# Oxygen to argon molar ratios measured in surface waters of Station ALOHA between June 16 and June 23, 2019 onboard R/V Kilo Moana cruise KM1910.

**Website**: https://www.bco-dmo.org/dataset/868774
**Data Type**: Other Field Results
**Version**: 1
**Version Date**: 2022-05-25

**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**
Oxygen to argon molar ratios measured in surface waters of Station ALOHA between June 16 and June 23, 2019 onboard R/V Kilo Moana cruise KM1910.

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## Coverage

**Spatial Extent**: **N**:22.83 **E**:-157.924 **S**:22.667 **W**:-158.045
**Temporal Extent**: 2019-06-16 - 2019-06-23

### Methods & Sampling

Samples for O2/Ar analyses were collected at three different depths within the mixed layer (5, 15, and 25 m) with 12-L Niskin® bottles attached to a CTD rosette. Seawater samples, collected in triplicate, were transferred to 12mL Labco Exetainer® screw cap vials with rubber septa. The vials were filled from the bottom using Tygon® tubing and allowed to overflow at least 3 times their volume. Samples were poisoned with 50 µL of saturated mercuric chloride solution and stored in the dark immersed in water at 4°C until analysis on board, within 2 days of collection.

### Data Processing Description

Dissolved O2/Ar was measured in discrete water samples using membrane inlet mass spectrometry as described by Ferrón et al. (2015).

Membrane inlet mass spectrometer consists of a Pfeiffer Vacuum HiCube 80 Eco turbo pumping station connected to a HiQuayTM quadrupole mass spectrometer (QMG700), with a Balzers radio frequency generator (QMH 400-5) and a Balzers analyzer (QMA 430). The membrane inlet design is from Bay Instruments (Easton, Maryland).

BCO-DMO Processing Notes:
* Adjusted column names to comply with database requirements
* Added ISO8601 format of date and times

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## Data Files

| File |
|---|
| **mixed_layer.csv** (Comma Separated Values (.csv), 8.51 KB) MD5:1f7f5a094228e4769c491d6f78bd1812<br>Primary data file for dataset ID 868774 |

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## Supplemental Files

| File |
|---|
| **Mixed_layer_oxygen_to_argon_km1910**<br>filename: Mixed_layer_oxygen_to_argon_km1910.xlsx (Octet Stream, 18.24 KB) MD5:f5612c8f0ae962eb1ac3e13daa5ff9f8<br>Mixed layer oxygen to argon km1910: Data table with mean and standard deviation of three replicates of parameters Oxygen to Argon molar ratio and Biological O2 saturation anomaly. |

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## Related Publications

De Boyer Montégut, C. (2004). Mixed layer depth over the global ocean: An examination of profile data and a profile-based climatology. Journal of Geophysical Research, 109(C12). doi:10.1029/2004jc002378 https://doi.org/doi:10.1029/2004JC002378
*Methods*

Ferrón, S., Wilson, S. T., Martínez-García, S., Quay, P. D., & Karl, D. M. (2015). Metabolic balance in the mixed layer of the oligotrophic North Pacific Ocean from diel changes in O2 /Ar saturation ratios. Geophysical Research Letters, 42(9), 3421–3430. doi:10.1002/2015gl063555 https://doi.org/10.1002/2015GL063555
*Methods*

Garcia, H. E., & Gordon, L. I. (1992). Oxygen solubility in seawater: Better fitting equations. Limnology and Oceanography, 37(6), 1307–1312. doi:10.4319/lo.1992.37.6.1307
*Methods*

Hamme, R. C., & Emerson, S. R. (2004). The solubility of neon, nitrogen and argon in distilled water and seawater. Deep Sea Research Part I: Oceanographic Research Papers, 51(11), 1517–1528. doi:10.1016/j.dsr.2004.06.009
*Methods*

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## Parameters

| Parameter | Description | Units |
|---|---|---|
| Cruise_ID | Cruise identification number | unitless |
| Sample_ID | Sample identification number | unitless |
| Date | Date and time of CTD cast | UTC |
| Latitude | Latitude, south is negative | decimal degrees |
| Longitude | Longitude, west is negative | decimal degrees |
| Cast | Cast number | unitless |
| Niskin | Niskin bottle | unitless |
| Target_depth | Target depht | meters (m) |
| MLD | Mixed layer depth, calculated following de Boyer Montégut et al. (2004), as the first depth where the potential density is at least 0.03 kg m−3 larger than the value at 10 m | meters (m) |
| Temp | Conservative temperature | degrees Celsius (°C) |
| Sal | Absolute salinity | g/kg |
| Sig | Potential density | kg/m3 |
| O2_sol | Oxygen solubility determined from Garcia and Gordon (1992) solubility equations | mmol/m3 |
| O2_Ar | Oxygen to Argon molar ratio. | mol O2/mol Ar |
| D_O2_Ar | Biological O2 saturation anomaly in percent. delta (O2/Ar) = [((O2/Ar)measured / (O2/Ar)equilibrium) - 1] * 100. Oxygen solubility determined from Garcia and Gordon (1992). Argon solubility solubility determined from Hamme and Emmerson (2004) | % (percent) |
| ISO_DateTime_UTC | Sampling start date and time (UTC) in ISO8601 format: YYYY-MM-DDThh:mm:ssz | unitless |

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## Instruments

| | |
|---|---|
| **Dataset-specific Instrument Name** | Membrane inlet mass spectrometer |
| **Generic Instrument Name** | Membrane Inlet Mass Spectrometer |
| **Dataset-specific Description** | Membrane inlet mass spectrometer consists of a Pfeiffer Vacuum HiCube 80 Eco turbo pumping station connected to a HiQuayTM quadrupole mass spectrometer (QMG700), with a Balzers radio frequency generator (QMH 400-5) and a Balzers analyzer (QMA 430). The membrane inlet design is from Bay Instruments (Easton, Maryland). |
| **Generic Instrument Description** | Membrane-introduction mass spectrometry (MIMS) is a method of introducing analytes into the mass spectrometer's vacuum chamber via a semipermeable membrane. |

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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-1911990 |


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