Grazing experiment 7: Cellular lipid data for low-high pCO2 acclimated Rhodomonas sp. cultures, 2011-2016 (E Hux Response to pCO2 project)

Website: https://www.bco-dmo.org/dataset/670162
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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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. Some of the culture removed was used to evaluate chemical parameters. Samples for lipid mass were collected on day 16. Samples were filtered onto muffled glass fiber filters, wrapped in muffled foil and flash frozen on dry ice. Samples were then stored at -80° C until analysis. Filters were transferred to a tissue grinder containing 1.9 ml of 1:2 v/v CHCl3: MeOH and 0.125 ml deionized water. Filters were homogenized with the solution and transferred to a clean glass culture tube and vortexed for 1 minute. Samples were then sonicated in a water bath at room temperature for 10 minutes and then centrifuged at 2000 rpm for 10 minutes. The supernatant was then transferred to another glass culture tube and 0.625 ml of CHCl3 and 0.625 ml deionized water were added and then centrifuged another 10 minutes. The samples were now separated into two phases and the bottom organic phase was collected using a Pasteur pipet and transferred to a pre-

weighed glass culture tube. Samples were evaporated with nitrogen gas to dryness and weighed to determine total cellular lipid mass.

Data Processing Description

Data are raw picogram lipid per cell.

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
expt7_lipid.csv (Comma Separated Values (.csv), 826 bytes) MD5:9ec9e52b8f662296fea1001b5f297c2c Primary data file for dataset ID 670162

[table of contents | back to top]

Parameters

Parameter	Description	Units
treatment_replicate	Sample identifier that names the treatment replicate and the day of semi-continuous culture	unitless
pre_weight	weight of sample tube	milligrams (mg)
weight_total	weight of dried lipid sample plus the tube	milligrams (mg)
weight_lipid	total lipid weight	milligrams (mg)
vol_filt	volume of sample filtered	milliliters (ml)
cells_filtered_ml	concentration of cells on filter	milliliters (ml)
cells_filtered_total	the number of cells on the filter	cells
lipids_mg_cell	weight of lipids per cell	milligram/cell (mg/cell)
lipids_pg_cell	weight of lipids per cell	picograms/cell (pg/cell)

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	scale
Dataset-specific Description	Used to weigh extracted lipids
Generic Instrument Description	An instrument used to measure weight or mass.

Dataset-specific Instrument Name	Spec20D+ spectrophotometer
Generic Instrument Name	Spectrophotometer
Generic Instrument Description	An instrument used to measure the relative absorption of electromagnetic radiation of different wavelengths in the near infra-red, visible and ultraviolet wavebands by samples.

[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]