Picoplankton abundances by flow cytometry from R/V Thomas G. Thompson TT043, TT045, TT050, TT054 cruises in the Arabian Sea in 1995 (U.S. JGOFS Arabian Sea project)

Website: https://www.bco-dmo.org/dataset/2524
Version: July 9, 2001
Version Date: 2001-07-09

Project
» U.S. JGOFS Arabian Sea (Arabian Sea)

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

Contributors	Affiliation	Role
Campbell, Lisa	Texas A&M University (TAMU)	Principal Investigator, Co-Principal Investigator
Landry, Michael R.	University of California-San Diego (UCSD-SIO)	Principal Investigator, Co-Principal Investigator
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Dataset Description

Picoplankton abundances by flow cytometry

Methods & Sampling

See Platform deployments for cruise specific documentation

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Parameters

Parameter	Description	Units
event	event number from event log	
sta_std	Arabian Sea standard station identifier	
sta	station number from event log	
cast	CTD rosette cast number from event log	
bot	CTD rosette bottle number	
press	sample depth expressed as pressure	decibars
coccus_s	Synechococcus	cells/milliliter
coccus_p	Prochlorococcus	cells/milliliter
phyto_e_u	ultra eukaryotic phytoplankton	cells/milliliter
bact_het_cyt	heterotrophic bacteria; flow cytometry	cells/milliliter
flag	indicator for suspicious values (S)	
depth_n	nominal sample depth	meters
sample	originators internal sample number	
TON	total organic nitrogen	micromoles/liter

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Instruments

Dataset-specific Instrument Name	Niskin Bottle
Generic Instrument Name	Niskin bottle
Dataset-specific Description	CTD/Niskin Rosette bottles.
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

TT043

Website	https://www.bco-dmo.org/deployment/57704
Platform	R/V Thomas G. Thompson
Report	http://osprey.bcodmo.org/datasetDeployment.cfm?ddid=2580&did=353&flag=view
Start Date	1995-01-08
End Date	1995-02-05
Description	Purpose: Process Cruise #1 (Late NE Monsoon) **Methods & Sampling** PI: Lisa Campbell (University of Hawaii), David Caron (Woods Hole Oceanographic Institution), Michael Landry (University of Hawaii) dataset: Picoplankton abundances by flow cytometry dates: January 09, 1995 to January 31, 1995 location: N: 22.4826 S: 10.0013 W: 57.2999 E: 68.75 project/cruise: Arabian Sea/TTN-043 - Process Cruise 1 (Late NE Monsoon) ship: Thomas Thompson NOTE: The Arabian Sea samples were preserved with 0.33% paraformaldehyde vs. ~1% for EQPAC. Flow cytometry counts were corrected based on counting efficiencies of beads vs. E. coli for EQPAC. Standing Stocks and Microzooplankton Grazing Rates in the Equatorial Pacific Michael R. Landry Standing Stocks (Transect Cruises): Samples will be taken from predawn hydrocasts at each station. Population abundances of bacteria, cyanobacteria (Synechococcus and Prochlorococcus), and chlorophyll-containing nanoplankton will be determined from preserved samples frozen in liquid N and analyzed by flow cytometry (FCM) with internal standards of fluorescent beads. Biomass of nanoplankton will be estimated from calibrated relationships between forward and right-angle light scatter and carbon of cultured phytoplankton. The size structure of pico-plankton will be measured directly (shipboard) on unpreserved samples with a Coulter N4MD submicron particle analyzer. Slides for population and biomass assessment by epifluorescence image analysis will be prepared by us and analyzed by Sieracki et al.; thus constituting an intercomparison of methods. Larger volume samples for rare phytoplankton (e.g., large diatoms and dinoflagellates) and ciliated protozoa will be preserved by us for later microscopical analysis by Sieracki et al. Microzooplankton Grazing Rates: Phytoplankton growth and microzooplankton grazing rates will be estimated for three depth strata (mixed layer mid-euphotic zone, and chlorophyll max) using the dilution assay with fluorescently-labelled prey as an internal standard for relative grazing rates. Rate estimates will be derived from total chlorophyll (fluorometry) and various populations of phytoplankton determination by HPLC pigments (R. Bidigare) and FCM. We will run these experiments at each station on the transect cruises; Sieracki et al. will run dilution experiments on the time-series cruises. Short-term experiments involving uptake of fluorescently-labelled prey, bacteria (FLB) and algae (FLA), will be run at each station to assess grazing rates of different taxa, size-selection by grazers, and the occurrence and rates of algal mixotrophy. FLB-uptake experiments will be run in conjunction with H-thymidine work by D.L. Kirchman and H.W. Ducklow to test the assumption that grazing balances growth rate. Rates will be estimated from the time-course (30--60 min.) of particle uptake by microzooplankton as determined by FCM and epifluorescence microscopy (slides) using formalin-killed samples as controls. Growth and grazing mortalities of heterotrophic and photosynthetic bacterial populations will be independently determined from differences in the rates of change of populations (determined by FCM analysis) in 24-h incubations with and without the prokaryotic inhibitor ampicillin. FLBs will be used as internal controls. Parallel, long-term incubations will also measure the rate of decline of FLAs and will constitute an independent rate estimate of microzooplankton grazing on algae in the nanoplankton size range.

