AMSR-E/Aqua Daily L3 6.25 km 89 GHz Brightness Temperature Polar Grids, Version 4

USER GUIDE

How to Cite These Data

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

Markus, T., J. C. Comiso, L. Boisvert, and W. N. Meier. 2025. *AMSR-E/Aqua Daily L3 6.25 km 89 GHz Brightness Temperature Polar Grids, Version 4.* [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/SVVXO1WXDSLW. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/AE_SI6

National Snow and Ice Data Center

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1 DATA DESCRIPTION

1.1 Parameters

This data set (AE_SI6) reports average daily, 6.25 km resolution, horizontally and vertically polarized brightness temperatures (T_bs) at 89.0 GHz. Data are provided on Northern and Southern Hemisphere, polar stereographic grids.

T_bs are derived from observations acquired by the Advanced Microwave Scanning Radiometer for EOS (AMSR-E). They are created as an intermediate product while generating the AMSR-E Level-3 12.5 km (AE_SI12) and 25 km (AE_SI25) sea ice products.

1.2 File Information

1.2.1 Format

Data are provided in Hierarchical Data Format - Earth Observing System 5 (HDF-EOS5).

1.2.2 Data Fields

T_bs are written as 2-byte, signed data fields to separate North and South Pole grids. These grids can be found in the following data groups:

HDFEOS/GRIDS/NpPolarGrid06km/Data Fields/
HDFEOS/GRIDS/SpPolarGrid06km/Data Fields/

The NpPolarGrid06km and SpPolarGrid06km data groups also contain latitude and longitude grids, named "lat" and "lon", respectively, plus the NetCDF dimension scales[1] "XDim" and "YDim".

1.2.2.1 Naming Convention

Average 89.0 GHz horizontally polarized (H) and vertically polarized (V) T_bs are reported for ascending orbits (ASC), descending orbits (DSC), and as a daily average (DAY).

[1]For more information about NetCDF dimension scales, see NetCDF-4 Dimensions and HDF5 Dimension Scales.

Data fields utilize the following naming convention:

Example

SI_06km_NH_18H_ASC

Naming Convention

SI_06km_[HEM]_[FPOL]_[ORBIT]

The variables above are described in Table 1:

Table 1. Data Field Variable Names and Descriptions

Variable Name	Description
SI_06km	Sea ice, 6 km resolution
HEM	NH (Northern Hemisphere) or SH (Southern Hemisphere)
FPOL	Frequency and polarization: 18H = 18.7 GHz, horizontal 18V = 18.7 GHz, vertical
ORBIT	ASC (ascending) DSC (descending) DAY (daily average)

T_bs are scaled by a factor of 10 (i.e., have a scale factor = 0.1) when written to the data fields. To recover T_bs in kelvins, multiply the stored value by 0.1. E.g., a stored value of 2673 = 267.3 K. Missing data are denoted by a value of 0.

1.2.3 File Naming Convention

Data and ancillary files utilize the following naming convention:

Example

AMSR_E_L3_SeaIce6km_V16_20080207.he5

Naming Convention

AMSR_E_L3_SeaIce6km_X##_YYYYMMDD.EXT

File name variables are described in Table 2, Table 3, and Table 4.

Table 2. Variable Values for the File Name

Variable	Description
X	Product Maturity Code (see Table 3)
##	File version number
YYYYMMDD	Four digit year, two digit month, two digit day
EXT	One of: • he5 (HDF-EOS5) qa (quality assurance information) • ph (product history) • xml (granule-level science metadata)

Table 3. Variable Values for the Product Maturity Code

Variables	Description
P	Preliminary - refers to non-standard, near-real-time data available from NSIDC. These data are only available for a limited time until the corresponding standard product is delivered to NSIDC.
B	Beta - indicates a developing algorithm with updates anticipated.
T	Transitional - period between beta and validated where the product is past the beta stage, but not quite ready for validation. This is where the algorithm matures and stabilizes.
V	Validated - products are upgraded to Validated once the algorithm is verified by the algorithm team and validated by the validation teams. Validated products have an associated validation stage. Refer to Table 4 for a description of the stages.

Table 4. Validation Stages

Validation Stage	Description
Stage 1	Product accuracy is estimated using a small number of independent measurements obtained from selected locations, time periods, and ground-truth/field program efforts.
Stage 2	Product accuracy is assessed over a widely distributed set of locations and time periods via several ground-truth and validation efforts.
Stage 3	Product accuracy is assessed, and the uncertainties in the product are well-established via independent measurements made in a systematic and statistically robust way that represents global conditions.

1.3 Spatial Information

1.3.1 Coverage

North Polar Grid

N: 90.0° S: 30.98° E: 180.0° W: -180.0°

South Polar Grid

N: -39.23° S: -90.0° E: 180.0° W: -180.0°

The coverages specified above are shown in Figure 1 and Figure 2.

