CTD data from R/V Seward Johnson and R/V Knorr cruises collected in the Tropical Eastern Pacific from 2007-2009 (ETP project)

Website: https://www.bco-dmo.org/dataset/651131
Data Type: Cruise Results
Version: final
Version Date: 2016-07-05

Project
» Collaborative Research: Zooplankton in the Redoxcline of the Cariaco Basin: Impact on Biogeochemical Cycling (ETP)

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
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Coverage

Spatial Extent: **N**:13.01877 **E**:-89.99778 **S**:8.99468 **W**:-105.01878
Temporal Extent: 2007-10-24

Dataset Description

CTD profiles containing temperature, salinity, oxygen, fluorescence, beam attenuation & transmission, PAR and SPAR.

Related Data:
Event Log data for CTD cruises.
Chlorophyll a data

Methods & Sampling

A CTD-rosette was deployed between the surface (2 m) and up to a maximum depth depending on the bottom depth of the station. The CTD was deployed to ~ 2 m depth, the power turned on, and allowed to sit a few minutes until the pumps turned on and sensors stabilized and equilibrated. The CTD was then lowered at a rate of 30 m/min for the first 100 m, and thereafter at 60 m/min. Water column profiles and water sample collection often were made using two different CTD casts. Other CTD casts were for primary productivity

measurements and to support McLane large volume filtration pump deployments.

Data Processing Description

Raw data were saved as hex files and converted to 1 m bin averaged data using the Sea-Bird Electronics Inc. Data Processing Software v.7.23.1.

BCO-DMO Processing Notes:
Lat and lon were corrected when there were errors in the data entry or they were changed to 'nd' when the GPS stream failed.

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Data Files

File
etp_ctd.csv (Comma Separated Values (.csv), 29.52 MB) MD5:bc60cff6669e7a0365fd14c8f0144072 Primary data file for dataset ID 651131

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Parameters

Parameter	Description	Units
cruise_id	Cruise identifier	unitless
station	Station number	unitless
castno	Cast number	unitless
lat_start	Latitude of station at time of cast	decimal degrees
lon_start	Longitude of station at time of cast. West is negative	decimal degrees
date_start	Date at start of cast. UTC	unitless
time_start	Time at start of cast. UTC	unitless
date	Date of sample. UTC	unitless
time	Time of sample. UTC	unitless

lon	Longitude of sample. West is negative	decimal degrees
lat	Latitude of sample	decimal degrees
depth	Depth of sample	meters
temp	Primary temperature (ITS-90). Originally named t090C	degrees Celcius
temp2	Secondary temperature (ITS-90). Originally named t190C	degrees Celcius
potemp	Primary potential temperature (ITS-90). Originally named potemp090C	degrees Celcius
potemp2	Secondary potential temperature (ITS-90). Originally named potemp190C	degrees Celcius
sal	Salinity. Originally named sal00	practical salinity unit (PSU)
cond	Primary conductivity. Originally named c0S/m	Siemens per meter
cond2	Secondary conductivity. Originally named c1S/m	Siemens per meter
sigma_e00	Primary sigma theta.	kilograms per meters cubed
sigma_e11	Secondary sigma theta.	kilograms per meters cubed
press	Pressure	decibars
O2_ml_L	Oxygen. Originally named sbeox0ML/L	milliliters per liter
O2_mg_L	Oxygen. Originally named sbeox0Mg/L	miligrams per liter
O2_sat_pcnt	Oxygen saturation. Originally named sbeox0PS	percent
O2_umol_kg	Oxygen. Originally named sbeox0Mm/Kg	micromoles per kilogram
sound_vel_Chen	Sound velocity. Calculated using Chen and Millero (1977) formula. Parameter originally named svCM.	meters per second

sound_vel_Delgrosso	Sound velocity. Calculated using Del Grosso (1974) formula. Parameter originally named svDM.	meters per second
sound_vel_Wilson	Sound velocity. Calculated using Chen and Millero (1977) formula. Parameter originally named svCM.	meters per second
beam_c	Beam Attenuation Chelsea/Seatech. Parameter orginally named bat.	per meter
trans	Beam Transmission. Parameter originally named xmiss.	percent
cpar	Corrected Irradiance	percent
fluor	Fluorescence (Seapoint). Parameter originally named flSP	miligrams per meter cubed
par	Photosynthetically Active Radiation (Biospherical/Licor)	microEinsteins per meter squared per second
spar	Surficial Photosynthetically Active Radiation	microEinsteins per meter squared per second
ISO_DateTime_UTC	UTC date and time at start of cast. Formatted using the ISO standard (YYYY-MM-DDTHH:MM:SS[.xx]Z)	unitless

