Summary deployment data for MOCNESS 1m2 and 10m2 tows from R/V Kilo Moana KM1407, KM1418, KM1506 in the Central North Pacific, Station ALOHA from 2014-2015 (SuspendSinkPart project)

Website: https://www.bco-dmo.org/dataset/636602
Data Type: Cruise Results
Version: final
Version Date: 2016-01-27

Project
» Evaluating the relative importance of suspended and sinking particles to the meso and bathypelagic food web in the central North Pacific (SuspendSinkPart)

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Coverage

Spatial Extent: **N**:22.963 **E**:-157.5683 **S**:22.4076 **W**:-158.171
Temporal Extent: 2014-02-19 - 2015-05-11

Dataset Description

Summary data from 1m2 and 10m2 MOCNESS tows conducted off Hawaii. Start and end of each net deployment pressure, fluorometry,conductivity, salinity, temperature,potential temperature and potential density. These data represent 33 tows from three cruises.

DMO notes:
Changed MOCNESS time column to yrday_local and used it to get hour/min.
The first tow in each cruise has incorrect MOCNESS time when the tow crossed midnight. The hour and minute calculations are correct but for some reason the MOCNESS incremented a day when a net was opened. This is only true for the first tow in each cruise.
Added year column to help with time conversions.

Methods & Sampling

Standard Multiple Opening Closing Net Environmental Sampling Systems (MOCNESS; Wiebe et al., 1976; Wiebe et al., 1985; Sameoto et al., 2000) were used to sample zooplankton (1m2 mouth opening system) and micronekton (10m2 mouth opening system) from the surface to 1500m depth. Nets were first deployed to maximum depth and slowly retrieved towards the surface. Tows were conducted during the day (typically 09:30-15:30) or during the night (typically 21:30-03:30) so as to avoid migration times around sunrise and sunset. All raw data files are available upon request.

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Data Files

File
MOCsummary_rs.csv (Comma Separated Values (.csv), 83.61 KB) MD5:5e5c44f48e87b4d3d5238abf4af79401 Primary data file for dataset ID 636602

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Related Publications

Sameoto, D., Wiebe, P., Runge, J., Postel, L., Dunn, J., Miller, C., & Coombs, S. (2000). Collecting zooplankton. ICES Zooplankton Methodology Manual, 55–81. doi:10.1016/b978-012327645-2/50004-9 https://doi.org/10.1016/B978-012327645-2/50004-9
Methods

Wiebe, P. H., K.H. Burt, S. H. Boyd, A. W. Morton (1976). A multiple opening/closing net and environment sensing system for sampling zooplankton. J. Mar. Res., 34, 313-326.
Methods

Wiebe, P. H., Morton, A. W., Bradley, A. M., Backus, R. H., Craddock, J. E., Barber, V., … Flierl, G. R. (1985). New development in the MOCNESS, an apparatus for sampling zooplankton and micronekton. Marine Biology, 87(3), 313–323. doi:10.1007/bf00397811 https://doi.org/10.1007/BF00397811
Methods

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Parameters

Parameter	Description	Units
cruise	identification of cruise	text
year	year	number
datatype	sampling method - instrument type; e.g. MOCNESS-1 or MOCNESS-10	text
tow	tow number;encrypted to include the net size; the sequential tow number; and the year	alphanumeric
day_night	time of day the tow took place; reference to day or night operation	text
net	MOCNESS net number:0-9	number
event	start or end of tow	text
yrday_local	year day as a decimal; based on Julian calendar; local	decimal number
time_local	time of tow; local time using 24 hour clock	decimal minute
ISO_DateTime_Local	time standard based on ISO 8601:2004(E)	YYYY-MM-DDTHH:MM:SS[.xx][+/-TZ]
press_tow	depth of tow converted to pressure	decibars
temp	temperature at the recorded pressure	degrees Celsius
theta	potential temperature	degrees Celsius
sal	salinity calculated from conductivity; bad values are set to 50	unitless
sigma	sigma theta or potential density	unitless
net_angle	angle of net frame relative to vertical (0-89 degrees)	degrees
flow_counts	consecutive flow counts	counts
horizontal_velocity	horizontal net velocity	meters per second
vertical_velocity	vertical net velocity	meters per second
volume_filt	volume filtered by the net	cubic meters
fluor	relative fluorescence (0-5 volts)	volts
lat	latitude; positive = North	decimal degrees
lon	longitude; negative = West	decimal degrees
comments	information about the tows	text

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Instruments

Dataset-specific Instrument Name	MOCNESS_1
Generic Instrument Name	MOCNESS1
Dataset-specific Description	The 1-meter-squared MOCNESS that was used was a standard MOCNESS.
Generic Instrument Description	The Multiple Opening/Closing Net and Environmental Sensing System or MOCNESS is a family of net systems based on the Tucker Trawl principle. The MOCNESS-1 carries nine 1-m2 nets usually of 335 micrometer mesh and is intended for use with the macrozooplankton. All nets are black to reduce contrast with the background. A motor/toggle release assembly is mounted on the top portion of the frame and stainless steel cables with swaged fittings are used to attach the net bar to the toggle release. A stepping motor in a pressure compensated case filled with oil turns the escapement crankshaft of the toggle release which sequentially releases the nets to an open then closed position on command from the surface. -- from the MOCNESS Operations Manual (1999 + 2003).

