Cruise tracks from the R/V Kilo Moana KM1407, KM1418, KM1506 cruises in the central North Pacific, Station ALOHA from 2014-2015 (SuspendSinkPart project)

Website: https://www.bco-dmo.org/dataset/636267
Version: 22 January 2016
Version Date: 2016-01-22

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

Contributors	Affiliation	Role
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Dataset Description

Ship's Cruise Tracks from R2R Archive files for KM1407, KM1418, KM1506
Cruise_Id, ISO_DateTime_UTC, Latitude, Longitude,SOG,COG
1 minute fixes

Methods & Sampling

Generated by BCO-DMO staff from R2R Archive files

KM1407 R2R File Creation date: 2014-10-22T03:37:02Z

KM1418 R2R File Creation date: 2014-10-22T12:18:15Z

KM1506 R2R File Creation date: 2016-01-21T21:22:34Z

Data Processing Description

Generated by BCO-DMO staff from R2R Archive files

KM1407 R2R File Creation date: 2014-10-22T03:37:02Z

KM1418 R2R File Creation date: 2014-10-22T12:18:15Z

KM1506 R2R File Creation date: 2016-01-21T21:22:34Z

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Data Files

File
CruiseTracks.csv (Comma Separated Values (.csv), 2.82 MB) MD5:84140221c8259a0de2841168960e2e3f Primary data file for dataset ID 636267

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Parameters

Parameter	Description	Units
CruiseId	Official UNOLS cruise id	text
ISO_DateTime_UTC	ISO formatted UTC Date and Time	YYYY-MM-DDTHH:MM:SSZ
Latitude	Latitude Position (South is negative)	decimal degrees
Longitude	Longitude Position (West is negative)	decimal degrees
SOG	Instantaneous Speed-over-ground	meters/sec
COG	Instantaneous Course-over-ground [deg. clockwise from North]	decimal degrees

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Instruments

Dataset-specific Instrument Name	GPS
Generic Instrument Name	Global Positioning System Receiver
Generic Instrument Description	The Global Positioning System (GPS) is a U.S. space-based radionavigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis. The U.S. Air Force develops, maintains, and operates the space and control segments of the NAVSTAR GPS transmitter system. Ships use a variety of receivers (e.g. Trimble and Ashtech) to interpret the GPS signal and determine accurate latitude and longitude.

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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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