Underway data from R/V New Horizon NH1208 in the transect between 35 and 50N along CLIVAR line P17N from 2012-2012 (OAPS project)

Website: https://www.bco-dmo.org/dataset/3748
Version:
Version Date: 2012-10-18

Project
» Horizontal and Vertical Distribution of Thecosome Pteropods in Relation to Carbonate Chemistry in the Northwest Atlantic and Northeast Pacific (OAPS)

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

Contributors	Affiliation	Role
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Dataset Description

This alongtrack data set consists of individual .MET filed produced for each day of the NH1208 cruise, from 9 Aug. to 18 Sept. 2012. Data were obtained primarily by applying calibrations to raw data. However, several fields are derived measurements from more than a single raw input.

Methods & Sampling

The New Horizon alongtrack data acquisition systems continuously log data from a suite of instruments throughout the cruise.

For information about events and known problems with acquisition, see the Cruise Data Report. (add link)

Data Processing Description

Cruises often used "-99.0" or "-99.0000" to indicate missing or bad data. Those numbers were changed to 'nd'. Not all bad data were flagged in this way however.

BCO-DMO Processing Notes and Edits: BCO-DMO obtained the data in ascii format and made the following edits: The '#' was removed from the header line. Values originally used to indicate null, unusued, or unknown values (i.e. "-99.0" or "-99.0000") were replaced with "nd". Several columns were omitted from

display (BT, LF, HF, SH, SM, SR, ZO, ZS, ZT, XX, AX, IP, IV, IA) . "year", "month", "day" and "yrday" (all in GMT) were calculated and added to the display.

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Data Files

File
alongtrack_NH1208.csv (Comma Separated Values (.csv), 57.11 MB) MD5:afe2265f246b6b1069869cf41db5f34c Primary data file for dataset ID 3748

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Parameters

Parameter	Description	Units
wind_speed_r	relative wind speed on port side of bridge top	m/s
wind_dir_r	relative wind direction on port side of bridge top	degrees
wind_speed_c	true wind speed on port side of bridge top	m/s
wind_dir_c	true wind direction on port side of bridge top	degrees
wind_speed_r2	relative wind speed on starboard side of bridge top	m/s
wind_dir_2	wind direction on starboard side of bridge top	degrees
wind_speed_c2	true wind speed on starboard side of bridge top	m/s
wind_true_2	true wind direction on starboard side of bridge top	degrees
temp_air	air temperature	degrees C
press_bar	barometric pressure	millibars
press_bar_2	barometric pressure 2	millibars
humidity	relative humidity	percent
temp_air_2	air temperature (RH module)	degrees C

dew_pt	dew point	degrees C
precip	precipitation	millimeters
lwr_temp_1	long wave radiation dome temperature	degrees kelvin
lwr_temp_2	long wave radiation body temperature	degrees kelvin
lwr_therm	long wave radiation thermopile	uv
radiation_l	long wave radiation	W/m^2
radiation_s	short wave radiation	W/m^2
par	surface Photosynthetically Available Radiation	uE/sec/meter^2
temp_ss	sea surface temperature	degrees C
temp_ss_2	Thermosalinograph temperature	degrees C
cond_ss	Thermosalinograph conductivity	mS/cm
sal_ss	Thermosalinograph salinity	psu
sigma_t	Thermosalinograph density	kg/m^3
fluor_2	fluorescence (Wetlabs EnviroT)	ug/l
flow_rate	flow meter	liters/minute (?)
lat	latitude	decimal degrees
lon	longitude	decimal degrees
seconds_gps	GPS Time of Day	GMT Secs 0-86400
cog	ship's course (GPS COG)	degrees

sog	ship's speed (GPS SOG)	knots
seconds_since_1970	GPS DateTime in seconds since 00:00:00 01/01/1970	seconds
alt	GPS altitude above/below mean sealevel	meters
gps_status	GPS status/number of satellites.	1st digit - Status (see below)**; Last two digits - Number satellites
head	ship's heading (gyrocompass)	degrees
date	Day, month, year (GMT time)with format yyyymmdd	
day	day of month, 1 to 31. Values derived from the "date" field.	
month	month of year	1 to 12
year	year of sampling	yyyy
yrday_gmt	Jan. 1 = yrday 1. GMT day and decimal time, as 325.5 for the 325th day of the year, or November 22 at 1200 hours (noon). Values derived from the "date" field.	
time	time GMT, 24 hour clock	HHMMSS

