# Microbial cell counts in seawater samples collected on R/V Nerissa and R/V Yellowfin cruises at the San Pedro Ocean Time-series (SPOT) in 2017

**Website**: https://www.bco-dmo.org/dataset/827826
**Data Type**: Cruise Results
**Version**: 1
**Version Date**: 2020-10-28

**Project**
» The role of organic and metal cofactors on the biogenic synthesis of halogenated volatile hydrocarbons (Volatile_Hydrocarbons)

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|---|---|---|
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**Abstract**
This dataset contains microbial cell counts in seawater samples collected on R/V Nerissa and R/V Yellowfin cruises at the San Pedro Ocean Time-series (SPOT) in 2017. Samples for microbial cell counts were collected at six depths within the euphotic zone using Niskin bottles. Autotrophic picoplankton (Prochlorococcus, Synechococcus, and picoeukaryotes) and heterotrophic prokaryotes were enumerated by flow cytometry.

## Table of Contents



## Coverage

**Spatial Extent**: **Lat**:33.55 **Lon**:-118.4
**Temporal Extent**: 2017-03-15 - 2017-12-15

### Methods & Sampling

Samples for microbial cell counts were collected at six depths within the euphotic zone (5-250 m). Seawater was collected from each CTD depth using Niskin bottles, immediately fixed with formalin 2% (0.72% formaldehyde final concentration), and immediately frozen at -80C. Autotrophic picoplankton (Prochlorococcus, Synechococcus, and picoeukaryotes) and heterotrophic prokaryotes were enumerated by flow cytometry (Becton Dickinson FACSCalibur) (Gasol and del Giorgio, 2000).

### Data Processing Description

The flow cytometry data were analyzed and processed using BD FACStation software from Becton Dickinson.

[ table of contents | back to top ]

## Data Files

| File |
| --- |
| **SPOT_cell_counts.csv** (Comma Separated Values (.csv), 5.29 KB) MD5:56b1ec297171720b8aa05f3b4d750bb7<br>Primary data file for dataset ID 827826 |

[ table of contents | back to top ]

## Related Publications

Gasol, J. M., & Del Giorgio, P. A. (2000). Using flow cytometry for counting natural planktonic bacteria and understanding the structure of planktonic bacterial communities. Scientia Marina, 64(2), 197–224. doi:10.3989/scimar.2000.64n2197
*Methods*

[ table of contents | back to top ]

## Parameters

| Parameter | Description | Units |
|---|---|---|
| Cruise | Cruise name, month, and year | unitless |
| Date | Date; format: YYYY-MM-DD | unitless |
| Time_Start | Start time; format: hh:mm | unitless |
| Time_End | End time; format: hh:mm | unitless |
| Longitude | Longitude | degrees East |
| Latitude | Latitude | degrees North |
| Depth | Depth | meters (m) |
| HNA_bacteria | Number of high nucleic acid content bacterial cells per milliliter of seawater measured with Flow Cytometry | cells per milliter (cell ml-1) |
| LNA_bacteria | Number of low nucleic acid content bacterial cells per milliliter of seawater measured with Flow Cytometry | cells per milliter (cell ml-1) |
| Total_Bacteria | Number of total bacteria (high + low nucleic acid content) per milliliter of seawater measured with Flow Cytometry | cells per milliter (cell ml-1) |
| Pro | Number of Prochlorococcus cells per milliliter of seawater measured with Flow Cytometry | cells per milliter (cell ml-1) |
| Syn | Number of Synechococcus cells (regular fluorescence) per milliliter of seawater measured with Flow Cytometry | cells per milliter (cell ml-1) |
| Syn_HighF | Number of Synechococcus cells (high fluorescence) per milliliter of seawater measured with Flow Cytometry | picomoles per liter (pico mol L-1) |
| Syn_total | Number of Synechococcus cells (regular fluorescence + high fluorescence) per milliliter of seawater measured with Flow Cytometry | picomoles per liter (pico mol L-1) |
| Pico_small | Number of small picoeukaryotic cells per milliliter of seawater measured with Flow Cytometry | picomoles per liter (pico mol L-1) |
| Pico_large | Number of large picoeukaryotic cells per milliliter of seawater measured with Flow Cytometry | picomoles per liter (pico mol L-1) |
| Pico_total | Number of total picoeukaryotic cells (small + large) per milliliter of seawater measured with Flow Cytometry | picomoles per liter (pico mol L-1) |
| Nano | Number of total nanophytoplanktonic cells per milliliter of seawater measured with Flow Cytometry | picomoles per liter (pico mol L-1) |

