Cold core rings stratified euphausiid abundance and biomass (carbon) from multiple cruises in the N. Atlantic, 1973 - 1977

Website: https://www.bco-dmo.org/dataset/743479
Data Type: Cruise Results
Version: 1
Version Date: 2018-08-14

Project
» North Atlantic Dark Data: Rings (NAtlDarkData)

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Coverage

Spatial Extent: **N**:40.097 **E**:-60.067 **S**:32.725 **W**:-73.217
Temporal Extent: 1973-02-08 - 1977-11-16

Dataset Description

This dataset is the one of several from this project discovered, rescued, and made available online.

These data are zooplankton, specifically euphausiids, collected and identified in the 1970s as part of the cold-core rings multidisciplinary program. Included are stratified euphausiid species abundance and zooplankton biomass from over 100 MOCNESS tows and related metadata taken on 9 research cruises in the Northwest Atlantic. The euphausiid abundance numbers represent numbers per cubic meter in each depth layer. MOCNESS (Multiple Opening and Closing Nets and Environmental Sensing Systems) tows were quantified using flow meters calibrated to provide the volume of water filtered for each tow.

A note about 'nd': Traditionally 'nd' is taken to mean 'no data'. Within that meaning, however, there is much variability. Here 'nd' could mean the more traditional 'we tried and got bad or no data'. It could mean 'these data are not considered relevant to the overall effort'. Finally, 'nd' could mean 'does not exist'.

Methods & Sampling

The original acquisition and processing of these data was documented in cruise reports and peer-reviewed papers:
Hunt, M. and P.H. Wiebe (l980)

Joyce, T.M., and Wiebe, P.H. (1983)
McGowan, J. A., and Brown, D. M. (1966)
Wiebe, P.H., N.J. Copley, and S.H. Boyd (1992)

Data Processing Description

Recovering these data started with the metadata: how, when and where the zooplankton data were collected. The metadata being sought are summarized in Table 1. As noted above, the data reside in notebooks , cruise reports, old computer files, and blue cover reports.
However, the crucial element that makes the effort possible is the presence of the scientist who conducted the research for which the samples were collected and remembers many important details about where to look and what to look for. At one time some of the data were entered into a main-frame based database system, which has since disappeared (Hunt and Wiebe, [12]).

The search began systematically with the listing of all of the cruises that were participated on in the 1970s and 1980s, and then seeking out the information/data listing the zooplankton net tows. All of the data included cruise ids, station information, tow information, net descriptions rudimentary or otherwise, latitudes and longitudes, times and instrument depths, often including multiple sampling depths with the same net system.

Information was not often complete in the analysis notebooks and this required going back into the original cruise log books and crosschecking with other published papers.

For some cruises there was a personal log that had information to fill in the blanks.
There were also errors. The most potentially damaging errors were those of station position. Degrees and decimal minutes were sometimes converted to decimal degrees by simply moving the decimal place and not first dividing the minutes by 60. In addition, sometimes a discrepancy was found between the same information in two different sources. Those errors had to be tracked down using as many other sources as possible.

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Data Files

File
CCR_euph_strat_abund.csv (Comma Separated Values (.csv), 202.00 KB) MD5:071206e15f8dba24b7a9b1cd8bf68607 Primary data file for dataset ID 743479

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Related Publications

Hunt, Mary M., & Wiebe, Peter. (1980). A database for zooplankton net tow data. W.H.O.I. Technical Report 80-28. 65 pp. doi:10.1575/1912/9574
Methods

Joyce, T.M., & Wiebe, P.H. (1983). Warm core rings of the Gulf Stream. Oceanus, 26(2), 34-44.
Methods

McGowan, J. A., & Brown, D. M. (1966). A new opening-closing paired zooplankton net (No. SIO Ref-66-23). SCRIPPS INSTITUTION OF OCEANOGRAPHY LA JOLLA CALIF. Reference 66/23, 1–56.
Methods

