Historical Arctic and Antarctic Surface Observational Data, Version 1

USER GUIDE

How to Cite These Data

As a condition of using these data, you must *include a citation:*

Julienne Stroeve and Christopher Shuman 2004. *Historical Arctic and Antarctic Surface Observational Data, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/4DIN375AWFIO. [Date Accessed]

FOR QUESTIONS ABOUT THESE DATA, CONTACT NSIDC@NSIDC.ORG

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/NSIDC-0190

National Snow and Ice Data Center

TABLE OF CONTENTS

1 DATA DESCRIPTION 2
1.1 Parameters 2
1.2 File Information 2
1.2.1 Format 2
1.2.2 File Contents 4
1.2.3 Directory Structure 5
1.2.4 Naming Convention 5
1.3 Spatial Information 6
1.3.1 Coverage 6
1.3.2 Resolution 7
1.4 Temporal Information 7
1.4.1 Coverage 7
1.4.2 Resolution 7
2 DATA ACQUISITION AND PROCESSING 8
2.1 Acquisition 8
2.2 Processing 8
2.3 Quality, Errors, and Limitations 8
2.3.1 Error Sources 8
2.4 Instrumentation 8
2.4.1 Description 8
3 RELATED DATA SETS 9
4 CONTACTS AND ACKNOWLEDGMENTS 9
5 REFERENCES 9
6 DOCUMENT INFORMATION 9
6.1 Publication Date 9
6.2 Date Last Updated 9

1 DATA DESCRIPTION

This product consists of meteorological data from 105 Arctic weather stations and 137 Antarctic stations, extracted from the National Climatic Data Center (NCDC)'s Integrated Surface Hourly (ISH) database. Variables include wind direction, wind speed, visibility, air temperature, dew point temperature, and sea level pressure. Temporal coverage varies by station, with the earliest record in 1913 and the latest in 2002. Data are in tab-delimited ASCII text format, with one file per station and year. Graphs of meteorological variables throughout the time series accompany the ASCII data.

1.1 Parameters

Sample Data Record

Following are the first nine lines of the file "040180_1992.dat." Columns are described in the Format section of this document.

```
Station ID# 040180, Lat= 63.9670N, Lon=22.6000W, METAR Aviation routine weather report
Station Elevation = +0054B Meters, Call Letters = BIKF , Quality Control Process = V082

year  mo da hr mn dir dqc wtype wsp sqc cig hqc visby dqc vv  vqc  dbt bqc  dpt pqc  slp sqc
1992  1  1  0  0 250  1      N   98 1  1200 1   35000  1   N   1     3 1   -82  1   9777  1
1992  1  1  0 30 240  1      N  118 1   450 1    1600  1   N   1   -10 1   -80  1  99999  9
1992  1  1  1  0 270  1      N   57 1  1200 1   11200  1   N   1   -10 1   -80  1  99999  9
1992  1  1  1 30 250  1      N   77 1   360 1    1600  1   N   1   -20 1   -90  1  99999  9
1992  1  1  2  0 220  1      N   36 1   390 1    6000  1   N   1   -20 1   -90  1  99999  9
```

Figure 1. Sample Data

1.2 File Information

1.2.1 Format

Data are in tab-delimited ASCII text format. Each file contains one year of data and begins with a two-line header that provides the fixed weather station ID, latitude and longitude of the station, geophysical report type, elevation of station, call letter ID, and a meteorological point observation quality-control process name. Following is a sample header:

```
Station ID# 893240, Lat= -80.0000S, Lon=120.000W, Synoptic observation from a
fixed land station

Station Elevation = +15309 Meters, Call Letters = Missing, Quality Control
Process = V082
```

The first five columns of data (year, mo, da, hr, and mn) are year, month, day, hour, and minute, respectively. The remaining columns are described in the following table:

