Particulate phosphate, particulate carbon, particulate nitrogen, particulate bulk isotope composition (C and N), and dissolved oxygen from Niskin bottle samples collected on R/V Kilo Moana cruise KM1910 in June 2019

Website: https://www.bco-dmo.org/dataset/852179
Data Type: Cruise Results
Version: 1
Version Date: 2021-05-20

Project
» EAGER Collaborative Research: Early career chief scientist training for biological and chemical oceanographers (Chief Sci KM1910)

Contributors	Affiliation	Role
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Abstract
Particulate phosphate, particulate carbon, particulate nitrogen, particulate bulk isotope composition (C and N), and dissolved oxygen, collected with Niskin bottles during CTD deployments in June 2019 at station ALOHA during cruise KM1910.

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Coverage

Spatial Extent: **N**:22.8326 **E**:-157.9239 **S**:22.7725 **W**:-158.0188
Temporal Extent: 2019-06-22 - 2019-07-17

Dataset Description

Particulate phosphate, particulate carbon, particulate nitrogen, particulate bulk isotope composition (C and N), and dissolved oxygen, collected with Niskin bottles during CTD deployments in June 2019 at station ALOHA during cruise KM1910.

Methods & Sampling

CTD and Niskin sampling follow HOT procedures summarized in detail:
https://hahana.soest.hawaii.edu/hot/protocols/protocols.html#

Dissolved Oxygen sampling and titrations from Niskin bottles follow HOT procedures. Briefly, oxygen samples were the first samples drawn from the Niskin bottles as soon as the rosette arrived on deck, free of bubbles, and fixed. Samples were analyzed with a computer controlled potentiometric titration. At 2 depths on each cast, 3 titrations were performed and had an average standard deviation of 0.4 micromol/L.

Particulate Carbon and Nitrogen field and laboratory protocols follow HOT procedures (except sample analysis took place at Princeton University using a Vario ISOTOPE select EA-IRMS). Briefly, 4 to 20 L of water was collected from Niskin bottles, pre-filtered with an inline 202um mesh screen, and collected on combusted 25mm GF/F (Whatman, nominal pore size 0.7um), folded, and wrapped in clean (combusted) foil for storage at -20 degrees C until laboratory analysis. Samples were oven dried at 55-60 degrees celsius (samples were not acidified so C represents total C), pelletized in 9x11 tins, and analyzed via EA-IRMS for particulate carbon, delta-13C particulate carbon, particulate nitrogen, delta-15N particulate nitrogen. Six blank (dry) filters were analyzed for background C and N and subtracted from measured PC and PN sample values.

Particulate Phosphate field and laboratory protocols follow HOT procedures. Briefly, 4 to 10 L of water was collected from Niskin bottles, pre-filtered with an inline 202um mesh screen, and collected on combusted 25mm GF/F (Whatman, nominal pore size 0.7um), folded, and placed in clean glass tube, storage at -20 degrees C until laboratory analysis. One sample from each depth was combusted in 16 x 100 mm clean glass test tubes at 450°C for 4.5 hours in a muffle furnace, allowed to cool and immersed in 10ml 0.15N HCL/vortex/ 1 hour leach/vortex/30 Minute Spin/ 1 hour color development) (5ml sample : 500ul Mixed Reagent). The liberated orthophosphate is reacted with a mixed reagent of molybdic acid, ascorbic acid and trivalent antimony to form phosphomolybdic acid. This heteropoly acid is then reduced to the colored molybdenum blue complex by ascorbic acid and the solution is measured spectrophotometrically. This procedure measures all forms of phosphorus which can be released by combustion and acid hydrolysis. Three blank (dry) filters were analyzed for background P and subtracted from measured PP sample values.

Data Processing Description

BCO-DMO Processing:
- converted date_HST to YYYY-MM-DD format;
- created UTC date/time field in ISO8601 format.

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Data Files

File
niskin.csv (Comma Separated Values (.csv), 4.51 KB) MD5:a688928202dc59ac2d2e837cc4628ee7 Primary data file for dataset ID 852179

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Related Publications

Karl, D., Winn, C., Hebel, D., and Letelier, R. Hawai'i Ocean Time-Series Program Field and Laboratory Protocols. https://hahana.soest.hawaii.edu/hot/protocols/protocols.html#
Methods

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Parameters

Parameter	Description	Units
cruise_id	Cruise identifier	unitless
sta	Station number	unitless
cast	CTD cast identifier	unitless
lon	Longitude (degrees E)	degrees East
lat	Latitude (degrees N)	degrees North
date_HST	Local date (HST) of deployment; format: YYYY-MM-DD	unitless
time_HST	Local time (HST) of CTD recovery (24 hour time); format: hhmm	unitless
ISO_DateTime_UTC	Date and time (UTC) of CTD recovery in ISO8601 format: YYYY-MM-DDThh:mmZ	unitless
targetdepth_m	Target depth of sample in meters (m)	meters (m)
pressure_mrk	Pressure at collection depth in decibar from CTD .mrk file	decibars
sal_mrk	Salinity at collection depth from CTD .mrk file	PSU
bottle	Niskin bottle number(s) (position(s) on rosette)	unitless
oxygen	Dissolved oxygen (umol/L), average uncertainty = 0.4 umol/L determined from triplicate titrations at 2 depths from each cast	micromoles per liter (umol/L)
PP	Particulate Phosphate (PP) [umol/L] (4 to 10 L sample prefiltered with 202um mesh screen onto combusted 25mm GF/F; measurements corrected for 3 blank (dry) filters)	micromoles per liter (umol/L)
samplesizePCPN_L	Liters of water taken from bottle(s) (deepest depths combined 2 bottles)	liters (L)
PC	Total Particulate Carbon (PC) [umol/L] (prefiltered with 202um mesh screen onto combusted 25mm GF/F; filters not acidified before analysis; measurements corrected for 6 blank (dry) filters)	micromoles per liter (umol/L)

