Cruise tracks from R/V New Horizon NH1417 in the Eastern Pacific between San Diego and Hawaii in 2014 (Phyto response to N substrates project)

Website: https://www.bco-dmo.org/dataset/632336
Version: 11 January 2016
Version Date: 2016-01-11

Project
» Oligotrophic phytoplankton community response to changes in N substrates and the resulting impact on genetic, taxonomic and functional diversity (PhytoNsubResponse)

Program
» Dimensions of Biodiversity (Dimensions of Biodiversity)

Contributors	Affiliation	Role
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Dataset Description

R/V New Horizon Cruise: NH1417 Cruise track generated from R2R Archive file
Cruise Id, Date/Time UTC, Lat, Lon, SOG, COG
1 minute fixes

R2R Archive File Creation Date: 2015-05-29T19:54:44Z

Methods & Sampling

Generated from R2R archive file by BCO-DMO staff

Data Processing Description

Generated from R2R archive file by BCO-DMO staff

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Data Files

File
CruiseTrack.csv (Comma Separated Values (.csv), 2.67 MB) MD5:5075b32d33d40bcad98d4408c934632b Primary data file for dataset ID 632336

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Parameters

Parameter	Description	Units
CruiseId	Official UNOLS cruise id	text
ISO_DateTime_UTC	ISO formatted UTC Date and Time	YYYY-MM-DDTHH:MM:SSZ
Latitude	Latitude Position (South is negative)	decimal degrees
Longitude	Longitude Position (West is negative)	decimal degrees
SOG	Instantaneous Speed-over-ground	meters/sec
COG	Instantaneous Course-over-ground [deg. clockwise from North]	decimal degrees

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Instruments

Dataset-specific Instrument Name	GPS
Generic Instrument Name	Global Positioning System Receiver
Dataset-specific Description	Navigation Equipment HEALY is outfitted with Sperry Marine's Voyage Management System (VMS). This system utilizes multiple heading, position, environmental, and navigation inputs to steer the ship along a desired course. Currently, HEALY has the following GPS receivers: GPS, DGPS, P-Code GPS, and 3-D GPS. Heading inputs include two gyrocompasses and the 3-D GPS heading information. The ship is also outfitted with an electronic magnetic compass. A Dynamic Positioning System (DPS) is available for station keeping and slow speed transits (towing, dredging). HEALY's DPS attempts to do with props and a bowthruster what smaller ships do with fore and aft thrusters, so it has limitations. It was designed and built by ALSTOM and integrates the use of propellers, rudders, and the bow thruster to accomplish ship movement. DPS Limitations: At best heading in openwater, in a 20 kt wind, seas with a significant wave height of 4.0 feet and a 1 knot currents, HEALY shall be capable of maintaining a position of +/- 150 feet or 3% of water depth (whichever is greater) from a point or trackline and maintain a heading of +/- 5 degrees. The seas and wind shall be from the same direction, with the current from less the 45 degrees off the wind. Antenna Layout Top View PDF
Generic Instrument Description	The Global Positioning System (GPS) is a U.S. space-based radionavigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis. The U.S. Air Force develops, maintains, and operates the space and control segments of the NAVSTAR GPS transmitter system. Ships use a variety of receivers (e.g. Trimble and Ashtech) to interpret the GPS signal and determine accurate latitude and longitude.

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Deployments

NH1417

Website	https://www.bco-dmo.org/deployment/544429
Platform	R/V New Horizon
Start Date	2014-08-18
End Date	2014-09-16
Description	NEMO cruise. Bounding box -- 35 degrees N to 21.5 degrees N, 117 degrees W to 157 degrees W NSF R2R data catalog

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Project Information

Oligotrophic phytoplankton community response to changes in N substrates and the resulting impact on genetic, taxonomic and functional diversity (PhytoNsubResponse)

Coverage: North Pacific Subtropical Gyre at Station ALOHA, and a transect from San Diego, CA to Hawaii

(Extracted from NSF award abstract)

