

# Sea Ice data from ARSV Laurence M. Gould and RVIB Nathaniel B. Palmer cruises LMG0106, LMG0205, NBP0104, and NBP0204 in the Southern Ocean from 2001-2002 (SOGLOBEC project; Sea Ice Microbes project)

Website: <https://www.bco-dmo.org/dataset/2377>

Data Type: Cruise Results

Version: 1

Version Date: 2003-02-11

## 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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## Abstract

Sea Ice data from ARSV Laurence M. Gould and RVIB Nathaniel B. Palmer cruises LMG0106, LMG0205, NBP0104, and NBP0204 in the Southern Ocean from 2001-2002 (SOGLOBEC project; Sea Ice Microbes project)

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## Coverage

**Spatial Extent:** N:67 E:63.917 S:-69.25 W:-76.85

**Temporal Extent:** 2001-07-27 - 2002-09-15

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## Dataset Description

### Sea Ice Observations during Southern Ocean GLOBEC

Sea ice observations on the Southern Ocean GLOBEC cruises were conducted according to standardized protocols developed and utilized by members of the Antarctic Sea Ice Processes and Climate working group (co-sponsored by SCAR and GIOCHANT).

Related datasets:

[ice properties](#), [ice thickness](#), [snow pits](#)

More details regarding methodology can be found at

<http://www.scar.org/GLOCHANT/ASPeCt/seaiceobs.htm> or by contacting Dr. C.H. Fritsen at [cfritsen@dri.edu](mailto:cfritsen@dri.edu).

#### **OPEN WATER (OpnWtrCode):**

Code --- Description

0 --- No openings

1 --- Small cracks

2 --- Very narrow breaks, <50m

3 --- Narrow breaks, 50-200 m

4 --- Wide breaks, 200-500 m

5 --- Very wide breaks, >500 m

6 --- Lead/coastal lead

- 7 --- Polynya/coastal polynya
- 8 --- Water broken only by small scattered floes
- 9 --- Open sea

**ICE CONCn (IceCon):** to be expressed in tenths.

**ICE TYPE (ITypeCode):**

Code --- Description

- 10 --- Frazil
- 11 --- Shuga
- 12 --- Grease
- 20 -- Nilas
- 30 --- Pancakes
- 40 --- Young grey ice, 0.1-0.15 m
- 50 --- Young grey-white ice, 0.15-0.3 m
- 60 --- First year, 0.3-0.7 m
- 70 --- First year, 0.7-1.2 m
- 80 --- First year, >1.2 m
- 85 --- Multiyear floes
- 90 --- Brash
- 95 --- Fast ice

**SEA ICE (IThkns) AND SNOWTHICKNESS (SnoThkns):** to be expressed in centimetres.

**FLOE SIZE (FloSzCode):**

Code --- Description

- 100 --- Pancakes
- 200 --- New sheet ice
- 300 --- Brash/broken ice
- 400 --- Cake ice, <20 m
- 500 --- Small floes, 20-100 m
- 600 --- Medium floes, 100-500 m
- 700 --- Large floes, 500-2000 m
- 800 --- Vast floes, >2000 m

**SNOW TYPE (SnoTypCode):**

Code --- Description

- 0 --- No snow observation
- 1 --- No snow, no ice or brash
- 2 --- Cold new snow, < 1 day old
- 3 --- Cold old snow
- 4 --- Cold wind-packed snow
- 5 --- New melting snow (wet new snow)
- 6 --- Old melting snow
- 7 --- Glaze

- 8 --- Melt slush
- 9 --- Melt puddles
- 10 --- Saturated snow (waves)
- 11 --- Sastrugi

