Niskin bottle data from R/V Endeavor cruise EN524 along the continental shelf of New England in 2013 (OA, Hypoxia and Warming project)

Website: https://www.bco-dmo.org/dataset/3956
Version: 03 June 2013
Version Date: 2013-06-18

Project
» Ocean Acidification, Hypoxia and Warming: Experimental Investigations into Compounded Effects of Global Change on Benthic Foraminifera (OA, Hypoxia and Warming)

Program
» Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)

Contributors	Affiliation	Role
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Dataset Description

Niskin bottle data from 4 CTD casts made during the May 2013 EN524 cruise aboard R/V Endeavor. CTD data were preliminarily processed by the ship's technician during the cruise for initital sensor check. No post-cruise processing or calibrations have been applied.

Methods & Sampling

Notes from the ship's technician:
No CTD "in water" tests were done during the cruise. Four CTD “on deck” tests were done during the cruise. Sampling casts were to ~72m, or shallower ~4m above bottom. The PAR and SPAR sensors were not installed at all during the cruise. Unless otherwise requested, only Primary Cond is advanced in deck unit. However, our Version 2 of SBE Model 11 plus deck unit can advance both. The Secondary Cond is advanced in processing. Max winch speed was 30 m/min. 12 place frame with 12 OTE external tension sample bottles were used.

CTD gets GPS from bridge switch. Whatever GPS they have selected is the unit that is used (most likely Northstar/Furuno WAAS or Furuno WAAS). 4800 baud.

The seas were calm for most of the cruise with rain and winds to ~25kts on 20 May 2013.

The CTD for all four casts had Pressure, dual Temperature and Conductivity sensors and Pumps, WET Labs C-Star 25cm Transmissometer, WET Labs ECO Fluorometer, Benthos Altimeter, SBE43 Oxygen 1, Oxygen 2 sensors and 12 OTE 10L Niskin bottles on the smaller (12pl) of GSO’s SBE frames. CTD was horizontally

mounted.

Data Processing Description

Notes from the ship's technician:
Data have been preliminarily processed by the ship's technician during the cruise for intitial sensor check. No post-cruise processing or calibrations have been applied. Pressure and blocked transmissometer values from a deck test were used to create con files with updated pressure and transmissometer sensor coefficients. All casts were processed with updated con files (con file used named "EN524_0444d_NoPS.xmlcon").

Configuration Reports (PDF files):
CTD con report
CTD psa report

BCO-DMO Processing Notes:
Modified parameter names to conform with BCO-DMO naming conventions;
Removed several columns from data display: scan; voltages; lat_sd, lat_min, lat_max, lon_sd, lon_min, lon_max (differences between max and min values were all 0.00001 or less);
Added starting date, time, lat, and lon from the CTD file headers;
Added ISO_DateTime_UTC using the original date and time fields.

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Data Files

File
bottle.csv (Comma Separated Values (.csv), 33.50 KB) MD5:bb8613c2f2da3e9e928fa1ec2946dcd7 Primary data file for dataset ID 3956

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Parameters

Parameter	Description	Units
sci_event	Event number designation provided by science party.	integer
month	2-digit month at start of CTD cast.	mm (01 to 12)
day	2-digit day of month at start of CTD cast.	dd (01 to31)
year	4-digit year at start of CTD cast.	YYYY
time_start	Time (UTC) at start of CTD cast.	HHMM.mm
lat_start	Latitude at start of cast. Positive values = North.	decimal degrees

