

# Ice thickness transect data from ARSV Laurence M. Gould LMG0106, LMG0205 in the Southern Ocean from 2001-2002 (SOGLOBEC project, Sea Ice Microbes project, Crabeater Seal Foraging project)

**Website:** <https://www.bco-dmo.org/dataset/3119>

**Data Type:** Cruise Results

**Version:** 2

**Version Date:** 2020-01-22

## Project

- » [U.S. GLOBEC Southern Ocean](#) (SOGLOBEC)
- » [GLOBEC: Sea Ice Microbial Communities](#) (Sea Ice Microbes)
- » [Foraging Ecology of Crabeater Seals \(Lobodon Carcinophagus\)](#) (Crabeater Seal Foraging)

## Programs

- » [U.S. GLOBal ocean ECosystems dynamics](#) (U.S. GLOBEC)
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## Abstract

Ice thickness transect data from ARSV Laurence M. Gould LMG0106, LMG0205 in the Southern Ocean from 2001-2002 (SOGLOBEC project, Sea Ice Microbes project, Crabeater Seal Foraging project).

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## Coverage

**Spatial Extent:** N:-66.3667 E:-67.8 S:-68.205 W:-70.725

**Temporal Extent:** 2001-07-28 - 2002-09-05

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## Dataset Description

Related datasets:

[ice properties](#), [snow pits](#), [sea ice](#), [ice optics](#)

## Methods & Sampling

Ice floes were accessed from the LMG throughout the cruise for snow and ice studies that entailed ice and snow thickness transects, snow collections, ice core collections and brine collections. In addition CTD deployments and measures of bacterial and algal production were undertaken while on these long term ice stations. Thickness transects and snow pits were accomplished in conjunction with OG-241.

At the ice stations we measured ice thickness transects 20 m to 100 m in length. These transects were often located in an area under which the divers (BG-244) would be working. Along these transect lines we measured snow depth, slush depth (if present), depth of the wicked layer (the layer of snow above the slush layer which has absorbed moisture), ice thickness, freeboard (the distance from sea level to the ice surface), and ice surface temperature.

When time and ice conditions permitted, surveys of snow depth and ice thickness were conducted along 20 to 100-m-long lines. These survey lines were laid out on the ice and snow depth, freeboard, and ice thickness were measured every meter along the line. This was a team effort with individual people working a 1 m auger, a 2 m auger, snow pits, and an ice thickness tape. Ice cores were also taken to provide a detailed look at ice properties and structure. These surveys were conducted at 10 sites in 2001 and are summarized in the 2001 table. Surveys were conducted at 12 sites in 2002 and are summarized in the 2002 table.

<b>Summary of 2001 survey sites</b>	<b>Summary of 2002 survey sites</b>
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Robert	Site 1
TR1	Site 6
TR2	Site 9-1
TR3	Site 9-2
TR4	Site 21-1
TR5	Site 21-2
TR10	Site 24-1
Billy	Site 24-2
Fernando	Site 29
Yoga	Site 30
	Site 31-1
	Site 31-2

## **Data Processing Description**

These observations are being analyzed in conjunction with those collected by personnel on the *N.B. Palmer* to yield a regional ice maps. The summary data from the observations on the *Gould* show substantial amounts of open water were encountered during cruise as was evident from a large amount of time spent in the vicinity of the southern end of Adelaide Island where the reoccurring polyna predominated. Because of these operations, the operations are highly biased and significant editing of observations has to occur to account for reoccurring observations in the same region. Such editing and analysis are underway. Despite these known biases, the observations yield useful information in regards to the types of ice encountered. For instance, the average estimated ice thickness on ridged ice types was 54 cm while the average level ice thickness encountered was 38 cm (below). Snow thickness estimates yielded an average snow thickness of 11 cm with only 70.8% of the ice observed had snow (the remainder of the ice observed being nilas or young gray ice with new snow cover).

## **Summary statistics from sea ice observations aboard LMG01-06.**

Total ice concentration (%):	82.18*
Open water within pack (%):	17.82*
Avg. level ice thickness (total area) cm:	31.52
Avg. level ice thickness (ice area) cm:	38.35
Fraction of surface area ridged:	0.05
Avg. ridged ice thickness (total area) cm:	44.5
Avg. ridged ice thickness (ice area) cm:	54.15
Avg. snow thickness (total area) cm:	9.05
Avg. snow thickness (ice area) cm:	11.01
Avg. snow thickness (snow covered area) cm:	15.55
Snow covered ice within pack (total area):	58.18
Snow free ice within pack (total area):	24
Percent ice with snow cover:	70.8
Percent ice with no snow:	29.2
Avg. albedo (total area)	0.55*

\*biased by repetitive polyna observations

### Summary statistics for observations taken during the LMG02-05 cruise.

Total ice concentration (%)	83.08
Open water within pack (%)	16.92
Avg. level ice thickness (total area) cm:	37.09
Avg. level ice thickness (ice area) cm:	44.65
Fraction of surface area ridged:	0.13
Avg. ridged ice thickness (total area) cm:	81
Avg. ridged ice thickness (ice area) cm:	97.5
Avg. snow thickness (total area) cm:	11.09
Avg. snow thickness (ice area) cm:	13.35
Avg. snow thickness (snow covered area) cm:	16.4
Snow covered ice within pack (% total area):	67.65
Snow free ice within pack (% total area):	15.43
Percent ice with snow cover:	81.43
Percent ice with no snow:	18.57
Avg. albedo (total area):	0.58

