Grazing experiments 4: Daily cell count data for low-high pCO2 acclimated Rhodomonas sp. (E Hux Response to pCO2 project)

Website: https://www.bco-dmo.org/dataset/668811
Data Type: experimental
Version:
Version Date: 2016-12-06

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 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. 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 a cell density of approximately 25,000 cells per ml which was the density determined in preliminary experiments to be adequate to maintain pCO2 near target 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
- nd (no data) was entered into all blank cells

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Data Files

File
expt4_cell_count_daily.csv (Comma Separated Values (.csv), 894 bytes) MD5:cd3ab8405b4a5380600e7cabbd9582c3 Primary data file for dataset ID 668811

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Parameters

Parameter	Description	Units
treatment_replicate	sample identifier: individual grazer analyzed	unitless
Day_1	Count for day 1 morning cell count	cells/milliliter
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
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
day_4	Count for day 4 morning cell count	cells/milliliter
day_4_post_dilution	Count for day 4 post-dilution; for the predicted cell count after dilution	cells/milliliter
day_5	Count for day 5 morning cell count	cells/milliliter
day_5_post_dilution	Count for day 5 post-dilution; for the predicted cell count after dilution	cells/milliliter
day_6	Count for day 6 morning cell count	cells/milliliter
day_6_post_dilution	Count for day 6 post-dilution; for the predicted cell count after dilution	cells/milliliter
day_7	Count for day 7 morning cell count	cells/milliliter

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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

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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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