BONGO net tow zooplankton abundance estimates from R/V New Horizon cruise NH1008 in Monterey Bay, near MBARI buoy M1 (36.747?N, 122.022?W); 2010 (GATEKEEPERS project)

Website: https://www.bco-dmo.org/dataset/540939
Version: 24 November 2014
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Project
» Zooplankton feeding at the base of the particle maximum: Gatekeepers of the Vertical Flux? (GATEKEEPERS)

Contributors	Affiliation	Role
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Dataset Description

The abundance (# m^{-3}, ppm) for selected taxa in each analyzed BONGO deployment.

Related reference:
Dagg, M.J., G.A. Jackson, and D.M. Checkley, Jr. (in press). The distribution and vertical flux of fecal pellets from large zooplankton in Monterey Bay and coastal California." *Deep-Sea Research Part I.*

Methods & Sampling

Sample Collection:
Samples were collected using a 71-cm diameter Bongo net with 505-micron-mesh nets with calibrated flow meter. Tow speed was generally 0.5-1 m sec^{-1}. Wire angle and wire out were used to conduct oblique tows from the surface to 100m to the surface.

Data Processing Description

Sample Analysis:
Samples were split multiple times using a Folsom splitter. Specific taxa were identified and enumerated in one or more splits using a dissecting microscope. Equivalent spherical diameter (ESD) was estimated from length and width and assuming a geometric shape for discretely sized taxa (*Calanus pacificus* adult females, adult males, and fifth copepodites: C.pac AF, AM, C5; *Metridia pacifica* adult females: M.pac AF; *Euclanus californicus*

adult males, adult females, and fourth and fifth copepodites: E.cal AF, AM, C4,C5). For other taxa (other large cops, euphausiids, and small zooplankton), mean ESD was calculated when present. Mean volume was calculated from mean ESD for each taxon using the equation ⅙π (mean ESD)^3. Abundance of each taxon was calculated by multiplying counts by their corresponding split factors and dividing by the sum volume filtered. Mean volume was multiplied by abundance for each taxon to calculate volume in cm^3m^{-3} or ppm. Number of individuals measured and counted in each taxonomic group was retained to display where low counts produce uncertainty in calculations.

BCO-DMO Processing Notes
- Generated from original file: "NH1008_BG_zoop_16sept13_jfb_no_header.xlsx" contributed by David Checkley
- Parameter names edited to conform to BCO-DMO naming convention found at Choosing Parameter Name
- "BONGO_" pre-pended to Tow Id for consistency with BONGO stations tow ids
- Date/Time and Lat/Lon deployed added to each record from BONGO stations to enable use in MapServer

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Data Files

File
BONGO_Zoop.csv (Comma Separated Values (.csv), 17.29 KB) MD5:2dafdd2172d53ffceda5f2b087f51c19 Primary data file for dataset ID 540939

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Parameters

Parameter	Description	Units
Taxon	Taxon enumerated in respective net tow	text
BONGO_Tow	Sequential number of BONGO deployment	Dimensionless
Date_Deployed	Deployment Date (PDT)	YYYYMMDD
Time_Deployed	Deployment Time (PDT)	HHMM
Latitude_Deployed	Deployment Latitude (South is negative)	decimal degrees
Longitude_Deployed	Deployment Longitude (West is negative)	decimal degrees
zl	Estimated deepest depth of tow	meters
zu	Upper depth (in this case the surface)	meters
Abund	Numerical abundance averaged over depth of tow	individuals m-3
Vol	Volumetric abundance averaged over depth of tow	ppm
Number_Measured	Number of individuals measured to estimate mean Equivalent Spherical Diameter (ESD)	individuals
Number_Counted	Number of individuals counted to estimate abundance	individuals

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Instruments

Dataset-specific Instrument Name	Bongo Net
Generic Instrument Name	Bongo Net
Dataset-specific Description	Samples were collected using a 71-cm diameter Bongo net with 505-micron-mesh nets with calibrated flow meter. Tow speed was generally 0.5-1 m sec-1. Wire angle and wire out were used to conduct oblique tows from the surface to 100m to the surface.
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

Dataset-specific Instrument Name	Folsom Splitter
Generic Instrument Name	Folsom Plankton Splitter
Dataset-specific Description	Samples were split multiple times using a Folsom splitter.
Generic Instrument Description	A device for sub-sampling of plankton and ichthyoplankton samples by splitting, developed by Dr. Folsom of the Scripps Institute of Oceanography. Ideally suited for splitting plankton samples with minimal debris. A measured volume of plankton sample is placed in the undivided section of the drum. This is rotated 120 degrees to divide the stirred sample with a separating blade. Standard Methods suggests splitting until a subsample of 200-500 individuals is obtained.

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Deployments

NH1008

Website	https://www.bco-dmo.org/deployment/58852
Platform	R/V New Horizon
Report	http://bcodata.whoi.edu/GATEKEEPERS/cruise_plan_checkley_nh_8_25_jul_10_v3.pdf
Start Date	2010-07-08
End Date	2010-07-25
Description	Collaborative Research: Zooplankton at the Base of the Particle Maximum: Gatekeepers of the Vertical Flux?: Deployment and recovery of SOLOPCs in Monterey Bay, plus CTD and MOCNESS deployments in Monterey Bay Cruise information and original data are available from the NSF R2R data catalog. Figure 1. R/V New Horizon Cruise NH1008 GATEKEEPERS [click on the image to view a larger version]

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Project Information

Zooplankton feeding at the base of the particle maximum: Gatekeepers of the Vertical Flux? (GATEKEEPERS)

Website: http://iod.ucsd.edu/gatekeeper/

Coverage: Monterey Bay, CA and waters offshore

Zooplankton feeding at the base of the particle maximum: Gatekeepers of the Vertical Flux?