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Instruments

Dataset-specific Instrument Name	Air Temperature Sensor
Generic Instrument Name	Air Temperature Sensor
Dataset-specific Description	RM Young Model: 41342V Location: Top Bridge 36'above MWL
Generic Instrument Description	Measures air temperature

Dataset-specific Instrument Name	Anemometer
Generic Instrument Name	Anemometer
Dataset-specific Description	Module 1: RM Young model 85000 Location: Top Bridge(PORT) 36'above MWL Module 2: RM Young model 85000 Location: Top Bridge(STBD) 36'above MWL
Generic Instrument Description	An anemometer is a device for measuring the velocity or the pressure of the wind. It is commonly used to measure wind speed. Aboard research vessels, it is often mounted with other meteorological instruments and sensors.

Dataset-specific Instrument Name	Barometer
Generic Instrument Name	Barometer
Dataset-specific Description	MFG: Vaisala, Model: PTB101C Location: Top Bridge 36'above MWL
Generic Instrument Description	A barometer is an instrument used to measure atmospheric pressure. There are many types of barometers identified by make and model and method of measurement.

Dataset-specific Instrument Name	Eppley Longwave Radiometer
Generic Instrument Name	Eppley Longwave Radiometer
Dataset-specific Description	Model: PIR Serial: 27926F3 MFG: Eppley Labs Location: Top Bridge 36'above MWL CAL LAB: Eppley CAL DATE: 17-Dec-2008
Generic Instrument Description	The Eppley Precision Infrared Radiometer (PIR) pyrgeometer measures longwave (infrared) radiation. It is housed in a weatherproof titanium canister that has been painted with a very flat black paint that absorbs radiation. A small glass dome at the top of the instrument is covered with an 'interference coating' which allows only infrared radiation to come through. Light levels are detected as temperature changes creating voltages in fine wire coil detectors. more from Eppley Labs

Dataset-specific Instrument Name	Fluorometer
Generic Instrument Name	Fluorometer
Dataset-specific Description	Model: Enviro-T 2800-000-C Serial: 20049847 MFG: Turner Designs Location: AFT LAB-UCW line Owner: SIO/STS CAL LAB: Wetlabs CAL DATE: 09-Sep-2011
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	Global Positioning System Receiver
Generic Instrument Name	Global Positioning System Receiver
Dataset-specific Description	Model: GP90D Serial: ?? MFG: Furuno Location: Chart Room Owner: New Horizon
Generic Instrument Description	The Global Positioning System (GPS) is a U.S. space-based radionavigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis. The U.S. Air Force develops, maintains, and operates the space and control segments of the NAVSTAR GPS transmitter system. Ships use a variety of receivers (e.g. Trimble and Ashtech) to interpret the GPS signal and determine accurate latitude and longitude.

Dataset-specific Instrument Name	Gyro
Generic Instrument Name	Gyro
Dataset-specific Description	Model: MK37 Serial: ?? MFG: Sperry Location: Bridge Owner: Ship CAL LAB: n/a CAL DATE: n/a
Generic Instrument Description	Compass with a motorized gyroscope that tracks true north (heading).

Dataset-specific Instrument Name	Hygrometer
Generic Instrument Name	Hygrometer
Dataset-specific Description	Model: 41382V Serial: 11255 MFG: Vaisala Location: Top Bridge New Horizon 36'above MWL
Generic Instrument Description	Hygrometers are used for measuring relative humidity. This term is used when details of the make, model number and measurement principle are not known.

Dataset-specific Instrument Name	Knudsen 320 BR deepwater echosounder
Generic Instrument Name	Knudsen 320 BR deepwater echosounder
Dataset-specific Description	Model: 3260 Serial: K2K-07-0919 MFG: Knudsen Location: Main Lab Owner: SIO/STS
Generic Instrument Description	The Knudsen 320 B/R deepwater echosounder is a digital data logging system used to measure water depth (e.g. depth of the seafloor). The system is configured to work with different frequency transducers. For example, the Edo 323 B is a 12 kHz High Frequency (HF) transducer or it can be configured to work with an array of 3.5 kHz Low Frequency (LF) transducers mounted in the hull of a vessel.

