Data collected from Miniature Autonomous Plume Recorders (MAPRs) deployed near the Axial Seamount on the Juan de Fuca Ridge on R/V Thomas G. Thompson TN327 in August 2015 and collected in July 2017.

Website: https://www.bco-dmo.org/dataset/731092
Data Type: Other Field Results
Version: 1
Version Date: 2018-03-21

Project
» Event response to an eruption at Axial Seamount (NeMO2015)

Program
» Ocean Observatories Initiative (OOI)

Contributors	Affiliation	Role
Baker, Edward T.	National Oceanic and Atmospheric Administration (NOAA-PMEL)	Principal Investigator
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Abstract
Data collected from Miniature Autonomous Plume Recorders (MAPRs) deployed near the Axial Seamount on the Juan de Fuca Ridge on R/V Thomas G. Thompson TN327 in August 2015 and collected in July 2017.

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Coverage

Spatial Extent: **Lat**:46.0934 **Lon**:-129.9814
Temporal Extent: 2015-08-27 - 2016-02-29

Dataset Description

Data for temperature, pressure, and turbidity collected by Miniature Autonomous Plume Recorders (MAPR's) near the Axial Seamount on the Juan de Fuca Ridge. The MAPR's were equipped with a Seapoint light-backscattering sensor, a temperature sensor, and a pressure sensor. The light-backscattering sensor measures “Nephelometric Turbidity Units”, which are a dimensionless, relative measure of particle mass

concentration. The data for each MAPR includes information for elevation above the seafloor and the depth below the surface.

Four MAPR's were deployed at different elevations above the seafloor: M34 at 55m, M12 at 80m, M13 at 105m, and M35 at 130m.

The mooring was deployed at 46.0934°N, 129.9814°W, at a bottom depth of 1780 m , on 27 August 2015, and recovered on 21 July 2017. A MAPR at 30 m above bottom (mab) failed to log. Batteries in MAPRs M12, M13, and M35 failed between early Nov and early Dec 2015. M34 recorded for the entire deployment, but data after ~February 2016 is unusable because of biofouling.

See details of Mooring operations in the online cruise reports for 2015 and 2017:
https://www.pmel.noaa.gov/eoi/axial/2015/Axial2015-Cruise-Report-with-logs-revised.pdf
https://www.pmel.noaa.gov/eoi/axial/2017/Axial-2017-CruiseReport-final-nologs.pdf

For an example of using moored MAPRs to measure temporal changes in water turbidity, see (Dziak et al., 2015).

Information on NOAA-PMEL MAPR:
https://www.pmel.noaa.gov/eoi/PlumeStudies/mapr/

Data Processing Description

Calibration information for MAPR sensors:
MAPR_calibration.txt

BCO-DMO processing notes:
-Changed parameter names to BCO-DMO naming conventions
-Changed date-time to ISO format
-Added fields for latitude and longitude

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Data Files

File
731092.csv (Comma Separated Values (.csv), 3.28 MB) MD5:0fb71d1366fcd6510d4458604bcae9c5 Primary data file for dataset ID 731092

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Related Publications

Dziak, R. P., Bohnenstiehl, D. R., Baker, E. T., Matsumoto, H., Caplan-Auerbach, J., Embley, R. W., ... Chadwick, W. W. (2015). Long-term explosive degassing and debris flow activity at West Mata submarine volcano. Geophysical Research Letters, 42(5), 1480–1487. doi:10.1002/2014gl062603
https://doi.org/10.1002/2014GL062603
Methods

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Parameters

Parameter	Description	Units
MAPR	Name of MAPR	no units
Elevation	Depth above the seafloor	meters
lat	Latidude of mooring	decimal degrees
lon	Longitude of mooring	decimal degrees
Cruise	Cruise ID	no units
ISO_date_time	ISO Date-Time UTC YYYY-MM-DDThh:mm:ss	no units
Press_db	Pressure	decibars
Temp_deg	Temperature	degrees Celsius
Depth	Depth below surface	meters
Neph_volts	Raw voltage reading of the light-backscattering sensor; 0-5 V scale	volts
Press_counts	Sensor pressure reading	counts
Temp_counts	Sensor temperature reading	counts
Neph_counts	Light backscattering sensor reading	counts

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Instruments

Dataset-specific Instrument Name	MAPR
Generic Instrument Name	Miniature Autonomous Plume Recorder
Dataset-specific Description	The PMEL MAPR is an inexpensive, lightweight yet rugged, simple to use self-contained instrument for recording light-backscattering (for suspended particle concentrations), oxidation-reduction potential (ORP, for detecting the presence of reduced chemical species such as H2S and Fe+2), temperature, and pressure during a wide variety of seagoing operations. MAPRs especially target operations where hydrothermal plume data are not normally collected: rock cores, dredges, or deep-towed geophysical and bottom imaging are some examples. To make these operations multi-disciplinary requires an instrument that is sensitive enough to detect hydrothermal optical anomalies yet simple enough for untrained researchers to use as an ancillary program without detracting from the time or efforts of the main sampling programs. With such an instrument, the opportunities to collect hydrothermal plume data through collaborations with other researchers, and without the need for additional dedicated technicians, expand to the global ocean. https://www.pmel.noaa.gov/eoi/PlumeStudies/mapr/
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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

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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.

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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.

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Funding

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

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