ADCP Transects from 2014-2015 R/V C-HAWK MuLTI-2 project cruises in the Gulf of Maine, Coastal eastern Maine, from Frenchman Bay to the Canadian border

Website: https://www.bco-dmo.org/dataset/615111
Data Type: Other Field Results
Version: 2
Version Date: 2016-01-20

Project
» An integrated theoretical and empirical approach to across-shelf mixing and connectivity of mussel populations (MuLTI-2)

Contributors	Affiliation	Role
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Abstract
ADCP Transects from 2014-2015 R/V C-HAWK MuLTI-2 project cruises in the Gulf of Maine, Coastal eastern Maine, from Frenchman Bay to the Canadian border

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Coverage

Spatial Extent: **N**:44.6616851 **E**:-67.3473161 **S**:44.2589326 **W**:-68.2755757
Temporal Extent: 2014-06-27

Dataset Description

ADCP data collected during the MuLTI-2 Project

These data are served as tar.gz native RDI ADCP ENX files. The data are not raw, but partially processed. ENX files are ADCP single-ping data (plus Navigation Data) after having been bin-mapped, transformed to Earth coordinates, and screened for error velocity, vertical velocity, and false targets. These data should be ready for averaging. Users are responsible for processing the files after downloading them. These files can be opened and viewed with VmDAS or WinADCP.

These data were published in Conlon, et al. (2018).

Across-shelf cruises
MuLTI-2_ChandlerBayAcrossShelf_20140620_Ebb

MuLTI-2_ChandlerBayAcrossShelf_20140717_Flood
MuLTI-2_ChandlerBayAcrossShelf_20150715_Ebb
MuLTI-2_ChandlerBayAcrossShelf_20150709_Flood
MuLTI-2_EnglishmanBayAcrossShelf_20140808_Ebb
MuLTI-2_EnglishmanBayAcrossShelf_20140711_Flood
MuLTI-2_EnglishmanBayAcrossShelf_20150730_Ebb
MuLTI-2_EnglishmanBayAcrossShelf_20150717_Flood
MuLTI-2_FrenchmanBayUpperAcrossShelf_20140812_Flood
MuLTI-2_FrenchmanBayUpperAcrossShelf_20150610_Flood
MuLTI-2_FrenchmanBayUpperAcrossShelf_20150625_Ebb
MuLTI-2_FrenchmanBayUpperAcrossShelf_20150828_Ebb
MuLTI-2_FrenchmanBayUpperAcrossShelf_20150608_Flood
MuLTI-2_FrenchmanBayLowerAcrossShelf_20140812_Ebb
MuLTI-2_FrenchmanBayLowerAcrossShelf_20150626_Ebb
MuLTI-2_FrenchmanBayLowerAcrossShelf_20150825_Flood
MuLTI-2_MachiasBayAcrossShelf_20140627_Ebb
MuLTI-2_MachiasBayAcrossShelf_20150807_Flood
MuLTI-2_PigeonHillAcrossShelf_20140718_Flood
MuLTI-2_PigeonHillAcrossShelf_20150714_Ebb
MuLTI-2_PleasantBayAcrossShelf_20140712_Ebb
MuLTI-2_PleasantBayAcrossShelf_20140619_Flood
MuLTI-2_PleasantBayAcrossShelf_20150806_Flood
MuLTI-2_PleasantBayAcrossShelf_20150729_Ebb
MuLTI-2_WesternBayAcrossShelf_20140619_Ebb
MuLTI-2_WesternBayAcrossShelf_20140717_Ebb
MuLTI-2_WesternBayAcrossShelf_20150707_Flood
MuLTI-2_WesternBayAcrossShelf_20150714_Flood

Along-shelf cruises
MuLTI-2_ChandlerEnglishmanBaysAlongShelf_20140711_Ebb
MuLTI-2_ChandlerEnglishmanBaysAlongShelf_20150722_Flood
MuLTI-2_ChandlerEnglishmanBaysAlongShelf_20150706_Flood
MuLTI-2_FrenchmanBayAlongShelf_20150615_Ebb
MuLTI-2_PleasantWesternBaysAlongShelf_20140624_Flood
MuLTI-2_PleasantWesternBaysAlongShelf_20140712_Flood
MuLTI-2_PleasantWesternBaysAlongShelf_20150721_Flood
MuLTI-2_PleasantWesternBaysAlongShelf_20150706_Ebb
MuLTI-2_FrenchmanBayInner_20150827_Ebb
MuLTI-2_FrenchmanBayInner_20150624_Flood
MuLTI-2_FrenchmanBayInner_20150630_Ebb
MuLTI-2_FrenchmanBayInner_20150618_Flood

Mixed
MuLTI-2_MoosabecEastern_20150811_Ebb
MuLTI-2_MoosabecEastern_20150716_Ebb

Methods & Sampling

Segments for the ADCP data correspond to the intervals between the CTD stations. Segment 1 runs from station 1 to station 2, etc. There were approximately 13 transects and 4 data sets (2 ebb tide, 2 flood tide) for each transect.

