APPENDIX B

INTERNATIONAL SATELLITE CLOUD CLIMATOLOGY PROJECT (ISCCP)

DESCRIPTION OF ICE/SNOW DATA SET

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1. PURPOSE OF DATA SET FOR ISCCP

The International Satellite Cloud Climatology Project (ISCCP), the first project of the World Climate Research Program, is organized to obtain global satellite observations of clouds for research and to produce a cloud climatology covering five years (WCRP, 1982; Schiffer and Rossow, 1983). As part of the satellite data analysis, information concerning the presence of sea ice and snow cover aids in separating clear and cloudy scenes (Schiffer and Rossow, 1985). Although these data are available from the original sources covering a longer time period (see below), the versions used during the processing of the satellite data are archived with the cloud climatology for two reasons: to document the complete ISCCP data analysis procedure and to provide the data in a format especially suited to satellite data processing. The latter reason arises since these data were re-formatted for ISCCP to make them more convenient for computer processing of the large volume satellite imaging data sets: other researchers may also find this form of these data more convenient to use than the original. The ISCCP version of these data covers the time period from July 1983 onwards.

These data were produced at:

NASA Goddard Space Flight Center
Institute for Space Studies
2880 Broadway
New York, NY 10025
USA

The data are archived at:

Satellite Data Services Division
National Environmental Satellite Data and Information Service
National Oceanic and Atmospheric Administration
Washington, DC 20233
USA

The ISCCP version of the ice/snow data set includes only information concerning fractional coverage. The version actually used in the cloud analysis is changed in two ways: reduction to ice/snow presence and creation of "margin zones" in the data. The first of these is simply the process of converting the coded parameters in the original dataset to code values that indicate only the presence or absence of sea ice and/or snow. The latter process fills in nearby grid cells in the data to indicate proximity to snow or sea ice covered locations. This was necessary since the cloud algorithm changes procedures in the presence of snow or ice: errors in the location of the snow/ice boundaries are found, but can be accounted for by adding code values that indicated close proximity to snow or ice covered locations. The second change is not included in the archived version of this data set.

2. SOURCES AND DESCRIPTION OF ORIGINAL DATA

2.1. Sea Ice Data

The sea ice data are obtained from the Navy/National Oceanic and Atmospheric Administration Joint Ice Center:

NAVY/NOAA Joint Ice Center
4301 Suitland Road
Washington, DC 20390
USA

and represent a digital version of the weekly analyses issued as paper maps since 1972. More detailed information concerning these data can be obtained from the above address.

The weekly analyses combine four types of data: shore station reports, ship reports, aerial reconnaissance and satellite image analysis. The satellite-based information constitutes 90-98% of the total and comes from two types of data: visible/infrared imagery from the operational weather satellites and microwave imagery from experimental and operational satellites (when available). The visible/infrared imagery data are preferred over the microwave during the summer season. If data do not arrive during the analysis cycle, older values are retained. All these data are combined by analysts and contoured to produce paper maps of sea ice characteristics, including fractional coverage.

The digitization of the paper products occurs in two steps: transformation of concentration contours into a series of point coordinates describing a line in latitude/longitude space and computer analysis to determine point values for ice concentration. The parameter values at a point lying between two contours represent those of the lower concentration contour value.

The analysis grid has constant latitude increments of 0.25 degrees and variable longitude increments such that the spatial resolution is better than 15 nautical miles (18,530 m) and the number of longitude increments is an integer divisor of 180 degrees. This results in longitude increments varying between 0.25 degrees near 45 degrees latitude to 30 degrees at the pole (see illustration in Fig. 1). The regions covered by three separate data sets are (shown in Figs. 2, 3, and 4): 45 N to the pole from 90 W through the Greenwich meridian to 90 E longitude (Arctic East), 45 N to the pole from 90 E through the Date Line to 90 W (Arctic West), and 50 S to the pole for all longitudes (Antarctic). The Great Lakes are also included.

The data sets represent the weekly analyses of the most recent information: the center dates are offset by 2 days between the Arctic and Antarctic data sets. Beginning with 1987 data, the center dates are different for both regions in the Arctic, as well as for the Antarctic. The period of time covered by the original data set is from 4 January 1972 onwards for the Arctic and 6 January 1973 onwards for the Antarctic.

The original sea ice data format allows for the reporting of up to 12 parameters for sea ice, including ice concentration, stage of development and ice type; however, most of the grid points only have information about total ice concentration and type.

