

# Chlorophyll-a concentration in 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/3853>

**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 )

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## Abstract

Chlorophyll-a measurements from control and experimental microcosms from the Dauphin Island Cubitainer Experiment (DICE).

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## Coverage

**Spatial Extent:** Lat:30.05068 Lon:-87.99513

**Temporal Extent:** 2006-10 - 2006-10

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## Dataset Description

Chlorophyll-a measurements from control and experimental microcosms from the Dauphin Island Cubitainer Experiment (DICE).

Experimental design, methods, and results are further described in: Howard et al. (2010) and Rinta-Kanto et al. (2011).

## Acquisition Description

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 (NaNO<sub>3</sub>) and 0.6 um potassium phosphate (K<sub>2</sub>HPO<sub>4</sub>) 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.

Chemical and activity measurements were collected from the microcosms at the beginning of the experiment (Day 0) and every day for the duration of the experiment at the same time. Chlorophyll-a samples were collected by filtration on Whatman GF/F filters. The filters were extracted in 90% acetone for 24 hours at -20 degrees C. The extracts were quantified by fluorometry on a Turner Designs TD-700."

## 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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## 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)

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](https://doi.org/10.1111/j.1462-2920.2010.02350.x)

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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.	YYYY
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
chl_a_mean	Mean chlorophyll a per microcosm per day.	micrograms/Liter
chl_a_sd	Standard deviation of chl_a_mean.	micrograms/Liter
replicate	Identifier of the technical replicate (pulled from the same microcosm).	unitless
vol_filt	Volume of water filtered measured in milliliters.	mL
vol_ext	Volume extracted in milliliters.	mL
fluor	Fluorometer reading. (The fluorometer excites the sample with blue light and red fluorescence is measured. The maximum emission is 668 nm.)	fluorometer reading
chl_a	Chlorophyll-a.	micrograms/Liter
exp_id	Name of the experiment. DICE = Dauphin Island Cubitainer Experiment.	text

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## Instruments

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

<b>Dataset-specific Instrument Name</b>	Turner Designs 700 Laboratory Fluorometer
<b>Generic Instrument Name</b>	Turner Designs 700 Laboratory Fluorometer
<b>Dataset-specific Description</b>	A Turner Designs TD-700 was used.
<b>Generic Instrument Description</b>	The TD-700 Laboratory Fluorometer is a benchtop fluorometer designed to detect fluorescence over the UV to red range. The instrument can measure concentrations of a variety of compounds, including chlorophyll-a and fluorescent dyes, and is thus suitable for a range of applications, including chlorophyll, water quality monitoring and fluorescent tracer studies. Data can be output as concentrations or raw fluorescence measurements.

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## Deployments

### DMSP\_Dauphin\_Island

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58888">https://www.bco-dmo.org/deployment/58888</a>
<b>Platform</b>	R/V E.O. Wilson
<b>Description</b>	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)

## 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).

## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0724017</a>

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