Radionuclides sediment cores collected on the R/V Thomas G. Thompson cruise TT013 in the Equatorial Pacific in 1992 during the U.S. JGOFS Equatorial Pacific (EqPac) project

Website: https://www.bco-dmo.org/dataset/985428
Data Type: Cruise Results
Version: 2
Version Date: 2025-11-18

Project
» U.S. JGOFS Equatorial Pacific (EqPac)

Program
» U.S. Joint Global Ocean Flux Study (U.S. JGOFS)

Contributors	Affiliation	Role
Anderson, Robert F.	Lamont-Doherty Earth Observatory (LDEO)	Principal Investigator
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
This dataset reports measurements of radionuclides detected in sediment core samples collected on the R/V Thomas G. Thompson cruise TT013 in the Equatorial Pacific in 1992 during the U.S. JGOFS Equatorial Pacific (EqPac) project.

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Coverage

Location: Equatorial Pacific
Spatial Extent: **N**:8.925 **E**:-134.9483 **S**:-12.0032 **W**:-140.1493
Temporal Extent: 1992-10 - 1992-12

Dataset Description

Dataset: Radionuclides, sediment cores
PI: Bob Anderson
of: Lamont-Doherty Earth Observatory
Project/cruise: EqPac/TT013, Benthic survey
Ship: R/V Thomas Thompson
Original version date (v1): April 22, 2002

Version 2 of this dataset was processed on November 18, 2025. In this update, four new values for the opal content of sediment have been added to piston core 18,. The principal change is that the number of samples analyzed for piston core 72 is approximately double the number of samples reported previously in version 1.

Methods & Sampling

Radionuclide analytical methodologies, sediment samples
Methodology originally published at: https://usjgofs.whoi.edu/PI-NOTES/Anderson_rad_sed_core.html
January 8, 2002
Bob Anderson, Lamont-Doherty Earth Observatory
EqPac TT013 Benthic Survey

U, Th and Pa were measured by isotope dilution alpha spectrometry; 10Be by accelerator mass spectrometry. The reference that best described the methods followed for measuring U, Th, Pa and 10Be in sediment samples is:

Y. Lao, R.F. Anderson, W.S. Broecker, H.J. Hofmann and W. Wolfli, Particulate fluxes of 230Th, 231Pa, and 10Be in the Northeastern Pacific Ocean, Geochimica Cosmochimica Acta 57(1), 205-217, 1993.

CaCO3 and opal were measured in the Lamont sediment laboratory (a semi-commercial operation) by standard methods (coulometry for CaCO3; spectrophotometry following alkaline leach for opal).

14C ages were obtained by accelerator mass spectrometry using bulk CaCO3 at the US AMS facility in Arizona.

Notes:
Each sample is a one-centimeter sample centered on the depth indicated by the parameter depth_core.

C14 ages were obtained by the University of Arizona Accelerator Mass Spectrometer (AMS) Facility using bulk sediment CaCO3. C14 age values uncorrected.

Error bars for all variables are plus or minus one sigma.

Based on a comparison of Piston core and Trigger core for station/core 32, it appears that about 10 (cm) of sediment was lost from the top of the piston core. Thus core 32, samples at 5.5 and 10.5 (cm) are from trigger core.

BCO-DMO Processing Description

Version History:
Version 1
Version Date 2002-04-22
This dataset was originally processed and published by Cynthia Chandler on 2002-04-22 as part of the JGOFS EqPac Project. The original file name was "rad_sed_core.tsv". This file was accompanied by several metadata files, which are attached here as Supplemental Files.

On 2025-09-29, Shannon Rauch made the following adjustments:
- Imported the original jgofs file "rad_sed_core.tsv" into our current processing system.
- Saved the data file in CSV format as "985428_v1_rad_sed_core.csv".

Version 2
Version Date 2025-11-18
Replaced version 1 file with version 2, in which four new values for the opal content of sediment have been added to piston core 18. The principal change is that the number of samples analyzed for piston core 72 is approximately double the number of samples reported previously for dataset 985428 (V1).
BCO-DMO Processing Steps:
- Imported original, revised file "985428_v2_rad_sed_core.xlsx" into the BCO-DMO system.
- Marked "nd" as a missing data value (missing data are empty/blank in the final CSV file).
- Saved the final file as "985428_v2_rad_sed_core.csv".

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Data Files

File
985428_v2_rad_sed_core.csv (Comma Separated Values (.csv), 45.99 KB) MD5:17f39d364100a0690d176e0dbe712512 Primary data file for dataset ID 985428, version 2

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Related Publications

Bradtmiller, L. I., Anderson, R. F., Fleisher, M. Q., & Burckle, L. H. (2007). Opal burial in the equatorial Atlantic Ocean over the last 30 ka: Implications for glacial-interglacial changes in the ocean silicon cycle. Paleoceanography, 22(4). Portico. https://doi.org/10.1029/2007pa001443
Results

Chase, Z., Anderson, R. F., Fleisher, M. Q., & Kubik, P. W. (2002). The influence of particle composition and particle flux on scavenging of Th, Pa and Be in the ocean. Earth and Planetary Science Letters, 204(1–2), 215–229. https://doi.org/10.1016/s0012-821x(02)00984-6
Results

Hayes, C. T., Anderson, R. F., & Fleisher, M. Q. (2011). Opal accumulation rates in the equatorial Pacific and mechanisms of deglaciation. Paleoceanography, 26(1). Portico. https://doi.org/10.1029/2010pa002008
Results

Lao, Y., Anderson, R. F., Broecker, W. S., Hofmann, H. J., & Wolfli, W. (1993). Particulate fluxes of 230Th, 231Pa, and 10Be in the northeastern Pacific Ocean. Geochimica et Cosmochimica Acta, 57(1), 205–217. https://doi.org/10.1016/0016-7037(93)90479-g
Methods

Pavia, F. J., Wang, S., Middleton, J., Murray, R. W., & Anderson, R. F. (2021). Trace Metal Evidence for Deglacial Ventilation of the Abyssal Pacific and Southern Oceans. Paleoceanography and Paleoclimatology, 36(9). Portico. https://doi.org/10.1029/2021pa004226
Results

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Parameters

Parameter	Description	Units
event	event number from event log	unitless
sta	station number from event log	unitless
lat	latitude, minus value means South	decimal degrees
lon	longitude, minus value means West	decimal degrees
core_type	type of coring instrument used, where gravity means gravity core,multi means multi core, and piston means piston core	unitless
depth_water	water depth where core was collected	meters

depth_core	depth in core, mid-point of interval sampled	centimeters
U238	uranium-238	dpm/gram
U238_err	uranium-238 error, plus/minus one sigma	dpm/gram
Th232	thorium-232	dpm/gram
Th232_err	thorium-232 error, plus/minus one sigma	dpm/gram
Th230	thorium-230	dpm/gram
Th230_err	thorium-230 error, plus/minus one sigma	dpm/gram
Pa231	protactinium-231	dpm/gram
Pa231_err	protactinium-231 error, plus/minus one sigma	dpm/gram
Be10	beryllium-10	atoms/gram
Be10_err	beryllium-10 error, plus/minus one sigma	atoms/gram
CaCO3	calcium carbonate	percent
opal	opal	percent
C14_age	carbon-14 age dating (uncorrected)	years
C14_age_err	carbon-14 age error, plus/minus one sigma	years

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Instruments

Dataset-specific Instrument Name	Accelerator Mass Spectrometer
Generic Instrument Name	Accelerator Mass Spectrometer
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	gravity core
Generic Instrument Name	Gravity Corer
Generic Instrument Description	The gravity corer allows researchers to sample sediment layers at the bottom of lakes or oceans. The coring device is deployed from the ship and gravity carries it to the seafloor. (http://www.whoi.edu/instruments/viewInstrument.do?id=1079).

Dataset-specific Instrument Name	multi core
Generic Instrument Name	Multi Corer
Generic Instrument Description	The Multi Corer is a benthic coring device used to collect multiple, simultaneous, undisturbed sediment/water samples from the seafloor. Multiple coring tubes with varying sampling capacity depending on tube dimensions are mounted in a frame designed to sample the deep ocean seafloor. For more information, see Barnett et al. (1984) in Oceanologica Acta, 7, pp. 399-408.

