Phosphate in marine waters during the international inter calibration cruise from March 17th to March 28th, 2017

Website: https://www.bco-dmo.org/dataset/808987
Data Type: Cruise Results
Version: 1
Version Date: 2020-04-10

Project
» Automated Instrumentation for Chemical Oceanography Based on Sequential Injection Lab-On-valve Technology (SI-LOV)

Contributors	Affiliation	Role
Measures, Christopher I.	University of Hawai'i at Mānoa (SOEST)	Principal Investigator
Hatta, Mariko	University of Hawai'i (UH)	Co-Principal Investigator, Contact
Biddle, Mathew	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Phosphate in marine waters during the international inter calibration cruise (CSIRO, March 17th to March 28th, 2017). Seawater is collected in 12L Ocean Test Equipment “Niskin” bottles that have been lowered open to the required depth and closed on ascent. The nutrients are sampled after the dissolved gases and salinity sampling.

Table of Contents

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

Coverage

Spatial Extent: **N**:-45.92617 **E**:142.38812 **S**:-46.72438 **W**:141.95212
Temporal Extent: 2017-03-18 - 2017-03-25

Dataset Description

Phosphate in marine waters during the international inter calibration cruise (CSIRO, March 17th to March 28th, 2017). Seawater is collected in 12L Ocean Test Equipment “Niskin” bottles that have been lowered open to the required depth and closed on ascent. The nutrients are sampled after the dissolved gases and salinity sampling.

Methods & Sampling

Seawater is collected in 12L Ocean Test Equipment “Niskin” bottles that have been lowered open to the required depth and closed on ascent. The nutrients are sampled after the dissolved gases and salinity sampling. Wear vinyl gloves that have been rinsed with MQ water. Do not touch the spigot when sampling.

Nutrient tubes used: Sarstedt 30 mL tubes, 62.543.001.
Nutrient sampling steps: Pre-label nutrient tubes with rosette position. Start sampling at rosette position 1. Open Niskin spigot with the collar and rinse nutrient tubes and caps three times in the sample stream. Fill the nutrient tubes then close the Niskin Spigot with the collar. Reduce the sample volume in the nutrient tube to approximately 30 mL by gently flicking out the access. Cap tubes and store in rack. Continue to the next rosette positon and repeat. When sampling is complete, store nutrient samples at 4°C in the fridge until assayed. Assay within 12 hours.

Data Processing Description

FloZF software

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions

[table of contents | back to top]

Supplemental Files

File
Phosphate analysis procedure by Mini-SIA 1 filename: NSF_2020_BCODMO_meta_data.docx (Octet Stream, 236.68 KB) MD5:73d47896a58f5e29088d4af5fd20b2ad This method is used for the determination of phosphate in marine waters during the international Intercalibration cruise (CSIRO, March 17th to March 28th, 2017).

[table of contents | back to top]

Parameters

Parameter	Description	Units
Cruise	cruise identifier	unitless
Station	station identifier	unitless
Date_Time	Date and time following ISO8601 format	yyyy-MM-dd'T'HH:mm:ss'Z'
Lon	longitude with positive values indicating East	decimal degrees
Lat	latitude with negative values indicating South	decimal degrees
Bot_Depth	Bottom depth	meters (m)
Pressure	Pressure	unknown
QF	Quality Flag	unitless
Temperature	Water temperature	degrees Celsius (C)
Pressure_QF	Quality flag for pressure observations	unitless
Salinity	salinity	psu
Salinity_QF	Quality flag for salinity observations	unitless
Phosphate	phosphate	micromoles per liter (umol/L)
Phosphate_QF	Quality flag for phosphate observations	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	GlobalFIA miniSIA-1
Generic Instrument Name	Spectrometer
Dataset-specific Description	The miniSIA-1 is equipped with A USB-4000 Ocean Optics spectrometer configured to measure absorbance between 420 and 1000 nm Two lights sources – a white LED and a Tungsten/Xenon lamp (used Tungsten/Xenon lamp) Chem-on-Valve manifold mounted on a Valco valve and right angle drive and equipped with a 12 cm path length Garth flow cell milliGAT pump 1 mL heated holding coil with PID-controlled heater (heated to 40°C) The miniSIA-1 makes use of the Global FIA FloZF device control and data acquisition and manipulation software installed on a laptop computer.
Generic Instrument Description	A spectrometer is an optical instrument used to measure properties of light over a specific portion of the electromagnetic spectrum.

[table of contents | back to top]

Project Information

Automated Instrumentation for Chemical Oceanography Based on Sequential Injection Lab-On-valve Technology (SI-LOV)

Coverage: Hawaii

NSF Abstract:

The ability of oceanographers to investigate and understand chemical processes in the ocean is only as good as the accuracy and precision of the techniques available for making chemical measurements. This project seeks to upgrade an existing analytical method (the micro-Sequential Injection Lab on Valve; uSI-LOV methodology) for measurement of dissolved aluminum (Al) and phosphate (P) in seawater. Aluminum is an abundant element used for tracking dust input to the ocean from the atmosphere and the movement of water masses. Phosphate is an essential nutrient for biological growth in the ocean, showing spatial and temporal variability that affects the growth of phytoplankton. The novel uSI-LOV methods would allow unattended and accurate measurement of Al and P together, with direct benefit for oceanographic research on biogeochemical cycles and ecosystem dynamics. Additionally, the uSI-LOV methodology includes an ingenious "single standard" technique that greatly simplifies calibration of the system, can be developed for analysis of many other elements beyond Al and P, and would provide a procedure for improved inter-comparison between different studies. The refined, modular uSI-LOV system produced by this proposal will be widely applicable for use by the oceanographic community. The project will also fund an excellent interdisciplinary PhD student thesis opportunity that incorporates aspects of engineering, analytical chemistry, and oceanography.

The PIs on this project intend to adapt the micro-Sequential Injection Lab on Valve (uSI-LOV) system to the measurement of seawater Al and P using fluorescent and spectrophotometric detection with flow injection analysis. They will develop and evaluate a novel "single standard" calibration process that uses the precisely reproduced timing of the rising and falling edge of a single standard injection peak as a pseudo-standard addition curve, potentially providing better calibration of other seawater analytical systems designed for trace element and nutrient concentrations in the ocean. The improved uSI-LOV methodology has advantages of physical robustness, as well as lowered power, sample, and reagent requirements. The project will field test the uSI-LOV system during an at-sea intercalibration against established shipboard analytical methods for P and Al, and deploy a small battery operated version in shallow water to test autonomous operation. The work is directed at eventual use of the uSI-LOV technology on existing and future remote platforms and autonomous vehicles. Successful adaptation, integration into the chemical oceanography community, and future deployments would provide greatly improved chemical data sets that would inform biogeochemical models and promote significant advancements in our understanding of marine biogeochemical cycles.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1634463

[table of contents | back to top]