Zooplankton wet weight and displacement volume, Bongo net tows from R/V Thomas G. Thompson TT043, TT045 cruises in the Arabian Sea in 1995 (U.S. JGOFS Arabian Sea project)

Website: https://www.bco-dmo.org/dataset/2985
Version: June 25, 1998
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Project
» U.S. JGOFS Arabian Sea (Arabian Sea)

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

Contributors	Affiliation	Role
Wishner, Karen	University of Rhode Island (URI-GSO)	Principal Investigator
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Dataset Description

Zooplankton wet weight and displacement volume, Bongo net tows

Methods & Sampling

See Platform deployments for cruise specific documentation

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Parameters

Parameter	Description	Units
event	unique event identifier	MMDDHHmm
sta_std	Arabian Sea standard station identifier	
sta	station number, from event log	
tow	tow number	
depth_tow	depth of plankton tow	
net_mesh	micron mesh size	153 or 335 micron mesh
vol_filt	volume filtered	cubic meters
zp_ww	wet weight	mg per m3
zp_disp_vol	displacement volume	ml per m3

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Instruments

Dataset-specific Instrument Name	Bongo Nets
Generic Instrument Name	Bongo Net
Generic Instrument Description	A Bongo Net consists of paired plankton nets, typically with a 60 cm diameter mouth opening and varying mesh sizes, 10 to 1000 micron. The Bongo Frame was designed by the National Marine Fisheries Service for use in the MARMAP program. It consists of two cylindrical collars connected with a yoke so that replicate samples are collected at the same time. Variations in models are designed for either vertical hauls (OI-2500 = NMFS Pairovet-Style, MARMAP Bongo, CalVET) or both oblique and vertical hauls (Aquatic Research). The OI-1200 has an opening and closing mechanism that allows discrete "known-depth" sampling. This model is large enough to filter water at the rate of 47.5 m3/minute when towing at a speed of two knots. More information: Ocean Instruments, Aquatic Research, Sea-Gear

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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
	Purpose: Process Cruise #1 (Late NE Monsoon) **Methods & Sampling** PI: Karen Wishner (University of Rhode Island), Marcia Gowing (University of California- Santa Cruz) dataset: Zooplankton wet weight and displacement volume, bongo net tows dates: January 12, 1995 to January 29, 1995 location: N: 19.1021 S: 10.0025 W: 58.0247 E: 68.7495 project: Arabian Sea cruise: TTN-043, Process 1, Winter monsoon ship: R/V Thomas

Description	Thompson PIs: Karen Wishner (URI), Marcia Gowing (UCSC) Data Base Organizer and Chief Technician: Celia Gelfman Assistants: Chelsea Donovan, Heidi Franklin, Maureen Koneval, Lauren Lankau, John Maccario, Jennifer Saltzman, Dorothee Schreiber, Cynthia Venn, Kathleen Vignes. Samples were collected with a double 1 m2 MOCNESS (two 1 m2 MOCNESS systems side-by-side), a multiple opening-closing net system with environmental sensors and control of the nets from shipboard (Wiebe et al. 1976, 1985). The nets were 153 micron mesh with a 1 m2 mouth opening (when towed at a 45 degree angle). The net was towed usually at 1.5 - 2.5 kts behind the ship. Wire was payed out at 10 - 25 m/min and hauled in at 5 - 20 m/min. Environmental data from the MOCNESS included time, depth, temperature (Sea-Bird SBE 3), salinity (Sea-Bird SBE 4), light transmission (SeaTech 25 cm beam transmissometer), and oxygen (Sea-Bird SBE 13). The volume filtered through each net was determined by the MOCNESS program, taking into account flow past the system (measured with a modified TSK flowmeter mounted on the net frame) and the towing angle. In some cases, the volume filtered per time from trouble-free portions of a tow was extrapolated to time intervals with electronic problems. Usually 16 discrete samples were collected in an oblique haul from about 1000 m to the surface. Typically a day and a night tow were taken at each of the six long stations during four seasonally-spaced process cruises (TN043, TN045, TN050, TN054). Occasional