AMSR/ADEOS-II L1A Raw Observation Counts, Version 3

USER GUIDE

How to Cite These Data

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

Japan Aerospace Exploration Agency (JAXA). 2014. *AMSR/ADEOS-II L1A Raw Observation Counts, Version 3*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/ADEOS-II/AMSR/AMSR-L1A.003. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/AMSR-L1A

National Snow and Ice Data Center

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1 DATA DESCRIPTION

1.1 File Information

1.1.1 Format

Level-1A data are in Hierarchical Data Format (HDF 4.2r1) with the following contents:

1.1.1.1 AMSR/ADEOS-II Level L1A Header

- Core metadata
- Product-specific attributes

1.1.1.2 AMSR/ADEOS-II Level L1A Data fields

- Navigation and attitude data
- Observation counts
- Calibration temperature counts
- Antenna temperature coefficients
- Time
- Latitude
- Longitude
- Sun azimuth
- Sun elevation
- Earth incidence
- Earth azimuth
- Data quality

The dimension of observation count data is 290 observations by approximately 2022 scans for all channels except 89.0 GHz. The dimension of 89.0 GHz data is 580 observations by approximately 2022 scans. The number of scans may fluctuate slightly. Missing data are indicated by a value of -9999.999.

1.1.2 File Contents

Each half-orbit granule is approximately 38 MB.

1.1.3 Naming Convention

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

Example file name: `A2AMS03011815MD_P01A0000000`

`A2AMSYYMMDDPPMX_KNLL0000000`

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

Table 1. Variable Explanation File Naming Convention

Variable for Granule ID	**Explanation**
A2	ADEOS-II satellite
AMS	AMSR sensor
YY	2-digit year
MM	2-digit month
DD	2-digit day
PP	Path number at the observation start point (01 - 57)
M	M or R (M = regular process or reprocess, R = near real time process)
X	orbit direction flag (A = ascending, D = descending)
Variable for Product ID	**Explanation**
K	P or N (P = regular process or reprocess, N = near real time process)
N	0 (spare field)
LL	1A (for Level-1A)
0000000	0 (spare fields)

1.2 Spatial Information

1.2.1 Coverage

Southernmost Latitude: -90° N

Northernmost Latitude: 90° N

Westernmost Longitude: -180° E

Easternmost Longitude: 180° E

AMSR is a conical scan sensor that sweeps the surface of the Earth at about ±90 degrees centered at the direction of the satellite flight. The swath width is about 1600 km.

1.2.2 Resolution

The sampling interval at the Earth's surface is 10 km for the 6.9 GHz to 52.8 GHz channels, and 5 km for the 89.0 GHz channel. The spatial resolution of each channel is listed in Table 2.

Table 2. Channel Spatial Resolution

Frequency (GHz)	6.9	10.65	18.7	23.8	36.5	50.3	52.8	89.0A	89.0B
Spatial Resolution	50 km		25 km		15 km	10 km		5 km	

1.3 Temporal Information

1.3.1 Coverage

2003-04-02 (00:03) to 2003-10-24 (20:50)

1.3.2 Resolution

The scanning period is 1.5 s and the data-sampling interval is every 2.6 ms for the 6 GHz to 52.8 GHz channels, and 1.3 ms for the 89 GHz channel. AMSR collects 580 data points per scan for the 89 GHz channel and 290 data points per scan for all other channels.

A granule of AMSR is defined as a half orbit between the South and North Poles for its observed position on the Earth. An observed position of AMSR is not nadir but a little forward to the satellite flight direction. Therefore, a scan location shifts about 2.5 minutes earlier from the satellite nadir on the orbit, but its center is positioned to the satellite nadir. Each half-orbit granule spans 50 minutes.

2 DATA ACQUISITION AND PROCESSING

2.1 Acquisition

AMSR provides geophysical information relevant to water by receiving weak microwaves naturally radiated from the Earth's surface and atmosphere such as atmospheric water vapor, precipitation, sea surface wind speed, sea surface temperature, soil moisture, sea ice extent, and snow water equivalent. AMSR observes microwaves instead of optical data, and it can observe from day to night, under any weather condition, and in the presence of clouds.

