Near-Real-Time DMSP SSM/I-SSMIS Daily Polar Gridded Brightness Temperatures, Version 1

USER GUIDE

How to Cite These Data

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

Maslanik, J. and J. Stroeve. 1999. *Near-Real-Time DMSP SSM/I-SSMIS Daily Polar Gridded Brightness Temperatures, Version 1.* [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/AKQDND71ZDLF. [Date Accessed].

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

TABLE OF CONTENTS

1 DATA DESCRIPTION

Near-real-time passive microwave gridded daily brightness temperatures data are received daily from the Special Sensor Microwave Imager/Sounder (SSMIS) on board the Defense Meteorological Satellite Program (DMSP) F18 satellite, and are gridded onto the polar stereographic grid. SSMIS data used for this data set are received from the Comprehensive Large Array-data Stewardship System (CLASS) at the National Oceanic and Atmospheric Administration (NOAA). Two-byte scaled integer data are available at a resolution of 25 km for the 19, 22, and 37 GHz channels, and at 12.5 km resolution for the 85 GHz and 91GHz channels. NSIDC plans daily updates to the data.

The near-real-time data do not supplant the standard DMSP SSM/I-SSMIS Daily Polar Gridded Brightness Temperatures data set product, but instead fill the gap in time between present-day and the delivery of the DMSP SSM/I-SSMIS Daily Polar Gridded Brightness Temperatures data set. Therefore, users are cautioned that data differences may exist and should use the standard product when available. Also, these data may contain errors and are not suitable for time series, anomalies, or trends analyses. Near-real-time products do not undergo quality assessment and are therefore not intended for operational use.

1.1 Format

The near-real-time brightness temperature files are stored as 2-byte scaled integer binary data

1.2 File Naming Convention

This section explains the file naming convention used for this product with an example.

Example File Name: tb_f18_20160724_nrt_s19v.bin

`tb_fxx_YYYYMMDD_nrt_RCCP.bin`

Refer to Table 1 for the valid values for the file name variables listed above.

Where:

Table 1. File Naming Convention Variable Description

Variable	Description
`tb`	Indicates this file contains brightness temperature data
`fxx`	Indicates which DMSP satellite the data came from (`f17`: DMSP-F17; `f18`: DMSP-F18)
`YYYY`	4-digit year

Variable	Description
MM	2-digit month
DD	2-digit day
nrt	Indicates that data are near-real-time
R	Region (n: north; s: south)
CC	Channel (19: 19 GHz, 22: 22 GHz, 37: 37 GHz, 85: 85 GHz, or 91:91 GHz)
P	Polarization (h: horizontal, v: vertical)
.bin	Identifies this as a binary data file

1.3 File Size

Distribution size: 200 - 1064 KB

1.4 Spatial Coverage

North and south polar regions

1.4.1 Spatial Resolution

The spatial resolution is 25 km for the 19, 22, and 37 GHz channels, and at 12.5 km resolution for the 85 GHz and 91GHz channels.

1.4.2 Projection and Grid Description

The gridded brightness temperature data are displayed in polar stereographic projection. For more information refer to the Polar Stereographic website. The grid size varies depending on the region and frequency as shown in Table 2.

Table 2. Grid Size by Regio n and Frequency

Region	Frequency	Columns	Rows
North	85.5 GHz or 91.7 GHz	608	896
North	all others	304	448
South	85.5 GHz or 91.7 GHz	632	664
South	all others	316	332

1.5 Temporal Coverage

The data are updated daily and are available from 01 April 2016 to present.

1.6 Parameter or Variable

Brightness Temperature

1.6.1 Parameter Description

Brightness temperature is the effective temperature of a blackbody radiating the same amount of energy per unit area at the same wavelength as the observed body. This is also called effective temperature.

Brightness temperatures are calculated at the following channels: 19.3V, 19.3H, 22.2V, 37.0V, 37.0H, 85.5V, 85.5H, 91.7V, and 91.7H. The SSM/I uses the 85.5V and 85.5H channels and the SSMIS uses the 91.7V channel. Nine channels result from vertical and horizontal polarization for each frequency, except 22.2 GHz, which is vertical only. Brightness temperature values are precise to 0.01 K.

1.6.2 Unit of Measurement

Brightness temperatures are measured in kelvins (K).

