Near-Real-Time DMSP SSM/I-SSMIS Daily Polar Gridded Brightness Temperatures, Version 2

USER GUIDE

How to Cite These Data

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

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/NSIDC-0080

National Snow and Ice Data Center

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1 DATA DESCRIPTION

Near-real-time daily brightness temperatures (T_b) data are produced daily from the Special Sensor Microwave Imager/Sounder (SSMIS) on board the Defense Meteorological Satellite Program (DMSP) satellites, and are gridded onto the polar stereographic grid.

NOTE: Near-real-time products are not intended for operational use. Also, these data may contain errors and are not suitable for time series, anomalies, or trends analysis. For historical SSM/I and SSMIS brightness temperature data, refer to the DMSP SSM/I-SSMIS Daily Polar Gridded Brightness Temperatures

1.1 Parameters

The geophysical parameter of this data set is Brightness Temperature (T_b), measured in kelvins (K). Values typically range from 50.0 K to 350.0 K. Brightness temperatures are provided for the following channels: 19.3 GHz-V, 19.3 GHz-H, 22.2 GHz-V, 37.0 GHz-V, 37.0 GHz-H, 91.7 GHz-V, and 91.7 GHz-H. These seven channels include vertical and horizontal polarization for each frequency, except 22.2 GHz, which is vertical only. Brightness temperature values are precise to 0.1 K.

1.2 File Information

1.2.1 Format

The near-real-time T_b files are stored in NetCDF (.nc), using CF 1.6 (Climate and Forecast) and ACDD 1.3 (Attribute Conventions for Dataset Discovery) metadata conventions.

1.2.2 File Contents

The NetCDF (.nc) files come with a granule-specific metadata file, called an Extensible Markup Language (.xml) file.

In the NetCDF file, T_b data are stored as scaled 2-byte integers representing brightness temperature values (in tenths of a kelvin), ranging from 50 K to 350 K. The brightness temperatures are multiplied by a factor of ten so that the precision of the data and the units in the data file are tenths of a kelvin. For example, a stored integer value of 2358 represents a brightness temperature value of 235.8 K. Most NetCDF software will automatically apply the scale factor to the values when reading the data, yielding floating point values. A value of 0 represents missing data.

1.2.3 Naming Convention

Files are named according to the following convention and as described in Table 1.

Generic File Name: NSIDC0080_TB_PS_HXkm_YYYYMMDD_vV.ext
Example Data File Name: NSIDC0080_TB_PS_N25km_20211206_v2.0.nc

Table 1. File Naming Convention Variable Description

Variable	Description
TB	Identifies this as a file containing brightness temperatures
PS	Identifies the grid as Polar Stereographic spatial reference system
H	Hemisphere: Northern (N) or Southern (S)
Xkm	Grid cell size (example: 12.5 km or 25 km)
YYYY	4-digit year
MM	2-digit month
DD	2-digit day
vV	Version number (example: v2.0)
.ext	File extension: NetCDF (.nc)

1.3 Spatial Information

1.3.1 Coverage

Instrument coverage is global except for directly over the poles. Locations poleward of 89.2° are never measured due to the orbital inclination of the satellite.

1.3.2 Resolution

Gridded data resolution varies by frequency. The 19.3 GHz, 22.2 GHz, and 37.0 GHz data are provided at a nominal resolution of 25 km, and the 91.7 GHz data are mapped to a 12.5 km grid. However, because the polar grids are not equal area, the actual resolution varies by latitude.

1.3.3 Projection and Grid Description

The following tables provide information for geolocating this data set. For more information, see the Polar Stereographic Projections web page.

Table 2. Geolocation Details

Geographic Coverage	Northern Hemisphere	Southern Hemisphere

Geographic coordinate system	Unspecified datum based upon the Hughes 1980 ellipsoid	Unspecified datum based upon the Hughes 1980 ellipsoid
Projected coordinate system	NSIDC Sea Ice Polar Stereographic North	NSIDC Sea Ice Polar Stereographic South
Longitude of true origin	-45	0
Latitude of true origin	70	-70
Scale factor at longitude of true origin	1	1
Datum	Not_specified_based_on_Hughes_1980_ellipsoid	Not_specified_based_on_Hughes_1980_ellipsoid
Ellipsoid/spheroid	Hughes 1980	Hughes 1980
Units	meter	meter
False easting	0	0
False northing	0	0
EPSG code	3411	3412
PROJ4 string	+proj=stere +lat_0=90 +lat_ts=70 +lon_0=-45 +k=1 +x_0=0 +y_0=0 +a=6378273 +b=6356889.449 +units=m +no_defs	+proj=stere +lat_0=-90 +lat_ts=-70 +lon_0=0 +k=1 +x_0=0 +y_0=0 +a=6378273 +b=6356889.449 +units=m +no_defs
Reference	https://epsg.io/3411	https://epsg.io/3412

