Temperature data from Virginia Aquarium Climate Change Facility, Virginia Beach VA; 2011-2015 (Impact of Climate on Eelgrass project)

Website: https://www.bco-dmo.org/dataset/504927
Version: 13 March 2015
Version Date: 2015-03-13

Project
» Impact of Climate Warming and Ocean Carbonation on Eelgrass (Zostera marina L.) (Impact of Climate on Eelgrass)

Contributors	Affiliation	Role
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Dataset Description

Eelgrass Climate Impacts
Experimental conditions, growth and survival of eelgrass
Temperature Data - Date, Tank Water Temperature readings

Methods & Sampling

Temperature data were recorded in each of the 20 experimental tanks using Omega 4404 precision thermistor elements connected to a custom-designed voltage divider circuit linked to a National Instruments data logger controlled by custom software written in LabView.

Data Processing Description

Temperature - Thermistors were individually calibrated to a precision of 0.01 ° C across a temperature range of 5° to 30° C in a temperature controlled water bath every six months. Mean daily values of temperature for each tank were calculated from the 10 minute records and provided in this spreadsheet. 10 minute records of the processed data, along with raw data files are available from the PIs, upon request.

BCO-DMO Processing Notes
- Generated from original file: "BORG_SeaGrass_Full_data_Records.xlsx" Sheet: "waterTemperature" contributed by David Ruble
- Approx Lat/Lon of Virginia Aquarium Climate Change Facility appended to enable data discovery in MapServer
- Parameters modified to conform to BCO-DMO parameter naming conventions (Choosing a Parameter Name)

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Data Files

File
Temp_Data.csv(Comma Separated Values (.csv), 80.54 KB) MD5:29d16be9dfdd1553f7794a394a89514a Primary data file for dataset ID 504927

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Parameters

Parameter	Description	Units
Lab_Id	Lab Id – Lab identifier where experiments were conducted	text
Lat	Approximate Latitude Position of Lab; South is negative	decimal degrees
Lon	Approximate Longitude Position of Lab; West is negative	decimal degrees
date	Date	yyyymmdd
tank01_Wt	tank01 Water Temperature	degreesC
tank02_Wt	tank02 Water Temperature	degreesC
tank03_Wt	tank03 Water Temperature	degreesC
tank04_Wt	tank04 Water Temperature	degreesC
tank05_Wt	tank05 Water Temperature	degreesC
tank06_Wt	tank06 Water Temperature	degreesC
tank07_Wt	tank07 Water Temperature	degreesC
tank08_Wt	tank08 Water Temperature	degreesC
tank09_Wt	tank09 Water Temperature	degreesC
tank10_Wt	tank10 Water Temperature	degreesC
tank11_Wt	tank11 Water Temperature	degreesC
tank12_Wt	tank12 Water Temperature	degreesC
tank13_Wt	tank13 Water Temperature	degreesC
tank14_Wt	tank14 Water Temperature	degreesC
tank15_Wt	tank15 Water Temperature	degreesC
tank16_Wt	tank16 Water Temperature	degreesC
tank17_Wt	tank17 Water Temperature	degreesC
tank18_Wt	tank18 Water Temperature	degreesC
tank19_Wt	tank19 Water Temperature	degreesC
tank20_Wt	tank20 Water Temperature	degreesC

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Instruments

Dataset-specific Instrument Name	Omega 4404 precision thermistor elements
Generic Instrument Name	Thermistor
Dataset-specific Description	Temperature data were recorded in each of the 20 experimental tanks using Omega 4404 precision thermistor elements connected to a custom-designed voltage divider circuit linked to a National Instruments data logger controlled by custom software written in LabView.
Generic Instrument Description	A thermistor is a type of resistor whose resistance varies significantly with temperature, more so than in standard resistors. The word is a portmanteau of thermal and resistor. Thermistors are widely used as inrush current limiters, temperature sensors, self-resetting overcurrent protectors, and self-regulating heating elements. Thermistors differ from resistance temperature detectors (RTD) in that the material used in a thermistor is generally a ceramic or polymer, while RTDs use pure metals. The temperature response is also different; RTDs are useful over larger temperature ranges, while thermistors typically achieve a higher precision within a limited temperature range, typically 90C to 130C.

