Dissolved oxygen of pore water from sediment gravity cores, and push cores taken during R/V Atlantis cruise AT26-24 at the Dorado Outcrop near Cocos Ridge in December of 2014 (Dorado Outcrop project)

Website: https://www.bco-dmo.org/dataset/664422
Data Type: Cruise Results
Version:
Version Date: 2016-11-10

Project
» Discovery, sampling, and quantification of flows from cool yet massive ridge-flank hydrothermal springs on Dorado Outcrop, eastern Pacific Ocean (Dorado Outcrop)

Program
» Center for Dark Energy Biosphere Investigations (C-DEBI)

Contributors	Affiliation	Role
Wheat, C. Geoffrey	University of Alaska Fairbanks (UAF)	Principal Investigator, Contact
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Dataset Description

This dataset contains dissolved oxygen data of pore waters from sediment gravity cores (2014) and push cores collected by Jason (2013) and Alvin (2014). Cores were collected during the R/V Atlantis cruises AT26-09 and AT26-24.

Methods & Sampling

Sampling took place at Dorado Outcrop off the west coast of Costa Rica in the Pacific Ocean during the R/V Atlantis cruises AT26-09 and AT26-24. For more information about operations of this cruise see the cruise pages which contain links to cruise reports (AT26-09, AT26-24).

Dissolved oxygen (DO) was measured at-sea in pore waters from sediment gravity cores and cores collected

by the submersible ALVIN with a needle-type oxygen optode inserted radially into sediment cores, following published protocols (e.g., Orcutt et al., 2013).

Reference:

Orcutt, B. N., Wheat, C. G., Rouxel, O., Hulme, S., Edwards, K. J., Bach, W., 2013. Oxygen Consumption rates in subseafloor basaltic crust derived from a reaction transport model, Nature Comm., published 27 Sep 2013, pg. 1-8, doi:10.1038/ncomms3539.

Data Processing Description

The data have not been processed further.

BCO-DMO 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 replaced with no data value 'nd'
* added approximate lat/lon values for Dorado Outcrop sample site

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Data Files

File
Core_O2.csv (Comma Separated Values (.csv), 6.02 KB) MD5:6bd964969989e76c3e3d4742b81d1900 Primary data file for dataset ID 664422

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Parameters

Parameter	Description	Units
cruise_id	Cruise identifier	unitless
lat_approx	Approximate latitude of Dorado Outcrop	decimal degrees
lon_approx	Approximate longitude of Dorado Outcrop	decimal degrees
core_id	Core identifier	unitless
sediment_depth	Depth in core sample	centimeters
oxygen	Dissolved oxygen	micromoles per liter (uM)
comment	Comment for core and sample depth	unitless

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Gravity Corer
Generic Instrument Description	The gravity corer allows researchers to sample sediment layers at the bottom of lakes or oceans. The coring device is deployed from the ship and gravity carries it to the seafloor. (http://www.whoi.edu/instruments/viewInstrument.do?id=1079).

Dataset-specific Instrument Name	ALVIN needle-type oxygen optode
Generic Instrument Name	Oxygen Sensor
Generic Instrument Description	An electronic device that measures the proportion of oxygen (O2) in the gas or liquid being analyzed

Dataset-specific Instrument Name	Alvin push cores
Generic Instrument Name	Push Corer
Generic Instrument Description	Capable of being performed in numerous environments, push coring is just as it sounds. Push coring is simply pushing the core barrel (often an aluminum or polycarbonate tube) into the sediment by hand. A push core is useful in that it causes very little disturbance to the more delicate upper layers of a sub-aqueous sediment. Description obtained from: http://web.whoi.edu/coastal-group/about/how-we-work/field-methods/coring/

Dataset-specific Instrument Name	
Generic Instrument Name	ROV Jason
Generic Instrument Description	The Remotely Operated Vehicle (ROV) Jason is operated by the Deep Submergence Laboratory (DSL) at Woods Hole Oceanographic Institution (WHOI). WHOI engineers and scientists designed and built the ROV Jason to give scientists access to the seafloor that didn't require them leaving the deck of the ship. Jason is a two-body ROV system. A 10-kilometer (6-mile) fiber-optic cable delivers electrical power and commands from the ship through Medea and down to Jason, which then returns data and live video imagery. Medea serves as a shock absorber, buffering Jason from the movements of the ship, while providing lighting and a bird's eye view of the ROV during seafloor operations. During each dive (deployment of the ROV), Jason pilots and scientists work from a control room on the ship to monitor Jason's instruments and video while maneuvering the vehicle and optionally performing a variety of sampling activities. Jason is equipped with sonar imagers, water samplers, video and still cameras, and lighting gear. Jason's manipulator arms collect samples of rock, sediment, or marine life and place them in the vehicle's basket or on "elevator" platforms that float heavier loads to the surface. More information is available from the operator site at URL. https://ndsf.whoi.edu/jason/

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Deployments

AT26-24

Website	https://www.bco-dmo.org/deployment/627856
Platform	R/V Atlantis
Report	http://dmoserv3.whoi.edu/data_docs/C-DEBI/cruise_reports/AT26-24_Dorado_Outcrop_2014_Cruise_Report_reduced.pdf
Start Date	2014-11-30
End Date	2014-12-12
Description	Research was conducted on this cruise as part of the C-DEBI project titled "Discovery, sampling, and quantification of flows from cool yet massive ridge-flank hydrothermal springs on Dorado Outcrop, eastern Pacific Ocean" (see: http://www.bco-dmo.org/project/627844).

