Zooplankton identified in the Eastern Atlantic from R/V Polarstern ANT-XXIV_1 from November 2007 (CMarZ_2004-2010 project)

Website: https://www.bco-dmo.org/dataset/3276
Version: 24 Nov. 2009
Version Date: 2009-11-24

Project
» Census of Marine Zooplankton-2004-2010 (CMarZ_2004-2010)

Program
» Census of Marine Life (CoML)

Contributors	Affiliation	Role
Blanco-Bercial, Leocadio	University of Connecticut (UConn - Avery Point)	Scientist
Bradford-Grieve, Janet M.	New Zealand National Institute of Water and Atmospheric Research (NIWA)	Scientist
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI)	Scientist
Escribano, Ruben	Universidad de Concepcion (UdeC)	Scientist
Kuriyama, Mikiko	Ocean Research Institute - University of Tokyo (ORI)	Scientist
Wiebe, Peter H.	Woods Hole Oceanographic Institution (WHOI)	Scientist

Table of Contents

Dataset Description

Objectives
The objective on this cruise was to collect and identify as many different species from those that were to be found in the plankton tows in order to increase the number of species that have been barcoded. Special emphasis was to sample large volumes of water from the deep sea where diversity is high and the discovery of new species most likely.

Methods & Sampling

"Zooplankton and micronekton were quantitatively sampled throughout the water column using a 1-m, a 10-m MOCNESS (Multiple Opening/Closing Net and Environmental Sensing System; Wiebe et al., 1985) and a Multinet (Hydro-Bios Kiel). The MOCNESS telemetered data continuously to the ship, including depth, temperature, salinity, horizontal speed, and volume filtered. This allowed on-the-fly adjustment of sampling depths or times, and completion of a continuous series of stratified hauls in a relatively short time. All data were recorded electronically for subsequent analysis.

The 10-m2 MOCNESS (MOC10) carried 5 separate nets; the mesh size of the nets was a combination of 3 mm and 335 um mesh. Net 0 had 3 mm mesh and nets 1 to 4 had 335 um mesh nets of special design that were fabricated for CMarZ cruises. The 1-m2 MOCNESS (MOC1) carried 9 separate nets; the mesh size of the nets was 335 um. The MOC10 sampled from about 5000 m to the surface, and the MOC1 and Multinet sampled from 1000 m to the surface." MOC-10 tows generally took 10 to 12 hours to complete, MOC-1 tows took about 3.5 hours, and Mulitnet tows took about 1.5 hours. (*from Polarstern ANT/24-1 Cruise Report*)

Reference:
Wiebe P.H., Morton A.W., Bradley A.M., Backus R.H., Craddock J.E., Cowles T.J., Barber V.A., Flierl G.R. (1985). New developments in the MOCNESS, an apparatus for sampling zooplankton and micronekton. Mar. Biol. 87: 313-323.

Data Processing Description

On Deck: With completion of the tow, the nets were immediately washed with seawater as they were pulled on deck and the plankton still in the nets carefully washed into the cod-end with a seawater hose. The cod-ends were placed in buckets with ice packs to cool the samples and moved expeditiously into the walk-in cold room to await analysis.

Specimen removal: All sample handling except microscopic examination was done in the cold room. The contents of codend bucket was first poured into a tray for a photograph of the entire sample. Then, followed picking and removal of large individuals of 1) gelatinous forms, 2) fish, and 3) macrozooplankton/nekton into cold seawater while a recorder wrote notes on the gross composition of the sample. The specimens removed were placed in numbered jars, shell vials, or dishes and the recorder wrote down all specimen information on the data sheets provided. The removed specimens were subject to a variety of procedures including further identification, dissection, preservation (in alcohol, frozen nitrogen, or formalin as appropriate), or taken for photographic imaging prior to preservation.

Sample splitting and preservation: Splitting was done using a box splitter. The first half was put into 95% pure (undenatured) ethanol. The second half was split again into 1/4 live and 1/4 formalin with buffer (sodium borate) added. The 1/4 live portion was kept in the cold room (time noted). Photos were taken of selected live animals and scientists removed and identified some zooplankton from the live split for genetic barcoding. Once done, the rest of the live sample was preserved in 4% buffered formalin (time noted). Twenty-four hours later, the ethanol was changed and the lid marked to show that this was done. Samples in the 1/4 ethanol were stored in a refrigerated storage area on the ship and later off-loaded at AWI for further examination and archiving. Live and formalin splits were transported to WHOI for further examination and storage.

For information the genetic barcoding protocol, see http://www.cmarz.org/barcode/protocols/protocols.html or email Ann Bucklin, UConn, ann.bucklin-at-uconn.edu.