## TOPOGRAPHY

**(TopoCode):**

| Code            | Description                                 |
|-----------------|---------------------------------------------|
| 100             | Level ice                                   |
| 200             | Rafted pancakes                             |
| 300             | Cemented pancakes                           |
| 400             | Finger rafting                              |
| 5xy             | New, unconsolidated ridges (no snow)        |
| 6xy             | New ridges filled with snow or a snow cover |
| 7xy             | Consolidated ridges (no weathering)         |
| 8xy             | Older, weathered ridges                     |
| <b>x values</b> | <b>Areal Coverage</b>                       |
| 0               | 0-10%                                       |
| 1               | 10-20%                                      |
| 2               | 20-30%                                      |
| 3               | 30-40%                                      |
| 4               | 40-50%                                      |
| 5               | 50-60%                                      |
| 6               | 60-70%                                      |
| 7               | 70-80%                                      |
| 8               | 80-90%                                      |
| 9               | 90-100%                                     |
| <b>y values</b> | <b>Avg. Sail Height</b>                     |
| 1               | 0.5 m                                       |
| 2               | 1.0 m                                       |
| 3               | 1.5 m                                       |

|   |       |
|---|-------|
| 4 | 2.0 m |
| 5 | 3.0 m |
| 6 | 4.0 m |
| 7 | 5.0 m |

**The following weather observation codes and descriptions are from the "National Weather Service Observing Handbook No. 1", Marine Surface Weather Observations, August 1995. U.S. Department of Commerce, Silver Spring, MD.**

**VISIBILITY (visib):**

Code --- Visibility in m/km

90 --- less than 50 m

91 --- 50 but less than 200 m

92 --- 200 but less than 500 m

93 --- 500 but less than 1000 m

94 --- > 1 but less than 2 km

95 --- > 2 but less than 4 km

96 --- > 4 but less than 10 km

97 --- > 10 but less than 20 km

98 --- > 20 but less than 50 km

99 --- > 50 km or more

**TOTAL CLOUD COVER (cldcvr):** to be expressed in eighths; -1 = Sky obscured by fog, snow or other met. phenom.

**PRESENT WEATHER (wx):**

| Code | Description                                          |
|------|------------------------------------------------------|
|      | <b>Change of sky during past hour</b>                |
| 0    | Cloud development not observable                     |
| 1    | Clouds dissolving or becoming less developed         |
| 2    | State of the sky on the whole unchanged              |
| 3    | Clouds generally forming or developing               |
|      | <b>Phenomena in past hour but not at time of obs</b> |

|    |                                                                       |
|----|-----------------------------------------------------------------------|
| 28 | Fog (in past hour, but not at time of obs.)                           |
|    |                                                                       |
| 36 | Slight or moderate drifting snow, low (below eye level)               |
| 37 | Heavy drifting snow, low (below eye level)                            |
| 38 | Slight or moderate drifting snow, high (above eye level)              |
| 39 | Heavy drifting snow, high (above eye level)                           |
|    | <b>Fog at the time of observation</b>                                 |
| 41 | Sky visible<br>Fog in patches (visibility may be greater than 1/2 nm) |
| 42 | Sky visible<br>Fog has become thinner in past hour                    |
| 43 | Sky invisible<br>Fog has become thinner in past hour                  |
| 44 | Sky visible<br>Fog, no change in past hour                            |
| 45 | Sky invisible<br>Fog, no change in past hour                          |
| 46 | Sky visible<br>Fog has begun or thickened in past hour                |
| 47 | Sky invisible<br>Fog has begun or thickened in past hour              |
|    | <b>Drizzle</b>                                                        |

|    |                                                   |
|----|---------------------------------------------------|
| 50 | Intermittent<br>Slight drizzle                    |
| 56 | Slight<br>Freezing drizzle                        |
|    | <b>Rain (Not falling as showers)</b>              |
| 60 | Intermittent<br>Slight rain                       |
|    | <b>Solid precipitation not falling as showers</b> |
| 70 | Intermittent<br>Slight snow in flakes             |
| 71 | Continuous<br>Slight snow in flakes               |
| 72 | Intermittent<br>Moderate snow in flakes           |
| 73 | Continuous<br>Moderate snow in flakes             |
| 74 | Intermittent<br>Heavy snow in flakes              |
| 75 | Continuous<br>Heavy snow in flakes                |
| 76 | Diamond dust (with or without fog)                |
| 77 | Snow grains (with or without fog)                 |
|    | <b>Solid precipitation in showers</b>             |
| 85 | Slight<br>Shower of snow                          |
| 86 | Moderate or heavy<br>Shower of snow               |

## Acquisition Description

Sea ice observations on the Southern Ocean GLOBEC cruises were conducted according to standardized protocols developed and utilized by members of the Antarctic Sea Ice Processes and Climate working group (co-sponsored by SCAR and GIOCHANT).

