Processed CTD data from cruises R/V Atlantis (AT15-61) in Jan-Feb 2010 and R/V Melville (MV1104) in Mar-Apr 2011 in the Eastern Tropical South Pacific

Website: https://www.bco-dmo.org/dataset/827861
Data Type: Cruise Results
Version: 1
Version Date: 2020-10-28

Project
» Expression of Microbial Nitrification in the Stable Isotopic Systematics of Oceanic Nitrite and Nitrate (Microbial Nitrification)

Contributors	Affiliation	Role
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Abstract
Processed CTD data from cruises R/V Atlantis (AT15-61) in Jan-Feb 2010 and R/V Melville (MV1104) in Mar-Apr 2011 in the Eastern Tropical South Pacific

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Coverage

Spatial Extent: **N**:-9.97286 **E**:-79.99646 **S**:-20.01002 **W**:-100.001
Temporal Extent: 2010-02-01 - 2011-04-19

Methods & Sampling

Seawater samples were collected on R/V Atlantis (AT15-61) cruise in Jan-Feb 2010 and on R/V Melville (MV1104) cruise in Mar-Apr 2011. Water samples were collected at discrete depths using Niskin bottle type rosette samplers equipped with either 24 bottles (10L) or 12 bottles (20L), and an SBE9plus conductivity-temperature-depth (CTD) sensor package (SeaBird Electronics, Bellevue, WA).

Data Processing Description

(All data are downcast sensor data only).

Downcast CTD sensor data were processed using Seabird Electronics (SBE) Data Processing software using SBE recommended parameters, including the tau oxygen correction and oxygen hysteresis correction. Processing commands were applied in the following order: filter, alignctd, celltm, loopedit, wildedit. After manual inspection of the data, in the 2011 dataset, oxygen values were advanced 3 sec relative to the temperature data to minimize spiking around large gradients in dissolved oxygen. Data were binned at 1 m depth intervals.

Note: Missing data values for longitude (and other fields) are due to instrument aberration during collection

BCO-DMO data processing:

- Added a conventional header with dataset name, PI names, version date
- Concatenated individual files of binned data from two cruises
- Replaced missing values with 'nd' ('nd' is BCO-DMO's default missing data identifier)
- Replaced any -9.99e-29, -9.99e-28, -9.99e-27, +9.99e-29, +9.90e-27, -9.90e-28 values with 'nd'
- Created Cruise and Cast columns based on filenames, and put filename in separate column
- Added ISO DateTime UTC field for each cast with times from raw CTD files (as found in R2R)

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Data Files

File
ETSP_CTD_processed.csv(Comma Separated Values (.csv), 8.27 MB) MD5:6d7b1a13000310fcd81f4481584bb285   Primary data file for dataset ID 827861

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Related Publications

Santoro, A. E., Buchwald, C., Knapp, A. N., Berelson, W. M., Capone, D. G., & Casciotti, K. L. (2020). Nitrification and nitrous oxide production in the offshore waters of the Eastern Tropical South Pacific. doi:10.1002/essoar.10503499.1
Results

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Parameters

Parameter	Description	Units
ISO_DateTime_UTC	Date of sampling in ISO format (yyyy-mm-ddThh:mm:ssZ) with UTC time zone	yyyy-mm-dd hh:mm:ss
Cruise	Cruise ID	unitless
Cast	Cast number	unitless
nbf	Bottles fired	unitless
c0	Conductivity, c0	Siemens per meter (S/m)
c1	Conductivity, c1	Siemens per meter (S/m)
density00	Density	kilograms per cubic meter (kg/m^3)
dep	Depth (salt water)	meters (m)
latitude	Latitude of sample collection, South is negative	decimal degrees
longitude	Longitude of sample collection, West is negative	decimal degrees
sal00	Salinity	practical salinity units (PSU)
svCM	Sound Velocity (Chen-Millero)	meters per second (m/s)
t090C	Temperature (ITS-90 standard scale)	degrees Celsius
prDE	Pressure, Digiquartz (on AT15-61 cruise)	psi (pound-force per square inch)
prDM	Pressure, Digiquartz (on MV1104 cruise)	decibar (db)
bat	Beam Attenuation (Chelsea/Seatech/WET Lab CStar)	reciprocal meter (1/m)
xmiss	Beam Transmission (Chelsea/Seatech/WET Lab CStar)	percent
density11	Density replicate	kilograms per cubic meter (kg/m^3)
oxsat	Oxygen Saturation (Weiss)	micromoles per kilogram (umol/kg)
par	Photosynthetic active radiation or PAR/Irradiance (Biospherical/Licor)	micromoles of photons per square meter per sec (umol photons/m^2/s)
fluorescence	Fluorescence (WET Lab ECO-AFL/FL for AT15-61, Seapoint for MV1104)	milligrams per cubic meters (mg/m^3)
sbeox0	Oxygen, SBE 43	micromoles per kilogram (umol/kg)
flag	Flag indicator for pressure slowdown or reversal (0 = good)	unitless
file_name	Filename of processed binned values	unitless

