Counts of pico- and nano-phytoplankton from R/V Thomas G. Thompson cruises TT008, TT012 in the Equatorial Pacific in 1992 during the U.S. JGOFS Equatorial Pacific (EqPac) project

Website: https://www.bco-dmo.org/dataset/2682
Version: October 17, 1995
Version Date: 1995-10-17

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

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

Contributors	Affiliation	Role
DuRand, Michele	Woods Hole Oceanographic Institution (WHOI)	Principal Investigator
Olson, Robert	Woods Hole Oceanographic Institution (WHOI)	Co-Principal Investigator
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Dataset Description

Counts of pico- and nano- phytoplankton

Methods & Sampling

See Platform deployments for cruise specific documentation

Data Processing Description

12 October 1995

Below is a description of the analysis (modified from DuRand, M.D. and R.J. Olson, in press, Contributions of phytoplankton light scattering and cell concentration changes to diel variations in beam attenuation in the equatorial Pacific from flow cytometric measurements of pico-, ultra-, and nanoplankton, Deep-Sea Research):

The eukaryotic phytoplankton were analyzed immediately on board the ship using an EPICS V flow cytometer modified to analyze 50 ml seawater samples at 5-10 ml min-1 (Olson et al., 1991, 1993). Samples were kept at room temperature in the dark until analysis; the surface samples were analyzed first (the upper 45 m samples were analyzed within an hour) and all depths were completed within two hours of collection. During

each cruise the phytoplankton groups were sorted on the flow cytometer and examined microscopically. Typically, the most abundant population of eukaryotic phytoplankton consisted of 1-2 um-diameter coccoid cells (referred to here as the ultraphytoplankton). The population referred to here as the nanophytoplankton primarily consisted of 2-3 um diameter coccoid cells, but also included cells as large as 20 um.

The picoplankton Synechococcus and Prochlorococcus were analyzed on shore from samples preserved with 0.125% glutaraldehyde and stored in liquid nitrogen (Vaulot et al., 1989, Olson et al., 1993), using a high sensitivity configuration of an EPICS 753 flow cytometer (Olson et al., 1993). Synechococcus were distinguished by their high phycoerythrin fluorescence and Prochlorococcus by their low forward light scatter and chlorophyll fluorescence.

Olson, R.J., E.R. Zettler, S.W. Chisholm and J.A. Dusenberry. (1991) Advances in oceanography through flow cytometry, pp. 351-399 in S. Demers (ed.), Particle Analysis in Oceanography, NATO ASI Series G 27, Springer-Verlag, Berlin.

Olson, R.J., E.R. Zettler and M.D. DuRand. (1993) Phytoplankton analysis using flow cytometry, pp. 175-186 in P.F. Kemp, B.F. Sherr, E.B. Sherr and J.J. Cole (eds.), Handbook of Methods in Aquatic Microbial Ecology, Lewis Publishers, Boca Raton.

Vaulot, D., C. Courties and F. Partensky. (1989) A simple method to preserve oceanic phytoplankton for flow cytometric analyses. Cytometry, 10, 629-635.

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Data Files

File
nanoplankton_TT008.csv (Comma Separated Values (.csv), 3.36 KB) MD5:8c424b893ae5836a52ef97a144399e7c version October 17, 1995 Michele DuRand and Rob Olson cell counts of pico and nano phytoplankton Thomas Thompson, cruise TT008 (diel time series)
nanoplankton_TT012.csv (Comma Separated Values (.csv), 5.96 KB) MD5:ca6622052cc8ab5548999b0d75d4d429 version = October 17, 1995 Michele DuRand and Rob Olson cell counts of pico and nano phytoplankton Thomas Thompson, cruise tt012 (diel time series)

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Parameters

Parameter	Description	Units
event	event number from event log	
sta	station number from event log	
cast	CTD rosette cast number from event log.	
diel	diel time series number	
depth_n	nominal depth	meters
bot	CTD rosette bottle number	
coccus_p	Prochlorococcus	cells/milliliter
coccus_s	Synechococcus	cells/milliliter
phyto_e_u	ultra eukaryotic phytoplankton (typically 1-2 um-diameter coccoid cells)	cells/milliliter
phyto_e_n	nano eukaryotic phytoplankton (primarily 2-3 um diameter coccoid cells, but including cells as large as 20 um)	cells/milliliter

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Instruments

Dataset-specific Instrument Name	Niskin Bottle
Generic Instrument Name	Niskin bottle
Dataset-specific Description	CTD clean rosette (Niskin) bottles were used to collect water samples.
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

