Pulse Amplitude Modulation (PAM) fluorometry readings from microcosm experiments from samples collected by R/V E.O. Wilson in the Gulf of Mexico, Alabama (En-Gen DMSP Cycling project)

Website: https://www.bco-dmo.org/dataset/3873
Data Type: experimental
Version: 1
Version Date: 2012-11-19

Project
» En-Gen: A Functional Genomics Approach to Organic Sulfur Cycling in the Ocean (En-Gen DMSP Cycling)

Contributors	Affiliation	Role
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Abstract
Fv:Fm ratios from control and experimental microcosms from the Dauphin Island Cubitainer Experiment (DICE) measured using a Pulse Amplitude Modulation (PAM) fluorometer.

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Coverage

Spatial Extent: **Lat**:30.05068 **Lon**:-87.99513
Temporal Extent: 2006-10-10 - 2006-10-16

Dataset Description

Fv:Fm ratios from control and experimental microcosms from the Dauphin Island Cubitainer Experiment (DICE) measured using a Pulse Amplitude Modulation (PAM) fluorometer.

Methods & Sampling

See Howard et al. 2010 and Rinta-Kanto et al. 2011 for detailed methods, summarized below:

"In October 2006, seawater was collected from surface waters (<1 m deep) in the Gulf of Mexico off the coast of Dauphin Island, AL (lat: 30 03.041N; lon: 87 59.708W). Water was filtered through a 200-um mesh into six

20-liter polyethylene Cubitainers with minimal headspace.

Three microcosms were amended with 10 um sodium nitrate (NaNO3) and 0.6 um potassium phosphate (K2HPO4) to serve as the experimental microcosms. Three microcosms were left untreated to serve as the control. The Cubitainers were maintained at 27 degrees C on a 12-hour light/dark cycle for the duration of the experiment.

Fv:Fm ratios were measured using a Walz Water PAM (pulse amplitude modulation) fluorometer."

Experimental design is further described in:
E. C. Howard, S. Sun, C. R. Reisch, D. A. del Valle, R. P. Kiene, and M. A. Moran (2010). Changes in DMSP Demethylase Gene Assemblages in Response to an Induced Phytoplankton Bloom. Applied and Environmental Microbiology, vol. 77, p. 524. DOI: 10.1128/AEM.01457-10
Rinta-Kanto, H. Burgmann, S. M. Gifford, S. Sun, S. Sharma, R. P. Kiene, and M. A. Moran (2011). Analysis of Sulfur-Related Gene Expression by Roseobacter Communities Using a Taxon-Specific Functional Gene Microarray. Environmental Microbiology, vol. 13, p. 453. DOI: 10.1111/j.1462-2920.2010.02350.x

Data Processing Description

BCO-DMO made the following changes:
- Modified parameter names to conform with BCO-DMO naming conventions.
- Replaced blanks with 'nd' to indicate 'no data'.
- Separated date in day, month, and year columns.
- Added the site coordinates provided in the publications above.

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Data Files

File
fluor_PAM.csv (Comma Separated Values (.csv), 11.60 KB) MD5:a752f838d2eefd218bb38981b310ce74 Primary data file for dataset ID 3873

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Related Publications

Howard, E. C., Sun, S., Reisch, C. R., del Valle, D. A., Bürgmann, H., Kiene, R. P., & Moran, M. A. (2010). Changes in Dimethylsulfoniopropionate Demethylase Gene Assemblages in Response to an Induced Phytoplankton Bloom. Applied and Environmental Microbiology, 77(2), 524–531. doi:10.1128/aem.01457-10 https://doi.org/10.1128/AEM.01457-10
Methods

Rinta-Kanto, J. M., Bürgmann, H., Gifford, S. M., Sun, S., Sharma, S., del Valle, D. A., … Moran, M. A. (2010). Analysis of sulfur-related transcription by Roseobacter communities using a taxon-specific functional gene microarray. Environmental Microbiology, 13(2), 453–467. doi:10.1111/j.1462-2920.2010.02350.x
Methods

