Species composition via niskin and associated CTD information collected on R/V Hugh R. Sharp (HRS1316, HRS1317) in the Chesapeake Bay from August to September in 2013

Website: https://www.bco-dmo.org/dataset/707526
Data Type: Cruise Results
Version: 1
Version Date: 2017-06-28

Project
» Copepod Population Dynamics in Hypoxic Coastal Waters: Physical and Behavioral Regulation of Resupply and Advective Losses (CopesPopDynHypoZone)

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Abstract
Species composition via niskin and associated CTD information collected on R/V Hugh R. Sharp (HRS1316, HRS1317) in the Chesapeake Bay from August to September in 2013

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Coverage

Spatial Extent: **N**:38.5761 **E**:-76.2741 **S**:38.3589 **W**:-76.5103
Temporal Extent: 2013-08-25 - 2013-09-17

Dataset Description

Species composition via MOCNESS and associated CTD information

Methods & Sampling

This abundance data was obtained from two week-long cruises (1301 in August and 1302 in September) during which niskin samples were taken from the mid-bay of the Chesapeake from 9 stations in a box formation; 3 stations in a northern transect across the bay (N1-N3), 3 in a midline transect (M1-M3), and 3 in a southern transect (S1-S3).

The niskin bottles used were General Oceanics 1010x External Spring Water Sampler with a 10L capacity (part number: 101010X). 12 of these were deployed rosette style on the SBE 32 Carousel Water Sampler from the starboard winch of the RV Sharp, along with the SBE 9plus unit which was attached to the rosette. On each downcast, instrument readings were sent from the SBE 9plus unit on the rosette to the SBE 11plus V2 Deck Unit. Based on these data, sampling depths were selected which fell into three areas of interest: above, within, and below the pycnocline. If a pycnocline was not evident, only two samples were taken. On the upcast, niskins were triggered to close electronically from the dry lab.

For zooplankton abundance assessment, one niskin bottle was triggered at each depth. Once on board, niskin bottles were drained through sieves with 64µm mesh. Sieves with 64um mesh were selected to catch all life stages of the copepod Acartia tonsa since Acartia tonsa eggs are about 75um in diameter and all subsequent life stages are larger. The captured zooplankton were transferred to glass jars and preserved with buffered formalin (about a 4% formalin solution), labeled with the cast number, date, local time, and sampling depth, and then stored in labeled boxes for later analysis.

After returning from the cruises, samples were stored indoors in climate-controlled laboratory space. To process the samples, the contents of the jars were filtered onto 25um mesh (to avoid any loss of organisms), resuspended, and a subsample was transferred to a counting wheel where it was checked for density and diluted if necessary, the goal being at least 200 individuals of Acartia tonsa present but less than 300.

The sample was then examined for species composition under dissecting microscope with darkfield illumination. Length and width measurements were taken for the first 50 individuals in the sample, and all were identified to lowest taxonomic level. After processing, samples were returned to their original jars for storage.

Abundance and size data were entered into Excel spreadsheets and checked for transcription errors, then imported into MatLab for data analysis.

Data Processing Description

Niskin electronic data was post processed using a series of MATLAB scripts to read the raw and processed data, and SBE Data Processing software was used to calculate summary statistics for each bottle.

Zooplankton samples were sorted under a stereo dissecting microscope within two years of collection. Sub samples were taken with a pipet such that a minimum of 200 individuals were counted from each sample. Zooplankton were identified to lowest possible taxonomic level, to species where possible for copepods, and copepod adults were sexed.

BCO-DMO Data Processing Notes:

- replaced blank cells with nd
- reformatted column names to comply with BCO-DMO standards
- reformated dates to YYYY/MM/DD

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Data Files

File
niskin.csv (Comma Separated Values (.csv), 1.68 MB) MD5:d51448d186a37b1356dffdece13cb344 Primary data file for dataset ID 707526

