Nitrous oxide concentrations from the R/V Falkor expedition FK160115 in the Central Pacific from January to February 2016

Website: https://www.bco-dmo.org/dataset/775849
Data Type: Cruise Results
Version: 1
Version Date: 2022-06-08

Project
» The ProteOMZ Expedition: Investigating Life Without Oxygen in the Pacific Ocean (ProteOMZ (Proteomics in an Oxygen Minimum Zone))

Contributors	Affiliation	Role
Santoro, Alyson E.	University of Maryland Center for Environmental Science (UMCES/HPL)	Principal Investigator
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Abstract
Dissolved N2O concentrations from were measured in discrete samples on a research expedition to the Equatorial Pacific. Water samples were collected using a 24 bottle Niskin rosette equipped with a CTD. N_2O concentrations were measured using a headspace equilibration method and analyzed on a SRI Greenhouse Gas Monitoring Gas Chromatograph.

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Coverage

Spatial Extent: **N**:17 **E**:156 **S**:-10.563 **W**:139.8
Temporal Extent: 2016-01-17 - 2016-02-04

Dataset Description

Falkor ProteOMZ nitrous oxide from expedition (FK160115) in the Central Pacific in 2016.

Methods & Sampling

Samples were collected from the CTD rosette into 160 mL glass serum bottles.

Nitrous oxide concentration: N2O concentrations were measured using a headspace equilibration method and analyzed on a SRI Greenhouse Gas Monitoring Gas Chromatograph (GC) equipped with an electron capture detector (ECD), dual HayeSep D packed columns, and a 1-mL sample loop (SRI Instruments, Torrance, California, USA; Elkins 1980; Laperriere et al. 2019). N2O concentrations were calculated according to Walter et al. (2006).

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
- combined date and time columns to form ISO Date format in column ISO_DateTime_UTC

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Data Files

File
n2o.csv (Comma Separated Values (.csv), 14.72 KB) MD5:a939e48d4656a988f2ba3790acc425bc Primary data file for dataset ID 775849

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Related Publications

Saunders, J. K., McIlvin, M. R., Dupont, C. L., Kaul, D., Moran, D. M., Horner, T., Laperriere, S. M., Webb, E. A., Bosak, T., Santoro, A. E., & Saito, M. A. (2022). Microbial functional diversity across biogeochemical provinces in the central Pacific Ocean. Proceedings of the National Academy of Sciences, 119(37). https://doi.org/10.1073/pnas.2200014119
Results

Walter, S., Bange, H. W., Breitenbach, U., & Wallace, D. W. R. (2006). Nitrous oxide in the North Atlantic Ocean. Biogeosciences, 3(4), 607–619. doi:10.5194/bg-3-607-2006
Methods

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Parameters

Parameter	Description	Units
ISO_DateTime_UTC	Date time time of cast following ISO 8601 convention in UTC	unitless
station	Station number	unitless
ctd	CTD cast number	unitless
latitude	latitude of station; North is positive; negative denotes South	decimal degrees
longitude	longitude station East is positive; negative denotes West	decimal degrees
niskin	Niskin bottle number	unitless
depth	depth of sampling	meters (m)
salinity	Salinity from CTD	practical salinity units (PSU)
temperature	Temperature from CTD	Celsius (C)
n2o_1	Nitrous oxide concentration replicate 1	nanomoles per liter (nmol/L)
n2o_2	Nitrous oxide concentration replicate 2	nanomoles per liter (nmol/L)
n2o_3	Nitrous oxide concentration replicate 3	nanomoles per liter (nmol/L)
n2o_4	Nitrous oxide concentration replicate 4	nanomoles per liter (nmol/L)
n2o_5	Nitrous oxide concentration replicate 5	nanomoles per liter (nmol/L)

