Nutrient summary from R/V Cape Hatteras cruise CH0212 from the Louisiana Shelf (hypoxic zone) and Gulf of Mexico, east-west transect through the hypoxic zone in 2012 (OMZ_Sulfur_Cycling project)

Website: https://www.bco-dmo.org/dataset/629226
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
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Dataset Description

Nutrient Summary - CH0212
Nutrient Summary 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)

Supporting reference describing data: Bristow_etal_2015_L&O.pdf

Methods & Sampling

Nutrient summary 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).

Data Processing Description

Data Processing:
(tbd)

BCO-DMO Processing Notes
- Generated from original files "Nutrient_summary.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

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Data Files

File
Nutrient_Summary_CH0212.csv (Comma Separated Values (.csv), 4.41 KB) MD5:c75ce30aff26abd8ad9a04054bad0ab6 Primary data file for dataset ID 629226

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Parameters

Parameter	Description	Units
CruiseId	UNOLS Cruise ID	text
Station	Station	dimensionless
Cast	Cast	dimensionless
Date	Date	YYYYMMDD
Time	Time	HHMM
Latitude	Latitude	decimal degrees
Longitude	Longitude	decimal degrees
Depth	Depth	meters
Bottle_No	Bottle_No	dimensionless
NO2	NO2	uM
NOX	NOX	uM
NO3	NO3	uM

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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	Niskin Bottle
Generic Instrument Name	Niskin bottle
Dataset-specific Description	Niskin Bottle
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

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

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Deployments

CH0212

Website	https://www.bco-dmo.org/deployment/628336
Platform	R/V Cape Hatteras
Report	http://dmoserv3.whoi.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.

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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.

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Funding

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

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