(from cruise reports, LMG0106, LMG0205)

#### BCO-DMO Processing Notes:

##### version 1 changes (2009-05-13):

- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions

##### version 2 changes (2020-01-22):

- changed lonitude values to negative for West locations
- changed date format from m/d/yyyy to yyyy-mm-dd

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## Data Files

File
<b>ice_thickness.csv</b> (Comma Separated Values (.csv), 4.85 KB) MD5:0468d6c60169656d5b167d487e05dabd
Primary data file for dataset ID 3119

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## **Parameters**

<b>Parameter</b>	<b>Description</b>	<b>Units</b>
year	year, reported as YYYY, e.g. 1995	
cruise_id	cruise designation; name	
sta_id	station number; generally sequential; a unique number designating a general geographic location at which one or more sampling activities may occur	
sta_name	station name	
lat_start	latitude at starting time of measurement (west is negative)	decimal degrees
lat_end	latitude at end time of measurement; in decimal degrees (negative denotes South)	decimal degrees
lon_start	longitude at starting time of measurement (west is negative)	decimal degrees
lon_end	longitude at end time of measurement; in decimal degrees (negative denotes West)	decimal degrees
transect_id	transect number	
date_gmt	gmt month, day and year, usually as a text string, e.g. feb10_1995.	
month_gmt	month of year, GMT time , i.e. 01-12	
day_gmt	day, GMT time e.g. 22.	
yrday_gmt	GMT day and decimal time, as 326.5 for the 326th day of the year, or November 22 at 1200 hours (noon).	
transect_len	length along the transect at which the sample was taken.	meters
pcent_below_sealevl	percent of ice situated below sea level.	%
comments	free text comments	
snow_mean	mean snow thickness	centimeters
snow_std	standard deviation of snow thickness	centimeters
snow_min	minimum snow thickness	centimeters
snow_max	maximum snow thickness	centimeters
ice_mean	mean ice thickness	centimeters
ice_std	standard deviation of ice thickness	centimeters
ice_min	minimum ice thickness	centimeters
ice_max	maximum ice thickness	centimeters
freebd_mean	mean freeboard: the distance from sea level to the ice surface	centimeters
freebd_std	standard deviation of freeboard: the distance from sea level to the ice surface	centimeters
freebd_min	minimum freeboard: the distance from sea level to the ice surface	centimeters
freebd_max	maximum freeboard: the distance from sea level to the ice surface	centimeters
wetlayr_mean	mean wet layer: the layer of snow above the slush layer which has absorbed moisture	centimeters
wetlayr_std	standard deviation of wet layer: the layer of snow above the slush layer which has absorbed moisture	centimeters
wetlayr_min	minimum wet layer: the layer of snow above the slush layer which has absorbed moisture	centimeters
wetlayr_max	maximum wet layer: the layer of snow above the slush layer which has absorbed moisture	centimeters

## Deployments

### LMG0106

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57639">https://www.bco-dmo.org/deployment/57639</a>
<b>Platform</b>	ARSV Laurence M. Gould
<b>Report</b>	<a href="http://www.ccpo.odu.edu/Research/globec/cruises01/lmg0106_menu.html">http://www.ccpo.odu.edu/Research/globec/cruises01/lmg0106_menu.html</a>
<b>Start Date</b>	2001-07-21
<b>End Date</b>	2001-09-01

### LMG0205

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57644">https://www.bco-dmo.org/deployment/57644</a>
<b>Platform</b>	ARSV Laurence M. Gould
<b>Report</b>	<a href="http://www.ccpo.odu.edu/Research/globec/main_cruises02/lmg0205/report_lmg0205.pdf">http://www.ccpo.odu.edu/Research/globec/main_cruises02/lmg0205/report_lmg0205.pdf</a>
<b>Start Date</b>	2002-07-29
<b>End Date</b>	2002-09-18

## Project Information

### U.S. GLOBEC Southern Ocean (SOGLOBEC)

**Website:** [http://www.ccpo.odu.edu/Research/globec\\_menu.html](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 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.

### **Foraging Ecology of Crabeater Seals (*Lobodon Carcinophagus*) (Crabeater Seal Foraging)**

**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 foraging behavior of adult female crabeater seals, using a combination of satellite-linked tracking, specialized diver recorders, and stable isotopic tracers. This research will be coordinated with components focused on prey (krill) distribution and the physical environment. The results will be analyzed using an optimality model. 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**

<b>Funding Source</b>	<b>Award</b>
<a href="#">NSF Antarctic Sciences (NSF ANT)</a>	<a href="#">ANT-9910098</a>
<a href="#">NSF Antarctic Sciences (NSF ANT)</a>	<a href="#">ANT-9981683</a>

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