Euphausiids: Some euphausiids were examined from all three fractions: formalin, ethanol, and live. The formalin split was not used for DNA analysis, so early in the cruise they provided a good source of euphausiids that could be examined at length in order to establish the species present. Once we became familiar with the species, we mainly sorted from the ethanol samples. These were most useful for submission to the on-board DNA barcoding effort because the live fractions could be looked at only briefly in order to keep their genetic material intact. Many of the specimens were photographed using the dissecting microscope and camera equipment provided by Cheryl Clark-Hopcroft.

Euphausiids were identified from the first four MOCNESS stations with a total of 172 euphausiid specimens representing 23 species, more than 1/4 of all known species worldwide. Most of the euphausiids were found in the 1-m2 MOCNESS samples, which collected in the top 1,000 m. Only three species were collected in the 10-m2 MOCNESS and they were found in the shallowest net (1,000- 2,000 m) although not all nets were examined from the tows. Photographs of the specimens will be used as identification checks, for the web photo gallery and as material for the CMarZ species pages (see www.cmarz.org).

Measurements of eye and carapace lengths are the primary method of distinguishing *N. atlantica* from *N. microps*, two very similar species with overlapping distributions. This relationship was originally established using formalin preserved specimens and may not hold for animals in 95 % ethanol, in which they shrink significantly. The photos of *Nematoscelis atlantica* (Fig. 3.6.1) were used to record eye and carapace lengths of the ethanol specimens and will be used to compare with formalin data. The genetic analysis will be essential for

validating this method of identification." (*from Polarstern ANT/24-1 Cruise Report*)

[table of contents | back to top]

Data Files

File
zoop_PS24.csv (Comma Separated Values (.csv), 43.85 KB) MD5:a3eb98045133848aa56f2b2eefdd15a6 Primary data file for dataset ID 3276

[table of contents | back to top]

Parameters

Parameter	Description	Units
inst	The instrument used to catch the animals.	
station	consecutive station number	
tow	tow number	
date_local	local date, yyyymmdd	
time_local	hhmm. 24 hour clock	
yrday_local	Decimal days since Jan. 1. Jan 1 at noon is 001.5.	decimal days
lat	North is positive and south is negative.	decimal degrees
lon	West is negative longitude and east is positive.	decimal degrees
net	Which net in a multiple net system.	
depth_range	The min and max depths over which the net was open.	meters
depth_mid	One depth to represent the sample collection depth if one depth is necessary. The middle of the depth range over which the net was sampled.	meters
taxon	The scientific name to species if possible. If not, to whatever taxonomic level the animal could be identified.	

num_specimens	How many animals were picked from the tow. Sometimes this was a subsample of the total found in the net, sometime it was the total found in a particular net.	
fraction	which subsample the animals came from: live, ethanol or formalin	
family	taxonomic family	
species	a binomial that consists of a genus name followed by the species name of an organism	
DNA_submitted	whether or not the specimen was submitted to the DNA lab for analysis.	
length	length of specimen	mm
id_by	initial of person who identified specimen.	mm
comments	free text comments	

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	MOCNESS1
Generic Instrument Name	MOCNESS1
Dataset-specific Description	335 micorn mesh, 9 nets
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	MOCNESS10
Generic Instrument Name	MOCNESS10
Dataset-specific Description	5 nets: net 0 with 3 mm mesh and the others with 335 micron mesh.
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).

Dataset-specific Instrument Name	Multinet
Generic Instrument Name	MultiNet
Dataset-specific Description	Maxi: mouth opening of 0.5 m2, nine nets and a mesh size of 150 µm; standard sampling intervals 1000-800-600-500-400-300-200-100-50-0 m. Midi: mouth opening of 0.25 m2 and five nets equipped with 100 µm mesh; standard sampling intervals 1005-500-300-100- 50-0 m.
Generic Instrument Description	The MultiNet© Multiple Plankton Sampler is designed as a sampling system for horizontal and vertical collections in successive water layers. Equipped with 5 or 9 net bags, the MultiNet© can be delivered in 3 sizes (apertures) : Mini (0.125 m2), Midi (0.25 m2) and Maxi (0.5 m2). The system consists of a shipboard Deck Command Unit and a stainless steel frame to which 5 (or 9) net bags are attached by means of zippers to canvas. The net bags are opened and closed by means of an arrangement of levers that are triggered by a battery powered Motor Unit. The commands for actuation of the net bags are given via single or multi-conductor cable between the Underwater Unit and the Deck Command Unit. Although horizontal collections typically use a mesh size of 300 microns, mesh sizes from 100 to 500 may also be used. Vertical collections are also common. The shipboard Deck Command Unit displays all relevant system data, including the actual operating depth of the net system.

