated Values (.csv), 692 bytes) MD5:f3fbefa7f3a45db1bd018b8cc45bec5c
Primary data file for dataset ID 726215	

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Related Publications

Davies, P.S. (1989). Short-term growth measurements of corals using an accurate buoyant weighing technique. Marine Biology, 101(3), 389–395. doi:10.1007/bf00428135 https://doi.org/10.1007/BF00428135
Methods

Jokiel, P., & Morrissey, J. (1993). Water motion on coral reefs: evaluation of the "clod card" technique . Marine Ecology Progress Series, 93, 175–181. doi:10.3354/meps093175
Methods

Shima, J. S., Osenberg, C. W., & Stier, A. C. (2010). The vermetid gastropod Dendropoma maximum reduces coral growth and survival. Biology Letters, 6(6), 815–818. doi:10.1098/rsbl.2010.0291
Methods

Smally, T. L. (1984). Possible effects of intraspecific competition on the population structure of a solitary vermetid mollusc. Marine ecology progress series. Oldendorf, 14(2), 139-144.
Methods

Zill, J. A., Gil, M. A., & Osenberg, C. W. (2017). When environmental factors become stressors: interactive effects of vermetid gastropods and sedimentation on corals. Biology Letters, 13(3), 20160957. doi:10.1098/rsbl.2016.0957

General

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Parameters

Parameter	Description	Units
Unit	the name of individual coral; the letter corresponds to the treatment received (P=Control; Y=Vermetids only; O=sediment only; R= both vermetids and sediment)	unitless
Block	the block number that the experimental coral belonged to which was based on morphology	unitless
Vermetids	presence [1] or absence [0] of vermetids in the vicinity of the coral	unitless
Sediment	whether the high sediment treatment was applied [1] or not applied [0]	unitless
GrowthRate	how much the coral grew on average per day over the duration of the experiment. Mass was calculated using the buoyant mass method (Davies 1989), and then converted to growth rate by dividing mass by surface for each coral and length of experiment (54 days).	miligrams per centimeter squared per day (mg/cm2 day)

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Deployments

Osenberg_et_al_Moorea

Website	https://www.bco-dmo.org/deployment/644752
Platform	Osenberg et al Moorea
Start Date	2003-05-19
End Date	2015-07-12

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Project Information

Spatial patterns of coral-vermetid interactions: short-term effects and long-term consequences (Vermetids_Corals)

Coverage: Moorea, French Polynesia (-17.48 degrees S, -149.82 degrees W)

Description from NSF abstract:
Ecological surprises are most likely to be manifest in diverse communities where many interactions remain uninvestigated. Coral reefs harbor much of the world's biodiversity, and recent studies by the investigators suggest that one overlooked, but potentially important, biological interaction involves vermetid gastropods. Vermetid gastropods are nonmobile, tube-building snails that feed via an extensive mucus net. Vermetids reduce coral growth by up to 80%, and coral survival by as much as 60%. Because effects vary among coral taxa, vermetids may substantially alter the structure of coral communities as well as the community of fishes and invertebrates that inhabit the coral reef.

The investigators will conduct a suite of experimental and observational studies that: 1) quantify the effects of four species of vermetids across coral species to assess if species effects and responses are concordant or idiosyncratic; 2) use meta-analysis to compare effects of vermetids relative to other coral stressors and

determine the factors that influence variation in coral responses; 3) determine the role of coral commensals that inhabit the branching coral, Pocillopora, and evaluate how the development of the commensal assemblage modifies the deleterious effects of vermetids; 4) determine how vermetid mucus nets affect the local environment of corals and evaluate several hypotheses about proposed mechanisms; and 5) assess the long-term implications of vermetids on coral communities and the fishes and invertebrates that depend on the coral.

Note: The Principal Investigator, Dr. Craig W. Osenberg, was at the University of Florida at the time the NSF award was granted. Dr. Osenberg moved to the University of Georgia during the summer of 2014 (current contact information).

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1130359

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