SMAP Radiometer Twice-Daily rSIR-Enhanced EASE-Grid 2.0 Brightness Temperatures, Version 1

How to Cite These Data

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

Brodzik, M. J., D. G. Long, and M. A. Hardman. 2019. *SMAP Radiometer Twice-Daily rSIR-Enhanced EASE-Grid 2.0 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/QZ3WJNOUZLFK. [Date Accessed].

NSIDC National Snow and Ice Data Center

TABLE OF CONTENTS

1   DATA DESCRIPTION

This data set contains twice-daily, enhanced-resolution brightness temperature data derived from the SMAP radiometer. Data are available on the Northern Hemisphere, Southern Hemisphere, Temperate, and Mid-Latitude (sub-set of Global) EASE-Grid 2.0 projections and on the 25 km, 3.125 km, 36 km, 09 km, and 03 km resolution grids. This data set applies the same SIR technique used to derive brightness temperatures from the SMMR, AMSR-E, and SSM/I-SSMIS sensors and is a companion product for the MEaSUREs Calibrated Enhanced-Resolution Passive Microwave Daily EASE-Grid 2.0 Brightness Temperature ESDR data set (DOI: 10.5067/MEASURES/CRYOSPHERE/NSIDC-0630.001).

1.1 Parameters

The main parameter for this data set is Brightness Temperature (Tb), measured in kelvins (K).

1.2 File Information

1.2.1   Format

Data are provided in netCDF (.nc) format.

Extensible Markup Language (.xml) files with associated metadata are also provided.

1.2.2   File Contents

Table 1. Parameters

Parameter	Description	Units	Scale Factor	Fill Value	Missing Value
TB	Brightness Temperature (T_b)	kelvin (K)	0.01	0.0	60000
TB_time	Average time of the measurements used to derive T_b	Minutes since 00:00:00 on the day of measurement	1.00	-32768	Not used
TB_std_dev	Standard deviation of the measurements used to derive T_b	kelvin (K)	0.01	65535	65534 (only used when T_b is set to missing value)

Parameter	Description	Units	Scale Factor	Fill Value	Missing Value
TB_num_samples	Number of measurements used to derive T_b	count	N/A	0	Not used
Incidence_angle	Average incidence angle of the measurements used to derive T_b	degrees (°)	0.01	-0.0	Not used

1.2.3 Naming Convention

Data files are named according to the following convention and as described in Table 1:

```
NSIDC-0738-EASE2_[G][###km]-[SMAP_LRM]-yyyyddd-[channel]-[pass]-[algorithm]-
JPL-v##.nc
```

Table 2. File Naming Convention Variable

Variable	Description
NSIDC-0738	NSIDC unique data set identifier
EASE2	Indicates the data use the EASE-Grid 2.0 projection
G	Grid: N = Northern S = Southern T = Temperate & Tropical M = Mid-latitudes
###km	Resolution of the data, values range from 3.125 km to 36 km
SMAP_LRM	Indicates the data are derived from the SMAP L-band radiometer
yyyyddd	Date in year-day-of-year format
channel	Channel (frequency + polarization), possible polarizations include: V = vertical H = horizontal F = fourth Stoke's parameter
pass	The direction or local time-of-day of the satellite pass: A = Asecending (T or M grids only) D = Descending (T or M grids only) M = Morning (N or S grids only) E = Evening (N or S grids only)
algorithm	Specifies the algorithm use for the image reconstruction: GRD = drop-in-the-bucket SIR = radiometer version of Scatterometer Image Reconstruction
JPL	Indicates the data were produced at the NASA Jet Propulsion Laboratory
v##	Data set version number

Example files:

NSIDC-0738-EASE2_S25km-SMAP_LRM-2019095-1.4F-E-GRD-JPL-v1.0.nc

NSIDC-0738-EASE2_S25km-SMAP_LRM-2019095-1.4H-E-GRD-JPL-v1.0.nc

1.3 Spatial Information

1.3.1 Coverage

The spatial coverage for the entire data set is global. However, spatial coverage varies between data files. Data are available on the Northern Hemisphere, Southern Hemisphere, Mid-Latitude, and Temperate & Tropical EASE-Grid 2.0 projections.

1.3.2 Resolution

Spatial resolution varies by data file. Possible grid resolutions include: 3 km, 3.125 km, 9 km, 25 km, and 36 km. See the Algorithm Theoretical Basis Document (Brodzik et al., 2020) for details.

1.3.3 Geolocation

Table 3 provides a description of the EASE-Grid 2.0 projections used in this data set. For a description of the various grids used in this data set, see the EASE Grids Map Projection and Grid web page.