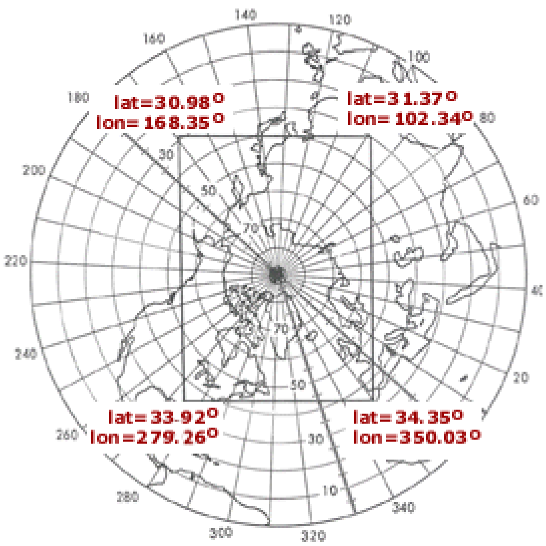

Figure 1. North Polar Grid

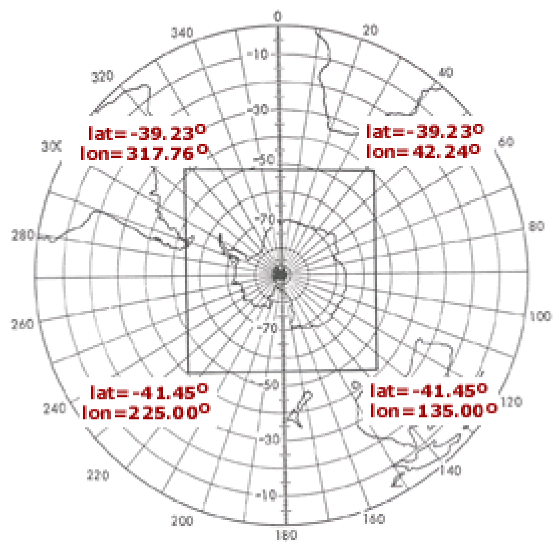

Figure 2. South Polar Grid

1.3.2 Resolution

6.25 km

1.3.3 Geolocation

The NSIDC polar stereographic grids specify a projection plane tangent to Earth at 70° latitude such that the projection is true at 70° rather than at the poles. This latitude was chosen so that little or no distortion would occur in the marginal ice zone.

The polar stereographic formula for converting between latitude–longitude and X–Y grid coordinates is taken from Snyder (1982). The projection assumes a Hughes ellipsoid with a radius of 6378.273 km (3443.992 nm) and an eccentricity of $e = 0.081816153$, or $e^2 = 0.006693883$. Note that this value of e^2 is stored to four significant digits (0.006694) in the HDF-EOS5 structural metadata ("HDFEOS INFORMATION/StructMetadata.0").

The following tables provide information about geolocating this data set:

Table 5. Geolocation Details

Projected coordinate system	NSIDC Sea Ice Polar Stereographic North	NSIDC Sea Ice Polar Stereographic South
Geographic coordinate system	Unspecified datum based upon the Hughes 1980 ellipsoid	Unspecified datum based upon the Hughes 1980 ellipsoid
Longitude of true origin	-45	0
Latitude of true origin	70	-70
Scale factor at longitude of true origin	1	1
Datum	Unspecified, based on Hughes 1980 ellipsoid	Unspecified, 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.org/crs_3411/NSIDC-Sea-Ice-Polar-Stereographic-North.html	https://epsg.org/crs_3412/NSIDC-Sea-Ice-Polar-Stereographic-South.html

Table 6. Grid Details

Hemisphere	North Polar	South Polar
Grid cell size (km)	6.25 × 6.25	6.25 × 6.25
Grid size (rows × columns)	1792 × 1216	1328 × 1264
Geolocated lower left point in grid (km)	(-3850, -5350)	(-3950, -3950)
Nominal gridded resolution	6.25 km	6.25 km
Grid rotation	0	0
ulxmap: x-axis coord, center of upper left pixel (XLLCORNER) (km)	-3,846.875	-3,946.875
ulymap: y-axis coord, center of upper left pixel (YLLCORNER) (km)	5,846.875	4,346.875

For additional details about this projection, grid dimensions, and grid coordinates, see "A Guide to NSIDC's Polar Stereographic Projection."

1.4 Temporal Information

1.4.1 Coverage

01 June 2002 to 4 October 2011

1.4.2 Resolution

Daily

2 DATA ACQUISITION AND PROCESSING

2.1 Acquisition

89 GHz observations at 5.4 km resolution, from the AMSR-E/Aqua L2A Global Swath Spatially-Resampled Brightness Temperatures, Version 4 product, are gridded to the 6.25 km polar stereographic grids using a drop-in-the-bucket approach, where the grid cell that contains the center of the observation footprint is given the whole weight of the observation. All valid observations within the extent of the polar grids are binned into grid cells (including land observations).

