Pacific Ocean Viral Line P metagenomes with depth, temperature and oxygen from CCGS John P. Tully JPT_2009-03, JPT_2009-09, JPT_2009-10 along Line P, eastern N. Pacific off British Columbia from Jan.-Aug.2009 (ENP viral community project)

Website: https://www.bco-dmo.org/dataset/529107
Data Type: Cruise Results
Version: 2014-09-26

Project
» Targeted and comparative viral community genomics of the Eastern North Pacific (ENP viral community)

Program
» Line P (Line P)

Contributors	Affiliation	Role
Sullivan, Matthew	University of Arizona (UA)	Principal Investigator
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Dataset Description

This dataset includes metadata for virus metagenome samples from the Line P transect, an Eastern North Pacific Ocean transect from Vancouver to Ocean Station Papa sampling at 10 to 2000 meters at stations P4 (48 N, 126W), P12 (48N, 130W), and P26 (50N, 144W).

All metagenomic sequences used in the analysis are available at CAMERA under the project accessions: CAM_P_0000915. http://camera.crbs.ucsd.edu/projects/details.php?id=CAM_P_0000915 "Pacific Ocean Virus (POV) Protein Clusters.

Relevant References:

Hurwitz, B.L., & Sullivan, M.B. (2013). The Pacific Ocean Virome (POV): A marine viral metagenomic dataset and associated protein clusters for quantitative viral ecology. PLoS One. 8(2), e57355. doi:10.1371/journal.pone.0057355.

Hurwitz, B.L., Hallam, S.J., & Sullivan, M.B. (2013). Metabolic reprogramming by viruses in the sunlit and dark ocean. Genome Biol. 14:R123. doi:10.1186/gb-2013-14-11-r123.

Hurwitz, B.L., Brum, J.R., & Sullivan, M.B. (2014). Depth-stratified functional and taxonomic niche specialization in the 'core' and 'flexible' Pacific Ocean Virome. ISME J. doi:10.1038/ismej.2014.143.

Hurwitz, B.L., Westveld, A.H., Brum, J.R., & Sullivan, M.B. (2014). Modeling ecological drivers in marine viral communities using comparative metagenomics and network analyses. PNAS. doi:10.1073/pnas.1319778111.

Methods & Sampling

See "Chemical Precipitation Method for Obtaining Viruses from Seawater" (pdf)

Data Processing Description

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date, reference information
- renamed parameters to BCO-DMO standard
- reformated date from m/d/yyyy to yyyy-mm-dd
- removed spaces and special characters
- sorted by date and depth
- removed columns that were all the same: country (Canada), habitat type (marine), region (eastern N. Pacific (ENP):nr. Vancouver Is.,British Columbia), sample type (virus), protocol (FeCl-Dnase-CsCl), min. filter size (0.2 um)

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Data Files

File
virus_metagen_v2.csv (Comma Separated Values (.csv), 1.67 KB) MD5:d811088b624b4330c2595cce08386073 Primary data file for dataset ID 529107

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Parameters

Parameter	Description	Units
library	CAMERA repository library name	unitless
site	collection site name	unitless
temp	temperature	degrees Celsius
depth	depth	meters
O2	oxygen concentration	milliliters/liter
date_coll	date of collection	yyyy-mm-dd
lon	latitude; north is positive	decimal degrees
lat	longitude; east is positive	decimal degrees
site_descrip	description of collection site	unitless

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Instruments

Dataset-specific Instrument Name	SBE-43 DO
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 the manufacturer: https://www.seabird.com/products/sbe-43-dissolved-oxygen-sensor

Dataset-specific Instrument Name	CTD SBE 911plus
Generic Instrument Name	Sea-Bird SBE 911plus CTD
Dataset-specific Description	Mounted in a rosette
Generic Instrument Description	[tethered, real-time] 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

JPT_2009-03

Website	https://www.bco-dmo.org/deployment/529644
Platform	CCGS John P. Tully
Report	http://dmoserv3.whoi.edu/data_docs/ENP_viral_community/cruise_reports/Tully_2009-03_cruise_report.pdf
Start Date	2009-01-27
End Date	2009-02-10
Description	**Methods & Sampling** The data url links to the whole dataset, not just the data for this cruise.

JPT_2009-09

Website	https://www.bco-dmo.org/deployment/529648
Platform	CCGS John P. Tully
Report	http://dmoserv3.whoi.edu/data_docs/ENP_viral_community/cruise_reports/Tully_2009-09_cruise_report.pdf
Start Date	2009-06-06
End Date	2009-06-23
Description	**Methods & Sampling** The data url links to the whole dataset, not just the data for this cruise.

