Pore fluid chemistry from gravity 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/671260
Data Type: Cruise Results
Version:
Version Date: 2016-12-27

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
Fisher, Andrew	University of California-Santa Cruz (UCSC)	Co-Principal Investigator
Hulme, Samuel	Moss Landing Marine Laboratories (MLML)	Co-Principal Investigator
McManus, James	University of Akron (UAkron)	Co-Principal Investigator
Orcutt, Beth N.	Bigelow Laboratory for Ocean Sciences	Co-Principal Investigator
York, Amber D.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Table of Contents

- Dataset Description
  - Methods & Sampling
  - Data Processing Description
- Data Files
- Parameters
- Instruments
- Deployments
- Project Information
- Program Information
- Funding

Dataset Description

This dataset contains concentrations of phosphate, nitrate+nitirite, silicate, ammonium, stable carbon isotope ratio of dissolved inorganic carbon (d13C_DIC), and various elemental concentrations (Ba, B, Mn, Fe, Si, Sr, Na, Ca, Mg, K, Li).

Gravity cores were collected during the R/V Atlantis cruise AT26-24 by the submersible Alvin in December of 2014.

Methods & Sampling

Gravity core sampling took place at Dorado Outcrop off the west coast of Costa Rica in the Pacific Ocean during the R/V Atlantis cruise AT26-24. For more information about operations of this cruise see the cruise page which contains a link to the cruise report (AT26-24).

Phosphate, N+N, silicate, and NH4, were all run at Oregon State University using standard colorimetric techniques. Dissolved inorganic carbon (DIC) was run at Oregon State University using coulometry. Remaining elements were analyzed using Inductively Coupled Plasma Optical Emission Spectrophotometer (ICPOES). Comparison of Si measured via the two techniques shows an offset with the colorimetric results being ~7 uM higher than the ICP-OES results.

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
* BD indicates Below Detection
* blank values replaced with no data value 'nd'
* added ,dive_date, dive_lat, dive_lon from information in the cruise report (Table 4)

[table of contents | back to top]

Data Files

File
GravPoreFluids.csv (Comma Separated Values (.csv), 4.29 KB) MD5:f1b8dc82a61228a9beba4e0d46d04cfa Primary data file for dataset ID 671260

[table of contents | back to top]

Parameters

Parameter	Description	Units
cmbsf	Depth below sea floor of sample	centimeters
core_id	Gravity core identifier	unitless
dive_id	Alvin submersible dive identifier	unitless
dive_date	Alvin submersible dive date in format yyyy-mm-dd	unitless
dive_lat	Alvin submersible dive latitude; north is positive	decimal degrees
dive_lon	Alvin submersible dive longitude; east is positive	decimal degrees
phosphate	Phosphate concentration	micromolar (uM)

N_plus_N	Nitrate plus Nitrite (NO3+NO2) concentration	micromolar (uM)
silicic_acid	Silicic acid concentration	micromolar (uM)
NH4	Ammonium concentration	micromolar (uM)
d13C_DIC	Stable carbon isotope ratio of dissolved inorganic carbon (13C/12C ratio in DIC) using the Pee Dee Belemnite (PDB) standard	permil (0/00)
d13C_DIC_stdev	Standard deviation of stable carbon isotope ratio of dissolved inorganic carbon (13C/12C ratio in DIC) using the Pee Dee Belemnite (PDB) standard	permil (0/00)
d13C	Stable carbon isotope ratio (13C:12C)	micromolar (uM)
Ba	Barium concentration	micromoles per kilogram (umol/kg)
B	Boron concentration	micromoles per kilogram (umol/kg)
Mn	Manganese concentration	micromoles per kilogram (umol/kg)
Fe	Iron concentration	micromoles per kilogram (umol/kg)
Si	Silicon concentration	micromoles per kilogram (umol/kg)
Sr	Strontium concentration	micromoles per kilogram (umol/kg)
S	Sulfur concentration	millimoles per kilogram (mmol/kg)
Na	Sodium concentration	millimoles per kilogram (mmol/kg)
Ca	Calcium concentration	millimoles per kilogram (mmol/kg)
Mg	Magnesium concentration	millimoles per kilogram (mmol/kg)
K	Potassium concentration	millimoles per kilogram (mmol/kg)

Li	Lithium concentration	micromoles per kilogram (umol/kg)

[table of contents | back to top]

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. From: http://www.whoi.edu/instruments/viewInstrument.do?id=1079

Dataset-specific Instrument Name	Inductively Coupled Plasma Optical Emission Spectrophotometer (ICPOES)
Generic Instrument Name	Inductively Coupled Plasma Optical Emission Spectrometer
Generic Instrument Description	Also referred to as an Inductively coupled plasma atomic emission spectroscope (ICP-AES). These instruments pass nebulised samples into an inductively-coupled gas plasma (8-10000 K) where they are atomised and excited. The de-excitation optical emissions at characteristic wavelengths are spectroscopically analysed. It is often used in the detection of trace metals.

[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).

AT26-24_Alvin_Dives

Website	https://www.bco-dmo.org/deployment/671838
Platform	HOV Alvin
Start Date	2014-12-01
End Date	2014-12-11
Description	dives numbers: 4775 4776 4777 4778 4779 4780 4781 4782 4783 4784 see data page: http://dmoserv3.bco-dmo.org/jg/serv/BCO-DMO/Dorado_Outcrop/AlvinLogAT26_... for location information

[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 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.

[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]