Dissolved, inorganic nutrient data integrated with bottle data from R/V Endeavor cruise EN614 in May 2018

Website: https://www.bco-dmo.org/dataset/861206
Data Type: Cruise Results
Version: 1
Version Date: 2021-10-26

Project
» Collaborative Research: Impact of the Amazon River Plume on Nitrogen Availability and Planktonic Food Web Dynamics in the Western Tropical North Atlantic (Amazon River Plume Nitrogen)

Contributors	Affiliation	Role
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Abstract
This dataset includes dissolved, inorganic nutrient data integrated with bottle data from R/V Endeavor cruise EN614 in May 2018.

Table of Contents

- Coverage
- Dataset Description
  - Methods & Sampling
  - Data Processing Description
- Data Files
- Supplemental Files
- Parameters
- Instruments
- Deployments
- Project Information
- Funding

Coverage

Spatial Extent: **N**:16.32318 **E**:-50.88972 **S**:4.88316 **W**:-57.25598
Temporal Extent: 2018-05-07 - 2018-05-29

Methods & Sampling

Hydrographic data and water samples were collected during casts with a CTD-rosette system (SBE11plus equipped with a fluorometer, transmissometer, oxygen sensor, and a PAR sensor).

Water samples for dissolved, inorganic nutrient analysis were collected in duplicate directly from Niskin bottles attached to the CTD-rosette system (listed above). Sampling tubes were rinsed with sample water three times before collection. After collection, one set of samples was placed in a fridge to be analyzed within 48hrs aboard the vessel while the duplicate set of samples was placed immediately in a freezer for later analysis. Analysis was completed on a Lachat Quickchem 8500 Series 2 nutrient analyzer, according to standard methods listed below:

PO4: 31-115-01-I

Si: 31-114-27-1-B

NO3/NO2: 31-107-04-1-A

NO2: 31-107-05-1-A

Method details available at: https://support.hach.com/app/answers/answer_view/a_id/1004798

Data Processing Description

Data Processing:
Hydrographic data were processed using SeaSave v 7.26.7.107. Please see the "EN614_Nutrients_Processing_Notes.pdf" Supplemental File for data processing details. Nutrient data were processed using Omnion 3.0 Software.

BCO-DMO Processing:
- renamed fields to comply with BCO-DMO naming conventions;
- converted date to YYYY-MM-DD format;
- added date-time field in ISO8601 format;
- replaced "31.2" with "31.20" in the "StnEvent" column.

[table of contents | back to top]

Data Files

File
EN614_Nutrients.csv (Comma Separated Values (.csv), 151.38 KB) MD5:f7c5bc2939010fc78a837a3bf45ec3a1 Primary data file for dataset ID 861206

[table of contents | back to top]

Supplemental Files

File
EN614_Nutrients_Processing_Notes.pdf (Portable Document Format (.pdf), 677.77 KB) MD5:a0a5fe0bb3619309cc72f500599197c2 Processing notes for the EN614 Nutrients data, including representative SeaBird header file.

[table of contents | back to top]

Parameters

Parameter	Description	Units
FileName	Original name of data file	unitless
Cruise	Cruise identifier	unitless
Station	Station number	unitless

StnEvent	Numeric identifier for each deployment in the format SSS.EE, where SSS is the station number and EE identifies the specific sampling event	unitless
BottleID	Bottle identifier (station, event, bottle)	unitless
Bottle	Bottle number	unitless
ISO_DateTime_UTC	Date and time (UTC) in ISO8601 format: YYYY-MM-DDThh:mm:ssZ	unitless
Date	Date (UTC) in format YYYY-MM-DD	unitless
Time	Time (UTC) in format hh:mm:ss	unitless
Sal00	Salinity, Practical	PSU
Sal11	Salinity, Practical, 2	PSU
Sigma_t00	Density [sigma-theta]	kilograms per cubic meter (kg/m^3)
Sigma_t11	Density, 2 [sigma-theta]	kilograms per cubic meter (kg/m^3)
Oxsat	O2 saturation	Mm/Kg
Sbeox0	Oxygen, SBE 43, WS = 2	micromoles per liter (umol/L)
Sbeox1	Oxygen, SBE 43, 2, WS = 2	micromoles per liter (umol/L)
Potemp090	Potential Temperature [ITS-90]	degrees Celsius
Potemp190	Potential Temperature, 2 [ITS-90]	degrees Celsius
SvCM	Sound Velocity [Chen-Millero]	meters per second (m/s)
SvCM1	Sound Velocity, 2 [Chen-Millero]	meters per second (m/s)
Scan	Scan count	unitless

