Water column bacteria data from ARSV Laurence M. Gould cruises LMG0104 and LMG0106 in the Southern Ocean in 2001 (SOGLOBEC project; Sea Ice Microbes project)

Website: https://www.bco-dmo.org/dataset/2350
Data Type: Cruise Results
Version: 1
Version Date: 2002-11-15

Project
» U.S. GLOBEC Southern Ocean (SOGLOBEC)
» GLOBEC: Sea Ice Microbial Communities (Sea Ice Microbes)

Programs
» U.S. GLOBal ocean ECosystems dynamics (U.S. GLOBEC)
» U.S. GLOBal ocean ECosystems dynamics (U.S. GLOBEC)

Contributors	Affiliation	Role
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Allison, Dicky	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Water column bacteria data from ARSV Laurence M. Gould cruises LMG0104 and LMG0106 in the Southern Ocean in 2001 (SOGLOBEC project; Sea Ice Microbes project)

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Coverage

Spatial Extent: **N**:-65.965 **E**:-67.049 **S**:-69.888 **W**:-72.427
Temporal Extent: 2001-04-29 - 2001-08-20

Dataset Description

Bacteria Abundance, Biomass and Chlorophyll: Water Column Samples*a*

BG 235 - Methods used for chlorophyll *a* (chla) analysis and bacteria biomass determination

Core Sampling techniques:

Sampling methods for recovery of chlorophyll *a* and bacteria from sea ice cores follows those described in Garrison and Buck (1986)

Recommendations for reporting were used as outlined by: Horner, R. et al.,(1992)

Analytic Techniques:

Chla (mg m^{-3}):

- determined fluorometrically (Turner Designs 10AU Fluorometer) following extraction in 90% acetone (Parsons *et al.*, 1984)
- ice core chla corrected to account for chla in filtered sea water (FSW) added to core sections during melting

Bacteria cell abundance (cells m^{-3}) and biomass (mg C m^{-3}):

LMG 0106

- preserved (0.5% glutaraldehyde) samples stained with 4',6-diamidino-2-phenylindole (DAPI; 0.1 to 0.3% final concentration), filtered through 0.2 mm black, polycarbonate membrane filters, and mounted onto glass microscope slides on the ship (within 24 hours following collection)
- bacteria enumerated using epifluorescence microscopy and sized using digital images taken with Image Pro Plus
- bacteria biomass determined using cell abundance, cell biovolume (BV; mm^3; as determined from mean length and width measurements), and an allometric conversion factor for bacterial carbon per volume specific for DAPI-stained bacteria (cellular carbon = 218 X $BV^{0.86}$; Loferer-Krossbacher *et al.*, 1998).
- ice core samples corrected for FSW dilution

NBP 0104

- preserved (0.5% glutaraldehyde) samples stained with SYBR Gold (0.01% final concentration), filtered through 0.2 mm Anodisc filters (Whatman), and mounted onto glass microscope slides at home institution (~1-2 months following collection)
- bacteria enumerated using epifluorescence microscopy and sized using digital images taken with Image Pro Plus
- bacteria biomass determined using cell abundance, cell biovolume (BV; mm^3), and an allometric conversion factor for bacterial carbon per volume specific for Acridine Orange-stained bacteria (cellular carbon = 89.9 X $BV^{0.59}$; Simon and Azam, 1989). Note: an AO-specific carbon per volume conversion factor was used in calculating biomass in SYBR Gold-stained samples because both AO and SYBR Gold stain bacteria cells similarly relative to DAPI (unpublished data).
- ice core samples corrected for FSW dilution

Data from **LMG0106** (July-August, 2001) added in June 2002.

