Processed CTD data from six cruises of the DeZoZoo project from R/V Hugh R. Sharp in the Chesapeake Bay from 2010-2011 (DeZoZoo project)

Website: https://www.bco-dmo.org/dataset/561249
Data Type: Cruise Results
Version: working
Version Date: 2015-06-29

Project
» Hypoxia in Marine Ecosystems: Implications for Neritic Copepods (DeZoZoo)

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Coverage

Spatial Extent: **N**:39.5371 **E**:-74.9864 **S**:37.4565 **W**:-76.6289
Temporal Extent: 2010-05-24 - 2011-12-21

Dataset Description

These are the processed CTD data from the DeZoZoo project taken from the mesohaline portion of Chesapeake Bay from 37.5 - 38.5 degrees N and from 76 - 76.5 degrees West.

Methods & Sampling

Data were collected using the shipboard SeaBird 9plus CTD fitted with a variety of sensors. Sensors are listed

in the table below:

CTD was lowered to within 2 m of the bottom slowly, with bottom depth determined by CTD mounted altimeter. If samples were collected on a given CTD cast, they were collected as the CTD was raised back to the surface using the attached Rosette fitted with 10L Niskin Bottles.

Sensor	Serial Number
SBE 9plus pressure	0445
SBE Temperature 1	2574
SBE Temperature 2	2631
SBE Conductivity 1	2208
SBE Conductivity 2	2209
WetLabs FLNTU	091
SBE 43 Oxygen	0539
C-Star Transmissometer	n/a

Data Processing Description

Data were processed according to suggested post-processing routines outlined in the SeaBird Data Processing manual. Headers for the data processing routines are included in the .cnv files of post-processed data. All data were batch processed by cruise using the same routines and averaged in 0.5m bins.

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Data Files

File
CTD_DZZ_rs.csv (Comma Separated Values (.csv), 2.95 MB) MD5:7c7520d6cc8d1d4d07ab9d0124db6d26 Primary data file for dataset ID 561249

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Parameters

Parameter	Description	Units
cruise	Cruise Number - first two digits signify year (10 = 2010; 11 = 2011); second two digits signify the sequential number of the cruise in each year	Number
station	Station Number; in order occupied (1 = South Station; 2 = North Station; 0 = Scanfish Survey)	Number
campaign	Campaign Number; in order conducted (1 = Anchor; 2 = Trawl; 0 = Scanfish Survey)	Number
campaign_name	Campaign Name; which identifies both the station and the campaign	Name
CTD_cast	Consecutive CTD number from each cruise	Number

lat	North Latitude	Decimal Degrees
lon	West Longitude	Decimal Degrees
year	Year data was collected	Year
month_gmt	Month data was collected	Month
day_gmt	Day data was collected	Day
hour_gmt	Hour data was collected	Hour
minute_gmt	Minute data was collected	Minute
second_gmt	Second data was collected	Second
press	Pressure in decibars	db
temp	Temperature in degrees C from sensor 1	C
temp2	Temperature in degrees C from sensor 2	C
cond	Conductivity	S/m
cond2	Conductivity	S/m
O2_volts	Dissolved oxygen voltage	mV
fluor	Chlorophyll a fluorescence	mg/m3
beam_atten	Beam attenuation	1/m
beam_trans	Beam transmission	%
alt	Depth of the altimiter	m

O2_mg_L	Dissolved oxygen concentration in mg/L	mg/L
O2_sat	Dissolved oxygen saturation in %	% saturation
sigma_t	Density in kg/m3	Kg/m3
depth	Depth in saltwater	m
temp_diff	Temperature difference calculated between different temperature sensors	C
sal	Salinity from sensor 1	PSU
sal2	Salinity from sensor 2	PSU
bin	Number of scans averaged for this bin of data	Number
flag	Flagged data	n/a
density_diff	Density difference between the primary and secondary sensors.	Kg/m3
ISO_DateTime_UTC	ISO 8601:2004(E) standard for time. Added to the dataset by the DMO.	YYYY-MM-DDTHH:MM:SS.xx

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Instruments

Dataset-specific Instrument Name	CTD
Generic Instrument Name	CTD Sea-Bird 911
Dataset-specific Description	Standard CTD911+ with fluorometer and oxygen sensors working.
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	Fluorometer
Generic Instrument Name	Fluorometer
Dataset-specific Description	WET Labs ECO-AFL/FL
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	Oxygen sensor
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Dataset-specific Description	SBE 43 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 the manufacturer: https://www.seabird.com/products/sbe-43-dissolved-oxygen-sensor

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Deployments

HRS100524JP

Website	https://www.bco-dmo.org/deployment/518664
Platform	R/V Hugh R. Sharp
Report	http://dmoserv3.bco-dmo.org/data_docs/DeZoZoo/DeZoZoo_1001_CruiseReport_FINAL.pdf
Start Date	2010-05-24
End Date	2010-06-01
Description	Cruise in Main Channel of Chesapeake Bay

HRS100819JP

Website	https://www.bco-dmo.org/deployment/518707
Platform	R/V Hugh R. Sharp
Start Date	2010-08-19
End Date	2010-08-26
Description	Cruise in main channel of Chesapeake Bay to collect zooplankton samples.

