Record of d2H of dinosterol variability in down core lake sediments from Clear Lake, Palau

Website: https://www.bco-dmo.org/dataset/699469
Data Type: Other Field Results
Version: 1
Version Date: 2017-05-04

Project
» Do Parallel Patterns Arise from Parallel Processes? (PaPaPro)

Program
» Dimensions of Biodiversity (Dimensions of Biodiversity)

Contributors	Affiliation	Role
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Abstract
Record of d2H of dinosterol variability in down core lake sediments from Clear Lake, Palau.

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Coverage

Spatial Extent: **Lat**:7.153166667 **Lon**:134.3594

Dataset Description

Record of d^2H of dinosterol variability in down core lake sediments from Clear Lake, Palau.

These data are published in the following journal article:
Richey, J. N., & Sachs, J. P. (2016). Precipitation changes in the western tropical Pacific over the past millennium. Geology, 44(8), 671–674. doi:10.1130/g37822.1

Methods & Sampling

Sampling and analytical procedures:
Clear Lake sediments were extracted using a Dionex Accelerated Solvent Extractor (ASE 200), and the resulting total lipid extract was separated into neutral and polar fractions using column chromatography with aminopropyl gel as the stationary phase. The neutral fraction was then separated into hydrocarbon, wax ester,

sterol and polar fractions via a silica gel column chromatography. Dinosterol was isolated then from the sterol fraction via reverse phase (RP)- high-performance liquid chromatography (HPLC).

Instruments:
Dinosterol was isolated from the sterol fraction via reverse phase (RP)- high performance liquid chromatography (HPLC). An Agilent 1100 HPLC with an integrated autoinjector, quaternary pump, and fraction collector was coupled to an Agilent 1100 LC/MSD SL mass spectrometer with a multimode source that was operated in positive atmospheric pressure chemical ionization (APCI+) mode. The HPLC method used is outlined in Nelson and Sachs (2013). Subsequently to HPLC separation the fraction containing dinosterol was analyzed via GC-MSD to verify sufficient baseline separation. Adjacent HPLC fractions were also analyzed to ensure that no dinosterol eluted into those fractions.

After the dinosterol was sufficiently isolated from co-eluting compounds, the sample was injected onto a GC-irms for determination of the d2H of dinosterol. Hydrogen isotope determinations were made using a Finnigan Delta V Plus Isotope Ratio Mass Spectrometer (irMS) coupled to a Thermo Trace GC Ultra with a Varian VF-17ms FactorFour capillary column (60 m x 0.32 mm x 0.25 m) and a pyrolysis reactor. Samples were injected into a split/splitless inlet in splitless mode at 310 C. The oven temperature was ramped from 100 C to 220 C at a rate of 20 C/min, then at 2 C /min up to 325 C where it was held for 17 min. The carrier gas, He, was held constant at 2.6 mL/min. The pyroloysis reactor was maintained at 1400 C. Isotope values, expressed as D values, were calculated in Isodat software relative to VSMOW using a co-injection standard containing nC28 nC32, nC40, and nC44 of known ∂2H values (obtained from Arndt Schimmelmann, Indiana University, Bloomington, IN, USA). The measured isotope values of dinosterol were corrected for the addition of hydrogen atoms (of known D value) that occurred during acetylation. Each sample was analyzed in at least duplicate, and error bars represent standard deviations of replicate measurements.

Data Processing Description

BCO-DMO Processing:
- modified parameter names to conform to BCO-DMO naming conventions;
- replaced "NaN" with "nd".

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Data Files

File	
Clear_Lake_reconstruction.csv	(Comma Separated Values (.csv), 4.53 KB) MD5:4aa22fce3b8eaec6454e10a9d843d3d4
Primary data file for dataset ID 699469	

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Related Publications

Richey, J. N., & Sachs, J. P. (2016). Precipitation changes in the western tropical Pacific over the past millennium. Geology, 44(8), 671–674. doi:10.1130/g37822.1 https://doi.org/10.1130/G37822.1
Results

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Parameters

Parameter	Description	Units
location	Name of the sampling location	unitless
lat	Latitude of the location	decimal degrees
lon	Longitude of the location	decimal degrees
core_depth	Depth below sediment-water interface	centimeters (cm)
age	Calendar age of sample in year A.D.	unitless
dDdino	d2Hdino: hydrogen isotopic composition of dinosterol	per mil
dDdino_stdev	1 sigma standard deviation on d2Hdino	per mil

