Grazing experiment 5: Short term microzooplankton ingestion on low-high pCO2 acclimated Rhodomonas sp. cultures ingested by Oxyrrhis grazers (E Hux Response to pCO2 project)

Website: https://www.bco-dmo.org/dataset/669508
Data Type: experimental
Version:
Version Date: 2016-12-09

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

Contributors	Affiliation	Role
Olson, M Brady	Western Washington University (WWU)	Principal Investigator
Love, Brooke	Western Washington University (WWU)	Co-Principal Investigator
Strom, Suzanne	Western Washington University (WWU)	Co-Principal Investigator
Still, Kelly Ann	Western Washington University (WWU)	Student
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Table of Contents

Dataset Description

Related Reference:
Still, Kelly Ann, Microzooplankton grazing, growth and gross growth efficiency are affected by pCO_2 induced changes in phytoplankton biology. (Masters Thesis) Western Washington University. http://cedar.wwu.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 9 Rhodomonas cells from the treatments were fed to starved Oxyrrhis marina cells for 30, 60, 90, and 120 minutes. During each sampling time point, 20 ml of experiment volume was removed, fixed with 0.5% glutaraldehyde and stained with DAPI. Samples were stored at 4° C for 12 hours to allow time for the DAPI to stain. This volume was filtered onto a 5 µm pore size polycarbonate filter with, which was then put on a slide with immersion oil and kept frozen until evaluation. Slides were evaluated under 400x using an epi-fluorescent microscope under blue-light excitation. The first 100 microzooplankton on each slide were assessed for each replicate/treatment, and individual prey cells were counted in the grazer food vacuole.

Data Processing Description

These data are unprocessed counts of the Rhodomonas cells ingested by each Oxyrrhis grazer.

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions

[table of contents | back to top]

Data Files

File
expt5_Ox_grazing_short.csv (Comma Separated Values (.csv), 9.25 KB) MD5:97af9284aefa7b8b8663d973bb12e283 Primary data file for dataset ID 669508

[table of contents | back to top]

Parameters

Parameter	Description	Units
grazer_analyzed	sample identifier: individual grazer analyzed	unitless
ambient_30min_A	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 30 minute grazing period; replicate A	cells
ambient_30min_B	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 30 minute grazing period; replicate B	cells
ambient_30min_C	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 30 minute grazing period; replicate C	cells
ambient_60min_A	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 60 minute grazing period; replicate A	cells
ambient_60min_B	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 60 minute grazing period; replicate B	cells
ambient_60min_C	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 60 minute grazing period; replicate C	cells
ambient_90min_A	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 90 minute grazing period; replicate A	cells

ambient_90min_B	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 90 minute grazing period; replicate B	cells
ambient_90min_C	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 90 minute grazing period; replicate C	cells
ambient_120min_A	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 120 minute grazing period; replicate A	cells
ambient_120min_B	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 120 minute grazing period; replicate B	cells
ambient_120min_C	Rhodomonas cells counted inside the grazer: ambient pCO2 level; 120 minute grazing period; replicate C	cells
moderate_30min_A	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 30 minute grazing period; replicate A	cells
moderate_30min_B	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 30 minute grazing period; replicate B	cells
moderate_30min_C	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 30 minute grazing period; replicate C	cells
moderate_60min_A	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 60 minute grazing period; replicate A	cells
moderate_60min_B	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 60 minute grazing period; replicate B	cells
moderate_60min_C	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 60 minute grazing period; replicate C	cells
moderate_90min_A	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 90 minute grazing period; replicate A	cells
moderate_90min_B	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 90 minute grazing period; replicate B	cells
moderate_90min_C	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 90 minute grazing period; replicate C	cells
moderate_120min_A	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 120 minute grazing period; replicate A	cells

moderate_120min_B	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 120 minute grazing period; replicate B	cells
moderate_120min_C	Rhodomonas cells counted inside the grazer: moderate pCO2 level; 120 minute grazing period; replicate C	cells
high_30min_A	Rhodomonas cells counted inside the grazer: high pCO2 level; 30 minute grazing period; replicate A	cells
high_30min_B	Rhodomonas cells counted inside the grazer: high pCO2 level; 30 minute grazing period; replicate B	cells
high_30min_C	Rhodomonas cells counted inside the grazer: high pCO2 level; 30 minute grazing period; replicate C	cells
high_60min_A	Rhodomonas cells counted inside the grazer: high pCO2 level; 60 minute grazing period; replicate A	cells
high_60min_B	Rhodomonas cells counted inside the grazer: high pCO2 level; 60 minute grazing period; replicate B	cells
high_60min_C	Rhodomonas cells counted inside the grazer: high pCO2 level; 60 minute grazing period; replicate C	cells
high_90min_A	Rhodomonas cells counted inside the grazer: high pCO2 level; 90 minute grazing period; replicate A	cells
high_90min_B	Rhodomonas cells counted inside the grazer: high pCO2 level; 90 minute grazing period; replicate B	cells
high_90min_C	Rhodomonas cells counted inside the grazer: high pCO2 level; 90 minute grazing period; replicate C	cells
high_120min_A	Rhodomonas cells counted inside the grazer: high pCO2 level; 120 minute grazing period; replicate A	cells
high_120min_B	Rhodomonas cells counted inside the grazer: high pCO2 level; 120 minute grazing period; replicate B	cells

high_120min_C	Rhodomonas cells counted inside the grazer: high pCO2 level; 120 minute grazing period; replicate C	cells

[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 Emiliania huxleyi to elevated pCO2 and their effects on microzooplankton (E Hux Response to pCO2)

Description from NSF award abstract:
The calcifying Haptophyte *Emiliania 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 *Emiliania 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]