Gulf Stream Warm-Core and Cold-Core Rings cruise tow data from 1970s and 1980s from multiple cruises in the North Atlantic from 1972-1986 (NAtlDarkData project)

Website: https://www.bco-dmo.org/dataset/541937
Version: preliminary
Version Date: 2014-12-05

Project
» North Atlantic Dark Data: Rings (NAtlDarkData)

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Dataset Description

These are the first data to go on-line from an ongoing effort to digitize Cold Core and Warm Core Rings data from the 1970s and 1980s. This dataset is the cruise and tow data, detailing where and when the MOCNESS, Bongo and Meter Net tows were taken from 34 cruises in the North Atlantic.

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. A data base for zooplankton net tow data. W.H.O.I. Technical Report 80-28. 65 pp.

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

McGowan, J. A., & Brown, D. M. (1966). A new opening-closing paired zooplankton net. Scripps Institute of Oceanography Reference, 66/23, 1–56.

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.

Wiebe, P.H., E.M. Hulburt, E.J. Carpenter, A.E. Jahn, G.P. Knapp, III. S.H. Boyd, P.B. Ortner, and J.L. Cox. 1996. Gulf Stream cold core rings: Large scale interaction sites for open ocean planktonic communities. Deep-Sea Res. 23: 695-710.

Wiebe, P.H. and G.R. Flierl. 1983. Euphausiid invasion/dispersal in Gulf Stream cold core rings. Aust. J. Mar. Freshwater Res. 34(4): 625-652.

Wiebe, P.H., N.J. Copley, and S.H. Boyd. 1992. Coarse-scale horizontal patchiness and vertical migration in newly formed Gulf Stream warm-core ring 82-H. Deep-Sea Res. 39, Suppl. 1: 247-278.

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 (Figure 1), 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
cruise_tow_data.csv (Comma Separated Values (.csv), 19.70 KB) MD5:fdd835ccda6dac378cb1941eb55df795 Primary data file for dataset ID 541937

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Parameters

Parameter	Description	Units
ship	research or fishing vessel used to collect data	text
cruiseid	unique identifier for cruise	text
year	year	YYYY
month	month of year	mm
day	day of year	dd
tow	numerical tow number specific to that cruise	numeric
tow_type	instrument used to collect the data	text
time_local	local time of zooplankton collection	hhmm
lat	latitude of tow. North is positive	decimal degrees
lon	longitude of tow. West is negative	decimal degrees
site	location on the Earth	text
depth_max	maximum depth of tow	meters

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Instruments

Dataset-specific Instrument Name	Bongo Net
Generic Instrument Name	Bongo Net
Generic Instrument Description	A Bongo Net consists of paired plankton nets, typically with a 60 cm diameter mouth opening and varying mesh sizes, 10 to 1000 micron. The Bongo Frame was designed by the National Marine Fisheries Service for use in the MARMAP program. It consists of two cylindrical collars connected with a yoke so that replicate samples are collected at the same time. Variations in models are designed for either vertical hauls (OI-2500 = NMFS Pairovet-Style, MARMAP Bongo, CalVET) or both oblique and vertical hauls (Aquatic Research). The OI-1200 has an opening and closing mechanism that allows discrete "known-depth" sampling. This model is large enough to filter water at the rate of 47.5 m3/minute when towing at a speed of two knots. More information: Ocean Instruments, Aquatic Research, Sea-Gear

Dataset-specific Instrument Name	Meter Net
Generic Instrument Name	Meter Net
Generic Instrument Description	A meter net is a plankton net with a one meter diameter opening and a mesh size of .333 mm, towed horizontally, obliquely or vertically, also known as a Ring Net.

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

G191

Website	https://www.bco-dmo.org/deployment/541940
Platform	R/V Gosnold
Start Date	1972-06-12
End Date	1972-06-14

G197

Website	https://www.bco-dmo.org/deployment/541944
Platform	R/V Gosnold
Start Date	1972-08-15
End Date	1972-08-15
Description	This is one point from a cruise but it's the only point we have. It is associated with the Rings Data being recovered.

