

CTD data from R/V Atlantic Explorer cruise AE2207 to the Bermuda Atlantic Time Series (BATS) station in April 2022

Website: <https://www.bco-dmo.org/dataset/877011>

Data Type: Cruise Results

Version: 1

Version Date: 2022-07-14

Project

» [Collaborative Research: Inferring Cellular Lysis and Regeneration of Organic Matter by Marine Viruses](#) (InVirT)

Contributors	Affiliation	Role
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Abstract

This dataset includes CTD data from R/V Atlantic Explorer cruise AE2207 to the Bermuda Atlantic Time Series (BATS) station in April 2022. The CTD data was processed into .cnv files from cast hex files. Then, the data from the .cnv files were converted and saved as .csv files, with each file containing all scans for all variables contained in the .cnv files.

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Coverage

Spatial Extent: N:31.6636667 E:-64.1648333 S:31.0265 W:-64.5931667

Temporal Extent: 2022-04-22 - 2022-04-25

Methods & Sampling

CTD packages with Niskin rosettes were deployed to 300 meters with the exception of two deep casts: C01 to 2000 meters (where PAR sensor was removed) and C13 to 1000 meters. Casts are identified by two-digit ids preceded by a C, so that C01 is the first cast and C10 is the tenth cast etc.

Data Processing Description

Data Processing:

Data were converted from .hex files to .cnv files using SeaSave on default parameters. The .cnv files were then converted to .csv.

BCO-DMO Processing:

- concatenated separate .csv files into one dataset;
- created CAST column from individual file names;
- renamed fields to comply with BCO-DMO naming conventions.

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Data Files

File
AE2207_ctd_unprocessed.csv (Comma Separated Values (.csv), 159.95 MB) MD5:589d7ff4bc0a33d3a3367d5dbbc0e976 Primary data file for dataset ID 877011

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Supplemental Files

File
ctd_cnv_files.zip (ZIP Archive (ZIP), 29.71 MB) MD5:e8bd88f8964514f0699ac0163b07b3e7 Unprocessed CTD data from AE2207 in .cnv format. These .cnv files were converted directly from .hex files. Files are named by cast number.

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Related Datasets

IsSourceOf

Muratore, D., Wilhelm, S. W., Sullivan, M., Weitz, J. (2022) **Processed CTD data with thermodynamic calculations from R/V Atlantic Explorer cruise AE2207 to the Bermuda Atlantic Time Series (BATS) station in April 2022**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2022-07-21 doi:10.26008/1912/bco-dmo.877100.1 [[view at BCO-DMO](#)]

Relationship Description: To generate the processed CTD dataset, the unprocessed data were binned and smoothed, and derived variables from thermodynamic calculations were generated.

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Parameters

Parameter	Description	Units
CAST	Cast number	unitless
DEPTH	Depth	meters (m)
TEMP	Temperature ITS-90	degrees Celsius
TEMP2	Temperature ITS-90 sensor 2	degrees Celsius
T2_T190C	Difference between temperature sensors	degrees Celsius
PSAL	Salinity	practical salinity
PSAL2	Salinity sensor 2	practical salinity
secS_priS	Difference between salinity sensors	practical salinity
sbox0Mm_Kg	Seabird oxygen sensor	micromoles per kilogram (umol/kg)
sbox1Mm_Kg	Seabird oxygen sensor 2	micromoles per kilogram (umol/kg)
sbox0Mm_Kgdiff	Difference between oxygen sensors	micromoles per kilogram (umol/kg)
fIC	Chelsea labs Chlorophyll Fluorescence	micrograms per liter (ug/L)
fIECO_AFL	Wet Labs ECO Chlorophyll Fluorescence	milligrams per cubic meter (mg/m ³)
altM	Altimetry	meters (m)
cpar	Corrected irradiance	percent (%)
par	PAR	microEinsteins per square centimeter per second (uE/cm ² s)
timeM	Time since deployment	minutes
PRES	Pressure	decibar
bpos	Bottle position	unitless
nbf	Number of bottles fired	unitless
v1	Voltage 1	volts
spar	Surface irradiance	microEinsteins per square centimeter per second (uE/cm ² s)
c0mS_cm	Conductivity sensor	microSiemens per centimeter (mS/cm)
c1mS_cm	Conductivity sensor 2	microSiemens per centimeter (mS/cm)
CStarAt0	Wet Labs C-Star Beam Transmissometer Attenuation	reciprocal meters (1/m)
CStarTr0	Wet Labs C-Star Beam Transmissometer Transmission	percent (%)
flag	Scan quality flag using Seabird flags	unitless
LATITUDE	Latitude	degrees North
LONGITUDE	Longitude	degrees East

