Suspended particles from in situ pumps on R/V Kilo Moana cruise KM1910 in June 2019

Website: https://www.bco-dmo.org/dataset/853048
Data Type: Cruise Results
Version: 1
Version Date: 2021-06-04

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

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Abstract
Suspended particulate total carbon concentration, organic carbon concentration, inorganic carbon concentration, nitrogen concentration, and bulk isotope composition (C and N) from in situ McLane pumps in June 2019 at station ALOHA during cruise KM1910.

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Coverage

Spatial Extent: **N**:22.8327 **E**:-157.9223 **S**:22.7088 **W**:-158.0675
Temporal Extent: 2019-06-16 - 2019-06-22

Methods & Sampling

Sampling and analytical procedures:

Particulates were collected using in situ pumps (25, 45, 75, 100, 125, 150, 225, and 300 m ocean depth) aboard the RV Kilo Moana. Pump heads were loaded with an acid-washed 51um nitex mesh screen as a pre-

filter followed by a combusted (4.5hrs 450 degrees C) 142mm GF75 (Advantec nominal pore size 0.3um). An adjacent pump head was loaded with a 52um Sefar filter. Additional 142mm GF75 filters were placed in cages and secured to the side of pumps during deployments and served as wet blanks for PC, POC, PIC, PN analysis. Filters were subsampled with a metal cork borer of known area, folded (active side in), and stored in clean (combusted) foil at -20 degrees C until analysis. The 0.3 to 51um size fraction samples analyzed at Princeton (subsample IDs “m1” and “m2”) and MBL labs (subsample ID “z”) were not acidified so PC and d13C represent total C; subsamples analyzed at WHOI for POC were acidified (subsample IDs “q” (small size fraction 0.3 to 51um) and “r” (large size fraction >51um). Subsamples were oven dried overnight at 55-60 degrees C then packed in 9x11 tin capsules for analysis on EA IRMS. Additional subsamples were analyzed for PIC at WHOI (subsample IDs “p” (small size fraction 0.3 to 52um) and “y” (large size fraction >52um)). PIC samples were stored frozen (-20C) on the ship and dried at 60C for 6-8h on shore, stored in 47mm petri dishes. Filters were analyzed roughly 2 months after collection following established procedures (Dong et al., 2019, Subhas et al., 2019).

Problem report:

Large particle (>51 micron) PIC data was not collected at 100m because that filter was allocated for other measurements. Mass of N on subsample was too low for 15N measurement at 225 m and 300 m. Filter subsample “z” was only collected at one depth (25 m).

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	
suspended-particles-from-in-situ-pumps.csv	(Comma Separated Values (.csv), 1.85 KB) MD5:0bc07c16ac29bd021a267715a1689943
Primary data file for dataset ID 853048	

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Related Publications

Dong, S., Berelson, W. M., Rollins, N. E., Subhas, A. V., Naviaux, J. D., Celestian, A. J., Liu, X., Turaga, N., Kemnitz, N. J., Byrne, R. H., & Adkins, J. F. (2019). Aragonite dissolution kinetics and calcite/aragonite ratios in sinking and suspended particles in the North Pacific. Earth and Planetary Science Letters, 515, 1–12. https://doi.org/10.1016/j.epsl.2019.03.016
Methods

Subhas, A. V., McCorkle, D. C., Quizon, A., McNichol, A. P., & Long, M. H. (2019). Selective Preservation of Coccolith Calcite in Ontong-Java Plateau Sediments. Paleoceanography and Paleoclimatology, 34(12), 2141–2157. doi:10.1029/2019pa003731
Methods

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Parameters

Parameter	Description	Units

cruise_id	Cruise identifier	unitless
sta	Station number	unitless
cast	Pump cast number	unitless
lon	Longitude (degrees E)	decimal degrees
lat	Latitude (degrees N)	decimal degrees
deploy_ISO_DateTime_UTC	ISO datetime of pump deployment (UTC)	unitless
date_deploy_HST	Local date (HST) of pump deployment	unitless
time_deploy_HST	Local time (HST) of pump deployment	unitless
recover_ISO_DateTime_UTC	ISO datetime of pump recovery (UTC)	unitless
date_recover_HST	Local date (HST) of pump recovery	unitless
time_recover_HST	Local time (HST) of pump recovery	unitless
depth_m	Target depth of sample in meters	meters (m)
PC_m1	Total Particulate Carbon (PC) [umol/L] (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at Princeton; measurements corrected for 8 blank (wet) filters) subsample id "m1"	micromole per litre (umol/L)
PC_m2	Total Particulate Carbon (PC) [umol/L] (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at Princeton; measurements corrected for 8 blank (wet) filters) subsample id "m2"	micromole per litre (umol/L)
PC_z	Total Particulate Carbon (PC) [umol/L] (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at MBL; measurements corrected for 8 blank (wet) filters) sample id "z"	micromole per litre (umol/L)
P13C_m1	Delta-13C of total PC (permil vs. VPDB) analytical uncertainty 0.1 permil (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at Princeton) subsample id "m1"	permil vs VPDB
P13C_m2	Delta-13C of total PC (permil vs. VPDB) analytical uncertainty 0.1 permil (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at Princeton) subsample id "m2"	permil vs VPDB
P13C_z	Delta-13C of total PC (permil vs. VPDB) analytical uncertainty 0.1 permil (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at MBL) sample id "z"	permil vs VPDB
PN_m1	Particulate Nitrogen (PN) [umol/L] (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at Princeton; measurements corrected for 8 blank (wet) filters) subsample id "m1"	micromole per litre (umol/L)
PN_m2	Particulate Nitrogen (PN) [umol/L] (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at Princeton; measurements corrected for 8 blank (wet) filters) subsample id "m2"	micromole per litre (umol/L)
PN_z	Particulate Nitrogen (PN) [umol/L] (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at MBL; measurements corrected for 8 blank (wet) filters) sample id "z"	micromole per litre (umol/L)

