Event log from R/V Sikuliaq SKQ201701S from January to February 2017

Website: https://www.bco-dmo.org/dataset/755088
Data Type: Cruise Results
Version: 1
Version Date: 2019-01-10

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

Contributors	Affiliation	Role
Wishner, Karen	University of Rhode Island (URI)	Principal Investigator
Roman, Christopher	University of Rhode Island (URI)	Co-Principal Investigator
Seibel, Brad	University of South Florida (USF)	Co-Principal Investigator
Biddle, Mathew	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Event log from R/V Sikuliaq cruise SKQ201701S, which took place from January to February 2017.

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Coverage

Spatial Extent: **N**:22.42 **E**:-116.5 **S**:21.22 **W**:-118.05
Temporal Extent: 2017-01-22 - 2017-02-11

Dataset Description

Date, time, and location of sampling operations.

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
- added date_MST and date_UTC to hold dates reformatted into yyyy-mm-dd.

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Related Publications

Childress, J. J., Barnes, A. T., Quetin, L. B., & Robison, B. H. (1978). Thermally protecting cod ends for the recovery of living deep-sea animals. Deep Sea Research, 25(4), 419–422. doi:10.1016/0146-6291(78)90568-4
Methods

J. J. Childress, B. A. Seibel, Life at stable low oxygen levels: adaptations of animals to oceanic oxygen minimum layers. J. Exp. Biol. 201, 1223–1232 (1998).
http://jeb.biologists.org/content/jexbio/201/8/1223.full.pdf
Methods

Roman, C., Ullman, D. S., Hebert, D., & Licht, S. (2019). The Wire Flyer Towed Profiling System. Journal of Atmospheric and Oceanic Technology, 36(2), 161–182. doi:10.1175/jtech-d-17-0180.1
https://doi.org/10.1175/JTECH-D-17-0180.1
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

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

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Related Datasets

IsRelatedTo

Wishner, K., Roman, C., Seibel, B. (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 http://lod.bco-dmo.org/id/dataset/855395 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
Event_no	event number	unitless
Gear_Type	gear type	unitless
Cast_no	cast number	unitless
Station	station	unitless
Tow_Type	tow type	unitless
Date_Local_MST	Date Local MST (MMDDYYYY)	unitless
Date_UTC	Date UTC (MMDDYYYY)	unitless
Time_In_Local_MST	Time In Local MST	unitless
Time_Out_Local_MST	Time Out Local MST	unitless
Time_In_UTC	Time In UTC	unitless
Time_Out_UTC	Time Out UTC	unitless
Lat_In	Lat in; North is positive, negative denotes South	decimal degrees
Lon_In	Lon in; East is positive, negative denotes West	decimal degrees
Lat_Out	Lat Out; North is positive, negative denotes South	decimal degrees
Lon_Out	Lon Out; East is positive, negative denotes West	decimal degrees
Day_Night	Day/Night	unitless
Min_Depth	min depth	meters (m)
Max_Depth	max depth	meters (m)
Comments	comments	unitless
date_time_in_UTC	date and time (UTC) in the water following ISO8601 yyyy-mm-ddTHH:MM	unitless
date_time_in_MST	date and time local (MST) in the water following ISO8601 yyyy-mm-ddTHH:MM	unitless

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Instruments

Dataset-specific Instrument Name	CTD
Generic Instrument Name	CTD Sea-Bird
Dataset-specific Description	CTD (Sikuliaq equipment, SeaBird rosette)
Generic Instrument Description	Conductivity, Temperature, Depth (CTD) sensor package from SeaBird Electronics, no specific unit identified. This instrument designation is used when specific make and model are not known. See also other SeaBird instruments listed under CTD. More information from Sea-Bird Electronics.

Dataset-specific Instrument Name	Tucker trawl net
Generic Instrument Name	Tucker Trawl
Dataset-specific Description	MTT + MOC (Seibel: large Tucker trawl net (3 m2 mouth, 100 m long) with MOCNESS software and sensors (Childress and Seibel 1998), large insulated closing cod end (Childress et al. 1978), live animal collections)
Generic Instrument Description	The original Tucker Trawl, a net with a rectangular mouth opening first built in 1951 by G.H. Tucker, was not an opening/closing system, but shortly thereafter it was modified so that it could be opened and closed. The original had a 183 cm by 183 cm flexible rectangular mouth opening 914 cm long net with 1.8 cm stretched mesh for the first 457 cm and 1.3 cm mesh for last 457 cm. 152 cm of coarse plankton or muslin netting lined the end of the net. Tucker designed the net to collect animals associated with the deep scattering layers, principally euphausiids, siphonophores, and midwater fish. (from Wiebe and Benfield, 2003). Currently used Tucker Trawls usually have 1-m2 openings and can have a single net or multiple nets on the frame.

Dataset-specific Instrument Name	MOCNESS
Generic Instrument Name	MOCNESS
Dataset-specific Description	MOCNESS (Wishner: Multiple Opening Closing Net and Environmental Sensing System (Wiebe et al. 1985), 1 m2 system, 8 or 9 nets, 222 µm mesh, updated software and Sea-Bird SBE911plusCTD system (SIO upgrades), day and night vertically- stratified and horizontally-sequenced tows, Wishner et al. 2018)
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) This designation is used when the specific type of MOCNESS (number and size of nets) was not specified by the contributing investigator.

Dataset-specific Instrument Name	Wire Flyer
Generic Instrument Name	Sea-Bird SBE 49 FastCAT CTD Sensor
Dataset-specific Description	Wire Flyer (Roman development: oscillating deep towed hydrographic profiler with Sea-Bird 49 FastCAT CTD and Aanderaa 4831F oxygen sensor, Roman et al 2018)
Generic Instrument Description	The SBE 49 FastCAT is an integrated CTD sensor intended for use as a modular component in towed vehicles, ROVs, AUVs, or other autonomous platforms that can supply DC power and acquire serial data. FastCAT’s pump-controlled / TC-ducted flow feature minimizes salinity spiking, and its 16 Hz sampling provides very high spatial resolution of oceanographic structures and gradients.

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Deployments

SKQ201701S

Website	https://www.bco-dmo.org/deployment/755461
Platform	R/V Sikuliaq
Start Date	2017-01-19
End Date	2017-02-15
Description	See additional cruise information from R2R: https://www.rvdata.us/search/cruise/SKQ201701S

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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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