# AQMET Air quality and meteorological measurements measured measured during DANCE cruise HRS1414 aboard the R/V Hugh R. Sharp from July to August 2014.

**Website**: https://www.bco-dmo.org/dataset/733059
**Data Type**: Cruise Results
**Version**: 1
**Version Date**: 2018-04-05

**Project**
» Collaborative Research: Impacts of atmospheric nitrogen deposition on the biogeochemistry of oligotrophic coastal waters (DANCE)

| Contributors | Affiliation | Role |
|---|---|---|
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**Abstract**
AQMET Air quality and meteorological measurements measured measured during DANCE cruise HRS1414 aboard the R/V Hugh R. Sharp from July to August 2014.

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## Coverage

**Spatial Extent**: **N**:38.89 **E**:-71.09 **S**:31.6 **W**:-75.16
**Temporal Extent**: 2014-07-29 - 2014-08-14

## Dataset Description

AQMET Air quality and meteorological measurements measured measured during DANCE cruise HRS1414 aboard the R/V Hugh R. Sharp from July to August 2014 on the offshore Mid-Atlantic Bight and northern South-Atlantic Bight between latitudes 31.60°N and 38.89°N, and longitudes 71.09°W and 75.16°W.

Air quality and meteorological measurements were collected using commercial instrumentation. The data were averaged to 1 minute and spatial data were linearly interpolated to match the continuous 1 minute data.

Averages and data interpolation was done using MATLAB. Data during known periods of interference such as routine maintenance are reported as NaN. The NOx channel of the Thermo 42C failed during the campaign. NOx can be calculated using the NO measurement from the Thermo 42C and the NO2 measurement from the Aerodyne CAPS.

Complete sampling procedures and methods are found in Martins et al. 2016.

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## Data Files

| File |
|---|
| **AQMET.csv** (Comma Separated Values (.csv), 4.74 MB)<br>MD5:25fc342705abff957149a147d5cb89e8<br>Primary data file for dataset ID 733059 |

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## Related Publications

Martins, D. K., Najjar, R. G., Tzortziou, M., Abuhassan, N., Thompson, A. M., & Kollonige, D. E. (2016). Spatial and temporal variability of ground and satellite column measurements of NO2and O3over the Atlantic Ocean during the Deposition of Atmospheric Nitrogen to Coastal Ecosystems Experiment. Journal of Geophysical Research: Atmospheres, 121(23), 14,175–14,187. doi:10.1002/2016jd024998
https://doi.org/10.1002/2016JD024998
*Methods*

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## Parameters

| Parameter | Description | Units |
|---|---|---|
| Index_number | Continuous numeric indicator of the number of observations from the start of the campaign | number |
| Seconds_utc | Seconds since the start of the campaign | seconds |
| Fract_day_of_year_utc | Fractional day of year in UTC | days |
| Year_utc | Year of measurement in UTC | year |
| Month_utc | Month of measurement in UTC | month |
| Day_of_month_utc | Day of month of measurement | day |
| Hour_of_day_utc | Hour of day of measurement | hour |
| Minute_of_hour_utc | Minute of hour of measurement | minute |
| Downwelling_shortwave_rad | Downwelling shortwave radiation from top of mast as measured by Eppley PSP | Watts per square meter |

| | | |
|---|---|---|
| Downwelling_longwave_rad | Downwelling longwave radiation from the top of mast as measured by Eppley PIR | Watts per square meter |
| Accumulated_precip_mm | Accumulated precipitation measured from the start of the campaign measured at the top of the mast as measured by RM Young 50202 | millimeters |
| Precipitation_flag | Equal to 0 when it is not raining or an integer when it is raining corresponding to the event number | number |
| JNO2 | Photolysis rate of NO2 measured at top of mast by Metcon 2-pi radiometer | per second |
| NO2 | Nitrogen dioxide measured on port side by cavity-attenuated phase shift (CAPS) analyzer (Aerodyne) | ppbv |
| O3 | Ozone measured on port side by UV absorption (Thermo 49C) | ppbv |
| CO | Carbon monoxide measured on port side by IR absorption (Thermo 48) | ppbv |
| NO | Nitric oxide measured on port side by chemiluminescence (Thermo 42C) | ppbv |
| NOx | Sum of nitric oxide and nitrogen dioxide measured on port side by molybdenum conversion (320 deg C) of NO2 to NO and chemiluminescence | ppbv |
| Plume_flag | Value equal to 1 indicates measurements were impacted by ship's plume; clean data have values equal to 0; Plume defined by relative (to ship) wind angles 40-140 deg and 170-190 deg and NO/NO2 ratio > 0.4 | number |
| lat | Interpolated from the SPS Sharp data; Positive is in the Northern Hemisphere [range -90 to 90] | decimal degrees |
| lon | Interpolated from the SPS Sharp data; Negative values correspond to the Western Hemisphere [range -180 to 180] | decimal degrees |

