

Water samples from R/V Kilo Moana cruises in the North Pacific Subtropical Gyre near Station ALOHA (DIAZOTROPHS-CO2 project)

Website: <https://www.bco-dmo.org/dataset/4011>

Version:

Version Date: 2013-08-19

Project

» [Oceanic diazotroph community structure and activities in a high carbon dioxide world](#) (DIAZOTROPHS-CO2)

Program

» [Ocean Carbon and Biogeochemistry](#) (OCB)

Contributors	Affiliation	Role
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Table of Contents

- [Dataset Description](#)
 - [Methods & Sampling](#)
 - [Data Processing Description](#)
- [Data Files](#)
- [Parameters](#)
- [Instruments](#)
- [Deployments](#)
- [Project Information](#)
- [Program Information](#)
- [Funding](#)

Dataset Description

Biogeochemical data from water samples collected in the area around Station ALOHA (22° 45'N, 158° 00'W) during the summer (August 2010) and spring period (March 2011) . An assessment of dinitrogen fixation rates and nifH community structure are published as a separate dataset.

Methods & Sampling

Sampling and analytical methods were conducted following the field and laboratory protocols used by the Hawaii Ocean Time-series. These protocols can be found at:
<http://hahana.soest.hawaii.edu/hot/protocols/protocols.html>

Data Processing Description

The processing of the data was followed by the standard procedures of the HOT program:
<http://hahana.soest.hawaii.edu/hot/protocols/protocols.html>

[[table of contents](#) | [back to top](#)]

Data Files

File
N2fix_CO2_WS.csv (Comma Separated Values (.csv), 152.83 KB) MD5:457ccb89108e021c39acbb0fc94af57f
Primary data file for dataset ID 4011

[[table of contents](#) | [back to top](#)]

Parameters

Parameter	Description	Units
cruise_id	Cruise identifier	text
sta	station identifier	integer
cast	cast number	integer
date	date of sample	YYYYMMDD
year	year of sample	YYYY
month	month of sample	MM
day	day of sample	DD
time	time of sample	HHMM
lat	latitude of sample	degrees
lon	longitude of sample	degrees
bot_NIS	Niskin bottle number	integer
depth	depth of sample	meters
potemp	Potential Temperature	ITS-90
density	Density	kg/m3
DIC	Dissolved Organic Carbon	umol/L
TALK	Total Alkalinity	umol/L
pH	pH	dimensionless
chl_a	chlorophyll_A	ug/L
PO4	Particulate Phosphate	umol/L
NO3_NO2	Nitrate plus Nitrite	umol/L
SiO4	Silicate	umol/L
LLP	Low-level Phosphorus	ng/L
PP	Primary Production	nmol/L
UCYN_A	UCYN_A count	copies/L
crococ	crocospaera count	copies/L
tricho	trichodesmium count	copies/L
het_1	Heterocyst 1 count	copies/L
het_2	Heterocyst 2 count	copies/L
het_3	Heterocyst 3 count	copies/L
taxon	taxonomic group	text
count	Number of individuals counted in sample or sample fraction	copies/liter

[[table of contents](#) | [back to top](#)]

Instruments

Dataset-specific Instrument Name	Niskin bottle
Generic Instrument Name	Niskin bottle
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

[[table of contents](#) | [back to top](#)]

Deployments

KM1016

Website	https://www.bco-dmo.org/deployment/59055
Platform	R/V Kilo Moana
Report	http://dmoserv3.bco-dmo.org/jg/serv/BCO-DMO/DIAZOTROPHS_CO2/726342.html1%7Bdir=dmoserv3.who.edu/jg/dir/BCO-DMO/DIAZOTROPHS_CO2/,info=dmoserv3.bco-dmo.org/jg/info/BCO-DMO/DIAZOTROPHS_CO2/CO2_experimental%7D?cruise_id_eq_km1016
Start Date	2010-08-20
End Date	2010-08-30
Description	Cruise information and original data are available from the NSF R2R data catalog.

KM1110

Website	https://www.bco-dmo.org/deployment/59056
Platform	R/V Kilo Moana
Report	http://dmoserv3.bco-dmo.org/jg/serv/BCO-DMO/DIAZOTROPHS_CO2/726342.html1%7Bdir=dmoserv3.who.edu/jg/dir/BCO-DMO/DIAZOTROPHS_CO2/,info=dmoserv3.bco-dmo.org/jg/info/BCO-DMO/DIAZOTROPHS_CO2/CO2_experimental%7D?cruise_id_eq_km1110
Start Date	2011-03-12
End Date	2011-03-23

[[table of contents](#) | [back to top](#)]

Project Information

Oceanic diazotroph community structure and activities in a high carbon dioxide world (DIAZOTROPHS-CO2)

The North Pacific Subtropical Gyre (NPSG) is the largest ocean ecosystem on Earth, playing a prominent role in global carbon cycling and forming an important reservoir of marine biodiversity. Nitrogen (N₂) fixing bacteria (termed diazotrophs) provide a major source of new nitrogen to the oligotrophic waters of the NPSG, thereby exerting direct control on the carbon cycle. Oceanic uptake of CO₂ causes long-term changes in the partial pressure of CO₂ (pCO₂) in the seawater of this ecosystem. Therefore, understanding how carbon system perturbations may influence ocean biogeochemistry is an important and timely undertaking.

In this project, the investigators will examine how natural assemblages of N₂ fixing microorganisms respond to perturbations in seawater carbon chemistry. Laboratory and field-based experiments will be placed in the context of monthly time series measurements on the activities and abundances of N₂ fixing microorganism abundances. Together, the project will provide insight into the dependence of N₂ fixing microorganism physiology on variations in CO₂. The broad objectives of the research are: (1) Quantify the responses and consequences of changes in seawater pCO₂ on the growth and community structure of naturally-occurring assemblages of ocean diazotrophs; (2) Identify why and how changes in seawater pCO₂ influence the growth and carbon acquisition strategies of two model marine diazotrophs (*Trichodesmium* and *Crocospaera*); and (3) Quantify temporal variability in diazotroph community structure and activities at Station ALOHA.

This is a Collaborative Research award.

[[table of contents](#) | [back to top](#)]

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.

[[table of contents](#) | [back to top](#)]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0850827

[[table of contents](#) | [back to top](#)]