

Upcast CTD profiles from R/V Cape Hatteras cruise CH0212 cruise from the Louisiana Shelf (hypoxic zone) and Gulf of Mexico in 2012 (OMZ_Sulfur_Cycling project)

Website: <https://www.bco-dmo.org/dataset/629046>

Version: 15 December 2015

Version Date: 2015-12-15

Project

» [A phylogenetic and functional understanding of microbial sulfur cycling in oxygen minimum zones](#)
(OMZ_Sulfur_Cycling)

Contributors	Affiliation	Role
Stewart, Frank James	Georgia Institute of Technology (GA Tech)	Principal Investigator, Contact
Gegg, Stephen R.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Table of Contents

- [Dataset Description](#)
 - [Methods & Sampling](#)
 - [Data Processing Description](#)
- [Data Files](#)
- [Parameters](#)
- [Instruments](#)
- [Deployments](#)
- [Project Information](#)
- [Funding](#)

Dataset Description

CTD Profiles - Upcasts - CH0212

Processed CTD data for cruise CH0212, Louisiana Shelf, July 2012

Louisiana Shelf, Gulf of Mexico, east-west transect through the hypoxic zone on the Louisiana Shelf (~28-29°N, 89-94° W)

Measured parameters, including units are listed within the files.

Upcasts only provided, to provide the best oxygen data.

Supporting reference describing data: [Bristow_etal_2015_L&O.pdf](#)

Methods & Sampling

Processed CTD data for cruise CH0212, Louisiana Shelf, July 2012

Louisiana Shelf, Gulf of Mexico, east-west transect through the hypoxic zone on the Louisiana Shelf (~28-29°N, 89-94° W)

Measured parameters, including units are listed within the files.

Upcasts only provided, to provide the best oxygen data.

Data Processing Description

Data Processing:

Using the SeaBird data processing software, with the following steps applied

- Filter: applied to the pressure data only (low pass 0.15s)
- Alignment: applied to the oxygen data only (using a value of 3)
- Loop edit: to mark and remove scans when the CTD is moving less than minimum velocity (set at 0.2 m/s)
- Binned: into 1m depth bins

BCO-DMO Processing Notes

- Generated from original files "CH0212_CTD.xlsx" contributed by Frank Stewart
- Parameter names edited to conform to BCO-DMO naming convention found at [Choosing Parameter Name](#)
- "nd" (no data) inserted into blank cells

[[table of contents](#) | [back to top](#)]

Data Files

File
CTD_Profiles_CH0212.csv (Comma Separated Values (.csv), 285.42 KB) MD5:f194aac6d150dde48f12a8a2e2e63ec2
Primary data file for dataset ID 629046

[[table of contents](#) | [back to top](#)]

Parameters

Parameter	Description	Units
CruiseId	UNOLS Cruise ID	text
Station	Station Id	text
Date	Date	YYYYMMDD
Time_Local	Local Time (CST Z +7)	HHMM
Latitude	Latitude (South is negative)	decimal degrees
Longitude	Longitude (West is negative)	decimal degrees
Depth_db	Depth (decibars)	decibars
Depth_m	Depth (meters)	meters
Salinity	Salinity	psu
Temperature_ITS90	Temperature ITS90	Degrees Celsius
Density_sigma_theta	Density sigma_theta	kg m-3
Oxygen_SBE43	Oxygen SBE43	umol kg-1
Fluorescence	Fluorescence	ug/l
Flag	Flag	dimensionless

[[table of contents](#) | [back to top](#)]

Instruments

Dataset-specific Instrument Name	CTD unit, SBE 911 plus
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Dataset-specific Description	CTD unit, SBE 911 plus
Generic Instrument Description	The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). more information from Sea-Bird Electronics

Dataset-specific Instrument Name	Fluorometer, Chelsea Aqua
Generic Instrument Name	Fluorometer
Dataset-specific Description	Fluorometer, Chelsea Aqua
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.

