Isotopes from B. gymnorhiza mangroves in Palau during 2013

Website: https://www.bco-dmo.org/dataset/709224
Data Type: Other Field Results
Version: 1
Version Date: 2017-07-19

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

Program
» Dimensions of Biodiversity (Dimensions of Biodiversity)

Contributors	Affiliation	Role
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Abstract
Isotopes from B. gymnorhiza mangroves in Palau during 2013. Leaf and stem samples were collected from three replicate trees on the north shore of each lake and stored frozen prior to analysis. Water samples were collected from 1cm below the lake surface, and salinity was measured with a refractometer.

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Coverage

Spatial Extent: **N**:7.45 **E**:134.6035 **S**:6.9486 **W**:134.1421
Temporal Extent: 2013-09-12 - 2013-10-08

Dataset Description

Lipid and water $\delta^{2}H$ and $\delta^{18}O$ from B. gymnorhiza mangroves in Palau during 2013.

Methods & Sampling

All methodology was described in Ladd & Sachs, GCA, 2017, doi: 10.1016/j.gca.2017.01.046

Leaf and stem samples were collected from three replicate trees on the north shore of each lake and stored frozen prior to analysis. Water samples were collected from 1cm below the lake surface, and salinity was measured with a refractometer.

Leaf and stem water were cryogenically extracted on a vacuum line at ETH Zurich. Leaf lipids were extracted

using a Dionex Accelerated Solvent Extractor (ASE 200). Total lipid extracts were saponified with KOH in MeOH (12 hours at 60 deg C). Following saponification, hexane soluble lipids were then separated into hydrocarbon, wax ester, alcohol and polar fractions via a silica gel column chromatography. Alcohol fractions were acetylated with acetic anhydride of known H isotopic composition prior to analysis by GC.

Data Processing Description

All methodology was described in Ladd & Sachs, GCA, 2017, doi: 10.1016/j.gca.2017.01.046

Surface water and precipitation δ2H and δ18O values were measured with a Picarro Cavity Ring Down Spectroscopy (CRDS) L2130i Water Isotope Analyzer at the University of Washington measured. Three laboratory standards of known isotopic composition were analyzed after every six samples and were used to normalize results to the Vienna Standard Mean Ocean Water (VSMOW) scale. All samples and standards were injected six times, and the first three measurements were discarded in order to avoid any memory effects from the previous analysis. Leaf and xylem water samples were analyzed by a Thermal Conversion Elemental Analyzer (TC/EA) coupled to a Delta V Isotope Ratio Mass Spectrometer (IRMS; ThermoFisher Scientific, Waltham, MA) at the University of Basel, Switzerland. Each sample and standard was injected six times in sequence. In order to avoid any memory effects from the previous analysis, the first three injections of each sample were discarded.

The δ2H values of individual lipids were measured by GC-IRMS on a Thermo DELTA V PLUS system (ThermoFisher Scientific, Waltham, MA, USA). The GC (Trace Ultra, ThermoFisher Scientific) was equipped with a split-splitless injector operated in splitless mode at 320 deg C, a TRIPLUS autosampler (ThermoFisher Scientific), and a VF-17ms capillary column (60 m X 0.25 mm X 0.25 um, Agilent). For lupeol analyses, the GC was heated from 120 deg C to 260 deg C at 20 deg C/min, then at 1 deg C/min to 300 deg C, at 20 deg C/min to 325 deg C and then held at 325 deg C for 20 min. For n-alkane analyses, the GC was heated from 120 deg C to 250 deg C at 20 deg C/min, then at 6 deg C/min to 325 deg C and then held at 325 deg C for 12 min. Helium was used as the carrier gas at a constant flow of 1.1 mL/min. Compounds were pyrolyzed in a ceramic reactor at 1400 deg C. 1 uL of sample was injected along with 0.5 uL of a mix of n-alkanes of known isotopic composition (A. Schimmelmann, Indiana University, Bloomington, Indiana). For lupeol analyses, this mix included nC26-, nC28-, nC32-, nC34- and nC41-alkanes. For n-alkane analyses, the co-injection standards were nC21 and nC23. At the beginning and the end of the sequence, as well as after every 4-6 sample injections, a mixture of additional n-alkane standards of known isotopic composition was analyzed with the co-injection standards, in place of a sample. For isoprenoid sequences, this external standard was nC38-alkane. For n-alkane sequences, nC28-, nC32- and nC34-alkanes were used as external standards.