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Instruments

Dataset-specific Instrument Name	high-performance liquid chromatography
Generic Instrument Name	High-Performance Liquid Chromatograph
Dataset-specific Description	Dinosterol was isolated from the sterol fraction via reverse phase (RP)- high performance liquid chromatography (HPLC). An Agilent 1100 HPLC with an integrated autoinjector, quaternary pump, and fraction collector was coupled to an Agilent 1100 LC/MSD SL mass spectrometer with a multimode source that was operated in positive atmospheric pressure chemical ionization (APCI+) mode.
Generic Instrument Description	A High-performance liquid chromatograph (HPLC) is a type of liquid chromatography used to separate compounds that are dissolved in solution. HPLC instruments consist of a reservoir of the mobile phase, a pump, an injector, a separation column, and a detector. Compounds are separated by high pressure pumping of the sample mixture onto a column packed with microspheres coated with the stationary phase. The different components in the mixture pass through the column at different rates due to differences in their partitioning behavior between the mobile liquid phase and the stationary phase.

Dataset-specific Instrument Name	Finnigan Delta V Plus Isotope Ratio Mass Spectrometer (irMS)
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	Hydrogen isotope determinations were made using a Finnigan Delta V Plus Isotope Ratio Mass Spectrometer (irMS) coupled to a Thermo Trace GC Ultra with a Varian VF-17ms FactorFour capillary column (60 m x 0.32 mm x 0.25 m) and a pyrolysis reactor.
Generic Instrument Description	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).

Dataset-specific Instrument Name	Agilent 1100 LC/MSD SL mass spectrometer
Generic Instrument Name	Mass Spectrometer
Dataset-specific Description	Dinosterol was isolated from the sterol fraction via reverse phase (RP)- high performance liquid chromatography (HPLC). An Agilent 1100 HPLC with an integrated autoinjector, quaternary pump, and fraction collector was coupled to an Agilent 1100 LC/MSD SL mass spectrometer with a multimode source that was operated in positive atmospheric pressure chemical ionization (APCI+) mode.
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.

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Deployments

Palau_lakes

Website	https://www.bco-dmo.org/deployment/542180
Platform	Small boats - CRRF
Start Date	2010-08-21
End Date	2016-06-14
Description	Palau marine lakes

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Project Information

Do Parallel Patterns Arise from Parallel Processes? (PaPaPro)

Website: http://marinelakes.ucmerced.edu/

Coverage: Western Pacific; Palau; Indonesia (West Papua)

This project will survey the taxonomic, genetic, and functional diversity of the organisms found in marine lakes, and investigate the processes that cause gains and losses in this biodiversity. Marine lakes formed as melting ice sheets raised sea level after the last glacial maximum and flooded hundreds of inland valleys around the world. Inoculated with marine life from the surrounding sea and then isolated to varying degrees for the next 6,000 to 15,000 years, these marine lakes provide multiple, independent examples of how environments and interactions between species can drive extinction and speciation. Researchers will survey the microbes, algae, invertebrates, and fishes present in 40 marine lakes in Palau and Papua, and study how diversity has changed over time by retrieving the remains of organisms preserved in sediments on the lake bottoms. The project will test whether the number of species, the diversity of functional roles played by organisms, and the genetic diversity within species increase and decrease in parallel; whether certain species can greatly curtail diversity by changing the environment; whether the size of a lake determines its biodiversity; and whether the processes that control diversity in marine organisms are similar to those that operate on land.

Because biodiversity underlies the ecosystem services on which society depends, society has a great interest in understanding the processes that generate and retain biodiversity in nature. This project will also help conserve areas of economic importance. Marine lakes in the study region are important for tourism, and researchers will work closely with governmental and non-governmental conservation and education groups and with diving and tourism businesses to raise awareness of the value and threats to marine lakes in Indonesia and Palau.

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Program Information

Dimensions of Biodiversity (Dimensions of Biodiversity)

Website: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503446

Coverage: global

(adapted from the NSF Synopsis of Program)
Dimensions of Biodiversity is a program solicitation from the NSF Directorate for Biological Sciences. FY 2010 was year one of the program. [MORE from NSF]

The NSF Dimensions of Biodiversity program seeks to characterize biodiversity on Earth by using integrative, innovative approaches to fill rapidly the most substantial gaps in our understanding. The program will take a broad view of biodiversity, and in its initial phase will focus on the integration of genetic, taxonomic, and functional dimensions of biodiversity. Project investigators are encouraged to integrate these three dimensions to understand the interactions and feedbacks among them. While this focus complements several core NSF programs, it differs by requiring that multiple dimensions of biodiversity be addressed simultaneously, to understand the roles of biodiversity in critical ecological and evolutionary processes.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1241247

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