16S sequence data in the form of fastq.gz files for all samples collected and sequenced as part of the Varadero Reef transplant experiment

Website: https://www.bco-dmo.org/dataset/789365
Data Type: Other Field Results
Version: 1
Version Date: 2020-02-05

Project
» RAPID: Coral robustness: lessons from an "improbable" reef (Varadero Reef)

Contributors	Affiliation	Role
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Abstract
16S sequence data in the form of fastq.gz files for all samples collected and sequenced as part of the Varadero Reef transplant experiment

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Coverage

Spatial Extent: **N**:10.30647222 **E**:-75.57694444 **S**:10.18669444 **W**:-75.74527778
Temporal Extent: 2016-10-14 - 2017-05-03

Dataset Description

This folder contains 16S sequence data in the form of fastq.gz files for all samples collected and sequenced as part of the Varadero Reef transplant experiment. These samples were collected at two time points (pre-transplant and post-trasplant 6 months later) from *Orbicella faveolata* fragments originating from Varadero (3.5m depth) and Rosario (12m depth). Samples were also transplanted to a site within Cartagena Bay at 3m depth. Samples have been demultiplexed but are being submitted in unpaired form.

Methods & Sampling

The Varadero Reef is located south-west of the Cartagena Bay close to the southern strait that connects the Bay to the Caribbean Sea in Colombia (10°18'23.3"N, 75°35'08.0"W). The Bay is a receiving estuary from the Magdalena River through the Canal del Dique, a man-made channel whose construction and operation dates back almost a century. Three study sites were considered in order to evaluate the role of the local light environment associated to the Canal del Dique plume on the photosynthetic performance of corals from Varadero: 1) Varadero reef at 3.5m depth (10°18'23.3"N, 75°35'08.0"W), 2) Punta Brava reef at 12m depth

(10°11'12.1"N, 75°44'43.0"W), and 3) Cartagena Bay at 3m depth (10°18'5.80"N, 75°34'37.10"W).

Samples were collected using hammers and chisels as well as corers. Water samples were collected by passing approximately 1 L of water through a 0.2 micron Sterivex filter. Samples were extracted using the MoBio Powersoil DNA Isolation Kit and sequenced on the Illumina MiSeq sequencing platform.

On October of 2016, flat fragments (~10 cm^2) were collected from the edge of 15 coral colonies (n = 45 per site) at the two donor sites (Varadero and Rosario). Coral colonies were chosen randomly at a constant depth of ~3.5 m and ~12 m in Varadero and Rosario, respectively. Fragments were fixed with non-toxic epoxy (Z-Spar A-788 epoxy) to PVC panels placed at the same depth from donor colonies at each site. After acclimation to the local environment (two weeks), corals were transplanted from their naturally turbid (Varadero) and clear (Rosario) environment in equal proportions (n = 15) to each of the three contrasting sites. Samples were collected pre-transplant (mother colony fragment and pre-transplant fragment samples) as well as post-transplant (6 months later). Samples were immediately flash-frozen in a dry shipper post-collection and stored at -80 degrees Celsius until DNA extraction. 50 µL of DNA was extracted from each sample using the MoBio Powersoil DNA Isolation Kit. We performed two-stage amplicon PCR on the V4 region of the 16S small subunit prokaryotic rRNA marker gene using modified versions of the 515F and 806R primers that included common sequence 1 (CS1) and common sequence 2 (CS2) linkers at the 5' end, the universal primer sequences that are required for Illumina MiSeq amplicon tagging and indexing. Amplicons were barcoded with Fluidigm Illumina primers and pooled for sequencing. The amplicon pool was then purified with AMPure XP beads and sequenced on the Illumina MiSeq sequencing platform at the DNA Services Facility at the University of Illinois at Chicago.

These samples and their sequences were later processed and analyzed using the Varadero Transplant Mapping File. See related dataset: https://www.bco-dmo.org/dataset/789290

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Data Files

File	
Varadero Transplant 16S Sequences (fastq files) filename: Sofia_Roitman_-_2_MetadataSubmission_Varadero_Transplant_16S_Sequences.zip Varadero Transplant 16S Sequences (fastq files)	(ZIP Archive (ZIP), 3.95 GB) MD5:bd64c2337a950a38ed48f267f5136ea1

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Related Datasets

IsRelatedTo

Medina, M., Iglesias-Prieto, R. (2020) **Metadata information for all samples taken from coral fragments used in a transplant experiment conducted at the Varadero Reef from 2016-2017.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2020-02-05 http://lod.bco-dmo.org/id/dataset/789290 [view at BCO-DMO]

