Animal condition data from Pleuromamma xiphias (Atlantic Ocean, AMT24) (Plankton Population Genetics project)

Website: https://www.bco-dmo.org/dataset/684199
Data Type: Cruise Results
Version: 1
Version Date: 2017-03-13

Project
» Basin-scale genetics of marine zooplankton (Plankton Population Genetics)

Contributors	Affiliation	Role
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Abstract
This dataset includes animal condition data for individual Pleuromamma xiphias specimens collected across ocean provinces on Atlantic Meridional Transect Cruise 24 (AMT24) in October 2014. Reported measurements include copepod prosome length (PL), wet and dry weight, carbon and nitrogen content, delta-15N and delta-13C stable isotope values, C:N ratio, and condition factor index (CFI).

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Coverage

Spatial Extent: **N**:31.87 **E**:-25.015 **S**:-43.02 **W**:-37.137
Temporal Extent: 2014-10-02 - 2014-10-28

Dataset Description

This dataset includes animal condition data for individual Pleuromamma xiphias specimens collected across ocean provinces on Atlantic Meridional Transect Cruise 24 (AMT24) in October 2014. Reported measurements include copepod prosome length (PL), wet and dry weight, carbon and nitrogen content, delta-15N and delta-13C stable isotope values, C:N ratio, and condition factor index (CFI).

Dataset release date is approximate.

Methods & Sampling

Field collection. Adults of Pleuromamma xiphias were collected on the Atlantic Meridional Transect Cruise 24 (AMT24), between 4 Oct and 28 Oct 2014 (Fig. 1, Table S1). Animals from 20 stations along the cruise transect between 31°N and 43°S were included in this study. Oblique bongo tows (200 mm nets) were conducted between on average 310 m and the sea surface. Upon recovery at the surface, plankton from one net was diluted into chilled seawater, and sorted immediately. At some stations, plankton was split quantitatively in a

Folsom plankton splitter prior to sorting. Adult females of Pleuromamma xiphias were sorted live under the microscope, flash frozen and stored in liquid nitrogen at sea, followed by transfer to -80°C in the laboratory. Only adult females were included in this study, in order to ensure comparable measurements across the oceanographic transect. Adult males have larger body size than females (Bradford-Grieve 1999), and are expected to have higher carbon and nitrogen content as well as dry weight relative to females.

Cryopreserved Pleuromamma xiphias females were stored on ice during all initial handling steps, with 5-10 animals processed at a time. Prosome length (mm) of each animal was measured in right lateral view. Individual females were then blotted dry and transferred to pre-weighed tin capsules for wet weight and dry weight measurements. Dry weight: copepods were individually weighed using a Mettler Toledo UMX2 ultramicrobalance, dried at 60°C for 24-72 hours, and weighed again.

Carbon and Nitrogen content: One or two individual copepods were included in elemental and isotope analyses, depending on dry weight. The C content, N content and bulk isotope composition of P. xiphias was determined using a Costech elemental combustion system (Model 4010) coupled to a ThermoFinnigan Delta Plus XP Isotope Ratio Mass Spectrometer (IRMS) through a Conflo IV interface. Isotope values are reported in standard δ-notation relative to the atmospheric N2 standard (AIR) as δ15N (‰) = [(15N:14Nsample / 15N:14NAIR) - 1] x 1000 or relative to Vienna Pee Dee Belemnite (VPDB) as δ13C (‰) = [(13C:12Csample / 13C:12CVPDB) - 1] x 1000. To ensure accuracy, glycine and ground tuna reference samples with well-characterized δ15N values were analyzed every 10 samples. The standard deviation of samples analyzed in duplicate was ≤ 0.2‰. Body size and weight measurements were made on a total of 237 animals, with 106 carbon and nitrogen content and isotopic measurements made across the transect.

Condition index (CFI) defined as CFI = 1000 x DW/(PL)3 (Ikeda et al. 2006). Stable isotope values measured on single individuals or in pools of N=2 (as noted in the SIA identifier column).

