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
Butterfield, David A.	National Oceanic and Atmospheric Administration (NOAA-PMEL)	Co-Principal Investigator
Walker, Sharon L.	National Oceanic and Atmospheric Administration (NOAA-PMEL)	Contact
Switzer, Megan	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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.

Table of Contents

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/

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

[table of contents | back to top]

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

[table of contents | back to top]

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

[table of contents | back to top]

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/
Generic Instrument 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/

[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 OOI is funded by the National Science Foundation and is managed and coordinated by the OOI Program Office at the Consortium for Ocean Leadership (COL), in Washington, D.C. COL is leader, owner, and operator of the OOI and its infrastructure. Implementing Organizations (IOs), subcontractors to COL, are responsible for construction and development of the different components of the program. Woods Hole Oceanographic Institution is responsible for the Coastal Pioneer Array and the four Global Arrays, including all associated vehicles. Oregon State University is responsible for the Coastal Endurance Array. The University of Washington is responsible for cabled seafloor systems and moorings. Rutgers, The State University of New Jersey, is implementing the Cyberinfrastructure component, which now includes the education and public engagement software. The OOI Data Management team is co-located with the Cyberinfrastructure group at Rutgers University.

[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]