Wiebe, P. H., Copley, N. J., & Boyd, S. H. (1992). Coarse-scale horizontal patchiness and vertical migration of zooplankton in Gulf Stream warm-core ring 82-H. Deep Sea Research Part A. Oceanographic Research Papers, 39, S247–S278. doi:10.1016/s0198-0149(11)80015-4 https://doi.org/10.1016/S0198-0149(11)80015-4
Results

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Parameters

Parameter	Description	Units
cruiseid	unique identifier for cruise	text
year	year	YYYY
tow	sequential number of tow	number
tow_type	which instrument was used	text
net	in a multi-net system - which net was used	number
month_local	month of year	mm
day_local	day of year	dd
time_local	local time of zooplankton collection	hhmm
ISODateTime_local	ISO 19115-2 Standard Date and time	formidable format
lat	latitude of tow. North is positive	decimal degrees
lon	longitude of tow. West is negative	decimal degrees
region	location on the Earth specific to the rings	text
depth_max	maximum depth of tow	meters
depth_int	depth interval fished by net	meters
depth_mid	middle depth of tow	meters
depth_low	deepest depth fished by the particular net	meters

vol_filt	volume filtered; i.e. how much water flows through the net	cubic meters
disp_vol	displacement volume; i.e.volume of animals caught in the net; measured with a graduated cylinder	milliliters
disp_vol_Mm3	displacement volume per thousand cubic meters	cubic centimeters per 1000 cubic meters
cum_pcnt	displacement volume per thousand cubic meters over water column cumulated for individual depth strata	percent
integ_disp_vol	displacement volume per cubic meter multiplied times the depth over which the net fished	cubic centimeters per square meter
Carbon_um_kg	Carbon	micromoles per kilogram
C_mM_m2	Integrated Carbon	millimoles per square meter
Euphausia_americana	Abundance of Euphausia_americana	number/cubic meter (#/m^3)
Euphausia_brevis	Abundance of Euphausia_brevis	number/cubic meter (#/m^3)
Euphausia_gibboides	Abundance of Euphausia_gibboides	number/cubic meter (#/m^3)
Euphausia_hemigibba	Abundance of Euphausia_hemigibba	number/cubic meter (#/m^3)
Euphausia_krohni	Abundance of Euphausia_krohni	number/cubic meter (#/m^3)
Euphausia_mutica	Abundance of Euphausia_mutica	number/cubic meter (#/m^3)
Euphausia_pseudogibba	Abundance of Euphausia_pseudogibba	number/cubic meter (#/m^3)
Euphausia_tenera	Abundance of Euphausia_tenera	number/cubic meter (#/m^3)
Nematobrachion_boopis	Abundance of Nematobrachion_boopis	number/cubic meter (#/m^3)
Nematobrachion_flexipes	Abundance of Nematobrachion_flexipes	number/cubic meter (#/m^3)
Nematobrachion_sexspinosum	Abundance of Nematobrachion_sexspinosum	number/cubic meter (#/m^3)

