2-meter hourly pCO2 data collected with a Sunburst SAMI from Bowdoin Buoy Mooring in the Lower Harpswell Sound, Casco Bay, Maine from 2011-2012

Website: https://www.bco-dmo.org/dataset/546343
Version: 29 January 2015
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Project
» River and sediment-modulated stress in planktonic and early settlement Mya arenaria (OA stress in Mya arenaria)

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Dataset Description

This data set includes 2-meter hourly pCO2 data collected with a Sunburst SAMI at Bowdoin Buoy in Casco Bay, Maine.

Methods & Sampling

pCO2 data were collected with a SAMI CO2 c0003; dissolved oxygen data were collected with an Aanderaa Optode model #3835, serial #336. For operation of SAMI CO2 see:
DeGrandpre, M.D., Hammar, T.R., Smith, S.P., and F.L. Sayles. 1995. In situ measurements of seawater pCO2. Limnol. Oceanog., 40, 969-975.

Data Processing Description

Data was collected at the rate of once an hour and dissolved oxygen has been corrected for temperature and salinity. Missing data or calibration runs were originally represented by a -9999 (BCO-DMO has changed -9999 to 'nd' to indicate 'no data'). BCO-DMO added ISO_DateTime_UTC column.

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Data Files

File
Bowdoin_buoy_pCO2.csv (Comma Separated Values (.csv), 1.00 MB) MD5:0f1b65c5027e831d38bedd52254d528f Primary data file for dataset ID 546343

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Parameters

Parameter	Description	Units
deployment	Name of the deployment.	dimensionless
lat	Latitude of the buoy; positive values = North.	decimal degrees
lon	Longitude of the buoy; positive values = East.	decimal degrees
year	4-digit year of sampling.	YYYY
month	2-digit month of sampling.	mm (01 to 12)
day	2-digit day of month of sampling.	dd (01 to 31)
date	Month/day/year of sampling; UTC.	mm/dd/yy
time	Time (UTC), in hours and minutes; 24-hour clock.	HHMM
serial_date	Serial date.	
temp_sami	Temperature collected with SAMI.	degrees Celsius (C)
co2_sami	pCO2 collected with SAMI CO2.	pCO2
O2_diss_2m_raw	Dissolved oxygen collected with Aanderaa Optode (raw).	micromoles per liter (umol/L)
O2_diss_2m_corr	Dissolved oxygen collected with Aanderaa Optode (corrected).	micromoles per liter (umol/L)
ISO_DateTime_UTC	Date and Time (UTC) formatted to ISO 8601 standard.	YYYY-MM-DDTHH:MM:SS[.xx]Z

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Instruments

Dataset-specific Instrument Name	Aanderaa Optode
Generic Instrument Name	Aanderaa Oxygen Optodes
Generic Instrument Description	Aanderaa Oxygen Optodes are instrument for monitoring oxygen in the environment. For instrument information see the Aanderaa Oxygen Optodes Product Brochure.

Dataset-specific Instrument Name	SAMI
Generic Instrument Name	Submersible Autonomous Moored Instrument
Generic Instrument Description	The Submersible Autonomous Moored Instrument (SAMI) measures and logs levels of dissolved chemicals in sea and fresh water. It is a plastic cylinder about 6 inches wide and 2 feet long that is self-powered and capable of hourly measurements for up to one year. All data collected are logged to an internal memory chip to be downloaded later. SAMI sensors usually are placed a few feet underwater on permanent moorings, while others on floating drifters sample the water wherever the wind and currents carry them. The instruments have been used by researchers around the globe in a variety of studies since 1999. Dr. Mike DeGrandpre, University of Montana, developed the SAMI between 1990 and 1993 during his postdoctoral work at the Woods Hole Oceanographic Institution (Woods Hole, MA, USA). For additional information, see URL: http://www.sunburstsensors.com/ from the manufacturer, Sunburst Sensors, LLC, 1226 West Broadway, Missoula, MT 59802.

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Deployments

Mooring_D0205

Website	https://www.bco-dmo.org/deployment/546294
Platform	Bowdoin Buoy
Start Date	2011-03-09
End Date	2012-03-08

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Project Information

River and sediment-modulated stress in planktonic and early settlement Mya arenaria (OA stress in Mya arenaria)

Coverage: Gulf of Maine: Kennebec River, Casco Bay

Extracted from the NSF award abstract:

Estuaries are productive, complex and have great economic value by virtue of their fisheries, ecosystem services and recreation potential. They are typically less buffered to acid than open oceans due to the

combined effects of acid production during heterotrophy and acidic inputs from both land and atmosphere. Within estuaries, it is important to understand how varying acid burdens impact living resources, particularly those that provide ecosystem services and/or generate income as fisheries. The bivalve Mya arenaria, the focal species of this proposed research, is one such resource that sustains a valuable coastal fishery while providing service via its filtration capacity. Because Mya shells are constructed from a relatively soluble form of calcium carbonate (aragonite), and the clams often inhabit eutrophic waters, they may be particularly vulnerable as pH declines. Planktonic larvae and benthic juveniles are critical life stages -- even small reductions in theier abundances could substantially decrease adult populations.

This proposed research addresses four distinct hypotheses concerning the roles of riverine and sediment interactions on the viability of larval and juvenile Mya. Research activities include the following.

1. Fieldwork will evaluate the spatial and seasonal changes in aragonite saturation state within the Kennebec River Estuary and Casco Bay. Seasonal sampling will be coupled with high-frequency sampling during the annual Mya spawn to observe and document the effect of lowered aragonite saturation state on the health status of larval Mya.

2. Using larval Mya, laboratory experiments will mimic the aragonite saturation state observed in Casco Bay during the high-frequency cruises. Metamorphic change (veligers, pediveligers, and metamorphosed juveniles), growth rate, and survivorship of Mya will be evaluated as a function of aragonite saturation state.

3. Spatially intensive daily cohort monitoring of the intertidal mud flats in Falmouth, Maine, will establish the link between changes in abundance of settling juveniles and aragonite saturation state during the period of Mya set. Cohort monitoring of settling Mya will be examined in reference to sediment pH and aragonite saturation state in nearby deposits to ascertain if sediment saturation state is a primary settlement cue for transitioning larvae.

4. A diagnostic model will be developed for the shellfish management community that can be used to detect aragonite saturation state of the water column. The model would run on routine oceanographic measurements (salinity, temperature, oxygen and chlorophyll fluorescence).

The chemical consequences of increasing atmospheric CO2 and resulting hydrolysis of carbonic acid is well understood and resultant ocean acidification has been accurately predicted with the current generation of global circulation models. These predictions have accelerated research into the effects of ocean acidification on marine organisms, particularly those with CaCO3 exoskeletons. Estuarine waters are far less buffered than oceans, are subject to a variety of acid loadings, and are quite possibly acidifying at a faster rate than the open ocean. Yet, these regions have been largely ignored in 'acidification' research. Effects of acidification on calcifying organisms are similar regardless of whether of acid origin -- atmospheric exchange, net heterotrophy, or discharge of acidic river water. Likewise, each of these acid fluxes is being perturbed via anthropogenic activity (e.g. fossil fuel use, deforestation, agriculture). The proposed research will further understanding of the combined and cumulative impacts of varied acid burdens on calcifying organisms in coastal waters.

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Funding

Funding Source	Award
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