

Iberian Margin Anaerobic Sediment Metagenomes from R/V JOIDES Resolution cruise JRES-339 in the West Iberian margin from 2011-2012 (Subseafloor Microbial Ecology project)

Website: <https://www.bco-dmo.org/dataset/628026>

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Project

» [Genomic analyses and microbial cultivations in unexplored sub-seafloor ridge flank and continental margin environments](#) (Subseafloor Microbial Ecology)

Programs

» [Center for Dark Energy Biosphere Investigations](#) (C-DEBI)

» [International Ocean Discovery Program](#) (IODP)

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Dataset Description

Whole genome amplified metagenomic datasets derived from sediments from 10.5, 29.5, 47.5, 68.5, 86.5, and 123 meters below seafloor at IODP Site U1385A on the Iberian Margin.

Methods & Sampling

Samples were acquired by the scientific drilling vessel JOIDES Resolution at IODP Site U1385A (37°34.285'N, 10°7.562'W) on November 25th, 2011 by Advanced Piston Coring (APC). Whole-round sections meant for molecular analysis were immediately frozen at -80 degrees C for the remainder of the cruise and shipped at this temperature. DNA was extracted using the MO BIO PowerMax Soil DNA Isolation Kit (MO BIO Laboratories Inc., Carlsbad, CA, USA) with a minor adjustment to manufacturer's protocol. Briefly, 10 g of sediment extruded from the interior (>1cm from core liner) of whole-round core samples was processed according to manufacturer's instructions, save for an additional step of incubation in a 65 degree C water bath for 15 minutes prior to step 4 (10 minute vortex). Extractions did not yield enough genomic DNA for direct Illumina library preparation. Thus, 2 ng of genomic DNA from each sample was added to the GenomePlex Whole Genome Amplification (WGA) kit (Sigma-Aldrich, Inc., St. Louis, MO, USA). Reactions were run for 20 cycles at manufacturer suggested denaturing and annealing temperatures. Triplicate reactions were pooled and

products were purified using the GenElute PCR Clean-Up kit (Sigma-Aldrich Inc., St. Louis, MO, USA). Samples were sent for Illumina library preparation and 2 x 150 bp paired-end-sequencing was performed on 2 lanes of a Illumina HiSeq2500 machine at the University of Delaware Sequencing and Genotyping Center in the Delaware Biotechnology Institute according to manufacturer's instructions. Over 85,000,000 reads were generated across 6 samples.

Data Processing Description

Reads were quality checked in the CLC-BIO Genomics Workbench. Poor quality scores were detected over the first 30 bp of the majority of the reads, likely an artifact of identical nucleotides in those positions due to the 30 bp universal primer sites ligated to each read in the WGA step. Thus, the first 30 bp of each read was removed and assembly was performed on resulting 120 bp paired end reads. Sequences were assembled using CLC-BIO and IDBA-UD (Peng et al. 2012) up to 120 kmer length. CLC-BIO assembly was run with default parameters. IDBA-UD assembly was run with the following flags called: --mink 40, --maxk 120, -- step 20, -- num_threads 18, --min_contig 300. N50 scores and maximum contig length were consistently higher using IDBA-UD and further analysis was performed on assembled data from IDBA-UD.

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Data Files

File
metagenomes.csv (Comma Separated Values (.csv), 1.19 KB) MD5:3e516183e316dd1a53d25b1af23b0c54
Primary data file for dataset ID 628026

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Parameters

Parameter	Description	Units
SRA_ID	NCBI SRA ID number.	dimensionless
sample_name	Sample name/description from NCBI.	dimensionless
organism	Type of organism.	dimensionless
description	Brief description.	dimensionless
SRA_URL	Hyperlink to NCBI SRA.	dimensionless

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Instruments

Dataset-specific Instrument Name	Advanced Piston Coring (APC)
Generic Instrument Name	Advanced Piston Corer
Dataset-specific Description	Samples were acquired by the scientific drilling vessel JOIDES Resolution at IODP Site U1385A on November 25th, 2011 by Advanced Piston Coring (APC).
Generic Instrument Description	The JOIDES Resolution's Advanced Piston Corer (APC) is used in soft ooze and sediments. The APC is a hydraulically actuated piston corer designed to recover relatively undisturbed samples from very soft to firm sediments. More information is available from IODP (PDF).