TT045

Website	https://www.bco-dmo.org/deployment/57706
Platform	R/V Thomas G. Thompson
Start Date	1995-03-14
End Date	1995-04-10
Description	**Methods & Sampling** PI: Lisa Campbell (University of Hawaii), David Caron (Woods Hole Oceanographic Institution), Michael Landry (University of Hawaii) dataset: Picoplankton abundances by flow cytometry dates: March 15, 1995 to April 07, 1995 location: N: 22.4853 S: 9.9994 W: 57.3007 E: 68.7532 project/cruise: Arabian Sea/TTN-045 - Process Cruise 2 (Spring intermonsoon) ship: Thomas Thompson NOTE: The Arabian Sea samples were preserved with 0.33% paraformaldehyde vs. ~1% for EQPAC. Flow cytometry counts were corrected based on counting efficiencies of beads vs. E. coli for EQPAC. Standing Stocks and Microzooplankton Grazing Rates in the Equatorial Pacific Michael R. Landry Standing Stocks (Transect Cruises): Samples will be taken from predawn hydrocasts at each station. Population abundances of bacteria, cyanobacteria (Synechococcus and Prochlorococcus), and chlorophyll-containing nanoplankton will be determined from preserved samples frozen in liquid N and analyzed by flow cytometry (FCM) with internal standards of fluorescent beads. Biomass of nanoplankton will be estimated from calibrated relationships between forward and right-angle light scatter and carbon of cultured phytoplankton. The size structure of pico-plankton will be measured directly (shipboard) on unpreserved samples with a Coulter N4MD submicron particle analyzer. Slides for population and biomass assessment by epifluorescence image analysis will be prepared by us and analyzed by Sieracki et al.; thus constituting an intercomparison of methods. Larger volume samples for rare phytoplankton (e.g., large diatoms and dinoflagellates) and ciliated protozoa will be preserved by us for later microscopical analysis by Sieracki et al. Microzooplankton Grazing Rates: Phytoplankton growth and microzooplankton grazing rates will be estimated for three depth strata (mixed layer mid-euphotic zone, and chlorophyll max) using the dilution assay with fluorescently-labelled prey as an internal standard for relative grazing rates. Rate estimates will be derived from total chlorophyll (fluorometry) and various populations of phytoplankton determination by HPLC pigments (R. Bidigare) and FCM. We will run these experiments at each station on the transect cruises; Sieracki et al. will run dilution experiments on the time-series cruises. Short-term experiments involving uptake of fluorescently-labelled prey, bacteria (FLB) and algae (FLA), will be run at each station to assess grazing rates of different taxa, size-selection by grazers, and the occurrence and rates of algal mixotrophy. FLB-uptake experiments will be run in conjunction with H-thymidine work by D.L. Kirchman and H.W. Ducklow to test the assumption that grazing balances growth rate. Rates will be estimated from the time-course (30--60 min.) of particle uptake by microzooplankton as determined by FCM and epifluorescence microscopy (slides) using formalin-killed samples as controls. Growth and grazing mortalities of heterotrophic and photosynthetic bacterial populations will be independently determined from differences in the rates of change of populations (determined by FCM analysis) in 24-h incubations with and without the prokaryotic inhibitor ampicillin. FLBs will be used as internal controls. Parallel, long-term incubations will also measure the rate of decline of FLAs and will constitute an independent rate estimate of microzooplankton grazing on algae in the nanoplankton size range.

