One decibar-averaged CTD values at bottle sample depths collected from the R/V Kilo Moana KM1013 from the Central Pacific Ocean in 2010 (Quorum-sensing and the Carbon Cycle project)

Website: https://www.bco-dmo.org/dataset/3585
Version: 12 January 2012
Version Date: 2011-01-12

Project
» Quorum-sensing and the Carbon Cycle: Identifying Cell-density Dependent Organic Carbon Degradation among Marine Bacteria in Sinking Particles (Quorum-sensing and the Carbon Cycle)

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
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Data Files

File
KM1013_Niskin.csv (Comma Separated Values (.csv), 3.40 KB) MD5:93af10b13dac1e90bce6674c3b12feee Primary data file for dataset ID 3585

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Parameters

Parameter	Description	Units
cruise	Cruise identifier	dimensionless
cast	CTD cast number	dimensionless
date	Date of sample	YYYYMMDD
lon	longitude	decimal degrees
lat	latitude	decimal degrees
time	time of cast	hhmm
prmax	pressure maximum	dimensionless
press	sampling pressure	decibars
depth	sampling depth	meters
temp	Temperature	degrees Celsius
sal	Salinity	dimensionless
potemp	Potential Temperature	degrees Celsius
sigma_0	Potential Density	kilograms/meter^3
O2_ml_L	dissolved oxygen concentration	milliliters/liter
fluor	Fluorescence	micrograms/m^3
beam_cp	particulate attenuation coefficient	m^-1
PAR	water column photosynthetically active radiation (PAR)	micromoles photon m^-2 s^-1
turbid_v	turbidity	volts

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Instruments

Dataset-specific Instrument Name	CTD Sea-Bird 911
Generic Instrument Name	CTD Sea-Bird 911
Generic Instrument Description	The Sea-Bird SBE 911 is a type of CTD instrument package. The SBE 911 includes the SBE 9 Underwater Unit and the SBE 11 Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with 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	Niskin Bottle
Generic Instrument Name	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.

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Deployments

KM1013

Website	https://www.bco-dmo.org/deployment/58750
Platform	R/V Kilo Moana
Report	http://strs.unols.org/Public/diu_cruise_view.aspx?cruise_id=120708
Start Date	2010-07-13
End Date	2010-07-23
Description	Cruise information and original data are available from the NSF R2R data catalog.

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Project Information

Quorum-sensing and the Carbon Cycle: Identifying Cell-density Dependent Organic Carbon Degradation among Marine Bacteria in Sinking Particles (Quorum-sensing and the Carbon Cycle)

Coverage: Woods Hole, MA to Bermuda

The project description is from the NSF award abstract.

The vast majority of sinking organic carbon formed within the surface layer of the ocean is degraded in transit through the water column, and heterotrophic bacteria on sinking particles are important agents of this process. Recent work suggests that these bacteria have the ability to regulate organic carbon degrading metabolisms by communicating with one another via quorum sensing (QS). QS is a process where bacteria use cell-cell signaling to gauge the density of related cells in their environment for the purpose of coordinating metabolic responses among these related cells.

In this study, researchers at the Woods Hole Oceanography Institution and the Marine Biological Laboratory will test the hypothesis that AHL-based QS systems are active in sinking marine particles by trapping sinking particles, and analyzing them for cell-cell signaling molecules that are diagnostic for active QS. Sinking marine particles contain abundant Proteobacteria. This group of bacteria utilizes a class of QS molecules called acylated homoserine lactones (AHL) for which the team has previously developed new pre-concentration and mass spectrometry methods for analyzing AHLs in sinking particles.

Additionally, the team will also test the hypothesis that that genes regulated by AHL-based QS in sinking particles encode enzymes for organic matter degradation by constructing libraries of genomic DNA from sinking particles and screening these libraries for AHL production. This should enable sections of genomic DNA that contain AHL-regulated genes to be singled out and analyzed further for genes encoding hydrolytic enzymes without relying on sequence database searches. Finally, they will apply a "functional gene expression" strategy to definitively constrain whether hydrolytic enzymes are indeed the products of these AHL-regulated genes. In previous work, the research team found that some marine bacteria also secrete enzymes to degrade AHLs; consequently, they will will examine whether this is occurring on sinking particles using both functional gene expression assays and incubation-based experiments.

This study of quorum sensing in sinking particles has the potential to reveal previously uncharacterized linkages between bacterial community composition and particle flux attenuation. The primary justification for the proposed study is that quorum sensing is one such connection. QS has been well-characterized in the biomedical literature, and, as such, is ripe for exploration in marine environments.

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Program Information

Ocean Carbon and Biogeochemistry (OCB)

Website: http://us-ocb.org/

Coverage: Global

The Ocean Carbon and Biogeochemistry (OCB) program focuses on the ocean's role as a component of the global Earth system, bringing together research in geochemistry, ocean physics, and ecology that inform on and advance our understanding of ocean biogeochemistry. The overall program goals are to promote, plan, and coordinate collaborative, multidisciplinary research opportunities within the U.S. research community and with international partners. Important OCB-related activities currently include: the Ocean Carbon and Climate Change (OCCC) and the North American Carbon Program (NACP); U.S. contributions to IMBER, SOLAS, CARBOOCEAN; and numerous U.S. single-investigator and medium-size research projects funded by U.S. federal agencies including NASA, NOAA, and NSF.

The scientific mission of OCB is to study the evolving role of the ocean in the global carbon cycle, in the face of environmental variability and change through studies of marine biogeochemical cycles and associated ecosystems.

The overarching OCB science themes include improved understanding and prediction of: 1) oceanic uptake and release of atmospheric CO2 and other greenhouse gases and 2) environmental sensitivities of biogeochemical cycles, marine ecosystems, and interactions between the two.

The OCB Research Priorities (updated January 2012) include: ocean acidification; terrestrial/coastal carbon

fluxes and exchanges; climate sensitivities of and change in ecosystem structure and associated impacts on biogeochemical cycles; mesopelagic ecological and biogeochemical interactions; benthic-pelagic feedbacks on biogeochemical cycles; ocean carbon uptake and storage; and expanding low-oxygen conditions in the coastal and open oceans.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0825407

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