# Grazing experiment 5: 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/669403
**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 |
|---|---|---|
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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 °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 |
|---|
| **expt5_CN.csv** (Comma Separated Values (.csv), 1.64 KB) MD5:5a17637bbc2b93db3eed92ee5bea6433 Primary data file for dataset ID 669403 |

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## Parameters

| Parameter | Description | Units |
|---|---|---|
| day_treatment_replicate | 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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