14C dates from core PC1 collected from T Lake, Palau in September 2013

Website: https://www.bco-dmo.org/dataset/771658
Data Type: Other Field Results
Version: 1
Version Date: 2019-06-21

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

Program
» Dimensions of Biodiversity (Dimensions of Biodiversity)

Contributors	Affiliation	Role
Sachs, Julian P.	University of Washington (UW)	Principal Investigator
Dawson, Michael N.	University of California-Merced (UC Merced)	Co-Principal Investigator
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
14C dates from core PC1 collected from T Lake, Palau in September 2013 using a Colinvaux-Vohnout Livingstone-type rod-operated piston corer.

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Coverage

Spatial Extent: **Lat**:7.3045 **Lon**:134.4385
Temporal Extent: 2013-09 - 2013-09

Methods & Sampling

Sediment core PTLN-PC1 was collected September 2013 in sequential 1-m sections using a 5-cm-diameter Colinvaux-Vohnout Livingstone-type rod-operated piston corer (Geocore, Columbus, Ohio). Each section was sealed in the field and refrigerated at 4 °C until core splitting and subsampling.

Thirteen macrofossils were pulled from the core and were pretreated with an acid-base-acid procedure according to the protocol in Brock et al. (2010) to remove extraneous organic materials. Accelerator mass spectrometry 14C dating was performed by DirectAMS in Bothell, WA, United States.

Data Processing Description

The modern age control (youngest age, at depth = 81 cm) was converted from fraction modern to 14C years using the pMC.age() function in the Bacon age-modeling software package (Blaauw and Christen, 2011). This produced a 90.3% confidence interval for the calibrated age estimate of −0.04611 to −0.05081 ka BP, or CE 1996–2001 (plus a small chance (4.6%) of −0.00831 to −0.00808 ka BP, or CE 1958); this age is anomalously young and clearly an outlier based on comparison with a nearby universal core, prompting its removal. All other dates were calibrated using IntCal2013 (Reimer et al., 2013) and the Clam 2.2 software package (Blaauw, 2010).

BCO-DMO Processing: modified parameter names (replaced "." with underscores; changed "14C_raw" to "raw_14C" because column names cannot start with numbers)

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Data Files

File
T_Lake_PC1_Chronology.csv (Comma Separated Values (.csv), 710 bytes) MD5:12233e485ca1458cf6b48cc846895c8a Primary data file for dataset ID 771658

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Related Publications

Blaauw, M. (2010). Methods and code for “classical” age-modelling of radiocarbon sequences. Quaternary Geochronology, 5(5), 512–518. doi:10.1016/j.quageo.2010.01.002
Methods

Blaauw, M., & Christen, J. A. (2011). Flexible paleoclimate age-depth models using an autoregressive gamma process. Bayesian Analysis, 6(3). doi:10.1214/11-ba618
Methods

Brock, F., Higham, T., Ditchfield, P., & Ramsey, C. B. (2010). Current Pretreatment Methods for AMS Radiocarbon Dating at the Oxford Radiocarbon Accelerator Unit (Orau). Radiocarbon, 52(1), 103–112. doi:10.1017/s0033822200045069 https://doi.org/10.1017/S0033822200045069
Methods

Sachs, J. P., Blois, J. L., McGee, T., Wolhowe, M., Haberle, S., Clark, G., & Atahan, P. (2018). Southward Shift of the Pacific ITCZ During the Holocene. Paleoceanography and Paleoclimatology. doi:10.1029/2018pa003469 https://doi.org/10.1029/2018PA003469
Results

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Parameters

Parameter	Description	Units
Labcode	sample identification used by 14C laboratory	unitless
depth_top	composite depth, top of 1 cm interval associated with fossil	centimeters (cm)
mat_dated	material dated	unitless
raw_14C	conventional radiocarbon age, relative to 1950	years
raw_14C_err	standard error, radiocarbon age	years
calib_14C_95_lo	calibrated age, 95% confidence interval lower bound	years
calib_14C_95_up	calibrated age, 95% confidence interval upper bound	years

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Instruments

Dataset-specific Instrument Name	Accelerator mass spectrometry
Generic Instrument Name	Accelerator Mass Spectrometer
Dataset-specific Description	Accelerator mass spectrometry 14C dating was performed by DirectAMS in Bothell, WA, United States.
Generic Instrument Description	An AMS measures "long-lived radionuclides that occur naturally in our environment. AMS uses a particle accelerator in conjunction with ion sources, large magnets, and detectors to separate out interferences and count single atoms in the presence of 1x1015 (a thousand million million) stable atoms, measuring the mass-to-charge ratio of the products of sample molecule disassociation, atom ionization and ion acceleration." AMS permits ultra low-level measurement of compound concentrations and isotope ratios that traditional alpha-spectrometry cannot provide. More from Purdue University: http://www.physics.purdue.edu/primelab/introduction/ams.html

Dataset-specific Instrument Name	Colinvaux-Vohnout Livingstone-type rod-operated piston corer
Generic Instrument Name	Piston Corer
Dataset-specific Description	Colinvaux-Vohnout Livingstone-type rod-operated piston corer (Geocore, Columbus, Ohio). Hand-operated sediment coring device.
Generic Instrument Description	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.

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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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