Sequence accession numbers for archaeal and bacterial clone libraries from Guaymas Basin sediments collected from R/V Atlantis cruise AT15-56 in 2009

Website: https://www.bco-dmo.org/dataset/653698
Data Type: Cruise Results
Version: 10 Aug 2016
Version Date: 2016-08-10

Project
» Constraints on microbial biogeography in hydrothermally active sediments of Guaymas Basin: Energetic limits, physical stressors, and upward compression of metabolic zones (Microbial Biogeo Guaymas)

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

Contributors	Affiliation	Role
Teske, Andreas	University of North Carolina at Chapel Hill (UNC-Chapel Hill)	Principal Investigator
McKay, Luke	University of Montana	Student
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Dataset Description

Sequence accession numbers for archaeal and bacterial clone libraries from Guaymas Basin hydrothermal sediments (2000 m depth) collected on R/V Atlantis cruise, AT15-56.

Methods & Sampling

Hydrothermal sediments were sampled using HOV Alvin.

For complete acquisition and processing details, refer to:
McKay, L., et al. 2016. Thermal and geochemical influences on microbial biogeography in the hydrothermal sediments of Guaymas Basin, Gulf of California. Environmental Microbiology Reports, 8(1), 150-161. doi:10.1111/1758-2229.12365

Data Processing Description

For complete acquisition and processing details, refer to:
McKay, L., et al. 2016. Thermal and geochemical influences on microbial biogeography in the hydrothermal sediments of Guaymas Basin, Gulf of California. Environmental Microbiology Reports, 8(1), 150-161. doi:10.1111/1758-2229.12365

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Data Files

File
arch_bac_sequences.csv (Comma Separated Values (.csv), 103.28 KB) MD5:d862c3f487f1a75e622b2a7dd4e27bb2 Primary data file for dataset ID 653698

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Parameters

Parameter	Description	Units
sequence_type	Description of the type of sequence	unitless
sample_location	Location where sample was collected	unitless
method	Sequencing method used	unitless
accession_num	NCBI accession number	unitless
popset_num	NCBI Popset number	unitless
closely_related_to	Description of closely related taxa	unitless
accession_link	Hyperlink to NCBI for the accession number	unitless
popset_link	Hyperlink to NCBI for the Popset	unitless

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Deployments

AT15-56

Website	https://www.bco-dmo.org/deployment/58832
Platform	R/V Atlantis
Report	http://www.marine.whoi.edu/at_synop.nsf/9452cb38d8d28f30852568cd004b8077/13f181c7f933dbac052574e4006399a9?OpenDocument
Start Date	2009-11-22
End Date	2009-12-06
Description	R/V Atlantis cruise in Guaymas Basin where 12 Alvin dives were made. Cruise information and original data are available from the NSF R2R data catalog.

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Project Information

Constraints on microbial biogeography in hydrothermally active sediments of Guaymas Basin: Energetic limits, physical stressors, and upward compression of metabolic zones (Microbial Biogeo Guaymas)

Coverage: Guaymas Basin

Project description from C-DEBI:
Shallow subsurface temperatures can reach extreme levels in just 40 cm depth in Guaymas Basin sediments, limiting microbial colonization to thermally tolerable surface sediments. At temperatures beyond approximately 80 degrees C and 100 degrees C, respectively, the 13C-isotopic signatures of microbial anaerobic oxidation of methane and organic matter remineralization appear to be thermally restricted. Putative methane consuming archaea dominate the archaeal clone library while sulfur cycling bacteria and*Chloroflexi*-related sequences dominate the bacterial clone library. Archaeal clone library data suggest that the ANME-1 Guaymas archaea tolerate high in situ temperatures up to approximately 80 degrees C, thereby gaining an advantage in access to the geothermal methane pool in hot Guaymas Basin sediments. Lastly, the results indicate that in situ thermal and/or geochemical gradients structure archaeal community composition and biogeography more than bacterial biogeography.

While the average upper thermal temperature for detectable microbial life by RNA recovery in Guaymas Basin sediments appears to be around 80 degrees C, temperatures may fluctuate by 25 degrees C in as little as a day. Isotopic evidence for microbially mediated methane oxidation is only slight, yet putative methanotrophic archaea are commonly recovered in nearly all samples suggesting they may perform other physiological modes or isotopic signatures are not detectable because of high methane concentrations. High temperature associated archaea appear to be represented by OTUs related to uncultured MCG and ANME-1 Guaymas groups. For bacteria the dominant high temperature associated OTU was phylogenetically associated with the *Thermodesulfobacteriaceae*.

Two of the four main themes of C-DEBI research are "Extent of Life" and "Limits of Life". Using sediment samples acquired from Guaymas Basin, my C-DEBI research links these two themes by examining how the biogeographical distribution of sedimentary microorganisms is shaped by severe, life-limiting conditions. Although these samples are not from deep sediments, they exemplify deep biogeochemical processes that have been compressed to shallower depths by elevated hydrothermal activity. My research demonstrates how thermal and geochemical regimes interact to control the spatial extent of life by focusing on microbial zonation in an energetically diverse hydrothermal environment. My intention with this research was to accurately describe microbial biogeography and the physicochemical factors controlling it in these unique, compressed sediments, which can be a useful asset in preparation for future IODP sampling procedures and analyses as well as investigations in deep subsurface microbiology around the world.

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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-0647633
NSF Division of Ocean Sciences (NSF OCE)	OCE-0939564

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