Bottle data from CTD casts from the first cruise of SPIROPA project on April 27, 2018

Website: https://www.bco-dmo.org/dataset/815450
Data Type: Cruise Results
Version: 1
Version Date: 2020-06-17

Project
» Collaborative Research: Shelfbreak Frontal Dynamics: Mechanisms of Upwelling, Net Community Production, and Ecological Implications (SPIROPA)

Contributors	Affiliation	Role
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Abstract
Bottle data from CTD casts from the first cruise of SPIROPA project on April 27, 2018

Table of Contents

Coverage

Spatial Extent: **N**:39.8145 **E**:-70.814 **S**:39.6215 **W**:-70.8287
Temporal Extent: 2018-04-27

Acquisition Description

Standard CTD cast. Water sampling bottle data (up casts) from standard station CTD profiles.

Processing Description

Sea-Bird Software:

Data acquisition: SBE Seasave, version 7.23.2
Data processing: SBE Data Processing, version 7.26.7.114

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- converted latitude and longitude coordinates to decimal degrees in the lat and lon columns
- concatenated all seabird data bottle files into one dataset.
- added ISO_DateTime_UTC, latitude, and longitude fields

[table of contents | back to top]

Parameters

Parameter	Description	Units
file_name	file name for the bottle file	unitless
latitude	Latitude of station location with positive values indicating North	decimal degrees
longitude	Longitude of station location with negative values indicating West	decimal degrees
ISO_DateTime_UTC	Date and time of observations following ISO8601 format	unitless
Bottle	Bottle number	unitless
SvCM1_avg	Average Sound Velocity Chen-Millero 2	meter per second (m/s)
PrDM_avg	Average Pressure	decibar (db)
T090C_avg	Average Temperature ITS-90	degrees Celsius (C)
T190C_avg	Average Temperature 2 ITS-90	degrees Celsius (C)
C0S_m_avg	Average conductivity	Siemens per meter (S/m)
C1S_m_avg	Average conductivity 2	Siemens per meter (S/m)
Sbeox0V_avg	Average Oxygen raw SBE 43	volts (V)
Sal00_avg	Average practical salinity	unitless
Spar_avg	Average SPAR Biospherical/Licor	microEinsteins per meter squared per second (uE/m2/s)
Par_avg	Average PAR/Irradiance Biospherical/Licor	microEinsteins per meter squared per second (uE/m2/s)
Cpar_avg	Average CPAR/Corrected Irradiance	percent (%)
Scan_avg	scan count for average	unitless
Sigma_e00_avg	Average Density sigma-theta	kilogram per meter cubed (kg/m3)
Sigma_e11_avg	Average Density 2 sigma-theta	kilogram per meter cubed (kg/m3)
Sbeox0ML_L_avg	Average Oxygen concentration	milliliter per liter (mL/L)
OxsolMm_Kg_avg	Average Oxygen saturation	mikroMol per kilogram (mkMol/kg)
Sbox0Mm_Kg_avg	Average Oxygen concentration	mikroMol per kilogram (mkMol/kg)
Potemp090C_avg	Average potential temperature	degrees Celsius (C)
Potemp190C_avg	Average potential temperature 2	degrees Celsius (C)

Sal11_avg	Average practical salinity 2	unitless
Density00_avg	Average density	unknown
Density11_avg	Average density 2	unknown
SvCM_avg	Average Sound Velocity Chen-Millero	meter per second (m/s)
FlECO_AFL_avg	Average Fluorescence WET Labs ECO-AFL/FL	milligrams per meter cubed (mg/m3)
TurbWETntu0_avg	Average Turbidity WET Labs ECO	NTU
C0S_m_max	Maximum conductivity	Siemens per meter (S/m)
C1S_m_max	Maximum conductivity 2	Siemens per meter (S/m)
Cpar_max	Maximum CPAR/Corrected Irradiance	percent (%)
FlECO_AFL_max	Maximum Fluorescence WET Labs ECO-AFL/FL	milligrams per meter cubed (mg/m3)
Par_max	Maximum PAR/Irradiance Biospherical/Licor	microEinsteins per meter squared per second (uE/m2/s)
PrDM_max	Maximum pressue	decibar (db)
Sal00_max	Maximum practical salinity	unitless
Sbeox0V_max	Maximum Oxygen raw SBE 43	volts (V)
Scan_max	scan count for maximum	unitless
Spar_max	Maximum SPAR Biospherical/Licor	microEinsteins per meter squared per second (uE/m2/s)
T090C_max	Maximum Temperature ITS-90	degrees Celsius (C)
T190C_max	Maximum Temperature 2 ITS-90	degrees Celsius (C)
TurbWETntu0_max	Maximum Turbidity WET Labs ECO	NTU
C0S_m_min	Minimum conductivity	Siemens per meter (S/m)
C1S_m_min	Minimum conductivity 2	Siemens per meter (S/m)
Cpar_min	Minimum CPAR/Corrected Irradiance	percent (%)
FlECO_AFL_min	Minimum Fluorescence WET Labs ECO-AFL/FL	milligrams per meter cubed (mg/m3)
Par_min	Minimum PAR/Irradiance Biospherical/Licor	microEinsteins per meter squared per second (uE/m2/s)
PrDM_min	Minimum pressure	decibar (db)
Sal00_min	Minimum practical salinity	unitless
Sbeox0V_min	Minimum Oxygen raw SBE 43	volts (V)
Scan_min	scan count for minimum	unitless
Spar_min	Minimum SPAR Biospherical/Licor	microEinsteins per meter squared per second (uE/m2/s)
T090C_min	Minimum Temperature ITS-90	degrees Celsius (C)
T190C_min	Minimum Temperature 2 ITS-90	degrees Celsius (C)
TurbWETntu0_min	Minimum Turbidity WET Labs ECO	NTU
C0S_m_sdev	Standard Deviation of conductivity	Siemens per meter (S/m)
C1S_m_sdev	Standard Deviation of conductivity	Siemens per meter (S/m)