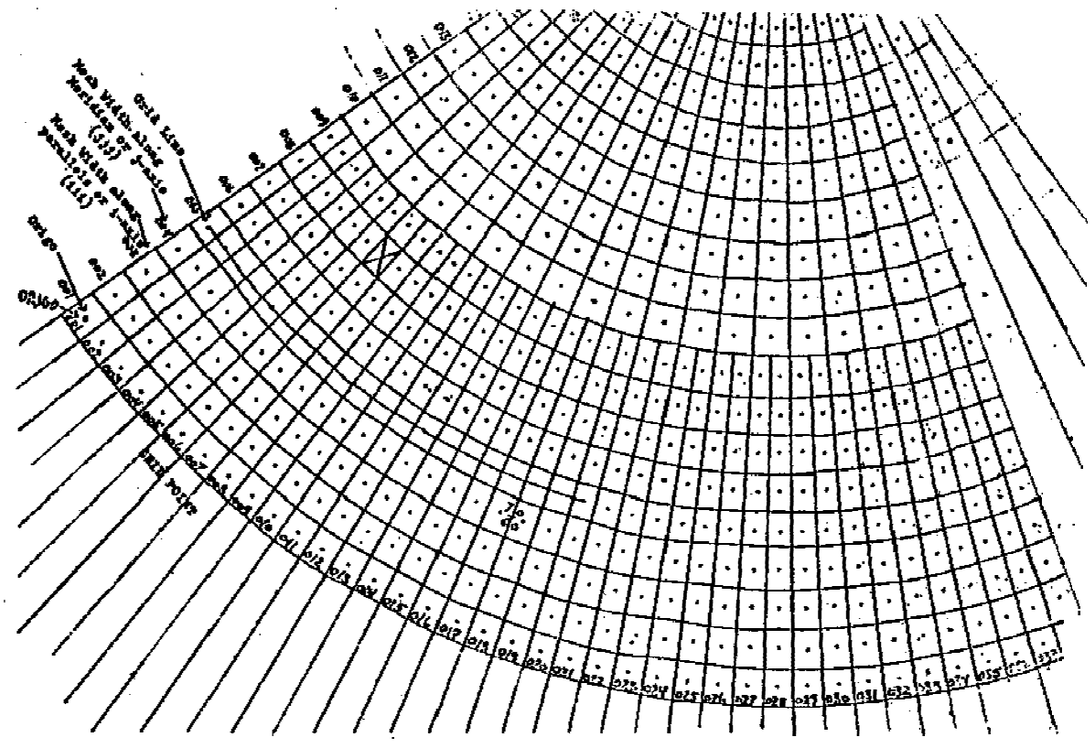

Figure 1. Original sea ice grid used to digitize analysis maps.

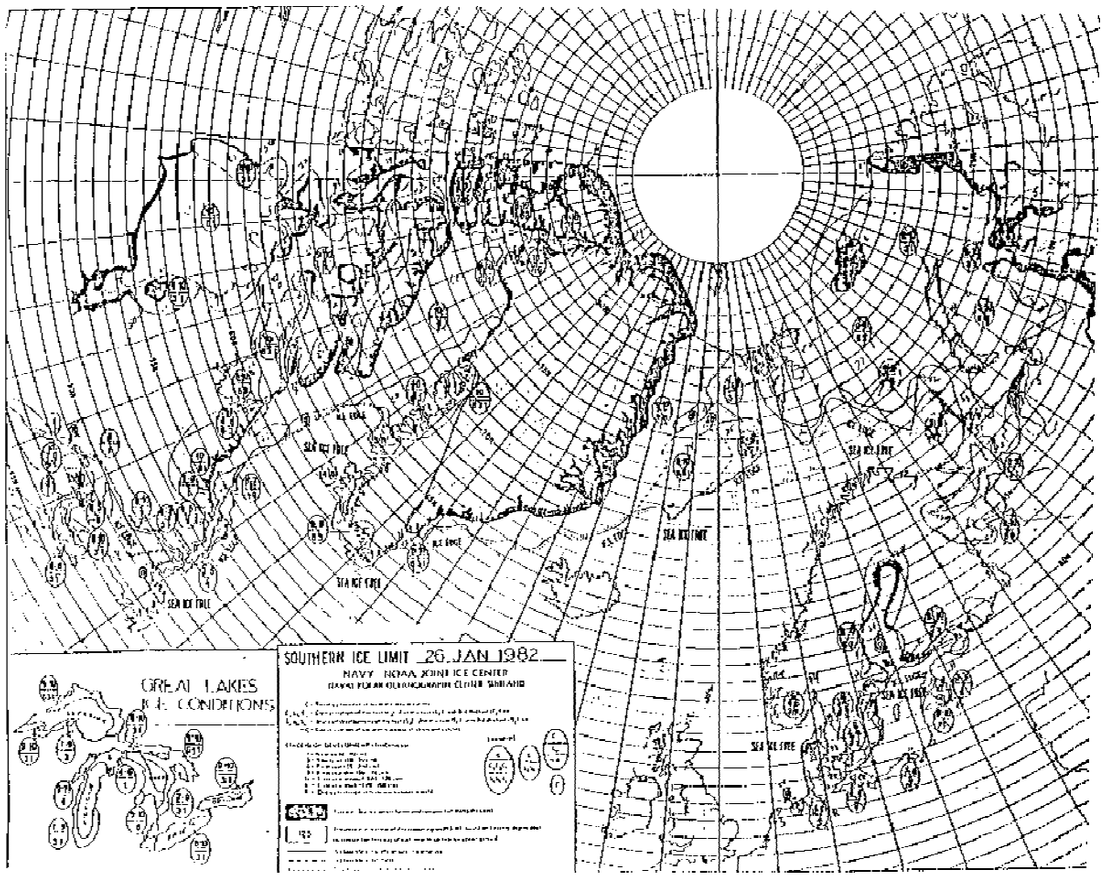

Figure 2. Domain for sea ice analysis: Arctic East.