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Instruments

Dataset-specific Instrument Name	CTD
Generic Instrument Name	CTD - profiler
Dataset-specific Description	Temperature and Salinity are from CTD
Generic Instrument Description	The Conductivity, Temperature, Depth (CTD) unit is an integrated instrument package designed to measure the conductivity, temperature, and pressure (depth) of the water column. The instrument is lowered via cable through the water column. It permits scientists to observe the physical properties in real-time via a conducting cable, which is typically connected to a CTD to a deck unit and computer on a ship. The CTD is often configured with additional optional sensors including fluorometers, transmissometers and/or radiometers. It is often combined with a Rosette of water sampling bottles (e.g. Niskin, GO-FLO) for collecting discrete water samples during the cast. This term applies to profiling CTDs. For fixed CTDs, see https://www.bco-dmo.org/instrument/869934.

Dataset-specific Instrument Name	RI Greenhouse Gas Monitoring Gas Chromatograph
Generic Instrument Name	Gas Chromatograph
Dataset-specific Description	Nitrous oxide concentration: N2O concentrations were measured using a headspace equilibration method and analyzed on a SRI Greenhouse Gas Monitoring Gas Chromatograph (GC) equipped with an electron capture detector (ECD), dual HayeSep D packed columns, and a 1-mL sample loop (SRI Instruments, Torrance, California, USA; Elkins 1980; Laperriere et al. 2019).
Generic Instrument Description	Instrument separating gases, volatile substances, or substances dissolved in a volatile solvent by transporting an inert gas through a column packed with a sorbent to a detector for assay. (from SeaDataNet, BODC)

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Deployments

FK160115

Website	https://www.bco-dmo.org/deployment/708387
Platform	R/V Falkor
Report	https://service.rvdata.us/data/cruise/FK160115/doc/FK160115_OfficialCruiseReport_Saito_v3.pdf
Start Date	2016-01-16
End Date	2016-02-11
Description	Project: Using Proteomics to Understand Oxygen Minimum Zones (ProteOMZ) More information is available from the ship operator at https://schmidtocean.org/cruise/investigating-life-without-oxygen-in-the... Additional cruise information is available from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/FK160115

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Project Information

The ProteOMZ Expedition: Investigating Life Without Oxygen in the Pacific Ocean (ProteOMZ (Proteomics in an Oxygen Minimum Zone))

Website: https://schmidtocean.org/cruise/investigating-life-without-oxygen-in-the-tropical-pacific/#team

Coverage: Central Pacific Ocean (Hawaii to Tahiti)

From Schmidt Ocean Institute's ProteOMZ Project page:

Rising temperatures, ocean acidification, and overfishing have now gained widespread notoriety as human-caused phenomena that are changing our seas. In recent years, scientists have increasingly recognized that there is yet another ingredient in that deleterious mix: a process called deoxygenation that results in less oxygen available in our seas.

Large-scale ocean circulation naturally results in low-oxygen areas of the ocean called oxygen deficient zones (ODZs). The cycling of carbon and nutrients – the foundation of marine life, called biogeochemistry – is fundamentally different in ODZs than in oxygen-rich areas. Because researchers think deoxygenation will

greatly expand the total area of ODZs over the next 100 years, studying how these areas function now is important in predicting and understanding the oceans of the future. This first expedition of 2016 led by Dr. Mak Saito from the Woods Hole Oceanographic Institution (WHOI) along with scientists from University of Maryland Center for Environmental Science, University of California Santa Cruz, and University of Washington aimed to do just that, investigate ODZs.

During the 28 day voyage named “ProteOMZ,” researchers aboard R/V *Falkor* traveled from Honolulu, Hawaii to Tahiti to describe the biogeochemical processes that occur within this particular swath of the ocean’s ODZs. By doing so, they contributed to our greater understanding of ODZs, gathered a database of baseline measurements to which future measurements can be compared, and established a new methodology that could be used in future research on these expanding ODZs.

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Funding

Funding Source	Award
Schmidt Ocean Institute (SOI)	R/V Falkor 160115 SOI ProteOMZ Expedition
Alfred P. Sloan Foundation (Sloan)	FG-2016-7129

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