Dataset-specific Instrument Name	piston core
Generic Instrument Name	Piston Corer
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

TT013

Website	https://www.bco-dmo.org/deployment/57732
Platform	R/V Thomas G. Thompson
Start Date	1992-10-30
End Date	1992-12-13
Description	Purpose: Benthic Survey, 12°N-12°S at 140°W TT013 was one of five cruises conducted in 1992 in support of the U.S. Equatorial Pacific (EqPac) Process Study. The five EqPac cruises aboard R/V Thomas G. Thompson included two repeat meridional sections (12°N - 12°S), 2 equatorial surveys, and a benthic survey (all at 140° W). The scientific objectives of this study were to observe the processes in the Equatorial Pacific controlling the fluxes of carbon and related elements between the atmosphere, euphotic zone, and deep ocean. As luck would have it, the survey window coincided with an El Nino event. A bonus for the research team.

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Project Information

U.S. JGOFS Equatorial Pacific (EqPac)

Website: http://usjgofs.whoi.edu/research/eqpac.html

Coverage: Equatorial Pacific

The U.S. EqPac process study consisted of repeat meridional sections (12°N -12°S) across the equator in the central and eastern equatorial Pacific from 95°W to 170°W during 1992. The major scientific program was focused at 140° W consisting of two meridional surveys, two equatorial surveys, and a benthic survey aboard the R/V Thomas Thompson. Long-term deployments of current meter and sediment trap arrays augmented the survey cruises. NOAA conducted boreal spring and fall sections east and west of 140°W from the R/V Baldridge and R/V Discoverer. Meteorological and sea surface observations were obtained from NOAA's in place TOGA-TAO buoy network.

The scientific objectives of this study were to determine the fluxes of carbon and related elements, and the processes controlling these fluxes between the Equatorial Pacific euphotic zone and the atmosphere and deep ocean. A broad overview of the program at the 140°W site is given by Murray et al. (Oceanography, 5: 134-142, 1992). A full description of the Equatorial Pacific Process Study, including the international context and the scientific results, appears in a series of Deep-Sea Research Part II special volumes:

Topical Studies in Oceanography, A U.S. JGOFS Process Study in the Equatorial Pacific (1995), Deep-Sea Research Part II, Volume 42, No. 2/3.

Topical Studies in Oceanography, A U.S. JGOFS Process Study in the Equatorial Pacific. Part 2 (1996), Deep-Sea Research Part II, Volume 43, No. 4/6.

Topical Studies in Oceanography, A U.S. JGOFS Process Study in the Equatorial Pacific (1997), Deep-Sea Research Part II, Volume 44, No. 9/10.

Topical Studies in Oceanography, The Equatorial Pacific JGOFS Synthesis (2002), Deep-Sea Research Part II, Volume 49, Nos. 13/14.

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Program Information

U.S. Joint Global Ocean Flux Study (U.S. JGOFS)

Website: http://usjgofs.whoi.edu/

Coverage: Global

The United States Joint Global Ocean Flux Study was a national component of international JGOFS and an integral part of global climate change research.

The U.S. launched the Joint Global Ocean Flux Study (JGOFS) in the late 1980s to study the ocean carbon cycle. An ambitious goal was set to understand the controls on the concentrations and fluxes of carbon and associated nutrients in the ocean. A new field of ocean biogeochemistry emerged with an emphasis on quality measurements of carbon system parameters and interdisciplinary field studies of the biological, chemical and physical process which control the ocean carbon cycle. As we studied ocean biogeochemistry, we learned that our simple views of carbon uptake and transport were severely limited, and a new "wave" of ocean science was born. U.S. JGOFS has been supported primarily by the U.S. National Science Foundation in collaboration with the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, the Department of Energy and the Office of Naval Research. U.S. JGOFS, ended in 2005 with the conclusion of the Synthesis and Modeling Project (SMP).

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-9022301

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