Grazing experiment 5: Chlorophyll-a data for low-high pCO2 acclimated Rhodomonas sp. cultures from 2011-2016 (E Hux Response to pCO2 project)

Website: https://www.bco-dmo.org/dataset/669424
Data Type: experimental
Version:
Version Date: 2016-12-09

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
Love, Brooke	Western Washington University (WWU)	Co-Principal Investigator
Strom, Suzanne	Western Washington University (WWU)	Co-Principal Investigator
Still, Kelly Ann	Western Washington University (WWU)	Student
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Table of Contents

- Dataset Description
  - Methods & Sampling
  - Data Processing Description
- Data Files
- Parameters
- Instruments
- Deployments
- Project Information
- Funding

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. For Chlorophyll-a analysis 10 ml of each culture replicate was filtered onto a glass fiber filter. Filters were immediately folded and placed in test tubes containing 6 ml of 90% v/v acetone and stored at -20°C for 24 hours. Samples were then warmed to room temperature in the dark, filters were removed and tubes were centrifuged before being analyzed on a Turner Designs Trilogy fluorometer. Raw fluorescence pre- and post-addition of 10% HCL was used to calculate Chl a.

Chl-a (µg/ml) = (K*Fm*ext.vol (ml)*(Fo-Fa))/ (L filtered-1)

Data Processing Description

These are unprocessed Chl data.

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- replaced spaces with underscores

[table of contents | back to top]

Data Files

File
expt5_Chla.csv (Comma Separated Values (.csv), 1.26 KB) MD5:a1c5e9af065b2b244c22f127ac406e0a Primary data file for dataset ID 669424

[table of contents | back to top]

Parameters

Parameter	Description	Units
sample_day_treatment_rep	sample identifier: treatment replicate that names the sample and the day of semi-continuous culture	unitless
inst_k	the instrument sensitivity coefficient	unitless
Fo	the raw fluorescence reading of the extract	unitless
Fa	the raw fluorescence reading of the acidified extract	unitless
Fm	fluorescence maximum obtained using pure Chl-a standard obtained by dividing Fo by Fa	unitless
filt_vol	filtered volume	liters
vol_extract	the amount of 90% acetone the filter was extracted in	milliliters
dilution_factor	dilution factor is used if the extract is diluted	unitless
chla_ug_L	Chlorophyll-a concentration	micrograms/liter (ug/L)
cell_concentration	cell concentration on sample day	cells/milliliter
chla_pg_cell	cell concentration on sample day	picograms/milliliter (pg/ml)

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Turner Designs Trilogy fluorometer
Generic Instrument Name	Fluorometer
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

[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]