

CTD bottle data collected near the Axial Seamount on the Juan de Fuca Ridge on R/V Thomas G. Thompson TN327 in August 2015.

Website: <https://www.bco-dmo.org/dataset/728426>

Data Type: Cruise Results

Version: 1

Version Date: 2018-03-01

Project

» [Event response to an eruption at Axial Seamount](#) (NeMO2015)

Program

» [Ocean Observatories Initiative](#) (OOI)

Contributors	Affiliation	Role
Butterfield, David A.	National Oceanic and Atmospheric Administration (NOAA-PMEL)	Principal Investigator
Resing, Joseph A.	National Oceanic and Atmospheric Administration (NOAA-PMEL)	Co-Principal Investigator
Switzer, Megan	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Table of Contents

- [Coverage](#)
- [Dataset Description](#)
 - [Data Processing Description](#)
- [Data Files](#)
- [Related Publications](#)
- [Parameters](#)
- [Instruments](#)
- [Deployments](#)
- [Project Information](#)
- [Program Information](#)
- [Funding](#)

Coverage

Spatial Extent: N:46.9272 E:-129.7955 S:45.9173 W:-130.0217

Temporal Extent: 2015-08-15 - 2018-08-26

Dataset Description

Axial Seamount 2015 Niskin Sample Data for TN327. In addition to standard CTD instrument measurements, water samples were analyzed on board for methane and hydrogen concentration by D. Butterfield and B. Larson using an SRI 8610C gas chromatograph with flame ionization detector for CH₄ and pulsed discharge detector for H₂ as described in (Larson et al., 2015). Due to time constraints, only selected samples were analyzed.

Methane and hydrogen results are reported in nmol/L. Methane and hydrogen results have been published in (Spietz et al., 2018).

The full CTD data for the cruise is available from the R2R site: <http://www.rvdata.us/catalog/TN327>

Metadata is also available through the cruise report on the PMEL web site:

<https://www.pmel.noaa.gov/eoi/axial/2015/Axial2015-Cruise-Report-with-logs-revised.pdf>

Data Processing Description

BCO-DMO processing notes:

-Changed parameter names to BCO-DMO naming conventions

[[table of contents](#) | [back to top](#)]

Data Files

File
728426.csv (Comma Separated Values (.csv), 37.91 KB) MD5:a8dad4430750586442bdb416b4144ac4 Primary data file for dataset ID 728426

[[table of contents](#) | [back to top](#)]

Related Publications

Larson, B. I., Lang, S. Q., Lilley, M. D., Olson, E. J., Lupton, J. E., Nakamura, K., & Buck, N. J. (2015). Stealth export of hydrogen and methane from a low temperature serpentinization system. *Deep Sea Research Part II: Topical Studies in Oceanography*, 121, 233-245. doi:[10.1016/j.dsr2.2015.05.007](https://doi.org/10.1016/j.dsr2.2015.05.007)
Methods

Spietz, R., Butterfield, D., Buck, N., Larson, B., Chadwick, W., Walker, S., ... Morris, R. (2018). Deep-Sea Volcanic Eruptions Create Unique Chemical and Biological Linkages Between the Subsurface Lithosphere and the Oceanic Hydrosphere. *Oceanography*, 31(1), 128-135. doi:[10.5670/oceanog.2018.120](https://doi.org/10.5670/oceanog.2018.120)
Results

[[table of contents](#) | [back to top](#)]

Parameters

Parameter	Description	Units
Cruise_ID	Cruise number (for T.G. Thompson)	no units
Cast_type	Cast type (Vertical or Tow)	no units
Cast_name	Unique Cast ID# composed of V or T, 15A cruise identifier, NN number of vertical cast or tow for this cruise.	no units
Site_name	Descriptor of the cast site.	no units
Cast_number	Overall sequence number of CTD casts on this cruise.	number
Bottle_position	Niskin bottle position on CTD rosette.	no units
Niskin_number	Number on Niskin bottle (generally the same as bottle position).	no units
Date	UTC date when Niskin bottle was fired.	no units
Time	UTC time when Niskin bottle was fired.	no units
Press	Pressure in decibars.	decibars
Depth	Depth in meters.	meters
Temp	Temperature in degrees C.	degrees Celsius
Cond	Conductivity in Siemens per meter.	Siemens per meter

Sal	Salinity in practical salinity units.	practical salinity units (psu)
Theta	Potential temperature at sea surface in degrees C.	degrees Celsius
Sigma_theta	Potential density at sea surface in kg/m3.	kg/m3
O2_VO_volts	Oxygen sensor 1 output in volts.	volts
O2_V1_volts	Oxygen sensor 2 output in volts.	volts
ORP_V2	Oxygen redox potential sensor place holder (no data).	no units
Fluoro_V3	Fluorometer sensor place holder (no data).	no units
LSS_V4	Light scattering sensor output in volts.	volts
LSS_V5	Light scattering sensor output in volts.	volts
empty_V6	Meaningless data.	no units
Alt_V7	Altimeter output in volts.	volts
Alt_meters	Altitude reading in meters above seafloor.	meters
O2_V1_umol	Oxygen sensor 1 output in micromol/liter.	micromol/L
O2_V2_umol	Oxygen sensor 2 output in micromol/liter.	micromol/L
scan_number	Scan line number for individual CTD cast.	number
time_ctd	Time in CTD format (since 01/01/1970).	no units
ORP_03	Oxygen redox potential sensor output in millivolts.	millivolts
ORP_02	Oxygen redox potential sensor place holder (no data).	no units
dNTU_V4	LSS voltage V4 converted to dimensionless nephelometric turbidity units.	NTU
dNTU_V5	LSS voltage V5 converted to dimensionless nephelometric turbidity units.	NTU
Lon	Longitude in decimal degrees.	decimal degrees
Lat	Latitude in decimal degrees.	decimal degrees
CH4	Methane concentration in nanomol/liter from shipboard gas chromatography (published in Spietz et al. 2018 Oceanography).	nanomol/Liter
H2	Hydrogen concentration in nanomol/liter from shipboard gas chromatography (published in Spietz et al. 2018 Oceanography).	nanomol/Liter

