Summary geochemistry and radiotracer rates for 30 marine sediment cores covering eight sites and four geochemical regimes

Website: https://www.bco-dmo.org/dataset/830008
Data Type: Cruise Results
Version: 1
Version Date: 2020-11-19

Project
» Quantifying biological production of ethane and propane in deep subsurface sediments (ALKOg)

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

Contributors	Affiliation	Role
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Abstract
This dataset contains porewater geochemistry and rate data obtained from Gulf of Mexico sediments collected using both push core and multiple core technology. Sediment push cores were collected across multiple dives of HOV Alvin, during cruises AT18-02 (2010) and AT26-13 (2014) aboard the R/V Atlantis. Multiple cores were collected during cruises EN527, EN528, EN529, and EN586 aboard the R/V Endeavor. Procedures for sample processing were identical for both types of cores.

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Coverage

Spatial Extent: **N**:28.8533 **E**:-88.4917 **S**:26.3787 **W**:-94.5259
Temporal Extent: 2013-06-20 - 2016-08-14

Dataset Description

This dataset contains porewater geochemistry and rate data obtained from Gulf of Mexico sediments collected using both push core and multiple core technology. Sediment push cores were collected across multiple dives of HOV Alvin, during cruises AT18-02 (2010) and AT26-13 (2014) aboard the R/V Atlantis. Multiple cores were collected during cruises EN527, EN528, EN529, and EN586 aboard the R/V Endeavor. Procedures for sample processing were identical for both types of cores.

Methods & Sampling

Sediment cores were collected immediately upon retrieval from the seafloor and stored at 4 degrees C until further processing. Sediment samples were collected from select cores in 3 cm intervals (reported as average depth below seafloor, in centimeters) for geochemical and rate analysis, using aseptic techniques at in situ temperature (4 degrees C). Methane samples were collected first: A 3 ml subsample was collected in a cut-end syringe, placed in a 20 ml serum vial containing 4 ml 2M NaOH to stop microbial activity, sealed with a butyl rubber stopper, crimp sealed, vortexed to homogenize, and stored at room temperature until analysis. Porewater samples were extracted from whole sediment under pressure into acid washed syringes using a custom argon-purged squeezer as described by Joye et al., 2004. A subsample was collected for sulfide determination and analyzed on board using Cline (1969) colorometric methods. DIC samples were collected in 20 ml Hungate tubes and sealed with butyl stoppers. Samples were preserved with 1 ml saturated CuSO4 and 1 ml of 56 mM NaMoO4 in 10% v/v H3PO4. The headspace DIC was methanized and analyzed by GC-FID. Subsamples were collected for determination of porewater pH and salinity: pH was measured on board using a ROSS pH electrode, calibrated with salinity corrected buffers (pH 4, 7, and 10) chilled to in situ temperature (Bowles et al., 2011), and salinity was measured visually on a 500µl subsample using a handheld refractometer (Cole-Parmer RSA-BR60). The remaining sample was filtered-sterilized through a washed 0.2 µm Target filter and subsampled further for ammonium, major ions, and nutrients.

A 2 ml ammonium subsample (amm1_micro_m) was immediately analyzed on board using the method of Soloranzo (1969). A 5 ml subsample for major ions (sodium, magnesium, potassium, calcium, sulfate, and chloride) was preserved with concentrated nitric acid (0.1 micromole per L final concentration) and stored at room temperature until analysis by ion chromatography (Joye et al., 2004). The remaining nutrient subsample was frozen at -20 degrees C until shore-based laboratory analysis. Total dissolved nitrogen (TDN) was analyzed via the oxidative combustion-chemiluminescence technique of Salgado and Miller (1998) using a Shimadzu TOC 5000 coupled to an Antek model 7020 NO analyzer (Joye et al., 2004). NOx (nitrate + nitrite) was analyzed on a Lachat FIA 8000 Autoanalyzer using method 31-107-04-1-A, phosphate via the molybdate blue colorometric method, total dissolved phosphate (TDP) by high-temperature combustion and hydrolysis (Monaghan and Ruttenberg 1999), dissolved inorganic carbon (DIC) by gas chromatography (flame ionization detector; GC-FID), dissolved organic carbon (DOC) by oxidative combustion-infrared analysis, methane by GC-FID, and stable 13C isotopes of DIC by headspace analysis using a Picarro G2201-i isotope analyzer (Joye et al., 2004, Bowles et al., 2016). An additional ammonium subsample was analyzed from the frozen nutrient split to check sample integrity (amm2_micro_m), again using the method outlined by Soloranzo (1969). Whole sediment subsamples for radiotracer sulfate reduction rates and anaerobic oxidation of methane rates were collected in triplicate from a parallel core and were handled, injected, incubated, and analyzed using the methods described in Joye et al., 2004.