AT26-09

Website	https://www.bco-dmo.org/deployment/627919
Platform	R/V Atlantis
Report	http://dmoserv3.whoi.edu/data_docs/C-DEBI/cruise_reports/AT26-09_DoradoCruiseReport2013.pdf
Start Date	2013-12-07
End Date	2013-12-23
Description	Research was conducted on this cruise as part of the C-DEBI project titled "Discovery, sampling, and quantification of flows from cool yet massive ridge-flank hydrothermal springs on Dorado Outcrop, eastern Pacific Ocean" (see: http://www.bco-dmo.org/project/627844). **Methods & Sampling** HOBO logger deployed during AT26-09

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Project Information

Discovery, sampling, and quantification of flows from cool yet massive ridge-flank hydrothermal springs on Dorado Outcrop, eastern Pacific Ocean (Dorado Outcrop)

Website: http://www.darkenergybiosphere.org/research/dorado.html

Coverage: Dorado Outcrop near Cocos Ridge (9N, 87W)

Description from NSF award abstract:
Pristine fluids from a typical ridge-flank hydrothermal system have never been sampled, mainly because it has not been possible to locate a site of focused discharge where representative samples could be collected. The PIs have located a small basement feature, Dorado outcrop, on 23 m.y.-old seafloor on the eastern flank of the East Pacific Rise that they plan to sample to determine the fluid composition, and to assess the rate of discharge from the outcrop, so that they can quantify the chemical impact of this hydrothermal system. They plan an 18-day expedition that combines the surveying capabilities of the AUV Sentry (bathymetric, sub-bottom sonar, photo mosaics, water column anomalies) and an ocean-class vessel capable of collecting high-quality multi-beam data and CTD samples, and supporting the survey and sampling capabilities of the ROV Jason II for collection of spring and plume fluids, heat flow data, sediment push cores, and still and video photography. These data and samples will be combined hopefully to generate the first well-constrained estimates of hydrothermal flows from Dorado outcrop. This expedition will result in the collection of samples and data from a "fire hose" of ridge-flank, hydrothermal system, challenging the commonly held view that discharge from ridge flank hydrothermal systems occurs primarily from diffuse seeps.

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Program Information

Center for Dark Energy Biosphere Investigations (C-DEBI)

Website: http://www.darkenergybiosphere.org

Coverage: Global

The mission of the Center for Dark Energy Biosphere Investigations (C-DEBI) is to explore life beneath the seafloor and make transformative discoveries that advance science, benefit society, and inspire people of all ages and origins.

C-DEBI provides a framework for a large, multi-disciplinary group of scientists to pursue fundamental questions about life deep in the sub-surface environment of Earth. The fundamental science questions of C-DEBI involve exploration and discovery, uncovering the processes that constrain the sub-surface biosphere below the oceans, and implications to the Earth system. What type of life exists in this deep biosphere, how much, and how is it distributed and dispersed? What are the physical-chemical conditions that promote or limit life? What are the important oxidation-reduction processes and are they unique or important to humankind? How does this biosphere influence global energy and material cycles, particularly the carbon cycle? Finally, can we discern how such life evolved in geological settings beneath the ocean floor, and how this might relate to ideas about the origin of life on our planet?

C-DEBI's scientific goals are pursued with a combination of approaches:
(1) coordinate, integrate, support, and extend the research associated with four major programs—Juan de Fuca Ridge flank (JdF), South Pacific Gyre (SPG), North Pond (NP), and Dorado Outcrop (DO)—and other field sites;

(2) make substantial investments of resources to support field, laboratory, analytical, and modeling studies of the deep subseafloor ecosystems;
(3) facilitate and encourage synthesis and thematic understanding of submarine microbiological processes, through funding of scientific and technical activities, coordination and hosting of meetings and workshops, and support of (mostly junior) researchers and graduate students; and
(4) entrain, educate, inspire, and mentor an interdisciplinary community of researchers and educators, with an emphasis on undergraduate and graduate students and early-career scientists.

Note: Katrina Edwards was a former PI of C-DEBI; James Cowen is a former co-PI.

Data Management:
C-DEBI is committed to ensuring all the data generated are publically available and deposited in a data repository for long-term storage as stated in their Data Management Plan (PDF) and in compliance with the NSF Ocean Sciences Sample and Data Policy. The data types and products resulting from C-DEBI-supported research include a wide variety of geophysical, geological, geochemical, and biological information, in addition to education and outreach materials, technical documents, and samples. All data and information generated by C-DEBI-supported research projects are required to be made publically available either following publication of research results or within two (2) years of data generation.

To ensure preservation and dissemination of the diverse data-types generated, C-DEBI researchers are working with BCO-DMO Data Managers make data publicly available online. The partnership with BCO-DMO helps ensure that the C-DEBI data are discoverable and available for reuse. Some C-DEBI data is better served by specialized repositories (NCBI's GenBank for sequence data, for example) and, in those cases, BCO-DMO provides dataset documentation (metadata) that includes links to those external repositories.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1130146
NSF Division of Ocean Sciences (NSF OCE)	OCE-1131210

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