Table 1. Column Descriptions

Name	Definition	Units	Scaling Factor	Minimum Data Value	Maximum Data Value	Missing Flag Value
dir	Wind Direction	Degrees	1	1	360	999
dqc	Wind Direction Quality Code	0 = No Check 1 = Good 2 = Suspect 3 = Erroneous 9 = Missing	1	0	9	9
wtype	Wind Observation Type Code	C: Calm N: Normal Q: Squall V: Variable 9: Missing	n/a	n/a	n/a	9
wsp	Wind Speed	Meters per second	10	0	900	9999
sqc	Wind Speed Quality Code	0 = No check 1 = Good 2 = Suspect 3 = Erroneous 9 = Missing	1	0	9	9
cig	Ceiling Determination Code	A: Aircraft B: Balloon C: Statistically derived E: Estimated M: Measured R: Radar W: Obscured 9: Missing	n/a	n/a	n/a	9
hqc	Sky Condition 'Ceiling and Visibility Okay' (CAVOK) code	N: No Y: Yes	n/a	n/a	n/a	n/a
visby	Visibility	Meters	1	0	1600000 Note: values greater than 160000 are entered in as 160000	999999

Name	Definition	Units	Scaling Factor	Minimum Data Value	Maximum Data Value	Missing Flag Value
dqc	Visibility Quality Code	0 = No check 1 = Good 2 = Suspect 3 = Erroneous 9 = Missing	1	0	9	9
vv	Visibility Variability Code	N: Not variable V: Variable	n/a	n/a	n/a	n/a
vqc	Visibility Variability Quality Code	0 = No check 1 = Good 2 = Suspect 3 = Erroneous 9 = Missing	1	0	9	9
dbt	Air Temperature	Degrees Celsius	10	-932	618	9999
bqc	Air Temperature Quality Code	0 = No check 1 = Good 2 = Suspect 3 = Erroneous 9 = Missing	1	0	9	9
dpt	Dew Point Temperature	Degrees Celsius	10	982	368	9999
pqc	Dew Point Temperature Quality Code	0 = No check 1 = Good 2 = Suspect 3 = Erroneous 9 = Missing	1	0	9	9
slp	Sea Level Pressure	Hectopascals	10	8600	10900	99999
sqc	Sea Level Pressure Quality Code	0 = No check 1 = Good 2 = Suspect 3 = Erroneous 9 = Missing	1	0	9	9
JPEG graphs of meteorological variables throughout the time series accompany the ASCII data.						

1.2.2 File Contents

File Size: Data files range from 1 KB to 1.5 MB. The complete data set is approximately 2.3 GB.

1.2.3 Directory Structure

The following figure shows the directory structure on the HTTPS site. Data are first organized into "data" and "browse" directories, each containing "arctic" and "antarctic" directories, which then contain directories for each weather station ID. Each file represents one year of data for one station.

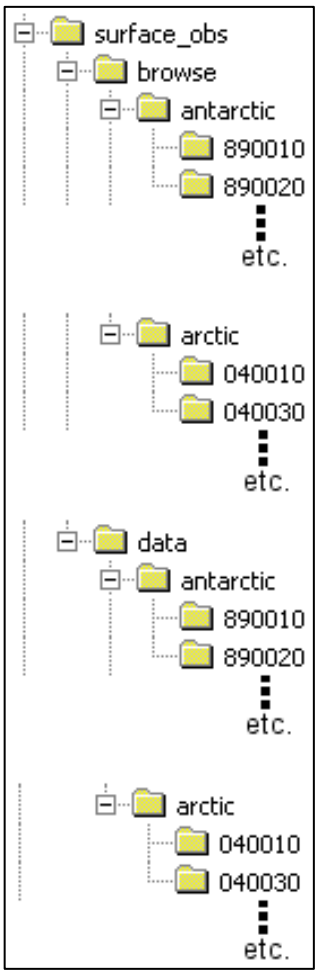

Figure 2. Directory Structure

1.2.4 Naming Convention

An example convention for a data file is "040010_2001.dat," where "040010" is the station ID and "2001" is the four-digit year. Browse files follow the same convention, except with a .jpg file extension.

