

Observational and experimental stable isotope data including stable isotopes from infauna collected in sediment cores at McMurdo Station, Antarctica in September, November and February of 2012 and 2013 (McMurdo Benthos project)

Website: <https://www.bco-dmo.org/dataset/716462>

Data Type: Cruise Results

Version:

Version Date: 2017-10-11

Project

» [Microbe - Metazoan Interactions in an Antarctic Infaunal Community](#) (McMurdo Benthos)

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Coverage

Spatial Extent: Lat:-77.846 Lon:166.639

Dataset Description

This dataset contains observational and experimental stable isotope data. Observational stable isotope data from infauna in sediment cores was collected at the “Jetty” dive site, Hutt Point, McMurdo Station, Antarctica. Seasonal sampling took place in September, November and February 2012-2013. This dataset also includes stable isotope data from isotopic labeling and mesocosm experiments.

Methods & Sampling

Methodology:

Observational component: Sediment cores were collected at the “Jetty” dive site location in September, November and February 2012-2013. These were sieved on a 300-micron sieve to collect macrofauna and sorted to putative species under a dissecting microscope, allowed to evacuate their guts overnight in 0.6 micron filtered seawater and then frozen at -80 C for later analysis. All samples for these experiments were from the “Spiophanes beds” that are a dense infaunal community that is present at this location.

Manipulative experiment:

Sediment cores were collected in mid September 2012 from four areas with dense Spiophanes beds and placed in the seawater tables at the Crary Lab at McMurdo station. Treatments included with or without antibiotics (100 microgram l-1 Kanamycin) and with three different levels of food (freeze dried Phaeocystis

antarctica) at levels of 0.04 grams to 0.17 grams representing different food stresses. Replicate cores were sacrificed at time intervals (between 0.5 and 6 weeks) and kept in the dark. At the termination of each core it was sieved and treated as above.

Pulse-chase experiment:

An additional selection of cores were taken in mid October and placed in the dark. *Phaeocystis antarctica* that had been grown on $H^{13}CO_3$ were added to the cores either with antibiotics or without and with $15NH_4$ to identify if antibiotics inhibited the uptake of NH_4 and the routing of carbon through the macrofaunal community. At the termination of the experiment, all cores were sieved and fauna sorted as in the above observational and manipulative experiments.

Sampling and analytical procedures:

All in dried overnight at 60 degrees, acidified using 1 M HCl, and their stable isotopic analysis measured at Washington State University on approximately 0.8 mg of tissue. Pulse chase and natural abundance samples were run separately.

Isotopic analysis was measured on a Eurovector elemental analyzer interfaced with a continuous flow Micromass Isoprime isotope ratio mass spectrometer (irms) at Washington State University.

Data Processing Description

We are including raw data after eliminating data whose N and C peak response were insufficient for reliable isotopic data as they fell outside of the linear portion of the standard curve.

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
- * parameter name modified for clarity: Concentration -> Fatty_Acid_Concentration
- * updated coordinates in data for hutt point sample site based on correspondence with data contributor.

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Data Files

File
Isotopes.csv (Comma Separated Values (.csv), 71.53 KB) MD5:30b4da91afa25e18b9de92321d00d336 Primary data file for dataset ID 716462

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Parameters

Parameter	Description	Units
Taxa	Species that had its fatty acid profile measured	unitless
Sample_date	Date which the sample was collected from the environment.	unitless
Core_Replicate	The sample identifier for the sediment core that the individual was collected from	unitless
Experiment	Either Observational (direct sampling from the environment to look at seasonality); Mesocosm (manipulated as described below); or Pulse Chase (isotopic labelling experiment). All are described below.	unitless
Time_point	Relevant only to mesocosm experiments. This is how long the cores were exposed to their treatment before being sacrificed.	unitless
Algae	Amount of <i>Phaeocystis antarctica</i> added to the core; grams rounded to nearest 0.01 gram.	grams (g)
Antibiotics	Experimental treatment description; "no" indicates no antibiotics were added and "yes" indicates that cores were exposed to 100 microgram l-1 Kanamycin sulfate at the beginning of the experiment. n/a indicates not relevant for observational cores.	unitless
Isotopic_Label	Experimental treatment description; no indicates there was no label added and yes means that carbon isotopically labeled <i>Phaeocystis Antarctica</i> was added with 15N labeled ammonium.	unitless
delta_13C	Stable carbon isotopic composition of the individual following the per mil standard in reference to a universal standard (pee dee belemnite) i.e. d13C.	permil (0/00)
delta_N15	delta N15 Stable nitrogen isotopic composition of the individual following the per mil standard in reference to a atmospheric nitrogen gas i.e. d15N.	permil (0/00)
lat	Latitude of sample; north is positive	decimal degrees
lon	Longitude of sample; west is negative	decimal degrees

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Instruments

Dataset-specific Instrument Name	Eurovector elemental analyzer
Generic Instrument Name	Elemental Analyzer
Dataset-specific Description	Isotopic analysis was measured on a Eurovector elemental analyzer interfaced with a continuous flow Micromass Isoprime isotope ratio mass spectrometer (irms) at Washington State University.
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	continuous flow Micromass Isoprime isotope ratio mass spectrometer (irms)
Generic Instrument Name	Mass Spectrometer
Dataset-specific Description	Isotopic analysis was measured on a Eurovector elemental analyzer interfaced with a continuous flow Micromass Isoprime isotope ratio mass spectrometer (irms) at Washington State University.
Generic Instrument Description	General term for instruments used to measure the mass-to-charge ratio of ions; generally used to find the composition of a sample by generating a mass spectrum representing the masses of sample components.

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Deployments

Thurber_Hutt_Point_2012

Website	https://www.bco-dmo.org/deployment/716447
Platform	Ross Island

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Project Information

Microbe - Metazoan Interactions in an Antarctic Infaunal Community (McMurdo Benthos)

Coverage: Ross Sea, 78 S 167 E

The biota of the world's seafloor is fueled by bursts of seasonal primary production. For food-limited sediment communities to persist, a balance must exist between metazoan consumption of and competition with bacteria, a balance which likely changes through the seasons. Polar marine ecosystems are ideal places to study such complex interactions due to stark seasonal shifts between heterotrophic and autotrophic communities, and temperatures that may limit microbial processing of organic matter. The research will test the following hypotheses: 1) heterotrophic bacteria compete with macrofauna for food; 2) as phytoplankton populations decline macrofauna increasingly consume microbial biomass to sustain their populations; and 3) in the absence of seasonal photosynthetic inputs, macrofaunal biodiversity will decrease unless supplied with microbially derived nutrition. Observational and empirical studies will test these hypotheses at McMurdo Station,

Antarctica, where a high-abundance macro-infaunal community is adapted to this boom-and-bust cycle of productivity. The investigator will mentor undergraduates from a predominantly minority-serving institution, in the fields of invertebrate taxonomy and biogeochemistry. The general public and young scientists will be engaged through lectures at local K-12 venues and launch of an interactive website. The results will better inform scientists and managers about the effects of climate change on polar ecosystems and the mechanisms of changing productivity patterns on global biodiversity.

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Funding

Funding Source	Award
NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	OPP-1103428

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