

Zooplankton abundance from ring net tows from RVIB Nathaniel B. Palmer NBP1801 in the Ross Sea, January 2018

Website: <https://www.bco-dmo.org/dataset/789299>

Data Type: Cruise Results

Version: 2

Version Date: 2020-04-27

Project

» [Using Bio-acoustics on an Autonomous Surveying Platform for the Examination of Phytoplankton-zooplankton and Fish Interactions in the Western Ross Sea](#) (bio-acoustic plankton surveys)

| Contributors | Affiliation | Role |
|-------------------------------|---|------------------------|
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Abstract

Net tows were conducted during the R/V Nathaniel B. Palmer cruise NBP18-01 in January 2018. These data represent the zooplankton species and abundance analysis resulting from these sample collections. A companion dataset of mid-water trawls abundances is also available.

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Coverage

Spatial Extent: N:-74.8033 E:165.7405 S:-75.0042 W:164.4441

Temporal Extent: 2018-01-10 - 2019-01-31

Dataset Description

Net tows were conducted during the R/V Nathaniel B. Palmer cruise NBP18-01 in Jan-Feb 2018. These data represent the zooplankton species and abundance analysis resulting from these sample collections. A companion dataset of mid-water trawls abundances is also available.

Methods & Sampling

Sample collection: Net tows and mid-water trawls were conducted in the western Ross Sea, Antarctica on board the R/V Nathaniel B. Palmer in January-February 2018 (cruise number 18-01). Both the ring net (1 m diameter, 333 um mesh, non-filtering cod end) and the Issacs-Kidd Midwater Trawl (IKMT, 1.8 m frame, 500 um mesh, non-filtering cod end) were fitted with a calibrated General Oceanics flow meter. Contents of each tow were concentrated and preserved with buffered formaldehyde (4% final concentration) in 500 ml wide-mouth glass jars. Samples were sent back to the home laboratory (Rutgers University) for analysis.

Analyses: Contents of each tow (or a subsample if the density of zooplankton or fish was high) were sorted

by taxa and, in some cases, developmental stage. Measurements for abundance were conducted using a dissecting microscope (Zeiss Discovery.V8).

Volume of water (cubic meter) that passed through the net/trawl during each tow was calculated using flowmeter rotor constant, flowmeter start and end values, and the area of net opening.

Abundance per cubic meter per tow/trawl was then calculated for each species and, in some cases, developmental stage, by dividing the number of individuals for each species/developmental stage by the volume of water.

Data Processing Description

BCO-DMO Processing Notes:

version 1:

- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- in Method column, replaced commas with semicolons
- two columns were named 'Latitude end'; renamed second one 'Longitude end' as it's clearly a longitude.
- converted latitudes and longitudes to decimal degrees
- reformatted date and times to ISO-format (from m/d/yy to yyyy-mm-ddTHH:MM:SSZ)
- corrected mis-spelled taxa:

- Oithoha similis -> Oithona similis
- Calanus simulus -> Calanus simillimus
- Pareuchaeta antarctica -> Paraeuchaeta antarctica
- Gaidus tenuispinus -> Gaidius tenuispinus
- Heterohabdum -> Heterorhabdus
- Pelagchia longicirrata -> Pelagobia longicirrata
- Schyphomedusa -> Scyphomedusa

version 2:

- corrected ISO_DateTime.UTC by removing an extra ":00" at end of the string (eg. 2018-01-10T02:04:00:00Z)

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Data Files

| File |
|--|
| ring_net_abund.csv (Comma Separated Values (.csv), 1.97 KB) MD5:18256520d0c6e5d2aadcaf052b694e63 |
| Primary data file for dataset ID 789299 |

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Parameters

| Parameter | Description | Units |
|------------------------|---|----------|
| Method | Collection method specified; either a 1-m diameter ring net with 333um mesh or an Isaacs Kidd Midwater Trawl with a 1.8-m frame | unitless |
| Tow_Trawl_number | Tow/Trawl number provided in chronological order during the cruise | unitless |
| ISO_DateTime.UTC_start | Time the tow/trawl started | unitless |
| ISO_DateTime.UTC_end | Time the tow/trawl ended | unitless |