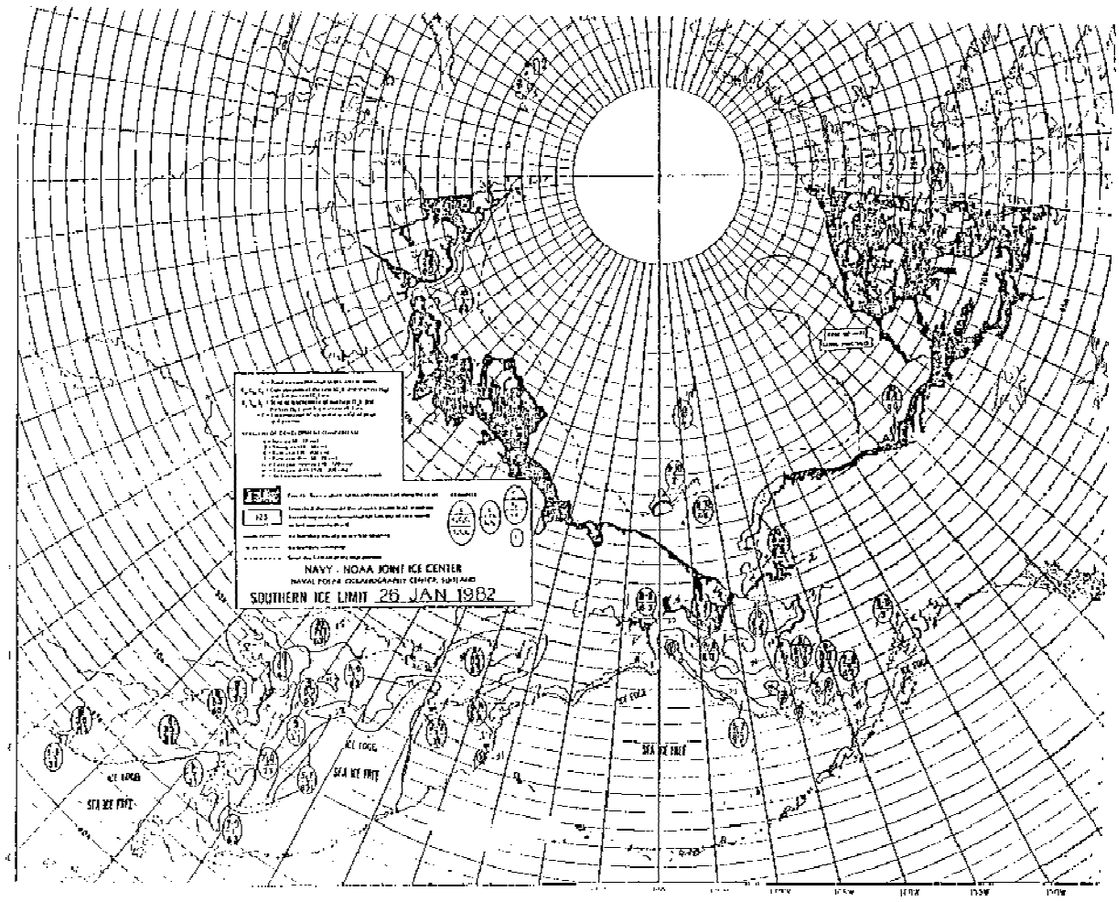

Figure 3. Domain for sea ice analysis: Arctic West.

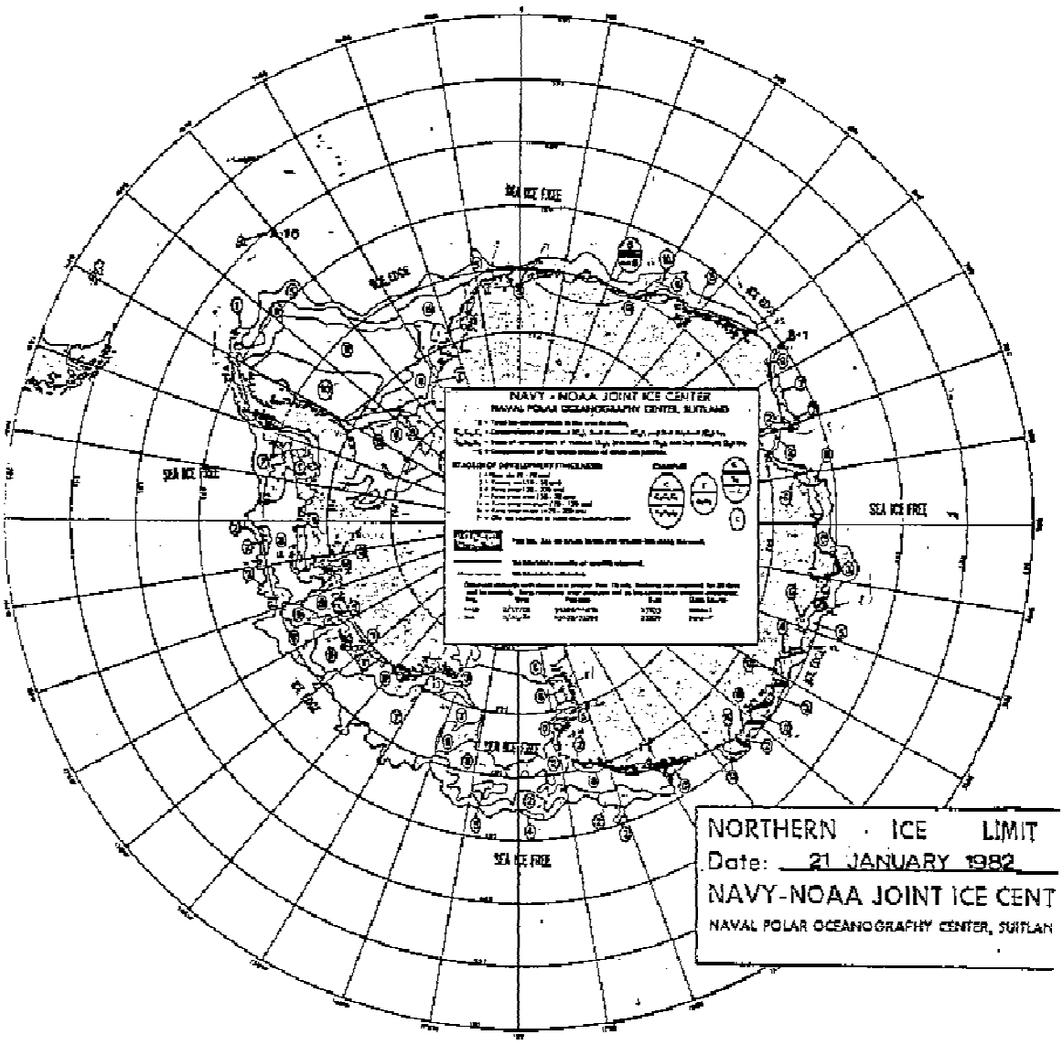

Figure 4. Domain for sea ice analysis: Antarctic.