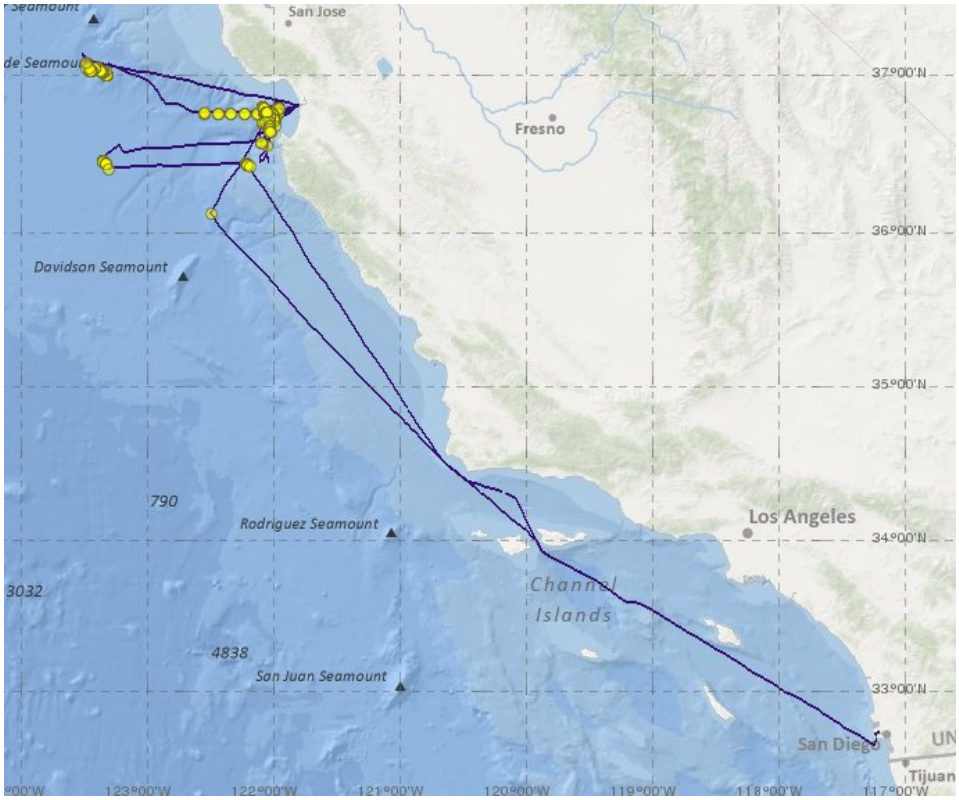
A range of observations suggest that zooplankton act as gatekeepers for material leaving the euphotic zone. This study will investigate the interactions of zooplankton with other particles using a suite of autonomous and tethered instruments in conjunction with finescale water sampling. The SOLOPC (Sounding Oceanographic Observer with Laser Optical Plankton Counter) will be the autonomous instrument and provide hourly profiles of zooplankton and other particles. Previous sampling with the SOLOPC indicated a diel cycle of production and abundance of particles in the euphotic zone and their sinking and consumption, presumably by zooplankton observed at the base of the particle abundance maximum. The SOLOPC senses particles, including zooplankton and aggregates, and measures their equivalent spherical diameters which can be used to compute particle size spectra. However, it is difficult to use the SOLOPC to distinguish among particle types, such as copepods, larvaceans, and aggregates, particularly if they are small. The research will include an intensive field study that will take place in Monterey Bay and use adaptive sampling to observe near SOLOPCs with a new, AUV-borne imaging system, ship-based CTD and MOCNESS sampling, and MBARI's ROV Ventana. The investigators will alter a SOLOPC to be stationary relative to an isopycnal and use the particle counts that it accumulates to calculate a flux spectrum. They will combine the flux and concentration spectra to estimate particle sinking velocities as a function of particle diameter. Zooplankton feeding in the water column will be estimated by analyzing the gut fluorescence of animals caught in zooplankton nets and by counting the distribution of fecal pellets in water samples. Results will enhance the understanding of the role of the zooplankton as gatekeepers in the vertical flux of particles and, hence, the biological pump. The study will also provide new insight into factors that affect zooplankton behavior and ecology.

Collaborating institutions include SIO, TAMU, LUMCON, MBARI, BIO, and Université Paris VI. The SOLOPC, modified to measure flux as well as profile, and REFLICS are intended for acquisition and use by other researchers worldwide. The understanding we gain of role of the zooplankton as gatekeepers of the vertical flux will contribute valuably to understanding of the biological pump and the carbon cycle.

PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

Jackson, GA and DM Checkley Jr. "Particle size distributions in the upper 100 m water column and their implications for animal feeding in the plankton," *Deep-Sea Research*, 2011.

Figure 1. R/V New Horizon Cruise NH1008 GATEKEEPERS
[click on the image to view a larger version]



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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0927863
NSF Division of Ocean Sciences (NSF OCE)	OCE-0928139
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