Dataset-specific Instrument Name	
Generic Instrument Name	Thermal Cycler
Generic Instrument Description	A thermal cycler or "thermocycler" is a general term for a type of laboratory apparatus, commonly used for performing polymerase chain reaction (PCR), that is capable of repeatedly altering and maintaining specific temperatures for defined periods of time. The device has a thermal block with holes where tubes with the PCR reaction mixtures can be inserted. The cycler then raises and lowers the temperature of the block in discrete, pre-programmed steps. They can also be used to facilitate other temperature-sensitive reactions, including restriction enzyme digestion or rapid diagnostics. (adapted from http://serc.carleton.edu/microbelife/research_methods/genomics/pcr.html)

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Deployments

JRES-339

Website	https://www.bco-dmo.org/deployment/628013
Platform	R/V JOIDES Resolution
Report	http://dmoserv3.whoi.edu/data_docs/C-DEBI/cruise_reports/JR339_PrelimReport.pdf
Start Date	2011-11-16
End Date	2012-01-16
Description	More information is available from IODP: http://publications.iodp.org/preliminary_report/339/index.html

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Project Information

Genomic analyses and microbial cultivations in unexplored sub-seafloor ridge flank and continental margin environments (Subseafloor Microbial Ecology)

Coverage: North Pond & the Iberian Margin

Project description from [C-DEBI](#):

Over the course of two years of C-DEBI support, I have investigated subseafloor microbial ecology in three separate environments; the basaltic crust aquifer underneath the sediments of North Pond, the sediments of North Pond, and the sediments of the Iberian Margin at IODP site U1385.

At North Pond, my research was primarily cultivation-based, with enrichments for multiple metabolisms across basalt and sediment samples. Shallow and deep heterotrophic isolates from the sediment column at site U1382B offer an opportunity to ask unique research questions regarding the breakdown of fresher, more labile organic carbon vs. older, more refractory organic carbon.

At the Iberian margin, my research was primarily molecular-based, with several enrichment and cultivation efforts initiated after compelling evidence for particular metabolisms associated with individual groups of microbes. Diversity studies using high-throughput sequencing of 16S/18S rRNA amplicons examined the distribution and abundance of bacteria, archaea, and microbial eukaryotes. To further investigate ecological trends and the biology of particular community members, metagenomes were generated from the same DNA pools as the amplicon data.

This project was funded by a C-DEBI Graduate Student Fellowship.

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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.

International Ocean Discovery Program (IODP)

Website: <http://www.iodp.org/index.php>

Coverage: Global

The International Ocean Discovery Program (IODP) is an international marine research collaboration that explores Earth's history and dynamics using ocean-going research platforms to recover data recorded in seafloor sediments and rocks and to monitor subseafloor environments. IODP depends on facilities funded by three platform providers with financial contributions from five additional partner agencies. Together, these entities represent 26 nations whose scientists are selected to staff IODP research expeditions conducted throughout the world's oceans.

IODP expeditions are developed from hypothesis-driven science proposals aligned with the program's [science plan](#) *Illuminating Earth's Past, Present, and Future*. The science plan identifies 14 challenge questions in the four areas of climate change, deep life, planetary dynamics, and geohazards.

IODP's three platform providers include:

- The U.S. National Science Foundation ([NSF](#))
- Japan's Ministry of Education, Culture, Sports, Science and Technology ([MEXT](#))
- The European Consortium for Ocean Research Drilling ([ECORD](#))

More information on IODP, including the Science Plan and Policies/Procedures, can be found on their website at <http://www.iodp.org/program-documents>.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0939564
NSF Ocean Sciences Ocean Drilling Program (NSF OCE-ODP)	OCE-1333104

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