

Coccolith dissolution experiment for the study: Gut dissolution of coccoliths by *Acartia*/effect on pellet sinking.

Website: <https://www.bco-dmo.org/dataset/720670>

Data Type: experimental

Version: 1

Version Date: 2017-12-15

Project

» [Effects of ocean acidification on *Emiliana huxleyi* and *Calanus finmarchicus*: insights into the oceanic alkalinity and biological carbon pumps](#) (OA_Copes_Coccoliths)

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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Table of Contents

- [Dataset Description](#)
- [Data Files](#)
- [Parameters](#)
- [Instruments](#)
- [Project Information](#)
- [Program Information](#)
- [Funding](#)

Dataset Description

Results for coccolith dissolution experiment. This experiment was performed at Bigelow Laboratory for Ocean Sciences, East Boothbay, ME. These data are presented in:

White, M. M., L. C. Lubelczyk, J. Waller, D. T. Drapeau, B. C. Bowler, A. Vermont, D. M. Fields, and W. M. Balch (2017), Testing the Tums hypothesis: Dissolution of coccoliths buffers copepod guts., *Nature, in prep.*

Please see paper for complete description and methods. Data are restricted until publication of manuscript.

[[table of contents](#) | [back to top](#)]

Data Files

File
720670.csv (Comma Separated Values (.csv), 1.33 KB) MD5:9e719052500263469f0e4b83215bbca9
Primary data file for dataset ID 720670

[[table of contents](#) | [back to top](#)]

Parameters

Parameter	Description	Units
Time	Time after start of feeding	hours
Replicate	Replicate ID	1 2 3 for standards; A B C D E F for samples
Algae_POC	Algae particulate organic carbon	pg C/cell
Algae_PIC	Algae particulate inorganic carbon	pg C/cell
Algae_PIC_POC	Algae ratio PIC/POC	no units
Pellets	Number of fecal pellets sorted	number
FP_POC	Fecal pellet particulate organic carbon	pg C/cell
FP_PIC	Fecal pellet particulate inorganic carbon	pg C/cell
FP_PIC_POC	Fecal pellet ratio PIC/POC	no units
Copepods	Number of copepods sorted	number
Cope_POC	POC content of copepods	ug C/copepod
Cope_PIC	PIC content of copepods	ug C/copepod
Cope_PIC_POC	Copepod ratio PIC/POC	ug C/copepod

[[table of contents](#) | [back to top](#)]

Instruments

Dataset-specific Instrument Name	ECS 4010 CHNSO Analyzer (Costech Analytical Technologies, Valencia, CA, USA) by Bigelow Analytical Services, East Boothbay, ME, USA
Generic Instrument Name	CHN Elemental Analyzer
Generic Instrument Description	A CHN Elemental Analyzer is used for the determination of carbon, hydrogen, and nitrogen content in organic and other types of materials, including solids, liquids, volatile, and viscous samples.

Dataset-specific Instrument Name	Tricarb 3110 TR scintillation counter
Generic Instrument Name	Liquid Scintillation Counter
Generic Instrument Description	Liquid scintillation counting is an analytical technique which is defined by the incorporation of the radiolabeled analyte into uniform distribution with a liquid chemical medium capable of converting the kinetic energy of nuclear emissions into light energy. Although the liquid scintillation counter is a sophisticated laboratory counting system used to quantify the activity of particulate emitting (β and α) radioactive samples, it can also detect the Auger electrons emitted from ^{51}Cr and ^{125}I samples. Liquid scintillation counters are instruments assaying alpha and beta radiation by quantitative detection of visible light produced by the passage of rays or particles through a suitable scintillant incorporated into the sample.

Dataset-specific Instrument Name	Jobin Yvon Ultima C inductively coupled plasma-atomic emission spectrometer (ICP-AES, HORIBA, Ltd., Kyoto, Japan)
Generic Instrument Name	Mass Spectrometer
Generic Instrument Description	General term for instruments used to measure the mass-to-charge ratio of ions; generally used to find the composition of a sample by generating a mass spectrum representing the masses of sample components.

[[table of contents](#) | [back to top](#)]

Project Information

Effects of ocean acidification on *Emiliana huxleyi* and *Calanus finmarchicus*; insights into the oceanic alkalinity and biological carbon pumps (OA_Copes_Coccoliths)

Coverage: Laboratory experiments; East Boothbay, Maine

(Extracted from the NSF award abstract)

Ocean acidification is one of the most pressing marine science issues of our time, with potential biological impacts spanning all marine phyla and potential societal impacts affecting man's relationship to the sea. Rising levels of atmospheric pCO_2 are increasing the acidity of the world oceans. It is generally held that average surface ocean pH has already declined by 0.1 pH units relative to the pre-industrial level (Orr et al., 2005), and is projected to decrease 0.3 to 0.46 units by the end of this century, depending on CO_2 emission scenarios (Caldeira and Wickett, 2005). The overall goal of this research is to parameterize how changes in pCO_2 levels

could alter the biological and alkalinity pumps of the world ocean. Specifically, the direct and indirect effects of ocean acidification will be examined within a simple, controlled predator/prey system containing a single prey phytoplankton species (the coccolithophore, *Emiliana huxleyi*) and a single predator (the oceanic metazoan grazer, *Calanus finmarchicus*). The experiments are designed to elucidate both direct effects (i.e. effects of ocean acidification on the individual organisms only) and interactive effects (i.e. effects on the combined predator/prey system). Interactive experiments with phytoplankton prey and zooplankton predator are a critical starting point for predicting the overall impact of ocean acidification in marine ecosystems. To meet these goals, a state-of-the-art facility will be constructed with growth chambers that are calibrated and have highly-controlled pH and alkalinity levels. The strength of this approach lies in meticulous calibration and redundant measurements that will be made to ensure that conditions within the chambers are well described and tightly monitored for DIC levels. Growth and calcification rates in coccolithophores and the developmental rates, morphological and behavioral effects on copepods will be measured. The PIC and POC in the algae and the excreted fecal pellets will be monitored for changes in the PIC/POC ratio, a key parameter for modeling feedback mechanisms for rising pCO₂ levels. In addition, 14C experiments are planned to measure calcification rates in coccolithophores and dissolution rates as a result of grazing. These key experiments will verify closure in the mass balance of PIC, allowing the determination of actual dissolution rates of PIC within the guts of copepod grazers.

[[table of contents](#) | [back to top](#)]

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 \(NSF\)](#)

[[table of contents](#) | [back to top](#)]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1220068

[[table of contents](#) | [back to top](#)]