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	CTD Sea-Bird 9
Generic Instrument Description	The Sea-Bird SBE 9 is a type of CTD instrument package. The SBE 9 is the Underwater Unit and is most often combined with the SBE 11 Deck Unit (for real-time readout using conductive wire) when deployed from a research 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, fluorometer, altimeter, etc.). Note that in most cases, it is more accurate to specify SBE 911 than SBE 9 since it is likely a SBE 11 deck unit was used. more information from Sea-Bird Electronics

Dataset-specific Instrument Name	C-Point chlorophyll fluorescence sensor
Generic Instrument Name	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	Biospherical underwater PAR QSP2300
Generic Instrument Name	Photosynthetically Available Radiation Sensor
Generic Instrument Description	A PAR sensor measures photosynthetically available (or active) radiation. The sensor measures photon flux density (photons per second per square meter) within the visible wavelength range (typically 400 to 700 nanometers). PAR gives an indication of the total energy available to plants for photosynthesis. This instrument name is used when specific type, make and model are not known.

Dataset-specific Instrument Name	Biospherical surface PAR QSR220
Generic Instrument Name	Photosynthetically Available Radiation Sensor
Generic Instrument Description	A PAR sensor measures photosynthetically available (or active) radiation. The sensor measures photon flux density (photons per second per square meter) within the visible wavelength range (typically 400 to 700 nanometers). PAR gives an indication of the total energy available to plants for photosynthesis. This instrument name is used when specific type, make and model are not known.

Dataset-specific Instrument Name	Seabird 9+ digital quartz pressure sensor
Generic Instrument Name	Pressure Sensor
Generic Instrument Description	A pressure sensor is a device used to measure absolute, differential, or gauge pressures. It is used only when detailed instrument documentation is not available.

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
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

Dataset-specific Instrument Name	
Generic Instrument Name	Sea-Bird SBE-3 Temperature Sensor
Generic Instrument Description	The SBE-3 is a slow response, frequency output temperature sensor manufactured by Sea-Bird Electronics, Inc. (Bellevue, Washington, USA). It has an initial accuracy of +/- 0.001 degrees Celsius with a stability of +/- 0.002 degrees Celsius per year and measures seawater temperature in the range of -5.0 to +35 degrees Celsius. more information from Sea-Bird Electronics

Dataset-specific Instrument Name	Seabird 4C conductivity sensor
Generic Instrument Name	Sea-Bird SBE-4 Conductivity Sensor
Generic Instrument Description	The Sea-Bird SBE-4 conductivity sensor is a modular, self-contained instrument that measures conductivity from 0 to 7 Siemens/meter. The sensors (Version 2; S/N 2000 and higher) have electrically isolated power circuits and optically coupled outputs to eliminate any possibility of noise and corrosion caused by ground loops. The sensing element is a cylindrical, flow-through, borosilicate glass cell with three internal platinum electrodes. Because the outer electrodes are connected together, electric fields are confined inside the cell, making the measured resistance (and instrument calibration) independent of calibration bath size or proximity to protective cages or other objects.

Dataset-specific Instrument Name	Wetlabs CST-721DR 25 cm pathlength transmissometer
Generic Instrument Name	WET Labs {Sea-Bird WETLabs} C-Star transmissometer
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

SJ07

Website	https://www.bco-dmo.org/deployment/651160
Platform	R/V Seward Johnson
Start Date	2007-10-18
End Date	2007-11-17
Description	Cruise from Panama City to Panama City Figure 1. Station locations in the eastern tropical north Pacific overlaid on a MODIS (Moderate-resolution Imaging Spectroradiometer) image of ocean color during October 2007. Image courtesy of Inia Soto (USF). SJ07 Cruise Summary (ROSCOP)

KN195-02

Website	https://www.bco-dmo.org/deployment/651161
Platform	R/V Knorr
Start Date	2008-12-08
End Date	2009-01-06
Description	Figure 1. Station locations in the eastern tropical north Pacific overlaid on a MODIS (Moderate-resolution Imaging Spectroradiometer) image of ocean color during December 2008. Image courtesy of Inia Soto (USF). KN195-02 Cruise Summary (ROSCOP) See additional information from R2R: https://www.rvdata.us/search/cruise/KN195-02

