

Spring and pore fluid chemistry from samples taken by OsmoSamplers at Dorado outcrop during R/V Atlantis cruise AT26-24 near Cocos Ridge, Pacific Ocean in 2014

Website: <https://www.bco-dmo.org/dataset/661481>

Data Type: Cruise Results

Version:

Version Date: 2016-10-12

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)

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Table of Contents

- [Coverage](#)
- [Dataset Description](#)
 - [Methods & Sampling](#)
 - [Data Processing Description](#)
- [Data Files](#)
- [Parameters](#)
- [Instruments](#)
- [Deployments](#)
- [Project Information](#)
- [Program Information](#)
- [Funding](#)

Coverage

Spatial Extent: Lat:9.09 Lon:-87.1

Temporal Extent: 2013-12-13 - 2013-12-21

Dataset Description

This dataset contains chemistry from fluid samples collected by OsmoSamplers including, dissolved inorganic carbon (DIC), the stable carbon isotope ratio of dissolved inorganic carbon ($^{13}\text{C}:^{12}\text{C}$ ratio in DIC). It also contains concentrations of V, Rb, Mo, Cs, Ba, U, Si, Sr, Li, S, Na, Ca, Mg, and K. Samples were collected at the Dorado Outcrop during the R/V Atlantis cruise AT26-24.

Methods & Sampling

Continuous fluid samplers (OsmoSamplers) included a 12-membrane pump and one coil of Teflon tubing that was 300-m-long and small bore (1.1 mm ID). The tubing was initially filled with 18 M Ω distilled water. Upon retrieval, the Teflon coil was cut in 1.1 m lengths and the fluid was expelled into hot acid cleaned plastic microcentrifuge tubes. For more information about OsmoSamplers see the [instruments page](#).

The R/V Atlantis cruise AT26-09 (2013 Jason/Sentry Expedition) deployed the OsmoSamplers. They were deployed for almost a full year. The R/V Atlantis cruise AT26-24 recovered the OsmoSamplers. Dorado Outcrop is off the west coast of Costa Rica in the Pacific Ocean at location 9 degrees 5.5 minutes north, 87 degrees 6.0 minutes west. For more information about operations of this cruise see the expedition reports and cruise information ([AT26-24](#), [AT26-09](#)).

Data Processing Description

Other than converting signal counts, voltages, etc. to concentrations, the data have not been processed further.

BCO-DMO Processing Notes:

- * added conventional header with dataset name, PI name, version date
- * modified parameter names to conform with BCO-DMO naming conventions
- * added fields for OsmoSampler_name, date_deployed, date_recovered, location (e.g. Marker_K) from information in comments of original files submitted.
- * Date format converted to ISO Date format

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

Data Files

File
OsmoSampler.csv (Comma Separated Values (.csv), 36.24 KB) MD5:3949b54ed81266712255f7f14298d3ee Primary data file for dataset ID 661481

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

Parameters

Parameter	Description	Units
OsmoSampler_name	Name of the OsmoSampler Instrument	unitless
date_deployed	Date of OsmoSampler deployment in ISO format YYYY-mm-dd	unitless
date_recovered	Date of OsmoSampler recovery in ISO format YYYY-mm-dd	unitless
location	Location of deployment	unitless
sample_num	Sample number	unitless

date_calculated	Date of chemical analysis in ISO format YYYY-mm-dd	unitless
DIC	Dissolved inorganic carbon	millimoles per liter (mM)
DIC_stdev	Standard deviation of dissolved inorganic carbon	millimoles per liter (mM)
d13C_DIC	Stable carbon isotope ratio of dissolved inorganic carbon (13C/12C ratio in DIC)	permille (o/oo)
d13C_DIC_stdev	Standard deviation of the stable carbon isotope ratio of dissolved inorganic carbon (13C/12C ratio in DIC)	permille (o/oo)
V	Vanadium concentration	nanomoles per kilogram (nmol/kg)
Rb	Rubidium concentration	nanomoles per kilogram (nmol/kg)
Mo	Molybdenum concentration	nanomoles per kilogram (nmol/kg)
Cs	Cesium concentration	nanomoles per kilogram (nmol/kg)
Ba	Barium concentration	nanomoles per kilogram (nmol/kg)
U	Uranium concentration	nanomoles per kilogram (nmol/kg)
Si	Silicon concentration	micromoles per kilogram (umol/Kg)
Sr	Strontium concentration	micromoles per kilogram (umol/Kg)
Li	Lithium concentration	micromoles per kilogram (umol/Kg)
S	Sulfur concentration	nanomoles per kilogram (nmol/kg)
Na	Sodium concentration	nanomoles per kilogram (nmol/kg)
Ca	Calcium concentration	nanomoles per kilogram (nmol/kg)
Mg	Magnesium concentration	nanomoles per kilogram (nmol/kg)
K	Potassium concentration	nanomoles per kilogram (nmol/kg)

lat_approx	Approximate latitude of sampling area Dorado Outcrop	decimal degrees
lon_approx	Approximate longitude of sampling area Dorado Outcrop; west is negative	decimal degrees

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

Instruments

Dataset-specific Instrument Name	OsmoSampler
Generic Instrument Name	osmotic pump
Dataset-specific Description	OsmoSamplers are long-term osmotically pumped fluid samplers. For more information see the following reference: Jannasch Hans W. , Wheat C. Geoff , Plant Josh N. , Kastner Miriam , Stakes Debra S. , (2004),Continuous chemical monitoring with osmotically pumped water samplers: OsmoSampler design and applications, Limnol. Oceanogr. Methods, 2, doi:10.4319/lom.2004.2.102.
Generic Instrument Description	A pump that uses osmotic pressure to collect water samples. An example of an osmotic pump is an OsmoSampler (Jannasch et al., 2004) which has no electrical or mechanical parts. References: Jannasch Hans W. , Wheat C. Geoff , Plant Josh N. , Kastner Miriam , Stakes Debra S. , (2004),Continuous chemical monitoring with osmotically pumped water samplers: OsmoSampler design and applications, Limnol. Oceanogr. Methods, 2, doi:10.4319/lom.2004.2.102.

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

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.who.edu/data_docs/C-DEBI/cruise_reports/AT26-09_DoradoCruiseReport2013.pdf
Start Date	2013-12-07
End Date	2013-12-23
Description	<p>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).</p> <p>Processing Description Deployed OsmoSamplers.</p>

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

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.

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

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 seafloor 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.

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

Funding

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

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