Temperature, salinity, and nitrate profiles within the ring centers of Warm Core Ring 81D, 82B, 82E and 82H from five oceanographic field experiments off the mid-Atlantic coast of the U.S. in September 1981, April, June, August, and October 1982

Website: https://www.bco-dmo.org/dataset/734784
Version: 1
Version Date: 2018-05-24

Project
» Collaborative Research: Physical-Biological Processes of Gulf Stream Warm Core Rings: Vertical Nutrient Delivery and Ecosystem Response (Warm Core Rings)

Contributors	Affiliation	Role
Chen, Ke	Woods Hole Oceanographic Institution (WHOI)	Principal Investigator
York, Amber D.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
75 quality-controlled temperature, salinity, and nitrate profiles within the ring centers of Warm Core Ring 81D, 82B, 82E and 82H. Excerpt from the summary section of the original technical report 86-3 (Fox et al., 1986): This investigation of nutrients and biologically active chemicals in warm core rings was conducted as part of an interdisciplinary study of the interactions among chemical, physical, and biological processes in an oceanic ecosystem. We determined the chemical changes in the water column as a ring migrates off the mid-Atlantic coast of the U.S. Five oceanographic field experiments were conducted in September 1981, April, June, August, and October 1982. Our measurements included vertical profiles of temperature, salinity, oxygen, nitrate, phosphate, and silicate in various locations related to rings.

Table of Contents

Coverage

Spatial Extent: **N**:41.26 **E**:-61.07 **S**:36.71 **W**:-74.08
Temporal Extent: 1981-09-21 - 1982-10-14

Methods & Sampling

"SUMMARY OF PROJECT RESULTS" excerpt from technical report 86-3 (Fox et al., 1986):

Shipboard measurements of nutrients, dissolved oxygen, and water column CTD-Oxygen characteristics were analyzed and processed in the Warm Core Rings program. Data were obtained from Ring 81-D in September-October 1981, from Ring 82-B in April, May, June and August, for Ring 82-E in August and for Ring 82-H in October. In addition to the planned extensive field experiments, two ship of opportunity samplings provided

nutrient samples for analysis onshore to provide an excellent time-series of nutrients variations in warm core rings.

The nutrient studies consisted of three types of water column sampling. One was the full water column characterization at each major sampling location; the second was a set of diel productivity series of samples in the upper 100 m; the third was a set of mid-depth samples to examine nutrient regeneration. Each cruise provided more than 60 sets of samples with 12 to 24 samples per set. These have been analyzed for nitrate, nitrite, phosphate and silicate.

The nutrient data were processed to determine nutrient distributions in warm core rings, the source water (Sargasso Sea and Gulf Stream) and the surrounding Slope Water. Final data reports have been distributed to other Warm Core Rings investigators for the nutrient results for Ring 81-D, the time series observation for Ring 82-B in April, June and August, the results for Ring 82-E in August, and for ring 82-H in October. The in-situ CTD and oxygen data from cruises AT-110, KN093 and KN095 have been used on the URI Prime computer for plotting data for analysis with the nutrient data. CTD-Oxygen data reports for the time-series observation in Ring 82-B in April and June have been distributed. Two interpretive manuscripts of nutrient distributions in rings have been submitted for publication. The initial results of this study have been presented at several national meetings.

Data Processing Description

Excerpts from Fox et al. 1986 extracted from PDF of the original report through optical character recognition and added to section "Methods & Sampling" and reviewed by a BCO-DMO data manager.

BCO-DMO Processing Description

* Matlab .m files (see supplemental file: nutrients_matlab_format.zip) containing data structures were concatenated, matlab datenum converted to additional human-readable date and times (ISO 8601 format), and exported as csv.