lon_start	Longitude at start of cast. Negative values = West.	decimal degrees
ISO_DateTime_UTC_start	Start date/time (UTC) formatted to ISO 8601 standard. T indicates start of time string; Z indicates UTC.	YYYY-mm-ddTHH:MM:SS.ssZ
bottle	Niskin bottle position.	integer
time	Time (UTC).	HHMM.mm
press_avg	Average pressure. Column originally named 'PrDM'.	decibars
depth_avg	Average depth. Column originally named 'DepSM'.	meters
lat_avg	Latitude. Positive values = North.	decimal degrees
lon_avg	Longitude. Negative values = West.	decimal degrees
potemp	Potential temperature (ITS-90) from primary sensor; originally named 'Potemp090C'.	degrees Celsius
potemp2	Potential temperature (ITS-90) from secondary sensor; originally named 'Potemp190C'.	degrees Celsius
sound_vel	Sound velocity (Chen-Millero) from primary sensor; originally named 'SvCM'.	meters per second (m/s)
sound_vel2	Sound velocity (Chen-Millero) from secondary sensor; originally named 'SvCM1'.	meters per second (m/s)
sigma_0	Density (sigma-theta) from primary sensor; originally named 'Sigma-e00'.	kilograms per cubic meter (kg/m^3)
sigma_0_2	Density (sigma-theta) from secondary sensor; originally named 'Sigma-e11'.	kilograms per cubic meter (kg/m^3)
temp_avg	Average temperature (ITS-90) from primary sensor. Column originally named 'T090C'.	degrees Celsius
temp2_avg	Average temperature (ITS-90) from secondary sensor. Column originally named 'T190C'.	degrees Celsius

temp_diff_avg	Average temperature difference; secondary - primary (temp2 - temp); originally named 'T2-T190C'.	degrees Celsius
cond_avg	Average conductivity from primary sensor. Column originally named 'C0S/m'.	siemens per meter (S/m)
cond2_avg	Average conductivity from secondary sensor. Column originally named 'C1S/m'.	siemens per meter (S/m)
cond_diff_avg	Average conductivity difference; secondary - primary (cond2 - cond); originally named 'C2-C1S/m'.	siemens per meter (S/m)
sal	Salinity from primary sensor; originally named 'Sal00'.	PSU
sal2	Salinity from secondary sensor; originally named 'Sal11'.	PSU
O2_sat	Oxygen saturation; originally named 'OxsatML/L'.	milliliters per Liter (mL/L)
O2	Oxygen from from primary SBE 43 sensor; originally named 'Sbeox0ML/L'.	milliliters per liter (mL/L)
O2_2	Oxygen from secondary SBE 43 sensor; originally named 'Sbeox1ML/L'.	milliliters per liter (mL/L)
O2_v_avg	Average raw oxygen reading from the SBE 43. Column originally named 'Sbeox0V'.	volts
O2_v2_avg	Average raw oxygen (volts) from secondary SBE 43 sensor; originally named 'Sbeox1V'.	volts
beam_c_avg	Average beam attenuation from WET Labs C-Star (in inverse meters). Column originally named 'CStarAt0'.	reciprocal meters (1/m)
trans_avg	Average beam transmission from WET Labs C-Star. Column originally named 'CStarTr0'.	%
fluor_avg	Average fluorescence from WET Labs ECO-AFL/FL. Column originally named 'FlECO-AFL'.	milligrams per cubic meter (mg/m^3)
alt_avg	Average altitude of instrument above the bottom; originally named 'AltM'.	meters

time_elapsed_avg	Average time elapsed; originally named 'TimeS'.	seconds
press_min	Minimum pressure.	decibars
press_max	Maximum pressure.	decibars
press_sd	Standard deviation of press_avg.	decibars
depth_min	Minimum depth.	meters
depth_max	Maximum depth.	meters
depth_sd	Standard deviation of depth_avg.	meters
temp_min	Minimum temperature (ITS-90) from primary sensor.	degrees Celsius
temp_max	Maximum temperature (ITS-90) from primary sensor.	degrees Celsius
temp_sd	Standard deviation of temp_avg.	degrees Celsius
temp2_min	Minimum temperature (ITS-90) from secondary sensor.	degrees Celsius
temp2_max	Maximum temperature (ITS-90) from secondary sensor.	degrees Celsius
temp2_sd	Standard deviation of temp2_avg.	degrees Celsius
temp_diff_min	Minimum temperature difference; secondary - primary (temp2 - temp).	degrees Celsius
temp_diff_max	Maximum temperature difference; secondary - primary (temp2 - temp).	degrees Celsius
temp_diff_sd	Standard deviation of temp_diff_avg.	degrees Celsius
cond_min	Minimum conductivity from primary sensor.	siemens per meter (S/m)
cond_max	Maximum conductivity from primary sensor.	siemens per meter (S/m)
cond_sd	Standard deviation of cond_avg.	siemens per meter (S/m)