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## Instruments

| | |
|---|---|
| **Dataset-specific Instrument Name** | Eppley PIR |
| **Generic Instrument Name** | Eppley Longwave Radiometer |
| **Generic Instrument Description** | The Eppley Precision Infrared Radiometer (PIR) pyrgeometer measures longwave (infrared) radiation. It is housed in a weatherproof titanium canister that has been painted with a very flat black paint that absorbs radiation. A small glass dome at the top of the instrument is covered with an 'interference coating' which allows only infrared radiation to come through. Light levels are detected as temperature changes creating voltages in fine wire coil detectors. more from Eppley Labs |

| | |
|---|---|
| **Dataset-specific Instrument Name** | Thermo 49C (ozone); Thermo 48 (CO); Thermo 42C (NO, NOx) |
| **Generic Instrument Name** | Gas Analyzer |
| **Generic Instrument Description** | Gas Analyzers - Instruments for determining the qualitative and quantitative composition of gas mixtures. |

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|---|---|
| **Dataset-specific Instrument Name** | R.M. Young 50202 |
| **Generic Instrument Name** | Precipitation Gauge |
| **Generic Instrument Description** | measures rain or snow precipitation |

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|---|---|
| **Dataset-specific Instrument Name** | Eppley PSP |
| **Generic Instrument Name** | Precision Spectral Pyranometer |
| **Generic Instrument Description** | This radiometer measures sun and sky irradiance in the range of wavelengths 0.285 to 2.8 microns, including most of the solar spectrum. The PSP is intended to weight the energy flux in all wavelengths equally. It is a "hemispheric receiver" intended to approximate the cosine response for oblique rays. The Eppley Precision Spectral Pyranometer (PSP) is primarily used where high accuracy is required or where it is used to calibrate other pyranometers. The PSP outputs a low level voltage ranging from 0 to a maximum of about 12mV depending on sensor calibration and radiation level. An instruction manual provided by Eppley contains the sensor calibration constant and serial number. The Precision Spectral Pyranometer is a World Meteorological Organization First Class Radiometer and comes with a calibration certificate traceable to the World Radiation Reference and a temperature compensation curve. More information is available from Eppley Labs. |

| | |
|---|---|
| **Dataset-specific Instrument Name** | Metcon 2-pi radiometer |
| **Generic Instrument Name** | Radiometer |
| **Generic Instrument Description** | Radiometer is a generic term for a range of instruments used to measure electromagnetic radiation (radiance and irradiance) in the atmosphere or the water column. For example, this instrument category includes free-fall spectral radiometer (SPMR/SMSR System, Satlantic, Inc), profiling or deck cosine PAR units (PUV-500 and 510, Biospherical Instruments, Inc). This is a generic term used when specific type, make and model were not specified. |

| | |
|---|---|
| **Dataset-specific Instrument Name** | Aerodyne CAPS |
| **Generic Instrument Name** | Spectrophotometer |
| **Generic Instrument Description** | An instrument used to measure the relative absorption of electromagnetic radiation of different wavelengths in the near infra-red, visible and ultraviolet wavebands by samples. |

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## Deployments

**HRS1414**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/731505 |
| **Platform** | R/V Hugh R. Sharp |
| **Start Date** | 2014-07-29 |
| **End Date** | 2014-08-16 |

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## Project Information

**Collaborative Research: Impacts of atmospheric nitrogen deposition on the biogeochemistry of oligotrophic coastal waters (DANCE)**

**Coverage**: Offshore Mid-Atlantic Bight and northern South-Atlantic Bight between latitudes 31.60°N and 38.89°N, and longitudes 71.09°W and 75.16°W

NSF abstract:

Deposition of atmospheric nitrogen provides reactive nitrogen species that influence primary production in nitrogen-limited regions. Although it is generally assumed that these species in precipitation contributes substantially to anthropogenic nitrogen loadings in many coastal marine systems, its biological impact remains poorly understood. Scientists from Pennsylvania State University, William & Mary College, and Old Dominion University will carry out a process-oriented field and modeling effort to test the hypothesis that deposits of wet atmospheric nitrogen (i.e., precipitation) stimulate primary productivity and accumulation of algal biomass in coastal waters following summer storms and this effect exceeds the associated biogeochemical responses to wind-induced mixing and increased stratification caused by surface freshening in oligotrophic coastal waters of the eastern United States. To attain their goal, the researchers would perform a Lagrangian field experiment during the summer months in coastal waters located between Delaware Bay and the coastal Carolinas to determine the response of surface-layer biogeochemistry and biology to precipitation events, which will be identified and intercepted using radar and satellite data. As regards the modeling effort, a 1-D upper ocean mixing model and a 1-D biogeochemical upper-ocean will be calibrated by assimilating the field data obtained a part of the study using the adjoint method. The hypothesis will be tested using sensitivity studies with the calibrated model combined with in-situ data and results from the incubation experiments. Lastly, to provide regional and historical context for the field measurements and the associated 1-D modeling, linked regional atmospheric-oceanic biogeochemical modeling will be conducted.

Broader Impacts. Results from the study would be incorporated into class lectures for graduate courses on marine policy and marine biogeochemistry. One graduate student from Pennsylvania State University, one graduate student from the College of William and Mary, and one graduate and one undergraduate student

from Old Dominion University would be supported and trained as part of this project.

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## Funding


| Funding Source | Award |
| --- | --- |
| NSF Division of Ocean Sciences (NSF OCE) | OCE-1260574 |


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