# Porewater hydrocarbon concentrations in Alvin pushcore samples from Guaymas Basin hydrothermal vents, RV/Atlantis cruise AT42-05, Nov. 2018

**Website**: https://www.bco-dmo.org/dataset/773288
**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 hydrocarbon concentrations in Alvin pushcore samples from Guaymas Basin hydrothermal vents, RV/Atlantis cruise AT42-05, Nov. 2018.

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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

This dataset includes porewater hydrocarbon concentrations from samples collected using Alvin pushcores at Guaymas Basin hydrothermal vents, RV/Atlantis cruise AT42-05, Nov. 2018.

### Methods & Sampling

Alvin pushcores dedicated to hydrocarbon analyses were sectioned to recover the 0-6cm, 6-12, and 12-18cm fractions, or the 0-10, 10-20, and 20-30cm fractions. 7 ml of sediment from each horizon was sampled for methane analysis. The samples were collected at 10 ml serum vials and treated with 2.8 ml of NaOH 1M. The serum vials were sealed with black stoppers and stored inverted at -20 degrees C. The remaining sediment from each horizon (~40ml of sample) was aliquoted into two 50 ml Falcon tubes and was centrifuged at 3000 rpm for 15 minutes to separate porewater from the sediment. After centrifugation, the porewater was filtered through sterile syringe cellulose 0.45micron filters. 20 ml of the porewater was collected into 20 ml serum vials

for saturated hydrocarbons, polycyclic aromatic hydrocarbons (PAH) and alkane analysis and stored at 4 degrees C. The sediment cake from each horizon was kept and stored at 4 degrees C for hydrocarbons, polycyclic aromatic hydrocarbons (PAH) and alkane analysis.

All hydrocarbon analyses were performed at Alpha Analytical Labs, Mansfield MA.

**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 and match porewater nutrients dataset
- added columns for EPA_method and sample_type
- moved header columns to separate dataset "hydrocarbon_sample_log"
- removed blank rows

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## Data Files

| File |
|---|
| **hydrocarbon_porewater.csv** (Comma Separated Values (.csv), 22.43 KB) MD5:1ba8247d655ea5e1a9604c16716148a9<br>Primary data file for dataset ID 773288 |

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## Related Publications

Standard Methods for the Examination of Water and Wastewater. ALPHA-AWWA-WEF. Standard Methods Online. https://www.standardmethods.org/
*Methods*

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I-IV, 2007. https://www.epa.gov/hw-sw846/sw-846-compendium
*Methods*

U.S. EPA. (2003) Method 8015D (SW-846): Nonhalogenated Organics Using GC/FID, Revision 4. Washington, DC. https://www.epa.gov/sites/production/files/2015-12/documents/8015d_r4.pdf
*Methods*

U.S. EPA. (2003) Method 8270D Semi-volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS). https://www.epa.gov/sites/production/files/2015-07/documents/epa-8270d.pdf
*Methods*

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## Parameters

| Parameter | Description | Units |
|---|---|---|
| EPA_method | Methods used for the analysis; from EPS publication | unitless |
| sample_type | type of sample: pore water or sediment | unitless |

| | | |
|---|---|---|
| units | units for the concentrations of each | unitless |
| hydrocarbon | name of organic compound | unitless |
| core7_0_6cm | concentration of hydrocarbon in sample 'Core 7 0-6cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core7_6_12cm | concentration of hydrocarbon in sample 'Core 7 6-12cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core7_12_18cm | concentration of hydrocarbon in sample 'Core 7 12-18cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core35_10_10cm | concentration of hydrocarbon in sample 'Core 35 10-10cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core35_10_20cm | concentration of hydrocarbon in sample 'Core 35 10-20cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core35_20_30cm | concentration of hydrocarbon in sample 'Core 35 20-30cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core41_0_10cm | concentration of hydrocarbon in sample 'Core 41 0-10cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core41_10_20cm | concentration of hydrocarbon in sample 'Core 41 10-20cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core41_20_30cm | concentration of hydrocarbon in sample 'Core 41 20-30cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core24_0_10cm | concentration of hydrocarbon in sample 'Core 24 0-10cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core24_0_20cm | concentration of hydrocarbon in sample 'Core 24 0-20cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core5_10_7cm | concentration of hydrocarbon in sample 'Core 5 10-7cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core5_17_14cm | concentration of hydrocarbon in sample 'Core 5 17-14cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |

| | | |
|---|---|---|
| core5_14_21cm | concentration of hydrocarbon in sample 'Core 5 14-21cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core15_0_7cm | concentration of hydrocarbon in sample 'Core 15 0-7cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core15_7_14cm | concentration of hydrocarbon in sample 'Core 15 7-14cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core15_14_21cm | concentration of hydrocarbon in sample 'Core 15 14-21cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core20_0_10cm | concentration of hydrocarbon in sample 'Core 20 0-10cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core20_10_20cm | concentration of hydrocarbon in sample 'Core 20 10-20cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core20_20_30cm | concentration of hydrocarbon in sample 'Core 20 20-30cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core8_0_7cm_A | concentration of hydrocarbon in sample 'Core 8 0-7cm' from dive 4999 | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core8_7_14cm_A | concentration of hydrocarbon in sample 'Core 8 7-14cm' from dive 4999 | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core8_14_21cm_A | concentration of hydrocarbon in sample 'Core 8 14-21cm' from dive 4999 | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core8_0_7cm_B | concentration of hydrocarbon in sample 'Core 8 0-7cm' from dive 5000 | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core8_7_14cm_B | concentration of hydrocarbon in sample 'Core 8 7-14cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |
| core8_14_21cm_B | concentration of hydrocarbon in sample 'Core 8 14-21cm' | nanograms/liter (ng/l) or milligrams/liter (mg/l) |

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## Instruments

| | |
|---|---|
| **Dataset-specific Instrument Name** | |
| **Generic Instrument Name** | Gas Chromatograph |
| **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** | |
| **Generic Instrument Name** | Mass Spectrometer |
| **Generic Instrument Description** | General term for instruments used to measure the mass-to-charge ratio of ions; generally used to find the composition of a sample by generating a mass spectrum representing the masses of sample components. |

| | |
|---|---|
| **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** | HOV 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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