BCO-DMO Data Processing Notes:

- reformatted column names to comply with BCO-DMO standards.
- converted lat/lons from degree minute format to decimal degrees.
- converted date format from YYMMDD to YYYY/MM/DD

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Data Files

File
isotopes.csv (Comma Separated Values (.csv), 8.97 KB) MD5:ef5f54a69c97ec080e0248a2cc8e33cb Primary data file for dataset ID 709224

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Parameters

Parameter	Description	Units

sample	Sample number	unitless
lat	Latitude; N is positive	decimal degrees
lon	Longitude; E is positive	decimal degrees
date	Date that sampling occurred; YYYY/MM/DD	unitless
time	Time that sampling occurred; HH:MM	unitless
salinity	Salinity of sample	ppt
dD_surface_water	H isotopes of surface water	per mil (0/00)
s1_dD_surface_water	1 standard deviation (analytical) of surface water H isotopes	per mil (0/00)
d18O_surface_water	O isotopes of surface water	per mil (0/00)
s1_d18O_surface_water	1 standard deviation (analytical) of surface water O isotopes	per mil (0/00)
lupeol_dD	H isotopes of Lupeol	per mil (0/00)
lupeol_St_dev	1 standard deviation (analytical) of lupeol H isotopes	per mil (0/00)
lupeol_n	Number of replicate measurements of Lupeol H isotopes	number
nC31_dD	H isotopes of nC31-alkane	per mil (0/00)
nC31_st_dev	1 standard deviation (analytical) of nC31 H isotopes	per mil (0/00)
nC31_n	Number of replicate measurements of nC31 H isotopes	number
historic_sal	Average salinity measured by Coral Reef Research Foundation from 2007-2013	ppt
hist_sal_stdev	Standard deviation of historical salinity measurements	ppt
hist_sal_n	Number of measurements of salinity	number
xylem_water_dD	H isotopes of xylem water	per mil (0/00)
s1_XW_dD	1 standard deviation (analytical) of xylem water H isotopes	per mil (0/00)
leaf_water_dD	H isotopes of leaf water	per mil (0/00)
s1_LW_dD	1 standard deviation (analytical) of leaf water H isotopes	per mil (0/00)
d18O_xw	O isotopes of xylem water	per mil (0/00)
s1_d18O_xw	1 standard deviation (analytical) of xylem water O isotopes	per mil (0/00)
d18O_lw	O isotopes of leaf water	per mil (0/00)
s1_d18O_lw	1 standard deviation (analytical) of leaf water O isotopes	per mil (0/00)
avg_rain_d2H_leaf_water_model	H rain water in Koror for closest three rain events	per mil (0/00)

s1_rain_d2H	1 standard deviation of rain water H isotopes	per mil (0/00)
avg_rain_d18O	O rain water in Koror for closest three rain events	per mil (0/00)
s1_rain_d18O	1 standard deviation of rain water O isotopes	per mil (0/00)
ISO_DateTime_UTC	DateTime ISO_UTC formatted	unitless

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Instruments

Dataset-specific Instrument Name	Temperature Conversion Elemental Analyzer (TC/EA)
Generic Instrument Name	Elemental Analyzer
Dataset-specific Description	Paired with a Isotope-ratio Mass Spectrometer for leaf water and xylem water analysis
Generic Instrument Description	Instruments that quantify carbon, nitrogen and sometimes other elements by combusting the sample at very high temperature and assaying the resulting gaseous oxides. Usually used for samples including organic material.

Dataset-specific Instrument Name	Thermo Delta V.
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	Paired with a Gas Chromatograph (GC) and used for leaf lipids (University of Washington).
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	Thermo Delta V.
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	Paired with a Temperature Conversion Elemental Analyzer (TC/EA) and used for leaf water and xylem water (Unversity of Basel)
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).

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Deployments

Ongael_2013-09

Website	https://www.bco-dmo.org/deployment/473284
Platform	shoreside Palau
Start Date	2013-09-11
End Date	2013-10-08

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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)

(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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