cond2_min	Minimum conductivity from secondary sensor.	siemens per meter (S/m)
cond2_max	Maximum conductivity from secondary sensor.	siemens per meter (S/m)
cond2_sd	Standard deviation of cond2_avg.	siemens per meter (S/m)
cond_diff_min	Minimum conductivity difference; secondary - primary (cond2 - cond).	siemens per meter (S/m)
cond_diff_max	Maximum conductivity difference; secondary - primary (cond2 - cond).	siemens per meter (S/m)
cond_diff_sd	Standard deviation of cond_diff_avg.	siemens per meter (S/m)
O2_v_min	Minimum raw oxygen reading from the SBE 43.	volts
O2_v_max	Maximum raw oxygen reading from the SBE 43.	volts
O2_v_sd	Standard deviation of O2_v_avg.	volts
O2_v2_min	Minimum raw oxygen (volts) from secondary SBE 43 sensor.	volts
O2_v2_max	Maximum raw oxygen (volts) from secondary SBE 43 sensor.	volts
O2_v2_sd	Standard deviation of O2_v2_avg.	volts
beam_c_min	Minimum beam attenuation from WET Labs C-Star (in inverse meters).	reciprocal meters (1/m)
beam_c_max	Maximum beam attenuation from WET Labs C-Star (in inverse meters).	reciprocal meters (1/m)
beam_c_sd	Standard deviation of beam_c_avg.	reciprocal meters (1/m)
trans_min	Minimum beam transmission from WET Labs C-Star.	%
trans_max	Maximum beam transmission from WET Labs C-Star.	%

trans_sd	Standard deviation of trans_avg.	%
fluor_min	Minimum fluorescence from WET Labs ECO-AFL/FL.	milligrams per cubic meter (mg/m^3)
fluor_max	Maximum fluorescence from WET Labs ECO-AFL/FL.	milligrams per cubic meter (mg/m^3)
fluor_sd	Standard deviation of fluor_avg.	milligrams per cubic meter (mg/m^3)
alt_min	Minimum altitude of instrument above the bottom.	meters
alt_max	Maximum altitude of instrument above the bottom.	meters
alt_sd	Standard deviation of alt_avg.	meters
time_elapsed_min	Minimum time elapsed.	seconds
time_elapsed_max	Maximum time elapsed.	seconds
time_elapsed_sd	Standard deviation of time_elapsed_avg.	seconds
ISO_DateTime_UTC	Date/time (UTC) formatted to ISO 8601 standard. T indicates start of time string; Z indicates UTC.	YYYY-mm-ddTHH:MM:SS.ssZ

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Instruments

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

EN524

Website	https://www.bco-dmo.org/deployment/59031
Platform	R/V Endeavor
Start Date	2013-05-19
End Date	2013-05-22
Description	UNOLS cruise request: http://strs.unols.org/Public/diu_project_view.aspx?project_id=103010 The May cruise is the first for the NSF OCE funded Ocean Acidification, Hypoxia and Warming project also known by the project researchers as "OA Propagule". The cruise was timed such that samples would be collected soon after the spring bloom. During the cruise, investigators plan to collect CTD profile data, including dissolved oxygen, bottom water with Niskin bottles deployed on the CTD rosette, MC800 multicores, and Soutar boxcores from the "Mud Patch" study site. The study area is located on the continental shelf approximately 50 nm south of Martha's Vineyard (40.43 N 70.5 W). The original cruise event log and other underway data submitted by the vessel operator will be available from the NSF R2R cruise catalog. Cruise track image from the University of Rhode Island, the vessel operator.

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Project Information

Ocean Acidification, Hypoxia and Warming: Experimental Investigations into Compounded Effects of Global Change on Benthic Foraminifera (OA, Hypoxia and Warming)

Coverage: continental shelf off New England

from the NSF award abstract:

The average sea surface temperature (SST) has increased over the last 100 years, rising atmospheric partial pressure of carbon dioxide (pCO2) is lowering the pH of the oceans, and the extent and intensity of low-oxygen bottom waters is growing, at least in certain regions. The biological impacts of these ongoing changes -- warming, acidification, and hypoxia -- have each been studied independently, but few studies have explored the possible interactions among these stressors.