AMSR is an eight-frequency, total-power microwave radiometer with dual polarization (except two vertical channels in the 50 GHz band). Conical scanning is employed to observe the Earth's surface with a constant incidence angle of 55 degrees. Multi frequency measurement is performed by an array of primary horns. Calibration counts are obtained every scan by using the hot load target (around 300 K) and the cold-sky mirror to introduce the temperature of deep space (around 3 K). Table 3 summarizes the AMSR instrument specifications.

Table 3. AMSR Instrument Specifications

Center Frequency (GHz)	6.925	10.65	18.7	23.8	36.5	50.3	52.8	89.0	89.0
								A	B
Band Width (MHz)	350	100	200	400	1000	200	400	3000	
Polarization	Vertical and Horizontal					Vertical		Vertical and Horizontal	
3dB Beam Width (°)	1.8	1.2	0.65	0.75	0.35	0.25	0.25	0.15	0.15
IFOV (km)	40×70	27×46	14×25	17×29	8×14	6×10	6×10	3×6	
Sampling Interval (km)	10×10							5×5	
Temperature Sensitivity (K)	0.34	0.7	0.7	0.6	0.7	1.8	1.6	1.2	
Incidence Angle (°)	55.0								54.5
Dynamic Range (K)	2.7 - 340								
Swath Width (km)	Approximately 1600								

2.1.1 Data Source

The Japan Aerospace Exploration Agency (JAXA) processes AMSR Level 0 data into Level-1A observation count data.

2.2 Processing

2.2.1 Calibration

AMSR calibration is defined as the task for evaluation and adjustment of Brightness Temperature (TB) data. Radiometeric calibration of the TB data includes an absolute evaluation of the TB value and relative evaluation of the scan bias. The TB calibration also includes regular monitoring of radiometric noise and physical temperature. Geometric calibration evaluates the rough beam patterns, inter-channel co-registration, and absolute position accuracy, as well as regular monitoring of antenna rotation speed and attitude notation. Data quality evaluations were also performed on the quality of initial data, the soundness of all engineering values, and deductive algorithms.

2.2.2 Processing Steps

Level-1A processing is performed to derive geometric and radiometric information from edited AMSR data. AMSR Level 0 data pre-processing starts with a quality check for detecting missing data, then all data gaps are filled by dummy data, and then the interpolation of anomalous data is carried out. Once those pre-processing operations are performed, the observation data are extracted to a scene of a half orbit from pole to pole. If a scene is composed of several Level 0 data, the divided input data are edited to make the data for one scene. Initially, Level 0 data include redundant data so the redundant data are deleted before generating the scene data. In redundant deletion processing, the quality information on corresponding data is compared and the data of the higher quality are chosen.

2.3 Quality, Errors, and Limitations

The AMSR Instrument Description document provides details on potential errors associated with radiometer calibration.

2.4 Instrumentation

2.4.1 Description

See the AMSR Instrument Description document.

3 VERSION HISTORY

Version 2 features empirical corrections to the Aqua scan azimuth and satellite flight direction. With corrected sun azimuth, sun elevation, earth azimuth, and earth incidence angles, the geometric accuracy of AMSR 89 GHz data improved to within 2 km, compared to Version 1 AMSR-L1A data.

The improved Version 3 AMSR-L1A product features empirical corrections to the co-registration parameters A1 and A2, and an updated parameter file used for correcting the AMSR 89 GHz position information. As a result, Version 3 AMSR-L1A data provide improved accuracy for the following: latitude and longitude, land/ocean flags, earth incidence angle, earth azimuth angle, sun azimuth angle, and sun elevation angle.

4 CONTACTS AND ACKNOWLEDGMENTS

Japan Aerospace Exploration Agency
Earth Observation Center
Japan

5 REFERENCES

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For more information regarding related publications, go to the Research Using AMSR Data web page.

6 DOCUMENT INFORMATION

6.1 Publication Date

February 2007

6.2 Date Last Updated

07 April 2021