[table of contents | back to top]

Deployments

ANT-XXIV_1

Website	https://www.bco-dmo.org/deployment/57857
Platform	R/V Polarstern
Report	http://epic.awi.de/28985/1/Sch2009ad.pdf
Start Date	2007-10-26
End Date	2007-11-27

[table of contents | back to top]

Project Information

Census of Marine Zooplankton-2004-2010 (CMarZ_2004-2010)

Website: http://www.cmarz.org/

Coverage: Global ocean

The Census of Marine Zooplankton (CMarZ) is a field project of the Census of Marine Life (see www.CoML.org). CMarZ is working toward a taxonomically comprehensive assessment of biodiversity of animal plankton throughout the world ocean. The project goal is to produce accurate and complete information on zooplankton species diversity, biomass, biogeographical distribution, genetic diversity, and community structure by 2010. Our taxonomic focus is the animals that drift with ocean currents throughout their lives (i.e., the holozooplankton, Fig. 1). This assemblage currently includes ~6,800 described species in fifteen phyla; our expectation is that at least that many new species will be discovered as a result of our efforts. The census encompasses unique marine environments and those likely to be inhabited by endemic and undescribed zooplankton species.

[table of contents | back to top]

Program Information

Census of Marine Life (CoML)

Website: http://www.coml.org/

Coverage: global

The Census of Marine Life is a global network of researchers in more than 80 nations engaged in a 10-year scientific initiative to assess and explain the diversity, distribution, and abundance of life in the oceans. The world's first comprehensive Census of Marine Life - past, present, and future - will be released in 2010.

The stated purpose of the Census of Marine Life is to assess and explain the diversity, distribution, and abundance of marine life. Each plays an important role in what is known, unknown, and may never be known about what lives in the global ocean.

First, diversity. The Census aims to make for the first time a comprehensive global list of all forms of life in the sea. No such unified list yet exists. Census scientists estimate that about 230,000 species of marine animals have been described and reside in jars in collections in museums of natural history and other repositories. Since the Census began in 2000, researchers have added more than 5600 species to the lists. They aim to add many thousands more by 2010. The database of the Census already includes records for more than 16 million records, old and new. By 2010, the goal is to have all the old and the new species in an on-line encyclopedia with a webpage for every species. In addition, we will estimate how many species remain unknown, that is, remain to be discovered. The number could be astonishingly large, perhaps a million or more, if all small animals and protists are included. For comparison, biologists have described about 1.5 million terrestrial plants and animals.

Second, distribution. The Census aims to produce maps where the animals have been observed or where they could live, that is, the territory or range of the species. Knowing the range matters a lot for people concerned about, for example, possible consequences of global climate change.

Third, abundance. No Census is complete without measures of abundance. We want to know not only that there is such a thing as a Madagascar crab but how many there are. For marine life, populations are being estimated either in numbers or in total kilos, called biomass.

To complete the context, it is important to understand the top motivations for the Census of Marine Life. Most importantly, much of the ocean is unexplored. Most of the records in its database are for observations near

the surface, and down to 1000 meters. No observations have been made in most of the deep ocean, while most of the ocean is deep.

Another important issue is that diversity varies in space. Marine hot spots, like the rain forests of the land, exist off for large fish off the coasts of Brazil and Australia. The goal is to know much more about marine hot spots, to help conserve these large fish. Their abundance and thus their diversity is changing, especially for commercially important species. Between 1952 and 1976, for example, fishermen and their customers emptied many areas of the ocean of tuna.

The Census has evolved a strategy of 14 field projects to touch the major habitats and groups of species in the global ocean. Eleven field projects address habitats, such as seamounts or the Arctic Ocean. Three field projects look globally at animals that either traverse the seas or appear globally distributed: the top predators such as tuna and the plankton and the microbes. The projects employ a mix of technologies. These include acoustics or sound, optics or cameras, tags placed on individual animals that store or report data, and genetics, as well as some actual capture of animals. The technologies complement one another. Sound can survey large areas in the ocean, while light cannot. Light can capture detail and characters that sound cannot. And genetics can make identifications from fragments of specimens or larvae where pictures tell little.

This mix of curiosity, need to know, technology, and scientists willing to investigate the unexplored and undiscovered will result in a Census of Marine Life in 2010 that provides a much clearer picture of what lives below the surface around the globe. Several reasons make such a report timely, indeed urgent. Crises in the sea are reported regularly. One recent study predicted the end of commercial fishery globally by 2050, if current trends persist. Better information is needed to fashion the management that will sustain fisheries, conserve diversity, reverse losses of habitat, reduce impacts of pollution, and respond to global climate change. Hence, there are biological, economic, philosophical and political reasons to push for greater exploration and understanding of the ocean and its inhabitants. Indeed, the United Nations Convention on Biological Diversity requires signatories to collect information on living resources, but, as yet, no nation has a complete baseline of such information. The Census of Marine Life's global network of researchers will help to fill this knowledge gap, providing critical information to help guide decisions on how to manage global marine resources for the future.

[Text copied from the CoML web site, November 5, 2008]

[table of contents | back to top]

Funding

Funding Source	Award
Alfred P. Sloan Foundation (Sloan)	unknown CMarZ_2004-2010 Sloan

[table of contents | back to top]