1.3 Spatial Information

1.3.1 Coverage

The Spatial Coverage table lists dates of coverage for each station. Surface observations fall within the following bounding coordinates:

Arctic:
Southernmost Latitude: 59.983
Northernmost Latitude: 83.633
Westernmost Longitude: -73.167
Easternmost Longitude: -13.583

Antarctica:
Southernmost Latitude: -90
Northernmost Latitude: -60.717
Westernmost Longitude: 0
Easternmost Longitude: 178.72

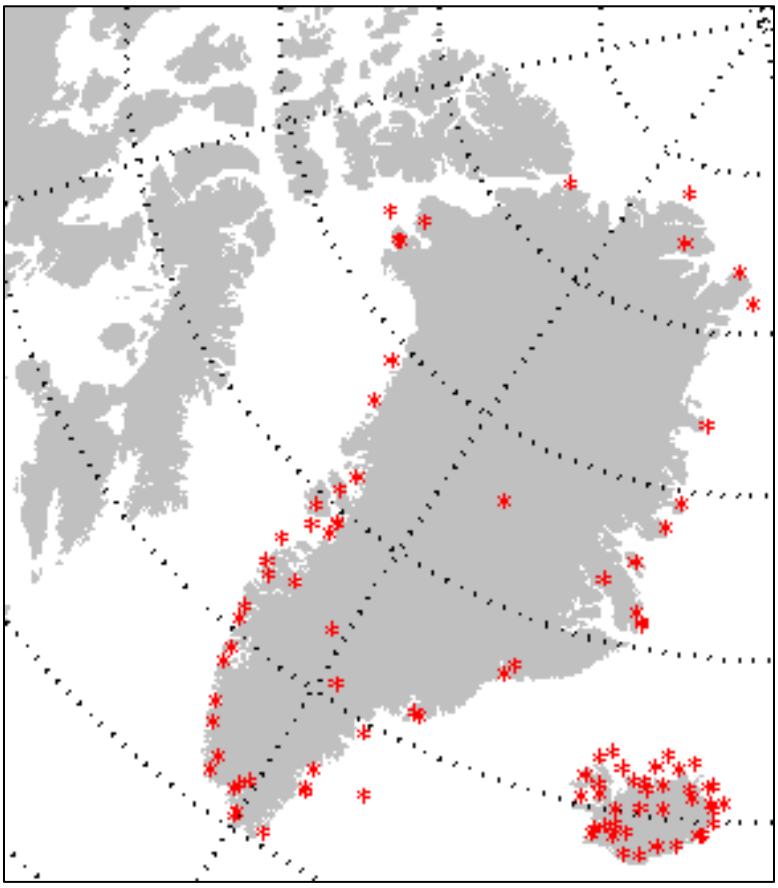

Figure 3. Greenland Automatic Weather Stations

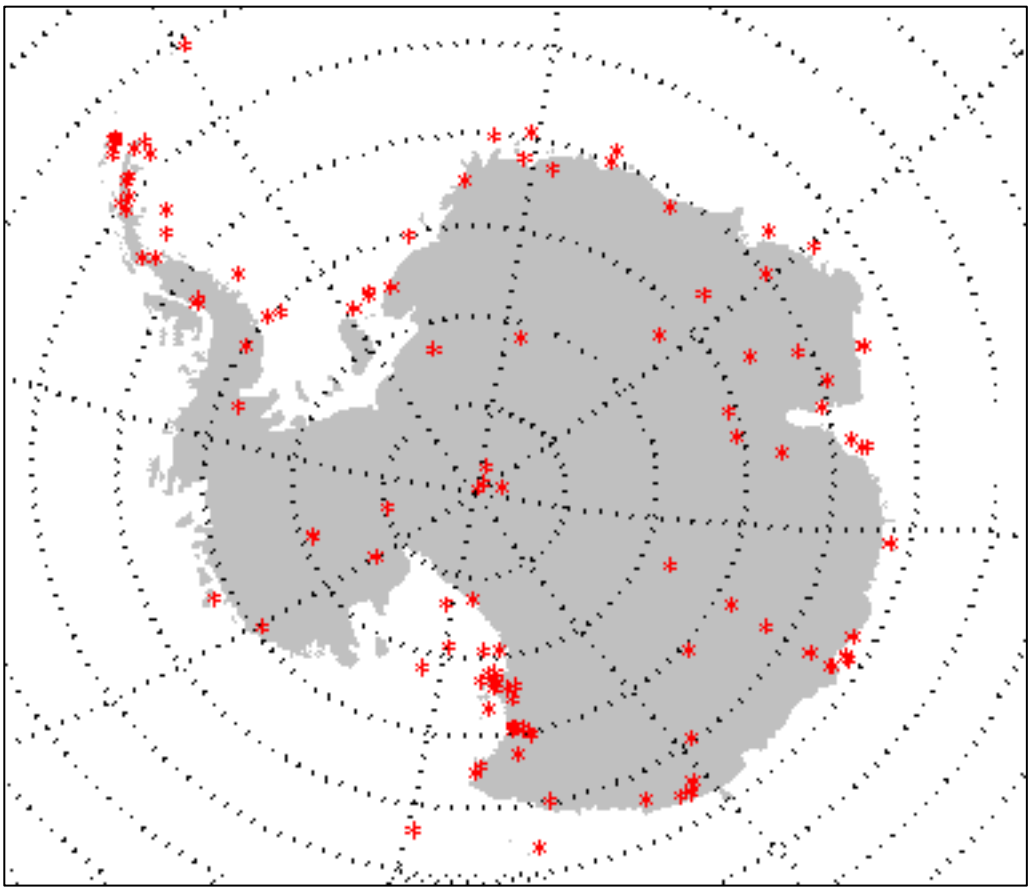

Figure 4. Antarctica Automated Weather Stations

1.3.2 Resolution

The Spatial Coverage table also lists dates of coverage for each station.

1.4 Temporal Information

1.4.1 Coverage

The Spatial Coverage table also lists dates of coverage for each station.

Temporal Coverage Map

See Temporal Coverage by Station.

1.4.2 Resolution

Data from automated weather stations were recorded on an hourly basis; temporal resolution from other sources varies from station to station.

2 DATA ACQUISITION AND PROCESSING

2.1 Acquisition

These data were extracted from the Air Force Combat Climatology Center (AFCCC)'s DATSAV3 database, which is part of the larger Integrated Surface Hourly (ISH) database, available from the National Climatic Data Center. The ISH database is composed of worldwide surface weather observations from about 20,000 stations, collected and stored from sources such as the Automated Weather Network (AWN), the Global Telecommunications System (GTS), the Automated Surface Observing System (ASOS), and data keyed from paper forms (NCDC 2000).

2.2 Processing

Lott, Baldwin, and Jones (2001) describe the processing steps used to assemble the ISH database. Each station record has a set of mandatory fields that are common across all records, along with a set of optional fields that are often inconsistent in format. Stroeve (NSIDC) extracted only the mandatory fields from each record and wrote the data to tab-delimited ASCII format.

