Experimental results: microarrays for Thalassiosira pseudonana diatoms grown in the laboratory under different conditions; 2013 (OA Diatom Response project)

Website: https://www.bco-dmo.org/dataset/546404
Version: 30 Jan 2015
Version Date: 2015-01-30

Project
» A Systems Biology Approach to Characterize Diatom Response to Ocean Acidification and Climate Change (OA Diatom Response)

Program
» Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)

Contributors	Affiliation	Role
Orellana, Monica V.	Institute for Systems Biology (ISB)	Principal Investigator
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Dataset Description

Microarrays for *Thalassiosira pseudonana* diatoms grown in the laboratory under different conditions including diel cycles and elevated CO2 levels.

Data from Ashworth et al. (2013) Proc. Natl. Acad. Sci. USA 110(18):7518-23 are publicly available on the NCBI GEO database under the accession code: GSE45252.

Data were submitted to the NCBI GEO database on May 16, 2014 under the accession code: GSE57737 and will be made publicly available upon publication of an accompanying manuscript in preparation.

References:

Ashworth J, Coesel S, Lee A, Armbrust EV, Orellana MO*, Baliga NS*. (2013) Genome-wide diel growth state transitions in the diatom Thalassiosira pseudonana. Proc. Natl. Acad. Sci. 110(18):7518-23. doi:10.1073/pnas.1300962110

Methods & Sampling

Transcriptomic profiling of the diatom *Thalassiosira pseudonana* at normal and elevlated CO2 levels and at normal and elevated light levels. Common reference total RNA (Agilent Quick-Amp Cy3-labeled) was used in all arrays as an internal standard. Triplicate batch cultures grown at normal (~400 ppm) and elevated (~800 ppm)

CO2 levels, both at i) normal or ii) elevated light levels. Samples were taken during a) exponential and b) stationary growth during all growth experiments.

Result: 48 total transcriptomic measurements: [3 parallel replicates] x [400 ppm, 800 ppm] x [normal light, high
light] x [exponential, stationary] x [2 serial replicates].

Data Processing Description

Array slides were scanned using an Agilent slide scanner. Data were processed from Agilent files using the limma package in R, including background correction, loess (within-array) and 'Aquantile' (between-array) normalization.

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Data Files

File
Thaps_microarrays.csv (Comma Separated Values (.csv), 406 bytes) MD5:af4f83e8407394ca48fd0449c525f9d7 Primary data file for dataset ID 546404

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Parameters

Parameter	Description	Units
taxon	Taxon/species of study.	text
publication	Publication where the details of the study can be found. Ashworth_et_al_2013 = Ashworth J, Coesel S, Lee A, Armbrust EV, Orellana MO*, Baliga NS*. (2013) Genome-wide diel growth state transitions in the diatom Thalassiosira pseudonana. Proc. Natl. Acad. Sci. 110(18):7518-23. doi:10.1073/pnas.1300962110	text
GEO_accession	Accession number and hyperlink to the NCBI GEO database.	alphanumeric

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Deployments

ISB_Orellana

Website	https://www.bco-dmo.org/deployment/546413
Platform	Institute for Systems Biology
Start Date	2013-07-01
End Date	2013-07-01

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Project Information

A Systems Biology Approach to Characterize Diatom Response to Ocean Acidification and Climate Change (OA Diatom Response)

Description from the NSF award abstract:
Diatoms account for approximately 40 percent of primary production in the world's oceans and are the most productive marine phytoplankton group. They form the basis of food webs in coastal and ocean upwelling areas that support important fisheries and have a major role in global carbon and silicon cycles. The goal of this project is to understand the impact of ocean acidification, in combination with other stressors, on the marine diatom *Thalassiosira pseudonana*. This project will generate a predictive model of expression of all genes of this diatom that can be used to forecast the diatom's response to projected environmental scenarios to an acidifying ocean. A combination of laboratory and field studies will be used; diatoms will be grown under carbon dioxide concentrations that reflect today's values as well as future predicted conditions and light levels and nutrients concentrations will also be varied. Physiological and gene expression responses will be measured and integrated using computational and modeling methods to gain an unbiased, systems-level understanding of the response of diatoms to ocean acidification. This combined approach will enable the forecasting and prediction of the diatom's response to environmental change and the elucidation and genomic interpretation of biochemically relevant processes in natural environment.

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Program Information

Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES): Ocean Acidification (formerly CRI-OA) (SEES-OA)

Website: https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503477

Coverage: global

NSF Climate Research Investment (CRI) activities that were initiated in 2010 are now included under Science, Engineering and Education for Sustainability NSF-Wide Investment (SEES). SEES is a portfolio of activities that highlights NSF's unique role in helping society address the challenge(s) of achieving sustainability. Detailed information about the SEES program is available from NSF (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504707).

In recognition of the need for basic research concerning the nature, extent and impact of ocean acidification on oceanic environments in the past, present and future, the goal of the SEES: OA program is to understand (a) the chemistry and physical chemistry of ocean acidification; (b) how ocean acidification interacts with processes at the organismal level; and (c) how the earth system history informs our understanding of the effects of ocean acidification on the present day and future ocean.

Solicitations issued under this program:
NSF 10-530, FY 2010-FY2011
NSF 12-500, FY 2012
NSF 12-600, FY 2013
NSF 13-586, FY 2014
NSF 13-586 was the final solicitation that will be released for this program.

PI Meetings:
1st U.S. Ocean Acidification PI Meeting(March 22-24, 2011, Woods Hole, MA)
2nd U.S. Ocean Acidification PI Meeting(Sept. 18-20, 2013, Washington, DC)
3rd U.S. Ocean Acidification PI Meeting (June 9-11, 2015, Woods Hole, MA – Tentative)

NSF media releases for the Ocean Acidification Program:

Press Release 10-186 NSF Awards Grants to Study Effects of Ocean Acidification

Discovery Blue Mussels "Hang On" Along Rocky Shores: For How Long?

Discovery nsf.gov - National Science Foundation (NSF) Discoveries - Trouble in Paradise: Ocean Acidification This Way Comes - US National Science Foundation (NSF)

Press Release 12-179 nsf.gov - National Science Foundation (NSF) News - Ocean Acidification: Finding New Answers Through National Science Foundation Research Grants - US National Science Foundation (NSF)

Press Release 13-102 World Oceans Month Brings Mixed News for Oysters

Press Release 13-108 nsf.gov - National Science Foundation (NSF) News - Natural Underwater Springs Show How Coral Reefs Respond to Ocean Acidification - US National Science Foundation (NSF)

Press Release 13-148 Ocean acidification: Making new discoveries through National Science Foundation research grants

Press Release 13-148 - Video nsf.gov - News - Video - NSF Ocean Sciences Division Director David Conover answers questions about ocean acidification. - US National Science Foundation (NSF)

Press Release 14-010 nsf.gov - National Science Foundation (NSF) News - Palau's coral reefs surprisingly resistant to ocean acidification - US National Science Foundation (NSF)

Press Release 14-116 nsf.gov - National Science Foundation (NSF) News - Ocean Acidification: NSF awards $11.4 million in new grants to study effects on marine ecosystems - US National Science Foundation (NSF)

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Funding

Funding Source	Award
NSF Emerging Frontiers Division (NSF EF)	EF-1316206

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