Grazing experiment 6: Carbon and Nitrogen data for low-high pCO2 acclimated Rhodomonas sp. cultures (E Hux Response to pCO2 project)

Website: https://www.bco-dmo.org/dataset/669776
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
Olson, M Brady	Western Washington University (WWU)	Principal Investigator
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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. Samples for particulate cellular carbon and nitrogen were taken by gently vacuum filtering 100 ml from each pCO2 treatment replicate onto 21 mm muffled glass fiber (GF/F) filters. After filtration, filters were removed and placed in tin boats. Samples and controls (media blanks, filter blanks, and capsule blanks) were placed in a drying oven for 24 hours at 60 deg C, after which time they were removed and placed in a desiccator until analysis. Tin boats containing the filters and controls were folded into pellets, and then combusted using a Micro Cube elemental analyzer interfaced to a PDZ Europa 20-20 isotope ratio mass spectrometer at the UC Davis Stable Isotope Facility.

Data Processing Description

Picograms per cell for carbon and nitrogen were calculated based on standard curves and were then normalized to per cell based on cell counts for the sample day.

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
expt6_CN.csv (Comma Separated Values (.csv), 1.57 KB) MD5:a92c9cc2109570cb7d1db36ddfb20175 Primary data file for dataset ID 669776

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Parameters

Parameter	Description	Units
day_treatment_rep	Treatment replicate that names the sample and the day of semi-continuous culture	unitless
C_ug	particulate carbon in sample	micrograms (ug)
C_pg	particulate carbon in sample	picograms (ug)
N_ug	particulate nitrogen in sample	micrograms (ug)
N_pg	particulate nitrogen in sample	picograms (ug)
total_cells	total number of cell on the filter	cells
C_pg_cell	carbon per cell	picograms/cell (pg/cell)
N_pg_cell	nitrogen per cell	picograms/cell (pg/cell)
C_to_N	ratio of carbon to nitrogen	dimensionless

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Instruments

Dataset-specific Instrument Name	Micro Cube elemental analyzer
Generic Instrument Name	Elemental Analyzer
Dataset-specific Description	Used to measure carbon and nitrogen concentrations
Generic Instrument Description	Instruments that quantify carbon, nitrogen and sometimes other elements by combusting the sample at very high temperature and assaying the resulting gaseous oxides. Usually used for samples including organic material.

Dataset-specific Instrument Name	PDZ Europa 20-20 isotope ratio mass spectrometer
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Generic Instrument Description	The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer).

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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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