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Deployments

TT008

Website	https://www.bco-dmo.org/deployment/57729
Platform	R/V Thomas G. Thompson
Start Date	1992-03-19
End Date	1992-04-15
Description	Purpose: Spring Time Series; Equator, 140°W TT008 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. **Methods & Sampling** PI: Michele DuRand, Rob Olson of: Woods Hole Oceanographic Institution dataset: Counts of pico- and nano- phytoplankton dates: April 01, 1992 to April 02, 1992 location: N: 0.0017 S: -0.0037 W: -140.0028 E: -139.996 project/cruise: EqPac/TT008 - Spring Time Series ship: Thomas Thompson PI-Notes on Analysis Niskin bottles from the CTD rosette were sampled during three diel time series on the equator at 140 degrees W (TT008 #1, TT012 #1, and TT012 #2) and were analyzed on a flow cytometer to obtain phytoplankton concentration for cells < 20 um diameter. **Processing Description** 12 October 1995 Below is a description of the analysis (modified from DuRand, M.D. and R.J. Olson, in press, Contributions of phytoplankton light scattering and cell concentration changes to diel variations in beam attenuation in the equatorial Pacific from flow cytometric measurements of pico-, ultra-, and nanoplankton, Deep-Sea Research): The eukaryotic phytoplankton were analyzed immediately on board the ship using an EPICS V flow cytometer modified to analyze 50 ml seawater samples at 5-10 ml min-1 (Olson et al., 1991, 1993). Samples were kept at room temperature in the dark until analysis; the surface samples were analyzed first (the upper 45 m samples were analyzed within an hour) and all depths were completed within two hours of collection. During each cruise the phytoplankton groups were sorted on the flow cytometer and examined microscopically. Typically, the most abundant population of eukaryotic phytoplankton consisted of 1-2 um-diameter coccoid cells (referred to here as the ultraphytoplankton). The population referred to here as the nanophytoplankton primarily consisted of 2-3 um diameter coccoid cells, but also included cells as large as 20 um. The picoplankton Synechococcus and Prochlorococcus were analyzed on shore from samples preserved with 0.125% glutaraldehyde and stored in liquid nitrogen (Vaulot et al., 1989, Olson et al., 1993), using a high sensitivity configuration of an EPICS 753 flow cytometer (Olson et al., 1993). Synechococcus were distinguished by their high phycoerythrin fluorescence and Prochlorococcus by their low forward light scatter and chlorophyll fluorescence. Olson, R.J., E.R. Zettler, S.W. Chisholm and J.A. Dusenberry. (1991) Advances in oceanography through flow cytometry, pp. 351-399 in S. Demers (ed.), Particle Analysis in Oceanography, NATO ASI Series G 27, Springer-Verlag, Berlin. Olson, R.J., E.R. Zettler and M.D. DuRand. (1993) Phytoplankton analysis using flow cytometry, pp. 175-186 in P.F. Kemp, B.F. Sherr, E.B. Sherr and J.J. Cole (eds.), Handbook of Methods in Aquatic Microbial Ecology, Lewis Publishers, Boca Raton. Vaulot, D., C. Courties and F. Partensky. (1989) A simple method to preserve oceanic phytoplankton for flow cytometric analyses. Cytometry, 10, 629-635.

TT012

Website	https://www.bco-dmo.org/deployment/57731
Platform	R/V Thomas G. Thompson
Start Date	1992-09-24
End Date	1992-10-21
Description	Purpose: Fall Time Series; Equator, 140°W TT012 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. **Methods & Sampling** PI: Michele DuRand, Rob Olson of: Woods Hole Oceanographic Institution dataset: Counts of pico- and nano- phytoplankton dates: October 05, 1992 to October 12, 1992 location: N: 0.0522 S: -0.0602 W: -140.062 E: -139.9197 project/cruise: EqPac/TT012 - Fall Time Series ship: Thomas Thompson PI-Notes on Analysis Niskin bottles from the CTD rosette were sampled during three diel time series on the equator at 140 degrees W (TT008 #1, TT012 #1, and TT012 #2) and were analyzed on a flow cytometer to obtain phytoplankton concentration for cells < 20 um diameter. **Processing Description** 12 October 1995 Below is a description of the analysis (modified from DuRand, M.D. and R.J. Olson, in press, Contributions of phytoplankton light scattering and cell concentration changes to diel variations in beam attenuation in the equatorial Pacific from flow cytometric measurements of pico-, ultra-, and nanoplankton, Deep-Sea Research): The eukaryotic phytoplankton were analyzed immediately on board the ship using an EPICS V flow cytometer modified to analyze 50 ml seawater samples at 5-10 ml min-1 (Olson et al., 1991, 1993). Samples were kept at room temperature in the dark until analysis; the surface samples were analyzed first (the upper 45 m samples were analyzed within an hour) and all depths were completed within two hours of collection. During each cruise the phytoplankton groups were sorted on the flow cytometer and examined microscopically. Typically, the most abundant population of eukaryotic phytoplankton consisted of 1-2 um-diameter coccoid cells (referred to here as the ultraphytoplankton). The population referred to here as the nanophytoplankton primarily consisted of 2-3 um diameter coccoid cells, but also included cells as large as 20 um. The picoplankton Synechococcus and Prochlorococcus were analyzed on shore from samples preserved with 0.125% glutaraldehyde and stored in liquid nitrogen (Vaulot et al., 1989, Olson et al., 1993), using a high sensitivity configuration of an EPICS 753 flow cytometer (Olson et al., 1993). Synechococcus were distinguished by their high phycoerythrin fluorescence and Prochlorococcus by their low forward light scatter and chlorophyll fluorescence. Olson, R.J., E.R. Zettler, S.W. Chisholm and J.A. Dusenberry. (1991) Advances in oceanography through flow cytometry, pp. 351-399 in S. Demers (ed.), Particle Analysis in Oceanography, NATO ASI Series G 27, Springer-Verlag, Berlin. Olson, R.J., E.R. Zettler and M.D. DuRand. (1993) Phytoplankton analysis using flow cytometry, pp. 175-186 in P.F. Kemp, B.F. Sherr, E.B. Sherr and J.J. Cole (eds.), Handbook of Methods in Aquatic Microbial Ecology, Lewis Publishers, Boca Raton. Vaulot, D., C. Courties and F. Partensky. (1989) A simple method to preserve oceanic phytoplankton for flow cytometric analyses. Cytometry, 10, 629-635.

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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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