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Parameters

Parameters for this dataset have not yet been identified

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Instruments

Dataset-specific Instrument Name	Illumina MiSeq sequencing platform
Generic Instrument Name	Automated DNA Sequencer
Generic Instrument Description	General term for a laboratory instrument used for deciphering the order of bases in a strand of DNA. Sanger sequencers detect fluorescence from different dyes that are used to identify the A, C, G, and T extension reactions. Contemporary or Pyrosequencer methods are based on detecting the activity of DNA polymerase (a DNA synthesizing enzyme) with another chemoluminescent enzyme. Essentially, the method allows sequencing of a single strand of DNA by synthesizing the complementary strand along it, one base pair at a time, and detecting which base was actually added at each step.

Dataset-specific Instrument Name	
Generic Instrument Name	Manual Biota Sampler
Dataset-specific Description	Samples were collected using hammers and chisels as well as corers.
Generic Instrument Description	"Manual Biota Sampler" indicates that a sample was collected in situ by a person, possibly using a hand-held collection device such as a jar, a net, or their hands. This term could also refer to a simple tool like a hammer, saw, or other hand-held tool.

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Project Information

RAPID: Coral robustness: lessons from an "improbable" reef (Varadero Reef)

Coverage: Caribbean Sea (10°18’10”N, 75°34’ 55”W)

NSF Award Abstract:
Coral reefs provide invaluable services to coastal communities, but coral populations worldwide are in a state of unprecedented decline. Studying resilient reefs is of primary importance for coral conservation and restoration efforts. A unique natural experiment in coral resilience to stress has been playing out in Cartagena Bay, Colombia since the Spanish conquistadors diverted the Magadalena River into the Bay in 1582. Varadero Reef at the southern mouth of the Bay has survived centuries of environmental insults and changing conditions with up to 80% coral cover. This reef provides an ideal system to test biological robustness theory. Given that Varadero is a highly perturbed system, we hypothesize that while likely more robust to perturbation than nearby pristine reefs, it will be less physiologically efficient. Some of the large star coral colonies (Orbicella faveolata) at this site have existed since before the construction of the Canal del Dique. These coral specimens contain invaluable information regarding the conditions of the Magdalena River wathershed and its construction in the XIV century. Changes in turbidity of the plume associated with the urban industrial and agricultural development of Colombia can be documented as variations in calcification rates and changes in the microstructure of the skeleton. The Colombian government has announced the approval for the construction of a shipping channel that will go right over this reef, with the goal to start dredging as early as Fall 2016 or early 2017. The RAPID funding mechanism would enable immediate collection of data and information of why this reef has survived centuries of environmental stress that can shed light on what genotype combinations of coral and its microbial constituents will fare better in similar conditions at other reef locations around the world. Coral reef conservation biology will benefit from this study by generating data for the development of stress

diagnostic tools to identify resilient corals. This project will help broaden participation in science by training a diverse cohort of students to work effectively in the global arena while fostering productive collaborations with several Colombian researchers and educational institutions. Students will also gain cultural empathy and sensitivity through direct engagement with the members of society who are most directly impacted by coral reef degradation (e.g. fishermen). Student researchers from Penn State University will work alongside their Colombian counterparts to develop a series of bilingual blog posts to record the cultural and scientific aspects of this project's research expeditions. The blog postings will be submitted for wide dissemination to the Smithsonian's Ocean Portal where Penn State students have published in the past. An educational coral kit developed by the Medina Lab and extensively tested in schools in the US has been translated into Spanish and will be used in local schools in Cartagena and vicinities. All expedition data and metadata will be incorporated into the Global Coral Microbiome Project's interactive web portal, a responsive outreach tool allows researchers, students and/or teachers to access a wealth of information about every coral colony we sample and to virtually explore coral reefs around the world from any internet-enabled device.

This research will generate information to understand functional traits related to symbioses stability under different perturbation regimes. Comparative analyses of microbiome modifications generated during the reciprocal transplantation will allow us to document possible differential responses of the holobionts to acute and chronic stressors relative to corals not exposed to significant levels of perturbation. The development of local bio-optical models of coral calcification and the characterization of the coral holobiont will permit the distinction between the effects in calcification attributed to local turbidity from those that can be ;attributed to differences in host genotype and/or microbial community composition and function. The information recorded in coral skeletons can be used to reconstruct the rates of agricultural, industrial and urban development of Colombia through the last 5 centuries as changes in the turbidity of the effluent of the Magdalena River.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1642311

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