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Project Information

Collaborative Research: Zooplankton in the Redoxcline of the Cariaco Basin: Impact on Biogeochemical Cycling (ETP)

Coverage: Eastern tropical Pacific

This project aims to characterize the spatial and interannual variability of physical, chemical, and biological properties between low productivity and high productivity regions of the eastern tropical Pacific. In particular, we will investigate the physiology of bacteria, phytoplankton, and zooplankton and food web interactions in relation to the oxygen minimum zone. Our results also will provide information on how marine carbon and nitrogen cycles are modified in suboxic regions of the ocean. Measurements include: ADCP, temperature, salinity, O2, pH, total DIC, fCO2, nutrients, CDOM, POC/N, methane oxidation rates, denitrification rates, chlorophyll, phytoplankton C&N uptake rates, bacteria abundance/growth rates/molecular fingerprinting, lipid biomarkers, microzooplankton grazing rates, mesozooplankton abundance, distribution, and physiology, and particle flux rates.

NSF abstract:

The CARIACO (CArbon Retention In A Colored Ocean) Program is a time-series programs, with the central goal to better understand seasonal to decadal time-scales of processes governing ocean biogeochemistry. The CARIACO site is situated in the tropics on a productive continental margin off Venezuela, the basin is anoxic, and the site is strongly connected to paleoclimate investigations. Thus, CARIACO has the additional goal of relating modern oceanographic processes with the production, transformation, and preservation of particulate matter in the sediment record.

Zooplankton composition, behavior, and physiological rates are important components of the biological pump. Recent findings from the Cariaco Basin and other regions with pelagic redoxclines (suboxic and anoxic interfaces) suggest that they are active regions of biogeochemical cycling, in which C may be directly transferred from bacterial production to zooplankton grazers.

The goals of this project are to determine the vertical and horizontal distributions of zooplankton in relation to the redoxcline during two seasons using discrete-depth net samples and a vertical-profiling laser-line scan camera system. Anaerobic and aerobic respiration and metabolites, excretion, and egestion rates will be experimentally determined for vertical migrators and resident species nearsurface and at suboxic and anoxic depths to determine whether zooplankton differ in their release of metabolic and egested products, due to differences in their metabolism and/or composition of food resources. Grazing experiments, in combination with lipid biomarkers and stable isotopic compositions, will be used to assess in situ diet and long-term feeding history of zooplankton. Fecal pellet composition will be compared with pellets in sediment traps. Time-series zooplankton samples also will be analyzed to obtain temporal information on zooplankton community dynamics and allow a seasonal estimate of the zooplankton contribution to elemental fluxes.

Intellectual Merit. One of the grand challenges of oceanography is to understand the processes that control the transformation and fate of organic carbon in marine systems. Meeting this challenge is hindered by a lack of basic information about factors that govern the response of biological activity to environmental forcing and climate change. In particular, the role of the marine biosphere in the global carbon cycle remains poorly constrained, in part due to uncertainties about biological controls on the quality and quantity of carbon export. This project will contribute to our knowledge of the role of mesozooplankton in biogeochemical cycles, especially in relation to how processes may be modified in regions with anoxic or suboxic layers and strong redox gradients, and will help to correctly understand the links between water column processes and climate history as recorded in the varved sediments of the Cariaco Basin.

Broader Impacts. The zooplankton time-series will provide information on patterns of marine biodiversity and ecological interactions from a poorly known region. The CARIACO Program has an ongoing impact in technology transfer and human resource development in Venezuela. This project will help train personnel in Venezuela and will support several graduate students. The lead investigators and students will develop materials on the project for dissemination through the NSF-Center for Ocean Science Education Excellence (COSEE) located at USF.

Note [2019-12-17]: BCO-DMO Project page updated to reflect information at nfs.gov for this collaborative award.
* Project tile changed from "Eastern Tropical Pacific" to the NSF award title "Collaborative Research: Zooplankton in the Redoxcline of the Cariaco Basin: Impact on Biogeochemical Cycling."
* The other award number in this collaborative award added to the page OCE-0526502
* Person roles on the page updated to reflect the NSF award roles (PI or Co-PI) all others on the page changed to "Scientist" from "Co-PI" if not listed as a Co-PI on the NSF award.

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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-0526545

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