Table 3. Grid Details

Nominal gridded resolution	12.5 km	25.0 km
Grid cell size (x, y)	12.5 km by 12.5 km	25.0 km by 25.0 km
Geolocated lower left point in grid	Northern Hemisphere: 33.92° N, 279.26° W Southern Hemisphere: 41.45° S, 225.00° W	
Number of rows	Northern Hemisphere: 896 Southern Hemisphere: 664	Northern Hemisphere: 448 Southern Hemisphere: 332

Number of columns	Northern Hemisphere: 608 Southern Hemisphere: 632	Northern Hemisphere: 304 Southern Hemisphere: 316
Grid rotation	N/A	N/A
ulxmap – x-axis map coordinate of the edge of the upper-left pixel (XLLCORNER for ASCII data)	Northern Hemisphere: -3850 projected km Southern Hemisphere: -3950 projected km	
ulymap – y-axis map coordinate of the edge of the upper-left pixel (YLLCORNER for ASCII data)	Northern Hemisphere: 5850 projected km Southern Hemisphere: 4350 projected km	

1.4 Temporal Information

1.4.1 Coverage

Data coverage begins on 01 January 2023 and is ongoing.

1.4.2 Resolution

The data are updated daily with a 1-day lag period.

2 DATA ACQUISITION AND PROCESSING

2.1 Background

The instrument used to acquire this data set is the Special Sensor Microwave Imager/Sounder (SSMIS) sensor (Kuynkee et al. 2008a, Kuynkee et al. 2008b), mounted on DMSP F16, F17, and F18 platforms. The SSMIS instrument is a microwave radiometer that senses emitted microwave radiation from the Earth's surface. This radiation is affected by surface and atmospheric conditions, and thus provides a range of geophysical information.

2.2 Acquisition

These near-real-time SSMIS gridded brightness temperature data are computed daily from swath brightness temperatures obtained from the Comprehensive Large Array-data Stewardship System (CLASS).

2.3 Processing

1. **NSIDC Receives Brightness Temperature Data from CLASS**
   NSIDC receives processed, geolocated, calibrated, and error-corrected T_b swath data from CLASS.

2. **NSIDC Converts to Swath Format**
   The original CLASS data are converted to NSIDC's "generic swath" format, which ensures that all data are available to NSIDC's gridding software in the same format, regardless of the format of the original swath data files. The T_b estimates are converted by NSIDC to a consistent swath format. The swath footprint size, or effective Field of View (FOV), varies by frequency and is described in Table

Table 4. Effective Field of View (FOV) per Channel

Channel Frequency	FOV
19.3 GHz	70 km x 45 km
22.2 GHz	60 km x 40 km
37.0 GHz	38 km x 30 km
91.7 GHz	16 km x 13 km

3. **NSIDC Converts to the Polar Stereographic Grid**
   Data are gridded to either the 12.5 km or 25 km Polar Stereographic Projection using a simple sum-and-average method, also known as the drop-in-the-bucket method. Swath data are assigned to grid cells based on where the center of each observation's footprint falls. Some grid cells are empty because no swath observations are centered in those grid cells; these grid cells are given a value of zero to indicate that no data was available on that day. Daily T_b values represent the average of all observations – usually between one and six – that contribute to a grid cell each day.

2.4 Instrumentation

2.4.1 Description

The SSMIS sensor is a conically-scanning passive microwave radiometer that harnesses the imaging and sounding capabilities of three previous DMSP microwave sensors, including the SSMI, the SSM/T-1 temperature sounder, and the SSMI/T-2 moisture sounder. The SSMIS sensor measures microwave energy at 24 frequencies from 19 to 183 GHz with a swath width of 1700 km.

This data set includes only the ground imaging channels that are consistent with the SSM/I channels.

3 SOFTWARE AND TOOLS

The data are provided in NetCDF format and can be read and viewed using software capable of interpreting this standard format. NASA's Panoply (https://www.giss.nasa.gov/tools/panoply/) visualization software and the NCO (http://nco.sourceforge.net/) suite of command line tools have been used extensively at NSIDC to work with these data. A GitHub repository (https://github.com/nsidc/polarstereo-reformat/) contains scripts that convert the NetCDF back to the original binary format from previous versions.

For a comprehensive list of all polar stereographic tools, see Does NSIDC have tools to extract and geolocate polar stereographic data web page.

4 VERSION HISTORY

Table 5 provides a summary of the version history of this product.

Table 4. Version History Summary

Version	Release Date	Description of Changes
V2	17 October 2022 – (ongoing)	Version update reflects the conversion of the data set from binary to NetCDF.
V1	1 December 1999 – October 2022	Initial release

5 RELATED DATA SETS

- Near-Real-Time DMSP SSM/I-SSMIS Daily Polar Gridded Sea Ice Concentrations
- DMSP SSM/I-SSMIS Daily Polar Gridded Brightness Temperatures, Version 6
- Near-Real-Time SSM/I-SSMIS EASE-Grid Daily Global Ice Concentration and Snow Extent, Version 5

6 ACKNOWLEDGMENTS

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7 REFERENCES

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8 DOCUMENT INFORMATION

8.1 Publication Date

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8.2 Date Last Updated

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