

# Carbon and nitrogen content of Rhodomonas cells grown with varying CO<sub>2</sub> levels for copepod experiments, 2015 (OA-Copepod\_PreyQual project)

**Website:** <https://www.bco-dmo.org/dataset/675242>

**Data Type:** experimental

**Version:**

**Version Date:** 2017-01-18

## Project

» [Impacts on copepod populations mediated by changes in prey quality](#) (OA-Copepod\_PreyQual)

## Program

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

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## Dataset Description

This dataset includes carbon and nitrogen content data from Rhodomonas used in copepod experiments with varying pCO<sub>2</sub> levels, from 2015.

## Methods & Sampling

The phytoplankton Rhodomonas sp. CCMP 755 was grown semi-continuously in atmosphere controlled chambers at three different CO<sub>2</sub> treatment concentrations; Ambient (400ppmv), Moderate (800ppmv), and High (1000ppmv). Cultures were diluted daily starting day 4 with pre-equilibrated media containing f/50 nutrients. Some of the culture removed was used to evaluate chemical parameters. Samples for particulate cellular carbon and nitrogen were taken by gently vacuum filtering 100 ml from each pCO<sub>2</sub> treatment replicate onto 21 mm muffled glass fiber (GF/F) filters. After filtration, filters were removed and placed in tin boats. Samples and controls (media blanks, filter blanks and capsule blanks) were placed in a drying oven for 24 hours at 60 °C, after which time they were removed and placed in a desiccator until analysis. Tin boats containing the filters and controls were folded into pellets, and then combusted using a Micro Cube elemental analyzer interfaced to a PDZ Europa 20-20 isotope ratio mass spectrometer at the UC Davis Stable Isotope Facility.

## Data Processing Description

The data are unprocessed.

### BCO-DMO Processing Notes:

- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- replaced spaces with underscore

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## Data Files

File
<b>Rhodo_CN.csv</b> (Comma Separated Values (.csv), 3.07 KB) MD5:f064a0699a338c62f823016d5c7797ce Primary data file for dataset ID 675242

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## Parameters

Parameter	Description	Units
temp	Temperature at which the Rhodomonas were grown	degrees Celsius
treatment	CO2 level for growth conditions (ambient = 400; moderate = 800; high = 1200)	unitless
date	date of sample collection	unitless
TOC_ug	Total micrograms of Carbon in sample	micrograms
TON_ug	Total micrograms of Nitrogen in sample	micrograms
C_per_cell_pg	picograms of Carbon per cell in sample	picograms
C_to_N	ratio of Carbon to Nitrogen in sample	dimensionless

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## Instruments

<b>Dataset-specific Instrument Name</b>	Micro Cube elemental analyzer
<b>Generic Instrument Name</b>	CHN Elemental Analyzer
<b>Generic Instrument Description</b>	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.

<b>Dataset-specific Instrument Name</b>	PDZ Europa 20-20 isotope ratio mass spectrometer
<b>Generic Instrument Name</b>	Isotope-ratio Mass Spectrometer
<b>Generic Instrument Description</b>	The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer).

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## Deployments

### Lab\_Olson\_B

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/521277">https://www.bco-dmo.org/deployment/521277</a>
<b>Platform</b>	WWU
<b>Start Date</b>	2011-03-31
<b>End Date</b>	2016-09-15
<b>Description</b>	laboratory experiments

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## Project Information

### Impacts on copepod populations mediated by changes in prey quality (OA-Copepod\_PreyQual)

**Coverage:** Puget Sound, Salish Sea

Research shows that ocean acidification (OA) has physiological consequences for individual organisms, even those lacking calcium carbonate skeletal structures. However, this existing research does not adequately address how OA effects to individuals are linked across trophic levels. Pelagic copepods are critical players in most marine biogeochemical cycles. Their consumption of phytoplankton and microzooplankton is the primary mechanism by which bacterial and phytoplankton production is transferred to higher trophic levels. Despite their high abundance and ecological importance, copepods have received little research attention concerning OA. The few extant studies focused on direct acute effects to copepods (e.g. egg hatching, survival) under elevated pCO<sub>2</sub>, and few significant effects have been observed at predicted future pCO<sub>2</sub>. However, there is increasing recognition that OA significantly affects their phytoplankton prey, including elevating growth rates, increasing cell sizes, altering nutrient uptake and ratios, and chemical composition. Because copepod grazing, egg production, and hatching success all can vary with these prey characteristics, OA mediated changes in phytoplankton quality may be an important indirect mechanism through which OA acts on copepod populations and, ultimately, marine food webs.

This study that will advance our understanding of how copepod populations may be affected by OA, specifically through OA induced changes in phytoplankton quality. Our core objective is to determine how changes in phytoplankton physiology and biochemistry (e.g. lipid composition) affect copepod egg production, hatching, and ontogenetic development of nauplii. We will also include a subset of experiments to test whether OA affects copepod reproductive output independent of changes to prey. To achieve these research goals, the diatom, *Ditylum brightwellii*, and dinoflagellate, *Prorocentrum micans*, will be cultured semi-continuously under several pCO<sub>2</sub> concentrations, during which time we will characterize changes in their physiology and biochemistry. The copepods, *Calanus pacificus*, a large, high lipid-bearing marine species, and *Acartia clausi*, a smaller, low lipid-bearing estuarine species, will be maintained across varying pCO<sub>2</sub> concentrations and fed

these pCO<sub>2</sub>-acclimated prey, and their grazing and reproductive capability quantified. The copepods and phytoplankton used in this study will be collected from the Salish Sea, a region already experiencing periods of high pCO<sub>2</sub>/H<sup>+</sup> (>1000 ppm, pH 7.5) on varying timescales. Therefore, this research addresses a question of how future climate change may impact marine ecosystems, but also is relevant to pCO<sub>2</sub>/H<sup>+</sup> variability presently experienced in coastal environments.

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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-1220664</a>
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1220381</a>

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