

# Event log from R/V Tioga TI777 in the Provincetown to Gulf of Maine from August 2014 (Gulf of Maine Pteropods project)

**Website:** <https://www.bco-dmo.org/dataset/539896>

**Version:** 2014-11-11

## Project

» [Seasonal and Ontogenetic Effects of Ocean Acidification on Pteropods in the Gulf of Maine](#) (Gulf of Maine Pteropods)

## Program

» [Science, Engineering and Education for Sustainability NSF-Wide Investment \(SEES\): Ocean Acidification \(formerly CRI-OA\)](#) (SEES-OA)

Contributors	Affiliation	Role
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## Data Files

File
<b>TI777_eventlog.csv</b> (Comma Separated Values (.csv), 3.98 KB) MD5:096d5a236fbbb781a449a6ee32e575f1
Primary data file for dataset ID 539896

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## Parameters

Parameter	Description	Units
event	event or sampling operation number	unitless
inst	Instrument used to collect data;see: instrument list	unitless
cast	cast number	unitless

sta_std	standard station number	unitless
station	consecutive station number	unitless
year	year	YYYY
mon_local	month of year; local time	1-12
day_local	day of month; local time	1-31
time_local	time of day; local time; using 2400 clock format	HHMM
time_diff	The number of hours added to local time to convert to UTC.	hours
mon_utc	month of year; UTC	1 to 12
day_utc	day of month; UTC	1 to 31
time_utc	time; UTC	HHMM
yrday_utc	UTC day and decimal time; as 326.5 for the 326th day of the year or November 22 at 1200 hours (noon).	unitless
ISO_DateTime.UTC	Date/Time (UTC) ISO formatted. This standard is based on ISO 8601:2004(E). e.g. 2009-08-30T14:05:00[.xx]Z (UTC time)	YYYY-MM-DDTHH:MM:SS[.xx]Z
lat	latitude; negative = South	decimal degrees
lon	longitude; negative = West	decimal degrees
se_flag	sampling operation start (s) or end (e) flag	unitless
depth	depth of sample	meters
depth_w	depth of water	meters
PI	scientific investigator's name	unitless
comment	free text comments	unitless

## Instruments

<b>Dataset-specific Instrument Name</b>	CTD SBE 911plus
<b>Generic Instrument Name</b>	CTD Sea-Bird SBE 911plus
<b>Generic Instrument Description</b>	The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). more information from Sea-Bird Electronics

<b>Dataset-specific Instrument Name</b>	MOC.25
<b>Generic Instrument Name</b>	MOCNESS.25
<b>Dataset-specific Description</b>	The MOCNESS-1/4 was equipped with nine 150-um mesh nets (nets 0-8). The underwater unit used was #169; temperature probe was #535 and conductivity probe was #120. In addition to the standard temperature and conductivity probes the system also had a beta-type strobe-light unit for reducing avoidance of the nets by some zooplankton and possibly small fish. The strobe system has two units each with 12 LED sets (LUXEON Rebel LED) with peak output between 490-520 nm. The LEDs are powered by the MOCNESS battery and their pulse width, amplitude, flash rate period, and on/off are controlled by the MOCNESS software.
<b>Generic Instrument Description</b>	The Multiple Opening/Closing Net and Environmental Sensing System or MOCNESS is a family of net systems based on the Tucker Trawl principle. The MOCNESS-1/4 carries nine 1/4-m2 nets usually of 64 micrometer mesh and is used to sample the larger micro-zooplankton.

<b>Dataset-specific Instrument Name</b>	pump
<b>Generic Instrument Name</b>	Pump
<b>Dataset-specific Description</b>	A "Little Giant" brand pump was used to retrieve water from depth for animal culture.
<b>Generic Instrument Description</b>	A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps

<b>Dataset-specific Instrument Name</b>	Reeve Net
<b>Generic Instrument Name</b>	Reeve Net
<b>Dataset-specific Description</b>	A 1-m diameter Reeve net with a 150-um mesh net was deployed via the A-frame. The book-clamp to attach the net was borrowed from Carin Asjian's lab. Ship speed during tows was ~1-1.5 knots. The depth and duration of deployment varied widely. We occasionally focused on very deep (90-130) or very shallow (40-20) layers based on acoustic evidence, but had our greatest success with a tow-yo pattern that focused on depth ranges between 40-90 m (See Cruise Report, Table 1 and Appendix 4 for details). <a href="http://bcodata.whoi.edu/GoME_Pteropods/cruise_reports/Tioga729_Cruise_Re...">http://bcodata.whoi.edu/GoME_Pteropods/cruise_reports/Tioga729_Cruise_Re...</a>
<b>Generic Instrument Description</b>	A Reeve Net is a conventional ring net with a very large acrylic cylindrical cod-end (30 liters) designed to collect fragile gelatinous animals. The net is lowered to a particular depth and then hauled slowly back to the surface (5-10 m/min). Reeve (1981) also described a double net system with no bridle and flotation at the net mouth that is attached to a roller mechanism that rides on a tow wire. The roller system is locked in place by a pressure release device. Once below a set pressure, the roller and nets are released and they float slowly up the wire, gently collecting the zooplankton, without being influenced by the motion of the vessel and associated vertical wire movements. (from Wiebe and Benfield, 2003)

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## Deployments

### TI777

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/539885">https://www.bco-dmo.org/deployment/539885</a>
<b>Platform</b>	R/V Tioga
<b>Report</b>	<a href="http://bcodata.whoi.edu/GoME_Pteropods/cruise_reports/Tioga777_Cruise_Report.pdf">http://bcodata.whoi.edu/GoME_Pteropods/cruise_reports/Tioga777_Cruise_Report.pdf</a>
<b>Start Date</b>	2014-08-19
<b>End Date</b>	2014-08-20
<b>Description</b>	Live capture of pteropod <i>Limacina retroversa</i> for experiments and water sampling for carbonate chemistry profile.

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## Project Information

### Seasonal and Ontogenetic Effects of Ocean Acidification on Pteropods in the Gulf of Maine (Gulf of Maine Pteropods)

**Website:** <http://www.whoi.edu/people/glawson/>

**Coverage:** Gulf of Maine

This project will involve a series of five short cruises in 2013 and 2014, during which a variety of hydrographic, chemical, and biological data and samples will be collected, as well as a number of laboratory experiments examining pteropod physiology and gene expression.

From NSF proposal abstract:

Dissolution of excess anthropogenic CO<sub>2</sub> into the ocean is causing the marine environment to decrease in pH. This "ocean acidification" is predicted to threaten a broad variety of marine organisms, particularly calcifying animals such as the thecosome (i.e., shelled) pteropods. These pelagic gastropods form an aragonite shell, are prey for a number of commercially important fish, and are significant contributors to carbon biogeochemistry. Their ecosystem importance, abundance, and sensitivity to dissolution position them as an important group for investigating the impacts of acidification. Our understanding of the effect of high CO<sub>2</sub> on pteropods and the pelagic ecosystem, however, is limited primarily to short-term studies of adult calcification and respiration response in the polar ecosystems. There have been no seasonal studies of sensitivity and our understanding of the effect of CO<sub>2</sub> on pteropod early life stages is limited. *Limacina retroversa* is a particularly abundant thecosome pteropod in the North Atlantic, where it is prey for a number of fisheries species and other top predators. This species is also the most common pteropod in the Gulf of Maine (GoM) where it is present year round. *L. retroversa* thus offers the prospect of a useful model pteropod species, given both its ecological importance and its abundance in readily accessible waters. The investigators will conduct a series of short cruises to sample *L. retroversa* on a seasonal basis from local waters of the GoM near Cape Cod. The carbonate chemistry of the GoM fluctuates seasonally, providing the opportunity to assess the response of wild caught pteropods to natural changes in CO<sub>2</sub>. By characterizing the carbonate chemistry of the water column and measuring the metabolic rate, shell quality, and gene expression of pteropods throughout the year, the researchers will achieve a time series of pteropod sensitivity to CO<sub>2</sub>. Subsequently, using experimental manipulations the investigators will explore the effect of seasonal acclimation on pteropod response to short- and medium-term exposure to enhanced CO<sub>2</sub>. Pteropods frequently lay eggs in captivity, and at WHOI there is institutional expertise in maintaining these individuals in the laboratory. Building on these strengths, the researchers will also study the effect of CO<sub>2</sub> on embryonic and larval development in *L. retroversa*. These earliest life-stages of marine calcifiers are thought to be especially sensitive since initial shell precipitation and the highly energetic processes of growth and development are impeded by CO<sub>2</sub> exposure. They will also document mortality, shell production, abnormality, and developmental rate of clutches of pteropod embryos exposed to increased CO<sub>2</sub>.

