Epifauna species list use for a benthic community survey at 17 sites in McMurdo Sound, Antarctica from 2002 to 2014

Website: https://www.bco-dmo.org/dataset/746999
Data Type: Other Field Results
Version: 1
Version Date: 2018-10-01

Project
» Decadal Variation in Antarctic Marine Benthic Ecosystems (McMurdo Marine Benthos)
» Food web dynamics in an intact ecosystem: the role of top predators in McMurdo Sound (McMurdo Predator Prey)
» Development of a Remotely Operated Vehicle for Under Sea Ice Research in Polar Environments (SCINI)
» Community Dynamics in a Polar Ecosystem: Benthic Recovery From A Large Scale Organic Enrichment in the Antarctic (Antarctic Benthic Recovery)

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Coverage

Spatial Extent: **N**:-77.5283 **E**:166.77 **S**:-77.9317 **W**:163.1683
Temporal Extent: 2002-01 - 2014-01

Dataset Description

Related datasets:
McMurdo epifauna: https://www.bco-dmo.org/dataset/745874
McMurdo sediment: https://www.bco-dmo.org/dataset/746035

Methods & Sampling

This species list was used for a benthic community survey in McMurdo Sound, Antarctica. See dataset McMurdo epifauna: https://www.bco-dmo.org/dataset/745874 for details of this survey.

Note that "data_column_name" in this dataset (McMurdo epifauna species list) contains the exact column names in the "McMurdo epifauna" dataset so the two datasets can be related.

Each identification has an AphiaID column. More information about these organisms can be found at the World Register of Marine Species. (e.g. http://www.marinespecies.org/aphia.php?p=taxdetails&id=129542).

Data Processing Description

BCO-DMO Processing notes:
* This dataset was generated from identifications from the "McMurdo epifauna" dataset https://www.bco-dmo.org/dataset/745874. Taxonomic data was originally provided along with the "McMurdo epifauna" dataset but was broken out into a separate species list and is served as the "McMurdo epifauna species list."
* The associated aphia IDs and associated phylum...subspecies columns was obtained from the World Register of Marine Species (WoRMS) on 2018-09-13.
* Taxonomic names and common names separated into separate columns.

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Data Files

File	
epifauna_species_list.csv	(Comma Separated Values (.csv), 8.67 KB) MD5:77041add38e3c63e65c2bb85564de7da
Primary data file for dataset ID 746999	

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Parameters

Parameter	Description	Units
identification	Taxanomic identification of organism (lowest possible taxonomic category)	unitless
AphiaID	Aphia ID for taxonomic identification. See World Register of Marine Species (WoRMS) for more information about Aphia IDs	unitless
Comment	Comments about organism. Includes descriptive or common names.	unitless
data_column_name	Name of the column in the dataset "McMurdo epifauna" https://www.bco-dmo.org/dataset/745874 relating to the organism	unitless
Phylum	Phylum	unitless
Class	Class	unitless
Order	Order	unitless
Family	Family	unitless
Genus	Genus	unitless
Species	Species	unitless
Subspecies	Subspecies	unitless

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Deployments

McMurdo_epifauna_2002-2014

Website	https://www.bco-dmo.org/deployment/746177
Platform	McMurdo Station

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Project Information

Decadal Variation in Antarctic Marine Benthic Ecosystems (McMurdo Marine Benthos)

Website: http://iceaged2010.mlml.calstate.edu/

Coverage: Western Antarctic

From proposal abstract:

