Flow Cytometry Results from Barbados incubation experiment, February 2012 (ADIMA project)

Website: https://www.bco-dmo.org/dataset/552977
Data Type: Other Field Results
Version: 1
Version Date: 2015-03-03

Project
» Atmospheric Deposition Impacts on Marine Ecosystems (ADIMA)

Contributors	Affiliation	Role
Paytan, Adina	University of California-Santa Cruz (UCSC)	Principal Investigator, Contact
Gegg, Stephen R.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Flow cytometry of seawater samples from an incubation experiment from West Barbados incubation experiment collected offshore (13.191912, -59.640579), February, 2012.

Table of Contents

Coverage

Spatial Extent: **Lat**:13.1919 **Lon**:-59.6406
Temporal Extent: 2012-02-01 - 2012-02-29

Methods & Sampling

Sampling and Analytical Methodology:
Nutrient and aerosol addition bioassay experiments were carried out over 3 days in February 2012. Seawater was collected from offshore (water depth >700 m) outside the Bellairs Research Institute at West Barbados (13º 11.309'N, 59º 38.267'W). Surface water was pumped into acid cleaned sample rinsed carboys using a peristaltic pump with acid washed Teflon tubing and pre filtered through a 50 um mesh acid washed Nitex© net to remove grazers. The seawater was stored in the dark until transport to the lab (within <2 hours). Seawater was dispensed into acid washed and sample rinsed polycarbonate bottles (500 mL each), pre-labeled with treatment type (12-20 bottles per treatment). Treatments included single nutrient (N, P, Fe) additions as well as a combination of N and P and a combination of N and Fe at concentrations representative of deep water in this area. Three aerosol treatments were used in this study representing aerosols deposited in three seasons, winter, spring and summer. Aerosols representing each of the seasons were added at concentrations simulating high and low deposition rates. High deposition was calculated to represent the cumulative deposition flux over 10 days of a strong dust storm event over the North Atlantic (300 g m^{-2} yr^{-1}) to the upper 10 m mixed layer. Low deposition treatments were equivalent to the normal average deposition rate for Barbados (10 g m^{-2} yr^{-1}) during spring and summer. A control (no addition, blank filter) treatment and procedural blanks (Milli-Q water) were also included. All bottles were incubated in a pool filled with circulating seawater to maintain local surface ocean temperature. The pool was covered with a neutral density shading screen to reduce light

intensity by 50%. Water samples used for the experiment (pre additions) was collected to characterize the baseline conditions (baseline, 5 replicates) and 3 replicate bottles for each treatment were also collected immediately after the additions were administered (time zero, t0). The experiment took place over 3 days, and each day 3 (for nutrients) or 5 (for aerosols) randomly selected bottles for each treatment were collected at 4pm in the afternoon (e.g. time points t1-t3). Immediately upon collection each bottle was sampled for chlorophyll *a*, flow cytometry, nutrients, and trace metal concentrations.

Water samples (1.5 mL) were collected from each incubation bottle for flow-cytometry, preserved by adding 300 uL of formalin and then frozen in liquid nitrogen until analysis. Approximately 10,000 0.75 um beads (Fluoresbrite™ particles, YG, Polysciences, Inc.) were added into each sample and samples were analyzed by flow-cytometer (BD Influx cell sorter) triggering on forward angle light scatter (FSC) to determine total cell numbers of populations of *Prochlorococcus*, *Synechococcus* and pico-eukaryotic algae. The 3 algal groups were discriminated based on their characteristic fluorescence and scattering properties

Data Processing Description

Data Processing:
572-27: fluorescence at 572nm, normalized to color beads
692-40: fluorescence at 692nm, normalized to color beads
FSC1 : forward angle light scatter, size normalized to 0.75 micrometer color beads

BCO-DMO Processing Notes
- Generated from original file: "Data_flow cytometry results from Barbados incubation experiment.xlsx" contributed by Chia-Te Chien
- Parameter names edited to conform to BCO-DMO naming convention found at Choosing Parameter Name
- Common parameter names standardized between the four contributed Barbados datasets
- Experiment Site Id and Lat/Lon appended to enable data discovery in MapServer
- Blank columns removed
- "nd" (no data) inserted into blank fields

[table of contents | back to top]

Data Files

File
ADIMA_Barbados_Flow_Cytom.csv (Comma Separated Values (.csv), 7.33 KB) MD5:ac965119a20ab1ed201cdc72b5c51529 Primary data file for dataset ID 552977

