Grazing experiment 6: Short term microzooplankton ingestion on low-high pCO2 acclimated Rhodomonas sp. cultures ingested by Coxliella grazers (E Hux Response to pCO2 project)

Website: https://www.bco-dmo.org/dataset/669886
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)

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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. On day 9 Rhodomonas cells from the treatments were fed to starved Coxliella sp. cells for 15, 30, and 45 minutes. During each sampling time point, 20 ml of experiment volume was removed, fixed with 0.5% glutaraldehyde and stained with DAPI. Samples were stored at 4° C for 12 hours to allow time for the DAPI to stain. This volume was filtered onto a 10 µm pore size polycarbonate filter with, which was then put on a slide with immersion oil and kept frozen until evaluation. Slides were evaluated under 400x using an epi-fluorescent microscope under blue-light excitation. The first 100 microzooplankton on each slide were assessed for each replicate/treatment, and individual prey cells were counted in the grazer food vacuole.

Data Processing Description

These data are unprocessed counts of the Rhodomonas cells ingested by each Coxliella grazer.

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

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Data Files

File
expt6_Cox_grazing_short.csv (Comma Separated Values (.csv), 1.31 KB) MD5:b1d5179adc17ee8549c88f447acc40c5 Primary data file for dataset ID 669886

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Parameters

Parameter	Description	Units
treatment_time_point_rep	sample identifier: pCO2 treatment_minutes allowed for ingestion_replicate (i.e. ambient_30min_A)	unitless
Coxliella_with_0_ingested	the number of Coxliella with zero ingested Rhodomonas cells	Coxliella
Coxliella_with_1_ingested	the number of Coxliella with 1 ingested Rhodomonas cells	Coxliella
Coxliella_with_2_ingested	the number of Coxliella with 2 ingested Rhodomonas cells	Coxliella
Coxliella_with_3_ingested	the number of Coxliella with 3 ingested Rhodomonas cells	Coxliella
Coxliella_with_4_ingested	the number of Coxliella with 4 ingested Rhodomonas cells	Coxliella
Coxliella_with_5_ingested	the number of Coxliella with 5 ingested Rhodomonas cells	Coxliella
Coxliella_with_6_ingested	the number of Coxliella with 6 ingested Rhodomonas cells	Coxliella
Coxliella_with_7_ingested	the number of Coxliella with 7 ingested Rhodomonas cells	Coxliella
Coxliella_with_8_ingested	the number of Coxliella with 8 ingested Rhodomonas cells	Coxliella
Coxliella_with_9_ingested	the number of Coxliella with 9 ingested Rhodomonas cells	Coxliella

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Instruments

Dataset-specific Instrument Name	epi-fluorescent microscope under blue-light excitation
Generic Instrument Name	Fluorescence Microscope
Dataset-specific Description	For cell counts
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of fluorescence and phosphorescence instead of, or in addition to, reflection and absorption of visible light. Includes conventional and inverted instruments.

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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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