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
- converted latitude and longitude to decimal degrees
- re-formatted date from m/d/yyyy to yyyy-mm-dd

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Related Publications

Ikeda, T., Yamaguchi, A., & Matsuishi, T. (2006). Chemical composition and energy content of deep-sea calanoid copepods in the Western North Pacific Ocean. Deep Sea Research Part I: Oceanographic Research Papers, 53(11), 1791–1809. doi:10.1016/j.dsr.2006.08.002
Methods

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Parameters

Parameter	Description	Units
sample	sample identifier: incrementing number of individuals included in the study	unitless
cruise_id	cruise identifier	unitless
station	station identifier	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
date	collection date (UTC) formatted as yyyy-mm-dd	unitless
wet_wgt_mg	wet weight	milligrams (mg)
dry_wgt_mg	dry weight	milligrams (mg)
len_prosome	prosome Length measured in right lateral view	millimeters (mm)
CFI	Condition Factor Index: CFI = 1000 x DW/(PL)3 -- (Ikeda et al. 2006)	unitless
water_content	percent water content	unitless
SIA_id	Stable Isotope Analysis identifier	unitless
delta_15N	delta 15N; the ratio of stable isotopes 15N:14N (o/oo vs. AIR)	unitless
delta_13C	delta 13C; the ratio of stable isotopes 13C:12C	unitless
wgt_animal_mg	wet weight per specimen	milligrams (mg)
N_animal_ug	Nitrogen content per animal	micrograms (ug)
C_animal_ug	Carbon content per animal	micrograms (ug)
C_to_N	Carbon to Nitrogen ratio	unitless

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Instruments

Dataset-specific Instrument Name	Costech elemental combustion system (Model 4010)
Generic Instrument Name	Elemental Analyzer
Dataset-specific Description	Used to measure the C and N content of the copepods
Generic Instrument Description	Instruments that quantify carbon, nitrogen and sometimes other elements by combusting the sample at very high temperature and assaying the resulting gaseous oxides. Usually used for samples including organic material.

Dataset-specific Instrument Name	ThermoFinnigan Delta Plus XP Isotope Ratio Mass Spectrometer (IRMS)
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	Coupled to the Elemental Analyzer through a Conflo IV interface to measure isotope values of individual copepods.
Generic Instrument Description	The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer).

Dataset-specific Instrument Name	Mettler Toledo UMX2 ultramicrobalance
Generic Instrument Name	scale or balance
Dataset-specific Description	Used to weigh individual copepods
Generic Instrument Description	Devices that determine the mass or weight of a sample.

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Deployments

AMT24

Website	https://www.bco-dmo.org/deployment/539721
Platform	RRS James Clark Ross
Report	http://dmoserv3.bco-dmo.org/data_docs/Goetze/AMT24_cruise/AMT24_jr303_cruise_report.pdf
Start Date	2014-09-21
End Date	2014-11-06
Description	Atlantic Meridional Transect Cruise 24, transited from Immingham, United Kingdom to Punta Arenas, Chile between Sept 21, 2014 – Nov 6, 2014. The final cruise report and other cruise information, including all science components, can be found online at the Atlantic Meridional Transect webpage (http://www.amt-uk.org/Cruises), or through the British Oceanographic Data Centre (BODC) (http://www.bodc.ac.uk/projects/uk/amt/). Zooplankton ecology data from the project "Basin-scale genetics of marine zooplankton" (NSF OCE-1338959) were collected on this cruise.

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Project Information

Basin-scale genetics of marine zooplankton (Plankton Population Genetics)

Coverage: Atlantic Ocean, 46 N - 46 S

Description from NSF award abstract:
Marine zooplankton show strong ecological responses to climate change, but little is known about their capacity for evolutionary response. Many authors have assumed that the evolutionary potential of zooplankton is limited. However, recent studies provide circumstantial evidence for the idea that selection is a dominant evolutionary force acting on these species, and that genetic isolation can be achieved at regional spatial scales in pelagic habitats. This RAPID project will take advantage of a unique opportunity for basin-scale transect sampling through participation in the Atlantic Meridional Transect (AMT) cruise in 2014. The cruise will traverse more than 90 degrees of latitude in the Atlantic Ocean and include boreal-temperate, subtropical and tropical waters. Zooplankton samples will be collected along the transect, and mitochondrial and microsatellite markers will be used to identify the geographic location of strong genetic breaks within three copepod species. Bayesian and coalescent analytical techniques will test if these regions act as dispersal barriers. The physiological condition of animals collected in distinct ocean habitats will be assessed by measurements of egg production (at sea) as well as body size (condition index), dry weight, and carbon and nitrogen content. The PI will test the prediction that ocean regions that serve as dispersal barriers for marine holoplankton are areas of poor-quality habitat for the target species, and that this is a dominant mechanism driving population genetic structure in oceanic zooplankton.

Note: This project is funded by an NSF RAPID award. This RAPID grant supported the shiptime costs, and all the sampling reported in the AMT24 zooplankton ecology cruise report (PDF).

Online science outreach blog at: https://atlanticplankton.wordpress.com

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1338959

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