Nematoscelis_atlantica	Abundance of Nematoscelis_atlantica	number/cubic meter (#/m^3)
Nematoscelis_megalops	Abundance of Nematoscelis_megalops	number/cubic meter (#/m^3)
Nematoscelis_microps	Abundance of Nematoscelis_microps	number/cubic meter (#/m^3)
Nematoscelis_tenella	Abundance of Nematoscelis_tenella	number/cubic meter (#/m^3)
Stylocheiron_abbreviatum	Abundance of Stylocheiron_abbreviatum	number/cubic meter (#/m^3)
Stylocheiron_affine	Abundance of Stylocheiron_affine	number/cubic meter (#/m^3)
Stylocheiron_carinatum	Abundance of Stylocheiron_carinatum	number/cubic meter (#/m^3)
Stylocheiron_elongatum	Abundance of Stylocheiron_elongatum	number/cubic meter (#/m^3)
Stylocheiron_longicorne	Abundance of Stylocheiron_longicorne	number/cubic meter (#/m^3)
Stylocheiron_maximum	Abundance of Stylocheiron_maximum	number/cubic meter (#/m^3)
Stylocheiron_suhmi	Abundance of Stylocheiron_suhmi	number/cubic meter (#/m^3)
Thysanoessa_gregaria	Abundance of Thysanoessa_gregaria	number/cubic meter (#/m^3)
Thysanoessa_longicaudata	Abundance of Thysanoessa_longicaudata	number/cubic meter (#/m^3)
Thysanoessa_parva	Abundance of Thysanoessa_parva	number/cubic meter (#/m^3)
Thysanopoda_acutifrons	Abundance of Thysanopoda_acutifrons	number/cubic meter (#/m^3)
Thysanopoda_aequalis	Abundance of Thysanopoda_aequalis	number/cubic meter (#/m^3)
Thysanopoda_obtusifrons	Abundance of Thysanopoda_obtusifrons	number/cubic meter (#/m^3)
Thysanopoda_pectinata	Abundance of Thysanopoda_pectinata	number/cubic meter (#/m^3)
Thysanopoda_tricuspidata	Abundance of Thysanopoda_tricuspidata	number/cubic meter (#/m^3)

Thysanopoda_monacantha	Abundance of Thysanopoda_monacantha	number/cubic meter (#/m^3)
Thysanopoda_orientalis	Abundance of Thysanopoda_orientalis	number/cubic meter (#/m^3)
Meganyctiphanes_norvegica	Abundance of Meganyctiphanes_norvegica	number/cubic meter (#/m^3)
Bentheuphausia_amblyops	Abundance of Bentheuphausia_amblyops	number/cubic meter (#/m^3)

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Instruments

Dataset-specific Instrument Name	MOC1D
Generic Instrument Name	MOCNESS-1D
Generic Instrument Description	The Double MOCNESS 1D carries 20 1m2 nets usually of mesh size 335micron and is designed to collect macrozooplankton. This MOCNESS system uses the same underwater and shipboard electronic system for operation and data acquisition as other MOCNESS systems. The nets are opened and closed sequentially by commands transmitted from the surface deck unit through a single conducting cable to the underwater unit. The command circuit has a provision to permit commands to be sent to either the left of right set of nets when using the double MOCNESS-1D. - from Wiebe et al, 1985.

Dataset-specific Instrument Name	MOC1
Generic Instrument Name	MOCNESS1
Generic Instrument Description	The Multiple Opening/Closing Net and Environmental Sensing System or MOCNESS is a family of net systems based on the Tucker Trawl principle. The MOCNESS-1 carries nine 1-m2 nets usually of 335 micrometer mesh and is intended for use with the macrozooplankton. All nets are black to reduce contrast with the background. A motor/toggle release assembly is mounted on the top portion of the frame and stainless steel cables with swaged fittings are used to attach the net bar to the toggle release. A stepping motor in a pressure compensated case filled with oil turns the escapement crankshaft of the toggle release which sequentially releases the nets to an open then closed position on command from the surface. -- from the MOCNESS Operations Manual (1999 + 2003).

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Deployments

CH111

Website	https://www.bco-dmo.org/deployment/541956
Platform	R/V Chain
Start Date	1973-02-07
End Date	1973-02-18
Description	Not the real cruise track. A collection of station locations.

KN35

Website	https://www.bco-dmo.org/deployment/541960
Platform	R/V Knorr
Start Date	1973-11-24
End Date	1973-12-03
Description	Resurrected station locations for the Rings project. Not really a cruise track, but for mapping purposes we made it so. DMO.

