Light data collected from loggers deployed at the Thalassia Experimental Network (TEN) sites in the Western Atlantic from 2018-2019

Website: https://www.bco-dmo.org/dataset/784809
Data Type: Other Field Results
Version: 1
Version Date: 2019-12-19

Project
» Collaborative Research: The tropicalization of Western Atlantic seagrass beds (Tropicalization Seagrass Beds)

Contributors	Affiliation	Role
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Abstract
Light data collected from loggers deployed at the Thalassia Experimental Network (TEN) sites in the Western Atlantic from 2018-2019.

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Coverage

Spatial Extent: **N**:32.2639 **E**:-64.8307 **S**:9.3516 **W**:-97.0348
Temporal Extent: 2018-04-01 - 2019-07-02

Dataset Description

Light data collected from loggers deployed at the *Thalassia* Experimental Network (TEN) sites.

Methods & Sampling

Two loggers deployed at the initiation of the project, and continuously recorded light for the duration of the one-year subtidal caging experiment. One logger was cable-tied to a PVC post at the side of the array (next to the cages, to record ambient light), and a second logger was cable-tied to the PVC post within one of the full

caged plots (to record light levels within shaded and caged plots). Both loggers were positioned at the height of the seagrass canopy, with sensors oriented parallel to the sediment surface. Light readings were recorded every six minutes. Every two weeks, loggers were removed from the field, cleaned with a mild vinegar solution (10% vinegar, 90% water), and data were downloaded.

Data Processing Description

Data Processing: Data was processed in the R Statistical Software (R version 3.6.1 (2019-07-05)). All data files were merged and QA/QC'ed to ensure proper and consistent formatting. All files were cleaned by omitting time periods where the loggers were removed from the water, and calibrating the raw light readings with logger-specific calibration equations.

Problem Report: During some periods at a given site, there was only one working logger. This logger was placed inside the cage. In the dataset's current state, some data has unknown location (IN vs OUT of the cage) since there are still some loggers that need to be downloaded. These data are denoted with "??", and will be assigned proper labeling once all the data is secured.

BCO-DMO Processing:
- added latitude, longitude, and full site names from the site cooridnates file provided to BCO-DMO;
- converted the latitude and longitude values from degrees-minutes-seconds to decimal degrees.

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Data Files

File
TEN_light.csv (Comma Separated Values (.csv), 116.65 MB) MD5:322761c2d1eed697549ac6677cdaa361 Primary data file for dataset ID 784809

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Parameters

Parameter	Description	Units
site	Site code; refer to "full_names" column for complete name	unitless
location	Placement either inside (IN) or outside (OUT) of a cage. If unknown: "??" or "??n", where n = an integer 2, 3, or 4	unitless
date_time	Date and time (local) each reading was taken; format: yyyy-mm-ddTHH:MM	unitless
raw_light_value	Raw light reading	unitless
calibrated_light_value	Light reading converted from raw light data.	umol photons m-2 s-1
logger_serial_number	Serial number identifying specific logger that recorded each reading	unitless
full_names	Full name of the site	unitless
lat_dd	Site latitude in decimal degrees	degrees
lon_dd	Site longitude in deicmal degrees	degrees

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Instruments

Dataset-specific Instrument Name	Odyssey Submersible PAR light logger
Generic Instrument Name	Photosynthetically Available Radiation Sensor
Dataset-specific Description	Odyssey Submersible PAR light loggers. Light loggers were individually calibrated against a Li-Cor 2pi PAR sensor connected to a Licor.
Generic Instrument Description	A PAR sensor measures photosynthetically available (or active) radiation. The sensor measures photon flux density (photons per second per square meter) within the visible wavelength range (typically 400 to 700 nanometers). PAR gives an indication of the total energy available to plants for photosynthesis. This instrument name is used when specific type, make and model are not known.

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Deployments

TEN_2018-2019

Website	https://www.bco-dmo.org/deployment/784708
Platform	Thalassia Experimental Network
Start Date	2018-04-16
End Date	2019-05-22
Description	Thalassia Experimental Network (TEN) sites sampled in 2018-2019; several sites in the Western Atlantic - including sites in the following locations: Bocas del Toro, Panama; Lac Bay, Bonaire; Little Cayman, Cayman Islands; Carrie Bow, Belize; Puerto Morelos, Mexico; Andros, Bahamas; Eleuthera, Bahamas; Corpus Christi, Texas; Galveston, Texas; Naples, Florida; Crystal River, Florida; St. Joes, Florida; and Bermuda.

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Project Information

Collaborative Research: The tropicalization of Western Atlantic seagrass beds (Tropicalization Seagrass Beds)

Website: https://marinegeo.si.edu/research/research-in-action/underwater-meadows-and-resilient-seas

Coverage: Western Atlantic

NSF Award Abstract:
The warming of temperate marine communities is becoming a global phenomenon, producing new biotic interactions that can result in a series of cascading effects on ecosystem structure. For example, the poleward expansion of herbivore populations can lead to the consumption of habitat-forming vegetation, which alters the ecological services provided by coastal environments (a phenomenon known as tropicalization). Many of the habitats at risk, such as kelp forest and seagrass beds, provide foundational habitat that supports complex food webs. Seagrass meadows along the Gulf of Mexico are currently experiencing an influx of tropical grazers, however a integrated understanding of how these communities might ultimately respond is lacking. This project describes the first experiment to quantify the disruptive effect of tropicalization on the ecology of a widely-distributed seagrass. A major contribution of this project will be the development of a seagrass research collaborative network to serve as a platform for broader scientific inquiry and future collaboration. The collaboration spans a total of 11 institutions, and this network will foster extensive collaborations among junior and senior scientists, as well as many undergraduate and graduate students. Given the geographic scope of this work, the research team will further pursue outreach opportunities across the network by hosting a series of public lectures and science café events promoting topics in marine ecology and conservation.

This study will develop a large-scale manipulative experiment across the Caribbean, premised upon a comparative network of 15 marine sites, which will quantify how temperature and light interact with grazer effects on the dominant tropical seagrass, Thalassia testudinum. Sites have been selected along a latitudinal gradient (from Bermuda to Panama), such that light and temperature vary, allowing the investigators to test for the effects of abiotic factors on the ecological effects of increased grazing (tropicalization simulated via artificial leaf clipping). At each of the 15 marine sites, grazing treatments will be crossed with nutrient manipulations in a factorial design for 18 weeks, after which seagrass structure and functioning will be assessed via measurements of areal productivity, shoot density, aboveground biomass, and carbohydrate storage. Experiments will be conducted both in the summer and winter seasons, when abiotic gradients are at their weakest and strongest, respectively. Emerging statistical techniques in hierarchical mixed modeling and structural equation modeling will further allow for integration of experimental and observational data.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1737247

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