# Iodine speciation measurements aboard R/V Roger Revelle and R/V Falkor in April and June 2018, respectively.

**Website**: https://www.bco-dmo.org/dataset/776552
**Data Type**: Cruise Results
**Version**: 1
**Version Date**: 2019-09-12

**Project**
» The role of cryptic nutrient cycling within sinking particles on trace element transport in oxygen minimum zones (OMZ Nutrient Cycling)



| Contributors | Affiliation | Role |
| --- | --- | --- |
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**Abstract**
Iodine speciation measurements aboard R/V Roger Revelle and R/V Falkor in April and June 2018, respectively.

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## Coverage

**Spatial Extent**: **N**:22.66672 **E**:-102 **S**:14 **W**:-128.00002
**Temporal Extent**: 2018-03-30 - 2018-07-13

## Dataset Description

Iodine speciation measurements aboard R/V Roger Revelle and R/V Falkor in April and June 2018, respectively.

### Methods & Sampling

Iodate was measured using spectrophotometry based off of Rue et al. 1997. Iodide measured voltammetry based off of Luther et al. 1988. Iodate was converted to triiodide and measured on the spectrophotometer at 350 nm. Iodide was measured on a hanging drop mercury electrode at approximately -0.3 V. Excel was used to process CSV files from the spectrophotometer. Excel was also used to process data from the voltammeter.

### Data Processing Description

**BCO-DMO Processing Notes:**

- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- concatenated RR1804 and FK18
- added cruise_id and ISO_DateTime columns
- rounded iodine columns to 1 decimal place for the FK180624 cruise records

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## Data Files

| File |
|---|
| **ETNP_iodine_speciation.csv** (Comma Separated Values (.csv), 82.22 KB) MD5:f7d13fb6d7af42e443d08af411052c8f<br>Primary data file for dataset ID 776552 |

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## Related Publications

Moriyasu, R., Evans, Z. C., Bolster, K. M., Hardisty, D. S., & Moffett, J. W. (2020). The Distribution and Redox Speciation of Iodine in the Eastern Tropical North Pacific Ocean. Global Biogeochemical Cycles, 34(2). doi:10.1029/2019gb006302 https://doi.org/10.1029/2019GB006302
*Methods*

Rue, E. L., Smith, G. J., Cutter, G. A., & Bruland, K. W. (1997). The response of trace element redox couples to suboxic conditions in the water column. Deep Sea Research Part I: Oceanographic Research Papers, 44(1), 113–134. doi:10.1016/s0967-0637(96)00088-x https://doi.org/10.1016/S0967-0637(96)00088-X
*Methods*

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## Parameters

| Parameter | Description | Units |
|---|---|---|
| cruise_id | cruise identifier | unitless |
| Bottle | bottle number | unitless |
| Station | station number | unitless |
| Depth | depth | meters |
| Iodate | iodate concentration | nanoMolar |
| Iodide | iodide concentration | nanoMolar |
| Total_Iodine | total iodine concentration | nanoMolar |
| Excess_Iodine | excess iodine concentration | nanoMolar |
| Longitude | longitude; east is positive | decimal degrees |
| Latitude | latitude; north is positive | decimal degrees |
| Date | sampling date | unitless |
| Time_UTC | UTC time | unitless |
| source_file | name of submitted file | unitless |
| ISO_DateTime_UTC | ISO formatted UTC date and time | unitless |

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## Instruments

| | |
|---|---|
| **Dataset-specific Instrument Name** | Perkin Elmer Lamda 35 |
| **Generic Instrument Name** | Perkin Elmer Lambda 35 Spectrophotometer |
| **Generic Instrument Description** | The Lambda 35 is a double beam UV/Vis spectrophotometer from Perkin Elmer, packing pre-aligned Tungsten and Deuterium Lamps. It has a wavelength range of 190-1100nm and a variable bandwidth range of 0.5 to 4nm. |

| | |
|---|---|
| **Dataset-specific Instrument Name** | BASi Controlled Growth Mercury Electrode |
| **Generic Instrument Name** | Voltammetry Analyzers |
| **Generic Instrument Description** | Instruments that obtain information about an analyte by applying a potential and measuring the current produced in the analyte. |

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## Deployments

**RR1804**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/776766 |
| **Platform** | R/V Roger Revelle |
| **Start Date** | 2018-03-27 |
| **End Date** | 2018-04-13 |
| **Description** | More information is available from R2R: https://www.rvdata.us/search/cruise/RR1804 |

**FK180624**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/776768 |
| **Platform** | R/V Falkor |
| **Start Date** | 2018-06-24 |
| **End Date** | 2018-07-15 |

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## Project Information

**The role of cryptic nutrient cycling within sinking particles on trace element transport in oxygen minimum zones (OMZ Nutrient Cycling)**

**Coverage**: Eastern Tropical North Pacific

*NSF Award Abstract:*
The major process controlling the internal cycling of biologically active trace metals in the oceans is through uptake onto and remineralization from sinking particles. Uptake can occur through active biological uptake into living cells as micronutrients, or chemical adsorption onto sinking materials. This latter process is often

referred to as scavenging. The relative importance of these processes is often unclear, especially for elements that are both biologically active and also "particle reactive." The latter characteristic is associated with sparing solubility in seawater and the formation of strong complexes with surface sites, with examples such as iron. Recent evidence suggests that the simplistic view of a sinking particle as a passive surface for metal complexation may require some revision. Investigators James Moffett and Seth John propose to study the chemistry of transition metals within large sinking particles and the resultant effects on metal biogeochemical cycling. They will collaborate with a group at the University of Washington, recently funded to study the microbiology and molecular biology of these particles. The central hypothesis of this project is that reducing microbial microenvironments within large particles support high rates of nitrogen and sulfur cycling, greatly enhancing the particles' influence on metal chemistry. The investigators will study these processes in the Eastern Tropical North Pacific Oxygen Minimum Zone (OMZ). This regime was selected because of the wide range of redox conditions in the water column, and strong preliminary evidence that microenvironments within sinking particles have major biogeochemical impacts.

The primary objective is to investigate the interactions of metals with particles containing microenvironments that are more highly reducing than the surrounding waters. Such microenvironments arise when the prevailing terminal electron acceptor (oxygen, or nitrate in oxygen minimum zones) becomes depleted and alternative terminal electron acceptors are utilized. Within reducing microenvironments metal redox state and coordination chemistry are different from the bulk water column, and these microenvironments may dominate metal particle interactions. For example, reduction of sulfate to sulfide could bind metals that form strong sulfide complexes, such as cadmium and zinc, processes previously thought to be confined to sulfidic environments. Reducing microenvironments may account for the production of reduced species such as iron(II), even when their formation is thermodynamically unfavorable in the bulk water column. Tasks include observational characterization of dissolved and particulate trace metals and stable isotopes in the study area, sampling and in situ manipulation of particles using large-dimension sediment traps, shipboard experimental incubations under a range of redox conditions, and modeling, providing insight from microscopic to global scales. The metal chemistry data will be interpreted within a rich context of complimentary data including rates of nitrogen and sulfur cycling, phylogenetics and proteomic characterization of the concentration of key enzymes. Broader impacts include training of a postdoctoral scientist, international collaborations with Mexican scientists, and involvement of undergraduate students in the research.

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## Funding

| Funding Source | Award |
|---|---|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-1636332 |

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