Identifications from biological samples collected with ROV ROPOS during R/V Falkor cruise FK160407 to hydrothermal vents in the Lau Basin, Tonga in April of 2016

Website: https://www.bco-dmo.org/dataset/740046
Data Type: Cruise Results
Version: 1
Version Date: 2018-07-17

Project
» Collaborative Research: Ecosystem dynamics of Western Pacific hydrothermal vent communities associated with polymetallic sulfide deposits (Eco Dyn W Pacific Vents)

Contributors	Affiliation	Role
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Abstract
Sampling occurred during the R/V Falkor cruise FK160407 to hydrothermal vents in the Lau Basin, Tonga in April of 2016. Biological samples were taken using the ROV ROPOS suction sampler. The data include taxonomic and common name identifications.

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Coverage

Spatial Extent: **N**:-20.31667 **E**:-176.13675 **S**:-22.1804 **W**:-176.60175
Temporal Extent: 2016-04-15 - 2016-04-22

Methods & Sampling

ROV ROPOS used a suction sampler or scoop to collect animals. Animals were kept in insulated chambers until recovery from the remotely-operated vehicle on deck.

Pieces of tissue (gill and foot) or whole animals were sampled and preserved in RNALater solution. Samples were stored frozen.

Data Processing Description

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date

* modified parameter names to conform with BCO-DMO naming conventions
* blank values in this dataset are displayed as "nd" for "no data." nd is the default missing data identifier in the BCO-DMO system.
* lat/lons converted to decimal degrees due to character restrictions (degree symbol)
* timestamp in ISO format added
* sample name "1922-9,10,11" changed to "1922-9;10;11" due to delimiter issues with download as a csv option.

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Data Files

File
biosamples.csv (Comma Separated Values (.csv), 2.13 KB) MD5:d60b13a0926a8f1ef827f9442f0fe395 Primary data file for dataset ID 740046

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Parameters

Parameter	Description	Units
Sample_ID	Sample Identifier	unitless
Vent_field	Vent field name	unitless
Dive	Dive identifier	untiless
Date_and_Time_UTC	Date and time (UTC) in format "d/m/yyyy h:m"	unitless
ISO_DateTime_UTC	Timestamp (UTC) in standard ISO 8601:2004(E) format YYYY-mm-ddTHH:MMZ	unitless
Latitude	Latitude	decimal degrees
Longitude	Longitude	decimal degrees
Depth	Depth	meters (m)
Alviniconcha_spp	Number of Alviniconcha spp. individuals in the sample	per individual
Ifremeria_nautilei	Number of Ifremeria nautilei individuals in the sample	per individual
Bathymodiolus_sp	Number of Bathymodiolus sp. individuals in the sample	per individual
Unidentified_Shrimp	Number of unidentified shrimp individuals in the sample	per individual
Unidentified_Octocoral	Number of unidentified octocoral individuals in the sample	per individual
Munidopsis_sp	Number of Munidopsis sp. individuals in the sample	per individual
Unidentified_barnacles	Number of unidentified barncale individuals in the sample	per individual

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Instruments

Dataset-specific Instrument Name	ROV ROPOS
Generic Instrument Name	Remotely Operated Vehicle
Dataset-specific Description	Using ROV ROPOS suction sampler
Generic Instrument Description	Remotely operated underwater vehicles (ROVs) are unoccupied, highly maneuverable underwater robots operated by a person aboard a surface vessel. They are linked to the ship by a group of cables that carry electrical signals back and forth between the operator and the vehicle. Most are equipped with at least a video camera and lights. Additional equipment is commonly added to expand the vehicle's capabilities. These may include a still camera, a manipulator or cutting arm, water samplers, and instruments that measure water clarity, light penetration, and temperature.

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Deployments

FK160407

Website	https://www.bco-dmo.org/deployment/740047
Platform	R/V Falkor
Start Date	2016-04-07
End Date	2016-05-05
Description	Chief Scientist: Leg 1 - Girguis, Peter, Harvard University Leg 2 - Fisher, Charles, Pennsylvania State University

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Project Information

Collaborative Research: Ecosystem dynamics of Western Pacific hydrothermal vent communities associated with polymetallic sulfide deposits (Eco Dyn W Pacific Vents)

Coverage: Lau basin (21S, 176W)

Description from NSF award abstract:
Hydrothermal vents are common in the Western Pacific, and are markedly different in many geological, geochemical, and biological aspects from the much better known hydrothermal vents on mid-ocean ridges. The processes that structure western Pacific vent communities, such as the extent to which physical and chemical conditions change over time, the dispersal of organisms among hydrothermal vent fields, and the physiological capacities of the symbionts and their animal host are poorly understood. And yet, large-scale industrial mining of polymetallic sulfide deposits at active hydrothermal vents is imminent in the Western Pacific. In 2005 and 2006, 19 long term study sites were established on the Eastern Lau Spreading Center by generating high resolution photomosaics of animal communities in both active and inactive flow areas and on both sulfide chimneys and on lavas, and mapping spatially discrete physical and chemical environmental measurements on to these photomosaics. Revisiting these study sites and acquiring data of comparable resolution in the coming year, combined with detailed studies of the physiology of key species, will significantly increase our understanding of the physiology of the fauna and how these communities respond to change.

