Moored time-series records for temperature collected from the LB1 Mooring, R/V Savannah (LB-2012-LB1, SAV-12-02) in the South Atlantic Bight (SAB) continental shelf off Long Bay during 2012 (Long Bay Wintertime Bloom project)

Website: https://www.bco-dmo.org/dataset/639382
Data Type: Cruise Results
Version: 1
Version Date: 2016-02-26

Project
» Mechanisms of nutrient input at the shelf margin supporting persistent winter phytoplankton blooms downstream of the Charleston Bump (Long Bay Wintertime Bloom)

Contributors	Affiliation	Role
Nelson, James	Skidaway Institute of Oceanography (SkIO)	Principal Investigator
Edwards, Catherine	Skidaway Institute of Oceanography (SkIO)	Co-Principal Investigator
Seim, Harvey E.	University of North Carolina at Chapel Hill (UNC-Chapel Hill)	Co-Principal Investigator
Haines, Sara	University of North Carolina at Chapel Hill (UNC-Chapel Hill)	Contact
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Moored time-series records of temperature measured every 5 minutes (300sec) by 25 Onset HOBO Water Temperature Data Loggers mounted on a tautline mooring. Collected from the LB1 Mooring, R/V Savannah (LB-2012-LB1, SAV-12-02) in the South Atlantic Bight continental shelf off Long Bay during 2012.

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Coverage

Spatial Extent: **N**:33.312 **E**:-77.86 **S**:32.483 **W**:-78.748
Temporal Extent: 2012-01-20 - 2012-04-04

Methods & Sampling

Onset HOBO temperature data loggers were attached to a tautline mooring from near-bottom to 25 m above bottom. Sampling was set for every 300 seconds (5min).

Data Processing Description

The original HOBO temperatures were adjusted to match the near-bottom logger during a well-mixed period [29 Jan 2012 from 00:00 to 12:00 GMT]. The near-bottom logger temperatures were also very similar to those recorded by the SeaBird MicroCat at the nearby LB1 ADCP mooring.

The individual logger files are organized in a matrix of corrected temperatures for 25 vertical levels as indicated by the variable "mab".

Observations before and after the mooring was in place have been removed.

The heights of the loggers above the bottom have been corrected for tilt using a pressure sensor mounted near the top of the mooring and assuming a linear drawdown of the mooring line. These heights are saved as "mab_corrected". The depths of the sensors has also been computed using these data and depth record from the LB1 bottom mounted CTD interpolated to the time base of the HOBO loggers. The variable is "sensor_depth_corrected" and utilizes the water column depth ("wc_depth").

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Data Files

File
Matlab file of temperature data for LongBay mooring #1 filename: lb1_temp_tchain.mat   (MATLAB Data (.mat), 7.94 MB)   MD5:41d91bc583c3e6e7bcc8ff938c593c16 A matrix of corrected temperatures for 25 vertical levels as indicated by the variable "mab" (meters above bottom). variable: variable description;   units dn_hobo: MATLAB datenum time;   days since 0000-01-01T00:00 UTC tem_mat_fix: water temperature matrix; degrees Celsius mab: meters above bottom - uncorrected; meters mab_corrected: meters above bottom - corrected; meters wc_depth: water column depth;   meters sensor_depth_corrected: sensor depth below surface; meters hobo_corr: offsets applied to temperatures; degrees Celsius
mooring_LB1_tchain_LB_2012_LB1.csv   (Comma Separated Values (.csv), 156 bytes)   MD5:f15ecad8a44581d75c0e1912147553bb   LB_2012_LB1_tchain   Mooring thermistor data   J. Nelson (SkIO)   version: 2016-02-26
mooring_LB1_tchain_SAV-12-02.csv   (Comma Separated Values (.csv), 156 bytes)   MD5:f15ecad8a44581d75c0e1912147553bb   LB_2012_LB1_tchain   Mooring thermistor data   J. Nelson (SkIO)   version: 2016-02-26

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Related Publications

IOC, SCOR and IAPSO (2010). The international thermodynamic equation of seawater - 2010: Calculation and use of thermodynamic properties. Intergovernmental Oceanographic Commission, Manuals and Guides No. 56, UNESCO (English), 196 pp. Available from http://www.TEOS-10.org http://www.teos-10.org/
Methods

Parameters

Parameters for this dataset have not yet been identified

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Temperature Logger
Dataset-specific Description	Onset HOBO temperature data loggers
Generic Instrument Description	Records temperature data over a period of time.

