

Grazing experiment 6: Cellular lipid data for low-high pCO₂ acclimated *Rhodomonas* sp. cultures, 2011-2016 (E Hux Response to pCO₂ project)

Website: <https://www.bco-dmo.org/dataset/669863>

Data Type: experimental

Version:

Version Date: 2016-12-12

Project

» [Planktonic interactions in a changing ocean: Biological responses of *Emiliana 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 pCO₂ 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 lipid mass were collected on day 16. Samples were filtered onto muffled glass fiber filters, wrapped in muffled foil and flash frozen on dry ice. Samples were then stored at -80° C until analysis. Filters were transferred to a tissue grinder containing 1.9 ml of 1:2 v/v CHCl₃: MeOH and 0.125 ml deionized water. Filters were homogenized with the solution and transferred to a clean glass culture tube and vortexed for 1 minute. Samples were then sonicated in a water bath at room temperature for 10 minutes and then centrifuged at 2000 rpm for 10 minutes. The supernatant was then transferred to another glass culture tube and 0.625 ml of CHCl₃ and 0.625 ml deionized water were added and then centrifuged another 10 minutes. The samples were now separated into two phases and the bottom organic phase was collected using a Pasteur pipet and

transferred to a pre-weighed glass culture tube. Samples were evaporated with nitrogen gas to dryness and weighed to determine total cellular lipid mass.

Data Processing Description

Data are raw picogram lipid per cell.

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_lipid.csv (Comma Separated Values (.csv), 804 bytes) MD5:2d5669d87f3571626dc349ba63e8f8d5 |
| Primary data file for dataset ID 669863 |

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Parameters

| Parameter | Description | Units |
|----------------------|---|--------------------------|
| treatment_replicate | Sample identifier that names the treatment replicate and the day of semi-continuous culture | unitless |
| pre_weight | weight of sample tube | milligrams (mg) |
| weight_total | weight of dried lipid sample plus the tube | milligrams (mg) |
| weight_lipid | total lipid weight | milligrams (mg) |
| vol_filt | volume of sample filtered | milliliters (ml) |
| cells_filtered_ml | concentration of cells on filter | milliliters (ml) |
| cells_filtered_total | the number of cells on the filter | cells |
| lipids_mg_cell | weight of lipids per cell | milligram/cell (mg/cell) |
| lipids_pg_cell | weight of lipids per cell | picograms/cell (pg/cell) |

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Instruments

| | |
|---|---|
| Dataset-specific Instrument Name | |
| Generic Instrument Name | scale |
| Dataset-specific Description | Used to weigh extracted lipids |
| Generic Instrument Description | An instrument used to measure weight or mass. |

| | |
|---|--|
| Dataset-specific Instrument Name | Spec20D+ spectrophotometer |
| Generic Instrument Name | Spectrophotometer |
| Generic Instrument Description | An instrument used to measure the relative absorption of electromagnetic radiation of different wavelengths in the near infra-red, visible and ultraviolet wavebands by samples. |

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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 *Emiliana huxleyi* to elevated pCO₂ and their effects on microzooplankton (E Hux Response to pCO₂)

Description from NSF award abstract:

The calcifying Haptophyte *Emiliana 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 *Emiliana 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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