[table of contents | back to top]

Parameters

Parameter	Description	Units
Experiment_Site	Identifier where experiments were conducted	text
Lat	Approximate Latitude Position of Experiment Site; South is negative	decimal degrees
Lon	Approximate Longitude Position of Experiment Site; West is negative	decimal degrees
ID	Sample Id	text

Treatment	Treatments	text
Time_Point	Experiment time point	days
Eukaryote	Eukaryote – cell number per milliliter	Cells/ml
Eukaryote_572_27	Eukaryote 572-27: fluorescence at 572nm; normalized to color beads	(tbd)
Eukaryote_692_40	Eukaryote 692-40: fluorescence at 692nm; normalized to color beads	(tbd)
Eukaryote_FSC1	Eukaryote FSC1 : forward angle light scatter; size normalized to 0.75 micrometer color beads	(tbd)
Pro	Prochlorococcus – cell number per milliliter	Cells/ml
Pro_572_27	Prochlorococcus 572-27: fluorescence at 572nm; normalized to color beads	(tbd)
Pro_692_40	Prochlorococcus 692-40: fluorescence at 692nm; normalized to color beads	(tbd)
Pro_FSC1	Prochlorococcus FSC1 : forward angle light scatter; size normalized to 0.75 micrometer color beads	(tbd)
Syn	Synechococcus – cell number per milliliter	Cells/ml
Syn_572_27	Synechococcus 572-27: fluorescence at 572nm; normalized to color beads	(tbd)
Syn_692_40	Synechococcus 692-40: fluorescence at 692nm; normalized to color beads	(tbd)
Syn_FSC1	Synechococcus FSC1 : forward angle light scatter; size normalized to 0.75 micrometer color beads	(tbd)

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Flow Cytometer
Generic Instrument Name	Flow Cytometer
Dataset-specific Description	Approximately 10,000 0.75 □m beads (FluoresbriteTM particles, YG, Polysciences, Inc.) were added into each sample and samples were analyzed by flow-cytometer (BD Influx cell sorter) triggering on forward angle light scatter (FSC) to determine total cell numbers of populations of Prochlorococcus, Synechococcus and pico-eukaryotic algae.
Generic Instrument Description	Flow cytometers (FC or FCM) are automated instruments that quantitate properties of single cells, one cell at a time. They can measure cell size, cell granularity, the amounts of cell components such as total DNA, newly synthesized DNA, gene expression as the amount messenger RNA for a particular gene, amounts of specific surface receptors, amounts of intracellular proteins, or transient signalling events in living cells. (from: http://www.bio.umass.edu/micro/immunology/facs542/facswhat.htm)

[table of contents | back to top]

Deployments

ADIMA_Barbados

Website	https://www.bco-dmo.org/deployment/552888
Platform	lab Bellairs Research Institute
Start Date	2012-02-01
End Date	2012-02-01
Description	Nutrient and aerosol addition bioassay experiments were carried out over 3 days in February 2012. Seawater was collected from offshore (water depth >700 m) outside the Bellairs Research Institute at West Barbados (13o 11.309'N, 59o 38.267'W).

[table of contents | back to top]

Project Information

Atmospheric Deposition Impacts on Marine Ecosystems (ADIMA)

Website: http://pmc.ucsc.edu/~apaytan/page_projects.html

Coverage: Gulf of Aqaba, Atlantic Ocean (Bermuda Time Series Station), Monterey Bay

Chemical components delivered to the surface ocean through atmospheric deposition influence ocean productivity and ecosystem structure thus are tightly related to the global carbon cycle and climate. Accordingly, the major aim of this project is to quantitatively estimate the variable impact of aerosols on marine phytoplankton and to determine the specific effects on various taxa. Such data could in the future be used to better understand the global impact of aerosols on the oceanic ecosystem. To accomplish this goal the PI will monitor aerosol dry deposition fluxes, determine aerosol sources, obtain the chemical composition and solubility of aerosols, and evaluate the contribution of aerosols to nutrient and trace metal budgets of seawater at two oceanographically different sites (Bermuda and Monterey Bay) representing open ocean and coastal setting. The effects of the different aerosol "types" (defined by source and chemical characteristics) on specific phytoplankton taxa will also be evaluated using pure culture and natural samples bioassays. This project is particularly important in light of the role atmospheric deposition can resume in oligotrophic and coastal settings

and the predicted future global conditions of increased aridity and urbanization and associated changes in dust fluxes and composition.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0850467

[table of contents | back to top]