**Intellectual Merit:** Thecosome pteropods are an abundant group of calcifying zooplankters that have been chronically understudied, particularly in temperate regions. Due to its accessibility and ecological importance, *L. retroversa* can be developed as a valuable model, interesting both as the dominant pteropod in the commercially-important GoM region and also an abundant pteropod in the temperate waters of the North Atlantic. The goal of this research is to augment our knowledge of the distribution of *L. retroversa*, to attain an understanding of their seasonal sensitivity to natural variability in CO<sub>2</sub>, and to see how this exposure impacts responses to both short- and medium-term CO<sub>2</sub> exposure. Using powerful transcriptomic technologies, the research will transform our understanding of this group by investigating the molecular mechanisms of response in *L. retroversa* to both seasonality and varying durations and intensities of acidification, contextualized by ecosystem- and organism-level metrics. Furthermore the study will examine the effect of CO<sub>2</sub> on the eggs of pteropods for the first time, providing insight into their sensitivity to an acidifying environment.

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## Program Information

**Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)**

**Website:** [https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=503477](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503477)

**Coverage:** global

NSF Climate Research Investment (CRI) activities that were initiated in 2010 are now included under Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES). SEES is a portfolio of activities that highlights NSF's unique role in helping society address the challenge(s) of achieving sustainability. Detailed information about the SEES program is available from NSF ([https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=504707](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504707)).

In recognition of the need for basic research concerning the nature, extent and impact of ocean acidification

on oceanic environments in the past, present and future, the goal of the SEES: OA program is to understand (a) the chemistry and physical chemistry of ocean acidification; (b) how ocean acidification interacts with processes at the organismal level; and (c) how the earth system history informs our understanding of the effects of ocean acidification on the present day and future ocean.

#### **Solicitations issued under this program:**

[NSF 10-530](#), FY 2010-FY2011

[NSF 12-500](#), FY 2012

[NSF 12-600](#), FY 2013

[NSF 13-586](#), FY 2014

NSF 13-586 was the final solicitation that will be released for this program.

#### **PI Meetings:**

[1st U.S. Ocean Acidification PI Meeting](#) (March 22-24, 2011, Woods Hole, MA)

[2nd U.S. Ocean Acidification PI Meeting](#) (Sept. 18-20, 2013, Washington, DC)

3rd U.S. Ocean Acidification PI Meeting (June 9-11, 2015, Woods Hole, MA – Tentative)

#### **NSF media releases for the Ocean Acidification Program:**

[Press Release 10-186 NSF Awards Grants to Study Effects of Ocean Acidification](#)

[Discovery Blue Mussels "Hang On" Along Rocky Shores: For How Long?](#)

[Discovery nsf.gov - National Science Foundation \(NSF\) Discoveries - Trouble in Paradise: Ocean Acidification This Way Comes - US National Science Foundation \(NSF\)](#)

[Press Release 12-179 nsf.gov - National Science Foundation \(NSF\) News - Ocean Acidification: Finding New Answers Through National Science Foundation Research Grants - US National Science Foundation \(NSF\)](#)

[Press Release 13-102 World Oceans Month Brings Mixed News for Oysters](#)

[Press Release 13-108 nsf.gov - National Science Foundation \(NSF\) News - Natural Underwater Springs Show How Coral Reefs Respond to Ocean Acidification - US National Science Foundation \(NSF\)](#)

[Press Release 13-148 Ocean acidification: Making new discoveries through National Science Foundation research grants](#)

[Press Release 13-148 - Video nsf.gov - News - Video - NSF Ocean Sciences Division Director David Conover answers questions about ocean acidification. - US National Science Foundation \(NSF\)](#)

[Press Release 14-010 nsf.gov - National Science Foundation \(NSF\) News - Palau's coral reefs surprisingly resistant to ocean acidification - US National Science Foundation \(NSF\)](#)

[Press Release 14-116 nsf.gov - National Science Foundation \(NSF\) News - Ocean Acidification: NSF awards \\$11.4 million in new grants to study effects on marine ecosystems - US National Science Foundation \(NSF\)](#)

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## **Funding**

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1316040</a>

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