The ability to document and understand long-term trends in ocean climate and ecology, including the role of human activities on the biosphere, depends on an adequate knowledge of natural interdecadal fluctuations. The proposed research will document changes in benthic ecosystems in McMurdo Sound over the last four decades, i.e., since the beginning of quantitative studies of population and community organization in this region. The investigators will retrieve, analyze, and archive historical data of benthic assemblages in both hard and soft substrata, and continue work on several time series projects begun in the mid-1960s and early 1970s. The investigators will focus on the succession of marine invertebrate communities that have settled and survived on a variety of artificial substrates placed on the sea floor from the late 1960s to 1989. The substrates harbor several decades of information on patterns of settlement, growth, survival, longevity, overgrowth and other biological interactions and processes. The original researchers will relocate and permanently mark (with GPS) historical sampling sites; recover data from as much of the historical work as possible; provide meta-data to insure that past data are understood and sites can be properly resampled; and make all data available to the general science community in a permanent database housed at SCAR-MarBIN. The proposed work will be closely coordinated with an international macroecology program in the Ross Sea, represented by collaborator Simon Thrush (Latitudinal Gradient Project). In addition to reporting results in peer-reviewed publications and providing research support and opportunities for at least two graduate students, the investigators also will involve undergraduate and high school interns in the project, and participate in teacher education programs. The investigators will continue ongoing collaborations with K-12 outreach and college programs that focus on ocean science, and develop a new, broader public outreach effort with the Birch Aquarium at Scripps Institution of Oceanography.

Food web dynamics in an intact ecosystem: the role of top predators in McMurdo Sound (McMurdo Predator Prey)

Website: https://scini-penguin.mlml.calstate.edu/pauls-wordpress-test-site/

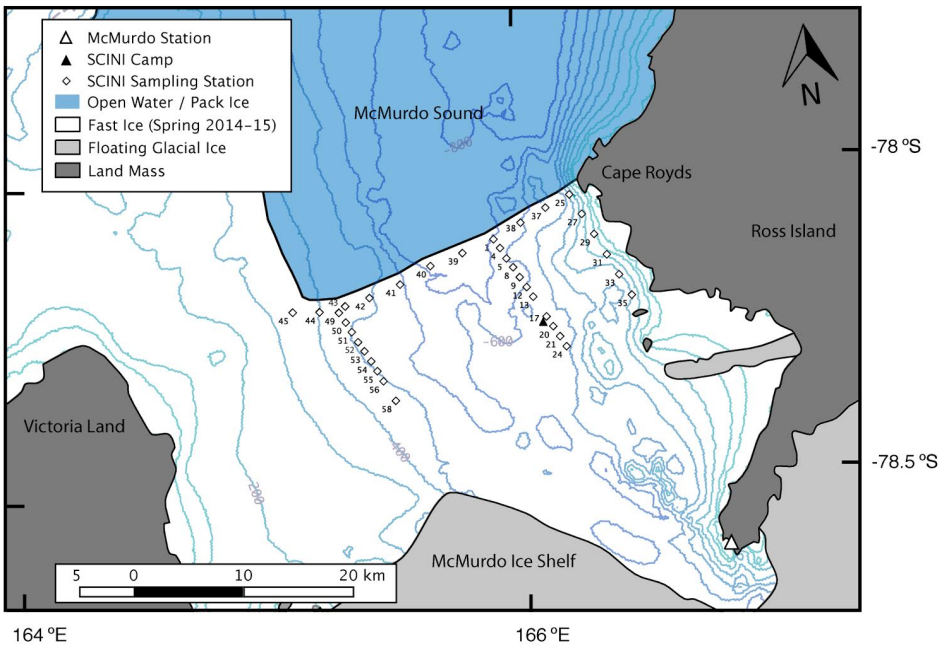
Coverage: McMurdo Sound, Antarctica

Extracted from the NSF award abstract:

The research project investigates the importance of top down forcing on pelagic food webs. The relatively pristine Ross Sea includes large populations of upper-level predators such as minke and killer whales, Adélie and Emperor penguins, and Antarctic toothfish. This project focuses on food web interactions of Adélie penguins, minke whales, and the fish-eating Ross Sea killer whales, all of which exert foraging pressure on their main prey, crystal krill (*Euphausia cyrstallorophias*) and silver fish (*Pleuragramma antarcticum*) in McMurdo Sound.

The investigators used a video- and acoustic-capable ROV, and standard biological and environmental sensors to quantify the abundance and distribution of phytoplankton, sea ice biota, prey, and relevant habitat data. The sampling area included 37 stations across an 30 x 15 km section of McMurdo Sound, stratified by distance from the ice edge as a proxy for air-breathing predator access. This study will be among the first to assess top-down forcing in the Ross Sea ecosystem and will form the basis for multidisciplinary studies in the future.

