

Fecal pellet sinking rate experiment and calculated density for the study: Gut dissolution of coccoliths by Acartia/effect on fecal pellet sinking.

Website: <https://www.bco-dmo.org/dataset/720671>

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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Dataset Description

Results for fecal pellet sinking rate experiment and calculated density. 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.

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Data Files

File
720671.csv (Comma Separated Values (.csv), 1.52 KB) MD5:88023ef4cd3ce27574b131d324de74c1
Primary data file for dataset ID 720671

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Parameters

Parameter	Description	Units
Time	Time after start of feeding	hours
pellet_size	Fecal pellet size	um (micrometers)
sinking_rate	Fecal pellet sinking rate	meters per day
water_viscosity	Dynamic molecular viscosity of the water	kg m ⁻¹ s ⁻¹
water_density	Water density	Kg m ⁻³
calculated_density	Calculated fecal pellet density from fecal pellet size and sinking rate	kg/m ³

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Instruments

Dataset-specific Instrument Name	Point Grey Flea 3 camera fitted with a 105 Nikon lens separated by a 25mm bellow system
Generic Instrument Name	Camera
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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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 pCO₂ 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 CO₂ emission scenarios (Caldeira and Wickett, 2005). The overall goal of this research is to parameterize how changes in pCO₂ 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.

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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 \(NSF\)](#)

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Funding

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

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