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Parameters

Parameter	Description	Units
lat	Latitude of the collection site. North = Positive.	decimal degrees
lon	Longitude of the collection site. West = Negative.	decimal degrees
site_desc	Description of the sample collection site.	text
exp_day	Day of the experiment. First experimental day = T0.	unitless
month	2-digit month of year.	mm (01 to 12)
day	2-digit day of month.	dd (01 to 31)
year	4-digit year in YYYY format.	unitless
microcosm	Identifier of the microcosm. C0 and E0 are the time zero (initial) samples that represent the starting chl-a concentrations in the seawater.	unitless
microcosm_type	Type of microcosm: experimental or control.	text
exp_id	Name of the experiment. DICE = Dauphin Island Cubitainer Experiment.	text
Fv_to_Fm_mean	Mean of Fv_to_Fm measured in each microcosm each day.	dimensionless
Fv_to_Fm_sd	Standard deviation of Fv_to_Fm_mean.	dimensionless
comments	Free-text notes/comments.	text
Fv_to_Fm	Ratio of Fv to Fm; indicates the proportion of the maximum possible chlorophyll fluorescence.	dimensionless

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Instruments

Dataset-specific Instrument Name	bucket
Generic Instrument Name	bucket
Dataset-specific Description	Water was collected in the field using a clean bucket.
Generic Instrument Description	A bucket used to collect surface sea water samples.

Dataset-specific Instrument Name	Fluorometer
Generic Instrument Name	Fluorometer
Dataset-specific Description	A Walz Water PAM (pulse amplitude modulation) fluorometer was used to determine Fv:Fm. PAM fluorometers emit a range of pulsed lights to measure photosynthesis. The pulses of light are modulated, and the amplitude of the pulse of light governs its intensity. See more information from the manufacturer.
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

DMSP_Dauphin_Island

Website	https://www.bco-dmo.org/deployment/58888
Platform	R/V E.O. Wilson
Description	October 2006 deployment in the Gulf of Mexico approximately 20 km off the coast of Dauphin Island, AL to collect surface water for the project "En-Gen: A Functional Genomics Approach to Organic Sulfur Cycling in the Ocean". (Latitude: 30°03.041′N, Longitude: 87°59.708′W)

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Project Information

En-Gen: A Functional Genomics Approach to Organic Sulfur Cycling in the Ocean (En-Gen DMSP Cycling)

Coverage: Sapelo Island, GA, USA, 31.4° N Lat, 81.3° W Lon / Dauphin Island, AL, USA, 30.3 ° N Lat, 88.1° W Lon

The recent discovery of key genes that mediate competing pathways at a critical juncture in the marine sulfur cycle has allowed biogeochemists to make rapid advances in understanding where and when sulfur transformations occur in the ocean, and most importantly, what factors regulate them. This project describes an environmental functional genomics project that will rapidly increase our knowledge of the role that bacterioplankton play in dimethylsulfoniopropionate (DMSP) cycling in ocean surface waters, focusing particularly on biological controls of volatile sulfur exchange across the ocean/atmosphere boundary.

The investigators have asked three critical hypotheses to explain the regulation of bacterial DMSP degradation: that involve investigations on the energy constraints of DMSP cycling, the role that DMSP concentration in the oceans plays, and the sulfur requirements for bacterial growth. These research areas serve as the focus for hypothesis-driven laboratory and field studies using functional genomics approaches that will track patterns in gene expression in relation to sulfur metabolism. The hypotheses will be tested with:
1) chemostat systems with a model marine bacterium Silicibacter pomeroyi;
2) microcosm experiments with Gulf of Mexico seawater; and
3) field studies at various sites in the Gulf of Mexico. Marine bacterioplankton play a key role in regulating the flux of DMSP-derived sulfur to the atmosphere, a process of great importance for global climate regulation and

marine productivity.

The investigators will also be involved in graduate and undergraduate student education, and two post-doctoral associates will be trained to address multidisciplinary challenges in environmental microbiology. High school biology students in Athens, GA will participate in marine microbial biology research that includes bacterial diversity and discovery studies in coastal Georgia, follow-up training in molecular tools and bioinformatics in their own classroom, and summer internships at the University of Georgia and Dauphin Island Sea Laboratory.

(The description above is from the NSF Award Abstract).

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0724017

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