Mesozooplankton sample data from R/V Pelican cruises PE03-NGOMEX, PE04-NGOMEX, PE06-NGOMEX, PE07-NGOMEX, PE09-05 in the Northern Gulf of Mexico from 2003-2008

Website: https://www.bco-dmo.org/dataset/746107
Data Type: Cruise Results
Version: 2
Version Date: 2018-10-22

Project
» NGOMEX - Living Marine Resources of the Northern Gulf of Mexico (GoMX - NGOMEX)

Program
» Gulf of Mexico - Deepwater Horizon Oil Spill (GoMX - DHOS)

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Abstract
CTD casts using a high-capacity, diaphragm pump were conducted during the R/V Pelican cruises PE03-NGOMEX, PE04-NGOMEX, PE06-NGOMEX, PE07-NGOMEX, and PE09-05 in the Northern Gulf of Mexico between 2003 and 2008. Plankton samples were collected from discrete depths during the CTD casts. Subsamples of sample contents were manually counted, identified, and measured in the laboratory.

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Coverage

Spatial Extent: **N**:29.6996 **E**:-89.47567 **S**:28.39068 **W**:-93.65449
Temporal Extent: 2003-07-30 - 2008-08-12

Dataset Description

Subsets of these data were published in the papers listed in the "Related Resources" section.

Related dataset:
* ScanFish Optical Plankton Counter (OPC) data: https://www.bco-dmo.org/dataset/746081

Methods & Sampling

Methodology:
Plankton samples were collected from discrete depths during CTD casts using a high-capacity, diaphragm pump with an intake hose mounted to the CTD Rosette. Subsamples of sample contents were manually counted, identified, and measured in the laboratory

Sampling and analytical procedures:
For each sample, the pump was run for a timed period of nominally 5 min. The flow rate of the pump was usually measured immediately prior to sampling, by recording the time required to fill a barrel of known volume. Samples were preserved and stored in 5% buffered formalin. The laboratory protocol was to separate samples into two size fractions by passing them through large (200 or 500 µm) then small (64 µm) mesh sieves; split, dilute, and sub-sample each size fraction as needed; count and identify all plankters (minimum n = 50) in each subsample; and estimate the length and width of exactly 100 plankters (the first 50 from the large and small fraction, respectively) to the nearest 50 µm using a dissecting microscope. Three replicate small size fractions per sample were processed starting in 2006.

Data column "vol" was calculated as follows:
vol = length(unique(replicate)*aliquot/beaker/2^splits*50/s_per_50l*d_min*60*1e-3

Data column "flag" contains the following codes:
flag 1: length & width were not measured, but estimated from similar samples
flag 2: shallow & deep samples not labeled, but deduced from sample contents
flag 3: depth estimate less accurate than usual (± ~3 m)
flag 4: time estimate less accurate than usual (± ~15 min)
flag 5: pump flow rate estimated by nominal flow rate

Data Processing Description

Data processing:
Nominal sampling time and depth were corrected by analysis of CTD upcast data. CTD pressure sensor measurements at depth were adjusted to compensate for non-zero readings on deck of the research vessel over the course of each cruise. Bottom depth was estimated from filtered CTD altimeter and pressure data. Longitude and latitude were taken from the vessel's MIDAS system or a separate GPS unit at the time the CTD was turned on. Inconsistent taxonomic identifications (e.g., misspelled or misleading colloquial categories) were corrected by manually creating and automatically applying a lookup table. All data processing was performed using the R language and environment for statistical computing.

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* modified parameter names to conform with BCO-DMO naming conventions
* added ISO Timestamp column
* rounded decimal places of columns. Number of decimal places provided by data contributor.

Data version 1: 2018-09-12 replaced by data version 2: 2018-10-22. Dataset was modified to use unique ctd profile identifiers and remove redundant time/date columns (y,m,d,h,m,s).