Data Processing Description

Data Processing: Raw instrument data were converted to concentration units by applying linear regression of standard curves, using Excel V 16.38 for Macintosh. Sulfate reduction rates were calculated using the relationships outlined in Fossing and Jorgensen, 1989. Anaerobic oxidation of methane rates were similarly calculated using the procedure outlined in Iversen and Blackburn, 1981.

Problem Report: Missing data (represented by 'nd') are due either to deliberate choices, or from accidental loss of sample.

BCO-DMO Processing:
- renamed fields;
- converted date format o YYYY-MM-DD;
- converted date-time field to ISO8601 format.

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Data Files

File
ALKOg_geochem.csv(Comma Separated Values (.csv), 79.75 KB) MD5:87d94d9813cc71529e950161988670e5 Primary data file for dataset ID 830008

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Related Publications

Alvarez-Salgado, XA, Miller, AEJ. (1998)/ Simultaneous determination of dissolved organic carbon and total dissolved nitrogen in seawater by high temperature catalytic oxidation: conditions for precise shipboard measurements. Marine Chemistry, 62 (03-Apr). 325-333. https://doi.org/10.1016/S0304-4203(98)00037-1
Methods

Bowles, M. W., Samarkin, V. A., Bowles, K. M., & Joye, S. B. (2011). Weak coupling between sulfate reduction and the anaerobic oxidation of methane in methane-rich seafloor sediments during ex situ incubation. Geochimica et Cosmochimica Acta, 75(2), 500–519. doi:10.1016/j.gca.2010.09.043
Methods

Bowles, M., Hunter, K. S., Samarkin, V., & Joye, S. (2016). Patterns and variability in geochemical signatures and microbial activity within and between diverse cold seep habitats along the lower continental slope, Northern Gulf of Mexico. Deep Sea Research Part II: Topical Studies in Oceanography, 129, 31–40. doi:10.1016/j.dsr2.2016.02.011
Methods

Cline, J. D. (1969). Spectrophotometric Determination of Hydrogen Sulfide in Natural Waters. Limnology and Oceanography, 14(3), 454–458. doi:10.4319/lo.1969.14.3.0454
Methods

Fossing, H., & Jorgensen, B. (1989). Measurement of bacterial sulfate reduction in sediments: Evaluation of a single-step chromium reduction method. Biogeochemistry, 8(3). doi:10.1007/bf00002889
https://doi.org/10.1007/BF00002889
Methods

Iversen, N., & Blackburn, T. H. (1981). Seasonal Rates of Methane Oxidation in Anoxic Marine Sediments. Applied and Environmental Microbiology, 41(6), 1295–1300. doi:10.1128/aem.41.6.1295-1300.1981
https://doi.org/10.1128/AEM.41.6.1295-1300.1981
Methods

Joye, S. B., Boetius, A., Orcutt, B. N., Montoya, J. P., Schulz, H. N., Erickson, M. J., & Lugo, S. K. (2004). The anaerobic oxidation of methane and sulfate reduction in sediments from Gulf of Mexico cold seeps. Chemical Geology, 205(3-4), 219–238. doi:10.1016/j.chemgeo.2003.12.019
Methods

Monaghan, E. J., & Ruttenberg, K. C. (1999). Dissolved organic phosphorus in the coastal ocean: Reassessment of available methods and seasonal phosphorus profiles from the Eel River Shelf. Limnology and Oceanography, 44(7), 1702–1714. doi:10.4319/lo.1999.44.7.1702
Methods

Solórzano, L. (1969). Determination of ammonia in natural waters by the phenolhypochlorite method 1 1.This research was fully supported by U.S. Atomic Energy Commission Contract No. ATS (11-1) GEN 10, P.A. 20. Limnology and Oceanography, 14(5), 799–801. doi:10.4319/lo.1969.14.5.0799
Methods

