Grazing experiment 7:Long term microzooplankton ingestion and growth on low-high pCO2 acclimated Rhodomonas sp. cultures ingested by Gyrodinium grazers (E Hux Response to pCO2 project)

Website: https://www.bco-dmo.org/dataset/670184
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 On day 11 Rhodomonas cells from the treatments replicates were pooled then used to inoculate Gyrodinium marina experiment treatments. Rhodomonas were fed to Gyrodinium at saturating food concentrations (400 µg Carbon/Liter) and maintained for 5 days in treatment CO2 conditions with daily adjustments of Rhodomonas and media to maintain a steady state Rhodomonas density. After the 5 acclimation day cell densities were again adjusted to maintain food concentration, then time zero samples were taken and fixed with acid Lugol's for later cell counts of both Gyrodinium and Rhodomonas. After 24 hours another set of samples was fixed for both types of cell counts as well as counts of Rhodomonas only controls.

Data Processing Description

These data are unprocessed counts of the Gyrodinium and Rhodomonas cells in a long-term ingestion rate experiment.

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

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Data Files

File
expt7_Gyr_grazing_long.csv (Comma Separated Values (.csv), 761 bytes) MD5:5aaf21d885b29d471d8ee32cfe307325 Primary data file for dataset ID 670184

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Parameters

Parameter	Description	Units
treatment_rep	sample identifier: CO2 treatment and replicate	unitless
Gyrodinium_per_ml_day_0	number of Gyrodinium per ml at experiment initiation	per milliliter
Gyrodinium_per_ml_day_1	number of Gyrodinium per ml after 24 hours with treatment conditions and Rhodomonas	per milliliter
Rhodo_per_ml_with_Gyrodinium_day_0	Rhodomonas cells per ml at experiment initiation	per milliliter
Rhodo_per_ml_with_Gyrodinium_day_1	number of Rhodomonas per ml in grazing treatment after 24 hours	per milliliter
Rhodo_per_ml_control_day_0	number of Rhodomonas in controls with no grazers at initiation	per milliliter
Rhodo_per_ml_control_day_1	number of Rhodomonas in controls with no grazers after 24 hours	per milliliter

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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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