This research, led by a scientist from the Woods Hole Oceanographic Institution, studies the compounded effects of ocean acidification, hypoxia, and warming on an assemblage of benthic foraminifera collected from the continental shelf off New England. Foraminifera are an ideal organism for this work because they (1) are relatively small, allowing experimentation on statistically significant populations; (2) have both calcareous and non-calcareous representatives; (3) are relatively short-lived so experiments include a major portion of their life cycle; (4) include aerobes and anaerobes; and (5) provide a fossil record allowing comparisons across time. Laboratory culturing experiments will be used to determine the response of benthic foraminifera, in terms of survival and growth, to co-varying parameters of pH and oxygen, and to explore the influence of increased temperature on these responses. The researchers will examine the relative effects of higher pCO2, lower [O2], and higher temperature (T) on both calcareous and non-calcareous benthic foraminifera. In addition, they will examine the pre-Industrial benthic foraminiferal assemblage at the field site, and will compare that assemblage to those produced in the experiments under pre-Industrial (lower than current day) and elevated pCO2 levels.

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Program Information

Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)

Website: https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503477

Coverage: global

NSF Climate Research Investment (CRI) activities that were initiated in 2010 are now included under Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES). SEES is a portfolio of activities that highlights NSF's unique role in helping society address the challenge(s) of achieving sustainability. Detailed information about the SEES program is available from NSF (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504707).

In recognition of the need for basic research concerning the nature, extent and impact of ocean acidification on oceanic environments in the past, present and future, the goal of the SEES: OA program is to understand (a) the chemistry and physical chemistry of ocean acidification; (b) how ocean acidification interacts with processes at the organismal level; and (c) how the earth system history informs our understanding of the effects of ocean acidification on the present day and future ocean.

Solicitations issued under this program:
NSF 10-530, FY 2010-FY2011
NSF 12-500, FY 2012
NSF 12-600, FY 2013
NSF 13-586, FY 2014
NSF 13-586 was the final solicitation that will be released for this program.

PI Meetings:
1st U.S. Ocean Acidification PI Meeting(March 22-24, 2011, Woods Hole, MA)
2nd U.S. Ocean Acidification PI Meeting(Sept. 18-20, 2013, Washington, DC)
3rd U.S. Ocean Acidification PI Meeting (June 9-11, 2015, Woods Hole, MA – Tentative)

NSF media releases for the Ocean Acidification Program:

Press Release 10-186 NSF Awards Grants to Study Effects of Ocean Acidification

Discovery Blue Mussels "Hang On" Along Rocky Shores: For How Long?

Discovery nsf.gov - National Science Foundation (NSF) Discoveries - Trouble in Paradise: Ocean Acidification This Way Comes - US National Science Foundation (NSF)

Press Release 12-179 nsf.gov - National Science Foundation (NSF) News - Ocean Acidification: Finding New Answers Through National Science Foundation Research Grants - US National Science Foundation (NSF)

Press Release 13-102 World Oceans Month Brings Mixed News for Oysters

Press Release 13-108 nsf.gov - National Science Foundation (NSF) News - Natural Underwater Springs Show How Coral Reefs Respond to Ocean Acidification - US National Science Foundation (NSF)

Press Release 13-148 Ocean acidification: Making new discoveries through National Science Foundation research grants

Press Release 13-148 - Video nsf.gov - News - Video - NSF Ocean Sciences Division Director David Conover answers questions about ocean acidification. - US National Science Foundation (NSF)

Press Release 14-010 nsf.gov - National Science Foundation (NSF) News - Palau's coral reefs surprisingly resistant to ocean acidification - US National Science Foundation (NSF)

Press Release 14-116 nsf.gov - National Science Foundation (NSF) News - Ocean Acidification: NSF awards $11.4 million in new grants to study effects on marine ecosystems - US National Science Foundation (NSF)

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1219948

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