HRS100920JP

Website	https://www.bco-dmo.org/deployment/518709
Platform	R/V Hugh R. Sharp
Start Date	2010-09-21
End Date	2010-09-27
Description	One of a series of cruises in the main channel of the Chesapeake Bay to collect gelatinous zooplankton.

HRS110525JP

Website	https://www.bco-dmo.org/deployment/518711
Platform	R/V Hugh R. Sharp
Start Date	2011-05-24
End Date	2011-06-01
Description	One of six week-long cruises in the main channel of Chesapeake Bay to collect gelatinous zooplankton.

HRS110719JP

Website	https://www.bco-dmo.org/deployment/518842
Platform	R/V Hugh R. Sharp
Start Date	2011-07-19
End Date	2011-07-26
Description	One of six week-long cruises in the main channel of the Chesapeake Bay to collect gelatinous zooplankton

HRS110922JP

Website	https://www.bco-dmo.org/deployment/518904
Platform	R/V Hugh R. Sharp
Start Date	2011-09-21
End Date	2011-09-26
Description	One of 6 week-long cruises in the main channel of the Chesapeake Bay, collecting gelatinous zooplankton.

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Project Information

Hypoxia in Marine Ecosystems: Implications for Neritic Copepods (DeZoZoo)

Website: http://www.planktoneer.com/research.html#HYPOX

Coverage: Chesapeake Bay

Description from NSF award abstract:
The occurrence of low-oxygen waters, often called "dead zones" in coastal ecosystems throughout the world is increasing. Despite these increases, the pelagic food-web consequences of low-oxygen waters remain poorly understood. Laboratory research has demonstrated that hypoxic water (< 2 mg l-1) can result in mortality, reduced fitness and lower egg production of planktonic copepods, a major link in food webs supporting pelagic fish. Observations in the sea indicate that hypoxic bottom waters usually have depressed abundances of copepods compared to normoxic waters (> 2 mg l-1). The gradient of declining oxygen concentration with respect to depth (oxycline) can be a critical interface in coastal pelagic ecosystems by altering the migratory behavior and depth distribution of copepods and their spatial coherence with potential predators and prey. This project will result in a mechanistic understanding of how behavior and fitness of copepods are affected by hypoxia. The PIs will compare bottom-up and top-down controls on the ecology of copepods in Chesapeake Bay waters experiencing seasonal hypoxia and those that are normoxic.

Specific objectives of this project are to:
1) analyze changes in migratory behavior and fine-scale (meter) distribution of copepods across the oxycline over hourly and diel time scales while simultaneously examining the distribution and abundance of their food (phytoplankton and microzooplankton) and predators (fish, gelatinous zooplankton);
2) estimate effects of hypoxia on the "fitness" of copepods using a suite of measurements (length/weight ratios, feeding, egg production, and egg hatching success) to develop condition indices of copepods captured at different times and depths in hypoxic and normoxic waters; and
3) evaluate effects of hypoxia on copepod mortality by hypoxia-induced, stage-specific copepod mortality in hypoxic bottom waters and by changes in top-down control of copepods from predation by fish and gelatinous zooplankton.

Oxyclines may be a barrier to vertical migration of copepods and thus disruptive to predator avoidance behavior. Faced with increased predation risk from fish and jellyfish, copepods may seek refuge in hypoxic waters for part of the day and/or make short-term vertical excursions between hypoxic and normoxic waters. By regulating vertical migrations, copepods may increase utilization of microzooplankton prey concentrated in the oxycline. Hypoxic waters may elevate consumption of copepods by jellyfish and depress consumption by pelagic fish. This project will evaluate copepod distribution and migration behavior, individual fitness and stage-specific mortality in hypoxic and normoxic waters. It will examine food-web consequences of increased or decreased spatial coherence of copepods and their predators and prey in regions with hypoxic bottom waters and will contribute to fundamental understanding of food-web processes in eutrophic coastal ecosystems.

Project acronym "DeZoZoo" = "Dead Zone Zooplankton"

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0961942

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