

Sampling overview from R/V Roger Revelle cruise RR1507 in the Eastern Lau Spreading Center in 2015 (Functional microbial dynamics of vent deposits project)

Website: <https://www.bco-dmo.org/dataset/566965>

Data Type: Cruise Results

Version: 1

Version Date: 2015-09-21

Project

» [Geochemical effects on the functional microbial community dynamics of hydrothermal deposits along the Eastern Lau Spreading Center](#) (Functional microbial dynamics of vent deposits)

Contributors	Affiliation	Role
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Abstract

Sampling overview from R/V Roger Revelle cruise RR1507 in the Eastern Lau Spreading Center in 2015.

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Coverage

Spatial Extent: N:-20.0531712 E:-176.133725 S:-22.2157018 W:-176.6086121

Temporal Extent: 2015-04-26 - 2015-05-10

Dataset Description

Log of sampling events from RR1507 cruise.

Data Processing Description

BCO-DMO Processing:

- Modified parameter names to conform with BCO-DMO naming conventions.
- Replaced blanks (missing data) and N/A with 'nd' to indicate 'no data'.
- Replaced commas with semi-colons in the 'chemistry' column.
- Changed format of lat and lon to decimal degrees.
- Changed date format to yyyyymmdd.

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Data Files

File
sample_overview.csv (Comma Separated Values (.csv), 5.60 KB) MD5:9c2a41e481bcc8150992df9689f701aa Primary data file for dataset ID 566965

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Supplemental Files

File
J2-815 Dive vent field map filename: J2815c.png (Portable Network Graphics (.png), 344.08 KB) MD5:e5442beb8d7cfc8f06d2f3fd1e9b6dd1 J2-815 Dive vent field map
J2-819 Dive vent field map filename: J2819c.png (Portable Network Graphics (.png), 339.42 KB) MD5:0910cce66deb147b6f0e02af2a31773b J2-819 Dive vent field map
Mariner vent field map filename: MA2015c.png (Portable Network Graphics (.png), 494.84 KB) MD5:f5b7e2fbed41ab2ed11e854b16973929 Mariner vent field map

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Related Datasets

IsSupplementTo

Seewald, J. S. (2017) **Chemical composition of hydrothermal fluids collected on RV/Roger Revelle RR1507 in the Eastern Lau Spreading Center and Valu Fa Ridge, April-May 2015 (Functional microbial dynamics of vent deposits project)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2017-01-13 <http://lod.bco-dmo.org/id/dataset/674750> [[view at BCO-DMO](#)]

Seewald, J. S., Sievert, S. M. (2017) **Vent fluid chemistry from R/V Atlantis AT26-10 and AT26-23 in the East Pacific Rise, Pacific Ocean from 2013-2014 (Microbial Communities at Deep-Sea Vents project)**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2017-01-13 <http://lod.bco-dmo.org/id/dataset/674781> [[view at BCO-DMO](#)]

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Parameters

Parameter	Description	Units
sample	Sample identification number.	dimensionless
type	Description of sample type.	dimensionless
sub_type	Sample sub-type.	dimensionless
moleculer	Processed for DNA? Yes (+) or No (-)	dimensionless
culture	Processed for culturing? Yes (+) or No (-)	dimensionless
chemistry	Any end-member geochemical data? Yes (+) or No (-)	dimensionless
RNAlater	Is sample preserved in RNALater? Yes (+) or No (-)	dimensionless
bact_16S_rDNA	Was bacterial 16S rDNA detected by qPCR? Yes (+) or No (-)	dimensionless
arch_16S_rDNA	Was archaeal 16S rDNA detected by qPCR? Yes (+) or No (-)	dimensionless
mcrA	Was mcrA gene detected by qPCR? Yes (+) or No (-)	dimensionless
dsrB	Was dsrB gene detected by qPCR? Yes (+) or No (-)	dimensionless
ANME_1	Was ANME_1 16S rRNA gene detected by qPCR? Yes (+) or No (-)	dimensionless
date_collected	Year, month, day when sample was collected (UTC).	YYYYmmdd
lat	Latitude of sample collection.	decimal degrees
lon	Longitude of sample collection.	decimal degrees

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Instruments

Dataset-specific Instrument Name	ROV Jason
Generic Instrument Name	ROV Jason
Generic Instrument Description	<p>The Remotely Operated Vehicle (ROV) Jason is operated by the Deep Submergence Laboratory (DSL) at Woods Hole Oceanographic Institution (WHOI). WHOI engineers and scientists designed and built the ROV Jason to give scientists access to the seafloor that didn't require them leaving the deck of the ship. Jason is a two-body ROV system. A 10-kilometer (6-mile) fiber-optic cable delivers electrical power and commands from the ship through Medea and down to Jason, which then returns data and live video imagery. Medea serves as a shock absorber, buffering Jason from the movements of the ship, while providing lighting and a bird's eye view of the ROV during seafloor operations. During each dive (deployment of the ROV), Jason pilots and scientists work from a control room on the ship to monitor Jason's instruments and video while maneuvering the vehicle and optionally performing a variety of sampling activities. Jason is equipped with sonar imagers, water samplers, video and still cameras, and lighting gear. Jason's manipulator arms collect samples of rock, sediment, or marine life and place them in the vehicle's basket or on "elevator" platforms that float heavier loads to the surface. More information is available from the operator site at URL.</p>