P15N_m1	Delta-15N of PN (permil vs. VPDB) analytical uncertainty 0.2 permil (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at Princeton) subsample id "m1"	permil vs. air-N2
P15N_m2	Delta-15N of PN (permil vs. VPDB) analytical uncertainty 0.2 permil (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at Princeton) subsample id "m2"	permil vs. air-N2
P15N_z	Delta-15N of PN (permil vs. VPDB) analytical uncertainty 0.2 permil (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters not acidified before analysis at MBL) sample id "z"	permil vs. air-N2
SP_PIC_p	Small Particle Particulate Inorganic Carbon (PIC) [umol/L] (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um), analyzed at WHOI) subsample id "p"	micromole per litre (umol/L)
LP_PIC_y	Large Particle Particulate Inorganic Carbon (PIC) [umol/L] from 52um Sefar mesh screen, analyzed at WHOI, subsample id "y"	micromole per litre (umol/L)
SP_POC_q	Small Particle Particulate Organic Carbon (POC) [umol/L] (prefiltered with 51um mesh screen onto combusted 142mm GF75 (nominal pore size 0.3um); filters acidified before analysis at WHOI) subsample id "q"	micromole per litre (umol/L)
LP_POC_r	Large Particle Particulate Organic Carbon (POC) [umol/L] from 51um Nitex mesh screen, washed onto 25mm QMA; filters acidified before analysis at WHOI, sample id "r"	micromole per litre (umol/L)

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Instruments

Dataset-specific Instrument Name	CHN flash analyzer at the WHOI Nutrient Facility
Generic Instrument Name	CHN Elemental Analyzer
Dataset-specific Description	POC and PON were acid fumed with concentrated HCl and then POC and PON were measured by combustion via a Flash AE1112 Carbon/Nitrogen Analyzer using a Dynamic Flash Combustion technique. Certified reference material Acetanilide (Certificate#293514) is combusted with every run and an average recovery is provided with the sample results.
Generic Instrument Description	A CHN Elemental Analyzer is used for the determination of carbon, hydrogen, and nitrogen content in organic and other types of materials, including solids, liquids, volatile, and viscous samples.

Dataset-specific Instrument Name	Picarro 2101i
Generic Instrument Name	CO2 Analyzer
Dataset-specific Description	PIC samples were analyzed on a Picarro 2101i cavity ring-down CO2 isotope analyzer system with an AutoMate prep device front end. Detailed instrument methods are established and published in Dong et al., 2019 and Subhas et al., 2019. Samples were acidified manually in 12mL exetainers and left to sit for 1h to dissolve all PIC before mounting in the autosampler rack. Standards were run before, during, and after the samples in the same analytical session to calculate PIC concentration, using a well-characterized pure calcite standard of known isotopic composition (Iceland Spar). Calibrated PIC quantities (in micromoles) were blank-corrected using the mean value of McLane pump dipped blank filters. Blank-corrected quantities were then normalized to the volume pumped of each filter head to arrive at a PIC concentration at each pump depth in units of umol/L.
Generic Instrument Description	Measures atmospheric carbon dioxide (CO2) concentration.

Dataset-specific Instrument Name	Vario ISOTOPE select (Elementar Isoprime)
Generic Instrument Name	Elemental Analyzer
Dataset-specific Description	A Vario ISOTOPE select (Elementar Isoprime) was used to quantify total C, N, and d13C and d15N. 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). Analytical uncertainty (determined from standards with natural abundance isotope values) was 0.2‰ for delta-15N and 0.1‰ for delta-13C.
Generic Instrument Description	Instruments that quantify carbon, nitrogen and sometimes other elements by combusting the sample at very high temperature and assaying the resulting gaseous oxides. Usually used for samples including organic material.

Dataset-specific Instrument Name	Europa 20-20
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	EA-IRMS at MBL Stable Isotope Lab: Europa 20-20 continuous-flow isotope ratio mass spectrometer interfaced with a Europa ANCA-SL elemental analyzer. Measurements were calibrated using international and in-house reference materials analyzed in the same analytical run. The analytical precision based on replicate analyses of isotopically homogeneous international standards is +/- 0.1 ‰ (1 sigma) for both δ 15N and δ 13C measurements, and about 1% relative on the %N and %C measurements.
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	WTS 6-1-142LV
Generic Instrument Name	McLane Pump
Dataset-specific Description	Samples were collected via two dual-filter head McLane large-volume in-situ pumping systems (WTS 6-1-142LV).
Generic Instrument Description	McLane pumps sample large volumes of seawater at depth. They are attached to a wire and lowered to different depths in the ocean. As the water is pumped through the filter, particles suspended in the ocean are collected on the filters. The pumps are then retrieved and the contents of the filters are analyzed in a lab.

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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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