TT050

Website	https://www.bco-dmo.org/deployment/57711
Platform	R/V Thomas G. Thompson
Start Date	1995-08-18
End Date	1995-09-15
Description	**Methods & Sampling** PI: Michael Landry and Lisa Campbell of: University of Hawaii dataset: Picoplankton population estimates dates: August 18, 1995 to September 13, 1995 location: N: 22.4688 S: 9.9586 W: 57.3004 E: 68.7494 project/cruise: Arabian Sea/TTN-050 - Process Cruise 5 (Late SW Monsoon) ship: Thomas Thompson NOTE: The Arabian Sea samples were preserved with 0.33% paraformaldehyde vs. ~1% for EQPAC. Flow cytometry counts were corrected based on counting efficiencies of beads vs. E. coli for EQPAC. PI-Note: An incorrect volume was used for event 08282130 in the original data. The corrected data (version January 11, 1999) reflect this calculation correction. Standing Stocks and Microzooplankton Grazing Rates in the Equatorial Pacific Michael R. Landry Standing Stocks (Transect Cruises): Samples will be taken from predawn hydrocasts at each station. Population abundances of bacteria, cyanobacteria (Synechococcus and Prochlorococcus), and chlorophyll-containing nanoplankton will be determined from preserved samples frozen in liquid N and analyzed by flow cytometry (FCM) with internal standards of fluorescent beads. Biomass of nanoplankton will be estimated from calibrated relationships between forward and right-angle light scatter and carbon of cultured phytoplankton. The size structure of pico-plankton will be measured directly (shipboard) on unpreserved samples with a Coulter N4MD submicron particle analyzer. Slides for population and biomass assessment by epifluorescence image analysis will be prepared by us and analyzed by Sieracki et al.; thus constituting an intercomparison of methods. Larger volume samples for rare phytoplankton (e.g., large diatoms and dinoflagellates) and ciliated protozoa will be preserved by us for later microscopical analysis by Sieracki et al. Microzooplankton Grazing Rates: Phytoplankton growth and microzooplankton grazing rates will be estimated for three depth strata (mixed layer mid-euphotic zone, and chlorophyll max) using the dilution assay with fluorescently-labelled prey as an internal standard for relative grazing rates. Rate estimates will be derived from total chlorophyll (fluorometry) and various populations of phytoplankton determination by HPLC pigments (R. Bidigare) and FCM. We will run these experiments at each station on the transect cruises; Sieracki et al. will run dilution experiments on the time-series cruises. Short-term experiments involving uptake of fluorescently-labelled prey, bacteria (FLB) and algae (FLA), will be run at each station to assess grazing rates of different taxa, size-selection by grazers, and the occurrence and rates of algal mixotrophy. FLB-uptake experiments will be run in conjunction with H-thymidine work by D.L. Kirchman and H.W. Ducklow to test the assumption that grazing balances growth rate. Rates will be estimated from the time-course (30--60 min.) of particle uptake by microzooplankton as determined by FCM and epifluorescence microscopy (slides) using formalin-killed samples as controls. Growth and grazing mortalities of heterotrophic and photosynthetic bacterial populations will be independently determined from differences in the rates of change of populations (determined by FCM analysis) in 24-h incubations with and without the prokaryotic inhibitor ampicillin. FLBs will be used as internal controls. Parallel, long-term incubations will also measure the rate of decline of FLAs and will constitute an independent rate estimate of microzooplankton grazing on algae in the nanoplankton size range.