Marine phytoplankton are a diverse group of Prokaryotic and Eukaryotic unicellular organisms that account for approximately 50% of global carbon fixation. Nitrogen (N) is an essential element for microbial growth, but

concentrations of bioavailable nitrogen in vast regions of subtropical ocean gyres are extremely low (submicromolar to nanomolar concentrations), and generally limit phytoplankton growth. Phytoplankton taxa differ in their genetic capabilities to take up and assimilate nutrients, and thus competition for different chemical forms of N (NH4+, NO3- and urea) and supply of these N-containing compounds are important controls on phytoplankton growth, productivity, and ultimately ecosystem function. The form and supply of N to phytoplankton have already been altered by anthropogenic activities, and with increasing environmental perturbations the effects will accelerate. To date however, there is limited information on how the N forms and fluxes impact the marine phytoplankton community composition and primary production. Similarly, determining the mechanisms of the response are crucial to assessing how ocean ecosystem function will respond to global climate change.

This project seeks to determine how taxonomic, genetic and functional dimensions of phytoplankton diversity are linked with community-level responses to the availability of different N substrates (NH4+, NO3-, and urea) in one of Earth's largest aquatic habitats, the North Pacific Subtropical Gyre. The project will characterize phytoplankton community composition change and gene expression, photosynthetic performance, carbon fixation, and single-cell level N and C uptake in different taxa within the phytoplankton assemblage in response to different N compounds. The research project is unique in investigating community-to-single-cell level function and species (strain)-specific gene expression patterns using state-of-the-art methods including fast repetition rate fluorometry, nanoscale secondary ion mass spectrometry and a comprehensive marine microbial community microarray. The results will provide predictive understanding of how changes in the availability of key nitrogen pools (N) may impact phytoplankton dynamics and function in the ocean.

References:

Karl, D. M., Bjorkman, K. M., Dore, J. E., Fujieki, L., Hebel, D. V., Houlihan, T., Letelier, R. M., Tupas, L. M. 2001. Ecological nitrogen-to-phosphorus stoichiometry at station ALOHA. Deep-Sea Research II. 48:1529 - 1566.

Karl, D. M., Letelier, R., Tupas, L., Dore, J., Christian, J. & Hebel, D. 1997. The role of nitrogen fixation in biogeochemical cycling in the subtropical North Pacific Ocean. Nature. 388:533-538.

McCarthy, J., Taylor, W. R., Taft, J. 1997. Nitrogenous nutrition of the plankton in the Chesapeake Bay. Limnology and Oceanography. 35:822 - 829.

Letelier, R., Karl, D. M. 1996. Role of Trichodesmium spp. in the productivity of the subtropical North Pacific Ocean. Marine Ecology Progress Series. 133:263 - 273.

Lipschultz, F. 1995. Nitrogen-specific uptake rates of marine phytoplankton isolated from natura populations of particles by flow cytometry. Marine Ecology Progress Series. 123:245-258.

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Program Information

Dimensions of Biodiversity (Dimensions of Biodiversity)

Website: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503446

Coverage: global

(adapted from the NSF Synopsis of Program)
Dimensions of Biodiversity is a program solicitation from the NSF Directorate for Biological Sciences. FY 2010 was year one of the program. [MORE from NSF]

The NSF Dimensions of Biodiversity program seeks to characterize biodiversity on Earth by using integrative, innovative approaches to fill rapidly the most substantial gaps in our understanding. The program will take a broad view of biodiversity, and in its initial phase will focus on the integration of genetic, taxonomic, and functional dimensions of biodiversity. Project investigators are encouraged to integrate these three dimensions to understand the interactions and feedbacks among them. While this focus complements several core NSF programs, it differs by requiring that multiple dimensions of biodiversity be addressed simultaneously, to

understand the roles of biodiversity in critical ecological and evolutionary processes.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1241221
NSF Division of Ocean Sciences (NSF OCE)	OCE-1241263
NSF Division of Ocean Sciences (NSF OCE)	OCE-1241093

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