In 2014 the ADCP data was collected in segments corresponding to the intervals between CTD stations, but in 2015 the instrument was left running continuously while the CTD casts were conducted.

Georeferencing is incorporated into the data from individual transects.

600 kHz RDI Sentinel: www.rdinstruments.com/sen.aspx

Data Processing Description

These data are served as tar.gz native RDI ADCP ENX files. The data are not raw, but partially processed. ENX files are ADCP single-ping data (plus Navigation Data) after having been bin-mapped, transformed to Earth coordinates, and screened for error velocity, vertical velocity, and false targets. These data should be ready for averaging. Users are responsible for procesing the files after downloading them. These files can be opened and viewed with VmDAS or WinADCP.

600 kHz RDI Sentinel: www.rdinstruments.com/sen.aspx

BCO-DMO Processing Notes
DATA VERSION 1:
* Generated from original files contributed by Phil Yund
* Original files were tar.gzipped and organized for retrieval by transect id
DATA VERSION 2:
* Data access updated to include all Across, Along, and Mixed transects. Data version1 was only one site, Machias Bay. * Data file download option added to download all the transect files in one tar.gz file.

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Data Files

File	
ADCP (*.ENX) transect files filename: all_transects.tar.gz A bundled tar.gz file containing all ADCP data collected during the MuLTI-2 Project. These data are served as tar.gz native RDI ADCP ENX files. The data are not raw, but partially processed. ENX files are ADCP single-ping data (plus Navigation Data) after having been bin-mapped, transformed to Earth coordinates, and screened for error velocity, vertical velocity, and false targets. These data should be ready for averaging. Users are responsible for processing the files after downloading them. These files can be opened and viewed with VmDAS or WinADCP.	(GZIP (.gz), 181.70 MB) MD5:60cde20a698333847e5678cfff4da804
ADCP_Transects_all.csv Primary data file for dataset ID 615111	(Comma Separated Values (.csv), 32.16 KB) MD5:c12fcd55fc749ce0004a05d788b0372d

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Related Publications

Conlon, L. M., Xue, H., Morello, S. L., & Yund, P. O. (2018). Nearshore Flow Patterns in a Complex, Tidally Driven System in Summer: Part I. Model Validation and Circulation. Journal of Geophysical Research: Oceans, 123(4), 2401–2421. doi:10.1002/2017jc013331 https://doi.org/10.1002/2017JC013331
Results

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Parameters

Parameter	Description	Units
Deployment_Id	Deployment identifier	unitless
Transect_Id	Transect or transect segment identifier in format Project_BayDirection_Date_Tidal phase_Length; Project=MuLTI-2, Bay=Local bay name, Direction=AcrossShelf, AlongShelf, or not specified (when a mixture of both), Date in format yyyymmdd, Tidal phase=Flood or Ebb, Length=Segment ID number for 2014 data, in the format of Seg#, or All for 2015 data.	unitless
Date_Start	Transect or transect segment start date (UTC time zone) in format yyyymmdd	unitless
Time_Start	Transect or transect segment start time (UTC) in format HHMM	unitless
Lat_Start	Transect or transect segment starting latitude	decimal degrees
Lon_Start	Transect or transect segment starting longitude	decimal degrees
Date_End	Transect or transect segment end date (UTC time zone) in format yyyymmdd	unitless
Time_End	Transect or transect segment end time (UTC) in format HHMM	unitless
Lat_End	Transect or transect segment ending latitude	decimal degrees
Lon_End	Transect or transect segment ending longitude	decimal degrees
Data_File	Link to data file (Files served as tar.gz native RDI ADCP ENX files.)	unitless