1.6.3 Parameter Range

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. A value of 0 represents missing data.

2 SOFTWARE AND TOOLS

Tools for reading and displaying the brightness temperature files are available via FTP. Included are tools to extract the files; determine geolocation (geocoordinates) of data; display, extract, and export the data; and masking tools that limit the influence of non-sea ice brightness temperatures.

The tools are divided into directories on the FTP site as shown in Figure 1.

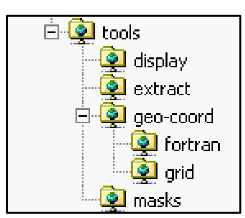

Figure 1. Tools File Directory

Table 3 lists the tools that can be used with this data set. For more information refer to the Polar Stereographic web page.

Table 3. Tools for this Data Set

Tool Type	Tool File Name(s)
Data Extraction	`extract.pro`
Data Display	`display_ssmi_xa.pro`
Pixel-Area	`psn12area_v3.dat and pss12area_v3.dat`
	`psn25area_v3.dat and pss25area_v3.dat`
Land Masks	`gsfc_12n.msk and gsfc_12s.msk`
	`gsfc_25n.msk and gsfc_25s.msk`
Land Overlays	`coast_12n.msk and coast_12s.msk`
	`coast_25n.msk and coast_25s.msk`
	`ltln_12n.msk and ltln_12s.msk`
	`ltln_25n.msk and ltln_25s.msk`

3 DATA ACQUISITION AND PROCESSING

3.1 Theory of Measurements

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.

3.2 Data Acquisition Methods

These near-real-time SSMIS gridded brightness temperature data are computed daily from swath brightness temperatures obtained from CLASS at NOAA.

3.3 Derivation Techniques and Algorithms

SSMIS data from the DMSP-F18 satellite are used in the current near-real-time product starting with 4/1/2016 to present.

3.3.1 Processing Steps

3.3.1.1 Current Processing

Due to the compromised data integrity with the DMSP F17 vertically polarized 37 GHz channel (37V) of the Special Sensor Microwave Imager and Sounder (SSMIS) in April, 2016, NSIDC started distributing data from the F18 satellite on 1 April 2016.

3.3.1.2 Past Processing

SSM/I Data from the DMSP-F13 Satellite Switched to SSMIS Data from the DMSP-F17 Satellite

On 02 June 2009, NSIDC switched its SSM/I data processing stream from the DMSP-F13 satellite to the SSMIS data processing stream from the DMSP-F17 satellite because the DMSP-F13 satellite came to the end of its mission and no longer produced reliable data. For data continuity, F17 data were processed back to 01 April 2008.

Note: The SSMIS sensor on the F17 satellite is similar to the SSM/I sensor on the F13 satellite and has the same low frequency channels: dual-polarized 19 GHz and 37 GHz channels, and a vertically polarized 22 GHz channel. However, the high-frequency 85.5 GHz channel on SSM/I was replaced by a 91 GHz channel on SSMIS. Users should note that the different frequency will affect any products that employ a high frequency channel. Any such products should be evaluated for the impact of the different frequency and adjustments may be necessary for consistent products. Please refer to the SMMR, SSM/I, and SSMIS Sensors Summary for more details.

SSM/I Data from the DMSP-F13 Satellite Switched to the DMSP-F15 Satellite

On 02 June 2008, NSIDC switched its SSM/I processing stream from the DMSP-F13 satellite to the DMSP-F15 satellite due to a failing recorder on F13. For continuity, F15 data were acquired and processed from 01 January 2008 until 25 February 2009. On 16 February 2009, however, NSIDC switched its SSM/I processing stream back to the DMSP-F13 satellite due to an issue with the DMSP-F15 SSM/I 22 GHz frequency brightness temperature fields. NSIDC continued to produce the F13 products until further degradation of the SSM/I instrument on 11 May 2009. Processed F13 data are available for the 01 July 2008 through 11 May 2009 time period.

3.4 Sensor or Instrument 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. For more information regarding the SSMIS instrument, refer to the SMMR, SSM/I, and SSMIS Sensors Summary.

3.5 Version History

Version 1

4 CONTACTS AND ACKNOWLEDGMENTS

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5 DOCUMENT INFORMATION

5.1 Publication Date

27 May 1999

5.2 Date Last Updated

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