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Instruments

Dataset-specific Instrument Name	Altimeter (Valeport) - VA500
Generic Instrument Name	Altimeter
Generic Instrument Description	An instrument that measures height above a fixed surface. The data can be used to map ocean-surface topography and generate gridded surface height fields.

Dataset-specific Instrument Name	Licor PAR sensor (Biospherical Instruments) QSP-2300
Generic Instrument Name	Biospherical PAR sensor
Generic Instrument Description	Unspecified Biospherical PAR. An irradiance sensor, designed to measure Photosynthetically Active Radiation (PAR).

Dataset-specific Instrument Name	CTD unit (Seabird) SBE 9+
Generic Instrument Name	CTD Sea-Bird
Generic Instrument Description	Conductivity, Temperature, Depth (CTD) sensor package from SeaBird Electronics, no specific unit identified. This instrument designation is used when specific make and model are not known. See also other SeaBird instruments listed under CTD. More information from Sea-Bird Electronics.

Dataset-specific Instrument Name	Fluorometer (Chelsea) Aquatracka
Generic Instrument Name	CTD-fluorometer
Generic Instrument Description	A CTD-fluorometer is an instrument package designed to measure hydrographic information (pressure, temperature and conductivity) and chlorophyll fluorescence.

Dataset-specific Instrument Name	Fluorometer (Wet Labs) ECO-FLRTD
Generic Instrument Name	CTD-fluorometer
Generic Instrument Description	A CTD-fluorometer is an instrument package designed to measure hydrographic information (pressure, temperature and conductivity) and chlorophyll fluorescence.

Dataset-specific Instrument Name	Oxygen sensors (Seabird) SBE 43
Generic Instrument Name	Sea-Bird SBE 43 Dissolved Oxygen Sensor
Generic Instrument Description	The Sea-Bird SBE 43 dissolved oxygen sensor is a redesign of the Clark polarographic membrane type of dissolved oxygen sensors. more information from Sea-Bird Electronics

Dataset-specific Instrument Name	Conductivity sensor (Seabird) SBE 4C
Generic Instrument Name	Sea-Bird SBE-4 Conductivity Sensor
Generic Instrument Description	The Sea-Bird SBE-4 conductivity sensor is a modular, self-contained instrument that measures conductivity from 0 to 7 Siemens/meter. The sensors (Version 2; S/N 2000 and higher) have electrically isolated power circuits and optically coupled outputs to eliminate any possibility of noise and corrosion caused by ground loops. The sensing element is a cylindrical, flow-through, borosilicate glass cell with three internal platinum electrodes. Because the outer electrodes are connected together, electric fields are confined inside the cell, making the measured resistance (and instrument calibration) independent of calibration bath size or proximity to protective cages or other objects.

Dataset-specific Instrument Name	Transmissometer (Wet Labs) C-Star
Generic Instrument Name	Transmissometer
Generic Instrument Description	A transmissometer measures the beam attenuation coefficient of the lightsource over the instrument's path-length. This instrument designation is used when specific manufacturer, make and model are not known.