[[table of contents](#) | [back to top](#)]

Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	CTD - profiler
Generic Instrument Description	The Conductivity, Temperature, Depth (CTD) unit is an integrated instrument package designed to measure the conductivity, temperature, and pressure (depth) of the water column. The instrument is lowered via cable through the water column. It permits scientists to observe the physical properties in real-time via a conducting cable, which is typically connected to a CTD to a deck unit and computer on a ship. The CTD is often configured with additional optional sensors including fluorometers, transmissometers and/or radiometers. It is often combined with a Rosette of water sampling bottles (e.g. Niskin, GO-FLO) for collecting discrete water samples during the cast. This term applies to profiling CTDs. For fixed CTDs, see https://www.bco-dmo.org/instrument/869934 .

[[table of contents](#) | [back to top](#)]

Deployments

TN327

Website	https://www.bco-dmo.org/deployment/664100
Platform	R/V Thomas G. Thompson
Start Date	2015-08-14
End Date	2015-08-29
Description	NOAA New Millennium Observatory (NeMO) 2015/Rapid Response to an Eruption

[[table of contents](#) | [back to top](#)]

Project Information

Event response to an eruption at Axial Seamount (NeMO2015)

Website: <http://axial2015.blogspot.com>

Coverage: Axial Seamount, Juan de Fuca Ridge, northeastern Pacific Ocean (46.06°N 130.00°W)

On 24 April 2015, the NSF-funded Ocean Observatories Initiative's (OOI) Cabled Array detected the onset of a probable eruption at Axial Seamount, heralded by a swarm of >8000 small earthquakes and a rapid subsidence of the seafloor by >2.4 meters at the center of the caldera. Evidence that lava was erupted in or near the summit caldera includes a dramatic temperature rise recorded by instruments on the OOI Cabled Array-- up to 0.6-0.7°C above ambient sustained for weeks after the event. This eruption is likely to have significantly perturbed the hydrothermal and biological systems in and around the summit caldera, and provides the rare opportunity to address time-critical scientific questions that can only be investigated with the near-term seafloor investigations. A currently scheduled NSF and NOAA funded cruise to Axial Seamount on R/V Thompson with ROV Jason and AUV Sentry in August 2015 provides an excellent opportunity for such a response. This study adds 3 days onto this cruise to facilitate time-critical event response science.

Detailed seafloor mapping with shipboard multi-beam sonar and near-bottom Sentry surveys will cover areas of the caldera and adjacent rift zones that are expected eruption site(s). Fresh rock, if located, will be sampled and dated using the ²¹⁰Po-²¹⁰Pb technique. Hydrothermal plumes will be discerned with CTD casts and sensor tows. A mooring will be deployed with Miniature Autonomous Plume Recorders to measure

temperature, light attenuation, and redox potential. The at-sea team plans to make samples and data available to the broader science community for targeted research on seafloor processes.

[[table of contents](#) | [back to top](#)]

Program Information

Ocean Observatories Initiative (OOI)

Website: <http://oceanobservatories.org/>

The Ocean Observatories Initiative (OOI) is a science-driven ocean observing network that delivers real-time data to address critical science questions regarding the world's oceans. Funded by the National Science Foundation to encourage scientific investigation, OOI data are freely available online to anyone with an Internet connection. OOI was designed as a long-term project to collect ocean data for up to 30 years. This longevity makes it possible to measure and directly observe both short-lived episodic events and longer-term changes occurring in the ocean. Such data make it possible to better understand ocean processes and how the ocean is changing.

The OOI has five active research arrays that comprise the three major observatory elements linked together by instrument, infrastructure, and information management systems. Global Ocean Arrays consist of moored arrays and autonomous vehicles that provide time-series observations and mesoscale spatial sampling at sparsely sampled, high-latitude regions critical to our understanding of climate, the carbon cycle, and ocean circulation. The Regional Cabled Array consists of fiber-optic cables off the Oregon coast that provide unprecedented power, bandwidth, and communication to seafloor instrumentation and profiler moorings, enabling monitoring of volcanic and hydrothermal activity, methane seeps, earthquakes, and myriad ocean processes in coastal and blue water environments. Coastal Arrays consist of cross-shelf moored arrays and autonomous vehicles that observe the dynamic coastal environment, enabling examination of upwelling, shelf break fronts, and cross-shelf exchanges.

These marine arrays are outfitted with more than 900 instruments — of 45 different types — measuring more than 200 different parameters. These instruments gather physical, chemical, geological, and biological data — from the air-sea interface to the seafloor. The data collected are transmitted through a cyberinfrastructure, an information management system that allows users to access real- to near real-time data from suites of sensors. The OOI provides annotations and automated quality control for data streams and is working to meet the IOOS Quality Assurance of Real Time Ocean Data (QARTOD) standards.

[[table of contents](#) | [back to top](#)]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1546695

[[table of contents](#) | [back to top](#)]