Scan_SD	Standard deviation of Scan	unitless
TimeJ	Julian day (UTC)	unitless
TimeJ_SD	Standard deviation of TimeJ	unitless
TimeS	Time elapsed	seconds
TimeS_SD	Standard deviation of TimeS	seconds
PrDM	Pressure, Digiquartz	decibars (db)
PrDM_SD	Standard deviation of PrDM	decibars (db)
DepSM	Depth [salt water, m]	meters (m)
DepSM_SD	Standard deviation of DepSM	meters (m)
T090C	Temperature [ITS-90]	degrees Celsius
T090C_SD	Standard deviation of T090C	degrees Celsius
T190C	Temperature, 2 [ITS-90]	degrees Celsius
T190C_SD	Standard deviation of T190C	degrees Celsius
T2_T190C	Temperature Difference, 2 - 1 [ITS-90]	degrees Celsius
T2_T190C_SD	Standard deviation of T2_T190C	degrees Celsius
C0S	Conductivity	Siemens per meter (S/m)
C0S_SD	Standard deviation of C0S	Siemens per meter (S/m)
C1S	Conductivity, 2	Siemens per meter (S/m)
C1S_SD	Standard deviation of C1S	Siemens per meter (S/m)

C2_C1	Conductivity Difference, 2 - 1	Siemens per meter (S/m)
C2_C1_SD	Standard deviation of C2_C1	Siemens per meter (S/m)
V0	Voltage 0	volts (V)
V0_SD	Standard deviation of V0	volts (V)
CStarAt0	Beam Attenuation, WET Labs C-Star	reciprocal meters (1/m)
CStarAt0_SD	Standard deviation of CStarAt0	reciprocal meters (1/m)
CStarTr0	Beam Transmission, WET Labs C-Star	percent (%)
CStarTr0_SD	Standard deviation of CStarTr0	percent (%)
V1	Voltage 1	volts (V)
V1_SD	Standard deviation of V1	volts (V)
FlECO_AFL	Fluorescence, WET Labs ECO-AFL/FL	milligrams per cubic meter (mg/m^3)
FlECO_AFL_SD	Standard deviation of FlECO_AFL	milligrams per cubic meter (mg/m^3)
V2	Voltage 2	volts (V)
V2_SD	Standard deviation of V2	volts (V)
AltM	Altimeter	meters (m)
AltM_SD	Standard deviation of AltM	meters (m)
V3	Voltage 3	volts (V)
V3_SD	Standard deviation of V3	volts (V)
Par	PAR/Irradiance, Biospherical/Licor	micromoles photons per square meter per second (umol photons/m^2/sec)

Par_SD	Standard deviation of Par	micromoles photons per square meter per second (umol photons/m^2/sec)
V4	Voltage 4	volts (V)
V4_SD	Standard deviation of V4	volts (V)
Sbeox0V	Oxygen raw, SBE 43	volts (V)
Sbeox0V_SD	Standard deviation of Sbeox0V	volts (V)
V5	Voltage 5	volts (V)
V5_SD	Standard deviation of V5	volts (V)
Sbeox1V	Oxygen raw, SBE 43, 2	volts (V)
Sbeox1V_SD	Standard deviation of Sbeox1V	volts (V)
V6	Voltage 6	volts (V)
V6_SD	Standard deviation of V6	volts (V)
V7	Voltage 7	volts (V)
V7_SD	Standard deviation of V7	volts (V)
Spar	SPAR Biospherical/Licor	micromoles photons per square meter per second (umol photons/m^2/sec)
Spar_SD	Standard deviation of Spar	micromoles photons per square meter per second (umol photons/m^2/sec)
Latitude	Latitude	degrees North
Latitude_SD	Standard deviation of Latitude	degrees North
Longitude	Longitude	degrees East
Longitude_SD	Standard deviation of Longitude	degrees East

Mean_PO4	dissolved, inorganic phosphate	micromolar (uM)
Mean_Si	dissolved, inorganic silicate	micromolar (uM)
Mean_NO3_NO2	dissolved, inorganic nitrate+nitrite	micromolar (uM)
Mean_NO2	dissolved, inorganic nitrite	micromolar (uM)
Mean_N_star	deviation of NO3/NO2 relative to PO4 from the Redfield Ratio	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Dataset-specific Description	Hydrographic data and water samples were collected during casts with a CTD-rosette system (SBE11plus equipped with a fluorometer, transmissometer, oxygen sensor, and a PAR sensor). Individual sensor details and calibration info provided in the "EN614_Nutrients_Processing_Notes.pdf" Supplemental File.
Generic Instrument Description	The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). more information from Sea-Bird Electronics

Dataset-specific Instrument Name	Biospherical/Licor
Generic Instrument Name	LI-COR Biospherical PAR Sensor
Generic Instrument Description	The LI-COR Biospherical PAR Sensor is used to measure Photosynthetically Available Radiation (PAR) in the water column. This instrument designation is used when specific make and model are not known.

Dataset-specific Instrument Name	Niskin bottles attached to CTD-rosette system
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.