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Data Files

File
pump_meso.csv (Comma Separated Values (.csv), 3.00 MB) MD5:c4315a1ca5e09125cc11f3f8b9ffd494 Primary data file for dataset ID 746107

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Related Publications

Elliott, D. T., Pierson, J. J., & Roman, M. R. (2012). Relationship between environmental conditions and zooplankton community structure during summer hypoxia in the northern Gulf of Mexico. Journal of Plankton Research, 34(7), 602–613. doi:10.1093/plankt/fbs029
Results

Kimmel, D. G., Boicourt, W. C., Pierson, J. J., Roman, M. R., & Zhang, X. (2010). The vertical distribution and diel variability of mesozooplankton biomass, abundance and size in response to hypoxia in the northern Gulf of Mexico USA. Journal of Plankton Research, 32(8), 1185–1202. doi:10.1093/plankt/fbp136
Results

Pierson, J. J., Roman, M. R., Kimmel, D. G., Boicourt, W. C., & Zhang, X. (2009). Quantifying changes in the vertical distribution of mesozooplankton in response to hypoxic bottom waters. Journal of Experimental Marine Biology and Ecology, 381, S74–S79. doi:10.1016/j.jembe.2009.07.013
Results

Roman, M. R., Pierson, J. J., Kimmel, D. G., Boicourt, W. C., & Zhang, X. (2012). Impacts of Hypoxia on Zooplankton Spatial Distributions in the Northern Gulf of Mexico. Estuaries and Coasts, 35(5), 1261–1269. doi:10.1007/s12237-012-9531-x
Results

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Parameters

Parameter	Description	Units
ctd	CTD profile ID / start time	unitless
lon	longitude immediately preceeding CTD cast	decimal degrees
lat	latitude immediately preceeding CTD cast	decimal degrees
ISO_DateTime_UTC	Timestamp (UTC) in standard ISO 8601:2004(E) format YYYY-mm-ddTHH:MM:SSZ	unitless
d_min	sampling duration, elapsed minutes	minutes
depth	sampling depth (± ~1.5 m)	decibars (dbar)
bottom	bottom depth (± ~1.5 m)	decibars (dbar)
s_per_50l	inverse of flow rate (time to pump 50 l) (± ~40%)	seconds (s)
mesh	sieve mesh size fraction (64 and either 200 or 500 µm)	micrometers (µm)
splits	number of times sample was halved by plankton splitter	unitless
beaker	remaining sample volume after splits	milliliters (ml)
aliquot	volume examined under microscope	milliliters (ml)
replicate	name for replicate aliquots	unitless
vol	sample volume for in situ concentration estimates. See methodology for the formula used to calculate volume.	cubic meters (m^3)
ID	taxonomic group	unitless
length	length (to nearest 0.05 mm)	millimeters (mm)
width	width (to nearest 0.05 mm)	millimeters (mm)
adj_count	total count divided among length, width measurements	unitless
flag	flag (see methodology for flag codes)	unitless

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Instruments

Dataset-specific Instrument Name	Sea-Bird 9 CTD
Generic Instrument Name	CTD - profiler
Generic Instrument Description	The Conductivity, Temperature, Depth (CTD) unit is an integrated instrument package designed to measure the conductivity, temperature, and pressure (depth) of the water column. The instrument is lowered via cable through the water column. It permits scientists to observe the physical properties in real-time via a conducting cable, which is typically connected to a CTD to a deck unit and computer on a ship. The CTD is often configured with additional optional sensors including fluorometers, transmissometers and/or radiometers. It is often combined with a Rosette of water sampling bottles (e.g. Niskin, GO-FLO) for collecting discrete water samples during the cast. This term applies to profiling CTDs. For fixed CTDs, see https://www.bco-dmo.org/instrument/869934.