P13C	Delta-13C of total PC (permil vs. VPDB) analytical uncertainty 0.1 permil (prefiltered with 202um mesh screen onto combusted 25mm GF/F; filters not acidified before analysis)	permil vs VPDB
PN	Particulate Nitrogen (PN) [umol/L] (prefiltered with 202um mesh screen onto combusted 25mm GF/F; filters not acidified before analysis; measurements corrected for 6 blank (dry) filters). Detection limit ~0.75 micromol N.	micromoles per liter (umol/L)
P15N	Delta-15N of PN (permil vs. air-N2) analytical uncertainty 0.2 permil (prefiltered with 202um mesh screen onto combusted 25mm GF/F; filters not acidified before analysis)	permil vs air-N2

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Instruments

Dataset-specific Instrument Name	Dosimat titrator (Brinkmann)
Generic Instrument Name	Automatic titrator
Dataset-specific Description	5 ml Dosimat titrator (Brinkmann)
Generic Instrument Description	Instruments that incrementally add quantified aliquots of a reagent to a sample until the end-point of a chemical reaction is reached.

Dataset-specific Instrument Name	Sea-Bird SBE 911
Generic Instrument Name	CTD Sea-Bird 911
Dataset-specific 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.)
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	Vario ISOTOPE select (Elementar Isoprime)
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	A Vario ISOTOPE select (Elementar Isoprime) was used to quantify total C, N, and delta-13C and delta-15N. Samples are combusted/reduced at high temperature to create gases (CO2 and N2); column chromatography separates the gases; a thermal conductivity detector determines the carbon and nitrogen concentrations, followed by an isotope ratio mass spectrometer for bulk isotope composition. Measurements were calibrated with an in-house aminocaproic acid standard (ACROS) and four USGS standards (#41, #41a, #65, #25). [C] and [N] (umol/L) were corrected for the average value measured on blank filters (n=6). Analytical uncertainty (determined from standards with similar isotope values) was 0.2‰ for delta-15N and 0.1‰ for delta-13C.
Generic Instrument Description	The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer).

Dataset-specific Instrument Name	muffle furnace
Generic Instrument Name	muffle furnace
Dataset-specific Description	One sample from each depth was combusted in 16 x 100 mm clean glass test tubes at 450°C for 4.5 hours in a muffle furnace, allowed to cool and immersed in 10ml 0.15N HCL/vortex/ 1 hour leach/vortex/30 Minute Spin/ 1 hour color development) (5ml sample : 500ul Mixed Reagent).
Generic Instrument Description	A muffle furnace or muffle oven (sometimes retort furnace in historical usage) is a furnace in which the subject material is isolated from the fuel and all of the products of combustion, including gases and flying ash. A type of jacketed enclosure that is used to heat a material to significantly high temperatures while keeping it contained and fully isolated from external contaminants, chemicals or substances. Muffle furnaces are usually lined with stainless steel, making them largely corrosion-resistant.

Dataset-specific Instrument Name	Niskin bottle
Generic Instrument Name	Niskin bottle
Dataset-specific Description	Briefly, 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 were deployed in a 24 bottle rosette system mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples.
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.

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Deployments

KM1910

Website	https://www.bco-dmo.org/deployment/841636
Platform	R/V Kilo Moana
Report	https://datadocs.bco-dmo.org/docs/305/Chief_Sci_KM1910/data_docs/matt_church_EAGER_cruise_plan_06_17_2019.pdf
Start Date	2019-06-15
End Date	2019-06-24
Description	NSF Chief Scientist Training Cruise. For more information, see Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/KM1910 (cruise DOI: 10.7284/908380)

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Project Information

EAGER Collaborative Research: Early career chief scientist training for biological and chemical oceanographers (Chief Sci KM1910)

Coverage: Station ALOHA (22.75N, 158W), North Pacific Ocean

NSF Award Abstract:

Intellectual Merit
The PIs request funds to provide training in leading and organizing research cruises to early career researchers in the areas of Biological and Chemical Oceanography. Participants in this training program would be introduced to pre-cruise planning and logistics, receive training in commonly used oceanographic sampling equipment, and conduct shipboard measurements during a 10-day oceanographic cruise to the North Pacific Subtropical Gyre (NPSG). The goal of this training program is to prepare early career scientists for leading and participating in interdisciplinary oceanographic research at sea.

Broader Impacts
The proposed program addresses the broader impacts criteria successfully. The research cruise and follow-up reports and publications focus on interdisciplinary questions important for advancing the field. Given the rapid changes that oceanic systems are undergoing, it is important to have a cadre of junior scientists who are adept at managing interdisciplinary collaborations and conducting research at sea. The PIs are considering ways to connect with diverse audiences in recruiting participants. The impact on early career oceanographers will be very strong. This will create an experience that will be a major impact on the careers of the trainees, especially if they stay in the oceanography field.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1911831
NSF Division of Ocean Sciences (NSF OCE)	OCE-1911990

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