Dataset-specific Instrument Name	LI-COR Biospherical PAR Sensor
Generic Instrument Name	LI-COR Biospherical PAR Sensor
Dataset-specific Description	MFG: Biospherial Instruments Model: QSR-240P Location: Top Bridge 36'above MWL CAL DATE: 18-Mar-2009
Generic Instrument Description	The LI-COR Biospherical PAR Sensor is used to measure Photosynthetically Available Radiation (PAR) in the water column. This instrument designation is used when specific make and model are not known.

Dataset-specific Instrument Name	Meteorological Station
Generic Instrument Name	Meteorological Station
Dataset-specific Description	Sensor: Precipitation. Model: 50202 Serial: 1301 MFG: RM Young; Location: Top Bridge 36'above MWL
Generic Instrument Description	MET station systems are designed to record meteorological information on board ships or mounted on moorings. These are commonly referred to as EMET (Electronic Meteorological Packages) or IMET (Improved Meteorological Packages) systems. These sensor packages record measurements of sea surface temperature and salinity, air temperature, wind speed and direction, barometric pressure, solar and long-wave radiation, humidity and precipitation.

Dataset-specific Instrument Name	Precipitation Gauge
Generic Instrument Name	Precipitation Gauge
Dataset-specific Description	Model: 50202 Serial: 1301 MFG: RM Young Location: Top Bridge 36'above MWL Owner: SIO/STS CAL LAB: SEG CAL DATE: 05-Jan-09 Install Date: 06-Jan-2009
Generic Instrument Description	measures rain or snow precipitation

Dataset-specific Instrument Name	Precision Spectral Pyranometer
Generic Instrument Name	Precision Spectral Pyranometer
Dataset-specific Description	Model: PSP Location: Top Bridge 36'above MWL
Generic Instrument Description	This radiometer measures sun and sky irradiance in the range of wavelengths 0.285 to 2.8 microns, including most of the solar spectrum. The PSP is intended to weight the energy flux in all wavelengths equally. It is a "hemispheric receiver" intended to approximate the cosine response for oblique rays. The Eppley Precision Spectral Pyranometer (PSP) is primarily used where high accuracy is required or where it is used to calibrate other pyranometers. The PSP outputs a low level voltage ranging from 0 to a maximum of about 12mV depending on sensor calibration and radiation level. An instruction manual provided by Eppley contains the sensor calibration constant and serial number. The Precision Spectral Pyranometer is a World Meteorological Organization First Class Radiometer and comes with a calibration certificate traceable to the World Radiation Reference and a temperature compensation curve. More information is available from Eppley Labs.

Dataset-specific Instrument Name	Thermosalinograph
Generic Instrument Name	Thermosalinograph
Dataset-specific Description	Model: SBE45 Serial: 0325 MFG: Seabird Location: Ocean Lab Owner: SIO/STS CAL LAB: Seabird CAL DATE: 19-Apr-2012
Generic Instrument Description	A thermosalinograph (TSG) is used to obtain a continuous record of sea surface temperature and salinity. On many research vessels the TSG is integrated into the ship's underway seawater sampling system and reported with the underway or alongtrack data.

Dataset-specific Instrument Name	Water Temperature Sensor
Generic Instrument Name	Water Temperature Sensor
Dataset-specific Description	Model: SEG14 Serial: 5125 MFG: SEG Location: Hull-2nd deck Machine rm Owner: SIO/STS CAL LAB: ODF CAL DATE: 17-Dec-2008
Generic Instrument Description	General term for an instrument that measures the temperature of the water with which it is in contact (thermometer).