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Parameters

Parameter	Description	Units
index	row identifier	unitless

core_id	core ID	unitless
cruise_id	cruise ID	unitless
lease_block	BOEM convention used for the sale of drilling rights in the GoM; used in this dataset as a site name. Briefly, the letters represent the name of the planning area, followed by the lease block number within the planning area. For example, GB480 is read, Garden Banks (planning area), lease block 480. Additional acronyms: GC = Green Canyon, AC = Alaminos Canyon, and MC = Mississippi Canyon. The only site that breaks this convention is Orca basin.	unitless
date	sampling date; format: YYYY-MM-DD	unitless
ISO_DateTime_UTC	sampling date and time (UTC) formatted to ISO8601 standard: YYYY-MM-DDThh:mmZ	unitless
lat	latitude	decimal degrees
long	longitude	decimal degrees
avg_depth_cbsf	sediment depth	centimeters below sea floor
pH	pH	pH
salinity_mille	salinity	per mille
amm1_micro_m	ammonium concentration measured immediately on the ship	micromoles per L
nitrite_micro_m	nitrite	micromoles per L
NOx_micro_m	nitrite + nitrate	micromoles per L
nitrate_micro_m	nitrate	micromoles per L
din_micro_m	dissolved inorganic nitrogen	micromoles per L
tdn_micro_m	total dissolved nitrogen	micromoles per L
amm2_micro_m	ammonium concentration measured in the lab from frozen nutrient sample	micromoles per L

don_micro_m	dissolved organic nitrogen	micromoles per L
phos_micro_m	phosphate	micromoles per L
tdp_micro_m	total dissolved phosphorus	micromoles per L
dop_micro_m	dissolved organic phosphorus	micromoles per L
din_dip_mol_rat	DIN:DIP ratio	unitless (mole ratio)
don_dop_mol_rat	DON:DOP ratio	unitless (mole ratio)
doc_micro_m	dissolved organic carbon	micromoles per L
dic	dissolved inorganic carbon	micromoles per L
d13c_dic	dic 13C stable isotopes	per mille
ch4_micro_m	methane	micromoles per L
sulfide_mmol	sulfide	millimoles per L
sulfate_mmol	sulfate	millimoles per L
chlor_mmol	chloride	millimoles per L
sod_mmol	sodium	millimoles per L
potas_mmol	potassium	millimoles per L
magn_mmol	magnesium	millimoles per L
calci_mmol	calcium	millimoles per L
aom_pmol_cc_d	anaerobic oxidation of methane rates	picomole per cubic centimeter per day

aom_nmol_cc_d	anaerobic oxidation of methane rates	nanomole per cubic centimeter per day
aom_err_nmol	AOM rate standard error	nanomole per cubic centimeter per day
srr_nmol_cc_d	sulfate reduction rates	nanomole per cubic centimeter per day
srr_err_nmol	sulfate reduction rate standard error	nanomole per cubic centimeter per day

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Instruments

Dataset-specific Instrument Name	Antek 7020 NO analyzer
Generic Instrument Name	Chemiluminescence NOx Analyzer
Dataset-specific Description	Antek Instruments model 7020 NO analyzer. Calibrated with standards made from KNO3 dissolved in MQ (0-100 uM)
Generic Instrument Description	The chemiluminescence method for gas analysis of oxides of nitrogen relies on the measurement of light produced by the gas-phase titration of nitric oxide and ozone. A chemiluminescence analyzer can measure the concentration of NO/NO2/NOX. One example is the Teledyne Model T200: https://www.teledyne-api.com/products/nitrogen-compound-instruments/t200

Dataset-specific Instrument Name	gas chromatography (flame ionization detector; GC-FID)
Generic Instrument Name	Flame Ionization Detector
Dataset-specific Description	SRI 8610C gas chromatograph with flame ionization detector (FID), 1.8m x 3.17 mm Hayecep D packed column, helium carrier, calibrated with certified gas standards (Scotty Specialty Gases; 0.01% UHP CH4 in helium balance).
Generic Instrument Description	A flame ionization detector (FID) is a scientific instrument that measures the concentration of organic species in a gas stream. It is frequently used as a detector in gas chromatography. Standalone FIDs can also be used in applications such as landfill gas monitoring, fugitive emissions monitoring and internal combustion engine emissions measurement in stationary or portable instruments.

Dataset-specific Instrument Name	Lachat FIA 8000 Autoanalyzer
Generic Instrument Name	Flow Injection Analyzer
Dataset-specific Description	Lachat Instruments FIA 8000 Autoanalyzer. Calibrated with standards made from NaNO2 dissolved in MQ (0-10 uM)
Generic Instrument Description	An instrument that performs flow injection analysis. Flow injection analysis (FIA) is an approach to chemical analysis that is accomplished by injecting a plug of sample into a flowing carrier stream. FIA is an automated method in which a sample is injected into a continuous flow of a carrier solution that mixes with other continuously flowing solutions before reaching a detector. Precision is dramatically increased when FIA is used instead of manual injections and as a result very specific FIA systems have been developed for a wide array of analytical techniques.