2.2. Snow Data

The original snow data are the operational snow product produced by the National Oceanic and Atmospheric Administration (Dewey, K.F., 1987). These data may be obtained from

NOAA/NESDIS
Washington, DC 20233
USA

These data are digitized from the NOAA NESDIS Northern Hemisphere Weekly Snow and Ice Cover Charts prepared by the Synoptic Analysis Branch. Snow cover is estimated by visual inspection of all available visible band satellite imagery on a daily basis; thus, the presence of snow at a particular location represents the latest available observation of that site. If cloud cover is persistent, however, older observations are retained. For the unilluminated portions of the polar regions, snow cover is assumed to be complete and constant. Greenland is always reported to be snow covered. These charts are prepared in a polar stereographic projection at 1:50,000,000 scale.

The digital version of the snow cover charts is reduced to an 89 × 89 point grid covering the northern hemisphere (except for some parts of the tropics) in a polar stereographic projection (Fig. 5). The effective resolution of each grid cell is about 150 km at low latitudes to about 200 km near the pole. Each cell is declared to be snow covered if the snow cover on the analysis chart is ≥ 50%.

The weekly analysis charts have been prepared since November 1966; digital data sets are labelled by the date range for each chart. Data from 1966 through 1974 did not consistently include information on Himalayan snow cover.

Each grid cell is labelled as snow-free (0) or snow-covered (1). The sea ice information in the original analysis charts is not included in the digital data set; thus, all ocean locations in the data set are labelled as snow-free.

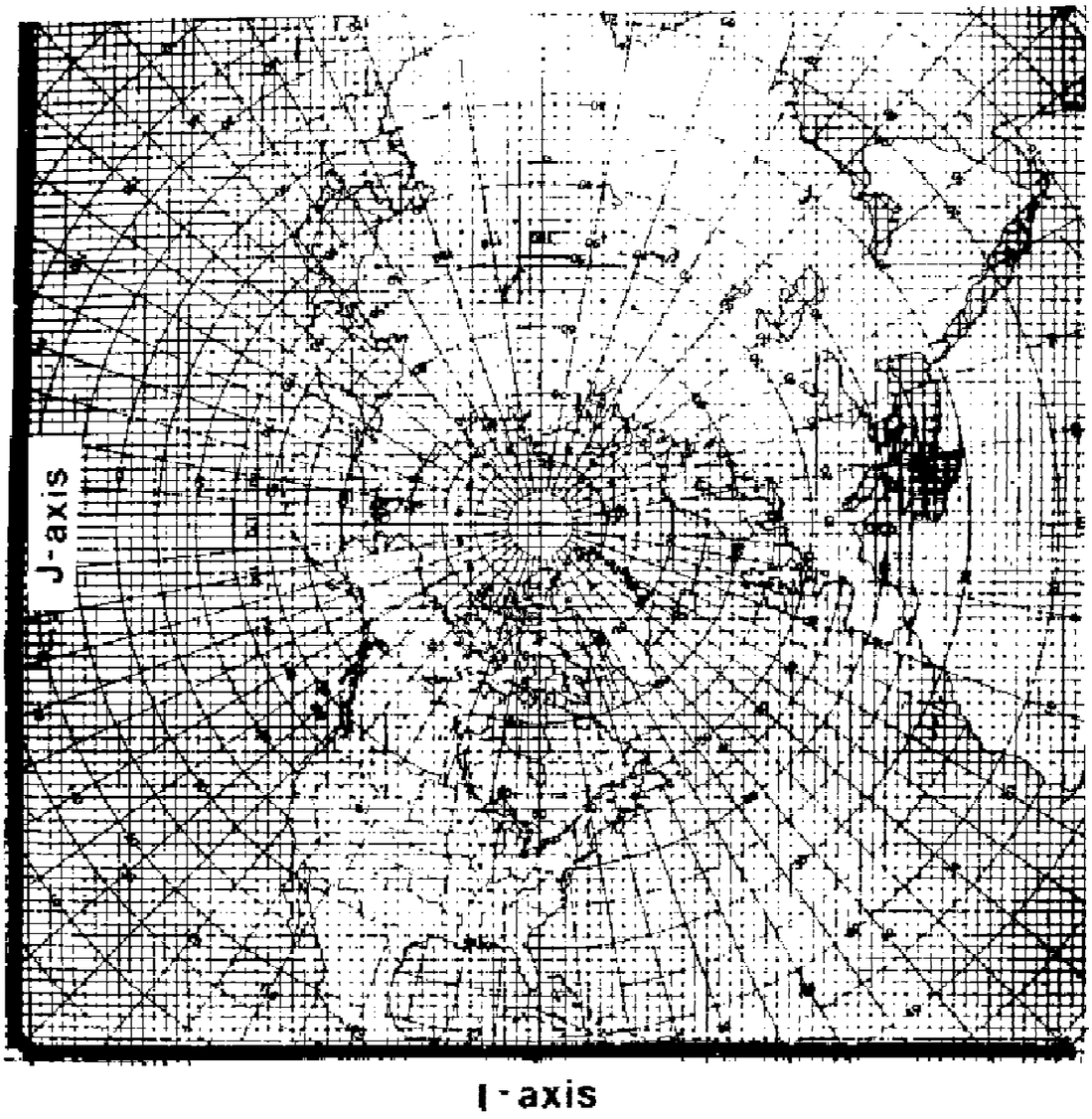

Figure 5. Original grid used for digitizing snow cover data.

3. ISCCP VERSION OF ICE/SNOW DATA

The ISCCP cloud analysis of operational satellite imagery uses the snow and sea ice data sets to influence the type of analysis performed to help discriminate between ice/snow cover and clouds. These data were, therefore, re-formatted to a uniform grid, compatible with the ISCCP analysis grids, and to uniform time spacing, compatible with the cloud analysis cycle. Moreover, the two data sets were merged into a single data set. Antarctica (all land south of 60°S) is assumed to be permanently snow covered (Version number = 1 for 1983-1987, = 0 for later years). This version of these two datasets, covering the period from July 1983 onwards, is archived with the ISCCP cloud climatology data sets.

