Environmental data, nutrients, and leucine and thymidine bacterial production from samples collected by CTD during cruises in the San Pedro Channel on R/V Yellowfin from 2005 to 2018

Website: https://www.bco-dmo.org/dataset/885939
Data Type: Cruise Results
Version: 1
Version Date: 2022-12-29

Project
» Protistan, prokaryotic, and viral processes at the San Pedro Ocean Time-series (SPOT)

Contributors	Affiliation	Role
Fuhrman, Jed A.	University of Southern California (USC)	Principal Investigator
Yeh, Yi-Chun	University of Southern California (USC)	Scientist
Furtado, Laura	University of Southern California (USC)	Technician
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
This dataset includes temperature, oxygen, and fluorescence were recorded by a Seabird Scientific SBE25plus Sealogger CTD during San Pedro Ocean Time-series (SPOT) cruises from 2005 to 2018. Nutrient variables include nitrite, nitrate, and phosphate. Satellite sea surface temperature, chlorophyll-a concentration, and surface productivity estimates were downloaded from the NOAA Coastwatch browser website. Leucine and thymidine bacterial production data are also included.

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Coverage

Spatial Extent: **Lat**:33.33 **Lon**:-118.24
Temporal Extent: 2005-01-19 - 2018-07-18

Methods & Sampling

Monthly San Pedro Ocean Time-series (SPOT) cruises on R/V Yellowfin were conducted in the San Pedro Channel, off the coast of Los Angeles, California, USA (33 N, 118 W). Variables including temperature, oxygen, and fluorescence were recorded by a Seabird Scientific SBE25plus Sealogger CTD at the time of sample collection. Nutrient variables including nitrite, nitrate, and phosphate were analyzed by MSI Analytical Lab at the University of California Santa Barbara. Satellite sea surface temperature, chlorophyll-a concentration, and surface productivity estimates were downloaded from the NOAA Coastwatch browser website. Leucine and thymidine bacterial production assays were performed by incubating seawater with H3-tagged leucine or thymidine for one hour, killing with trichloroacetic acid, filtered onto a 0.45 µm MCE filter (EMD Millipore

HAWP02500). Activity on the filters is measured using a liquid scintillation counter (Beckman Coulter LS6500), and then the rate of uptake is used to calculate bacterial cells per milliliter of each sample.

Data Processing Description

BCO-DMO Processing:
- converted dates to YYYY-MM-DD format;
- replaced "No data" with "nd".

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Data Files

File
environmental_2005-18.csv (Comma Separated Values (.csv), 99.67 KB) MD5:b2306357503ab26267e938b37a3428e4 Primary data file for dataset ID 885939

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Parameters

Parameter	Description	Units
Date	Day of collection	unitless
DepthBin	Bin category corresponding to targeted sampling depths. DCM is Deep Chlorophyll Maximum, which varies depending on environmental conditions.	unitless
depth	Actual depth sampled for given DepthBin	meters (m)
CTDTemp	Temperature as recorded by onboard CTD	degrees Celsius
CTDSal	Salinity as recorded by onboard CTD	PSU
CTDOxy	Oxygen concentration as recorded by onboard CTD	milliliters per liter (ml/L)
CTDFlu	Chlorophyll fluorescence as recorded by onboard CTD	milligrams per cubic meter (mg/m^3)
NO2NO3	Total nitrate and nitrite	micromolar (uM)
PO4	Phosphate	micromolar (uM)

ChlMo	Satellite-observed monthly average chlorophyll-a concentration	milligrams per cubic meter (mg/m^3)
Chl8day	Satellite-observed 8-day average chlorophyll-a concentration	milligrams per cubic meter (mg/m^3)
MEI	Multivariate ENSO index	unitless
SST	Satellite-observed monthly average sea surface temperature	degrees Celsius
PP	Satellite-observed monthly average primary productivity	milligrams carbon per square meter per day (mg C/m^2/day)
mean_Leu	Mean cell/mL/day based on leucine uptake	cells per milliliter per day (cell/ml/day)
sd_Leu	Standard deviation for leucine uptake assay in cells/mL/day	cells per milliliter per day (cell/ml/day)
mean_Thy	Mean cell/mL/day based on thymidine uptake	cells per milliliter per day (cell/ml/day)
sd_Thy	Standard deviation for thymidine uptake assay in cells/mL/day	cells per milliliter per day (cell/ml/day)

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Instruments

Dataset-specific Instrument Name	Beckman Coulter LS6500
Generic Instrument Name	Liquid Scintillation Counter
Generic Instrument Description	Liquid scintillation counting is an analytical technique which is defined by the incorporation of the radiolabeled analyte into uniform distribution with a liquid chemical medium capable of converting the kinetic energy of nuclear emissions into light energy. Although the liquid scintillation counter is a sophisticated laboratory counting system used the quantify the activity of particulate emitting (ß and a) radioactive samples, it can also detect the auger electrons emitted from 51Cr and 125I samples. Liquid scintillation counters are instruments assaying alpha and beta radiation by quantitative detection of visible light produced by the passage of rays or particles through a suitable scintillant incorporated into the sample.