| | | |
|--|--|---------------------------|
| lat_start_decdeg | Latitude/Location where the tow/trawl started | decimal degrees |
| lon_start_decdeg | Longitude/Location where the tow/trawl started | decimal degrees |
| lat_end_decdeg | Latitude/Location where the tow/trawl ended | decimal degrees |
| lon_end_decdeg | Longitude/Location where the tow/trawl ended | decimal degrees |
| Net_depth_m | Water depth the ring net or trawl were towed | meters |
| Bottom_depth_m | Water depth at location of tow/trawl | meters |
| SST_deg_C | Sea Surface Temperature at time and location of tow/trawl | Degrees Celsius |
| Flowmeter_start | Calibrated General Oceanics flowmeter reading at start of tow/trawl; used in calculations for water volume that passed through the net/trawl | unitless |
| Flowmeter__end | Calibrated General Oceanics flowmeter reading at end of tow/trawl; used in calculations for water volume that passed through the net/trawl | unitless |
| Volume_m3 | Volume of water that passed through the net/trawl; calculated using flowmeter data and area of net opening | cubic meters |
| Copepods_Calanoides_acutus | Abundance of Calanoides acutus | number/meter ³ |
| C_acutus_CIII_to_V | Abundance of Calanoides acutus stages CIII to V | number/meter ³ |
| Metridia_gerlachei | Abundance of Metridia gerlachei | number/meter ³ |
| Oithona_similis | Abundance of Oithona similis | number/meter ³ |
| Calanus_simillimus | Abundance of Calanus simillimus | number/meter ³ |
| Paraeuchaeta_antarctica | Abundance of Paraeuchaeta antarctica | number/meter ³ |
| Oncaea_sp | Abundance of Oncaea sp. | number/meter ³ |
| Gaidius_tenuispinus | Abundance of Gaidius tenuispinus | number/meter ³ |
| Heterorhabdus_sp | Abundance of Heterorhabdus sp. | number/meter ³ |
| Unspecified_Nauplii | Abundance of unspecified nauplii | number/meter ³ |
| Euphausiids_Euphausia_crystallorophias | Abundance of Euphausia crystallorophias | number/meter ³ |
| Thysanoessa_macrura | Abundance of Thysanoessa macrura | number/meter ³ |
| Decapods_Notocrangon_antarcticus | Abundance of Notocrangon antarcticus | number/meter ³ |
| Amphipods_Themisto_gaudichaudii | Abundance of Themisto gaudichaudii | number/meter ³ |
| Hyperoche_sp | Abundance of Hyperoche sp. | number/meter ³ |
| Vibilia_stebbingi | Abundance of Vibilia stebbingi | number/meter ³ |
| Pteropods_Limacina_rangii | Abundance of Limacina rangii | number/meter ³ |
| Clione_limacina_antarctica | Abundance of Clione limacina antarctica | number/meter ³ |
| Polychaeta_Pelagobia_longicirrata | Abundance of Pelagobia longicirrata | number/meter ³ |
| Polychaete_larvae | Abundance of polychaete larvae | number/meter ³ |
| Fish_Pleuragramma_antarctica_larvae | Abundance of Pleuragramma antarctica larvae | number/meter ³ |
| Pleuragramma_antarctica_juvenile | Abundance of Pleuragramma antarctica juveniles | number/meter ³ |
| Channichthyidae | Abundance of Channichthyidae | number/meter ³ |
| Artedidraconidae | Abundance of Artedidraconidae | number/meter ³ |
| Other_Ostracods | Abundance of other ostracods | number/meter ³ |
| Chaetognatha | Abundance of Chaetognatha | number/meter ³ |

| | | |
|--------------|---------------------------|---------------------------|
| Ctenophora | Abundance of Ctenophora | number/meter ³ |
| Scyphozoa | Abundance of Scyphomedusa | number/meter ³ |
| Siphonophore | Abundance of Siphonophora | number/meter ³ |
| Salpidae | Abundance of Salpa | number/meter ³ |

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Instruments

| | |
|---|--|
| Dataset-specific Instrument Name | Isaacs-Kid Midwater Trawl |
| Generic Instrument Name | Isaacs-Kidd Midwater Trawl |
| Dataset-specific Description | Rectangle framed net (1.75 m x 1.44 m) with 500 um mesh and a non-filtering cod end. Used to collected zooplankton during the Ross Sea cruise. |
| Generic Instrument Description | A trawl with a pentagonal mouth opening and a dihedral depressor vane as part of the mouth opening. IKMTs come in various dimensions (refer to individual dataset documentation). The original IKMTs were 10 foot (304 cm) and 15 foot (457 cm) at the mouth. The 10 foot IKMT net was 31 feet (9.45 m) in length (Wiebe and Benfield 2003). |

| | |
|---|---|
| Dataset-specific Instrument Name | Zeiss Discovery V8 Dissecting microscope |
| Generic Instrument Name | Microscope - Optical |
| Dataset-specific Description | Optical microscope with magnification for observation of the Ross Sea cruise tow/rawl samples. Used to taxonomically identify and count collected zooplankton during the Ross Sea cruise. |
| Generic Instrument Description | Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope". |