Dataset-specific Instrument Name	Lachat Quikchem 8500 Series 2
Generic Instrument Name	Nutrient Autoanalyzer
Dataset-specific Description	Lachat Quikchem 8500 Series 2, with ASX-260 autosampler, manufactured by Lachat Instruments a Hach company brand
Generic Instrument Description	Nutrient Autoanalyzer is a generic term used when specific type, make and model were not specified. In general, a Nutrient Autoanalyzer is an automated flow-thru system for doing nutrient analysis (nitrate, ammonium, orthophosphate, and silicate) on seawater samples.

Dataset-specific Instrument Name	SBE 43
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Generic Instrument Description	The Sea-Bird SBE 43 dissolved oxygen sensor is a redesign of the Clark polarographic membrane type of dissolved oxygen sensors. more information from Sea-Bird Electronics

Dataset-specific Instrument Name	WET Labs ECO-AFL/FL
Generic Instrument Name	Wet Labs ECO-AFL/FL Fluorometer
Generic Instrument Description	The Environmental Characterization Optics (ECO) series of single channel fluorometers delivers both high resolution and wide ranges across the entire line of parameters using 14 bit digital processing. The ECO series excels in biological monitoring and dye trace studies. The potted optics block results in long term stability of the instrument and the optional anti-biofouling technology delivers truly long term field measurements. more information from Wet Labs

Dataset-specific Instrument Name	WET Labs C-Star
Generic Instrument Name	WET Labs {Sea-Bird WETLabs} C-Star transmissometer
Generic Instrument Description	The C-Star transmissometer has a novel monolithic housing with a highly intgrated opto-electronic design to provide a low cost, compact solution for underwater measurements of beam transmittance. The C-Star is capable of free space measurements or flow-through sampling when used with a pump and optical flow tubes. The sensor can be used in profiling, moored, or underway applications. Available with a 6000 m depth rating. More information on Sea-Bird website: https://www.seabird.com/c-star-transmissometer/product?id=60762467717

[table of contents | back to top]

Deployments

EN614

Website	https://www.bco-dmo.org/deployment/751104
Platform	R/V Endeavor
Start Date	2018-05-06
End Date	2018-06-01
Description	See additional cruise information from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/EN614

[table of contents | back to top]

Project Information

Collaborative Research: Impact of the Amazon River Plume on Nitrogen Availability and Planktonic Food Web Dynamics in the Western Tropical North Atlantic (Amazon River Plume Nitrogen)

Coverage: Amazon River plume

NSF Award Abstract:
This is a focused program of field research in waters of the Western Tropical North Atlantic influenced by the Amazon River Plume during the high river flow season. The Amazon Plume region supports diverse plankton communities in a dynamic system driven by nutrients supplied by transport from the river proper as well as nutrients entrained from offshore waters by physical mixing and upwelling. This creates strong interactions among physical, chemical, and biological processes across a range of spatial and temporal scales. The field program will link direct measurements of environmental properties with focused experimental studies of nutrient supply and nutrient limitation of phytoplankton, as well as the transfer of phytoplankton nitrogen to the zooplankton food web. The Amazon Plume exhibits a close juxtaposition of distinct communities during the high-flow season, making it an ideal site for evaluating how nutrient availability, nutrient supply, and habitat longevity interact to drive offshore ecosystem dynamics and function. This project will include German collaborators and will seamlessly integrate education and research efforts. The investigators and their institutions have a strong commitment to undergraduate and graduate education and to increasing the diversity of the ocean science community through active recruiting and training efforts. The team has a strong track record of involving both undergraduate and graduate students in their field and lab research. The two research cruises planned will provide opportunities for students and technicians to interact with an interdisciplinary and international research team.

The ultimate objectives of this project are to understand the processes and interactions that promote distinct communities of nitrogen-fixing organisms (diazotrophs) and other phytoplankton around the Amazon Plume and to explore the impacts of these diazotroph-rich communities on zooplankton biomass and production. The research team includes scientists with expertise in nutrient and stable isotope biogeochemistry, remote sensing as well as specialists in characterizing water mass origin and history using naturally occurring radium isotopes. This combination of approaches will provide a unique opportunity to address fundamental questions related to plankton community structure, primary production, and links to secondary production in pelagic ecosystems. The project will address the following key questions focused on fundamental issues in plankton ecology resulting from previous research in this region:

A. What mechanisms promote the preferential delivery of bioavailable phosphorus and the resulting strong nitrogen limitation associated with the northern reaches of the Amazon Plume during the high flow season?

B. What factors lead to the clear niche separation between diazotrophs within and around the Amazon Plume and how are the distinct diazotroph communities influenced by hydrographic and biogeochemical controls associated with the Amazon River Plume and offshore upwelling processes?

C. How does the nitrogen fixed by the different types of diazotrophs contribute to secondary production, and how efficiently does diazotroph nitrogen move through the food web?

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1737078

[table of contents | back to top]