JPT_2009-10

Website	https://www.bco-dmo.org/deployment/529654
Platform	CCGS John P. Tully
Report	http://dmoserv3.whoi.edu/data_docs/ENP_viral_community/cruise_reports/Tully_2009-10_cruise_report.pdf
Start Date	2009-08-18
End Date	2009-09-04
Description	**Methods & Sampling** The data url links to the whole dataset, not just the data for this cruise

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Project Information

Targeted and comparative viral community genomics of the Eastern North Pacific (ENP viral community)

Coverage: Eastern North Pacific Ocean transect from Vancouver to Ocean Station Papa

Description from NSF award abstract:
Two climatically and biogeochemically important features characterize the Eastern North Pacific (ENP). This region encompasses one of the planet's largest oxygen minimum zones, and annually hosts a phytoplankton bloom that leads to some of the highest dimethyl sulfide (DMS) concentrations observed. Oxygen minimum zones (OMZs) play integral roles in marine biogeochemical cycles, as major sinks for nitrogen and sources for climatologically active trace gases including methane and nitrous oxide. There is increasing evidence that projected ocean warming and circulation changes is decreasing dissolved oxygen concentrations within the coastal and interior regions of the ENP, causing lateral and vertical OMZ expansion. This will have a direct effect on coastal benthic ecosystems and the productivity of marine fisheries, as well as potentially positive climatalogical feedbacks. In addition, the DMS produced in the ENP is a potential negative feedback for atmospheric warming through its role in atmospheric cloud formation, while it also accounts for approximately half of the planet's total biogenic sulfur flux.

The PI of this project has collaborated with Dr. Steven Hallam (UBC) since June 2008 to archive viral community DNA, paired with high molecular weight genomic DNA from microbial biomass (since June 2006) and a rich synoptic oceanographic metadataset, along defined redox gradients in the ENP as part of the Canadian-funded Line P time series program. The viral samples focus on open-ocean station OSP and span surface waters, hypoxic interior, and upper and lower oxichypoxic transition zones. Microbial investigations, ongoing since 2006, have examined community diversity and population structure of indigenous microbial groups in the ENP. Time-series analyses have revealed dynamic seasonal changes, consistent with changing light, temperature, and nutrient conditions. However, little is known about the role that co-occurring viral communities play in modulating microbial community dynamics and responses to both water column hypoxia and massive DMS production and sulfur cycling. Marine viruses are responsible for the largest flux of carbon in the oceans by lysing microbial cells, while also encoding "host" metabolic genes. In the case of marine cyanobacteria, phage directly impact global carbon cycling by encoding ~60% of the core reaction center genes in surface water photosystems. Understanding coupled viral, microbiological and biogeochemical processes the ENP is critical to understand, predict, or one day possibly mitigate changes in productivity and trace gas cycling associated with OMZ expansion and changing DMS production.

This project will investigate viral community diversity and metabolic capacity through viral metagenomes sampled along defined spatiotemporal gradients in the ENP. The endeavor is highly leveraged with funding already secured for sequencing 20 viral metagenomes, and their co-occurring microbial communities at high phylogenetic resolution using 16S hypervariable sequence tagging through the DOE JGI Community Sequencing Program and the Moore Foundation viral sequencing initiative. This project will identify relevant patterns of viral-host interaction with profound ecological and evolutionary consequences.

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Program Information

Line P (Line P)

Website: http://www.pac.dfo-mpo.gc.ca/science/oceans/data-donnees/line-p/index-eng.html

Coverage: Eastern sub-Arctic Pacific

Excerpt from: Canadian Data Report of Hydrography and Ocean Sciences No. 107. 1992

An Update of the Statistics of Hydrographic/CTD Data taken at Ocean Station P (May 1956-September 1990)

by S. Tabata and W.E. Weichselbaumer Institute of Ocean Sciences, Department of Fisheries and Oceans, Sidney, B.C. V8L 4B2

Introduction

In recent years the importance of the oceans to global climatic changes has been given much attention and consequently the study of the ocean climatology has received major consideration in global climate studies. Interest in large-scale oceanographic events and general ocean circulation is more widespread than ever before. This shift in interest has necessitated the requirement for examining the ocean within a greater time frame. However, long ocean time series data needed for such a study are not readily available. Ocean Station P (50 00°N, 145 00°W, depth 4220 meters) was operated as an ocean weather station from 19 December, 1949 through 20 June, 1981. The first oceanographic observation there, in the form of a bathythermograph cast, was made on 19 December, 1949 (Leipper et al., 1954). In view of the importance of long ocean time series the observations at Station P and Line P were continued, although at much less frequent intervals than in the past, after the withdrawal of the weatherships in June 1981. The observations are carried out mainly by the staff of the Institute of Ocean Sciences using, to a large measure, their own ships. The present ship schedule permits only 3 to 4 cruises there per year. The statistics of representative oceanographic data for Station P and Line P, based on oceanographic observations made during August 1956 through June 1981 by the Canadian weatherships, have been published previously (Tabata and Peart,1985a, 1985b, 1986). Since then observations have continued there to this day.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0961947

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