

CTD profiles from R/V Atlantic Explorer cruise AE1913 in the Sargasso Sea in June of 2019

Website: <https://www.bco-dmo.org/dataset/916411>

Data Type: Cruise Results

Version: 1

Version Date: 2023-12-07

Project

» [Collaborative Research: Direct Characterization of Adaptive Nutrient Stress Responses in the Sargasso Sea using Protein Biomarkers and a Biogeochemical AUV](#) (Nutrient Stress Responses and AUV Clio)

Contributors	Affiliation	Role
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Abstract

Oceanographic samples were collected onboard the R/V Atlantic Explorer between June 16th - 28th 2019, along a transect beginning at the Bermuda Atlantic Time-series Station (BATS) in the Sargasso Sea and terminating in northeast US continental shelf waters. The R/V Atlantic Explorer CTD provided physicochemical contextualization (temperature, oxygen, fluorescence, turbidity) and was deployed at all stations except the last one, St. 9, due to time restrictions.

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Coverage

Location: Sargasso Sea, beginning at Bermuda Atlantic Time-series Station (BATS) and ending in the northeast shelf of Woods Hole Oceanographic Institution (WHOI)

Spatial Extent: N:38.528372 E:-64.231587 S:31.617488 W:-70.84278

Temporal Extent: 2019-06-16 - 2019-06-27

Dataset Description

See the "Related Datasets" section on this page for other data from coordinated deployments, and the ELOG from cruise AE1913.

Methods & Sampling

The RV Atlantic Explorer CTD was deployed at each station along the BATS to WHOI transect by the crew (see

supplemental station list and R2R ELOG). Continuous measurements were collected on these casts. Complementary underway data and other processed products from this cruise on R2R (AE1913, doi: 10.7284/908544).

Data Processing Description

SeaBird software was used to process raw CTD files and convert to .cnv. (Seasave V 7.26.7.107)

BCO-DMO Processing Description

* Processed (depth binned) data tables provided within in seabird files (.cnv) were imported into the BCO-DMO data system with the missing value identifier specified in the seabird header information "-9.990e-29" as the missing data identifier. This table is the primary bco-dmo table for this dataset. The source .cnv files were downloaded from a shared google drive on 20231229T170156Z.

* PAR column removed upon submitter request due to sensor failure during cruise.

* The timestamp for each cast was extracted from the standard seabird header within each file and added into data column "NMEA_DateTime_UTC" and converted Example:

line: "* NMEA UTC (Time) = Jun 27 2019 03:02:35"

included as NMEA_DateTime_UTC "2019-06-27T03:02:35Z"

* The raw seabird files and processed .cnv file format were also added to the supplemental files section within .zip packages.

* Column names adjusted to conform to BCO-DMO naming conventions designed to support broad re-use by a variety of research tools and scripting languages. [Only numbers, letters, and underscores. Can not start with a number]

Problem Description

PAR data not collected. PAR column was removed from the primary data table for this dataset (the Data File "916411_v1_ctd.csv"). The supplemental zip files containing seabird files (raw, processed) contain the PAR column but should not be used.

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Related Publications

Cohen, N.R., Krinos, A.I., Kell, R.M., Chmiel, R. J., Moran, D.M., McIlvin, M.R., Lopez, P.Z., Barth, A., Stone, J., Alanis, B.A., Chan, E.W., Breier, J.A., Jakuba, M.V., Johnson, R., Alexander, H., Saito, M.A. (2023) Microeukaryote metabolism across the western North Atlantic Ocean revealed through autonomous underwater profiling. Submitted to Nature Communications.

Results

Sea-Bird Scientific (2017). Seasoft V2: Seasave V7 [Software]. Available from

<http://www.seabird.com/software/seasavev7>

Software

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Related Datasets

IsRelatedTo

Rolling Deck To Repository. (2020). *Cruise AE1913 on RV Atlantic Explorer* (Version 1). Rolling Deck to Repository (R2R) Program. <https://doi.org/10.7284/908544>

Saito, M. A., Cohen, N. (2023) **Macronutrients and dissolved and particulate trace metals collected from the R/V Atlantic Explorer cruise AE1913 in the Sargasso Sea in June of 2019.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2023-12-07 <http://lod.bco-dmo.org/id/dataset/916429> [[view at BCO-DMO](#)]

Relationship Description: Data from coordinated deployments during the same cruise.

Saito, M. A., Cohen, N. (2024) **Amended Rolling Deck to Repository (R2R) event log (ELOG) taken on the R/V Atlantic Explorer cruise AE1913 in the Sargasso Sea in June of 2019.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-05-03 <http://lod.bco-dmo.org/id/dataset/926526> [[view at BCO-DMO](#)]

Relationship Description: Data from coordinated deployments during the same cruise.