Instruments

Dataset-specific Instrument Name	CTD Sea-Bird 9
Generic Instrument Name	CTD Sea-Bird 911
Generic Instrument Description	The Sea-Bird SBE 911 is a type of CTD instrument package. The SBE 911 includes the SBE 9 Underwater Unit and the SBE 11 Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with 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	Seapoint
Generic Instrument Name	CTD-fluorometer
Generic Instrument Description	A CTD-fluorometer is an instrument package designed to measure hydrographic information (pressure, temperature and conductivity) and chlorophyll fluorescence.

Dataset-specific Instrument Name	Biospherical/Licor
Generic Instrument Name	LI-COR Biospherical PAR Sensor
Dataset-specific Description	The LI-COR Biospherical PAR Sensor is used to measure Photosynthetically Available Radiation (PAR) in the water column.
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	
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	Digiquartz
Generic Instrument Name	Pressure Sensor
Generic Instrument Description	A pressure sensor is a device used to measure absolute, differential, or gauge pressures. It is used only when detailed instrument documentation is not available.

Dataset-specific Instrument Name	Seatech
Generic Instrument Name	Sea Tech Transmissometer
Generic Instrument Description	The Sea Tech Transmissometer can be deployed in either moored or profiling mode to estimate the concentration of suspended or particulate matter in seawater. The transmissometer measures the beam attenuation coefficient in the red spectral band (660 nm) of the laser lightsource over the instrument's path-length (e.g. 20 or 25 cm). This instrument designation is used when specific make and model are not known. The Sea Tech Transmissometer was manufactured by Sea Tech, Inc. (Corvalis, OR, USA).

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	Wetlab 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 CStar
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

Deployments

AT15-61

Website	https://www.bco-dmo.org/deployment/58785
Platform	R/V Atlantis
Start Date	2010-01-29
End Date	2010-03-03
Description	See more information at R2R: https://www.rvdata.us/search/cruise/AT15-61

MV1104

Website	https://www.bco-dmo.org/deployment/555585
Platform	R/V Melville
Start Date	2011-03-23
End Date	2011-04-23
Description	See more information at R2R: https://www.rvdata.us/search/cruise/MV1104

Project Information

Expression of Microbial Nitrification in the Stable Isotopic Systematics of Oceanic Nitrite and Nitrate (Microbial Nitrification)

Coverage: Eastern Tropical South Pacific

Description from NSF award abstract:
Closing the marine budgets of nitrate and nitrous oxide are central goals for researchers interested in nutrient-driven changes in primary productivity and climate change. With the implementation of new methods for oxygen isotopic analysis of seawater nitrate, it will be possible to construct a budget for nitrate based on its oxygen isotopic distribution that is complementary to nitrogen isotope budgets. Before we can effectively use oxygen isotopes in nitrate to inform the current understanding of the marine nitrogen cycle, we must first understand how different processes that produce (nitrification) and consume (assimilation, denitrification)

nitrate affect its oxygen isotopic signature.

In this study, researchers at the Woods Hole Oceanographic Institution will provide a quantitative assessment of the oxygen isotopic systematics of nitrification in the field and thus fill a key gap in our understanding of 18O variations in nitrate, nitrite, and nitrous oxide. The primary goal is to develop a quantitative prediction of the oxygen isotopic signatures of nitrite and nitrate produced during nitrification in the sea. The researchers hypothesize that oxygen isotopic fractionation during nitrification is the primary factor setting the 18O values of newly produced nitrate and nitrite. Secondly, they hypothesize that oxygen atom exchange is low where ammonia oxidation and nitrite oxidation are tightly coupled, but may increase in regions with nitrite accumulation, such as in the primary and secondary nitrite maxima. They will test these hypotheses with a series of targeted laboratory and field experiments, as well as with measurements of nitrite and nitrate isotopic distributions extending through the euphotic zone, primary nitrite maximum, and secondary nitrite maximum of the Eastern Tropical South Pacific. The results of these experiments are expected to provide fundamental information required for the interpretation of 18O isotopic signatures in nitrite, nitrate, and N2O in the context of underlying microbial processes. A better understanding of these features and the processes involved is important for quantifying new production, controls on the N budget, and N2O production in the ocean -- which should lead to a better understanding of the direct and indirect interactions among the nitrogen cycle, marine chemistry, and climate.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0961098

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