

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.

Table of Contents

- [Coverage](#)
 - [Dataset Description](#)
 - [Acquisition Description](#)
 - [Processing Description](#)
 - [Related Publications](#)
 - [Parameters](#)
 - [Instruments](#)
 - [Deployments](#)
 - [Project Information](#)
 - [Funding](#)
-

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 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 NO_x channel of the Thermo 42C failed during the campaign. NO_x 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.

[[table of contents](#) | [back to top](#)]

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 NO₂ and O₃ over 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)

[[table of contents](#) | [back to top](#)]

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

[[table of contents](#) | [back to top](#)]

Instruments

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	Eppley PSP
Generic Instrument Name	Precision Spectral Pyranometer
Generic Instrument Description	<p>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.</p>

Dataset-specific Instrument Name	Eppley PIR
Generic Instrument Name	Eppley Longwave Radiometer
Generic Instrument Description	<p>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</p>

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

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.

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.

[[table of contents](#) | [back to top](#)]

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

[[table of contents](#) | [back to top](#)]

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.

[[table of contents](#) | [back to top](#)]

Funding

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

[[table of contents](#) | [back to top](#)]