Map sampling stations



Development of a Remotely Operated Vehicle for Under Sea Ice Research in Polar Environments (SCINI)

Coverage: McMurdo Sound, McMurdo Ice Shelf

NSF Award Abstract:
In marine habitats worldwide, the zone between scuba-diving depths (to 40 m) and surge-free depths (below 200 m) has been poorly studied. Under ice-covered seas, wave motion is minimal to nonexistent, and the zone between 40 and 200 m is accessible to ROVs. Polar marine research has the benefit of stable sea ice platforms for staging and deploying instruments like ROVs, but this requires a hole that is, fo rmost ROVs, a meter in diameter. This proposal develops an ROV that can be deployed through a 15 cm hole that can be drilled with a hand-held power head, requiring minimal logistical support and technical expertise. The new ROV provides access to regions that remain unstudied, expanding our scientific reach and ability to address new questions. We will develop, test, and modify the ROV while accomplishing several overlapping and interdependent science objectives, including (1) exploration and documentation of rates and patterns of ecological succession from one of the most extreme coastal habitats in the world, (2) a survey of two unique benthic habitats and communities beyond scuba diving depths (at 40-170 m), which are almost completely unknown to most researchers and assembly of individual photographs into high-resolution images of the seafloor and (3) testing of protocols for conducting sonar mapping and creating high resolution continuous bathymetric maps of the entire seafloor around McMurdo Station. The ROV will be constructed as modules; this allows flexibility to change the ROV capabilities to suit different missions. Some components can be purchased off the shelf (e.g. VideoRay high resolution and low light video cameras), but may require development of some custom integration software. Power is provided from the surface via a 2 conductor tether; bi-directional high speed data is modulated on the tether as well, providing 84 mbs of data and unlimited dive duration. The topside controls consist of a laptop computer and joystick for the pilot. Many of the control functions and display screens could be accessed via the Internet for educational demonstrations and interactions. Two graduate students will participate fully in the project. Several other Antarctic scientists have indicated a strong interest in utilizing this tool in their research and it will be available to a pool of users on completion of the project.

Community Dynamics in a Polar Ecosystem: Benthic Recovery From A Large Scale Organic Enrichment in the Antarctic (Antarctic Benthic Recovery)

Coverage: Antarctic

NSF abstract:
Antarctic marine ecosystems differ from other polar, temperate and tropical systems at the level of individuals, populations and communities. The environment is characterized by extreme seasonality in light and food availability, along with cold stenothermal conditions. Additionally, human impacts are more limited in Antarctica than in highly populated or exploited areas. A unique research opportunity will occur in 2003 with the installation of a sewage treatment plant at McMurdo Station. This will allow for the conduct of a large-scale experiment on community recovery from organic enrichment and physical disturbance. This research will test whether major hypotheses related to community structure and disturbance recovery, which were formulated and demonstrated in more accessible marine communities, applies to Antarctic ecosystems. This research will build on a ten-year time-series that follows benthic community degradation resulting from emplacement of a sewage outfall. A complicating factor in the local McMurdo ecosystem is the input of fecal matter from the abundant populations of marine mammals and large fishes. Sampling will span the implementation of sewage treatment and the data will be incorporated in a meta-analysis of community recovery from organic disturbance in a variety of habitats, to test the generality of recovery patterns. Experimental manipulations will compare the potentially complex roles of burial and patch size in recovery dynamics. The knowledge gained from this research can be applied to other examples of high organic loading in polar habitats. Significant anthropogenic inputs in high latitudes include pulp mills and increases in human occupation and visitation as well as natural sources including woody debris in river outputs and carcass-falls from the productive surface waters above also present significant carbon inputs to high latitude environments. This study will significantly further the understanding of anthropogenic impacts in polar environments using an integrated approach to evaluate the recovery of the infaunal and epifaunal assemblages after a substantial carbon-loading perturbation sustained over ten years.

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Funding

Funding Source	Award
NSF Antarctic Sciences (NSF ANT)	ANT-0842064
NSF Division of Polar Programs (NSF PLR)	PLR-0944511
NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	PLR-0619622
NSF Division of Polar Programs (NSF PLR)	PLR-0126319

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