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Deployments

RR1507

Website	https://www.bco-dmo.org/deployment/566757
Platform	R/V Roger Revelle
Report	http://dmoserv3.who.edu/data_docs/RR1507/RV1507report.pdf
Start Date	2015-04-21
End Date	2015-05-14
Description	The cruise goals were to collect samples to explore the following objectives: 1) Link geochemical and microbial dynamics along the ELSC 2) Use of metagenomic and transcriptomic data to explore biogeochemical cycles that are regulating the functional roles of the microbial communities in vent fields along the ELSC. 3) Use the metagenomic information to enrich for targeted novel Thermoprotei and acidophiles. Cruise RR1507 departed from Auckland, 21 April 2015, and arrived on site April, 24. Unfortunately, due to mainly weather related issues, almost 9 of the 15 planned sampling days with the Remotely Operated Vehicle (ROV), Jason, were lost. During the cruise, about 54 different vent deposits and about 27 (duplicate) hydrothermal fluid samples were collected for microbiological and geochemical investigations. ROV Jason Virtual Van for this cruise: http://4dgeo.who.edu/webdata/virtualvan/html/VV-rr1507/index.html

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Project Information

Geochemical effects on the functional microbial community dynamics of hydrothermal deposits along the Eastern Lau Spreading Center (Functional microbial dynamics of vent deposits)

Coverage: Eastern Lau Spreading Center

Extreme environmental gradients exist at deep-sea hydrothermal vents where high temperature, low pH and reduced fluids mix with cold oxygenated seawater. This results in a plethora of microbes taking advantage of abundantly available microniches. From small subunit (16S) rRNA gene surveys and directed enrichment culturing of vent deposits from many sites, patterns in diversity are emerging that suggest that geochemical processes, particularly those that affect fluid pH, play a fundamental role in regulating microbial diversity and community composition.

This is a three year study at vent fields along the Eastern Lau Spreading Center (ELSC) to investigate the relationship between vent geochemistry and microbial community dynamics. The ELSC was chosen because it provides large and systematic changes in fluid and rock geochemistry, spreading rate, magmatic/tectonic processes, and proximity to the volcanic arc over its relatively short length of 397 km. The individual vent fields therefore provide excellent natural laboratories for exploring, in depth, the factors that influence the diversity and relationships of microbial communities associated with actively forming deep-sea hydrothermal deposits. The study will be carried out at 3 geochemically different hydrothermal fields along the ELSC. The scientists will document microbial community composition and diversity associated with hydrothermal deposits from each area for comparison with data obtained in 2009 and 2005. The close proximity of these geochemically distinct vent areas within the ELSC provides an ideal opportunity to investigate the effect of vent fluid and deposit geochemistry on the structure and function of microbial communities, as well as the specific roles of individual populations, associated with active hydrothermal deposits. The investigators hypothesize that, given the extreme environmental characteristics (e.g., low fluid pH and high iron at Mariner), they will see distinct differences in the metagenomes and particularly in the metatranscriptomes among the Kilo Moana, ABE and Mariner vent fields.

The specific objectives are to:

- 1) Link geochemical and microbial dynamics along the ELSC (from 2005-2013);
- 2) Use of metagenomic and transcriptomic data to explore biogeochemical cycles that are regulating the functional roles of the microbial communities in vent fields along the ELSC; and
- 3) Use the metagenomic information to enrich for targeted novel Thermoprotei and acidophiles. Active hydrothermal metal sulfide deposits and fluid samples will be collected from the vent fields along the ELSC.

Bar-coded pyrosequencing of archaeal and bacterial 16S rRNA amplicons will be obtained for over eighty samples. The geochemical environment of the chimneys will be modeled to determine in situ geochemical conditions. These values will be used in statistical analyses to explore the factors affecting the observed differences in the communities. Using the 16S rRNA gene 454 pyrotags coupled with the geochemical characterization, specific samples will be selected for metagenomic and metatranscriptomic analyses (1-3 of each per site). The molecular information will be used to target specific samples that: (i) harbor novel unclassified diversity; (ii) have vent endemic lineages; and (iii) have acidophilic relatives from terrestrial systems, for enrichment culturing (using the geochemistry to help constrain culturing conditions).

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1235432
NSF Division of Ocean Sciences (NSF OCE)	OCE-1233037

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