

Grazing experiment 6: Long term microzooplankton ingestion and growth on low-high pCO₂ acclimated *Rhodomonas* sp. cultures ingested by *Coxiella* grazers (E Hux Response to pCO₂ project)

Website: <https://www.bco-dmo.org/dataset/669910>

Data Type: experimental

Version:

Version Date: 2016-12-12

Project

» [Planktonic interactions in a changing ocean: Biological responses of *Emiliana huxleyi* to elevated pCO₂ and their effects on microzooplankton](#) (E Hux Response to pCO₂)

Contributors	Affiliation	Role
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Table of Contents

- [Dataset Description](#)
 - [Methods & Sampling](#)
 - [Data Processing Description](#)
- [Data Files](#)
- [Parameters](#)
- [Instruments](#)
- [Deployments](#)
- [Project Information](#)
- [Funding](#)

Dataset Description

Related Reference:

Still, Kelly Ann, Microzooplankton grazing, growth and gross growth efficiency are affected by pCO₂ induced changes in phytoplankton biology. (Masters Thesis) Western Washington University. <http://cedar.wvu.edu/cgi/viewcontent.cgi?article=1490&context=wwuet>

Methods & Sampling

The phytoplankton *Rhodomonas* sp. CCMP 755 was grown semi-continuously in atmosphere controlled chambers at three different CO₂ treatment concentrations; Ambient (400ppmv), Moderate (750ppmv), and High (1000ppmv). Cultures were diluted daily starting day 4 with pre-equilibrated media containing f/50 nutrients. On day 11 *Rhodomonas* cells from the treatments replicates were pooled then used to inoculate *Coxiella* sp. experiment treatments. *Rhodomonas* were fed to *Coxiella* at saturating food concentrations (400 µg carbon/liter) and maintained for 5 days in treatment CO₂ conditions with daily adjustments of *Rhodomonas* and media to maintain a steady state *Rhodomonas* density. After the 5 acclimation day, cell densities were again adjusted to maintain food concentration, then time zero samples were taken and fixed with acid Lugol's for later cell counts of both *Coxiella* and *Rhodomonas*. After 24 hours, another set of samples was fixed for both types of cell counts as well as counts of *Rhodomonas* only controls.

Data Processing Description

These data are unprocessed counts of the *Coxiella* and *Rhodomonas* cells in a long term ingestion rate experiment.

BCO-DMO Processing Notes:

- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- nd (no data) was entered into all blank cells

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

Data Files

File
expt6_Cox_grazing_long.csv (Comma Separated Values (.csv), 791 bytes) MD5:be95dae7f8c4617bd59a59e9017ea922 Primary data file for dataset ID 669910

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

Parameters

Parameter	Description	Units
treatment_replicate	sample identifier: CO2 treatment and replicate	unitless
Coxiella_per_ml_day_0	number of <i>Coxiella</i> per ml at experiment initiation	per milliliter
Coxiella_per_ml_day_1	number of <i>Coxiella</i> per ml after 24 hours with treatment conditions and <i>Rhodomonas</i>	per milliliter
Rhodo_per_ml_with_Coxiella_day_0	<i>Rhodomonas</i> cells per ml at experiment initiation	per milliliter
Rhodo_per_ml_with_Coxiella_day_1	number of <i>Rhodomonas</i> per ml in grazing treatment after 24 hours	per milliliter
Rhodo_per_ml_control_day_0	number of <i>Rhodomonas</i> in controls with no grazers at initiation	per milliliter
Rhodo_per_ml_control_day_1	number of <i>Rhodomonas</i> in controls with no grazers after 24 hours	per milliliter

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

Instruments

Dataset-specific Instrument Name	epi-fluorescent microscope under blue-light excitation
Generic Instrument Name	Fluorescence Microscope
Dataset-specific Description	For cell counts
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of fluorescence and phosphorescence instead of, or in addition to, reflection and absorption of visible light. Includes conventional and inverted instruments.

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

Deployments

Lab Olson B

Website	https://www.bco-dmo.org/deployment/521277
Platform	WWU
Start Date	2011-03-31
End Date	2016-09-15
Description	laboratory experiments

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

Project Information

Planktonic interactions in a changing ocean: Biological responses of *Emiliana huxleyi* to elevated pCO₂ and their effects on microzooplankton (E Hux Response to pCO₂)

Description from NSF award abstract:

The calcifying Haptophyte *Emiliana huxleyi* appears to be acutely sensitive to the rising concentration of ocean pCO₂. Documented responses by *E. huxleyi* to elevated pCO₂ include modifications to their calcification rate and cell size, malformation of coccoliths, elevated growth rates, increased organic carbon production, lowering of PIC:POC ratios, and elevated production of the active climate gas DMS. Changes in these parameters are mechanisms known to elicit alterations in grazing behavior by microzooplankton, the oceans dominant grazer functional group. The investigators hypothesize that modifications to the physiology and biochemistry of calcifying and non-calcifying Haptophyte *Emiliana huxleyi* in response to elevated pCO₂ will precipitate alterations in microzooplankton grazing dynamics. To test this hypothesis, they will conduct controlled laboratory experiments where several strains of *E. huxleyi* are grown at several CO₂ concentrations. After careful characterization of the biochemical and physiological responses of the *E. huxleyi* strains to elevated pCO₂, they will provide these strains as food to several ecologically-important microzooplankton and document grazing dynamics. *E. huxleyi* is an ideal organism for the study of phytoplankton and microzooplankton responses to rising anthropogenic CO₂, the effects of which in the marine environment are called ocean acidification; *E. huxleyi* is biogeochemically important, is well studied, numerous strains are in culture that exhibit variation in the parameters described above, and they are readily fed upon by ecologically important microzooplankton.

The implications of changes in microzooplankton grazing for carbon cycling, specifically CaCO₃ export, DMS production, nutrient regeneration in surface waters, and carbon transfer between trophic levels are profound,

as this grazing, to a large degree, regulates all these processes. *E. huxleyi* is a model prey organism because it is one of the most biogeochemically influential global phytoplankton. It forms massive seasonal blooms, contributes significantly to marine inorganic and organic carbon cycles, is a large producer of the climatically active gas DMS, and is a source of organic matter for trophic levels both above and below itself. The planned controlled study will increase our knowledge of the mechanisms that drive patterns of change between trophic levels, thus providing a wider array of tools necessary to understand the complex nature of ocean acidification field studies, where competing variables can confound precise interpretation.

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

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0961229

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