Table 3. Geolocation Details

Geographic coordinate system	WGS 1984	WGS 1984	WGS 1984
Projected coordinate system	EASE-Grid 2.0 Global (also applies to Temperate & Tropical and Mid-latitude projections)	EASE-Grid 2.0 Northern Hemisphere	EASE-Grid 2.0 Southern Hemisphere
Longitude of true origin	0	0	0
Latitude of true origin	30	90	-90
Scale factor at longitude of true origin	N/A	N/A	N/A
Datum	WGS 1984	WGS 1984	WGS 1984

Ellipsoid/spheroid	WGS 1984	WGS 1984	WGS 1984
Units	Meter	Meter	Meter
False easting	0	0	0
False northing	0	0	0
EPSG code	6933	6931	6932
PROJ4 string	+proj=cea +lon_0=0 +lat_ts=30 +x_0=0 +y_0=0 +ellps=WGS84 +towgs84=0,0,0,0,0,0, 0 +units=m +no_defs	+proj=laea +lat_0=90 +lon_0=0 +x_0=0 +y_0=0 +ellps=WGS84 +towgs84=0,0,0,0,0,0, 0 +units=m +no_defs	+proj=laea +lat_0=-90 +lon_0=0 +x_0=0 +y_0=0 +ellps=WGS84 +towgs84=0,0,0,0,0,0, 0 +units=m +no_defs
Reference	http://epsg.io/6933	http://epsg.io/6931	http://epsg.io/6932

1.4 Temporal Information

1.4.1 Coverage

31 March 2015 to 06 April 2019

1.4.2 Resolution

Twice-daily

2 DATA ACQUISITION AND PROCESSING

2.1 Background

This data set applies the radiometer version of the Scatterometer Image Reconstruction (rSIR) technique to a new passive microwave sensor, the NASA SMAP radiometer. This technique was originally developed and applied to the SMMR, AMSR-E, and SSM/I-SSMIS sensors; it has now been used to produce enhanced-resolution and improved soil moisture data from the SMAP satellite. This data set is provided in the same format, with all the same high-quality metadata, as the *MEaSUREs Calibrated Enhanced-Reoslution Passive Microwave Daily EASE-Grid 2.0 Brightness Temperature ESDR (NSIDC-0630)* data set.

2.2 Acquisition

The input for this data set is the *SMAP L1B Radiometer Half-Orbit Time-Ordered Brightness Temperatures, Version 4 (SPL1BTB)* data set, minor version R16010. Using the quality flag on the input data set, all but the highest quality SPL1BTB measurements are removed.

2.3 Processing

This data set follows the same processing steps as the MEaSUREs (NSIDC-0630) data set. For details, see Long et al. (2019), the Algorithm Theoretical Basis Document for this data set (Brodzik et al., 2020), and the NSIDC-0630 User Guide and ATBD (Brodzik and Long, 2016).

2.4 Quality, Errors, and Limitations

For a more detailed description of this data set, see Long et al. 2019.

2.5 Instrumentation

2.5.1 Description

For a detailed description of the SMAP instrument, visit the SMAP Instrument page at the Jet Propulsion Laboratory (JPL) SMAP website.

3 VERSION HISTORY

This is the first version of this data set.

4 RELATED DATA SETS

MEaSUREs Calibrated Enhanced-Resolution Passive Microwave Daily EASE-Grid 2.0 Brightness Temperature ESDR (NSIDC-0630)

SMAP L1B Radiometer Half-Orbit Time-Ordered Brightness Temperatures, Version 4 (SPL1BTB)

SMAP Data at NSIDC | Overview

5 RELATED WEBSITES

SMAP at NASA JPL

6 CONTACTS AND ACKNOWLEDGMENTS

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7   REFERENCES

Brodzik, M. J. and D. G. Long. 2016. Calibrated Passive Microwave Daily EASE-Grid 2.0 Brightness Temperature ESDR (CETB) Algorithm Theoretical Basis Document. MEaSUREs Project White Paper. NSIDC. Boulder, CO. Available at: https://nsidc.org/sites/nsidc.org/files/technical-references/MEaSUREs_CETB_ATBD_v1.0.pdf

Brodzik, M. J., D. G. Long, and M. A. Hardman. 2020. SMAP Twice-Daily rSIR-Enhanced EASE-Grid 2.0 Brightness Temperatures Algorithm Theoretical Basis Document. Version 1.0. Available at: https://nsidc.org/sites/nsidc.org/files/technical-references/ATBD_rSIR_SMAP.v1.0.pdf

Long, D. G., M. J. Brodzik, and M. A. Hardman. 2019. Enhanced-Resolution SMAP Brightness Temperature Image Products. *IEEE Transactions on Geoscience and Remote Sensing* 57(7), 4151-4163. https://dx.doi.org/10.1109/TGRS.2018.2889427

8   DOCUMENT INFORMATION

8.1 Publication Date

28 August 2019

8.2 Date Last Updated

14 July 2020