Dataset-specific Instrument Name	Ingersoll-Rand diaphragm pump
Generic Instrument Name	Pump
Dataset-specific Description	220 l/m nominal flow rate, 10 cm intake diameter opening
Generic Instrument Description	A pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps

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Deployments

PE03-NGOMEX

Website	https://www.bco-dmo.org/deployment/58120
Platform	R/V Pelican
Start Date	2003-06-30
End Date	2003-08-05
Description	2003 Sampling cruise to the Northern Gulf of MexicoNote: Deployment Id assigned by BCO-DMO staff (not official)

PE04-NGOMEX

Website	https://www.bco-dmo.org/deployment/58121
Platform	R/V Pelican
Start Date	2004-07-28
End Date	2004-08-02
Description	2004 Sampling cruise to the Northern Gulf of MexicoNote: Deployment Id assigned by BCO-DMO staff (not official)

PE06-NGOMEX

Website	https://www.bco-dmo.org/deployment/58122
Platform	R/V Pelican
Start Date	2006-08-04
End Date	2006-08-13
Description	2006 Sampling cruise to the Northern Gulf of MexicoNote: Deployment Id and Chief Scientist assigned by BCO-DMO staff (not official)

PE07-NGOMEX

Website	https://www.bco-dmo.org/deployment/58123
Platform	R/V Pelican
Start Date	2007-07-21
End Date	2007-08-07
Description	2007 Sampling cruise to the Northern Gulf of MexicoNote: Deployment Id and Chief Scientist assigned by BCO-DMO staff (not official)

PE09-05

Website	https://www.bco-dmo.org/deployment/58124
Platform	R/V Pelican
Start Date	2008-08-01
End Date	2008-08-12
Description	2008 Sampling cruise to the Northern Gulf of MexicoNote: Cruise ID confirmed with R2R catalog Original cruise data are available from the NSF R2R data catalog

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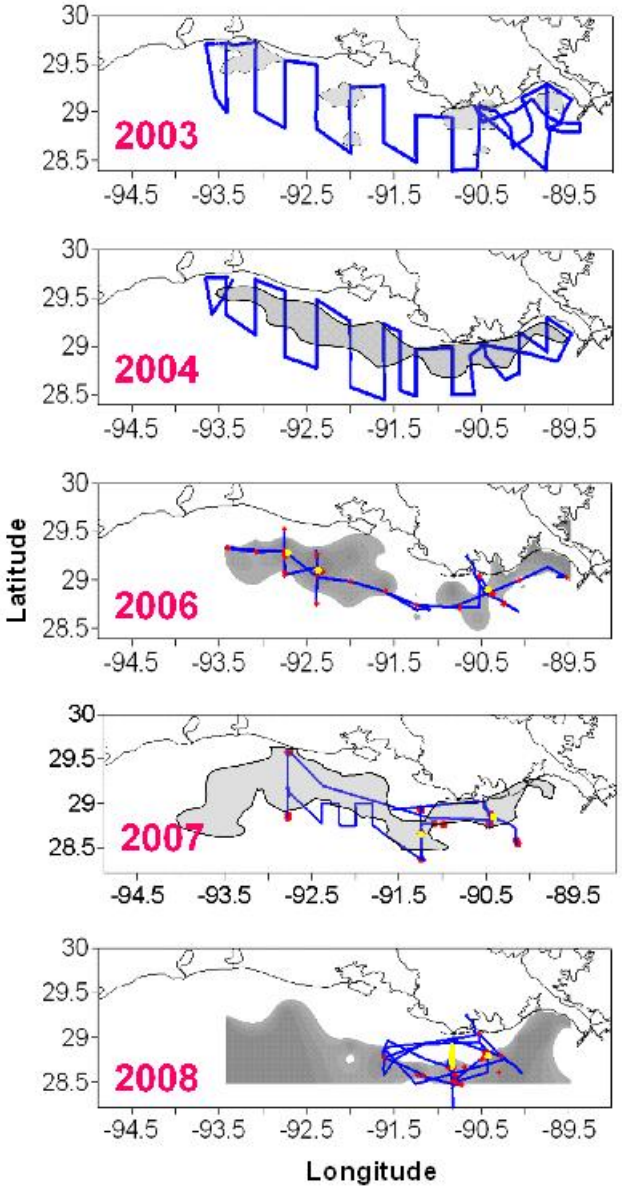
Project Information

