Grazing experiment 5: Cell size measurements of low-high pCO2 acclimated Rhodomonas (E Hux Response to pCO2 project)

Website: https://www.bco-dmo.org/dataset/669615
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
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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 days 9 and 16, after Rhodomonas cells from the treatments were mounted live on a microscope slide and 50 cells from each treatment replicate were imaged using RSImage software under 400X magnification on an Olympus CHA microscope. ImageJ software was used to measure Rhodomonas length and width. Rhodomonas cells are described has having a prolate spheroid shape. The volume was calculated using: $V_{prolate}(\mu m3) = (4/3)\pi a^2 b$. Where a=1/2 width and b=1/2 length of the Rhodomonas cell.

Data Processing Description

These data are unprocessed cell sizes as calculated above.

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- added column for day in order to combine days 9 and 16 data

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Data Files

File
expt5_cell_size.csv(Comma Separated Values (.csv), 35.83 KB) MD5:6d6e67c4781ec813861f8fb3e872060b Primary data file for dataset ID 669615

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Parameters

Parameter	Description	Units
day	experiment day	day
expt_day_treatment_rep_cell_number	sample identifier: individual cell measured: experiment day_pCO2 level_replicate_cell number	unitless
length	cell length	micometers
width	cell width	micometers
volume	cell volume	micometers

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Instruments

Dataset-specific Instrument Name	Olympus CHA microscope
Generic Instrument Name	Microscope - Optical
Dataset-specific Description	Used to measure Rhodomonas cells
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope".

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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

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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.

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Funding

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

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