Experimental biogeochemical data from R/V Melville MV1405 collected along the California coastline in 2014

Website: https://www.bco-dmo.org/dataset/564697
Version: 20 August 2015
Version Date: 2015-08-20

Project
» Linking physiological and molecular aspects of diatom silicification in field populations (Diatom Silicification)

Contributors	Affiliation	Role
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Table of Contents

Methods & Sampling

See the following protocol documents:

32Si Sample Processing (.doc)
Biogenic Si Analysis (.doc)
Dissolved Si Analysis (.doc)

Data Processing Description

BCO-DMO Processing Notes:
- replaced spaces with underscores;
- added column for lon (in negative degrees east rather than positive degrees west);
- modified parameter names to conform with BCO-DMO naming conventions;
- removed "ms" (meters) from sample depth column and bottom depth column;
- replaced ~ with 'nd' to indicate 'no data';
- replaced 'sfc' with '1' in depth_sample column (per email from Janice Jones on 21 Aug 2015).

[table of contents | back to top]

Data Files

File
IrnBru.csv (Comma Separated Values (.csv), 39.65 KB) MD5:ec4cbd2c91515dab0e5433bfe1ce99cc Primary data file for dataset ID 564697

[table of contents | back to top]

Parameters

Parameter	Description	Units
cruise_id	Cruise during which sample was collected.	dimensionless
event	Event number from Bruland event log.	dimensionless
station	Sampling station number or location.	dimensionless
date_utc	UTC date (day-month-year).	dd-mon-YYYY
julian_day_utc	UTC julian day of year.	dimensionless
time_utc	UTC time (hours:minutes).	HH:MM
lat	Latitude in decimal degrees. Positive values = North.	decimal degrees
lon	Longitude in decimal degrees. Positive values = East.	decimal degrees
depth_sample	Samplling depth in meters.	meters (m)
depth_bottom	Bottom depth in meters.	meters (m)
cast_type	Cast type (CTD or experiment).	dimensionless
bottle_rosette	Rosette bottle number.	dimensionless
pcnt_lo	Percent light level (PAR sensor)	percent (%)
bottle_carboy	Sample identifier.	dimensionless
depth_target	Target depth for sample collection.	meters (m)
BRZ_dSi	Silicic acid concentration (also known as dissolved silicon concentration or dSi).	micromoles Si per Liter (umol/L)
bSi	Particulate biogenic silica in micromoles Si per liter.	micromoles Si per Liter (umol/L)
Si32_rho	Silica production rate.	micromoles Si per Liter per day (umol Si/L/d)
Si32_Vb	Biomass normalized silica production rate.	per day (d-1)
Si32_E_rho	Silica production rate after the addition of 20 mM sodium silicate.	micromoles Si per Liter per day (umol Si/L/d)
Si32_E_Vb	Biomass normalized silica production rate after the addition of 20 mM sodium silicate.	per day (d-1)
ISO_DateTime_UTC	Date and time formatted to ISO 8601 standard.	YYYY-mm-ddTHH:MM:SS.xx

[table of contents | back to top]

Deployments

MV1405

Website	https://www.bco-dmo.org/deployment/559966
Platform	R/V Melville
Start Date	2014-07-03
End Date	2014-07-26
Description	Deployment MV1405 on R/V Melville. Cruise took place during July 2014.

[table of contents | back to top]

Project Information

Linking physiological and molecular aspects of diatom silicification in field populations (Diatom Silicification)

Coverage: Oregon/California Coastal Upwelling Zone, between 34-44N and 120-124W

Description from NSF award abstract:
Diatoms, unicellular, eukaryotic photoautotrophs, are among the most ecologically successful and functionally diverse organisms in the ocean. In addition to contributing one-fifth of total global primary productivity, diatoms are also the largest group of silicifying organisms in the ocean. Thus, diatoms form a critical link between the carbon and silicon (Si) cycles. The goal of this project is to understand the molecular regulation of silicification processes in natural diatom populations to better understand the processes controlling diatom productivity in the sea. Through culture studies and two research cruises, this research will couple classical measurements of silicon uptake and silica production with molecular and biochemical analyses of Silicification-Related Gene (SiRG) and protein expression. The proposed cruise track off the West Coast of the US will target gradients in Si and iron (Fe) concentrations with the following goals: 1) Characterize the expression pattern of SiRGs, 2) Correlate SiRG expression patterns to Si concentrations, silicon uptake kinetics, and silica production rates, 3) Develop a method to normalize uptake kinetics and silica production to SiRG expression levels as a more accurate measure of diatom activity and growth, 4) Characterize the diel periodicity of silica production and SiRG expression.

It is estimated that diatoms process 240 Teramoles of biogenic silica each year and that each molecule of silicon is cycled through a diatom 39 times before being exported to the deep ocean. Decades of oceanographic and field research have provided detailed insight into the dynamics of silicon uptake and silica production in natural populations, but a molecular understanding of the factors that influence silicification processes is required for further understanding the regulation of silicon and carbon fluxes in the ocean. Characterizing the genetic potential for silicification will provide new information on the factors that regulate the distribution of diatoms and influence in situ rates of silicon uptake and silica production. This research is expected to provide significant information about the molecular regulation of silicification in natural populations and the physiological basis of Si limitation in the sea.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1334387

[table of contents | back to top]