NGOMEX - Living Marine Resources of the Northern Gulf of Mexico (GoMX - NGOMEX)

Coverage: Northern Gulf of Mexico, 28-30N 89-94W

NGOMEX - Living Organisms of the Northern Gulf of Mexico
A synthesis of data collected in the Northern Gulf of Mexico from 2003-2004, 2006-2008 and 2010
Data include:
- CTD Profiles
- Rosette Samples
- MIDAS underway metereological
- Towed SCANFISH
- Net Trawls
- Zooplankton counts

High-resolution mapping of the major ecosystem components of the NGOMEX by year



References:

Kimmel, D. G., W. C. Boicourt, J. J. Pierson, M. R. Roman, X. Zhang. 2010. The vertical distribution and diel variability of mesozooplankton biomass, abundance and size in response to hypoxia in the northern Gulf of Mexico USA. Journal of Plankton Research 32(8): 1185-1202. doi:10.1093/plankt/fbp136

Pierson, J. J., M. R. Roman, D. G. Kimmel, W. C. Boicourt, & X. Zhang. 2009. Quantifying changes in the vertical distribution of mesozooplankton in response to hypoxic bottom waters. Journal of Experimental Marine Biology and Ecology 381: S74-S79. doi.org/10.1016/j.jembe.2009.07.013

Kimmel, D. G., W. C. Boicourt, J. J. Pierson, M. R. Roman, & X. Zhang. 2009. A comparison of the mesozooplankton response to hypoxia in Chesapeake Bay and the northern Gulf of Mexico using the biomass size spectrum. Journal of Experimental Marine Biology and Ecology 381: S65-S73. doi.org/10.1016/j.jembe.2009.07.012

Zhang, H., S. A. Ludsin, D. M. Mason, A. T. Adamack, S. B. Brandt, X. Zhang, D. G. Kimmel, M. R. Roman, & W. C. Boicourt. 2009. Hypoxia-driven changes in the behavior and spatial distribution of pelagic fish and mesozooplankton in the northern Gulf of Mexico. Journal of Experimental Marine Biology and Ecology. 381: S80-91. http://dx.doi.org/10.1016/j.jembe.2009.07.014

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Program Information

Gulf of Mexico - Deepwater Horizon Oil Spill (GoMX - DHOS)

Coverage: Northern Gulf of Mexico

Grants for Rapid Response Research (RAPID)
The RAPID funding mechanism is used for proposals having a severe urgency with regard to availability of, or access to data, facilities or specialized equipment, including quick-response research on natural or anthropogenic disasters and similar unanticipated events.

GOM - Broader Impacts
The need to understand the impact of this largest oil spill to date on ecosystems and biochemical cycling is self evident. The consequences of the disaster and accompanying clean up measures (e.g. the distribution of dispersants) need to be evaluated to guide further mediating measures and to develop and improve responses to similar disasters in the future. Would it be advantageous if such oil aggregates sink, or should it rather remain suspended? Possibly measures can be developed to enhance sinking or suspension (e.g. addition of ballast minerals) once we understand their current formation and fate. Understanding the particle dynamics following the input of large amounts of oil and dispersants into the water is a prerequisite to develop response strategies for now and in the future.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1043261
NSF Division of Ocean Sciences (NSF OCE)	OCE-1043248
NSF Division of Ocean Sciences (NSF OCE)	OCE-1043249
National Oceanic and Atmospheric Administration (NOAA)	NA06NOS4780148
National Oceanic and Atmospheric Administration (NOAA)	NA09NOS4780198
Gulf Research Program of the National Academies of Sciences, Engineering, and Medicine (GRP)	NAS-GRP-2000006418

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