Updated: April 21, 2006

Methods & Sampling

```
#  Bacteria data from Southern Ocean GLOBEC
#     C. Fritsen and F. Stewart
#          * BactAbun = bacterial abundance = cells m-3
#          * BactBio = bacterial biomass = mg C m-3 = ug C l-1
#          * chla = mg chla m-3 = ug chla l-1
```

Data Processing Description

Chla (mg m^{-3}):

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- ice core samples corrected for FSW dilution

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Data Files

File
bacteria.csv (Comma Separated Values (.csv), 17.33 KB) MD5:a29b2740490370329f4038d3b88197bf Primary data file for dataset ID 2350

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Related Publications

Garrison, D. L., & Buck, K. R. (1986). Organism losses during ice melting: A serious bias in sea ice community studies. Polar Biology, 6(4), 237–239. doi:10.1007/bf00443401 https://doi.org/10.1007/BF00443401
Methods

Horner, R., Ackley, S., Dieckmann, G., Gulliksen, B., Hoshiai, T., Legendre, L., … Sullivan, C. (1992). Ecology of sea ice biota. Polar Biology, 12(3-4). doi:10.1007/bf00243113 https://doi.org/10.1007/BF00243113
Methods

M. Loferer-Krößbacher, J. Klima, R. Psenner (1998) Determination of Bacterial Cell Dry Mass by Transmission Electron Microscopy and Densitometric Image Analysis. Applied and Environmental Microbiology, 64 (2) 688-694
Methods

Parsons, T. R., Y. Maita, and C. M. Lalli. "A Manual of Chemical and Biological Methods of Seawater Analysis", Pergamon Press (1984). ISBN: 9780080302874
Methods

Simon, M., & Azam, F. (1989). Protein content and protein synthesis rates of planktonic marine bacteria . Marine Ecology Progress Series, 51, 201–213. doi:10.3354/meps051201
Methods

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Parameters

Parameter	Description	Units
cruiseid	cruise identification	
year	year	
station	station identification	
event	event number from event log	
month_gmt	month of year	GMT
day_gmt	day of month	GMT
lat	latitude, negative = South	decimal degrees
lon	longitude, negative = West	decimal degrees
depth	depth of sample	meters
bact_abun	bacteria abundance	cells/meter3
bact_biomass_C	bacteria carbon biomass	milligrams C/meter3
chl_a_ugm	chlorophyll a concentration	micrograms/liter

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Instruments

Dataset-specific Instrument Name	Niskin Bottle
Generic Instrument Name	Niskin bottle
Dataset-specific Description	Niskin bottle cast, use Bottle_Niskin
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

LMG0104

Website	https://www.bco-dmo.org/deployment/57637
Platform	ARSV Laurence M. Gould
Report	http://www.ccpo.odu.edu/Research/globec/cruises/gould0103_0104.doc
Start Date	2001-04-20
End Date	2001-06-05
Description	**Methods & Sampling** # Bacteria data from Southern Ocean GLOBEC # C. Fritsen and F. Stewart # * BactAbun = bacterial abundance = cells m-3 # * BactBio = bacterial biomass = mg C m-3 = ug C l-1 # * chla = mg chla m-3 = ug chla l-1 **Processing Description** Chla (mg m-3): determined fluorometrically (Turner Designs 10AU Fluorometer) following extraction in 90% acetone (Parsons et al., 1984) ice core chla corrected to account for chla in filtered sea water (FSW) added to core sections during melting