Routine observations of sea ice and snow characteristics were routinely collected on an hourly basis while the *L.M. Gould* was actively steaming throughout the cruise. These observations began on 26 July 2001 and continued through 27 August 2001. The observational protocol followed during the cruise was the protocol that is formally endorsed by the SCAR ASPeCt (Antarctic Sea ice Processes and Climate) program for observing sea ice characteristics. In short, our program (combined efforts of BG-244 as well as OG-241) was able to gather the information that will be used to characterize the predominate types of ice in the region according to parameters, such as areal coverage, floe size, ice thickness, snow type, snow thickness and deformation.

## Processing Description

More details regarding methodology can be found at <http://www.scar.org/GLOCHANT/ASPeCt/seaiceobs.htm> or by contacting Dr. C.H. Fritsen at [cfritsen@dri.edu](mailto:cfritsen@dri.edu).

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## Parameters

| Parameter  | Description                                               | Units |
|------------|-----------------------------------------------------------|-------|
| month_gmt  | month in GMT time                                         |       |
| day_gmt    | day of month GMT time                                     |       |
| time_gmt   | time in GMT, in hours and minutes                         |       |
| lat        | latitude, decimal degrees, minus = south                  |       |
| lon        | longitude, decimal degrees, minus = west                  |       |
| ConT       | total ice concentration in tenths                         |       |
| OpnWtrCode | open water code                                           |       |
| TrackDist  | distance along track in Km from start of ice observations |       |



|                |                                               |          |
|----------------|-----------------------------------------------|----------|
| IceCon1        | ice concentration in tenths                   |          |
| IType1Code     | ice type code for IceCon1                     |          |
| IThkns1        | ice thickness code for IceCon1 in centimeters |          |
| Flo1SzCode     | ice floe size code for IceCon1                |          |
| Topo1Code      | ice topography code for IceCon1               |          |
| SnoTyp1Code    | snow type code for IceCon1                    |          |
| SnoThkns1      | snow thickness for IceCon1 in centimeters     |          |
| IceCon2        | ice concentration in tenths                   |          |
| IType2Code     | ice type code for IceCon2                     |          |
| IThkns2        | ice thickness code for IceCon2 in centimeters |          |
| Flo2SzCode     | ice floe size code for IceCon2                |          |
| Topo2Code      | ice topography code for IceCon2               |          |
| SnoTyp2Code    | snow type code for IceCon2                    |          |
| SnoThkns2      | snow thickness for IceCon2 in centimeters     |          |
| IceCon3        | ice concentration in tenths                   |          |
| IType3Code     | ice type code for IceCon3                     |          |
| IThkns3        | ice thickness code for IceCon3 in centimeters |          |
| Flo3SzCode     | ice floe size code for IceCon3                |          |
| Topo3Code      | ice topography code for IceCon3               |          |
| SnoTyp3Code    | snow type code for IceCon3                    |          |
| SnoThkns3      | snow thickness for IceCon3 in centimeters     |          |
| temp           | water temperature, degrees centigrade         |          |
| temp_air       | air temperature, degrees centigrade           |          |
| wind_speed_kts | wind speed in knots                           |          |
| wind_dir       | wind direction in degrees                     |          |
| frame          | photograph taken, PI reference ID number      |          |
| visib          | visibility code in meters/kilometer           |          |
| cldcvr         | total cloud cover code in eights              |          |
| wx             | present weather code                          |          |
| Comments       | free text, PI observational notes             |          |
| cruiseid       | cruise id                                     | unitless |

|      |              |          |
|------|--------------|----------|
| year | 4 digit year | unitless |
|------|--------------|----------|

