Grazing experiment 7: Carbonate chemistry data for low-high pCO2 acclimated Rhodomonas sp. cultures and long term grazing treatments (E Hux Response to pCO2 project)

Website: https://www.bco-dmo.org/dataset/670112
Data Type: experimental
Version:
Version Date: 2016-12-14

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. Some of the culture removed was used to evaluate chemical parameters.

pCO2 Rhodomonas: Samples for total alkalinity were taken on growth days 1, 3, 5, 7, 9, 11, 12, 14 and 17 and preserved with HgCl2 and stored at 4° until analysis. Alkalinity was measured by gran titration using a Titrando 888, and 0.1 N HCl titrant, in a temperature controlled titration vessel. DIC samples were filtered through a 0.2 µm nylon syringe filter on the morning of the experimental day, then stored in airtight vials at 4°C until analysis within 60 days using an Apollo SciTech DIC Analyzer AS-C3 which incorporates the LI-7000 CO2/H2O Analyzer. Other parameters were calculated with CO2sys.

pCO2 Rhodomonas and long-term grazing by Gyrodinium: Samples for total alkalinity of pre-equilibrated media

were taken on growth day 11 and from the Rhodomonas plus Gyrodinium grazing treatments on day16 and preserved with HgCl2 and stored at 4° until analysis. Alkalinity was measured by gran titration using a Titrando 888, and 0.1 N HCl titrant, in a temperature controlled titration vessel. DIC samples from the long-term grazing experiment were filtered through a 0.2 µm nylon syringe filter on the morning of the experimental day, then stored in airtight vials at 4°C until analysis within 60 days using an Apollo SciTech DIC Analyzer AS-C3 which incorporates the LI-7000 CO2/H2O Analyzer. Other parameters were calculated with CO2sys.

Data Processing Description

Data are unprocessed.

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
- replaced spaces with underscores

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Data Files

File
expt7_pCO2.csv (Comma Separated Values (.csv), 12.54 KB) MD5:690f0d784e5b5b092a72f9a9fbe42d67 Primary data file for dataset ID 670112

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Parameters

Parameter	Description	Units
treatment_rep_culture_day	Treatment replicate that names the sample and the day of semi-continuous culture	unitless
alkalinity	total alkalinity of the culture material removed	micromoles/kilogram (umol/kg)
DIC	dissolved inorganic carbon	micromoles/kilogram (umol/kg)
pCO2	Partial pressure of carbon dioxide in the water body by computation from pH and alkalinity	parts per million by volume (ppmv)
description	description of the sub-dataset: Rhodomoas: no grazers; Rhodomonas_and_Gyrodinium: grazers present	unitless

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Instruments

Dataset-specific Instrument Name	LI-7000 CO2/H2O Analyzer
Generic Instrument Name	LI-COR LI-7000 Gas Analyzer
Generic Instrument Description	The LI-7000 gas analyzer is a differential, single source, non-dispersive, infrared gas analyzer. It has two solid state detectors, one each for CO2 and H2O, filters at 4.255 microns and 2.595 microns respectively. CO2 is measured in the range 0-3000ppm, with an accuracy of 1 percent nominally. H2O is measured in the range 0-60 mmol per mol, with an accuracy of one 1 percent.

Dataset-specific Instrument Name	
Generic Instrument Name	Titrator
Dataset-specific Description	Titrando 888
Generic Instrument Description	Titrators are instruments that incrementally add quantified aliquots of a reagent to a sample until the end-point of a chemical reaction is reached.

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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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