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Parameters

Parameter	Description	Units

cruise	Designation cruise 1301 or 1302, a week-long plankton survey in August and September, respectively	unitless
date	Gergorian claendar date as recorded in the cruise log; YYYY/MM/DD	unitless
time_EDT	Time in EDT as recorded in the cruise log; HHMM	unitless
EDT_DOY	Day of year calculation using cruise log EDT time	decimal day
station	Station ID as recorded in the cruise log	unitless
CTD_num	Number ID of each CTD/niskin sampling rig cast	unitless
bottle_num	Number ID of niskin bottle in sampling rosette/CTD rig from which the sample was taken	unitless
depth	Depth at which sample was taken as recorded in the cruise log	meters
genus	Genus or least specific identifier of organism in sample	unitless
species	Species or most specific identifier of organism in sample	unitless
stage	Life stage of organism in sample	unitless
count	Total number of organism found in subsample	number of organism/subsample
number_per_m3	Concentration of organism per cubic meter calculated from dilutions, splits, and the 10L volume of each niskin	number of organism/cubic meter
initials_of_counter	Initials of tech or student who counted the sample	unitless
idx	Unique numeric ID for each row of data	unitless
lat	Average latitude traveled during collection for each CTD cast	decimal degrees
lon	Average longitude traveled during collection for each CTD cast	decimal degrees
GMT_DOY	Day of year calculation using CTD recorded GMT time for each cast	decimal day
density00	Density recorded by CTD sensors for each bottle	number of organism/cubic meter
sigma_t00	Density recorded by CTD sensors for each bottle	number of organism/cubic meter
sal00	Salinity recorded by CTD sensor for each bottle	PSU
sal11	Salinity recorded by second CTD sensor for each bottle	PSU
Sbeox0MgL	Dissolved oxygen calculated in SEB post-processing from oxygen data recorded by CTD sensors for each bottle	milligrams per liter
Sbeox0PS	Dissolved oxygen pressure saturation calculated in SEB post-processing from oxygen data recorded by CTD sensors for each bottle	decibars
OxsatMgL	Dissolved oxygen percent saturation calculated in SEB post-processing from oxygen data recorded by CTD sensors for each bottle	percent
PrDM	Pressure recorded by CTD sensors for each bottle	decibars
T090C	Temperature recorded by CTD sensor for each bottle	degrees Celsius
T190C	Temperature recorded by secondary CTD sensor for each bottle	degrees Celsius
FLECO_AFL	Fluorescence recorded by CTD sensors for each bottle	milligrams per cubic meter
CStarTr0	Transmissometer data recorded for each bottle	unitless

Upoly0	Turbidity recorded by CTD sensors for each bottle	Nephelometric Turbidity Units (NTU)
sample_comments	Comments from sample counter regarding sample processing	unitless
counter_comments	Additional comments from the counter about the sample	unitless
counter_comments_2	Additional counter comments	unitless
counter_comments_3	Additional counter comments	unitless

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Instruments

Dataset-specific Instrument Name	CTD
Generic Instrument Name	CTD - profiler
Dataset-specific Description	Used for sampling
Generic Instrument Description	The Conductivity, Temperature, Depth (CTD) unit is an integrated instrument package designed to measure the conductivity, temperature, and pressure (depth) of the water column. The instrument is lowered via cable through the water column. It permits scientists to observe the physical properties in real-time via a conducting cable, which is typically connected to a CTD to a deck unit and computer on a ship. The CTD is often configured with additional optional sensors including fluorometers, transmissometers and/or radiometers. It is often combined with a Rosette of water sampling bottles (e.g. Niskin, GO-FLO) for collecting discrete water samples during the cast. This term applies to profiling CTDs. For fixed CTDs, see https://www.bco-dmo.org/instrument/869934.

Dataset-specific Instrument Name	Niskin
Generic Instrument Name	Niskin bottle
Dataset-specific Description	Used for water sampling
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

HRS1316

Website	https://www.bco-dmo.org/deployment/707119
Platform	R/V Hugh R. Sharp
Report	http://ezid.cdlib.org/id/doi:10.7284/902881
Start Date	2013-08-25
End Date	2013-09-01
Description	R/V Hugh R Sharp 1316. Mid-bay of Chesapeake Bay, 38°N 76°W.

HRS1317

Website	https://www.bco-dmo.org/deployment/707274
Platform	R/V Hugh R. Sharp
Report	http://ezid.cdlib.org/id/doi:10.7284/902882
Start Date	2013-09-12
End Date	2013-09-17
Description	R/V Hugh R Sharp 1317. Mid-bay of Chesapeake Bay, 38°N 76°W.

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Project Information

Copepod Population Dynamics in Hypoxic Coastal Waters: Physical and Behavioral Regulation of Resupply and Advective Losses (CopesPopDynHypoZone)

Coverage: hypoxic zone of Chesapeake Bay

Description from NSF award abstract:
The PIs will develop a mechanistic understanding of how circulation interacts with hypoxia-induced behavioral and physiological changes to affect the population dynamics of coastal zooplankton. They will do this by assessing two potentially contrasting mechanisms influencing the dynamics of the copepod *Acartia tonsa* in the hypoxic zone of Chesapeake Bay. The first hypothesis is that maintenance of copepod populations in the hypoxic region requires replenishment by advection (immigration) of animals through wind-driven lateral transport processes. The second, counteractive, hypothesis is that bottom water hypoxia alters the vertical distribution of *A. tonsa*, thereby making them more susceptible to advective losses from the region (emigration) via surface water transport in the estuarine circulation. They will take advantage of a current NSF-funded physical oceanography research program in Chesapeake Bay that will comprehensively measure and model axial and lateral water exchanges in the mid-Bay region.

The present study will use the physical oceanography study site as a Controlled Volume (CV) in which the oceanographic exchanges of water and the driving mechanisms for those exchanges will be well defined. The PIs will conduct high-resolution spatial and temporal sampling of zooplankton and combine the data with measurements of copepod behavior, mortality and egg production in the hypoxic region. They will use an improved Individual-Based Model of the life history of *A. tonsa* coupled with the circulation to explore the combined effects of advection, behavior, egg production, and mortality on population dynamics. In addition to increasing our knowledge of the impacts of bottom water hypoxia on copepod populations in Chesapeake Bay, the study will improve our general understanding of the regulation of zooplankton populations by physical and biological processes and the impacts of hypoxia on secondary production and food webs in coastal waters.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1259691

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