CTD profile data 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/614744

Data Type: Cruise Results

Version: 2

Version Date: 2015-10-29

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

CTD profile data 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**:-67.3446914 **S**:44.238717 **W**:-68.2755757

Temporal Extent: 2014-06-19 - 2015-08-28

Dataset Description

Data from CTD downcasts on transects in coastal eastern Maine collected during the MuLTI-2 Project.

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

Acquisition Description

CTD casts at discrete stations located along transects. Most transects are oriented either across-shelf or along-shelf (one is a mixture). Sampling was limited to 2 hrs. in the middle of the tidal cycle, on either flood or ebb tides. CTD was a YSI Castaway: www.sontek.com/productsdetail.php?CastAway-CTD-11. Calibration dates and additional information are supplied in the headers of each data file. Headers also contain coordinates of the instrument at the start and stop of each cast.

Frenchman Bay is a long transect that had to broken into two with half run on each cruise, in order to stay within our 2 hour tidal phase window. Hence the renchman Bay cruises have an "Upper" vs. "Lower" designation, but the station coordinates are continuous. To accommodate weather conditions and/or logistical delays, we did not consistently run the same set of stations on each cruise designated "Upper" vs. "Lower" cruise, but the designation indicates the general location of stations.

Processing Description

Data Processing:
All processing was via YSI software. Depths were calculated from pressures and all measured values expressed as depth. Up-cast data were excluded, so only down-cast data are presented.

BCO-DMO Processing Notes
- Generated from original .csv files contributed by Phil Yund
- Routine written to reformat the original .csv files into tab separated, BCO-DMO compatible files
- Header metadata removed from original files during reformatting
- Significant header metadata preserved in transect header files generated by BCO-DMO
- Parameter names edited to conform to BCO-DMO naming convention found at Choosing Parameter Name: http://usjgofs.whoi.edu/naming-guidelines.html
- ISO formatted UTC date/time added
- **29October2015/srg** (data version 2) Corrected the BCO-DMO generated link between the Transect_Id and the Data Files from that Transect_Id

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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

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Parameters

Parameter	Description	Units
Deployment_Id	MuLTI-2 Deployment Id	text
Transect_Id	MuLTI-2 Transect Id	text
Station_Id	CTD Station Id	text
Date_UTC	Date of CTD station (UTC)	YYYYMMDD
Time_UTC	Time of CTD station (UTC)	HHMMSS
Date_Local	Date of CTD station (Local)	YYYYMMDD
Time_Local	Time of CTD station (Local)	HHMMSS
Lat_Start	CTD Station start latitude (South is negative)	decimal degrees
Lon_Start	CTD Station start longitude (West is negative)	decimal degrees
Lat_End	CTD Station end latitude (South is negative)	decimal degrees
Lon_End	CTD Station end longitude (West is negative)	decimal degrees
Cast_Duration	CTD Cast duration	seconds
Pressure	Pressure	decibars
Depth	Depth	meters
Temperature	Temperature	degrees Celsius
Conductivity	Conductivity	MicroSiemens per Centimeter
Specific_Conductance	Specific Conductance	MicroSiemens per Centimeter
Salinity	Salinity	PSU
Sound_Velocity	Sound_Velocity	meters/sec
Density	Density	kilograms/meter^3

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Instruments

Dataset-specific Instrument Name	YSI Castaway CTD
Generic Instrument Name	CTD profiler
Dataset-specific Description	YSI Castaway CTD Device (2014 and 2015): CC1223007 2014 Calibration Information from headers in original .csv files: Electronics calibration date,0001-01-01 Conductivity calibration date,2012-06-01 Temperature calibration date,2012-06-01 Pressure calibration date,2012-05-31 2015 Calibration Information from headers in original .csv files: Electronics calibration date,0001-01-01 Conductivity calibration date,2015-02-19 Temperature calibration date,2015-02-19 Pressure calibration date,2015-02-16
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 and permits scientists observe the physical properties in real time via a conducting cable connecting the CTD to a deck unit and computer on the 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 instrument designation is used when specific make and model are not known.

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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

Dataset-specific Instrument Name	YSI Castaway CTD
Generic Instrument Name	Global Positioning System Receiver
Dataset-specific Description	YSI Castaway CTD with internal GPS sensor
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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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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