3.1. Merging Procedure

The two original data sets give snow cover presence and sea ice concentration in their respective grid cells. Most locations are either completely land-covered or ocean-covered, so that a single data value in a merged data set can represent the coverage of ice or snow, whichever is appropriate. However, some locations in a low resolution map grid are a mixture of land and water; therefore, extra code values (explained below) are used to indicate all combinations of snow/land and ice/ocean cover. Observations of snow and sea ice are not available for the whole globe; therefore, special codes are employed to distinguish between an observed lack of snow or sea ice and the lack of an observation.

The ISCCP data set is contained in a new map grid that is lower resolution than the original sea ice grid and approximately the same resolution as the original snow grid, though a different projection. Sea ice concentrations in the ISCCP version are preserved by calculating the average of all the sea ice grid values falling into a particular ISCCP grid cell; the center coordinates of the ice grid cells are used to determine whether they are within the ISCCP grid cell. Snow cover is simply indicated as present whenever the corresponding original cell contained snow; correspondence is determined by locating the original snow grid cell with its center nearest the center coordinates of the ISCCP map grid.

The ISCCP version of these data is also arranged in uniform time intervals of 5 days. The original data sets represent weekly time intervals that are offset from each other: the ice data sets for the three polar regions are offset by 2 days, while the snow data are not synchronous with the ice data sets. The merged data are created by identifying each original ice/snow data set by its center date and each merged version by its center date; the merged data then contain those values from the ice/snow data set with the nearest center date. The original time intervals of each data set merged into the ISCCP version are indicated in the prefix of each data record; thus, the original time intervals can be reconstructed from the ISCCP data.

3.2. Map Grid

The ISCCP ice/snow data are collected into a global EQUAL-AREA map grid with a cell area equivalent to a 1 degree latitude/longitude cell at the equator. The cells are formed by equal increments in latitude and variable longitude increments selected to preserve, approximately, the area of the cell and to provide an integer number of cells in a latitude zone; Fig. 6 illustrates the near-polar portion of this grid. There are 41252 cells in this grid. The position (Greenwich, equator) is a cell corner.

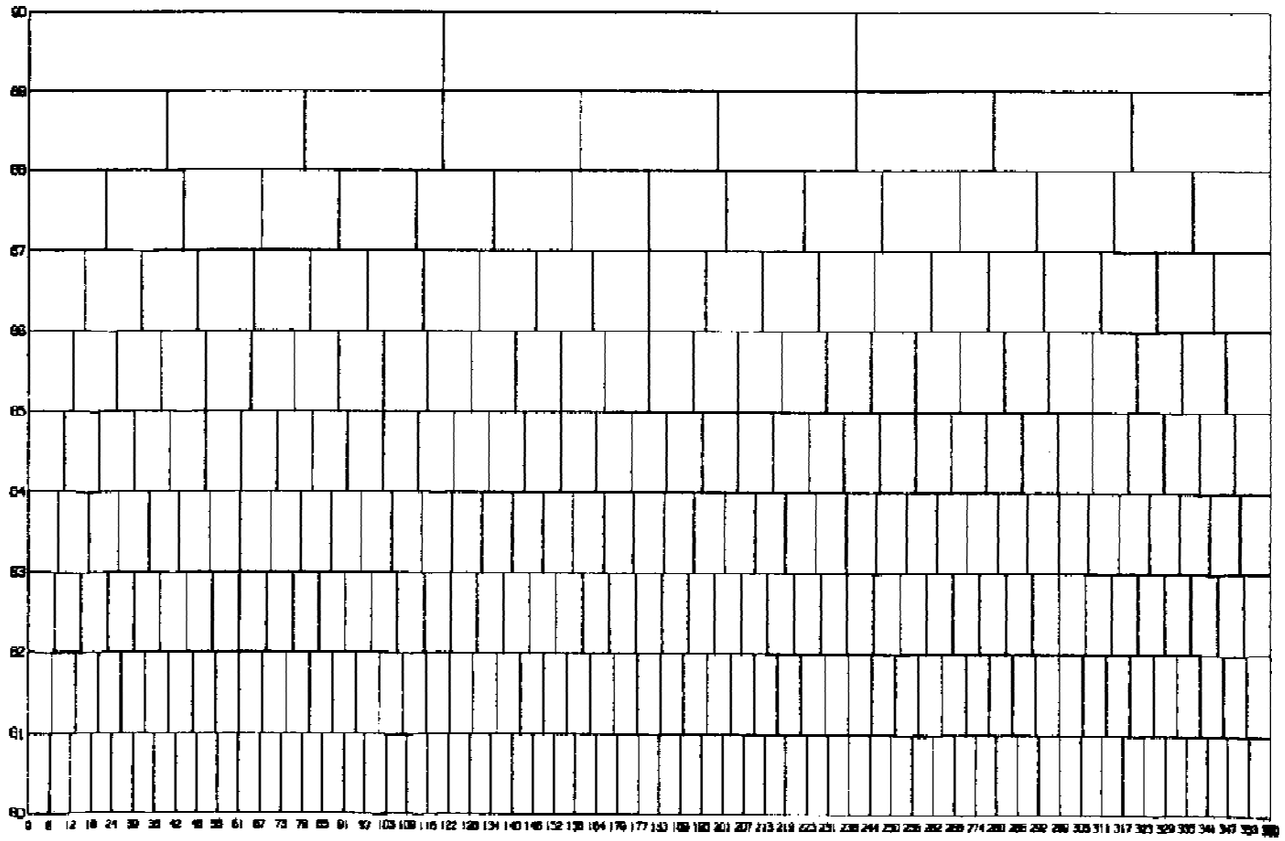

Figure 6. Demonstration of ISCCP equal-area map grid near North Pole.

The ISCCP ice/snow data are presented on the data tape in a global EQUAL-ANGLE map with 1 degree increments in latitude and longitude. Cells are arranged, starting at the south pole and the Greenwich meridian, in order of longitude increasing eastward and latitude increasing northward. There are 64800 map cells. The position (Greenwich, equator) is a cell corner.

