Amino acid flux data collected from the U.S. JGOFS Eqpac Moored Sediment Trap Array in the Equatorial Pacific in 1992 during the U.S. JGOFS Equatorial Pacific (EqPac) project

Website: https://www.bco-dmo.org/dataset/2620
Version: January 2, 2002
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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 fluxes from moored sediment traps

Methods & Sampling

PI: Cindy Lee
of: State University New York, Stony Brook
dataset: Amino acid fluxes from moored sediment traps
dates: February 3, 1992 to December 13, 1992
location: N: 9 S: 0 W: -140 E: -140
project/cruise: EqPac/W9201B Sediment trap mooring deployment cruise
ship: R/V Wecoma

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.I., 2000. Composition and flux of particulate amino acids and chloropigments in equatorial Pacific seawater and sediments. Deep-Sea Research, I, 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-phthaldialdehyde 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 (Pyrophide) 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 form 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. 831ï¿½870.

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_acids.csv (Comma Separated Values (.csv), 1.12 KB) MD5:77a62de1e1fce51f3c661a0710391f85 Primary data file for dataset ID 2620

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Parameters

Parameter	Description	Units
mooring	mooring identification	
lat_n	nominal latitude, minus = south	degrees
lon_n	nominal longitude, minus = west	degrees
depth_trap	depth of trap	meters
trap_type	type of trap where: IRS = Indented Rotary Sphere NVC = Non-Valve Control	
Asp_f	aspartic acid flux	milligrams/m2/day
Glu_f	glutamic acid flux	milligrams/m2/day
Ser_f	serine flux	milligrams/m2/day
His_f	histidine flux	milligrams/m2/day
Gly_f	glycine flux	milligrams/m2/day
Thr_f	threonine flux	milligrams/m2/day
Arg_f	arginine flux	milligrams/m2/day
Ala_f	alanine flux	milligrams/m2/day
Tyr_f	tyrosine flux	milligrams/m2/day
Met_f	methionine flux	milligrams/m2/day
Val_f	valine flux	milligrams/m2/day
p_Ala_f	phenylalanine flux	milligrams/m2/day
Ile_f	isoleucine flux	milligrams/m2/day
Leu_f	leucine flux	milligrams/m2/day
Lys_f	lysine flux	milligrams/m2/day
amino_flux	sum, amino acid fluxes	milligrams/m2/day

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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.

Dataset-specific Instrument Name	IRS Sediment Trap
Generic Instrument Name	Sediment Trap - IRS
Generic Instrument Description	Sediment traps are specially designed containers deployed in the water column for periods of time to collect particles from the water column falling toward the sea floor. In general a sediment trap has a jar at the bottom to collect the sample and a broad funnel-shaped opening at the top with baffles to keep out very large objects and help prevent the funnel from clogging. The Indented Rotating Sphere (IRS) Sediment Trap is described in Peterson et al. (Field evaluation of a valved sediment trap. 1993. Limnology and Oceanography, 38, pp. 1741-1761 and Novel techniques for collection of sinking particles in the ocean and determining their settling rates. 2005. Limnology and Oceanography Methods 3, pp. 520-532). The IRS trap consists of four cylindrical modules; a particle interceptor, an IRS valve; a skewed funnel, and an eleven sample carousel (designated IRSC trap). The key to the trap design is the patented IRS valve located between the particle interceptor and particle accumulator portions of the trap. The valve and carousel are regulated by a TattleTale IVA (manufactured by Onset Computer Corp.) microprocessor and custom software. The IRS sediment trap was specifically designed to exclude zooplankton (Trull et al. 2008. Deep-Sea Research II v.55 pp. 1684-1695).

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Deployments

EqPac-Array

Website	https://www.bco-dmo.org/deployment/57749
Platform	JGOFS Sediment Trap
Start Date	1992-01-12
End Date	1992-02-08
Description	Sediment Trap Deployments at 140°W that relate to seven locations between 9°N and 12°S

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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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