Vent Fluid Sample Information and Fluid Composition from R/V Thomas G. Thompson TN253 in the NE Pacific Ocean, Juan de Fuca Ridge, Axial Seamount from August to September 2010 (AXIAL project)

Website: https://www.bco-dmo.org/dataset/515947
Version: 27 May 2014
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Project
» Function, activity, and adaptation of microbial communities in geochemically diverse subseafloor habitats (AXIAL)

Contributors	Affiliation	Role
Butterfield, David A.	University of Washington (UW)	Principal Investigator
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Dataset Description

Hydrothermal fluid chemistry from Axial Seamount collected by the JASON ROV system during R/V Thompson TN253 in August/2010

Methods & Sampling

(tbd)

Data Processing Description

BCO-DMO Processing Notes
Generated from original spreadsheet "Butterfield2010AxialSeamountFluidChemBCODMO.xlsx" contributed by David Butterfield

BCO-DMO Edits
- Parameter names edited to conform to BCO-DMO naming convention found at Choosing Parameter Name
- dates reformatted to YYYYMMDD
- times reformatted to HHMMSS
- J2[space]XXX[space]YYY converted to J2-XXX_YYY in SampleId
- "nd" (BCO_DMO flag for no data) added to blank cells
- Commas in fields converted to semi-colons
- Blank columns removed

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Parameters

Parameters for this dataset have not yet been identified

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Deployments

TN253

Website	https://www.bco-dmo.org/deployment/58138
Platform	R/V Thomas G. Thompson
Report	http://data.bco-dmo.org/AXIAL/nemo10-cruise-report.pdf
Start Date	2010-08-26
End Date	2010-09-07
Description	This expedition to Axial Seamount (Axial 2010 or TN"253) on R/V Thompson with ROV Jason (August 26 to September 7, 2010, Newport to Astoria) included two different but complimentary projects funded by the National Science Foundation. One project is continuing a decade"long time"series of pressure measurements at an array of seafloor benchmarks to measure volcanic inflation at Axial (Bill Chadwick and Scott Nooner, co"PIs). The other project is focused on coordinated fluid chemistry and microbiological sampling at hydrothermal vent sites utilizing new methods of sample collection and analysis (Julie Huber and Dave Butterfield, co"PIs). The cruise accomplished six Jason ROV dives, the first two for fluid sampling, followed by one long dive for the pressure measurements, and ending with three additional fluid"sampling dives. In between ROV dives, we deployed and recovered six instrumental moorings (4 ocean"bottom hydrophones (OBHs), 1 bottom pressure recorder (BPR), and 1 remote access fluid sampler (RAS)), deployed six new cement benchmarks to improve the repeatability of the pressure measurements, conducted three CTDs, and collected EM300 multibeam sonar bathymetric data. The expedition was very successful and all our goals were achieved, thanks to the combined efforts of the science party, the Jason team, and the ship's crew. Cruise information and original data are available from the NSF R2R data catalog.

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Project Information

Function, activity, and adaptation of microbial communities in geochemically diverse subseafloor habitats (AXIAL)

Website: http://www.pmel.noaa.gov/vents/index.html

Coverage: NE Pacific Ocean, Juan de Fuca Ridge, Axial Seamount

Collaborative Research: Function, activity, and adaptation of microbial communities in geochemically diverse subseafloor habitats

The integration of both laboratory and field-based chemical and microbiological measurements into a quantitative predictive framework is crucial to understanding the microbial ecology of marine systems. This project work will provide a quantitative assessment of the functional diversity, activity, and physiological adaptation of microbial communities in geochemically diverse subseafloor habitats. Results will guide development of models for linking biogeochemical processes with particular microbial communities at deep-sea hydrothermal vents, with implications for other marine habitats as well. The focus of the effort is at Axial Seamount, a well-studied, active, deep-sea hydrothermal seamount in the NE Pacific Ocean. Samples already

collected from Axial, along with a field program in Year 2, will serve as the foundation for the three objectives, which are to:

1. Determine and quantify the functional diversity and activity (expression) of key subseafloor microbial lineages at Axial Seamount.

2. Determine physiological adaptations to the subseafloor habitat by quantifying the growth response of Axial Seamount isolates to in-situ geochemical parameters.

3. Develop a quantitative predictive framework for linking particular types of geochemical vent conditions with specific microbial functional groups and activities at Axial Seamount.

Specific outcomes of this project include the creation of a comprehensive quantitative microbiological and chemical dataset on diffuse and adjacent high-temperature vents within Axial Seamount. This database will include chemical measurements (gases, nutrients, metals, isotopes, and calculated Gibbs free energies) relevant to microbial metabolic processes that can be compared to microbiological data (abundance and activity of microbial lineages and functional genes, growth rates of subseafloor isolates at relevant environmental conditions) using statistical analysis to identify how specific microbial activity is linked to the geochemical environment. This project builds on previous studies of microbial population structure and geochemical measurements at Axial Seamount and addresses critical gaps in current knowledge and understanding that are impeding progress of modeling hydrothermal systems. Results will increase understanding of deep-sea hydrothermal ecosystems as well as provide new insights into controls on the distribution and activity of marine microbial communities throughout the world's oceans.

NeMO10 TN253 Cruise Report

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0926199
NSF Division of Ocean Sciences (NSF OCE)	OCE-0929167

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