Dataset-specific Instrument Name	Oxygen sensor, SBE 43
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Dataset-specific Description	Oxygen sensor, SBE 43
Generic Instrument Description	The Sea-Bird SBE 43 dissolved oxygen sensor is a redesign of the Clark polarographic membrane type of dissolved oxygen sensors. more information from Sea-Bird Electronics

[[table of contents](#) | [back to top](#)]

Deployments

CH0212

Website	https://www.bco-dmo.org/deployment/628336
Platform	R/V Cape Hatteras
Report	http://dmoserv3.who.edu/data_docs/OMZ_SulfurCycling/Cruise_plan_CH-02-12.pdf
Start Date	2012-07-22
End Date	2012-08-05
Description	CRUISE PLAN - CH-02-12_Stewart This cruise will involve a combination of metagenomic sampling, gene expression profiling, and shipboard microcosm experiments to characterize microbial sulfur cycling and microbial community transcriptional responses to oxygen depletion in the hypoxic "dead zone" on the Louisiana Shelf west of the Mississippi River. Proposed Sampling Stations Cruise information and original data are available from the NSF R2R data catalog.

[[table of contents](#) | [back to top](#)]

Project Information

A phylogenetic and functional understanding of microbial sulfur cycling in oxygen minimum zones (OMZ_Sulfur_Cycling)

Website: <http://omz.biology.gatech.edu/>

Coverage: Gulf of Mexico; Louisiana Shelf hypoxic zone; approx. 28-29 N, 89-94 W

Oxygen concentration significantly impacts the community structure and function of marine ecosystems. In waters with low oxygen, including the major marine oxygen minimum zones (OMZs), biological diversity is dominated by a complex community of microorganisms whose anaerobic metabolisms mediate key steps in global nitrogen and carbon cycles. Surprisingly, new evidence indicates that OMZs also support diverse microorganisms capable of utilizing inorganic sulfur compounds for energy metabolism. This assemblage appears to include both sulfur-oxidizing autotrophs and sulfate-reducing heterotrophs, suggesting an active sulfur cycle with potentially substantial roles in organic carbon input and mineralization, as well as critical links to the OMZ nitrogen cycle. Our knowledge of the microorganisms driving OMZ sulfur cycling is based largely on the metagenome of a single bacterial lineage (SUP05) and on surveys of diagnostic marker genes, which have thus far targeted only a subset of the diverse low-oxygen regions in the global ocean. The metabolic diversity, activity, and biogeographic distribution of sulfur-metabolizing microorganisms in the OMZ water column remain largely unexplored.

This project uses an integrated molecular and experimental approach to critically examine the physiological and phylogenetic basis of microbial sulfur cycling in oxygen minimum zones. Combining targeted metagenomics with gene expression profiling, microcosm sulfur-addition experiments, and enrichment culturing, the PI will characterize sulfur-metabolizing microorganisms in two oceanographically and ecologically distinct low-oxygen regions: the Eastern Tropical North Pacific (ETNP) OMZ off Mexico, which represents the largest permanent OMZ in the world, and the seasonally hypoxic "dead zone" in the Gulf of Mexico (GOM). Specifically, they will test the hypotheses that sulfur-oxidizing and -reducing bacterioplankton 1) are abundant and transcriptionally active in the ETNP OMZ, 2) are minor components of the hypoxic GOM, but increase in activity and abundance when oxygen decreases and sulfide increases, and 3) exhibit biogeographic variation in functional gene content and phylogenetic diversity over vertical profiles, among OMZs, and in response to environmental gradients.

OMZs are predicted to expand in response to future climate change, making it imperative to holistically understand the biology of low-oxygen regions. This project will establish a comprehensive framework for studying the genomics and physiology of an ecologically important, but poorly characterized, functional group(s) of marine bacterioplankton in OMZs. Results will be analyzed relative to existing metagenomic data from the permanent Eastern Tropical South Pacific (ETSP) OMZ, and a second seasonal OMZ (Saanich Inlet), thereby establishing a comparative basis for describing the ecological distribution of pelagic sulfur-metabolizing microorganisms and their relative role in OMZ community metabolism.

[[table of contents](#) | [back to top](#)]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1151698

[[table of contents](#) | [back to top](#)]