The EQUAL-ANGLE version of the data is created by replicating the EQUAL-AREA values within a latitude zone. The latitudes of the cell centers are the same in both maps. Below is the index number for each latitude zone in the southern hemisphere (counting from the south pole) followed by the number of equal-area cells (longitude increments) in each zone.

1 - 3	24 - 144	47 - 261	70 - 337
2 - 9	25 - 149	48 - 265	71 - 339
3 - 16	26 - 155	49 - 270	72 - 341
4 - 22	27 - 161	50 - 274	73 - 343
5 - 28	28 - 166	51 - 278	74 - 345
6 - 35	29 - 172	52 - 282	75 - 347
7 - 41	30 - 177	53 - 286	76 - 349
8 - 47	31 - 183	54 - 289	77 - 350
9 - 53	32 - 188	55 - 293	78 - 351
10 - 59	33 - 193	56 - 297	79 - 353
11 - 66	34 - 199	57 - 300	80 - 354
12 - 72	35 - 204	58 - 304	81 - 355
13 - 78	36 - 209	59 - 307	82 - 356
14 - 84	37 - 214	60 - 310	83 - 357
15 - 90	38 - 219	61 - 313	84 - 358
16 - 96	39 - 224	62 - 316	85 - 358
17 - 102	40 - 229	63 - 319	86 - 359
18 - 108	41 - 234	64 - 322	87 - 359
19 - 114	42 - 239	65 - 325	88 - 360
20 - 120	43 - 243	66 - 328	89 - 360
21 - 126	44 - 248	67 - 330	90 - 360
22 - 132	45 - 252	68 - 333	
23 - 138	46 - 257	69 - 335	

3.3. Time Resolution and Coverage

The ISCCP ice/snow data are presented as a series of data sets representing 5 day intervals, starting on 1 July 1983. Thus, the first data set is labelled by the date 3 July 1983. These data will eventually cover the time period 1983 (from July) onwards.

3.4. New Parameter Code Values

The classification of each map cell is represented by a one BYTE numerical code that represents the following ice/snow cover conditions.

0 - 10:	Sea ice fraction in tenths for an all water cell
20 - 30:	Sea ice fraction in tenths for water mixed with snow-free land
40 - 50:	Sea ice fraction in tenths for water mixed with snow-covered land
60:	No snow (either snow-free land or water with no sea ice data)
70:	Snow-covered all land cell
255:	No data

For example, codes 3, 23, and 43 represent 0.3 sea ice coverage for an all water cell, a mixed cell with snow-free land, and a mixed cell with snow-covered land. All land cells over Antarctica are always set to code 70.

3.5. Ancillary Data

Three ancillary data sets are provided for convenience. The first data set provides, for each location in the EQUAL-ANGLE map grid, the cell-center longitude of the EQUAL-AREA grid cell that is replicated to that location. The longitudes are given to the nearest 0.01 degree; values are multiplied by 100. The cell-center latitudes are the same for both maps and can be calculated by counting from the first latitude zone with a center at -89.5 degrees. These values can be used to reconstruct the equal-area version of the ice/snow data, if desired.

The second data set indicates the type of surface (land, water, mixed) for each map grid cell. The spatial resolution at which the type is determined was originally 10 minutes of latitude/longitude (Masaki, 1972). The land/water/coast designation (= 1, 2, 3) in this data set has been found to be inconsistent with the ice and snow data sets in a few coastal and island locations; these inconsistencies have not been reconciled.

The third data set gives the global, mean topographic height above mean sea level of each location (obtained from the NCAR archive). Heights are coded in 50 meter intervals plus 20; zero height = code value 20. The original resolution of this information is 10 minutes of latitude/longitude; heights have been averaged to reduce the resolution to the equal-area resolution of the ice/snow data. There are a few inconsistencies between the topographic height data and the ice/snow surface designation and the land/water/coast designations, usually associated with small islands; these inconsistencies have not been reconciled.

4. TAPE FORMAT

4.1. Tape Characteristics

The data tapes are written in "IBM labelled" format, which means that each data file is preceded and followed by a very small, separate file for documentation purposes. These files contain data set names that can be used to read the data files on some computer systems. In the description to follow, the file numbers refer only to the actual data files on the tape, arranged as shown in Fig. 7.

The basic tape characteristics are as follows.

2	Header files on tape in ASCII
1	Ancillary data file on tape in ASCII
2	Ancillary data files on tape in BINARY
110	Ice/snow data files on tape in BINARY
13040	Bytes per record in all files

The number of ice/snow data files on the tape depends on the amount of data that is available; 110 files covers the period July 1983 through December 1984. The tape number indicates the date of the first and last data set on a particular tape.

The first two tape files are coded as standard ASCII text, where each BYTE represents a single character of text. These files are meant to be printed with separate lines of text represented by 80 byte groups. When the first file is printed, it should look like the example provided in Section 4.6.

The first Ancillary Data File (File 3) is also coded using ASCII text characters; however, the information is NOT arranged in 80 byte groups. Instead, each set of six bytes represents a single longitude value as a 5 character positive integer value followed by a blank. The series of values in a record correspond to the longitudes of the equal-angle map grid for six latitude zones, in order from the Greenwich meridian and from the south pole. Each record begins with a prefix represented by an 80 byte group. The first 320 bytes of this file are shown in Section 4.8.

The other two Ancillary Data files (Files 4 and 5) and all Ice/Snow Data files are coded as BINARY values that are not meant to be printed as text. In these files one BYTE represents the bit pattern that corresponds to a positive integer value from 0 to 255.

Volume ID File

The first file on the tape is the Volume ID file, which is one record in length. This file provides a complete description of the tape contents, recorded as ASCII text (see Section 4.6), summarizing the same information as contained in this document. Each 80 bytes in the record represents a line of text with useful numerical values placed first in certain lines for easy access. Any unused lines are filled with ASCII blanks.