2.3 Quality, Errors, and Limitations

NCDC, AFCCC, and FNMOD (2000) state that "data have undergone extensive automated quality control, and additional manual quality control for U.S. Air Force stations, U.S. Navy stations, and U.S. National Weather Service stations." Upon extracting and reformatting the data, Julienne Stroeve (NSIDC) checked that all data values were correctly filled in.

2.3.1 Error Sources

NCDC, AFCCC, and FNMOD (2000) state that data contain a "minimal number of errors, decode errors, and reporting errors (by station) -- less than 0.1% of observations affected overall. Most errors corrected/eliminated by quality control software."

2.4 Instrumentation

2.4.1 Description

Data originate from various sources such as synoptic, airways, Meteorological Routine Weather Report (METAR), Supplementary Marine Reporting Station (SMARS), and observations from automated weather stations.

3 RELATED DATA SETS

- Arctic Climatology Project - EWG Arctic Meteorology and Climate Atlas
- Automated Weather Station Data for Greenland Ice Core Locations
- Three-Hourly Antarctic Automatic Weather Station Data, 1980-2000

4 CONTACTS AND ACKNOWLEDGMENTS

Julienne Stroeve
National Snow and Ice Data Center
CIRES, 449 UCB, University of Colorado
Boulder, CO 80309-0449

Christopher Shuman
NASA Goddard Space Flight Center
Code 971, Building 33, Room A210
Greenbelt, MD 20771

5 REFERENCES

AFCCC. 1998. *Documentation for DATSAV3 surface hourly data*. Asheville, NC: AFCCC.

Lott, N., R. Baldwin, and P. Jones. 2001. *The FCC Integrated Surface Hourly Database*, NCDC Technical Report 2001-01. Asheville, NC: NCDC. View PDF file.

NCDC, AFCCC, and FNMOD. 2000. *Federal Climate Complex data documentation for integrated surface hourly data*. Asheville, NC: National Climatic Data Center.

6 DOCUMENT INFORMATION

6.1 Publication Date

December 2003

6.2 Date Last Updated

December 2020