

AMSR3

Level 2 Product Format Manual

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Japan Aerospace Exploration Agency

Advanced Product Format Manual			
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Appendix 1 Data Quality of Each Physical Quantity Data

1. Introduction

1.1 Purpose

This document defines the format of the Level 2 product file for the sensor mounted on the Global Observing SATellite for Greenhouse gases and Water cycle satellite (hereinafter referred to as GOSAT-GW) and Advanced Microwave Scanning Radiometer 3 (hereinafter referred to as AMSR3).

1.2 Overview

The AMSR3 Level 2 product is a scene-based product that stores physical quantities calculated from brightness temperatures for each footprint. It is created using either product Level 1B, Level 1C, Level 1R, or Level 1H as input.

2. Related Documents

2.1 Applicable Documents

- Greenhouse Gases and Water Cycle Observation Technology Satellite (GOSAT-GW) AMSR3 High-Level Processing Interface Condition Document (FTZ-200004-0B)
- Greenhouse Gases and Water Cycle Observation Technology Satellite (GOSAT-GW) AMSR3 Product Format Definition Document (FTZ-220003A)

2.2 Reference Documents

- First Phase Water Cycle Variation Observation Satellite (GCOM-W1) AMSR2 High-Level Product Format Explanation Document
- First Phase Water Cycle Variation Observation Satellite 'Shizuku' (GCOM-W1) