



AMSR-E/AMSR2 Unified L3 Global Monthly Ascending/Descending .25x.25 deg Ocean Grids, Version 1

USER GUIDE

How to Cite These Data

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

Kummerow, C., R. Ferraro, D. Randel, and P. Brown. 2024. *AMSR-E/AMSR2 Unified L3 Global Monthly Ascending/Descending .25x.25 deg Ocean Grids, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/EX7P1JPQ0UA8>. [Date Accessed].

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

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



National Snow and Ice Data Center

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1 DATA DESCRIPTION

The AMSR-E/AMSR2 Unified L3 Global Monthly Ascending/Descending .25 x .25 deg Ocean Grids data set (AU_MoOcn) reports monthly estimates of water vapor, cloud liquid water content, and surface wind speed over the ocean, on a global 0.25° × 0.25° resolution grid.

The data are derived from the [AMSR-E/AMSR2 Unified L2B Global Swath Ocean Products, Version 1](#) data set.

AMSR Unified data are generated from Advanced Microwave Scanning Radiometer (AMSR) for EOS (AMSR-E) and AMSR2 data that have been resampled to intercalibrate (i.e., unify) the two instruments.

1.1 Parameters

Integrated liquid water (cloud water only)

Integrated water vapor (precipitable water)

Ocean surface wind speed

Sea surface temperature

1.2 File Information

1.2.1 Format

Data are provided in Hierarchical Data Format - Earth Observing System, Version 5 (HDF-EOS5) format. HDF-EOS5 is a file format and software library that augments standard HDF5 with conventions, data types, and metadata elements specific to NASA EOS mission data.

1.2.2 File Contents

As shown in Figure 1, similar data fields are grouped together within the HDF-EOS5 data files. The science and geolocation data are stored as 32-bit, floating point data fields in the “/HDFEOS/GRIDS/GRID/Data Fields/” subgroup. The HDF-EOS global attributes “StructMetadata.0” and “CoreMetadata.0” are stored within the /HDFEOS INFORMATION/” subgroup.

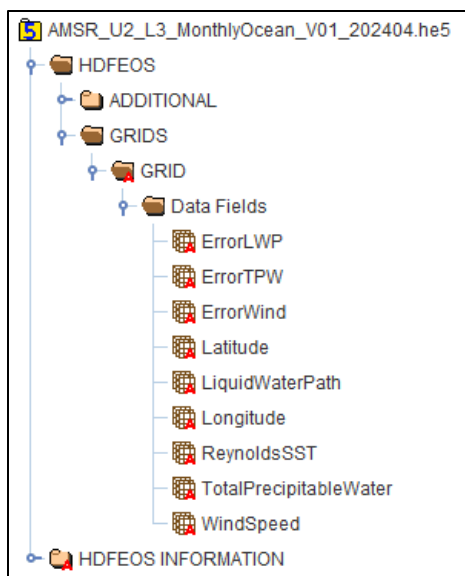


Figure 1. HDF-EOS5 Internal Structure as seen in HDFView

The following table describes the data fields shown in Figure 1:

Table 1. Data Field Names and Descriptions

Data Field Name	Description	Valid Range
ErrorLWP	Posterior error (g/m ²) for retrieved liquid water path, computed as the standard deviation of errors	0.0 – 3000.0
ErrorTPW	Posterior error (mm) for retrieved total precipitable water, computed as the standard deviation of errors	0.0 – 75.0
ErrorWind	Posterior error (m/s) for retrieved 10 m wind speed, computed as the standard deviation of errors	0.0 – 50.0
Latitude	Latitude (°N), center of pixel	-89.875 – 89.875
LiquidWaterPath	Integrated liquid water (g/m ²) in the atmospheric column, cloud water only	0.0 – 3000.0
Longitude	Longitude (°E), center of pixel	-180 – 180
ReynoldsSST	Sea surface temperature (K) ¹	268.15 – 323.15
TotalPrecipitableWater	Integrated water vapor (mm) in the atmospheric column	0.0 – 75.0
WindSpeed	Wind speed (m/s), 10 m altitude above ocean surface	0.0 – 50.0

¹From [NOAA 0.25-degree Daily Optimum Interpolation Sea Surface Temperature \(OISST\), Version 2.1](#) (a.k.a. the Reynolds SST).

1.2.3 Fill Values

The data fields above utilize the following fill values:

- -999: No data available²
- -998: Land/bad pixel marker
- -997: Data quality issue

1.2.4 File Naming Convention

Each HDF-EOS5 data file has a corresponding product history, quality assurance, and science metadata file. AU_MoOcn files utilize the following naming convention:

Example file name:

AMSR_UE_L3_MonthlyOcean_V01_200206.he5

AMSR_U2_L3_MonthlyOcean_V01_201207.he5

File name convention:

AMSR_U[I]_L3_MonthlyOcean_[p][vv]_[YYYYMMDD].[ext]

Table 2. File Name Variable Descriptions

Variable	Description
AMSR	Advanced Microwave Scanning Radiometer
I	Instrument code. E (AMSR-E) or 2 (AMSR2)
L3_MonthlyOcean	Processing level (L3) and product (monthly ocean)
p	Product Maturity Code (See Table 3)
vv	Version number
YYYYMM	Data month in year (YYYY), month (MM) format
ext	File extension. he5 = HDF-EOS5 file; qa = quality assurance; ph = product history; xml = science metadata

Table 3. Valid Values for the Product Maturity Code

Variable	Description
P	Preliminary. Refers to non-standard, near-real-time data available from the NSIDC DAAC. These data are only available for a limited time until the corresponding standard product is ingested at the NSIDC DAAC.
B	Beta - indicates a developing algorithm with updates anticipated.

