Grazing experiments 6: Daily Rhodomonas counts during grazing acclimation for low-high pCO2 acclimated cells (E Hux Response to pCO2 project)

Website: https://www.bco-dmo.org/dataset/669996
Data Type: experimental
Version:
Version Date: 2016-12-12

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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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 started and allowed to grow four days to reach a density of approximately 50,000 cells per ml. Cultures were then diluted daily with pre-equilibrated media containing f/50 nutrients. On day 11 Rhodomonas cells from the treatments replicates were pooled then used to inoculate Coxliella sp. experiment treatments. Rhodomonas were fed to Coxliella 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. Each morning of dilution the cultures were gently mixed prior to a small sample being taken for cell counts. Cells were counted live on a Z2 Coulter Particle Counter. The dilution volume was then calculated to achieve saturating food concentrations.

Data Processing Description

These data are unprocessed cell counts.

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
expt6_acclimation_daily_cell_counts.csv (Comma Separated Values (.csv), 992 bytes) MD5:8feb548231890774fe8e47740da55bc6 Primary data file for dataset ID 669996

[table of contents | back to top]

Parameters

Parameter	Description	Units
treatment_replicate	sample identifier: treatment replicate that names the sample	unitless
count_day_1	Count for day 1 morning cell count	cells/milliliter
count_day_2	Count for day 2 morning cell count	cells/milliliter
day_2_post_dilution	Count for day 2 post-dilution; for the predicted cell count after dilution	cells/milliliter
count_day_3	Count for day 3 morning cell count	cells/milliliter
day_3_post_dilution	Count for day 3 post-dilution; for the predicted cell count after dilution	cells/milliliter
count_day_4	Count for day 4 morning cell count	cells/milliliter
count_day_5	Count for day 5 morning cell count	cells/milliliter
count_day_6	Count for day 6 morning cell count	cells/milliliter

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Z2 Coulter Particle Counter
Generic Instrument Name	Coulter Counter
Dataset-specific Description	Used to count cells
Generic Instrument Description	An apparatus for counting and sizing particles suspended in electrolytes. It is used for cells, bacteria, prokaryotic cells and virus particles. A typical Coulter counter has one or more microchannels that separate two chambers containing electrolyte solutions. from https://en.wikipedia.org/wiki/Coulter_counter

[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]