Date, time, location, and depth range for MOCNESS tows from R/V Oceanus in the Eastern Tropical Pacific, Tropical Eastern Pacific from 2016-04-17 to 2016-05-02

Website: https://www.bco-dmo.org/dataset/787329
Data Type: Cruise Results
Version: 1
Version Date: 2020-01-30

Project
» Collaborative Research: A metabolic index to predict the consequences of climate change for midwater ecosystems (Metabolic Index)

Contributors	Affiliation	Role
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Abstract
Date, time, location, and depth range for MOCNESS tows

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Coverage

Spatial Extent: **N**:31.13 **E**:-119.931 **S**:21.849 **W**:-126.27
Temporal Extent: 2016-04-17 - 2016-05-02

Dataset Description

Vertically-stratified day and night MOCNESS tows usually from 1200 or 1000 m to the surface. Some tows covered smaller depth intervals in finer detail. Some tows during the Sikuliaq cruise were horizontally sequenced. See Wishner et al. 2013, 2018, and 2019 (online preprint in review) for more details.

Methods & Sampling

See Wishner et al. 2013, 2018, and 2019 (online preprint in review) for details and results. Sampling for zooplankton occurred on the upcast portion of the tow. Samples were preserved in borate-buffered formaldehyde at sea. Zooplankton, especially copepods, were sorted and identified microscopically later in the lab.

Data Processing Description

BCO-DMO Processing Notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- extracted cruise_id from file names
- combined Date_UTC and Time_In_UTC to create ISO_DateTime_UTC
- replaced comma with semicolon in Comments field

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Data Files

File
moc_event_log.csv (Comma Separated Values (.csv), 2.03 KB) MD5:b617859074bc712f816c0ee070694bab Primary data file for dataset ID 787329

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Related Publications

Maas, A. E., Frazar, S. L., Outram, D. M., Seibel, B. A., & Wishner, K. F. (2014). Fine-scale vertical distribution of macroplankton and micronekton in the Eastern Tropical North Pacific in association with an oxygen minimum zone. Journal of Plankton Research, 36(6), 1557–1575. doi:10.1093/plankt/fbu077
Results

Williams, R. L., Wakeham, S., McKinney, R., & Wishner, K. F. (2014). Trophic ecology and vertical patterns of carbon and nitrogen stable isotopes in zooplankton from oxygen minimum zone regions. Deep Sea Research Part I: Oceanographic Research Papers, 90, 36–47. doi:10.1016/j.dsr.2014.04.008
Results

Wishner, K. F., Outram, D. M., Seibel, B. A., Daly, K. L., & Williams, R. L. (2013). Zooplankton in the eastern tropical north Pacific: Boundary effects of oxygen minimum zone expansion. Deep Sea Research Part I: Oceanographic Research Papers, 79, 122–140. doi:10.1016/j.dsr.2013.05.012
Results

Wishner, K. F., Seibel, B. A., Roman, C., Deutsch, C., Outram, D., Shaw, C. T., … Riley, S. (2018). Ocean deoxygenation and zooplankton: Very small oxygen differences matter. Science Advances, 4(12), eaau5180. doi:10.1126/sciadv.aau5180
Results

Wishner, K. F., Seibel, B., & Outram, D. (2019). Ocean Deoxygenation and Copepods: Coping with Oxygen Minimum Zone Variability. doi:10.5194/bg-2019-394
Results

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Related Datasets

IsRelatedTo

Wishner, K., Outram, D., Seibel, B., Roman, C. (2021) **Abundances of copepod species in each net from MOCNESS tows in the Eastern Tropical North Pacific collected on four research cruises from 2007-2017.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version

Date 2021-07-09 doi:10.26008/1912/bco-dmo.855395.1 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
cruise_id	identifier for the cruise as extracted from the file name	unitless
MOC	MOCNESS Number	unitless
Station	Station number	unitless
Tow_Type	type of tow	unitless
ISO_DateTime_UTC	Date and time following the ISO8601 format	unitless
Date_Local	local date in mmddyyyy format	unitless
Date_UTC	UTC date in mmddyyyy format	unitless
Time_In_UTC	UTC time in following format HHMM	unitless
Time_Out_UTC	UTC time out following format HHMM	unitless
Time_In_Local	Local time (UTC-700) in following format HHMM.	unitless
Time_Out_Local	local time (UTC-700) out following format HHMM	unitless
Lat_In	latitude in decimal degrees with negative values indicating South	decimal degrees
Lon_In	longitude in decimal degrees with negative values indicating West	decimal degrees
Lat_Out	latitude in decimal degrees with negative values indicating South	decimal degrees
Lon_Out	longitude in decimal degrees with negative values indicating West	decimal degrees
Day_Night	Designator if cast was during the day or night	unitless