2.2 Processing

See the AMSR-E/Aqua L2A Global Swath Spatially-Resampled Brightness Temperatures user guide for details about how AMSR-E T_bs are derived.

2.2.1 Processing Steps

Once out-of-range data are screened out, swath T_bs derived from the 89 GHz channel are mapped onto the 6.25 km polar stereographic grid by converting the geodetic latitude and longitude for the center of each scene into AMSR-E grid coordinates, which are then binned to corresponding polar grid cells. Observations that fall outside the polar grid are ignored. To obtain an average daily value for a grid cell, the algorithm sums all T_bs observations that fall with the cell during a 24-hour period (midnight to midnight GMT) and then divides by the number of observations. If no observations fall within a grid cell on a given day, the average brightness temperature in that cell is reported as missing.

After the input Level-2A T_bs are binned into 6.25 km grid cells, the ascending and descending averages are combined to obtain a daily average. Note that daily T_b averages are not computed as the average of all T_b observations, but as the average of the ascending (ASC) and descending (DSC) averages. As shown by the following equation, if the ascending and descending averages on a given day were computed from different numbers of observations, this can bias the daily value:

$$DAY = \frac{\frac{ASC_1 + ASC_2 + \ldots ASC_n}{n} + \frac{DSC_1 + DSC_2 + \ldots DSC_m}{m}}{2}$$

2.3 Quality Assessment

Each HDF-EOS file contains core metadata with Quality Assessment (QA) metadata flags that are set by the Science Investigator-led Processing System (SIPS) before delivery to NSIDC (this metadata is also available as a separate XML file).

2.3.1 Automatic QA

Automatic Weather filters are employed for the Level-3 sea ice products to eliminate spurious sea ice concentrations over open ocean resulting from varying atmospheric emission. The weather filters are based on threshold values for the spectral gradient radio and thresholds derived from brightness temperature differences. Sea ice products are checked to see if ice concentration values fall within reasonable limits. Diagnostics are based in part on satellite sea ice climatology developed since the Scanning Multichannel Microwave Radiometer (SMMR) era in 1978.

2.3.2 Science QA

AMSR-E Level-2A data are subject to science QA in the SIPS environment prior to being processed to higher-level products. Science QA checks for and computes the percentages of missing and out-of-range values for each variable, and If <50% of the data in a file are good, the file’s science QA flag is marked suspect. Science QA also involves reviewing the operational QA files and performing the following additional automated QA procedures (Conway 2002):

- Historical data comparisons
- Detection of errors in geolocation
- Verification of calibration data
- Trends in calibration data
- Detection of large scatter among data points that should be consistent.

Once a product passes QA, it is ready to be used for higher-level processing, active science QA, archive, and distribution. Individual files that fail QA are reprocessed before being sent to NSIDC. Files that fail QA are not delivered to NSIDC.

For more information, see the AMSR-E/Aqua Data Quality and Data Uncertainty document. In addition, users can access AMSR-E Validation Data that contain details about the accuracy and precision checks conducted on AMSR-E observations.

2.3.3 Error Sources

See the AMSR-E/Aqua L2A Global Swath Spatially-Resampled Brightness Temperatures user guide for information about potential errors with derived T_bs.

2.4 Instrumentation

See AMSR-E Instrument Description

3 VERSION HISTORY

See AMSR-E Version History for a summary of changes since the start of mission.

4 SOFTWARE AND TOOLS

4.1 Geolocation

Arrays of latitudes and longitudes at grid cell centers of the 6.25 km north and south polar stereographic grids are available in NetCDF format in the Polar Stereographic Ancillary Grid Information data set. The previous version of these grids (in binary format[2]) can be obtained via an FTP client from:

ftp://sidads.colorado.edu/pub/DATASETS/brightness-temperatures/polar-stereo/tools/geo-coord/grid/

4.2 Land Masks

NSIDC also provides masks and overlays that can be used, for example, to conceal unwanted northern and southern hemisphere land regions or contaminated coastal ocean pixels incorrectly assigned sea ice concentrations. To determine which masks are available for this data set, see "Does NSIDC have tools to extract and geolocate polar stereographic data? | Land Masks."

5 RELATED DATA SETS

- Sea Ice Data at NSIDC
- Sea Ice Trends and Climatologies from SMMR and SSM/I-SSMIS

6 CONTACTS

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[2]Latitudes/longitudes are stored as long word integers (4 byte) scaled by 100,000. Each (i,j) array location contains the latitude or longitude value at the center of the corresponding data grid cell.

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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