TT054

Website	https://www.bco-dmo.org/deployment/57715
Platform	R/V Thomas G. Thompson
Start Date	1995-11-30
End Date	1995-12-28
Description	**Methods & Sampling** PI: Michael Landry and Lisa Campbell of: University of Hawaii dataset: Picoplankton population estimates dates: November 30, 1995 to December 26, 1995 location: N: 22.5171 S: 9.9789 W: 57.2992 E: 68.7849 project/cruise: Arabian Sea/TTN-054 - Process Cruise 7 (Early NE Monsoon) ship: Thomas Thompson NOTE: The Arabian Sea samples were preserved with 0.33% paraformaldehyde vs. ~1% for EQPAC. Flow cytometry counts were corrected based on counting efficiencies of beads vs. E. coli for EQPAC. Standing Stocks and Microzooplankton Grazing Rates in the Equatorial Pacific Michael R. Landry Standing Stocks (Transect Cruises): Samples will be taken from predawn hydrocasts at each station. Population abundances of bacteria, cyanobacteria (Synechococcus and Prochlorococcus), and chlorophyll-containing nanoplankton will be determined from preserved samples frozen in liquid N and analyzed by flow cytometry (FCM) with internal standards of fluorescent beads. Biomass of nanoplankton will be estimated from calibrated relationships between forward and right-angle light scatter and carbon of cultured phytoplankton. The size structure of pico-plankton will be measured directly (shipboard) on unpreserved samples with a Coulter N4MD submicron particle analyzer. Slides for population and biomass assessment by epifluorescence image analysis will be prepared by us and analyzed by Sieracki et al.; thus constituting an intercomparison of methods. Larger volume samples for rare phytoplankton (e.g., large diatoms and dinoflagellates) and ciliated protozoa will be preserved by us for later microscopical analysis by Sieracki et al. Microzooplankton Grazing Rates: Phytoplankton growth and microzooplankton grazing rates will be estimated for three depth strata (mixed layer mid-euphotic zone, and chlorophyll max) using the dilution assay with fluorescently-labelled prey as an internal standard for relative grazing rates. Rate estimates will be derived from total chlorophyll (fluorometry) and various populations of phytoplankton determination by HPLC pigments (R. Bidigare) and FCM. We will run these experiments at each station on the transect cruises; Sieracki et al. will run dilution experiments on the time-series cruises. Short-term experiments involving uptake of fluorescently-labelled prey, bacteria (FLB) and algae (FLA), will be run at each station to assess grazing rates of different taxa, size-selection by grazers, and the occurrence and rates of algal mixotrophy. FLB-uptake experiments will be run in conjunction with H-thymidine work by D.L. Kirchman and H.W. Ducklow to test the assumption that grazing balances growth rate. Rates will be estimated from the time-course (30--60 min.) of particle uptake by microzooplankton as determined by FCM and epifluorescence microscopy (slides) using formalin-killed samples as controls. Growth and grazing mortalities of heterotrophic and photosynthetic bacterial populations will be independently determined from differences in the rates of change of populations (determined by FCM analysis) in 24-h incubations with and without the prokaryotic inhibitor ampicillin. FLBs will be used as internal controls. Parallel, long-term incubations will also measure the rate of decline of FLAs and will constitute an independent rate estimate of microzooplankton grazing on algae in the nanoplankton size range.

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Project Information

U.S. JGOFS Arabian Sea (Arabian Sea)

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

Coverage: Arabian Sea

The U.S. Arabian Sea Expedition which began in September 1994 and ended in January 1996, had three major

components: a U.S. JGOFS Process Study, supported by the National Science Foundation (NSF); Forced Upper Ocean Dynamics, an Office of Naval Research (ONR) initiative; and shipboard and aircraft measurements supported by the National Aeronautics and Space Administration (NASA). The Expedition consisted of 17 cruises aboard the R/V Thomas Thompson, year-long moored deployments of five instrumented surface buoys and five sediment-trap arrays, aircraft overflights and satellite observations. Of the seventeen ship cruises, six were allocated to repeat process survey cruises, four to SeaSoar mapping cruises, six to mooring and benthic work, and a single calibration cruise which was essentially conducted in transit to the Arabian Sea.

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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
National Science Foundation (NSF)	unknown Arabian Sea NSF

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