Min_Depth	minimum depth	meters (m)
Max_Depth	maximum depth	meters (m)
Comments	additional comments	unitless

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Instruments

Dataset-specific Instrument Name	MOCNESS
Generic Instrument Name	MOCNESS
Dataset-specific Description	1 m2 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. There are currently 8 different sizes of MOCNESS in existence which are designed for capture of different size ranges of zooplankton and micro-nekton Each system is designated according to the size of the net mouth opening and in two cases, the number of nets it carries. The original MOCNESS (Wiebe et al, 1976) was a redesigned and improved version of a system described by Frost and McCrone (1974). (from MOCNESS manual)

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Deployments

OC1604B

Website	https://www.bco-dmo.org/deployment/786136
Platform	R/V Oceanus
Start Date	2016-04-16
End Date	2016-05-06
Description	See additional cruise information from R2R: https://www.rvdata.us/search/cruise/OC1604B

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Project Information

Collaborative Research: A metabolic index to predict the consequences of climate change for midwater ecosystems (Metabolic Index)

Coverage: Eastern Tropical North Pacific

Description from NSF award abstract:
With climate change, ocean temperatures are expected to increase which in turn will reduce oxygen availability and increase metabolic oxygen demand in marine organisms. The investigators will conduct shipboard physiological experiments for various marine organisms and determine their distributions in relation to environmental conditions within an oxygen minimum zone (OMZ) in the Eastern Pacific Ocean. The goal will be to model and map a Metabolic Index (MI) to predict how vertical and horizontal distributions for these species might change throughout the world's oceans in the future. The MI is defined as the ratio between environmental oxygen supply and temperature-dependent oxygen demand. Oxygen supply includes both the environmental oxygen concentration across a habitat range and the physiological features of organisms that facilitate oxygen uptake, such as gills and circulatory systems. Thus, the MI will integrate measured tolerance and environmental exposure to low oxygen with environmental data. The investigators will measure tolerance to low oxygen, focusing on under-studied organisms, including the effect of temperature and organism size. They will sample along a natural gradient in oxygen content south of the California Current in the Eastern Pacific. The science team and a videographer will develop a blog about deep-sea biology and climate change using web-based and video technologies. Four graduate students will be funded on this project, and in conjunction with a recently developed course in pelagic ecology, several undergraduates will have the opportunity to participate in seagoing research.

This research fills a critical need for a physiology-based metric that can be used to predict changing marine communities as the oceans warm and hypoxic zones expand. Modern OMZs are extensive and characterized by deep-water (300-800 m) oxygen partial pressures lethal to most marine organisms, yet thriving communities exist there. Climate change is predicted to further deplete oxygen. The investigators will model and map a Metabolic Index (MI) for diverse marine species to help predict how in vertical and horizontal distributions of species may change throughout the world's oceans in the future. The MI will derive oxygen supply and demand data from published and planned measurements of the minimum environmental partial pressure of oxygen to which individual species are exposed (based on their distributions in the water column) and the minimum requirements to support routine aerobic metabolic demand (from shipboard respiration measurements of individuals). During research cruises in the Eastern Pacific along a gradient of OMZ intensity, the investigators will conduct shipboard physiological measurements to determine metabolic demand for understudied mesozooplankton and gelatinous taxa and determine the size- and temperature dependence for diverse species for incorporation into the MI. Vertically-stratified net sampling and in situ photography will identify and characterize unique OMZ community features, such as the lower oxycline biomass peak present in some OMZs and the oxygen-dependence of day and night habitat depths for vertically-migrating species. The MI will be mapped using climatological data to both test and generate hypotheses about the response of oceanic communities to climate change. In preliminary analysis, the MI suggests a metabolic constraint at a MI of ~2 that may act to limit vertical and horizontal habitat ranges.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1459243

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