AII-71

Website	https://www.bco-dmo.org/deployment/541947
Platform	R/V Atlantis II
Start Date	1972-09-21
End Date	1972-10-14
Description	This deployment is a collection of locations for stations for the meter net to collect zooplankton for the Rings projects.

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. **Methods & Sampling** These positions are the station positions, not the ship's track.

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.

KN38

Website	https://www.bco-dmo.org/deployment/541964
Platform	R/V Knorr
Start Date	1974-03-12
End Date	1974-04-03
Description	These 'cruise track' positions are station positions for the Rings project zooplankton tows.

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

OC07

Website	https://www.bco-dmo.org/deployment/541979
Platform	R/V Oceanus
Start Date	1976-06-07
End Date	1976-06-07
Description	We only have one position from this cruise.

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.

KN73

Website	https://www.bco-dmo.org/deployment/541998
Platform	R/V Knorr
Start Date	1979-07-28
End Date	1979-08-07
Description	These positions are not the complete cruise track. They represent a subset of the cruise track -- the station locations of zooplankton tows which are part of the Rings Projects.

AII-101

Website	https://www.bco-dmo.org/deployment/542002
Platform	R/V Atlantis II
Start Date	1978-06-23
End Date	1978-07-13
Description	These positions are not the complete cruise track. They represent the locations of zooplankton tows that are part of the Rings Projects.

SH-001

Website	https://www.bco-dmo.org/deployment/542007
Platform	F/V Super Horse
Start Date	1981-04-29
End Date	1981-04-29
Description	This fishing vessel was used as a ship of opportunity and went to one station to tow for zooplankton.

SH-002

Website	https://www.bco-dmo.org/deployment/542010
Platform	F/V Super Horse
Start Date	1981-05-12
End Date	1981-05-12
Description	This fishing vessel was used as a ship-of-opportunity to occupy stations as part of the Rings Projects. Only one location is recorded.

OC98

Website	https://www.bco-dmo.org/deployment/542013
Platform	R/V Oceanus
Start Date	1981-05-29
End Date	1981-05-29
Description	This is the only location recorded for this cruise. It is the location of a MOCNESS tow and is part of the Rings Projects.

SH-003

Website	https://www.bco-dmo.org/deployment/542016
Platform	F/V Super Horse
Start Date	1981-06-29
End Date	1981-06-29
Description	This was a ship of opportunity for the Rings Project and only one station was recorded. This is the location of a zooplankton tow.

SH-004

Website	https://www.bco-dmo.org/deployment/542019
Platform	F/V Super Horse
Start Date	1981-07-28
End Date	1981-07-28
Description	This is the only location reported for this cruise. It was a ship of opportunity used to facilitate the collection of zooplankton as part of the Rings Projects.

SH-005

Website	https://www.bco-dmo.org/deployment/542022
Platform	F/V Super Horse
Start Date	1981-08-19
End Date	1981-08-19
Description	This is the only position for this cruise. This was a ship of opportunity to enable zooplankton collection in a Gulf Stream Ring.

OC106

Website	https://www.bco-dmo.org/deployment/542030
Platform	R/V Oceanus
Start Date	1981-10-27
End Date	1981-10-27
Description	This position is the only one for this cruise. If other positions become known, they will be added. This is the position of a zooplankton tow during one of the Rings Project cruises.

OC109

Website	https://www.bco-dmo.org/deployment/542033
Platform	R/V Oceanus
Start Date	1981-11-23
End Date	1981-11-23
Description	This deployment has only one known point at this time. When more locations become available, they will be added. This point represents a zooplankton tow which was a part of the Rings Projects.

OC111

Website	https://www.bco-dmo.org/deployment/542035
Platform	R/V Oceanus
Start Date	1981-12-11
End Date	1981-12-13
Description	This is not really the entire cruise track. Instead, these are the two positions of zooplankton tows taken during this cruise and the only representation of the cruise track that we have at the moment. When more locations become available, we will add them.