Cpar_sdev	Standard Deviation of CPAR/Corrected Irradiance	percent (%)
FlECO_AFL_sdev	Standard Deviation of Fluorescence WET Labs ECO-AFL/FL	milligrams per meter cubed (mg/m3)
Par_sdev	Standard Deviation of PAR/Irradiance Biospherical/Licor	microEinsteins per meter squared per second (uE/m2/s)
PrDM_sdev	Standard Deviation of pressure	decibar (db)
Sal00_sdev	Standard Deviation of practical salinity	unitless
Sbeox0V_sdev	Standard Deviation of Oxygen raw SBE 43	volts (V)
Scan_sdev	scan count for Standard Deviation	unitless
Spar_sdev	Standard Deviation of SPAR Biospherical/Licor	microEinsteins per meter squared per second (uE/m2/s)
T090C_sdev	Standard Deviation of Temperature ITS-90	degrees Celsius (C)
T190C_sdev	Standard Deviation of Temperature 2 ITS-90	degrees Celsius (C)
TurbWETntu0_sdev	Standard Deviation of Turbidity WET Labs ECO	NTU

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Sea-Bird SBE 9
Generic Instrument Name	CTD Sea-Bird 9
Dataset-specific Description	Sea-Bird SBE 9
Generic Instrument Description	The Sea-Bird SBE 9 is a type of CTD instrument package. The SBE 9 is the Underwater Unit and is most often combined with the SBE 11 Deck Unit (for real-time readout using conductive wire) when deployed from a research 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, fluorometer, altimeter, etc.). Note that in most cases, it is more accurate to specify SBE 911 than SBE 9 since it is likely a SBE 11 deck unit was used. more information from Sea-Bird Electronics

[table of contents | back to top]

Deployments

AR29

Website	https://www.bco-dmo.org/deployment/806753
Platform	R/V Neil Armstrong

[table of contents | back to top]

Project Information

Collaborative Research: Shelfbreak Frontal Dynamics: Mechanisms of Upwelling, Net Community Production, and Ecological Implications (SPIROPA)

Website: http://science.whoi.edu/users/olga/SPIROPA/SPIROPA.html

Coverage: Shelf break south of New England, OOI Pioneer Array

NSF award abstract:

The continental shelf break of the Middle Atlantic Bight supports a productive and diverse ecosystem. Current paradigms suggest that this productivity is driven by several upwelling mechanisms at the shelf break front. This upwelling supplies nutrients that stimulate primary production by phytoplankton, which in turn leads to enhanced production at higher trophic levels. Although local enhancement of phytoplankton biomass has been observed in some circumstances, such a feature is curiously absent from time-averaged measurements, both from satellites and shipboard sampling. Why would there not be a mean enhancement in phytoplankton biomass as a result of the upwelling? One hypothesis is that grazing by zooplankton prevents accumulation of biomass on seasonal and longer time scales, transferring the excess production to higher trophic levels and thereby contributing to the overall productivity of the ecosystem. However, another possibility is that the net impact of these highly intermittent processes is not adequately represented in long-term means of the observations, because of the relatively low resolution of the in-water measurements and the fact that the frontal enhancement can take place below the depth observable by satellite. The deployment of the Ocean Observatories Initiative (OOI) Pioneer Array south of New England has provided a unique opportunity to test these hypotheses. The combination of moored instrumentation and autonomous underwater vehicles will facilitate observations of the frontal system with unprecedented spatial and temporal resolution. This will provide an ideal four-dimensional (space-time) context in which to conduct a detailed study of frontal dynamics and plankton communities needed to examine mechanisms controlling phytoplankton populations in this frontal system. This project will also: (1) promote teaching, training and learning via participation of graduate and undergraduate students in the research , (2) provide a broad dissemination of information by means of outreach in public forums, printed media, and a video documentary of the field work, and (3) contribute to improving societal well-being and increased economic competitiveness by providing the knowledge needed for science-based stewardship of coastal ecosystems, with particular emphasis on connecting with the fishing industry through the Commercial Fisheries Research Foundation.

The investigators will conduct a set of three cruises to obtain cross-shelf sections of physical, chemical, and biological properties within the Pioneer Array. Nutrient distributions will be assayed together with hydrography to detect the signature of frontal upwelling and associated nutrient supply. The investigators expect that enhanced nutrient supply will lead to changes in the phytoplankton assemblage, which will be quantified with conventional flow cytometry, imaging flow cytometry (Imaging FlowCytobot, IFCB), optical imaging (Video Plankton Recorder, VPR), traditional microscopic methods, and pigment analysis. Zooplankton will be measured in size classes ranging from micro- to mesozooplankton with the IFCB and VPR, respectively, and also with microscopic analysis. Biological responses to upwelling will be assessed by measuring rates of primary productivity, zooplankton grazing, and net community production. These observations will be synthesized in the context of a coupled physical-biological model to test the two hypotheses that can potentially explain prior observations: (1) grazer-mediated control and (2) undersampling. Hindcast simulations will also be used to diagnose the relative importance of the various

mechanisms of upwelling. The intellectual merit of this effort stems from our interdisciplinary approach, advanced observational techniques, and integrated analysis in the context of a state-of-the-art coupled model. The project will address longstanding questions regarding hydrodynamics and productivity of an important ecosystem, leading to improved understanding of physical-biological interactions in a complex continental shelf regime. Given the importance of frontal systems in the global coastal ocean, it is expected that knowledge gained will have broad applicability beyond the specific region being studied.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1657803

[table of contents | back to top]