The first 80 bytes of the file are the tape number, which identifies the contents and source of the data tape:

GPC.IS.NNNN.V.YYDDD.YYDDD.ISCCP

GPC	=	Global Processing Center for ISCCP, producer of the data
IS	=	Data type: Ice/Snow
NNNN	=	Tape sequence number, starting with 0001
V	=	Tape version number, starting with 0
YYDDD	=	Year and Julian day of first data set on tape
YYDDD	=	Year and Julian day of last data set on tape
ISCCP	=	Project producing the data

4.3. Table of Contents File

The second file is the Table of Contents file, which is two records in length. Each 80 bytes represents one line of ASCII text that gives a one-line summary for each Ice/Snow Data file on the tape (see Section 4.7). Any unused lines are filled with ASCII blanks. The summary gives the nominal date of the data file as the middle date of a 5-day interval, the original dates of the northern (east and west sectors) and southern hemisphere sea ice data as the middle date of a 7-day interval, and the original dates of the northern and southern hemisphere snow data as the middle date of a 7-day interval. The dates are given in the form YYMMDD; YY = year, starting with 83, MM = month from 01 to 12, and DD = day from 01 to 31. A date of 000000 indicates no data available. East and west Arctic dates are reported separately for data from 1987 onwards. No southern hemisphere snow data are available; however, Antarctica is assumed to be permanently snow-covered in this data set.

4.4. Ancillary Data files

File 3 gives the cell-center longitudes for the EQUAL-AREA map cells replicated to each latitude and longitude in the EQUAL-ANGLE map grid. These values are given in six bytes that are the ASCII text characters for five numbers followed by one blank. The five numbers represent the longitude in 0.01 degrees as a positive integer from 0 to 35999, positive eastward from the Greenwich meridian. Each of the 30 records in the file contains values for 6 whole latitude zones, starting at the south pole. The center latitude can be calculated by counting from the first latitude zone with a center at -89.5 degrees. These values can be used to reconstruct the equal-area version of the ice/snow data, if desired.

The first 80 bytes in each record is an ASCII text prefix that identifies the record and reads as follows:

File 3; Record ##; Data type 1; First lat index ###; Last lat index ###

The record number ranges from 01 to 30. The longitude data are type 1. The latitude indices are the same as for the equal-angle map, ranging from 001 to 180, starting at the south pole.

The next two Ancillary Data files on the tape contain the land/water/coast map (File 4) and the mean topographic height map (File 5). Both files are 5 records long. The code values for each map grid cell are represented by a single BYTE; these are BINARY numbers, not ASCII text, and are not meant to be printed.

All records in these two files have an 80-byte numerical prefix to identify the record:

Byte 1:	File number on tape (= 4 - 5)
Byte 2:	Record number in file (= 1 - 5)
Byte 3:	Data type (2 = land/water/coast, 3 = topographic height)
Byte 4:	First latitude index in record
Byte 5:	Last latitude index in record
Byte 6 - 80:	= 255 (no data)

The remainder of each record is the BINARY data for 36 whole latitude zones. The entire file represents a single array covering the whole globe in a 1 × 1 degree map grid, starting at the south pole (see map grid description in Section 3.2).

File 4 indicates surface type for each latitude/longitude cell. A single BYTE for each cell represents one of the following numerical codes:

1 = all water
2 = all land
3 = coast (mixed water/land)

File 5 gives mean topographic height above mean sea level for each latitude/longitude cell. Heights are coded in 50 m intervals with zero height represented by the value, 20.

4.5. Data Files

All Ice/Snow Data files are 5 records in length and contain one global map of ice and snow cover conditions. All records have an 80 byte numerical prefix to identify the record:

Byte 1:	File number on tape (= 6 - 115)
Byte 2:	Record number in file (1 - 5)
Byte 3:	Data type (ice/snow = 0)
Byte 4:	First latitude index in record
Byte 5:	Last latitude index in record
Byte 6:	Year of data set (Y = 83, 84)
Byte 7:	Month of data set (M = 1 - 12)
Byte 8:	Day of data set (D = 1 - 31)
Byte 9 - 11:	Year, month, day of northern hemisphere (east) ice data
Byte 12 - 14:	Year, month, day of northern hemisphere (west) ice data
Byte 15 - 17:	Year, month, day of southern hemisphere ice data
Byte 18 - 20:	Year, month, day of northern hemisphere snow data
Byte 21 - 23:	Year, month, day of southern hemisphere snow data
Byte 24 - 80:	= 255 (no data)

A value of zero for the three bytes representing the data date indicates that no data are available.

The remainder of each of the five records contains BINARY values for each map cell for 36 whole latitude zones. The one BYTE classification codes are as follows:

```
     0 - 10:  Sea ice fraction in tenths for an all water cell
    20 - 30:  Sea ice fraction in tenths for water mixed with snow-free land
    40 - 50:  Sea ice fraction in tenths for water mixed with snow-covered land
         60:  No snow (either snow-free land or water with no sea ice data)
         70:  Snow-covered all land cell
        255:  No data
```

4.6. Sample Volume ID File

```
GPC.IS.0001.1.83184.84364.ISCCP

Sea Ice and Snow Data
    From the International Satellite Cloud Climatology Project
         of the World Climate Research Program

1983 07 03    (year month day)      time of first data file
1983 12 29    (year month day)      time of last data file

Main data:
    Type:                     Source:
        Sea ice                     US Navy/NOAA Joint Ice Center
        Snow cover                  National Oceanic and Atmospheric Admin

Ancillary data:
    Type:                     Source:
        Land/Water/Coast            NASA Goddard Space Flight Center
        Topographic height          National Center for Atmospheric Research

Tape Produced at:
    NASA Goddard Space Flight Center
    Institute for Space Studies
    2880 Broadway
    New York, NY 10025
    USA

Tape Archived at:
    Satellite Data Services Division
    National Environmental Satellite Data and Information Service
    National Oceanic and Atmospheric Administration
    Washington, DC 20233
    USA

1989 10 18    (year month day)      date of tape creation

Tape characteristics:
       2    Header files on tape in ASCII
       1    Ancillary data file on tape in ASCII
       2    Ancillary data files on tape in BINARY
     110    Data files on tape in BINARY
   13040    Bytes per record in all files

Tape file description:
    File 1:  Volume ID
        1 record in length
        ASCII text description of tape contents and format
        (Remainder of record filled with ASCII blanks)
```