Dataset-specific Instrument Name	MOCNESS_10
Generic Instrument Name	MOCNESS10
Dataset-specific Description	The 10-square-meter mouth opening MOCNESS was a standard MOCNESS.
Generic Instrument Description	The Multiple Opening/Closing Net and Environmental Sensing System (MOCNESS) is based on the Tucker Trawl principle (Tucker, 1951). The MOCNESS-10 (with 10 m^2 nets) carries 6 nets of 3.0-mm circular mesh which are opened and closed sequentially by commands through conducting cable from the surface (Wiebe et al., 1976). In this system, "the underwater unit sends a data frame, comprising temperature, depth, conductivity, net-frame angle, flow count, time, number of open net, and net opening/closing, to the deck unit in a compressed hexadecimal format every 2 seconds and from the deck unit to a microcomputer every 4 seconds" (Wiebe et al., 1985).

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Deployments

KM1407

Website	https://www.bco-dmo.org/deployment/635932
Platform	R/V Kilo Moana
Start Date	2014-02-19
End Date	2014-02-28
Description	Original cruise data are available from the NSF R2R data catalog

KM1418

Website	https://www.bco-dmo.org/deployment/636002
Platform	R/V Kilo Moana
Start Date	2014-08-29
End Date	2014-09-11
Description	Original cruise data are available from the NSF R2R data catalog

KM1506

Website	https://www.bco-dmo.org/deployment/636095
Platform	R/V Kilo Moana
Start Date	2015-05-03
End Date	2015-05-12
Description	Original cruise data are available from the NSF R2R data catalog

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Project Information

Evaluating the relative importance of suspended and sinking particles to the meso and bathypelagic food web in the central North Pacific (SuspendSinkPart)

Coverage: Subtropical waters north of Hawaii; Station Aloha (22° 45'N, 158° 00'W)

Description from NSF award abstract:
The ocean's midwaters are the largest living space on the planet. The mesopelagic food web plays key roles in the biological carbon pump and the production of food for commercially harvested species, but its functioning is understudied because it is remote and technologically challenging to sample. Recent estimates indicate respiratory demand outstrips measured sinking particle supply by up to 2-3 orders of magnitude suggesting that some food inputs to the mesopelagic food web have been underestimated or missed. Suspended particles frequently are not sampled effectively and may be an overlooked food source. Because identifying the principal inputs of organic matter to the deep-sea food web is critical to understanding its function, the investigators propose to evaluate the relative importance of suspended and sinking particles to the meso- and bathypelagic food web in the central North Pacific. They will characterize the isotopic compositions of specific groups of mesopelagic and bathypelagic zooplankton and micronekton, and identify the extent to which they consume suspended or sinking particles using mass balance approaches. The investigators recently have recognized differences in delta 15N and delta 13C values of amino acids (AA) of sinking and suspended particles; these patterns diverge with depth, providing a means to distinguish between food web pathways. The research will define the source-specific isotopic values of suspended and sinking particles at several depths from the surface to the bathypelagic and test proposed microbial mechanisms driving these depth patterns. At corresponding depths, MOCNESS trawls will sample diverse metazoa: zooplankton size fractions, plus targeted resident, migrating and likely suspension-feeding taxa of zooplankton and micronekton. Preliminary data suggest that suspended particles are a secondary food source, containing less labile organic matter than sinking particles that exhibit a seasonal cycle in flux in the central North Pacific. This study will determine if suspended particles become more important to zooplankton and micronekton during a time of year when sinking particle flux is low (Jan/Feb) in comparison to when it is high (Aug), allowing an evaluation of how temporal change in surface ocean productivity affects the functioning of mesopelagic food webs.

Recent research has called for additional study of the ocean's deep midwaters. This study will provide new insights into the functioning of the meso- and bathypelagic food web and its coupling with surface ocean processes in the central North Pacific. The recently-demonstrated ecological tool of amino acid-specific isotopic analysis will provide a novel and comprehensive approach with which to address our hypotheses, and the project will develop the first AA isotopic dataset spanning particles to fish. Results will help identify the ecological underpinnings of increasing delta 15N values with depth in zooplankton -- apparently a common

pattern. Zooplankton consumption of suspended particles also could constitute a mechanistic link between the microbial loop and higher trophic levels. The processes controlling the enormous attenuation of particle flux by mesopelagic consumers -- and thereby the strength of carbon sequestration to the deep ocean -- are not understood. Seasonal sampling will help us relate mesopelagic food web processes to changes in surface ocean productivity, furthering our understanding of future climate change impacts on deep-sea food webs and carbon flux. With regard to fisheries, many oceanic top predators such as tuna and swordfish feed on mesopelagic micronekton. A clearer understanding of the structure of mesopelagic food webs will help inform ecosystem models which are used to understand variation in fisheries production.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1333734

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