Specific daily growth of heterotrophic bacteria and grazing mortality on bacteria by microzooplankton from R/V Roger Revelle KIWI6, KIWI7, KIWI8, KIWI9 cruises in the Southern Ocean, 1997-1998 (U.S. JGOFS AESOPS project)

Website: https://www.bco-dmo.org/dataset/943333
Data Type: Cruise Results
Version: 1
Version Date: 2024-11-14

Project
» U.S. JGOFS Antarctic Environment and Southern Ocean Process Study (AESOPS)

Program
» U.S. Joint Global Ocean Flux Study (U.S. JGOFS)

Contributors	Affiliation	Role
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Abstract
This dataset is from dilution experiments conducted on 1997-98 cruises KIWI6, KIWI7, KIWI8, and KIWI9 on R/V Roger Revelle as part of the US JGOFS AESOPS Program in the Southern Ocean. Rate estimates are specific daily growth of heterotrophic bacteria (d-1) and grazing mortality on bacteria by microzooplankton (d-1).

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Coverage

Location: Southern Ocean
Spatial Extent: **N**:-52.97 **E**:-165.92 **S**:-70.4 **W**:-174.73
Temporal Extent: 1997-10-24 - 1998-03-10

Methods & Sampling

Rates of microzooplankton grazing were determined from serial dilution experiments as described in Landry et al. (2002). Seawater for most experiments was collected in 30-liter Go-Flo bottles, except for a few stations sampled with CTD Niskin bottles. Generally, two experiments were run at each station – one with water collected from the depth of penetration of ~25% of surface PAR, the other varying from 10 to 58% PAR depending on relative mixed-layer versus euphotic zone depths.

For each experiment, ten 2-liter polycarbonate bottles were used to establish a nutrient-enriched dilution series consisting of replicated bottles with 22, 45, 65, 86, and 100% natural (unfiltered) seawater with final concentrations of 0.5 micromolar (µM) ammonium, 0.03 µM phosphate, 1.0 nM FeSO4, and 0.1 nM MnSO4. Five additional bottles were filled with whole seawater with no nutrient enrichment. Two were used for initial samples, and the final three were incubated as natural seawater controls. All bottles were tightly capped after filling and incubated for ~48 hours in seawater-cooled incubators calibrated to the relative PAR light levels.

Data Processing Description

Initial and final concentrations of bacterial cells were determined from 1-milliliter (mL) samples preserved with 0.5% paraformaldehyde, frozen in liquid nitrogen, and analyzed with a Coulter EPICS 753 flow cytometer with two lasers (UV and 488 nanometers (nm)) after Hoechst 33342 staining. Net rates of change (ki, d-1) during the incubations were computed from initial and final cell counts in each bottle; k = ln(Pf/Pi)/t, where t = 2 days. Mortality rates due to microzooplankton grazing (m, d-1) were computed as the slopes of the linear regressions between kiand Di for the nutrient-amended bottles, and growth rates (µ, d-1) were determined from net growth in bottles without added nutrients (Landry and Hassett, 1982).

BCO-DMO Processing Description

- Imported file "AESOPS_bacterivory_BCO_DMO submission 5Nov2024.csv" into the BCO-DMO system.
- Converted Date column to YYYY-MM-DD format.
- Renamed fields to comply with BCO-DMO naming conventions.
- Saved final file as "943333_v1_bacterivory_aesops.csv".

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Data Files

File	
943333_v1_bacterivory_aesops.csv	(Comma Separated Values (.csv), 3.17 KB) MD5:c34f1378b718bb364657d8afed9faada
Primary data file for dataset ID 943333, version 1	

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Related Publications

Landry, M. R., & Hassett, R. P. (1982). Estimating the grazing impact of marine micro-zooplankton. Marine Biology, 67(3), 283–288. doi:10.1007/bf00397668 https://doi.org/10.1007/BF00397668
Methods

Landry, M. R., Selph, K. E., Brown, S. L., Abbott, M. R., Measures, C. I., Vink, S., Allen, C. B., Calbet, A., Christensen, S., & Nolla, H. (2002). Seasonal dynamics of phytoplankton in the Antarctic Polar Front region at 170°W. Deep Sea Research Part II: Topical Studies in Oceanography, 49(9–10), 1843–1865. https://doi.org/10.1016/s0967-0645(02)00015-2 https://doi.org/10.1016/S0967-0645(02)00015-2
Methods

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Related Datasets

IsRelatedTo

Landry, M. R. (2024) **Phytoplankton growth, microzooplankton herbivory from R/V Roger Revelle**

KIWI6, KIWI7, KIWI8, KIWI9 cruises in the Southern Ocean, 1997-1998 (U.S. JGOFS AESOPS project). Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 2) Version Date 2024-11-07 doi:10.26008/1912/bco-dmo.2773.2 [view at BCO-DMO]
Relationship Description: Estimates of phytoplankton growth and microzooplankton grazing on phytoplankton from the same incubation experiments.

