CTD bottle data for all CTD casts during R/V Roger Revelle RR1804, RR1805 cruises in the Eastern Tropical North Pacific Ocean, from March to April 2018

Website: https://www.bco-dmo.org/dataset/779185
Data Type: Cruise Results
Version: 1
Version Date: 2019-10-15

Project
» Dimensions: Diversity, assembly and function of microbial communities on suspended and sinking particles in a marine Oxygen Deficient Zone (ETNP_ParticleOmics)

Program
» Dimensions of Biodiversity (Dimensions of Biodiversity)

Contributors	Affiliation	Role
Devol, Allan	University of Washington (UW)	Principal Investigator
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Abstract
CTD bottle data for all CTD casts during R/V Roger Revelle RR1804, RR1805 cruises in the Eastern Tropical North Pacific Ocean, 20N-14N, 105W-130W, from March to April 2018.

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Coverage

Spatial Extent: **N**:26.95932 **E**:-105.46536 **S**:14.00016 **W**:-128.0001
Temporal Extent: 2018-03-28 - 2018-04-29

Dataset Description

CTD bottle files for all CTD casts during R/V Roger Revelle cruise RR1804-1805 along with all nutrient data on casts from which it was collected.

Methods & Sampling

The Dataset contains the processed bottle files, i.e., depths and associated data collected electronically by the CTD, for all ctd casts during cruise RR1804-1805 along with all nutrient data on casts from which it was collected. The nutrients include nitrate, nitrite, silicate, phosphate, and ammonium. The concentrations for all nutrients are in micromoles per kg as is the CTD oxygen concentration. Nutrient samples were filtered (Millipore Sterivex sterile PES, 0.22uM) before analysis and analyzed using the US-JGOFS protocols (http://usjgofs.whoi.edu/protocols_rpt_19.html).

Data Processing Description

CTD data has been reprocessed and aligned and outliers have been removed.

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* modified parameter names to conform with BCO-DMO naming conventions. Brackets, slashes, hyphens, and spaces removed and replaced with underscores. Units in column names were removed and can be found in the parameter description section.
* blank values in this dataset are displayed as "nd" for "no data." nd is the default missing data identifier in the BCO-DMO system.
* converted date to ISO8601 format yyyy-mm-dd
* cruise column values populated across all data based on cruise date ranges. Originally submitted data had "RR1804/5" in first cell only.
* column 'type' with values of 'b' removed from the dataset. Leftover from ODV where 'b' was for bottle data
* adjusted typo in the last 47 lines of data with 2019 year to 2018 year.
* column 'event' with numeric values removed from the dataset. Full event log was not provided and PI instructed it be deleted.

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Data Files

File
bottle.csv (Comma Separated Values (.csv), 294.66 KB) MD5:8477b79903e3e38a93772e0a0072bdc3 Primary data file for dataset ID 779185

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Related Publications

Intergovernmental Oceanographic Commission. (1994). Protocols for the Joint Global Ocean Flux Study (JGOFS) Core Measurements. https://hdl.handle.net/11329/220
Methods

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Related Datasets

IsSupplementTo

Moffett, J. W. (2020) **Iron, manganese and nutrient data from four cruises in the eastern tropical North Pacific, 2012 to 2018.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2020-11-02 doi:10.26008/1912/bco-dmo.828183.1 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
Cruise	cruise designation; name	unitless
Station	station identifier	unitless
Date	date; reported in m/dd/yy	GMT
Cast	cast or profile number	unitless
CTD_btl	CTD bottle identifier	unitless
Longitude	longitude, in decimal degrees	decimal degrees
Latitude	latitude, in decimal degrees	decimal degrees
Depth	Observation/sample depth below the sea surface.	meter (m)
Sal0	Primary salinity from CTD	psu
Sal1	Secondary salinity from CTD	psu
T0	Primary temperature from CTD	degrees Celsius C
T1	Secondary temperature from CTD	degrees Celsius C
Sigma_0	sigma-theta	Kg/M3
Sigma_11	sigma-theta	gm/cm3
Sbeox_0	O2 sensor 0; dissolved oxygen concentration	micromoles/kg
Sbeox_1	O2 sensor 1; dissolved oxygen concentration	micromoles/kg
Sbeox_pcnt	Based on Sbeox_0; Saturation of oxygen in the water body, as a percentage.	%
Fluorescence	Total chlorophyll_a pigment. See dataset for units of measurement; often reported in: milligrams per cubic meter (mg/m3); micrograms/liter (ug/L); nanograms/liter (ng/L).	ug/l
Beam_Attn	attenuation (loss of light) of a narrow, well collimated beam of light; beam attenuation due to particles; the particulate beam attenuation coefficient (cp)	1/m
Beam_Trans	light transmission, as percent	%
Par	Photosynthetically Available [Active] Radiation; downwelling irradiance	micro einsteins
pH	on deck pH meter; the measure of the acidity or basicity of an aqueous solution	unitless; pH scale
PO4	Orthophosphate (phosphate, reactive phosphorus)	micromoles/l
SiOH_4	Silicate (Orthosilicic Acid)	micromoles/l
NO3	Nitrate	micromoles/l
NO2	Nitrite	micromoles/l
NH4	Ammonium	micromoles/l

