Event log from R/V Cape Hatteras CH0712 in the Gulf of Maine from September to October 2012

Website: https://www.bco-dmo.org/dataset/558551
Data Type: Cruise Results
Version: working
Version Date: 2015-05-15

Project
» Ocean Acidification-Category 1- Impact of ocean acidification on survival of early life stages of planktonic copepods in the genus Calanus in the northern (OA Calanus Survival)

Programs
» Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
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Dataset Description

The eventlog records the stations sampled and the instruments deployed and includes latitude, longitude, depth, time and the investigator responsible for any particular measurement.

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Data Files

File
CH0712_eventlog.csv (Comma Separated Values (.csv), 13.74 KB) MD5:9263593d8e5a24e6e16efa7939776cff Primary data file for dataset ID 558551

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Parameters

Parameters for this dataset have not yet been identified

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Deployments

CH0712

Website	https://www.bco-dmo.org/deployment/557808
Platform	R/V Cape Hatteras
Report	http://dmoserv3.bco-dmo.org/data_docs/CH0712/CH0712_CruiseReport.docx
Start Date	2012-09-24
End Date	2012-10-03
Description	The R/V Cape Hatteras loaded the scientific crew and equipment at Portland, Maine, on 24 September, 2012. The cruise lasted 8 days, following a counter clockwise loop through the U.S. portion of the Gulf of Maine, and finished back in Portland Maine on 3 October, 2012. During the cruise two scientific crews operated in 12-h shifts to conduct activities at 29 stations. The various activities are recorded in two separate documents, an events log and a sampling log.

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Project Information

Ocean Acidification-Category 1- Impact of ocean acidification on survival of early life stages of planktonic copepods in the genus Calanus in the northern (OA Calanus Survival)

Coverage: Gulf of Maine

The project description is a modification of the original NSF award abstract.

This research project is part of the larger NSF funded CRI-OA collaborative research initiative and was funded as an Ocean Acidification-Category 1, 2010 award. While attention concerning impacts of predicted acidification of the world's oceans has focused on calcifying organisms, non-calcifying plankton may also be vulnerable. In this project, the investigator will evaluate the potential for impacts of ocean acidification on the reproductive success of three species of planktonic copepods in the genus Calanus that are prominent in high latitude oceans. *C. finmarchicus* dominates the mesozooplankton biomass across much of the coastal and deep North Atlantic Ocean. *C. glacialis* and the larger *C. hyperboreus* are among the most abundant planktonic copepods in the Arctic Ocean. Previous research showed that hatching success of *C. finmarchicus* eggs was severely inhibited by increased CO2 and lower pH in seawater, but only tested at an extreme level. Preliminary results in the investigator's laboratory indicate that hatching success of *C. finmarchicus* is substantially reduced at increased seawater CO2 concentrations corresponding to pH levels between 7.9 and 7.5. Predictions of likely decline of surface pH levels to 7.7-7.8 over the next century raise questions about impacts on Calanus population dynamics if these preliminary results are confirmed. *C. finmarchicus*, for example, is presently at the southern edge of its range in the Gulf of Maine. The combination of higher surface layer temperature and lower pH may inhibit reproductive success during the late summer/fall bloom, which the PI hypothesize is critical to sustain the overwintering stock in this region. The investigators will collect *C. finmarchicus* females from the Gulf of Maine and, with the assistance of Canadian colleagues, *C. glacialis* and *C. hyperboreus* females from the deep lower St. Lawrence Estuary. They will conduct laboratory experiments in which hatching success, development and growth of Calanus nauplius stages are measured in controls of natural seawater and at a series of treatments in which CO2 concentrations, pH and temperature are rigorously controlled to represent possible future states of the northern ocean. The investigators will measure present surface and deep pCO2 and pH across the Gulf of Maine, including its deep basins, during a research cruise. The study will evaluate the hypothesis that predicted levels of CO2 increase in the northern ocean will impact population dynamics of the Calanus species. Using the results from the research cruise and a recently developed 1-D, Individual-Based life cycle model, the PI will explore in detail scenarios of impact of higher temperature and lower surface and deep pH on population dynamics of *C. finmarchicus* in the Gulf of Maine.

The lipid-rich Calanus species are considered key intermediary links between primary production and higher trophic levels in North Atlantic and Arctic Ocean food webs. Impacts of higher surface temperature and lower

pH on reproductive success may potentially lead to profound changes in energy transfer and structure of pelagic ecosystems in the northern oceans. In the Gulf of Maine, *C. finmarchicus* serves as primary prey for herring, sand lance, and mackerel, as well as the endangered northern right whale, warranting thorough evaluation of ocean acidification effects on its population dynamics.

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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

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).

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)

Ocean Carbon and Biogeochemistry (OCB)

Website: http://us-ocb.org/

Coverage: Global

The Ocean Carbon and Biogeochemistry (OCB) program focuses on the ocean's role as a component of the global Earth system, bringing together research in geochemistry, ocean physics, and ecology that inform on and advance our understanding of ocean biogeochemistry. The overall program goals are to promote, plan, and coordinate collaborative, multidisciplinary research opportunities within the U.S. research community and with international partners. Important OCB-related activities currently include: the Ocean Carbon and Climate Change (OCCC) and the North American Carbon Program (NACP); U.S. contributions to IMBER, SOLAS, CARBOOCEAN; and numerous U.S. single-investigator and medium-size research projects funded by U.S. federal agencies including NASA, NOAA, and NSF.

The scientific mission of OCB is to study the evolving role of the ocean in the global carbon cycle, in the face of environmental variability and change through studies of marine biogeochemical cycles and associated ecosystems.

The overarching OCB science themes include improved understanding and prediction of: 1) oceanic uptake and release of atmospheric CO2 and other greenhouse gases and 2) environmental sensitivities of biogeochemical cycles, marine ecosystems, and interactions between the two.

The OCB Research Priorities (updated January 2012) include: ocean acidification; terrestrial/coastal carbon fluxes and exchanges; climate sensitivities of and change in ecosystem structure and associated impacts on biogeochemical cycles; mesopelagic ecological and biogeochemical interactions; benthic-pelagic feedbacks on biogeochemical cycles; ocean carbon uptake and storage; and expanding low-oxygen conditions in the coastal and open oceans.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1041081

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