[table of contents | back to top]

Related Publications

Fox, M., Bates, P., Kester, D. (1983). Nutrient data for warm core ring 81-D from R/V Atlantis II cruise 110 (GSO technical report, 83-3). Narragansett, R.I.: University of Rhode Island, Graduate School of Oceanography.
Methods
,
Results

Fox, M., Bates, P., Kester, D. (1984). Nutrient data for warm core ring 82-B from r/V knorr cruise 93 (GSO technical report, 84-1). Narragansett, R.I.: University of Rhode Island, Graduate School of Oceanography.
Results
,
Methods

Fox, M., Bates, P., Kester, D. (1984). Nutrient data for warm core ring 82-B, R/V Knorr cruise 95 (GSO technical report, 84-2). Narragansett, R.I.: University of Rhode Island, Graduate School of Oceanography
Results
,
Methods

Fox, M., Bates, P., Kester, D. (1985). Nutrient data for warm core ring 82-B and warm core ring 82-E, R/V Knorr cruise 97 (GSO technical report, 85-1). Narragansett, R.I.: University of Rhode Island, Graduate School of Oceanography.
Methods
,
Results

Fox, M., Bates, P., Kester, D. (1985). Nutrient data for warm core ring 82-H, R/V Knorr cruise 98 (GSO technical report, 85-4). Narragansett, R.I.: University of Rhode Island, Graduate School of Oceanography.
Methods
,
Results

Kester, D., Fox, M. (1986). Chemical studies of nutrients in warm core rings : A project summary (GSO technical report, 86-3). Narragansett, R.I.: University of Rhode Island, Graduate School of Oceanography.
Results
,
Methods

[table of contents | back to top]

Parameters

Parameter	Description	Units
corename	Core name	unitless
depth	depth	meters (m)
temp	temperature	degrees C
salt	salinity	unknown
NO3	nitrate	micro-mol per Kg (umol/kg)
lat	latitude	decimal degrees
lon	longitude	decimal degrees
datenum	time (Matlab datenum)	unitless
date	date	unitless
time	time	unitless
sigmaT	Sigma-t density	unknown

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	CTD - profiler
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.

[table of contents | back to top]

Deployments

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.

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.

KN93

Website	https://www.bco-dmo.org/deployment/737588
Platform	R/V Knorr

KN95

Website	https://www.bco-dmo.org/deployment/737587
Platform	R/V Knorr

KN97

Website	https://www.bco-dmo.org/deployment/737586
Platform	R/V Knorr

[table of contents | back to top]

Project Information

Collaborative Research: Physical-Biological Processes of Gulf Stream Warm Core Rings: Vertical Nutrient Delivery and Ecosystem Response (Warm Core Rings)

Coverage: Northwest North Atlantic continental slope

NSF abstract:

Warm core rings acting between western boundary currents and the continental shelf exert significant impact on the physical and biological environments of the slope seas and coastal oceans, which are major contributors to the global primary production. However, compared to that of eddies in the open ocean, the role of Gulf Stream warm core rings in the biophysical processes of the shelf-slope system has received less attention, and contrasting results exist. This study will elucidate the key biophysical mechanisms by investigating the biomass characteristics and the dominant physical mechanisms controlling the vertical nutrient delivery associated with Gulf Stream warm core rings. The improved understanding on nutrient dynamics from this research will contribute to the stewardship of living marine resources, and better ecosystem management. Research findings will be presented to the general public through public lectures. This project will also support the training of undergraduate students outside of oceanography through the Summer Undergraduate Research Program at the Woods Hole Oceanographic Institution.

This project investigates the physical-biological processes associated with the evolution of Gulf Stream warm core rings in the shelf-slope system of the Northwest Atlantic, with a focus on the dominant physical processes controlling vertical nutrient delivery. The research will include analyses of satellite data, historical in situ data, and numerical simulations. For better understanding of the relative importance of several mesoscale biophysical processes, the photoautotrophic biomass within the warm core rings will be characterized first using satellite observed sea surface height and chlorophyll concentration. The investigators will then conduct idealized numerical modeling experiments to identify the dominant physical processes responsible for vertical nutrient delivery including vertical mixing and vertical advection induced by frictional decay, eddy-induced Ekman pumping, and wind-sea surface temperature interaction. The findings from the idealized modeling will be further synthesized in a realistic coupled biophysical model for the Northwest Atlantic region.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1558960

[table of contents | back to top]