Porewater nutrient concentrations (NO3+NO2, NH4, and PO4) from pushcore samples collected at Guaymas Basin hydrothermal vents via Alvin dives on RV/Atlantis cruise AT42-05, Nov. 2018 and reported by Woods Hole Oceanographic Institution

Website: https://www.bco-dmo.org/dataset/773129
Data Type: Cruise Results
Version: 1
Version Date: 2019-07-15

Project
» Collaborative Research: Hydrothermal Fungi in the Guaymas Basin Hydrocarbon Ecosystem (HOTFUN)

Contributors	Affiliation	Role
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Abstract
Porewater nutrient concentrations from pushcore samples collected at two locations in the Guaymas Basin hydrothermal vents region during Alvin dives on RV/Atlantis cruise AT42-05, Nov. 2018. NO3+NO2, NH4, and PO4 concentrations at different depths within the cores are reported. These samples are reported by the PI at Woods Hole Oceanographic Institution.

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Coverage

Spatial Extent: **N**:27.0116 **E**:-111.4044 **S**:27.0078 **W**:-111.4071
Temporal Extent: 2018-11-17 - 2018-11-25

Dataset Description

Porewater nutrient concentrations from pushcore samples collected at two locations in the Guaymas Basin hydrothermal vents region during Alvin dives on RV/Atlantis cruise AT42-05, Nov. 2018. NO3+NO2, NH4, and PO4 concentrations at different depths within the cores are reported. These samples are reported by the PI at Woods Hole Oceanographic Institution.

Nutrient porewater samples from this cruise were also analyzed at the Max Planck Institute for Marine Microbiology. See related dataset: https://www.bco-dmo.org/dataset/816549 (MPI)

Methods & Sampling

Alvin pushcores dedicated to nutrient analyses were sectioned to recover the 0-6cm, 6-12, and 12-18cm fractions, or the 0-10, 10-20, and 20-30cm fractions. Two ~40ml samples of sediment were placed in 50 ml Falcon tubes and were centrifuged at 3000 rpm for 15 minutes to separate porewater from the sediment. After centrifugation, the porewater was filtered through sterile syringe cellulose 0.45 micron filters. 5 ml of the porewater was placed into 5 ml screwcap Eppendorf cryotubes stored without headspace at -20 degrees C for nitrate (NO3), nitrite (NO2) and phosphate (PO4) analysis. The headspace was flushed with nitrogen and the samples were stored inverted at 4 degrees C.

All porewater analyses were performed at Louisiana State University Wetland Biogeochemistry Analytical Services. Dilution info: All samples @ 2x and various samples @ 20x , 50x , 70x , and/or 350x.

Data Processing Description

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- re-formatted date from d/m/yyyy to yyyy-mm-dd

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Data Files

File
nuts_porewater_N-P.csv (Comma Separated Values (.csv), 3.92 KB) MD5:7a46443e07fdb63506a4fd7ca559d392 Primary data file for dataset ID 773129

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Supplemental Files

File
Quality control report filename: Dataset773129_QC_NO3-NO2_NH4_PO4_suppl.pdf (Portable Document Format (.pdf), 144.75 KB) MD5:63829269981accd3aa471f6bf2dff847 QC standards and % recovery for NO3+NO2, NH4, and PO4 from porewater nutrient analyses from pushcore samples at different depths at hydrothermal vents from RV/Atlantis cruise AT42-05, Nov. 2018.

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Parameters

Parameter	Description	Units
Date_local	sampling date - local time (UTC-07:00)	unitless
Site	sampling site name	unitless
Dive	Alvin dive number	unitless
Sample_ID	sample identifier	unitless
NO3_NO2_uM	nitrates and nitrites concentration from the push core pore water	micromoles/liter (uM)
NH4_uM	ammonium concentration from the push core pore water	micromoles/liter (uM)
PO4_uM	phosphates concentration from the push core pore water	micromoles/liter (uM)
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Nutrient Autoanalyzer
Generic Instrument Description	Nutrient Autoanalyzer is a generic term used when specific type, make and model were not specified. In general, a Nutrient Autoanalyzer is an automated flow-thru system for doing nutrient analysis (nitrate, ammonium, orthophosphate, and silicate) on seawater samples.

Dataset-specific Instrument Name	
Generic Instrument Name	Push Corer
Dataset-specific Description	Used to collect sediment samples
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/

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Deployments

AT42-05

Website	https://www.bco-dmo.org/deployment/773347
Platform	R/V Atlantis
Start Date	2018-11-15
End Date	2018-11-29
Description	Alvin dives to hydrothermal vent area.

AT42-05_Alvin_Dives

Website	https://www.bco-dmo.org/deployment/773374
Platform	Alvin
Start Date	2018-11-17
End Date	2018-11-25
Description	Alvin dives 4991-5001at Guaymas Basin

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Project Information

Collaborative Research: Hydrothermal Fungi in the Guaymas Basin Hydrocarbon Ecosystem (HOTFUN)

Coverage: Guaymas Basin, Gulf of CA, Mexico

NSF Award Abstract:
Fungi that can derive energy from chemicals, yet consume other organisms or organic material to obtain carbon have been reported from diverse marine subsurface samples, including from hundreds of meters below the seafloor. Evidence exists that Fungi are active in subsurface marine sediments globally, yet there is a dearth of knowledge on their role in the marine subsurface, and specifically on their role(s) in hydrocarbon degradation within deep-sea sediments. This team is isolating a broad collection of environmentally relevant filamentous Fungi and yeasts from hydrothermally-influenced and hydrocarbon-rich seep sediments of Guaymas Basin using high-throughput culture-based approaches. They aim to reveal the diversity of Fungi and Bacteria in these hydrothermal sediments, how temperature and hydrocarbon composition shape their distribution, and how Fungi cooperate to enhance the degradation of hydrocarbons by Bacteria. By hosting six undergraduates through the WHOI Summer Student Fellows program and the Woods Hole Partnership Education Program, the project contributes to increasing diversity in marine science by offering opportunities for promising undergraduates from disadvantaged populations. High school students are involved in summer projects and in intensive summer workshops. One postdoc, a graduate student, and two Research Associates are supported, and international collaborations are strengthened. The postdoc and graduate student are gaining valuable cruise-based experience. An e-lecture on Fungi and their role(s) in biodegradation of hydrocarbons will be made publicly available by the end of the project. Fungal isolates with accompanying information will be secured in a reference culture collection for long-term storage and are available to any interested researcher throughout the project.

The PIs are isolating a broad collection of environmentally relevant filamentous Fungi and yeasts from hydrothermally-influenced and hydrocarbon-rich seep sediments of Guaymas Basin using high-throughput culture-based approaches, with the aim to reveal their ability to degrade individual hydrocarbons under in situ pressures and temperatures. Culture independent methods marker gene analyses are used to characterize in situ fungal and bacterial diversity and to examine how temperature and hydrocarbon composition shape fungal community composition and distribution. Traditional and comprehensive two-dimensional gas chromatographic analyses are used to examine the complexities and subtle changes in inventories of hydrocarbons within sediment cores, and provide evidence for in situ microbial alteration of individual hydrocarbons. Incubation experiments are used to test the ability of fungal isolates to utilize different hydrocarbons as a sole or auxiliary carbon source under in situ pressures and temperatures and their ability to stimulate biodegradation of

hydrocarbons by hydrocarbon-degrading bacteria. Expressed genes within these incubation studies tell us how Fungi and Bacteria couple metabolisms to increase overall specificity and extent of biodegradation of hydrocarbons.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1829903

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