additional tows and samples to deeper depths were also done. During the monsoon cruise (TN050), there were often problems with knotted or ripped nets because of the rough seas; data from this cruise should be treated with caution. Tow times and geographic locations can be found in the cruise event log. Cod ends were placed on ice immediately after retrieval. Nets were hosed down with filtered (nominally 2 micron) seawater. For most day tows, the entire sample was preserved in 4% borate-buffered formaldehyde. For most night tows, the samples were split in a NMFS-style (flat-bottomed) plankton splitter. Half the sample was preserved as above for displacement volumes, wet weights, and distributions; one quarter (or the entire remaining half for very small samples and for surface samples) was set aside in a refrigerator for dry weight and CHN subsampling several hours later; and one quarter (when available) was preserved in paraformaldehyde for electron microscopy of zooplankton gut contents. For dry weights, the sample was size-fractionated through a sieve series (2000, 1000, 505, 202 micron) and each size fraction was resuspended in a known volume of filtered seawater. Aliquots were taken with a Stempel piston pipette, filtered onto combusted pre-weighed GF/D 25 mm glass fiber filters, rinsed with distilled water, loosely wrapped in aluminum foil, placed in an oven (60 degrees C) for several days, and stored in a desiccator for shipment home. Two replicates were done for each size fraction. Four blanks (aliquots of filtered seawater treated as above) were done for each tow. In the lab, filters were dried in an oven (60 degrees C) for 8 - 10 hr, weighed for dry weight on a Cahn microbalance, ashed in a muffle furnace (500 degrees C) for 4 hr, and weighed for ash. For dry weights, the pre-cruise filter weight and the mean dry weight blank for the cruise (a single value for each cruise) were subtracted from the measured post-cruise dry weights. The ash-free dry weight was calculated as the post-cruise dry weight minus the post-cruise ash weight and the cruise mean ash weight blank. For carbon values, a conversion factor from the literature was used [log (dry weight) = 0.499 + 0.991 (log carbon)] (Wiebe et al. 1975, Wiebe 1988). The mean of the 2 replicate filters from each sample was used. In cases where no measurements were made and in cases where the weight of a filter with sample was less than the blank and pre-cruise filter weight, the data were recorded as ND (no data). Carbon values from CHN measurements were also obtained by Roman from some of these same samples in the upper 200 m on cruises TN043, TN045, and TN050. Displacement volumes and wet weights were measured several months after the cruise on preserved samples. Either the entire sample or a half split was used. Large singular organisms (large fish or jellyfish) were removed beforehand. Displacement volumes were done with no size fractionation. Wet weights were done on the large (> 2 mm) and small (< 2 mm) size fractions after separation by sieving. Bongo tows were taken at many of the hydro and intermediate stations, as well as the long stations. Wishner's bongo frame (used on TN043, TN045, and the beginning of TN050) had mouth openings of 61 cm, used one net with 153 micron mesh and one with 335 micron mesh, and had a General Oceanics counter flowmeter in each mouth opening. A Wildlife Systems electronic time-depth recorder was attached to the frame. Oblique tows from the starboard side were done to about 200 m depth at about 1.5 - 2 kts. Wire was payed out at 30 m/min and hauled in at 20 m/min. Half of each sample was preserved for displacement volume and distributional measurements, while the other half was used for dry weight, ash-free dry weight, and carbon analyses (and CHN analyses by Roman on the 153 micron mesh net sample) as described above. In the Zooplankton Biomass--MOCNESS and Bongo files, data are presented as mmoles of carbon for each size fraction and for the sum of all size fractions, totaled within the indicated depth range (per m2). For some MOCNESS tows, depth intervals with missing data were represented as the mean of the

