
USER GUIDE

How to Cite These Data

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


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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/NSIDC-0080
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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>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB</td>
<td>Identifies this as a file containing brightness temperatures</td>
</tr>
<tr>
<td>PS</td>
<td>Identifies the grid as Polar Stereographic spatial reference system</td>
</tr>
<tr>
<td>H</td>
<td>Hemisphere: Northern (N) or Southern (S)</td>
</tr>
<tr>
<td>Xkm</td>
<td>Grid cell size (example: 12.5 km or 25 km)</td>
</tr>
<tr>
<td>YYYY</td>
<td>4-digit year</td>
</tr>
<tr>
<td>MM</td>
<td>2-digit month</td>
</tr>
<tr>
<td>DD</td>
<td>2-digit day</td>
</tr>
<tr>
<td>vV</td>
<td>Version number (example: v2.0)</td>
</tr>
<tr>
<td>.ext</td>
<td>File extension: NetCDF (.nc)</td>
</tr>
</tbody>
</table>

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](https://nsidc.org) web page.

<table>
<thead>
<tr>
<th>Geographic Coverage</th>
<th>Northern Hemisphere</th>
<th>Southern Hemisphere</th>
</tr>
</thead>
</table>

Table 2. Geolocation Details
### Geographic coordinate system

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

Table 3. Grid Details
<table>
<thead>
<tr>
<th>Number of columns</th>
<th>Northern Hemisphere: 608</th>
<th>Northern Hemisphere: 304</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Southern Hemisphere: 632</td>
<td>Southern Hemisphere: 316</td>
</tr>
<tr>
<td>Grid rotation</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>ulxmap – x-axis map coordinate of the edge of the upper-left pixel (XLLCORNER for ASCII data)</td>
<td>Northern Hemisphere: -3850 projected km</td>
<td>Southern Hemisphere: -3950 projected km</td>
</tr>
<tr>
<td>ulymap – y-axis map coordinate of the edge of the upper-left pixel (YLLCORNER for ASCII data)</td>
<td>Northern Hemisphere: 5850 projected km</td>
<td>Southern Hemisphere: 4350 projected km</td>
</tr>
</tbody>
</table>

1.4 Temporal Information

1.4.1 Coverage

Data coverage begins on 01 November 2021 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) at NOAA.
2.3 Processing

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

2. **NSIDC Converts to Swath Format**
   The original NOAA 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 4.

<table>
<thead>
<tr>
<th>Channel Frequency</th>
<th>FOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.3 GHz</td>
<td>70 km x 45 km</td>
</tr>
<tr>
<td>22.2 GHz</td>
<td>60 km x 40 km</td>
</tr>
<tr>
<td>37.0 GHz</td>
<td>38 km x 30 km</td>
</tr>
<tr>
<td>91.7 GHz</td>
<td>16 km x 13 km</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Version</th>
<th>Release Date</th>
<th>Description of Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2</td>
<td>17 October 2022 – (ongoing)</td>
<td>Version update reflects the conversion of the data set from binary to NetCDF.</td>
</tr>
<tr>
<td>V1</td>
<td>1 December 1999 – October 2022</td>
<td>Initial release</td>
</tr>
</tbody>
</table>

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

6 ACKNOWLEDGMENTS

The authors are grateful to James Maslanik and Julienne Stroeve, who worked on a previous version of this data set.
7 REFERENCES


8 DOCUMENT INFORMATION

8.1 Publication Date

October 2022

8.2 Date Last Updated

October 2023