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	CTD Sea-Bird 911
Dataset-specific Description	Factory Calibrations
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	Sea Point fluorometer
Generic Instrument Name	Fluorometer
Dataset-specific Description	Chlorophyll was measured by SeaPoint fluorometer.
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	Wetlabs C-star
Generic Instrument Name	WET Labs {Sea-Bird WETLabs} C-Star transmissometer
Dataset-specific Description	For beam attenuation and transmission.
Generic Instrument Description	The C-Star transmissometer has a novel monolithic housing with a highly intgrated opto-electronic design to provide a low cost, compact solution for underwater measurements of beam transmittance. The C-Star is capable of free space measurements or flow-through sampling when used with a pump and optical flow tubes. The sensor can be used in profiling, moored, or underway applications. Available with a 6000 m depth rating. More information on Sea-Bird website: https://www.seabird.com/c-star-transmissometer/product?id=60762467717

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Deployments

RR1804

Website	https://www.bco-dmo.org/deployment/776766
Platform	R/V Roger Revelle
Start Date	2018-03-27
End Date	2018-04-13
Description	More information is available from R2R: https://www.rvdata.us/search/cruise/RR1804

RR1805

Website	https://www.bco-dmo.org/deployment/779193
Platform	R/V Roger Revelle
Start Date	2018-04-14
End Date	2018-05-02
Description	More information is available at R2R: https://www.rvdata.us/search/cruise/RR1805

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Project Information

Dimensions: Diversity, assembly and function of microbial communities on suspended and sinking particles in a marine Oxygen Deficient Zone (ETNP_ParticleOmics)

Coverage: Eastern Tropical North Pacific

Extracted from the NSF award abstract:

Marine oxygen deficient zones (ODZs) are waters that are functionally devoid of oxygen. Without oxygen, some microbes are capable of converting nitrogen in the water into N2 gas, which then leaves the ocean and enters the atmosphere. This loss of an important nutrient from the ocean has impacts on phytoplankton growth and marine food webs. While oxygen deficient zones occupy a very small percentage of the ocean, they account for as much as half of the oceanic loss of N as N2. Moreover, the size of these regions is predicted to expand during this century due to climate change. The microbes that are capable of producing N2 gas are extremely diverse, and use several different biochemical pathways to carry out this process. They may occur both free-floating in the water and attached to small particles that are suspended or sinking from the surface waters and providing them a carbon source. However the importance of these two lifestyles (free-living vs particle attached) in terms of contributions to N loss from the oceans is not well understood. This project will identify the major organisms that result in N2 gas production on both suspended and sinking particles, the chemical reactions they carry out, and the rates at which this occurs. This information will be used to improve global climate models to better predict rates of N loss in a future ocean. Elementary and middle school teachers enrolled in a Masters in Science for Science Teachers program will be involved in the project and the graduate students and post-doctoral researchers supported by the project will have opportunities to participate in their classrooms. Underserved populations will also be integrated into the research at the undergraduate and middle school level through a series of summer internships.

ODZs have very complex elemental cycles, implying great microbial diversity. Intertwined with the microbial complexity of ODZ regions is the relatively unexplored interplay between free-living bacteria and those living on either suspended or sinking particles. Determining how these communities and niches interact and relate is one of the most challenging components of ODZ system studies today. Current climate models portray the dynamics of particles in the ODZs and throughout the deep ocean through prescribed functions based on sparse data from the oxic ocean with microbes represented only by the net chemical reactions of the community. However, in reality a phylogenetically and metabolically diverse group of microbes, likely acting in consortia, are responsible for the nitrogen transformations that ultimately result in the production of N2. To explore the processes maintaining the genetic diversity and functional redundancy in N loss processes, four research areas will be integrated: the community phylogenetic diversity (both taxonomic and genomic

diversity) the genetic diversity of the proteins that carry out key N transformation processes (as seen through quantitative proteomics), the resulting biogeochemical functions (15N labeled nitrogen transformation rate measurements) and predictions about how this diversity and corresponding function may change in response to climate change (biogeochemical modeling). The approach will be to assay both phylogenetic (16S rRNA tag sequencing) and functional genetic diversity (genomics) on sinking particles collected using large-volume sediment traps. Phylogenetic and genomic studies will be intimately tied to measurements of activity - who is doing key biogeochemical transformations (proteomics) and what are the in situ rates at which they are doing them (using novel incubation systems). Data will then be used to model how diversity and corresponding function change on a range of time and space scales, from the sinking of a single particle to seasonal cycles. To understand the relationship of community diversity and function on suspended and sinking particles, a series of three cruises will be conducted in the Eastern Tropical North Pacific ODZ.

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Program Information

Dimensions of Biodiversity (Dimensions of Biodiversity)

Website: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503446

Coverage: global

(adapted from the NSF Synopsis of Program)
Dimensions of Biodiversity is a program solicitation from the NSF Directorate for Biological Sciences. FY 2010 was year one of the program. [MORE from NSF]

The NSF Dimensions of Biodiversity program seeks to characterize biodiversity on Earth by using integrative, innovative approaches to fill rapidly the most substantial gaps in our understanding. The program will take a broad view of biodiversity, and in its initial phase will focus on the integration of genetic, taxonomic, and functional dimensions of biodiversity. Project investigators are encouraged to integrate these three dimensions to understand the interactions and feedbacks among them. While this focus complements several core NSF programs, it differs by requiring that multiple dimensions of biodiversity be addressed simultaneously, to understand the roles of biodiversity in critical ecological and evolutionary processes.

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Funding

Funding Source	Award
NSF Division of Environmental Biology (NSF DEB)	DEB-1542240

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