Dataset-specific Instrument Name	Seabird Scientific SBE25plus Sealogger CTD
Generic Instrument Name	Sea-Bird SBE 25 Sealogger CTD
Dataset-specific Description	Serial Number 0251231
Generic Instrument Description	The Sea-Bird SBE 25 SEALOGGER CTD is battery powered and is typically used to record data in memory, eliminating the need for a large vessel, electrical sea cable, and on-board computer. All SBE 25s can also operate in real-time, transmitting data via an opto-isolated RS-232 serial port. Temperature and conductivity are measured by the SBE 3F Temperature sensor and SBE 4 Conductivity sensor (same as those used on the premium SBE 9plus CTD). The SBE 25 also includes the SBE 5P (plastic) or 5T (titanium) Submersible Pump and TC Duct. The pump-controlled, TC-ducted flow configuration significantly reduces salinity spiking caused by ship heave, and in calm waters allows slower descent rates for improved resolution of water column features. Pressure is measured by the modular SBE 29 Temperature Compensated Strain-Gauge Pressure sensor (available in eight depth ranges to suit the operating depth requirement). The SBE 25's modular design makes it easy to configure in the field for a wide range of auxiliary sensors, including optional dissolved oxygen (SBE 43), pH (SBE 18 or SBE 27), fluorescence, transmissivity, PAR, and optical backscatter sensors. More information from Sea-Bird Electronics: http:www.seabird.com.

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Deployments

SPOT_Yellowfin_Cruises

Website	https://www.bco-dmo.org/deployment/754348
Platform	R/V Yellowfin
Start Date	2005-01-19
End Date	2018-07-18
Description	San Pedro Ocean Time Series (SPOT) station (33°33′N, 118°24′W) R/V Yellowfin, monthly SPOT cruises in the San Pedro Channel Deployment: SPOT Platform: RV Yellowfin Platform Type: vessel

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Project Information

Protistan, prokaryotic, and viral processes at the San Pedro Ocean Time-series (SPOT)

Coverage: San Pedro Channel off the coast of Los Angeles

Planktonic marine microbial communities consist of a diverse collection of bacteria, archaea, viruses, protists (phytoplankton and protozoa) and small animals (metazoan). Collectively, these species are responsible for virtually all marine pelagic primary production where they form the basis of food webs and carry out a large fraction of respiratory processes. Microbial interactions include the traditional role of predation, but recent research recognizes the importance of parasitism, symbiosis and viral infection. Characterizing the response of pelagic microbial communities and processes to environmental influences is fundamental to understanding

and modeling carbon flow and energy utilization in the ocean, but very few studies have attempted to study all of these assemblages in the same study. This project is comprised of long-term (monthly) and short-term (daily) sampling at the San Pedro Ocean Time-series (SPOT) site. Analysis of the resulting datasets investigates co-occurrence patterns of microbial taxa (e.g. protist-virus and protist-prokaryote interactions, both positive and negative) indicating which species consistently co-occur and potentially interact, followed by examination gene expression to help define the underlying mechanisms. This study augments 20 years of baseline studies of microbial abundance, diversity, rates at the site, and will enable detection of low-frequency changes in composition and potential ecological interactions among microbes, and their responses to changing environmental forcing factors. These responses have important consequences for higher trophic levels and ocean-atmosphere feedbacks. The broader impacts of this project include training graduate and undergraduate students, providing local high school student with summer lab experiences, and PI presentations at local K-12 schools, museums, aquaria and informal learning centers in the region. Additionally, the PIs advise at the local, county and state level regarding coastal marine water quality.

This research project is unique in that it is a holistic study (including all microbes from viruses to small metazoa) of microbial species diversity and ecological activities, carried out at the SPOT site off the coast of southern California. In studying all microbes simultaneously, this work aims to identify important ecological interactions among microbial species, and identify the basis(es) for those interactions. This research involves (1) extensive analyses of prokaryote (archaean and bacterial) and eukaryote (protistan and micro-metazoan) diversity via the sequencing of marker genes, (2) studies of whole-community gene expression by eukaryotes and prokaryotes in order to identify key functional characteristics of microorganismal groups and the detection of active viral infections, and (3) metagenomic analysis of viruses and bacteria to aid interpretation of transcriptomic analyses using genome-encoded information. The project includes exploratory metatranscriptomic analysis of poorly-understood aphotic and hypoxic-zone protists, to examine their stratification, functions and hypothesized prokaryotic symbioses.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1737409
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