Gene expression data from SFSU RTC Carpenter lab, 2012 results (En-Gen OA and E huxleyi project)

Website: https://www.bco-dmo.org/dataset/3783
Version: 17 November 2012
Version Date: 2012-11-17

Project
» En-Gen: A functional genomic analysis of how a major calcifying phytoplankter responds to ocean acidification predicted for the end of the century (En-Gen OA and E huxleyi)

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
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Dataset Description

Gene expression data will be deposited at NCBI (http://www.ncbi.nlm.nih.gov/geo/info/seq.html), Assembly Data with GenBank TSA (http://www.ncbi.nlm.nih.gov/genbank/tsa), and NCBI BioProject portal (http://www.ncbi.nlm.nih.gov/bioproject/182373).

Methods & Sampling

Data Processing Description

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Parameters

Parameters for this dataset have not yet been identified

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Deployments

lab_Carpenter_En-Gen

Website	https://www.bco-dmo.org/deployment/58884
Platform	SFSU RTC
Description	Ed Carpenter's lab at San Francisco State University, Romberg Tiburon Cente.

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Project Information

En-Gen: A functional genomic analysis of how a major calcifying phytoplankter responds to ocean acidification predicted for the end of the century (En-Gen OA and E huxleyi)

The coccolithophore *Emiliania huxleyi* is the most abundant calcifying phytoplankton species in the world&aposs oceans. Due to its abundance and broad range of occurrence, deep-sea export of its CaC03 coccoliths plays a significant role in the oceans alkalinity balance, and in turn, air-sea CO2 exchange. Since the start of the industrial age, atmospheric partial pressure of CO2 (pCO2) has steadily increased due to fossil fuel combustion and land use change, and is projected to reach 750 ppm by the end of this century. As a consequence, both seawater pH and carbonate ion concentration are expected to drop significantly relative to pre-industrial times. Calcifying organisms are sensitive to changes in carbonate ion concentration, however, neither the extent of this sensitivity, nor its physiological basis, are well understood. The purpose of this project is to examine the mechanism (s) by which *E. huxleyi* physiologically acclimates and adapts to changes in its environment in order to understand the impact of changes in seawater carbonate chemistry on this important planktonic calcifying organism. Cells from two genetically distinct ecotypes will be cultured in chemostats at present day and projected year 2100 levels of pCO2 under nitrogen or phosphorus limitation. Both short- (2 week) and long-term (2 year) experiments will be conducted to investigate acclimation and adaptation responses to changes in carbonate chemistry, respectively. In each experiment, patterns of gene expression will be investigated using a microarray that has been developed by the *E. huxleyi* genome sequencing projects. Gene expression will be analyzed as a function of physiological performance (photosynthesis vs. irradiance), calcification rates and cellular nutrient content. The results of this project will generate a novel set of candidate biomarker genes for analysis of the environmental physiology of coccolithophorids and contribute to a better prediction of the role of *E. huxleyi* in air-sea CO2 exchange in the next century. Since *E. huxleyi* is a globally distributed organism that frequently forms massive blooms, there are numerous investigators studying it and this research will therefore be of broad interest to the scientific community.

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Program Information

Ocean Carbon and Biogeochemistry (OCB)

Website: http://us-ocb.org/

Coverage: Global

The Ocean Carbon and Biogeochemistry (OCB) program focuses on the ocean's role as a component of the global Earth system, bringing together research in geochemistry, ocean physics, and ecology that inform on and advance our understanding of ocean biogeochemistry. The overall program goals are to promote, plan, and coordinate collaborative, multidisciplinary research opportunities within the U.S. research community and with international partners. Important OCB-related activities currently include: the Ocean Carbon and Climate Change (OCCC) and the North American Carbon Program (NACP); U.S. contributions to IMBER, SOLAS, CARBOOCEAN; and numerous U.S. single-investigator and medium-size research projects funded by U.S.

federal agencies including NASA, NOAA, and NSF.

The scientific mission of OCB is to study the evolving role of the ocean in the global carbon cycle, in the face of environmental variability and change through studies of marine biogeochemical cycles and associated ecosystems.

The overarching OCB science themes include improved understanding and prediction of: 1) oceanic uptake and release of atmospheric CO2 and other greenhouse gases and 2) environmental sensitivities of biogeochemical cycles, marine ecosystems, and interactions between the two.

The OCB Research Priorities (updated January 2012) include: ocean acidification; terrestrial/coastal carbon fluxes and exchanges; climate sensitivities of and change in ecosystem structure and associated impacts on biogeochemical cycles; mesopelagic ecological and biogeochemical interactions; benthic-pelagic feedbacks on biogeochemical cycles; ocean carbon uptake and storage; and expanding low-oxygen conditions in the coastal and open oceans.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0723908

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