[ table of contents | back to top ]

## Instruments

| | |
|---|---|
| **Dataset-specific Instrument Name** | Becton Dickinson FACSCalibur |
| **Generic Instrument Name** | Flow Cytometer |
| **Dataset-specific Description** | Autotrophic picoplankton (Prochlorococcus, Synechococcus, and picoeukaryotes) and heterotrophic prokaryotes were enumerated by flow cytometry (Becton Dickinson FACSCalibur). |
| **Generic Instrument Description** | Flow cytometers (FC or FCM) are automated instruments that quantitate properties of single cells, one cell at a time. They can measure cell size, cell granularity, the amounts of cell components such as total DNA, newly synthesized DNA, gene expression as the amount messenger RNA for a particular gene, amounts of specific surface receptors, amounts of intracellular proteins, or transient signalling events in living cells. (from: http://www.bio.umass.edu/micro/immunology/facs542/facswhat.htm) |

| | |
|---|---|
| **Dataset-specific Instrument Name** | Niskin bottles |
| **Generic Instrument Name** | Niskin bottle |
| **Dataset-specific Description** | Seawater was collected from each CTD depth using Niskin bottles. |
| **Generic Instrument Description** | A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc. |

[ table of contents | back to top ]

## Deployments

**SPOT_Nerissa_Cruises_2017**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/754351 |
| **Platform** | R/V Nerissa |
| **Start Date** | 2017-03-15 |
| **End Date** | 2017-12-15 |
| **Description** | San Pedro Ocean Time Series (SPOT) station (33°33′N, 118°24′W) Deployment: SPOT Platform: RV Yellowfin and RV Nerissa Platform Type:  vessel Start Date: 03/15/2017 End Date: 12/15/2017 |

**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 |

[ table of contents | back to top ]

## Project Information

**The role of organic and metal cofactors on the biogenic synthesis of halogenated volatile hydrocarbons (Volatile_Hydrocarbons)**

*NSF Award Abstract:*
Volatile halogenated hydrocarbon gases, in this case halomethanes, are produced naturally by organisms in the ocean; which then serves as a source of these biogenic gases to the atmosphere. Their chemical reactions in the atmosphere are very similar to those of anthropogenic chlorofluorocarbons (CFCs). While CFCs are well-studied because they consume the ozone in the upper atmosphere that shields the earth from harmful ultraviolet radiation, halomethanes have been largely neglected, even though they currently account for 25% of the ozone depletion. As anthropogenic CFC levels steadily decline, however, halomethanes are predicted to account for 50% of ozone depletion by 2050. Based on limited study thus far, marine halomethane production has been ascribed mainly to phytoplankton and macro algae. This project will build on new and compelling data that suggests marine heterotrophic bacteria could also be major producers of halomethanes. The data produced here will provide the critical evaluation required to address discrepancies in global halomethane budgets which currently are out of balance due to an unknown source to the atmosphere, evaluating the hypothesis that marine heterotrophic bacteria can supply this missing source. Concerns over the stability of the earth's stratospheric ozone layer make this valuable and necessary research with added value of providing support for engaged undergraduate, graduate, and postdoctoral education at the University of Southern California.

Past research on the production of marine halomethanes has focused on phytoplankton and macro algae, while potential bacterial contributions to the processe have been neglected. This research proposes to study the role of marine heterotrophic bacteria on the production of halomethanes. It has been noted in past studies that there are discrepancies in the global atmospheric halomethane budget, and it is possible this is due to a large missing bacterial source. Additionally, this research will evaluate the potential importance of vitamin B12, methionine, and vanadium cofactors on the synthesis of halomethanes in bacteria. A large portion of marine bacteria cannot synthesize methylation co-enzymes, and therefore, would require available B12, methionine, and vanadium from external sources to complete the methylation step. This study will also measure concentrations of halomethanes, B12, methionine, and vanadium in upwelling regions as well as at a long-term time series site in order to put constraints on the variability of halomethanes concentrations for use in global linked air-sea models.

[ table of contents | back to top ]

## Funding

| Funding Source | Award |
|---|---|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-1559276 |

[ table of contents | back to top ]