Saito, M. A., Cohen, N., Johnson, R. J. (2024) **Pigment concentration data from AUV Clio dives conducted during R/V Atlantic Explorer cruise AE1913 in the Sargasso Sea in June of 2019.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-05-03 <http://lod.bco-dmo.org/id/dataset/926546> [[view at BCO-DMO](#)]

Relationship Description: Data from coordinated deployments during the same cruise.

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Parameters

Parameter	Description	Units
Cast	cast identifier	unitless
NMEA_DateTime_UTC	DateTime (in UTC time zone) from navigation data, National Marine Electronic Association (NMEA). This value was extracted from the standard seabird header information for the cast and converted to ISO 8601 format.	unitless
latitude	latitude	decimal degrees
longitude	longitude	decimal degrees
depSM	Depth (salt water)	meters (m)
c1mS_cm	Conductivity 2. Seabird parameter name c1mS/cm	milliSiemens per centimeter (mS/cm)
c0mS_cm	Conductivity. Seabird parameter name c0mS/cm	milliSiemens per centimeter (mS/cm)
t090C	Temperature [ITS-90]	degrees Celsius (deg C)
prDM	Pressure	Digiquartz (db)
sbeox0Mm_L	Dissolved oxygen. Seabird parameter name sbeox0Mm/L. Oxygen, SBE 43	micromoles per liter (umol/l)
fIC	Fluorescence. Chelsea Aqua 3 Chl Con	Micrograms per liter (ug/l)
CStarTr0	Beam Transmission, WET Labs C-Star	Percent (%)
sal00	Salinity, Practical	Practical Salinity Units (PSU)
flag	quality flag (0.000e+00 indicates good scan, -9.990e-29 indicates a bad scan)	unitless

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Instruments

Dataset-specific Instrument Name	SeaBird SBE-911+
Generic Instrument Name	CTD Sea-Bird SBE 911plus
Generic Instrument Description	The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). more information from Sea-Bird Electronics

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Deployments

AE1913

Website	https://www.bco-dmo.org/deployment/916412
Platform	R/V Atlantic Explorer
Start Date	2019-06-16
End Date	2019-06-28
Description	coordinated deployments: McLane pumps, AUV Clio, CTD, trace metal rosette

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Project Information

Collaborative Research: Direct Characterization of Adaptive Nutrient Stress Responses in the Sargasso Sea using Protein Biomarkers and a Biogeochemical AUV (Nutrient Stress Responses and AUV Clio)

Coverage: Bermuda Atlantic Time Series

NSF Award Abstract:

Microscopic communities in the ocean can be surprisingly diverse. This diversity makes it difficult to study the individual organisms and reactions that control specific reactions controlling nutrient cycles. Past studies confirm that iron and nitrogen are vital elements for biological growth. There is increasing evidence, however, that other chemicals such as silica, zinc, cobalt, and vitamin B12 may be just as important. This project will provide an unprecedented view of community distributions using new molecular methods to isolate and link active proteins to specific chemical cycles during the very first research deployment of a brand-new autonomous underwater vehicle (AUV). The AUV will collect samples in programmed patterns by pumping water directly into its filtering mechanism and then return the samples to the ship for analysis. The Bermuda Atlantic Time-series Study (BATS) station, which provides abundant supporting data, is the site for this innovative investigation into the microbial ecology and chemistry of the open oceans. Additionally, data will be widely distributed to other scientists through the Ocean Protein Portal website being developed by the Woods Hole Oceanographic Institute (WHOI) and the Biological and Chemical Oceanography Data Management Office. Data will also contribute a new teaching module in the Marine Bioinorganic Chemistry course at WHOI.

This first scientific deployment of the newly engineered and constructed biogeochemical AUV, Clio, will generate a novel dataset to examine marine microbial biogeochemical cycles in the Northwestern Atlantic oligotrophic ocean in unprecedented detail and at high vertical resolution. First the project proposes to understand if the microbial community reflects the varying chemical composition and cyanobacterial species through nutrient response adaptations. Additionally, the research will determine if iron stress in the low light Prochlorococcus ecotype found in the deep chlorophyll maximum is a persistent feature influenced by seasonal dust fluxes. The highly resolved vertical data from the in situ pumping capabilities of Clio are fundamental to a rigorous examination of these biogeochemical questions. This highly transformative dataset will greatly advance understanding of the nutrient and trace element cycling of this region and will be the first field validation of the potentially revolutionary capability these new approaches represent for the study of marine microbial biogeochemistry.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1658030

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