| | |
|---|--|
| Dataset-specific Instrument Name | ring net |
| Generic Instrument Name | Ring Net |
| Dataset-specific Description | Plankton net with 1 m diameter, 333 um mesh, non-filtering cod end. Used to collected zooplankton during the Ross Sea cruise. |
| Generic Instrument Description | A Ring Net is a generic plankton net, made by attaching a net of any mesh size to a metal ring of any diameter. There are 1 meter, .75 meter, .25 meter and .5 meter nets that are used regularly. The most common zooplankton ring net is 1 meter in diameter and of mesh size .333mm, also known as a 'meter net' (see Meter Net). |

Deployments

NBP1801

| | |
|--------------------|---|
| Website | https://www.bco-dmo.org/deployment/778919 |
| Platform | RVIB Nathaniel B. Palmer |
| Report | https://service.rvdata.us/data/cruise/NBP1801/doc/NBP1801DATA.pdf |
| Start Date | 2017-12-16 |
| End Date | 2018-03-03 |
| Description | Start Port: Punta Arenas, Chile End Port: Hobart, Australia |

Project Information

Using Bio-acoustics on an Autonomous Surveying Platform for the Examination of Phytoplankton-zooplankton and Fish Interactions in the Western Ross Sea (bio-acoustic plankton surveys)

Coverage: Terra Nova Bay, Western Ross Sea, Antarctica

NSF Award Abstract:

The Ross Sea is the one of the most productive regions in Antarctica and supports large populations of several key species in the Ross Sea food web, including copepods, crystal krill (*Euphausia crystallorophias*), and Antarctic silverfish (*Pleuragramma antarcticum*). Copepods and crystal krill dominate the diets of Antarctic silverfish, the dominant fish species in the high Antarctic zone, and silverfish are a major link between lower (copepods, krill) and higher (fishes, marine mammals, flighted birds, Adélie and Emperor penguins) trophic levels. Despite the significance of these key species, there is limited understanding of copepod, krill, and silverfish mesoscale distribution, spatial structure of age/maturity classes, and their interactions with physical drivers within the Ross Sea. Autonomous underwater profiling gliders are a developing technology that offers the potential for providing high spatial, temporal, and depth resolution data on regional scales. The project will test the capability of a multi-frequency echo sounder integrated into a Slocum Webb glider with the aim of providing the first glider-based acoustic assessment of simultaneous distributions of three trophic levels in the Ross Sea. Complementary glider sensors measuring physical, chemical, and biological parameters will provide mesoscale and sub-mesoscale hydrographic information from which phytoplankton-zooplankton-fish interactions and the relationships between these organisms and physics drivers (sea ice, circulation features) will be investigated. The approach proposed here, glider acoustics, is relatively new and has the potential to be transformational for investigating food webs and the Ross Sea ecosystem.

Researchers will modify and integrate an Acoustic Zooplankton and Fish Profiler (AZFP) multi-frequency echo sounder into a Slocum Webb G2 glider with the capability to differentiate between krill and other types of zooplankton, including copepods, and different sizes of krill and silverfish. The AZFP will be complemented with the existing glider sensors including a CTD, a WET Labs BB2FL ECO puck configured for simultaneous chlorophyll fluorescence (phytoplankton biomass) and optical backscatter measurements, and an Aanderaa Optode for measuring dissolved oxygen. The new sensor suite will be tested during a four-week glider deployment, where it will conduct acoustic surveys to map distribution and abundance of multiple zooplankton taxa and silverfish during the austral summer along the Terra Nova Bay polynya ice shelf and in adjacent continental shelf waters. The relationships between phytoplankton-zooplankton-fish distributions and the physical drivers of zooplankton and silverfish species and size distributions will be investigated. Coordinated ship-based acoustic sampling and net tows/trawls will be conducted multiple times during the glider deployment to validate glider acoustic-based species, size, and abundance measurements. Open accessible, automated data produced during this project will be made available through RUCOOL (Rutgers University Center for Ocean Observing Leadership) and THREDDS (Thematic Real-time Environmental Data Distribution System). The production of consistent, vertically-resolved, high resolution glider-based acoustic measurements will define a

successful outcome of this project that should help in identifying the challenges in their use as a potentially cost-effective, automated examination of food webs in the Antarctic.

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Funding

| Funding Source | Award |
|---|-----------------------------|
| NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP) | OPP-1743035 |

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