

Amino acid compositions in sediment cores collected during 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/2702>

Version: December 17, 2001

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Project

» [U.S. JGOFS Equatorial Pacific](#) (EqPac)

Program

» [U.S. Joint Global Ocean Flux Study](#) (U.S. JGOFS)

Contributors	Affiliation	Role
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Dataset Description

Amino acid compositions in sediment cores

Methods & Sampling

PI: Cindy Lee
of: State University New York, Stony Brook
dataset: Amino acid compositions in sediment cores
dates: October 30, 1992 to December 13, 1992
location: N: 9 S: -12 W: -140 E: -140
project/cruise: EqPac / TT013 - Benthic Survey
ship: R/V Thomas Thompson

Notes:

1. Histidine and serine were not always resolved under the conditions used. Where His is not reported (nd), the Mole% Ser includes both His and Ser.
2. Negative depth_core values indicate the flocculent material just above the top of core.
3. Zeros reflect concentrations or Mole% values that are below detection levels.

US JGOFS EqPac: Chloropigments and Amino Acid Concentrations in Sediment Cores and Traps

Cindy Lee EqPac (cruise 13 for collection of sediment cores) Chloropigments and Amino Acid Concentrations in Sediment Cores and Traps 2.2. Analytical methods
For more detail on this data set, see: Lee, C; Wakeham, S.G.; Hedges, J.L., 2000.
Composition and flux of particulate amino acids and chloropigments in equatorial Pacific seawater and sediments. Deep-Sea Research, 1, 47 (8), 1535-1568.

Deep sediment traps were also deployed between January 1992, and January 1993, on moorings (Honjo et al., 1995) at 9°N, 5°N and 0°. Both IRS-valved traps and valveless (NVC no-valve control) traps collected samples from about 1000 m below the sea surface, while NVC traps collected samples from ~1000 m above the sea floor (mab). Traps were poisoned with mercuric chloride, and retention of poison was verified by salinity measurements. Particulate material collected was split and filtered as for free-drifting traps

Sediment cores were collected during November-December, 1992, from seven stations along the N-S transect using a multiple corer (Barnett et al., 1984). These stations were at 9, 5, 2°N, the equator, and 2, 5 and 12°S. Cores were sectioned aboard ship; similar sediment depth intervals from several cores taken simultaneously were composited and homogenized.

Particulate amino acids were measured by fluorescence high performance liquid chromatography (HPLC) after acid hydrolysis (Lee and Cronin, 1982; 1984). Thawed filters and sediments were hydrolyzed under N₂ at 110degC for 19 h with 6 N HCl to release THAA, total hydrolyzable amino acids in peptide bonds (proteins and peptides) or adsorbed onto particles. Hydrolyzates were dried in vacuo, taken up in water, and the resulting free amino acids were analyzed by HPLC using a modification of the Mopper and Lindroth (1982) o-phthalaldehyde derivative technique. Only one sample was usually available from each site and depth for hydrolysis because of the splitting scheme. Duplicate analyses of the same hydrolyzate agreed within 10-15% except for lysine

(~40%).

We report here results only for chlorophyll-a and some of its immediate degradation products. Chloropigments were extracted from thawed filters into 100% acetone and analyzed by HPLC with fluorescence detection (Mantoura and Llewellyn, 1983; Bidigare et al., 1985). Samples were covered with Al foil as much as possible during handling and analysis to exclude light. Details of our analytical methods appear in Sun and Sun. Here we report data on chlorophyll-a (Chl), pheophytin-a (Phytin), pheophorbide-a (Phide) and pyropheophorbide-a (Pyropheide) fluxes and composition. Monovinyl and divinyl chlorophylls (Bidigare and Ondrusek, 1997) were not separated. Only one sample was usually available from each site and depth for extraction because of the splitting scheme. Duplicate analyses of the same extract agreed within 10%.

Barnett, R.P.O., Watson, J., Connelly, D. 1984. A multiple corer for taking virtually undisturbed samples from shelf, bathyal and abyssal sediments. *Oceanologica Acta* 7, 399-408.

Bidigare, R.R., Kennicutt, M.C., Brookes, J.M. 1985. Rapid determination of chlorophylls and their degradation products by high performance chromatography. *Limnology and Oceanography* 30, 432-435.

Bidigare, R.R., Ondrusek, M.E. 1996. Spatial and temporal variability of phytoplankton pigment distributions in the central equatorial Pacific Ocean. *Deep-Sea Research II* 43, 809-833.

Honjo S., Dymond, J., Collier, R. and Manganini, S.J., 1995. Export production of particles to the interior of the equatorial Pacific Ocean during the 1992 EqPac experiment. *Deep-Sea Research II* 42, pp. 831-870.

Lee, C., Cronin, C. 1982. The vertical flux of particulate organic nitrogen in the sea: decomposition of amino acids in the Peru upwelling area and the equatorial Atlantic. *Journal of Marine Research* 40, 227-251.

Lee, C., Cronin, C. 1984. Particulate amino acids in the sea: Effects of primary productivity and biological decomposition. *Journal of Marine Research* 42, 1075-1097.

Mantoura, R.F.C., Llewellyn, C.A. 1983. The rapid determination of algal chlorophyll and carotenoid pigments and their breakdown products in natural waters by reverse-phase high-performance liquid chromatography. *Analytica Chimica Acta* 151, 297-314.

Mopper, K., Lindroth, P. 1982. Diel and depth variations in dissolved free amino acids and ammonium in the Baltic Sea determined by shipboard HPLC analyses. *Limnology and Oceanography* 27, 336-347

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Data Files

File
amino_core.csv (Comma Separated Values (.csv), 2.35 KB) MD5:1719cb51c46a9f947ab7f32f547f5727
Primary data file for dataset ID 2702

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Parameters

Parameter	Description	Units
lat_n	nominal latitude, minus equals South	degrees
lon_n	nominal longitude, minus equals West	degrees
depth_r	depth range/interval sampled	centimeters
depth_core	average depth (from core top) of sediment sampling interval (negative numbers refer to water or fluff layer above the sediment-water interface)	centimeters
Asp	aspartic acid	mole percent
Glu	glutamic acid	mole percent
Ser	serine	mole percent
His	histidine	mole percent
Gly	glycine	mole percent
Thr	threonine	mole percent
Arg	arginine	mole percent
Ala	alanine	mole percent
Tyr	tyrosine	mole percent
Met	methionine	mole percent
Val	valine	mole percent
p_Ala	phenylalanine	mole percent
Ile	isoleucine	mole percent
Leu	leucine	mole percent
Lys	lysine	mole percent
amino_conc	amino acid concentration	milligrams/gram dry weight

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Instruments

Dataset-specific Instrument Name	High Performance Liquid Chromatography
Generic Instrument Name	High-Performance Liquid Chromatograph
Dataset-specific Description	Fluorescence high performance liquid chromatography (HPLC) was used to measure particulate amino acids.
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.

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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 Baldrige 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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