LMG0106

Website	https://www.bco-dmo.org/deployment/57639
Platform	ARSV Laurence M. Gould
Report	http://www.ccpo.odu.edu/Research/globec/cruises01/lmg0106_menu.html
Start Date	2001-07-21
End Date	2001-09-01
Description	**Methods & Sampling** # Bacteria data from Southern Ocean GLOBEC # C. Fritsen and F. Stewart # * BactAbun = bacterial abundance = cells m-3 # * BactBio = bacterial biomass = mg C m-3 = ug C l-1 # * chla = mg chla m-3 = ug chla l-1 **Processing Description** Chla (mg m-3): determined fluorometrically (Turner Designs 10AU Fluorometer) following extraction in 90% acetone (Parsons et al., 1984) ice core chla corrected to account for chla in filtered sea water (FSW) added to core sections during melting Bacteria cell abundance (cells m-3) and biomass (mg C m-3): LMG 0106 preserved (0.5% glutaraldehyde) samples stained with 4',6-diamidino-2-phenylindole (DAPI; 0.1 to 0.3% final concentration), filtered through 0.2 mm black, polycarbonate membrane filters, and mounted onto glass microscope slides on the ship (within 24 hours following collection) bacteria enumerated using epifluorescence microscopy and sized using digital images taken with Image Pro Plus bacteria biomass determined using cell abundance, cell biovolume (BV; mm3; as determined from mean length and width measurements), and an allometric conversion factor for bacterial carbon per volume specific for DAPI-stained bacteria (cellular carbon = 218 X BV0.86; Loferer-Krößbacher et al., 1998). ice core samples corrected for FSW dilution

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Project Information

U.S. GLOBEC Southern Ocean (SOGLOBEC)

Website: http://www.ccpo.odu.edu/Research/globec_menu.html

Coverage: Southern Ocean

The fundamental objectives of United States Global Ocean Ecosystems Dynamics (U.S. GLOBEC) Program are

The fundamental objectives of United States Global Ocean Ecosystems Dynamics (U.S. GLOBEC) Program are dependent upon the cooperation of scientists from several disciplines. Physicists, biologists, and chemists must make use of data collected during U.S. GLOBEC field programs to further our understanding of the interplay of physics, biology, and chemistry. Our objectives require quantitative analysis of interdisciplinary data sets and, therefore, data must be exchanged between researchers. To extract the full scientific value, data must be made available to the scientific community on a timely basis.

GLOBEC: Sea Ice Microbial Communities (Sea Ice Microbes)

Coverage: Southern Ocean

The U.S. Global Ocean Ecosystems Dynamics (U.S. GLOBEC) program has the goal of understanding and ultimately predicting how populations of marine animal species respond to natural and anthropogenic changes in climate. Research in the Southern Ocean (SO) indicates strong coupling between climatic processes and ecosystem dynamics via the annual formation and destruction of sea ice. The Southern Ocean GLOBEC Program (SO GLOBEC) will investigate the dynamic relationship between physical processes and ecosystem responses through identification of critical parameters that affect the distribution, abundance and population dynamics of target species. The overall goals of the SO GLOBEC program are to elucidate shelf circulation processes and their effect on sea ice formation and krill distribution, and to examine the factors which govern krill survivorship and availability to higher trophic levels, including penguins, seals and whales. The focus of the U.S. contribution to the international SO GLOBEC program will be on winter processes. This component will focus on the distribution and activities of sea ice microbial communities. This will be accomplished using an integrated combination of sampling (vertical profiles, horizontal surveys, and under-ice surveys) and observational protocols. Experiments will be designed to estimate microbial activity within the sea ice and at the ice-seawater interface. The research will be coordinated with components studying the water column productivity and the sea ice habitat. The result of the integrated SO GLOBEC program will be to improve the predictability of living marine resources, especially with respect to local and global climatic shifts.

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Program Information

U.S. GLOBal ocean ECosystems dynamics (U.S. GLOBEC)

Website: http://www.usglobec.org/

Coverage: Global

U.S. GLOBEC (GLOBal ocean ECosystems dynamics) is a research program organized by oceanographers and fisheries scientists to address the question of how global climate change may affect the abundance and production of animals in the sea.

The U.S. GLOBEC Program currently had major research efforts underway in the Georges Bank / Northwest Atlantic Region, and the Northeast Pacific (with components in the California Current and in the Coastal Gulf of Alaska). U.S. GLOBEC was a major contributor to International GLOBEC efforts in the Southern Ocean and Western Antarctic Peninsula (WAP).

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Funding

Funding Source	Award
NSF Antarctic Sciences (NSF ANT)	ANT-9910098

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