OC112

Website	https://www.bco-dmo.org/deployment/542058
Platform	R/V Oceanus
Start Date	1982-01-05
End Date	1982-01-05
Description	This is the only position we have for this cruise at the present time. When and if more locations become available, we will add them to the ship's track. This was the location of a zooplankton tow that was part of the Rings Projects.

OC114

Website	https://www.bco-dmo.org/deployment/542074
Platform	R/V Oceanus
Start Date	1982-02-08
End Date	1982-02-08
Description	This is the only position we have for this cruise at this time. It represents one of the stations where a net tow was made for zooplankton as part of the Rings Projects.

OC116

Website	https://www.bco-dmo.org/deployment/542078
Platform	R/V Oceanus
Start Date	1982-03-11
End Date	1982-03-15
Description	These positions are the only cruise track positions that we currently have. These represent stations where zooplankton tows were done as part of the Rings Projects. If and when more locations become available, they will be added as time permits.

OC118

Website	https://www.bco-dmo.org/deployment/542082
Platform	R/V Oceanus
Start Date	1982-04-19
End Date	1982-05-02
Description	These locations are not the real ship's track. They represent only those locations where zooplankton tows were made. If and when more cruise track locations become available, they will be added as time allows.

OC121

Website	https://www.bco-dmo.org/deployment/542086
Platform	R/V Oceanus
Start Date	1982-06-16
End Date	1982-06-29
Description	These locations only represent a portion of the ship's track. These positions are where tows were done to collect zooplankton as part of the Rings Projects. As more ship's track locations become available, they will be added as time permits.

OC125

Website	https://www.bco-dmo.org/deployment/542090
Platform	R/V Oceanus
Start Date	1982-08-10
End Date	1982-08-22

KN98

Website	https://www.bco-dmo.org/deployment/542094
Platform	R/V Knorr
Start Date	1982-09-27
End Date	1982-10-16
Description	These locations represent only a portion of the ship's track. They are the locations of zooplankton tows taken during the Rings Project. When more locations become available, they will be added as time permits.

KN122

Website	https://www.bco-dmo.org/deployment/542098
Platform	R/V Knorr
Report	http://dmoserv3.bco-dmo.org/data_docs/NAtlDarkData/KN122_INSTRUMENT_TESTING_CRUISE_TO_SLOPE_WATER_AND_WARM-CORE_RING_86A.pdf
Start Date	1986-05-29
End Date	1986-05-31
Description	These positions represent only a portion of the total ship's track. These positions represent stations where zooplankton tows were made as part of the Rings Projects. As more location data become available, they will be added as time permits.

GM

Website	https://www.bco-dmo.org/deployment/542103
Platform	R/V Gloria Michelle
Start Date	1986-06-07
End Date	1986-06-07
Description	This research vessel went out on a day trip to occupy a station and take a zooplankton tow as part of the Rings Projects.

AII-110

Website	https://www.bco-dmo.org/deployment/542025
Platform	R/V Atlantis II
Start Date	1981-09-21
End Date	1981-10-05
Description	These positions are only a portion of the cruise track. They represent the station locations where zooplankton tows were done and are the only positions we have at the present time for the cruise. More station positions will be added to the track as time permits. All the locations are found in the data.

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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

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

Kinkade, D., Chandler, C., Glover, D., Groman, R., Kline, D., Nahorniak, J., O'Brien, T., Perry, M.J., Pierson, J., & Wiebe, P. (2013). *Articulating cyberinfrastructure needs of the ocean ecosystem dynamics community*. Earthcube End-User Domain Workshop Report. Final report submitted to earthcube.org. Summary at http://workspace.earthcube.org/sites/default/files/files/document-repository/OceanEcosystemDynamicsEndUserWorkshop.pdf

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NSF11060. U.S. National Science Foundation. (2011). *Division of Ocean Sciences sample and data policy* (document number nsf11060). Retrieved from http://www.nsf.gov/pubs/2011/nsf11060/nsf11060.pdf

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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.

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Funding

Funding Source	Award
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