Dataset-specific Instrument Name	gas chromatography
Generic Instrument Name	Gas Chromatograph
Dataset-specific Description	SRI 8610C gas chromatograph with flame ionization detector (FID), 1.8m x 3.17 mm Hayecep D packed column, helium carrier, calibrated with certified gas standards (Scotty Specialty Gases; 0.01% UHP CH4 in helium balance).
Generic Instrument Description	Instrument separating gases, volatile substances, or substances dissolved in a volatile solvent by transporting an inert gas through a column packed with a sorbent to a detector for assay. (from SeaDataNet, BODC)

Dataset-specific Instrument Name	Dionex DX5000
Generic Instrument Name	Ion Chromatograph
Dataset-specific Description	Dionex DX5000 Ion Chromatograph, calibrated with laboratory made standards.
Generic Instrument Description	Ion chromatography is a form of liquid chromatography that measures concentrations of ionic species by separating them based on their interaction with a resin. Ionic species separate differently depending on species type and size. Ion chromatographs are able to measure concentrations of major anions, such as fluoride, chloride, nitrate, nitrite, and sulfate, as well as major cations such as lithium, sodium, ammonium, potassium, calcium, and magnesium in the parts-per-billion (ppb) range. (from http://serc.carleton.edu/microbelife/research_methods/biogeochemical/ic....)

Dataset-specific Instrument Name	Beckman-Coulter LS6500
Generic Instrument Name	Liquid Scintillation Counter
Dataset-specific Description	Beckman-Coulter LS6500 Liquid Scintillation Counter, calibrated with unquenched 3H and 14C standards from Perkin-Elmer (pn:6008500)
Generic Instrument Description	Liquid scintillation counting is an analytical technique which is defined by the incorporation of the radiolabeled analyte into uniform distribution with a liquid chemical medium capable of converting the kinetic energy of nuclear emissions into light energy. Although the liquid scintillation counter is a sophisticated laboratory counting system used the quantify the activity of particulate emitting (ß and a) radioactive samples, it can also detect the auger electrons emitted from 51Cr and 125I samples. Liquid scintillation counters are instruments assaying alpha and beta radiation by quantitative detection of visible light produced by the passage of rays or particles through a suitable scintillant incorporated into the sample.

Dataset-specific Instrument Name	ROSS pH electrode
Generic Instrument Name	pH Sensor
Dataset-specific Description	Thermo Scientific Orion glass body ROSS pH Electrode; calibrated with salinity and temperature corrected pH buffers (4, 7, 10 pH units).
Generic Instrument Description	An instrument that measures the hydrogen ion activity in solutions. The overall concentration of hydrogen ions is inversely related to its pH. The pH scale ranges from 0 to 14 and indicates whether acidic (more H+) or basic (less H+).

Dataset-specific Instrument Name	Thermo Scientific Orion 4 Star pH meter
Generic Instrument Name	pH Sensor
Generic Instrument Description	An instrument that measures the hydrogen ion activity in solutions. The overall concentration of hydrogen ions is inversely related to its pH. The pH scale ranges from 0 to 14 and indicates whether acidic (more H+) or basic (less H+).

Dataset-specific Instrument Name	Picarro G2201-i isotope analyzer
Generic Instrument Name	Picarro G2201-i isotope analyzer
Dataset-specific Description	Picarro G2201-i isotopic analyzer; cavity ring down spectrometer (CRDS)
Generic Instrument Description	The G2201-i Isotopic Analyzer measures d13C for CH4 and CO2. See: https://www.picarro.com/products/g2201i_isotopic_analyzer

Dataset-specific Instrument Name	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	Cole-Parmer RSA-BR60
Generic Instrument Name	Refractometer
Generic Instrument Description	A refractometer is a laboratory or field device for the measurement of an index of refraction (refractometry). The index of refraction is calculated from Snell's law and can be calculated from the composition of the material using the Gladstone-Dale relation. In optics the refractive index (or index of refraction) n of a substance (optical medium) is a dimensionless number that describes how light, or any other radiation, propagates through that medium.

Dataset-specific Instrument Name	Shimadzu UV-1601
Generic Instrument Name	Spectrophotometer
Dataset-specific Description	Shimadzu Instruments Spectrophotometer Model: UV-1601; Calibrated with laboratory made standards in envornmentally relevant concentration ranges and spectrum tuned for method. KH_2PO_4 for phosphate (0-40 uM in MQ; 885 nm wavelength); Na_2S for sulfide (1-3 uM in MQ; 670 nm wavelength); NH_4Cl for ammonium (0-60 uM; 640 nm wavelength)
Generic Instrument Description	An instrument used to measure the relative absorption of electromagnetic radiation of different wavelengths in the near infra-red, visible and ultraviolet wavebands by samples.