	biomass in the samples immediately above and below in order to calculate a value for the total depth range. References: Wiebe, P.H. 1988. Functional regression equations for zooplankton displacement volume, wet weight, dry weight, and carbon: a correction. Fish. Bull. U.S. 86:833-835. Wiebe, P.H., S.H. Boyd, and J.L. Cox. 1975. Relationships between zooplankton displacement volume, wet weight, dry weight, and carbon. Fish. Bull. U.S. 73:777-786. Wiebe, P.H., K.H. Burt, S.H. Boyd, and A.W. Morton. 1976. A multiple opening-closing net and environmental sensing system for sampling zooplankton. J. Mar. Res. 34:312-326. Wiebe, P.H., A.W. Morton, A.M. Bradley, J.E. Craddock, T.J. Cowles, V.A. Barber, R.H. Backus, and G.R. Flierl. 1985. New developments in the MOCNESS, an apparatus for sampling zooplankton and micronekton. Mar. Biol. 87:313-323.

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: Karen Wishner (University of Rhode Island), Marcia Gowing (University of California- Santa Cruz) dataset: Zooplankton wet weight and displacement volume, bongo net tows dates: January 12, 1995 to January 29, 1995 location: N: 19.1021 S: 10.0025 W: 58.0247 E: 68.7495 project: Arabian Sea cruise: TTN-045, Process 2, Spring Intermonsoon ship: R/V Thomas Thompson PIs: Karen Wishner (URI), Marcia Gowing (UCSC) Data Base Organizer and Chief Technician: Celia Gelfman Assistants: Chelsea Donovan, Heidi Franklin, Maureen Koneval, Lauren Lankau, John Maccario, Jennifer Saltzman, Dorothee Schreiber, Cynthia Venn, Kathleen Vignes. Samples were collected with a double 1 m2 MOCNESS (two 1 m2 MOCNESS systems side-by-side), a multiple opening-closing net system with environmental sensors and control of the nets from shipboard (Wiebe et al. 1976, 1985). The nets were 153 micron mesh with a 1 m2 mouth opening (when towed at a 45 degree angle). The net was towed usually at 1.5 - 2.5 kts behind the ship. Wire was payed out at 10 - 25 m/min and hauled in at 5 - 20 m/min. Environmental data from the MOCNESS included time, depth, temperature (Sea-Bird SBE 3), salinity (Sea-Bird SBE 4), light transmission (SeaTech 25 cm beam transmissometer), and oxygen (Sea-Bird SBE 13). The volume filtered through each net was determined by the MOCNESS program, taking into account flow past the system (measured with a modified TSK flowmeter mounted on the net frame) and the towing angle. In some cases, the volume filtered per time from trouble-free portions of a tow was extrapolated to time intervals with electronic problems. Usually 16 discrete samples were collected in an oblique haul from about 1000 m to the surface. Typically a day and a night tow were taken at each of the six long stations during four seasonally-spaced process cruises (TN043, TN045, TN050, TN054). Occasional additional tows and samples to deeper depths were also done. During the monsoon cruise (TN050), there were often problems with knotted or ripped nets because of the rough seas; data from this cruise should be treated with caution. Tow times and geographic locations can be found in the cruise event log. Cod ends were placed on ice immediately after retrieval. Nets were hosed down with filtered (nominally 2 micron) seawater. For most day tows, the entire sample was preserved in 4% borate-buffered formaldehyde. For most night tows, the samples were split in a NMFS-style (flat-bottomed) plankton splitter. Half the sample was preserved as above for displacement volumes, wet weights, and distributions; one quarter (or the entire remaining half for very small samples and for surface samples) was set aside in a refrigerator for dry weight and CHN subsampling several hours later; and one quarter (when available) was preserved in paraformaldehyde for electron microscopy of zooplankton gut contents. For dry weights, the sample was size-fractionated through a sieve series (2000, 1000, 505, 202 micron) and each size fraction was resuspended in a known volume of filtered seawater. Aliquots were taken with a Stempel piston pipette, filtered onto combusted pre-weighed GF/D 25 mm glass fiber filters, rinsed with distilled water, loosely wrapped in aluminum foil, placed in an oven (60 degrees C) for several days, and stored in a desiccator for shipment home. Two replicates were done for each size fraction. Four blanks (aliquots of filtered seawater treated as above) were done for each tow. In the lab, filters were dried in an oven (60 degrees C) for 8 - 10 hr, weighed for dry weight on a Cahn microbalance, ashed in a muffle furnace (500 degrees C) for 4 hr, and weighed for ash. For dry weights, the pre-cruise filter weight and the mean dry

	weight blank for the cruise (a single value for each cruise) were subtracted from the measured post-cruise dry weights. The ash-free dry weight was calculated as the post-cruise dry weight minus the post-cruise ash weight and the cruise mean ash weight blank. For carbon values, a conversion factor from the literature was used [log (dry weight) = 0.499 + 0.991 (log carbon)] (Wiebe et al. 1975, Wiebe 1988). The mean of the 2 replicate filters from each sample was used. In cases where no measurements were made and in cases where the weight of a filter with sample was less than the blank and pre-cruise filter weight, the data were recorded as ND (no data). Carbon values from CHN measurements were also obtained by Roman from some of these same samples in the upper 200 m on cruises TN043, TN045, and TN050. Displacement volumes and wet weights were measured several months after the cruise on preserved samples. Either the entire sample or a half split was used. Large singular organisms (large fish or jellyfish) were removed beforehand. Displacement volumes were done with no size fractionation. Wet weights were done on the large (> 2 mm) and small (< 2 mm) size fractions after separation by sieving. Bongo tows were taken at many of the hydro and intermediate stations, as well as the long stations. Wishner's bongo frame (used on TN043, TN045, and the beginning of TN050) had mouth openings of 61 cm, used one net with 153 micron mesh and one with 335 micron mesh, and had a General Oceanics counter flowmeter in each mouth opening. A Wildlife Systems electronic time-depth recorder was attached to the frame. Oblique tows from the starboard side were done to about 200 m depth at about 1.5 - 2 kts. Wire was payed out at 30 m/min and hauled in at 20 m/min. Half of each sample was preserved for displacement volume and distributional measurements, while the other half was used for dry weight, ash-free dry weight, and carbon analyses (and CHN analyses by Roman on the 153 micron mesh net sample) as described above. In the Zooplankton Biomass--MOCNESS and Bongo files, data are presented as mmoles of carbon for each size fraction and for the sum of all size fractions, totaled within the indicated depth range (per m2). For some MOCNESS tows, depth intervals with missing data were represented as the mean of the biomass in the samples immediately above and below in order to calculate a value for the total depth range. References: Wiebe, P.H. 1988. Functional regression equations for zooplankton displacement volume, wet weight, dry weight, and carbon: a correction. Fish. Bull. U.S. 86:833-835. Wiebe, P.H., S.H. Boyd, and J.L. Cox. 1975. Relationships between zooplankton displacement volume, wet weight, dry weight, and carbon. Fish. Bull. U.S. 73:777-786. Wiebe, P.H., K.H. Burt, S.H. Boyd, and A.W. Morton. 1976. A multiple opening-closing net and environmental sensing system for sampling zooplankton. J. Mar. Res. 34:312-326. Wiebe, P.H., A.W. Morton, A.M. Bradley, J.E. Craddock, T.J. Cowles, V.A. Barber, R.H. Backus, and G.R. Flierl. 1985. New developments in the MOCNESS, an apparatus for sampling zooplankton and micronekton. Mar. Biol. 87:313-323.

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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
NSF Division of Ocean Sciences (NSF OCE)	OCE-9310591

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