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Deployments

lab_Virginia_Aquarium_Climate_Change_Facility

Website	https://www.bco-dmo.org/deployment/504835
Platform	Virginia Aquarium Climate Change Facility
Start Date	2011-02-01
End Date	2015-01-31
Description	Laboratory experiments conducted from 1 May 2013 to 31 Jan 2013 at Virginia Aquarium Climate Change Facility, Virginia Beach VA

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Project Information

Impact of Climate Warming and Ocean Carbonation on Eelgrass (Zostera marina L.) (Impact of Climate on Eelgrass)

Website: http://sci.odu.edu/oceanography/directory/faculty/zimmerman/researchpage/index.shtml

Coverage: Virginia Beach, VA and Southern Chesapeake Bay region 36° 49’ 32.84” N 75° 58’ 58.17” W

Project abstract from the NSF proposal:
The past few decades have accumulated mounting evidence of profound anthropogenic effects on fundamental biogeochemical processes across the planet, especially in coastal environments that support a diverse array of highly productive ecosystems including coral reefs, seagrass meadows, and estuaries. The ecological significance of seagrasses is largely due to the remarkable degree of adaptation they exhibit to a submerged aquatic existence. Despite numerous successful adaptations, however, seagrasses have high light

requirements that make them vulnerable to anthropogenic disturbances. The paradoxical vulnerability results largely from their high reliance on dissolved aqueous CO2 for photosynthesis. The potential for rising atmospheric CO2 concentrations to have significant warming impacts on the global climate has long been recognized, but the potential impacts of the "other CO2 problem", also known as ocean acidification, have only recently begun to be appreciated. As with other impacts of climate change, the increased concentrations of dissolved aqueous CO2 [CO2 (aq)] in the oceans of the world will elicit both negative and positive responses among organisms, ultimately potentiating ecological losers and winners. This project will explore the response of eelgrass to increased CO2 (aq) within the context of a warming coastal ocean using a combination of manipulative experiments, physiological/biochemical investigations and mathematical modeling. The investigators hypothesize that rising CO2(aq) will increase the high temperature tolerance of plants by improving the Q10 response of photosynthesis relative to respiration, thereby leading to higher growth rates, improved survival of vegetative shoots at high temperature, and even flowering output and seed production. This project will investigate the key relationships between environmental parameters that have both negative (ocean warming) and positive (ocean carbonation) impacts on the light requirements and dynamics of carbon balance in these critically important marine angiosperms. By focusing on Chesapeake populations growing near the southern limit of eelgrass distribution on the Atlantic coast, the investigators will gain predictive insight into how climate change may alter the geographic distribution of this critically important species in other coastal environments that may be subjected to less temperature stress but similar levels of ocean carbonation.

Objectives: The overall goal of the proposed research will be to develop a predictive mechanistic understanding of the simultaneous impacts of water temperature, [$CO_{2(aq)}$] and [HCO^{3-}] on the photosynthetic metabolism, vegetative growth and reproductive success of Zostera marina L. We will address the following questions, (1) To what extent is the upper thermal limit of eelgrass controlled by $CO_{2(aq)}$ availability, (2) Will prolonged $CO_{2(aq)}$ enrichment affect the ability of eelgrass to utilize HCO^{3-} for photosynthesis, (3) Does prolonged $CO_{2(aq)}$ enrichment increase seed production and viability, and (4) Does $CO_{2(aq)}$ enrichment affect nutritional quality of seagrass tissue, particularly C:N ratios and protein content?

These experiments will be carried out at an experimental $CO_{2(aq)}$ enrichment facility which is being constructed at the Virginia Aquarium & Marine Science Center, adjacent to Owl Creek and Rudee Inlet, in Virginia Beach, VA.

Data Inventory

1) Weather and hydrographic data for Owl Creek Experimental Facility. Metadata and time series observations of irradiance, water temperature, pH, salinity, alkalinity, CO_2 and dissolved nutrients will be posted on our web site, and final version data will be supplied to NODC for permanent archive.
2) Experimental metadata from the tanks (pH, temperature, eelgrass abundance and survival, growth rates, metabolic rates, etc.) will also be posted on our website listed above. Final data will be supplied to NODC and/or other databases as appropriate and as they become available.

Project data will also be contributed to thematic databases, including SeaBASS operated by NASA, WOOD operated by ONR, as well as NODC.

Preliminary results may be posted at the group's Web site hosted at ODU:
http://sci.odu.edu/oceanography/directory/faculty/zimmerman/researchpage/index.shtml

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1061823

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