

# **d13C and d18O isotopic data for carbonate nodules and sedimentary carbonates in Guaymas Basin and Sonora Margin sediments collected from R/V El Puma, leaving Guaymas on October 14, 2014 and returning to Mazatlan on October 27, 2014**

**Website:** <https://www.bco-dmo.org/dataset/763715>

**Data Type:** Cruise Results

**Version:** 1

**Version Date:** 2019-03-13

## **Project**

» [RAPID proposal: Site characterization cruise to document the active and extensive subsurface biosphere in the Guaymas Basin](#) (RAPID Guaymas Basin)

## **Program**

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

<b>Contributors</b>	<b>Affiliation</b>	<b>Role</b>
<a href="#">Teske, Andreas</a>	University of North Carolina at Chapel Hill (UNC-Chapel Hill)	Principal Investigator
<a href="#">Ravelo, Ana Christina</a>	University of California-Santa Cruz (UCSC)	Co-Principal Investigator, Contact
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## **Abstract**

d13C and d18O isotopic data for carbonate nodules and sedimentary carbonates in Guaymas Basin and Sonora Margin sediments collected from R/V El Puma (the Pacific Coast research vessel of the Autonomous University of Mexico) from October 14, 2014 to October 27, 2014. Data for each core include: sample identification (core No., section number, cm within section, sample type), total sediment depth in cm, and d<sup>13</sup>C isotopic composition in permille. background = sediment around the nodule.

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## **Coverage**

**Spatial Extent:** Lat:27 Lon:-111

**Temporal Extent:** 2014-10-14 - 2014-10-27

## **Dataset Description**

d13C and d18O isotopic data for carbonate nodules and sedimentary carbonates in Guaymas Basin and

Sonora Margin sediments collected from R/V El Puma (the Pacific Coast research vessel of the Autonomous University of Mexico) from October 14, 2014 to October 27, 2014.

Data for each core include: sample identification (core No., section number, cm within section, sample type), total sediment depth in cm, and  $\delta^{13}\text{C}$  isotopic composition in permille. background = sediment around the nodule.

## Methods & Sampling

Sediment cores were obtained by Piston coring (using commercial PVC core liners) onboard R/V El Puma. Samples selected for carbonate isotope analyses were freeze-dried, homogenized, and roasted under vacuum to eliminate organic matter. Isotope analyses was performed on  $\sim 500\text{ }\mu\text{g}$  of sediment using a Kiel devise coupled with a Thermo MAT 253 gas ratio mass spectrometer at the University of California, Santa Cruz. Values are reported in the per mil (‰) notation relative to Vienna Pee Dee Belemnite (VPDB). Reproducibility of in-house standards is 0.07‰ for  $^{18}\text{O}$  and 0.03‰ for  $^{13}\text{C}$ .

## Data Processing Description

BCO-DMO Processing:

- modified column headers (replaced spaces with underscores, renamed standard deviation columns for clarity);
- replaced "n.d." with "nd" ("no data").

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## Data Files

File
<b>Stable_Isotopes.csv</b> (Comma Separated Values (.csv), 2.42 KB) MD5:8e3b71071acfe5d2f72bbd4cd21c5476
Primary data file for dataset ID 763715

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## Parameters

Parameter	Description	Units
Core_section_cm	Sample identification (core number, section number, cm within section)	unitless
cm_in_core	Total sediment depth in centimeters	centimeters (cm)
sample_type	Description of sample type	unitless
d13C	d13C stable isotope values reported in per mil (‰) notation relative to Vienna Pee Dee Belemnite (VPDB)	per mil (‰)
d13C_stdev	Standard deviation of d13C	per mil (‰)
d18O	d18O stable isotope values reported in per mil (‰) notation relative to Vienna Pee Dee Belemnite (VPDB)	per mil (‰)
d18O_stdev	Standard deviation of d18O	per mil (‰)

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## Instruments

<b>Dataset-specific Instrument Name</b>	Thermo MAT 253
<b>Generic Instrument Name</b>	Isotope-ratio Mass Spectrometer
<b>Dataset-specific Description</b>	Isotope analyses was performed on ~500 µg of sediment using a Kiel devise coupled with a Thermo MAT 253 gas ratio mass spectrometer at the University of California, Santa Cruz.
<b>Generic Instrument Description</b>	The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer).

<b>Dataset-specific Instrument Name</b>	
<b>Generic Instrument Name</b>	Piston Corer
<b>Generic Instrument Description</b>	The piston corer is a type of bottom sediment sampling device. A long, heavy tube is plunged into the seafloor to extract samples of mud sediment. A piston corer uses a "free fall" of the coring rig to achieve a greater initial force on impact than gravity coring. A sliding piston inside the core barrel reduces inside wall friction with the sediment and helps to evacuate displaced water from the top of the corer. A piston corer is capable of extracting core samples up to 90 feet in length.

## Deployments

### Guaymas\_2014

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/661688">https://www.bco-dmo.org/deployment/661688</a>
<b>Platform</b>	R/V El Puma
<b>Start Date</b>	2014-10-14
<b>End Date</b>	2014-10-27

## Project Information

### **RAPID proposal: Site characterization cruise to document the active and extensive subsurface biosphere in the Guaymas Basin (RAPID Guaymas Basin)**

**Coverage:** Guaymas Basin

#### *Description from NSF project abstract:*

The Guaymas Basin in the central Gulf of California is an active tectonic spreading center overlain with thick, organic-rich sediments. In contrast to typical deep-water, mid-ocean ridge spreading centers that have very focused magmatism and little or no sediment, magmatism in the Guaymas Basin is more broadly distributed. This broadly-distributed magmatism significantly expands the fraction of organic-rich sediments that may be subject to alteration by the magmatic heat and thus it greatly expands the range of environments that support hydrocarbon generation and microbial populations in the sediments. Recognition that magmatism is not confined to the spreading axis, but instead is distributed throughout Guaymas Basin, suggests that models for the natural sequestration of carbon, the formation of oceanic crust, and life in the subsurface in marginal rift basins should be reconsidered as this has implications for the long-term removal of atmospheric carbon dioxide (and hence potential climatic implications). The Principal Investigator of this RAPID proposal is a lead proponent on an International Ocean Discovery Program (IODP) proposal to study this system in depth through scientific ocean drilling. To properly plan this expensive IODP expedition, additional site characterization gained from sediment sampling and seismic data is required. This proposal requests funds for the Principal Investigator to participate on an already planned site survey cruise aboard the Mexican Research Vessel (RV) El Puma. The results from this cruise will provide valuable data, at an exceptionally low investment, to guide decisions about potential future scientific drilling in the Guaymas Basin.

This RAPID proposal requests funds for the Principal Investigator to participate on a Mexican site survey cruise in October 2014 on RV El Puma to collect five-meter gravity cores of an extensive sediment transect across the Guaymas Basin and to integrate sequencing-based microbial community analyses of subsurface bacteria and archaea with biogeochemical characterizations of these subsurface sediments. Gravity coring and microbial community analysis will target cold non-hydrothermal sediments as well as off-axis hydrothermally-influenced sediments. The gravity coring campaign and the geochemistry/microbiology studies are coordinated with heatflow measurements and extensive 2D seismic analysis and high-resolution 3D seismic mapping by other planned Mexican and German cruises. This multi-pronged strategy will deliver the additional data and complete the site characterizations that are required to properly plan a potential IODP drilling expedition by the JOIDES Resolution.

## 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
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0939564</a>
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1449604</a>

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