Dataset-specific Instrument Name	Shimadzu TOC 5000
Generic Instrument Name	Total Organic Carbon Analyzer
Dataset-specific Description	Shimadzu Instruments TOC-Vcpn with TNM-1 chemiluminescence NO unit; Calibrated with 1.25, 2.5, 5, 10, and 20 ppm C made from potassium hydrogen phthalate dissolved in 18.2 mOhm MQ water.
Generic Instrument Description	A unit that accurately determines the carbon concentrations of organic compounds typically by detecting and measuring its combustion product (CO_2). See description document at: http://bcodata.whoi.edu/LaurentianGreatLakes_Chemistry/bs116.pdf

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Deployments

AT18-02

Website	https://www.bco-dmo.org/deployment/58735
Platform	R/V Atlantis
Start Date	2010-11-08
End Date	2010-12-03
Description	The AT18-02 cruise sailed from Galveston, Texas and returned to Gulfport, Mississippi. Operations consisted of sediment sampling using the DSV ALVIN, hydrographic characterizations of the water column and sampling of water for geochemical and microbiological characterization using a standard CTD/Rosette, and additional sampling using a multiple corer. See more information from the WHOI cruise planning synopsis. Cruise information and original data are available from the NSF R2R data catalog.

AT26-13

Website	https://www.bco-dmo.org/deployment/830052
Platform	R/V Atlantis
Start Date	2014-03-30
End Date	2014-04-22
Description	See additional cruise information from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/AT26-13

EN527

Website	https://www.bco-dmo.org/deployment/830192
Platform	R/V Endeavor
Start Date	2013-06-19
End Date	2013-07-03
Description	See additional cruise information from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/EN527

EN528

Website	https://www.bco-dmo.org/deployment/830245
Platform	R/V Endeavor
Start Date	2013-07-07
End Date	2013-07-24
Description	See additional cruise information from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/EN528

EN559

Website	https://www.bco-dmo.org/deployment/830344
Platform	R/V Endeavor
Start Date	2015-05-29
End Date	2015-06-22
Description	See additional cruise information from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/EN559

EN586

Website	https://www.bco-dmo.org/deployment/830402
Platform	R/V Endeavor
Start Date	2016-07-23
End Date	2016-08-15
Description	See additional cruise information from the Rolling Deck to Repository (R2R): https://www.rvdata.us/search/cruise/EN86

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Project Information

Quantifying biological production of ethane and propane in deep subsurface sediments (ALKOg)

Coverage: Gulf of Mexico

Project abstract:
Light hydrocarbon gas mixtures are commonly found in organic-rich marine sediments. Methane (C1) is typically the dominant constituent in these mixtures, but ethane (C2) and propane (C3) are nearly always present in trace amounts. C1 dynamics are typically associated with either thermal cracking of deeply buried organic matter or the metabolic end-product of organic matter degradation. Ethane and propane production had typically been associated with thermocatalytic processes in deeply buried sediments, but limited studies suggested C2/C3 production in biogenic C1 gas mixtures was likely attributable to the activity of methanogenic archaea. However, very few of these studies looked at C1/C2 production in deep-sea sediments, and quantification of rates had either not been attempted, or were absent from the literature. We attempted to use organic-rich, cold seep sediments from the Green Canyon area of the Gulf of Mexico (GC600) to determine C2/C3 dynamics in the first ten meters of sediment (i.e. 0 – 10 m). We found C2/C3 production in near surface cold-seep sediments to be indistinguishable from the background degassing signatures of clay minerals. Surface sediments (i.e. < 4 m) are hypothesized to be dominated by communities of organisms that oxidize C2/C3 compounds, rather than communities that produce them. Experiments determining the controls and magnitude of C2/C3 oxidation in surface sediments in cold-seep environments are ongoing. We hypothesized that C2/C3 production likely occurs deeper in the sediment column (i.e. > 4 m), based primarily on ethane and propane profiles of similar environments. Such material proved difficult to acquire; efforts are ongoing to obtain deep piston cores (i.e. >10 m) for environmental profiling and experimental manipulation in the deeper sediment layers where C2/C3 production likely occurs.

C-DEBI project page: https://www.darkenergybiosphere.org/award/quantifying-biological-production-of-ethane-and-propane-in-deep-subsurface-sediments/

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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-0939564

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