File 2: Table of Contents
2 records in length
ASCII text giving the following file-by-file information:
Nominal time is middle date of 5 day interval
Ice dates are middle dates of 7 day intervals
Snow dates are middle dates of 7 day intervals
Date = 000000 indicates no data
(North and South refer to hemispheres)
(Remainder of record filled with ASCII blanks)

File 3: Ancillary Data - Equal-area map grid longitudes
30 records in length
6 whole latitude zones in each record
6 ASCII text characters for each map cell represent longitudes in 0.01 degrees
All records have an 80 byte ASCII text prefix containing:
File number (=3)
Record number (1 - 30)
Data type (=1)
First latitude index in record
Last latitude index in record
(Remainder blank)
The remainder of each record is ASCII text, BUT NOT IN 80 BYTE GROUPS. Center latitude is at -89.5 degrees for first latitude zone (first 2160 bytes after 80 byte prefix).

File 4: Ancillary Data - Land/water/coast index
5 records in length
36 whole latitude zones in each record
All records have an 80-byte numerical prefix containing:
Byte 1: File number on tape (= 4)
Byte 2: Record number in file (= 1 - 5)
Byte 3: Data type (= 2)
Byte 4: First latitude index in record
Byte 5: Last latitude index in record
Byte 6-80: = 255 (no data)
1 BYTE for each map cell representing BINARY values:
1 = all water
2 = all land
3 = coast (mixed water/land)

File 5: Ancillary Data - Mean topographic height
5 records in length
36 whole latitude zones in each record
All records have an 80-byte numerical prefix containing:
Byte 1: File number on tape (= 5)
Byte 2: Record number in file (= 1 - 5)
Byte 3: Data type (= 3)
Byte 4: First latitude index in record
Byte 5: Last latitude index in record
Byte 6-80: = 255 (no data)
1 BYTE for each map cell representing BINARY topographic heights in 50 m intervals, zero height = code value 20.

File 6 - 115: Ice/Snow Data
5 records in length
36 whole latitude zones in each record
1 BYTE for each map cell representing ice/snow code
All records have an 80 byte BINARY prefix containing:

Byte 1:	File number on tape (= 6 - 115)
Byte 2:	Record number in file (1 - 5)
Byte 3:	Data type (= 0)
Byte 4:	First latitude index in record
Byte 5:	Last latitude index in record
Byte 6:	Year of data set (Y = 83, 84)
Byte 7:	Month of data set (M = 1 - 12)
Byte 8:	Day of data set (D = 1 - 31)
Byte 9-11:	Y, M, D of northern hemisphere (east) ice data
Byte 12-14:	Y, M, D of northern hemisphere (west) ice data
Byte 15-17:	Y, M, D of southern hemisphere ice data
Byte 18-20:	Y, M, D of northern hemisphere snow data
Byte 21-23:	Y, M, D of southern hemisphere snow data
Byte 24-80:	= 255 (no data)

Classification of each map cell represented by one BYTE BINARY code:

0 - 10:	Sea ice fraction in tenths for all water cell
20 - 30:	Sea ice fraction in tenths for water mixed with snow-free land
40 - 50:	Sea ice fraction in tenths for water mixed with snow-covered land
60:	No snow (either snow-free land or water with no sea ice data)
70:	Snow-covered all land cell
255:	No data

For example, codes 3, 23, and 43 represent 0.3 sea ice coverage for an all water cell, a mixed cell with snow-free land, and a mixed cell with snow-covered land.

Map grid characteristics:

Each numerical array represents data in an equal-angle map with 1 degree increments in latitude and longitude. Cells are arranged, starting at the south pole and the Greenwich meridian, in order of longitude increasing eastward and latitude increasing northward. There are 64800 map cells. The position (Greenwich, equator) is a cell corner.

Data were originally collected in an equal-area map grid with a cell area equivalent to a 1 degree latitude/longitude cell at the equator. The cells are formed by equal increments in latitude and variable longitude increments selected to preserve, approximately, the area of the cell and to provide an integer number of cells in a latitude zone. There are 41252 cells in this grid. The position (Greenwich, equator) is a cell corner. The ancillary data file (File 3) gives the longitudes of the equal-area map cell centers. The latitudes of the cell centers are the same in both maps and can be calculated by counting from the first latitude zone with a center at -89.5 degrees. The equal-angle version of the data is created by replicating the equal-area values within a latitude zone. The number of longitude increments at each longitude is given in the documentation for this data set.

4.7. Sample of Table of Contents

The first 5 lines of the TABLE OF CONTENTS file are shown below.

FILE NUMBER	NOMINAL DATE	N-E ICE DATE	N-W ICE DATE	SOUTH ICE DATE	NORTH SNOW DATE	SOUTH SNOW DATE
006	830703	830701	830701	830703	830630	000000
007	830708	830708	830708	830710	800707	000000

4.8. Sample of File 3

The first 320 BYTES of this ANCILLARY DATA FILE are shown below. These data are NOT arranged in 80 byte groups, except for the prefix in the first 80 bytes of each record. Instead, the values must be read in 6 BYTE groups. The display below illustrates how some numerical values will be incorrectly divided if these data are read in 80 byte groups.

```
FILE 3; RECORD 01; DATA TYPE 1; FIRST LAT 001; LAST LAT 006
 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000 0
6000 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000 060
00 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000 06000
```

5. REFERENCES

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