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Deployments

NH1208

Website	https://www.bco-dmo.org/deployment/58830
Platform	R/V New Horizon
Report	http://hdl.handle.net/1834/43090
Start Date	2012-08-09
End Date	2012-09-18
Description	The primary objective of this cruise was to quantify the distribution, abundance, species composition, shell condition, and vertical migratory behavior of oceanic thecosome pteropods in the northeast Pacific, and correlate these quantities to concurrent measurements of carbonate chemistry. Underway data collection and station activities were conducted on a transect running between 35 and 50N along CLIVAR line P17N. Six instrument types were used: (1) a 1-m2 MOCNESS plankton net system and a 1-m diameter Reeve net; (2) a profiling Video Plankton Recorder mounted on the CTD package that includes a Rosette system with Niskin bottles for water sampling; (3) a deep (500 meter) towed broadband acoustic scattering system; (4) a surface narrowband multi-frequency acoustic scattering system; (5) an underway multi-parameter inorganic carbon analyzer and a GO underway pCO2 system; and (6) a suite of chemistry-related lab instruments for bottle sample analysis including a DIC auto-analyzer, an alkalinity auto-titrator, and an Agilent spectrophotometer for pH measurement. The R/V New Horizon departed from Newport OR, and set a course for the transect start point at 50N 150W. Following instrument package test deployments over the continental shelf, the transect ran in a single zig-zag between the start point and the end at 35N 135W; a total of 34 stations were sampled along the transect, every 1/2 degree of latitude. In addition 10 other stations were sampled with a Reeve net for live experimental pteropods. The science party, divided into biology and chemistry teams conducted 24-hour operations. Cruise information and original data are available from the NSF R2R data catalog.

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Project Information

Horizontal and Vertical Distribution of Thecosome Pteropods in Relation to Carbonate Chemistry in the Northwest Atlantic and Northeast Pacific (OAPS)

Coverage: 35 and 50 degrees North in the northwest Atlantic and northeast Pacific

Modified version of the NSF award abstract:
The impact of ocean acidification on marine ecosystems represents a vital question facing both marine scientists and managers of ocean resources. Thecosome pteropods are a group of calcareous planktonic molluscs widely distributed in coastal and open ocean pelagic ecosystems of the worldi¦s oceans. These animals secrete an aragonite shell, and thus are highly sensitive to ocean acidification due to the water column's changing carbonate chemistry, and particularly the shoaling of the aragonite compensation depth at which seawater becomes corrosive to aragonite. In many regions, however, relatively little is known about the abundance, distribution, vertical migratory behavior, and ecological importance of pteropods. Assessing the likely ecosystem consequences of changes in pteropod dynamics resulting from ocean acidification will require a detailed understanding of pteropod distribution and abundance relative to changing aragonite saturation in the water column.

The primary objective of this project is to quantify the distribution, abundance, species composition, shell condition, and vertical migratory behavior of oceanic thecosome pteropods in the northwest Atlantic and northeast Pacific, and correlate these quantities to hydrography and concurrent measurements of carbonate chemistry, including vertical and horizontal distributions of aragonite saturation. In particular, the project will capitalize on present-day variability in the depth distribution of aragonite saturation levels within and between the Atlantic and Pacific Oceans as a "natural experiment" to address the hypotheses that pteropod vertical distribution, species composition, and abundance vary as the compensation depth becomes shallower. Secondary objectives are to develop acoustic protocols for the remote quantification of pteropod abundance for future integration into ocean acidification monitoring networks, and to characterize carbonate chemistry

and nutrients along portions of two WOCE/CLIVAR Repeat Hydrography transects (A20 in the Atlantic and P17N in the Pacific) to identify decadal-scale changes in the carbonate system. These hypotheses and objectives will be addressed through two cruises along survey transects between 35 and 50 degrees North in the northwest Atlantic and northeast Pacific involving a combination of station-work and underway measurements, and a comprehensive array of instruments, including acoustic, optical, towed net, hydrographic, and carbonate chemistry sensors and sampling systems.

This highly inter-disciplinary project, combines expertise in zooplankton ecology, acoustics, and marine chemistry. The proposed work will result in a detailed baseline understanding of variability in the horizontal and vertical distribution, as well as species composition, of thecosome pteropods in the northwest Atlantic and northeast Pacific, making a key contribution to zooplankton ecology generally. In addition, by quantifying the response to current spatial variability within and between the Atlantic and Pacific Oceans, the project will provide important information on the likely response of pteropod distribution to future changes in the vertical distribution of aragonite saturation levels, a necessary component in modeling the impacts of ocean acidification on marine ecosystem function, services, and resources.

Ocean acidification is increasingly appreciated as an urgent societal concern. Thecosome pteropods are key prey for a variety of commercially-exploited fish species, and the improved understanding the PIs seek of pteropod distribution and likely response to changing water column carbonate chemistry will have important implications for our understanding of potential effects of ocean acidification on marine resources.

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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)

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-1041068

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