² This value is assigned to all grid cells when initialized.

Variable	Description
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. See "Validation Stage" on the "AMSR Unified Version History" page for more details.

1.3 Spatial Information

1.3.1 Coverage

N: 89.875° N

S: 89.875° S

E: 180° E

W: 180° W

1.3.2 Resolution

0.25° × 0.25°

1.3.3 Geolocation

The following tables provide information for geolocating this data set.

Table 4. Geolocation Details

Geographic coordinate system	WGS 84
Projected coordinate system	N/A
Longitude of Prime Meridian	Prime Meridian, Greenwich
Datum	World Geodetic System 1984
Ellipsoid/spheroid	WGS 84

Units	Degrees
False easting	N/A
False northing	N/A
EPSG code	4326
PROJ4 string	+proj=longlat +datum=WGS84 +no_defs +type=crs
Reference	https://epsg.org/crs_4326/WGS-84.html

Table 5. Grid Details


Grid cell size (x, y pixel dimensions)	720 × 1440
Number of rows	720
Number of columns	1440
Geolocated lower left point in grid	-90°, -180°
Nominal gridded resolution	0.25° × 0.25°
Grid rotation	0
ulxmap – x-axis map coordinate of the center of the upper-left pixel (XLLCORNER for ASCII data)	-179.875°
ulymap – y-axis map coordinate of the center of the upper-left pixel (YLLCORNER for ASCII data)	89.875°

1.4 Temporal Information

1.4.1 Coverage

1 June 2002 through 4 October 2011 (AMSR-E)³

2 July 2012 to present (AMSR2)

 The last file of AMSR-E derived data (AMSR_UE_L3_MonthlyOcean_V01_201110.he5) was generated from 4 days of observations (1 – 4 October, 2011). Similarly, the first file of AMSR2 derived data (AMSR_U2_L3_MonthlyOcean_V01_201207.he5) was generated from 30 days of observations (2 – 31 July, 2012).

³No data are available between the end of the AMSR-E mission on 4 October 2011 and the beginning of AMSR2 coverage on 2 July 2012.

1.4.2 Resolution

Monthly

2 DATA ACQUISITION AND PROCESSING

2.1 Acquisition

This gridded data set is generated from the [AMSR-E/AMSR2 Unified L2B Global Swath Ocean Products, Version 1](#) swath product. For a complete description of the AMSR Unified L2B ocean algorithm, see [AMSR-E/AMSR2 Unified Algorithm – Ocean Suite | Algorithm Theoretical Basis Document](#).

2.2 Processing

Grid cells are filled using a drop-in-the-bucket (i.e., a simple sum-and-average) method. For a given calendar month, the algorithm identifies all valid L2B swath observations with center latitudes and longitudes that fall within each $0.25^\circ \times 0.25^\circ$ grid cell. The swath observations are then averaged and the resulting value is written to the corresponding cell.

2.3 Quality Information

Posterior errors, reported as the standard deviation of errors, are computed and included in the output file. These data fields are provided so users can gauge uncertainty in the output products and calibration stability over time.

Each HDF-EOS5 data file also contains core metadata with Quality Assessment (QA) flags set by the operational processing code run by the AMSR Science Investigator-led Processing System (SIPS) prior to delivery to the NASA NSIDC DAAC. The same QA flags are also provided for each HDF-EOS5 granule as a separate XML file.

All AMSR Unified data files undergo three types of QA: Automatic QA, Operational QA, and Science QA. The following sections briefly describe the AMSR Unified QA processing chain.

i Granules must pass Automatic and Operational QA before being forwarded to NSIDC for distribution. Granules that fail either Automatic or Operational QA are reprocessed.

2.3.1 Automatic QA

L2B values are screened at the AMSR SIPS and any out-of-bounds values are removed prior to product generation.

2.3.2 Operational QA

AMSR Unified data are also subject to operational QA at the AMSR SIPS. Operational QA typically checks for the following criteria in a given file:

- File is correctly named and sized
- File contains all expected elements
- File is in the expected format
- Required EOS fields, e.g., time, latitude, and longitude are present and populated
- Structural metadata are correct and complete
- The file is not a duplicate
- The HDF-EOS5 version number is provided in the global attributes
- The correct number of input files was available and processed

2.3.3 Science QA

Science QA is performed automatically during processing, but only reviewed if questions arise after processing is complete.

Science QA performed at the SIPS includes checking to ensure that each variable's fractions of missing and out-of-bounds data are within predefined ranges.

At the Science Computing Facility (SCF), co-located with the SIPS, science QA is conducted manually as needed and involves reviewing operational QA files and browse images, as well as:

- Comparisons with historical data
- Detection of geolocation errors
- Verification of calibration data
- Assessment of trends in calibration data
- Identification of large scatter among data points that should be consistent

2.4 Instrumentation

For a detailed description of the AMSR-E instrument, see "[AMSR-E Instrument Description](#)."

Information about AMSR2 is available at [AMSR2 Channel Specification and Products](#) (maintained by JAXA).

3 RELATED DATA SETS

[AMSR-E/AMSR2 Unified L2B Global Swath Ocean Products, Version 1](#)

4 RELATED WEBSITES

[AMSR Unified at NSIDC](#)

5 DOCUMENT INFORMATION

5.1 Publication Date

November 2024

5.2 Date Last Updated

November 2024