AII-85

Website	https://www.bco-dmo.org/deployment/58766
Platform	R/V Atlantis II
Start Date	1974-10-12
End Date	1974-10-23
Description	1. in-situ filtration sampling at selected deptphs and locations between Bermuda and Woods Hole; 2. in-situ tests of the Longhurst-Hardy Plankton Recorder (LHPR) system using SCUBA; 3. studies of the phytoplankton, zooplankton, and fish of Gulf Stream rings with emphasis on spatial patterns of phytoplankton and hydrographic factors; 4. tests of the newly constructed Multiple Opening/Closing Net and Environmental System (MOCNESS); 5. studies of bird migration patterns; 6. studies to examine differences in gene frequencies in fish across physical-chemical stress gradients; 7. analyses of mesopelagic fish blood for differences in ionic concentrations. The positions are not the cruise track. The positions here are station locations for zooplankton tows.

CH125

Website	https://www.bco-dmo.org/deployment/541971
Platform	R/V Chain
Start Date	1975-08-04
End Date	1975-08-17
Description	These positions are not exactly the cruise track. They are station positions for zooplankton tows. This is part of a resurrected dark data set. At the beginning there are only two locations - the first and the last zooplankton tow locations -- but more locations will be filled in when there is time.

KN53

Website	https://www.bco-dmo.org/deployment/541975
Platform	R/V Knorr
Start Date	1975-11-14
End Date	1975-12-02
Description	These locations are not exactly the cruise track. They are station locations for Zooplankton tows. This is part of a resurrected dark data set. Only the first and last station locations are here to symbolize the cruise track. More locations will be added later as time permits. From http://dla.whoi.edu/catalog/dla_search/results/taxonomy%3A74113 [not currently available, 2018-08-20] GEOSECS Program, Project FAMOUS; subjects: transient traces in the ocean, bathymetry. Scientists: Luyendyk, B.P.; Teal, John M.; Metcalf, William G.; Haedrich, R. L. ; Worthington, L. Valentine ; Barvenik, F.W. ; Bradley, K.F. ;Hess, F.R.; Brewer, P.G. ; Bowen, Vaughn T. ; Burke, J.C. ; Jenkins, W.J. related subjects: Panulirus II (Ship) related subjects: R/V Oceanus related subjects: USS Mentor related subjects: R/V Knorr

KN62

Website	https://www.bco-dmo.org/deployment/541982
Platform	R/V Knorr
Start Date	1976-12-04
End Date	1976-12-20
Description	These positions are station locations and not cruise tracks per se. This is all we have for this cruise. We are charting the location of the zooplankton tows from the Rings Projects.

KN65

Website	https://www.bco-dmo.org/deployment/541986
Platform	R/V Knorr
Start Date	1977-04-11
End Date	1977-04-30
Description	These positions are not the complete cruise track. These positions are a subset and represent the locations of the zooplankton tows which are a part of the Rings Projects.

EN11

Website	https://www.bco-dmo.org/deployment/541990
Platform	R/V Endeavor
Start Date	1977-07-31
End Date	1977-08-17
Description	These positions are not the whole cruise track. They represent some of the zooplankton collection stations. We will be adding more positions as time permits.

KN71

Website	https://www.bco-dmo.org/deployment/541994
Platform	R/V Knorr
Start Date	1977-10-23
End Date	1977-11-16
Description	These positions represent only a portion of the cruise track. They are the location of some of the scientific stations, but they are all we have at the moment. More positions will be added to the cruise track as time allows.

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Project Information

North Atlantic Dark Data: Rings (NAtlDarkData)