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Instruments

Dataset-specific Instrument Name	600 kHz RDI Sentinel
Generic Instrument Name	Acoustic Doppler Current Profiler
Dataset-specific Description	600 kHz RDI Sentinel
Generic Instrument Description	The ADCP measures water currents with sound, using a principle of sound waves called the Doppler effect. A sound wave has a higher frequency, or pitch, when it moves to you than when it moves away. You hear the Doppler effect in action when a car speeds past with a characteristic building of sound that fades when the car passes. The ADCP works by transmitting "pings" of sound at a constant frequency into the water. (The pings are so highly pitched that humans and even dolphins can't hear them.) As the sound waves travel, they ricochet off particles suspended in the moving water, and reflect back to the instrument. Due to the Doppler effect, sound waves bounced back from a particle moving away from the profiler have a slightly lowered frequency when they return. Particles moving toward the instrument send back higher frequency waves. The difference in frequency between the waves the profiler sends out and the waves it receives is called the Doppler shift. The instrument uses this shift to calculate how fast the particle and the water around it are moving. Sound waves that hit particles far from the profiler take longer to come back than waves that strike close by. By measuring the time it takes for the waves to bounce back and the Doppler shift, the profiler can measure current speed at many different depths with each series of pings. (More from WHOI instruments listing).

Dataset-specific Instrument Name	GPS receiver
Generic Instrument Name	Global Positioning System Receiver
Dataset-specific Description	YSI CTD with built in GPS receiver
Generic Instrument Description	The Global Positioning System (GPS) is a U.S. space-based radionavigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis. The U.S. Air Force develops, maintains, and operates the space and control segments of the NAVSTAR GPS transmitter system. Ships use a variety of receivers (e.g. Trimble and Ashtech) to interpret the GPS signal and determine accurate latitude and longitude.

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Deployments

MuLTI-2_Across_Shelf

Website	https://www.bco-dmo.org/deployment/614681
Platform	R/V C-HAWK
Start Date	2014-06-20
End Date	2015-07-30
Description	A series of across shelf transects associated with the MuLTI-2 Project

MuLTI-2_Along_Shelf

Website	https://www.bco-dmo.org/deployment/614685
Platform	R/V C-HAWK
Start Date	2014-06-06
End Date	2015-08-27
Description	A series of along shelf transects associated with the MuLTI-2 Project

MuLTI-2_Mixed

Website	https://www.bco-dmo.org/deployment/614687
Platform	R/V C-HAWK
Start Date	2015-07-07
End Date	2015-08-11
Description	A series of mixed (across/along) shelf transects associated with the MuLTI-2 Project

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Project Information

An integrated theoretical and empirical approach to across-shelf mixing and connectivity of

mussel populations (MuLTI-2)

Coverage: Gulf of Maine: Frenchmen Bay (44 28.239 N -68 15.927 W) to Machais Bay (44 39.350 N -67 21.320 W)

Acronym "MuLTI-2" (Mussel Larval Transport Initiative-2)

Extracted from the NSF award abstract:

Existing larval transport models focus mainly on along-shelf transport and have done little to explicitly incorporate the effects of cross-shelf mixing and transport processes. Yet cross-shelf transits (both outgoing and incoming legs) are critical components of the dispersal paths of coastal invertebrates. This project will explore the role of cross-shelf mixing in the connectivity of blue mussel populations in eastern Maine. Previous work has shown that the Eastern Maine Coastal Current (EMCC) begins to diverge from shore southwest of the Grand Manan Channel and creates a gradient in cross-shelf mixing and larval transport, with cross-shelf mixing being more common on the northeastern end, episodic in the transitional middle area, and then becoming rare in the southwestern half of the region of the Gulf of Maine. As a result, the investigators predict that northeastern populations of mussels are seeded mostly from up-stream sources, while a significant component of self-seeding (local retention) exists in southwestern populations. Larvae settling in the intervening bays are expected to be derived from a mixture of local and up-stream sources. Using a combined empirical and theoretical approach hydrographic, current profile, and larval vertical migration data will be collected and used to develop and validate a high-resolution coastal circulation model coupled to a model of larval behavior. The investigators will model simulations in different years using the empirical data from mussel reproductive output and spawning times. Connectivity predicted from this model will be then tested against independent empirical estimates of connectivity based on trace element fingerprinting for larvae which can be connected to specific natal habitats. Regions of agreement and discrepancy in the model will be identified to guide additional data collection and model refinement. This iterative process will ensure an understanding of both larval transport patterns and processes, and provide estimates of inter-annual variability in connectivity for blue mussel populations in the Gulf of Maine.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1334022
NSF Division of Ocean Sciences (NSF OCE)	OCE-1333755
NSF Division of Ocean Sciences (NSF OCE)	OCE-1333797

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