Dataset-specific Instrument Name	Reversing Thermometer (Seabird) SBE 35RT
Generic Instrument Name	Water Temperature Sensor
Generic Instrument Description	General term for an instrument that measures the temperature of the water with which it is in contact (thermometer).

Dataset-specific Instrument Name	Temperature profiler (Seabird) SBE 3F (and 3+ secondary unit)
Generic Instrument Name	Water Temperature Sensor
Generic Instrument Description	General term for an instrument that measures the temperature of the water with which it is in contact (thermometer).

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Deployments

AE2207

Website	https://www.bco-dmo.org/deployment/873946
Platform	R/V Atlantic Explorer
Start Date	2022-04-22
End Date	2022-04-27
Description	See additional cruise information at the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/AE2207

Project Information

Collaborative Research: Inferring Cellular Lysis and Regeneration of Organic Matter by Marine Viruses (InVirT)

Coverage: Bermuda Atlantic Time Series

NSF Award Abstract:

Viral infections of marine microbes can transform the fate of microbial populations that fuel global ocean biogeochemical cycles. For example, viral infections of microbes lead to the release of carbon and nutrients back into the environment. This regeneration of carbon and nutrients stimulates the activity of other microbes and diverts carbon and nutrients from larger organisms in marine food webs. Because virus-microbe infections are relatively specific, it is critical to identify those pairs of viruses and microbes that may disproportionately contribute to the turnover of carbon and nutrients in the ocean. This project will develop quantitative approaches and tools to quantify which viruses infect which microbes and to use these data to quantify how viral infections of microbes collectively shape nutrient and carbon cycles in the North Atlantic Ocean. The project will analyze virus-microbe interactions in mesocosms at the Bigelow Laboratory for Ocean Sciences in mid-coast Maine and during open ocean expeditions to the Bermuda Atlantic Time-Series Study (BATS) site. An interdisciplinary team will leverage recent advances in molecular biology, computational biology, and mathematical modeling to identify virus-host partners and their impact on the movement of elements through marine systems. This project will support three graduate students, six undergraduate students and one postdoctoral researcher in an interdisciplinary context. Research advances will be translated into reproducible software methods to be disseminated via the community cyberinfrastructure platform iVirus, with additional training materials presented as part of a viral methods and informatics workshop held at The Ohio State University. The translation of discoveries to the public will be furthered by the involvement of journalism undergraduate students at the University of Tennessee-Knoxville.

This project builds upon advances in the molecular toolkit of viromics to develop an integrated approach to characterize lineage-specific rates of infection, lysis, and nutrient release induced by marine viruses in open ocean ecosystems. It will combine theory, in vitro experiments, and in situ sampling to (i) extend a robust inference method for estimating virus-microbe cross-infection networks from time-series data; (ii) establish and characterize in-vitro protocols for inferring cross-infectivity in complex communities using culture-independent methods; (iii) estimate lineage-specific rates of lysis and regeneration of nutrients in marine systems, including applications to coastal and open ocean ecosystems. Project aims focus on quantifying the extent to which virus-induced lysis and regeneration of carbon and nutrients is heterogeneously distributed across microbial populations. To do so, the project will incorporate time series measurements of abundance information (via metagenomes) and activity information (via metatranscriptomes). In so doing, it will advance efforts to understand community-scale interactions rather than those amongst a single virus-host pair. Theoretical methods and in vitro protocols will directly infer lineage-specific infection, lysis, and nutrient release rates in coastal- and open-ocean ecosystems in the North Atlantic Ocean. Results will be used to identify key links that disproportionately influence bulk nutrient release. A novel PCR-based approach will augment and validate the core inference approach. Overall, the project aims to enhance our understanding of how viruses contribute to marine ecosystem function.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1829636
NSF Division of Ocean Sciences (NSF OCE)	OCE-1829640
NSF Division of Ocean Sciences (NSF OCE)	OCE-1829641

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