Deployments

LB_2012_LB1

Website	https://www.bco-dmo.org/deployment/58860
Platform	LB1 Mooring
Start Date	2012-01-20
End Date	2012-04-04
Description	Deployment of taut line and bottom frame at LB1 (at 31 m depth) during cruise SAV-12-02 on 20 January 2012. Recovered on 04 April 2012 during cruise SAV-12-14.

SAV-12-02

Website	https://www.bco-dmo.org/deployment/58862
Platform	R/V Savannah
Start Date	2012-01-18
End Date	2012-01-21
Description	Deployment of SKIO Seahorse profiler and bottom frame at LB2 (76 m); deployment of taunt line and bottom frame at LB1 (31 m); 12 CTD stations, starting at 271 m ending at 30 m. We kept a 5 km spacing from the offshore end until ~45 m. (Section run from ~1905 EST to 2320 EST on 01/19/12). Cruise information and original data are available from the NSF R2R data catalog.

Project Information

Mechanisms of nutrient input at the shelf margin supporting persistent winter phytoplankton blooms downstream of the Charleston Bump (Long Bay Wintertime Bloom)

Website: http://nccoos.org/projects/long-bay-wintertime-blooms/

Coverage: outer South Atlantic Bight (SAB) continental shelf off Long Bay

NSF Project Title: Mechanisms of nutrient input at the shelf margin supporting persistent winter phytoplankton blooms downstream of the Charleston Bump

Sustained phytoplankton blooms along the outer South Atlantic Bight (SAB) continental shelf off Long Bay are observed in winter in multi-year satellite chlorophyll imagery. This section of the shelf lies north of the "Charleston Bump" (between 32.5-33.5°N), where the Gulf Stream is often strongly deflected offshore. Due to this offshore deflection, this is not an area where nutrient input to the shelf would be enhanced by upwelling associated with Gulf Stream frontal eddies, a major mechanism of nutrient input in other parts of the SAB shelf (Lee et al., 1991). Yet prior in situ observations suggest that there is recurring input of nutrients from the upper slope to the outer shelf off Long Bay from winter to early spring. This project will investigate a fundamental aspect of physical-biological coupling in the outer shelf to upper slope region. The PIs will test the hypotheses that: 1) the persistence of winter blooms on the outer shelf off Long Bay results from repeated episodes of nutrient input and mixing which maintains nutrient-sufficient conditions for extended periods; 2) several physical mechanisms are involved, including enhanced mixing energy from the internal tide along this section of the upper slope/shelf break; 3) the relatively high nutrient, intermittently turbulent environment will favor larger bloom-forming phytoplankton. The latter could have important implications for higher trophic levels, including early life history strategies of fish that spawn along the shelf margin off Long Bay in winter to early spring.

This project will combine several maturing observational technologies to address the following:

1. What is the frequency and magnitude on on-shelf transport of nitrate from the upper slope?
2. What are the mechanisms of nutrient delivery from the upper slope to the outer continental shelf zone that are operating off Long Bay under the range of hydrographic and forcing conditions encountered in winter?
3. What is the 3-D structure of outer shelf hydrography and associated winter bloom features and how do these evolve through multiple nutrient input/mixing events?
4. What are the rates of nitrate utilization and primary production associated with the winter blooms?
5. Does the winter regime consistently favor a bloom assemblage dominated by larger diatom forms?

Near-continuous cross-shelf and upper slope observations will be obtained with two autonomous gliders, time-series measurements on the outer shelf and slope from a set of moored instruments (including a moored profiling system at the shelf break), and repeated cross- and along-shelf ship surveys using a towed, undulating package. Ship station work will include measurements of primary production and on-board analyses of key functional characteristics of the phytoplankton assemblage (cell forms, abundance, size and bio-volume distributions) using a microfluidics/imaging system. In combination, these systems will provide a level of spatial and temporal resolution of physical, nutrient and biological fields that could not be achieved in earlier, station-based field studies and the basis for improved understanding of physical mechanisms of recurring nutrient input to the shelf, and how the nutrient, mixing, and circulation regime in winter structures the phytoplankton community. Coastal naturalists will be engaged through a seabird survey component of the field program that will augment existing information on pelagic seabirds in winter and define their association with oceanographic features on the central South Atlantic Bight shelf and slope.

This project will provide a deeper understanding of shelf/slope exchange processes and how these influence shelf ecosystems, generating information that will contribute to implementation of ecosystem-based management in the region.

References:
Lee, T. N., J. A. Yoder, and L. P. Atkinson, 1991: Gulf Stream frontal eddy influence on productivity of the southeast U.S. continental shelf. J. Geophys. Res, 96, 22191-22205.

Funding

Funding Source	Award
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