Total column nitrogen dioxide (NO2) 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/732115
Data Type: Cruise Results
Version: 1
Version Date: 2018-03-27

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

Contributors	Affiliation	Role
Najjar, Raymond	Pennsylvania State University (PSU)	Principal Investigator
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Abstract
Total column nitrogen dioxide (NO2) 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**:-75.06
Temporal Extent: 2014-07-29 - 2014-08-14

Dataset Description

Total column nitrogen dioxide 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. Sampling procedures and methods are found in Martins et al. 2016. Data are not cloud screened. For cloud screening use columns rms_unweighted or rms_weighted and NO2_uncert.

Processing Description

BCO-DMO processing notes:
-changes parameter names to BCO-DMO naming conventions
-organized under top-level file by station number

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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

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Parameters

Parameter	Description	Units
Station_ID	Station ID	no units

lat	Latitude, south is negative	decimal degrees
lon	Longitude, west is negative	decimal degrees
Date_Time	UT date and time for center of measurement (yyyymmddThhmmssZ)	no units
Samp_time	Total duration of measurement in seconds	seconds
Zenith	Solar zenith angle at the center-time of the measurement in degrees	degrees
Azimuth	Solar azimuth at the center-time of the measurement in degrees; 0=north; increases clockwise	degrees
rms_unweighted	rms of unweighted spectral fitting residuals	no units
rms_weighted	Normalized rms of weighted spectral fitting residuals	no units
NO2_vert	Nitrogen dioxide vertical column amount	Dobson units
NO2_uncert	Uncertainty of nitrogen dioxide vertical column amount	Dobson units
NO2_dir_sun	Direct sun nitrogen dioxide air mass factor	no units
err_index	Sum over 2^i with i being a level 2 error index	no units
Temp	Effective temperature; 999=no effective temperature given	degrees Celsius
Res_stray_light	Estimated average residual stray light level	percent
Wavelength_shift	Retrieved wavelength shift	nanometers (nm)
Filterwheel_pos	Position of filterwheel #2; 0=filterwheel not used; 1-9 are valid positions	no units
Result_index	Fitting result index; 1 and 2=no error; >2=error	no units
NO2_temp	Nitrogen dioxide effective temperature	degrees Kelvin (K)
NO2_temp_uncert	Uncertainty of nitrogen dioxide effective temperature	degrees Kelvin (K)

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Instruments

Dataset-specific Instrument Name	Pandora direct-sun spectrometer (Herman et al., 2009)
Generic Instrument Name	Spectrometer
Generic Instrument Description	A spectrometer is an optical instrument used to measure properties of light over a specific portion of the electromagnetic spectrum.

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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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