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## 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p><b>Acquisition Description</b><br/>Sea ice observations on the Southern Ocean GLOBEC cruises were conducted according to standardized protocols developed and utilized by members of the Antarctic Sea Ice Processes and Climate working group (co-sponsored by SCAR and GIOCHANT).</p> <p><b>Processing Description</b><br/>More details regarding methodology can be found at <a href="http://www.scar.org/GLOCHANT/ASPeCt/seaiceobs.htm">http://www.scar.org/GLOCHANT/ASPeCt/seaiceobs.htm</a> or by contacting Dr. C.H. Fritsen at <a href="mailto:cfritsen@dri.edu">mailto:cfritsen@dri.edu</a>.</p> |

### 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p><b>Acquisition Description</b><br/>Sea ice observations on the Southern Ocean GLOBEC cruises were conducted according to standardized protocols developed and utilized by members of the Antarctic Sea Ice Processes and Climate working group (co-sponsored by SCAR and GIOCHANT).</p> <p><b>Processing Description</b><br/>More details regarding methodology can be found at <a href="http://www.scar.org/GLOCHANT/ASPeCt/seaiceobs.htm">http://www.scar.org/GLOCHANT/ASPeCt/seaiceobs.htm</a> or by contacting Dr. C.H. Fritsen at <a href="mailto:cfritsen@dri.edu">mailto:cfritsen@dri.edu</a>.</p> |

#### NBP0104

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Website</b>     | <a href="https://www.bco-dmo.org/deployment/57638">https://www.bco-dmo.org/deployment/57638</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Platform</b>    | RVIB Nathaniel B. Palmer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Report</b>      | <a href="http://www.ccpo.odu.edu/Research/globec/cruises01/nbp0104_menu.html">http://www.ccpo.odu.edu/Research/globec/cruises01/nbp0104_menu.html</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Start Date</b>  | 2001-07-22                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>End Date</b>    | 2001-08-31                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p><b>Acquisition Description</b><br/>Sea ice observations on the Southern Ocean GLOBEC cruises were conducted according to standardized protocols developed and utilized by members of the Antarctic Sea Ice Processes and Climate working group (co-sponsored by SCAR and GIOCHANT).</p> <p><b>Processing Description</b><br/>More details regarding methodology can be found at <a href="http://www.scar.org/GLOCHANT/ASPeCt/seaiceobs.htm">http://www.scar.org/GLOCHANT/ASPeCt/seaiceobs.htm</a> or by contacting Dr. C.H. Fritsen at <a href="mailto:cfritsen@dri.edu">mailto:cfritsen@dri.edu</a>.</p> |

#### NBP0204

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Website</b>             | <a href="https://www.bco-dmo.org/deployment/57643">https://www.bco-dmo.org/deployment/57643</a>                                                                                                                                                                                                                                                                                                                                                     |
| <b>Platform</b>            | RVIB Nathaniel B. Palmer                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Report</b>              | <a href="http://globec.who.edu/so-dir/reports/nbp0204/nbp0204b.html">http://globec.who.edu/so-dir/reports/nbp0204/nbp0204b.html</a>                                                                                                                                                                                                                                                                                                                 |
| <b>Start Date</b>          | 2002-07-31                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>End Date</b>            | 2002-09-18                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                            | <p><b>Acquisition Description</b></p> <p>Sea ice observations on the Southern Ocean GLOBEC cruises were conducted according to standardized protocols developed and utilized by members of the Antarctic [ <a href="#">table of contents</a>   <a href="#">back to top</a> ] Sea ice Processes and Climate working group (co-sponsored by SCAR and</p>                                                                                              |
| <b>Description</b>         | GIOCHANT).                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Project Information</b> | <p><b>Processing Description</b></p> <p>More details regarding methodology can be found at <a href="http://www.scar.org/GLOCHANT/ASPeCt/seaiceobs.htm">http://www.scar.org/GLOCHANT/ASPeCt/seaiceobs.htm</a>"&gt;<a href="http://www.scar.org/G...">http://www.scar.org/G...</a> or by contacting Dr. C.H. Fritsen at <a href="mailto:cfritsen@dri.edu">mailto:cfritsen@dri.edu</a>"&gt;<a href="mailto:cfritsen@dri.edu">cfritsen@dri.edu</a>.</p> |

## **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.

## 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).

### 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).

## Funding

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

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