The resulting data will provide crucial information on the fauna and communities endemic to this region that is critical for predicting and mitigating the effects of mining activities on these ecosystems, and for informing plans for monitoring potential recovery post-mining. To ensure that Western Pacific Islanders are engaged throughout the duration of our program, local scientists will be included in the fieldwork, in-country presentations to students and the general public will be given in association with port stops, and findings will be communicated to local resource managers through the Geoscience Division of the Secretariat of the Pacific Community (SPC). The principal investigators are also proponents of fostering greater "open access and collaboration" among oceanographers, and telepresence will be used during this expedition to experiment on two different models of collaboration, which - along with the resulting scientific insights - will be published to disseminate the results of this effort. Finally, in collaboration with the Harvard Museum of Natural History (HMNH), an exhibit module and course curricula will be developed presenting the effects of both natural and anthropogenic disturbance on biodiversity. It will feature high-resolution imagery, animal and mineralogical samples, and deep-sea research technologies. Web-enabled kiosks will allow visitors to delve deeper into the subject material. The HMNH attracts 200,000 visitors each year, including 33,000 students (K-12) and their teachers, as well as visitors from around the world.

The funded interlinked studies of holobiont (symbionts and their animal host) physiology and distribution, community structure and change over time, genetic connectivity, and holobiont ecosystem engineering will significantly increase our understanding of the processes structuring hydrothermal vent ecosystems in general, and those of the Western Pacific in particular. Vent fields in the proposed study area within the Lau Basin are located in relative proximity to one another with no known barriers to biological dispersal and span a pronounced regional gradient in both geological setting and physico-chemical conditions. This natural laboratory, that is home to a significant diversity of vent fauna and where long-term study sites were established a decade ago, presents an opportunity to gain broad new insights into the ecological and physiological characteristics of the vent fauna and the processes that structure these communities. Accordingly, the project will A) determine the rates and patterns of natural physical, chemical, and biological changes at vents in the Lau Basin over a decadal time period by acquiring new high-resolution, co-registered geological, chemical and biological maps and comparing these with data of comparable resolution acquired in 2005, 2006, and 2009; B) evaluate the role of symbiont physiology -in particular their use of key energy sources not previously measured- in the realized distribution of the holobionts by coupling genetic characterization of host and symbionts with shipboard physiological measurements and gene expression studies, and physico-chemical microhabitat characterization; C) quantify the effects of different holobionts on the surrounding environment by coupling repeated spatially integrated measurements of physico-chemical conditions to all collections and; D) assess the influence of genetic connectivity of populations in the Lau Basin on the distribution of holobionts across regional gradients in geology and geochemistry. They will provide new and generally applicable insights on the role of multiple symbionts in both the distribution of their animal hosts and in structuring associated communities. These efforts will also constrain the roles of genetic connectivity, environmental chemistry, and holobiont capabilities in structuring communities along this spreading center. Moreover, through co-registered animal collections and in situ geochemical measurements, the investigators will develop first-order estimates of the extent to which holobiont aggregations affect geochemical flux from diffuse flows, which accounts for ~50% of all vent geochemical flux. Ultimately, this effort will provide critical and robust data on the dynamics of vent fields and communities in the western Pacific biogeographic province, as well as on the underlying physiological and ecological factors governing these patterns.

Datasets at the Marine Geoscience Data System (MGDS):

1. Processed ship-based multibeam data files: http://www.marine-geo.org/tools/search/Files.php?data_set_uid=24306
2. Raw ROV-based multibeam data files: http://www.marine-geo.org/tools/search/Files.php?data_set_uid=24317
3. CTD data from ROV: Conductivity, Temperature and Depth records from the ROV dives: http://www.marine-geo.org/tools/search/Files.php?data_set_uid=24206
4. ROPOS event logs: Event logs from the ROV dives: http://www.marine-geo.org/tools/search/Files.php?data_set_uid=24146
5. ROPOS navigation: Navigation records from the ROV dives: http://www.marine-geo.org/tools/search/Files.php?data_set_uid=24165
6. Geo-referenced photo mosaics of the study sites:http://www.marine-geo.org/tools/search/Files.php?data_set_uid=24031
7. Low-resolution photo mosaics of the study sites: http://www.marine-geo.org/tools/search/Files.php?data_set_uid=24046
8. IRLS photos: This includes 3,534 sea floor images taken from the ROV with a Nikon D700 digital camera in a pressure housing: http://www.marine-geo.org/tools/search/Files.php?data_set_uid=24151
9. Highlight photographs from the expedition:

http://www.marine-geo.org/tools/search/Files.php?data_set_uid=24047
10. Links to the ship based navigation data held at the Rolling Deck to Repository Website (R2R):http://www.marine-geo.org/tools/search/Files.php?data_set_uid=23926
11. Links to the raw ship-based multibeam held at NOAA:http://www.marine-geo.org/tools/search/DataSets.php?data_set_uids=23951,23952
12. The final GIS products linking the photomosaics to the chem/temp data: http://www.marine-geo.org/tools/search/Files.php?data_set_uid=24502

Due to PI transfer award OCE-1819530 was added to this project in March 2019

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1536331

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