Coverage: North Atlantic, Sargasso Sea, NW Atlantic Slope Water

Recent changes in NSF and other agency data policies (NSF11060, 2011; OSTP memo 2013) mandating timely and open access to data and information generated in the course of US funded research have resulted in a relatively rapid change in the culture of data sharing. Technological advances, policy changes, and increased awareness of the need for and benefits of well-curated data make it much more likely that recently generated research results will be made publicly available and in a timely manner. However, many scientific data were generated at a time when the technology for curation, storage, and dissemination were primitive or non-existent, and data sharing was not viewed as essential. In addition, many of the datasets were created by projects that make up the "long tail", smaller projects that form the bulk of the projects funded by agencies such as NSF (Heidorn, 2008). Data from these projects have in the past been poorly curated and thus less visible to other scientists, largely not available, and hence named "Dark Data" (Heidorn, 2008). But as Sinha et al. (2013) emphasize, without access to the types of historical observations or legacy data that make up the “dark data” in the “long tail” of science, emerging scientific challenges will not be addressable. "...making these data available on demand must be one of the highest priorities for any enterprise seeking to develop a cyberinfrastructure capable of promoting new ways to examine the earth system through time" (Sinha et al., 2013). The paucity of marine ecosystem data available to conduct cutting edge research and the critical need for the rescue of past data were also highlighted in a recent EarthCube End-User Domain Workshop Report "Articulating Cyberinfrastructure Needs of the Ocean Ecosystem Dynamics Community" (Kinkade et al., 2013). (from proposal to NSF, 2014)

There are significant dark datasets currently unavailable from multidisciplinary programs funded in the 1970’s and 1980’s such as those from the Northwest Atlantic cold-core and warm-core rings (The Ring Group, 1981; Joyce and Wiebe, 1983). The bulk of the data served here will be from the Rings projects.

The Cold-Core Rings (CCR) studies, [1972-1976] and Warm-Core Rings (WCR) Program, [1981-1982], were major research projects in the 1970s and 1980s. Large oceanic eddies or rings form when Gulf Stream waters first meander, then separate, forming a ring of Gulf Stream water around a core of cold Slope Water or a core of warm Sargasso Sea water. The CCRs move south or southwest from their point of origin into the Sargasso Sea and are initially 150-300 kilometers in diameter and 2500-3500 meters deep. They can persist as identifiable features for up to 2 years. WCRs move to the west/southwest in the Slope Water north of the Gulf Stream. They are 100 to 200 km in diameter, extend to at least 1500 m deep, and exist for a shorter period of time (usually less than a year) before gradually breaking up and rejoining the Gulf Stream. Both of these kinds of rings form about 5 to 8 times a year.

Rings are particularly interesting to the biologist because species living north and south of the Gulf Stream are distinctly different. Thus temperate species from the Slope Water or tropical-subtropical species from the Sargasso Sea are isolated during ring formation within their particular ring structure. Thus, a community of animals from one area is expatriated in the territory of another community of animals. As a ring decays, the water gradually takes on the physical and chemical characteristics of the surrounding non-ring water. Species outside the ring invade the ring habitat while those expatriated go to local extinction. This phenomenon provides for a large-scale natural ecological experiment that was the focus of the ring’s studies.

This project is digitizing data from 33 cruises to the Northwest Atlantic Ocean that are locked in notebooks and old digital file formats and preparing them for serving online in a publically available data repository (BCO-DMO).

Each dataset has been the subject of extensive data recovery efforts and the work is continuing.

References:

Heidorn, P.B. (2008). Shedding light on the dark data in the long tail of science. Library Trends, 57(2), 280-299. doi: http://dx.doi.org/10.1353/lib.0.0036

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Ring Group (Backus, R.H., G.R. Flierl, D. Kester, D.B. Olson, D. Richardson, A. Vastano, P.H. Wiebe and J. Wormuth). (1981). Gulf Stream cold core rings: Their physics, chemistry, and biology. *Science, 212*, 1091-1100.

Sinha, A.K., Thessen, A.E., & Barnes, C.G. (2013). Geoinformatics: towards an integrative view of Earth as a system. In Bickford, M.E. (ed.), *The Web of Geological Sciences: Advances, Impacts, and Interactions* (GSA Special Paper 500, pp. 591-604). Geological Society of America. doi: http://dx.doi.org/10.1130/2013.2500(19)

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Funding

Funding Source	Award
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