CTD Depth Profile Cast Data for the InVirT-2019-BATS (Bermuda Atlantic Time Series) project taken in the on board of the R/V Atlantic Explorer AE1926 in 2019.

Website: https://www.bco-dmo.org/dataset/835593
Data Type: Cruise Results
Version: 1
Version Date: 2021-08-23

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

Contributors	Affiliation	Role
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Abstract
CTD Depth Profile Cast Data for the InVirT-2019-BATS (Bermuda Atlantic Time Series) project taken in the on board of the R/V Atlantic Explorer AE1926 in 2019.

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Coverage

Spatial Extent: **N**:31.827679 **E**:0.4904 **S**:0.0147 **W**:-64.38645
Temporal Extent: 2019-10-12 - 2019-10-17

Methods & Sampling

CTD casts were performed using the ships CTD rosette every 4 hours to survey the water column down to a depth of 500 meters.

The CTD used for this study had redundant/ replicate sensors for measuring many of the parameters.

Data Processing Description

The data is converted from its raw form using the “convert” program in the SBEDataProcessing software. The data then got binned based on depth with a bin size of 1 using the “Bin Average” program within the same software suite. BCO-DMO processing notes: * Did not serve cast InVirTC1 (test cast) * Removed PAR and SPAR columns due to uncertain values * Renamed fields to comply with database requirements * Joined CTD files with dates

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Data Files

File
ctd.csv (Comma Separated Values (.csv), 5.84 MB) MD5:4b04b2ff888f7d38c6ce48bf3bc07dfe Primary data file for dataset ID 835593

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Parameters

Parameter	Description	Units
Cast_ID	ID of the CTD cast	unitless
ISO_DateTime_UTC	Start time of CTD cast in ISO format (yyyy-mm-ddThh-dd-tt) in UTC timezone.	unitless
CStarTr0	Beam Transmission	percentage (%)
Conductivity_0	Conductivity	siemens per meters (S/m)
Conductivity_1	Conductivity	siemens per meters (S/m)
Density_1	Density	kilograms per cubic meters (kg/m^3)
Density_2	Density	kilograms per cubic meters (kg/m^3)
Depth	Depth	meters (m)
Descent_Rate	Descent Rate	meters per seconds (m/s)
Fluoresence_1	Fluoresence, Chelsea Aqua 3 Chl Con	micrograms per liters (ug/l)
Fluoresence_2	Fluorescence, WET Labs ECO-AFL/FL	miligrams per cubic meters (mg/m^3)
Latitude	Latitude, south is negative	decimal degrees
Longitude	Longitude, west is negative	decimal degrees
Oxygen_Raw_1	Raw oxygen	Volts (V)
Oxygen_Raw_2	Raw oxygen, 2	Volts (V)
Oxygen_1	Oxygen	milligrams per liters (mg/l)
Oxygen_2	Oxygen, 2	milligrams per liters (mg/l)
Pressure	Pressure	dB
Salinity_1	Practical salinity	PSU
Salinity_2	Practical salinity	PSU
Temperature_ITS_1	Water temperature	degrees Celsius (°C), International Temperature Scale - 1990
Temperature_IPTS_1	Water temperature	degrees Celsius (°C)
Temperature_ITS_2	Water temperature	degrees Celsius (°C), International Temperature Scale - 1990
Temperature_IPTS_2	Water temperature	degrees Celsius (°C)
CStarAt0	Beam Transmission	percentage (%)

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Instruments

Dataset-specific Instrument Name	Seabird SBE 9plus
Generic Instrument Name	CTD Sea-Bird
Dataset-specific Description	Seabird SBE 9plus
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	SPAR
Generic Instrument Name	LI-COR Biospherical PAR Sensor
Dataset-specific Description	Surface PAR sensor. The SPAR sensor is typically mounted on the ship and does not submerge with the CTD.
Generic Instrument Description	The LI-COR Biospherical PAR Sensor is used to measure Photosynthetically Available Radiation (PAR) in the water column. This instrument designation is used when specific make and model are not known.

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Deployments

AE1926

Website	https://www.bco-dmo.org/deployment/835755
Platform	R/V Atlantic Explorer
Start Date	2019-10-12
End Date	2019-10-17
Description	More cruise information is available from Rolling Deck to Repository (R2R): * https://www.rvdata.us/search/cruise/AE1926 * https://doi.org/10.7284/908733

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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 disproportionally 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.

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Funding

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

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