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Parameters

Parameter	Description	Units
Cruise	cruise ID (KIWI6, KIWI7, KIWI8 or KIWI9)	unitless
Event	unique event number in UTC time (MMDDHHmm) assigned to each sampling activity	unitless
Date	date (GMT)	unitless
Latitude	latitude (North is positive; South is negative)	decimal degrees
Longitude	longitude (East is positive; West is negative)	decimal degrees
Station	designated cruise sampling station	unitless
Cast	designated cast number at station	unitless
Cast_type	CTD=CTD rosette; TM=Trace Metal rosette	unitless
Depth	water sample depth	meters (m)
Bact_growth	growth rate of heterotrophic bacteria cells	per day (d-1)
Microzoo_graz	grazing rate of microzooplankton on bacteria	per day (d-1)

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Instruments

Dataset-specific Instrument Name	Coulter EPICS 753 flow cytometer
Generic Instrument Name	Flow Cytometer
Dataset-specific Description	Coulter EPICS 753 flow cytometer with two lasers (UV and 488 nm)
Generic Instrument Description	Flow cytometers (FC or FCM) are automated instruments that quantitate properties of single cells, one cell at a time. They can measure cell size, cell granularity, the amounts of cell components such as total DNA, newly synthesized DNA, gene expression as the amount messenger RNA for a particular gene, amounts of specific surface receptors, amounts of intracellular proteins, or transient signalling events in living cells. (from: http://www.bio.umass.edu/micro/immunology/facs542/facswhat.htm)

Dataset-specific Instrument Name	30-liter Go-Flo bottles
Generic Instrument Name	GO-FLO Bottle
Dataset-specific Description	Seawater for most experiments was collected in 30-liter Go-Flo bottles, except for a few stations sampled with CTD Niskin bottles.
Generic Instrument Description	GO-FLO bottle cast used to collect water samples for pigment, nutrient, plankton, etc. The GO-FLO sampling bottle is specially designed to avoid sample contamination at the surface, internal spring contamination, loss of sample on deck (internal seals), and exchange of water from different depths.

Dataset-specific Instrument Name	CTD Niskin bottles
Generic Instrument Name	Niskin bottle
Dataset-specific Description	Seawater for most experiments was collected in 30-liter Go-Flo bottles, except for a few stations sampled with CTD Niskin bottles.
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

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Deployments

KIWI6

Website	https://www.bco-dmo.org/deployment/57724
Platform	R/V Roger Revelle
Report	http://usjgofs.whoi.edu/aesops/RRs1.html
Start Date	1997-10-20
End Date	1997-11-24
Description	Polar Front Survey I. Additional information about this cruise can be found at https://usjgofs.whoi.edu/aesops/aboutrr6.html

KIWI7

Website	https://www.bco-dmo.org/deployment/57725
Platform	R/V Roger Revelle
Report	http://usjgofs.whoi.edu/aesops/RRp1.html
Start Date	1997-12-02
End Date	1998-01-03
Description	Polar Front Process I. Additional information about this cruise can be found at https://usjgofs.whoi.edu/aesops/aboutrr7.html

KIWI8

Website	https://www.bco-dmo.org/deployment/57726
Platform	R/V Roger Revelle
Report	http://usjgofs.whoi.edu/aesops/RRs2.html
Start Date	1998-01-08
End Date	1998-02-08
Description	Polar Front Survey II. Additional information about this cruise can be found at https://usjgofs.whoi.edu/aesops/aboutrr8.html

KIWI9

Website	https://www.bco-dmo.org/deployment/57727
Platform	R/V Roger Revelle
Report	http://usjgofs.whoi.edu/aesops/RRp2.html
Start Date	1998-02-13
End Date	1998-03-19
Description	Polar Front Process II. Additional information about this cruise can be found at https://usjgofs.whoi.edu/aesops/aboutrr9.html

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Project Information

U.S. JGOFS Antarctic Environment and Southern Ocean Process Study (AESOPS)

Website: http://usjgofs.whoi.edu/research/aesops.html

Coverage: Southern Ocean, Ross Sea

The U.S. Southern Ocean JGOFS program, called Antarctic Environment and Southern Ocean Process Study (AESOPS), began in August 1996 and continued through March 1998. The U.S. JGOFS AESOPS program focused on two regions in the Southern Ocean: an east/west section of the Ross-Sea continental shelf along 76.5°S, and a second north/south section of the Southern Ocean spanning the Antarctic Circumpolar Current (ACC) at ~170°W (identified as the Polar Front). The science program, coordinated by Antarctic Support Associates (ASA), comprised eleven cruises using the R.V.I.B Nathaniel B. Palmer and R/V Roger Revelle as observational platforms and for deployment and recovery of instrumented moorings and sediment-trap arrays. The Ross-Sea region was occupied on six occasions and the Polar Front five times. Mapping data were obtained from SeaSoar, ADCP, and bathymetric systems. Satellite coverage was provided by the NASA SeaWiFS and the NOAA/NASA Pathfinder programs.

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Program Information

U.S. Joint Global Ocean Flux Study (U.S. JGOFS)

Website: http://usjgofs.whoi.edu/

Coverage: Global

The United States Joint Global Ocean Flux Study was a national component of international JGOFS and an integral part of global climate change research.

The U.S. launched the Joint Global Ocean Flux Study (JGOFS) in the late 1980s to study the ocean carbon cycle. An ambitious goal was set to understand the controls on the concentrations and fluxes of carbon and associated nutrients in the ocean. A new field of ocean biogeochemistry emerged with an emphasis on quality measurements of carbon system parameters and interdisciplinary field studies of the biological, chemical and physical process which control the ocean carbon cycle. As we studied ocean biogeochemistry, we learned that our simple views of carbon uptake and transport were severely limited, and a new "wave" of ocean science was born. U.S. JGOFS has been supported primarily by the U.S. National Science Foundation in collaboration with the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, the Department of Energy and the Office of Naval Research. U.S. JGOFS, ended in 2005 with the conclusion of the Synthesis and Modeling Project (SMP).

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Funding

Funding Source	Award
NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)	OPP-9634053

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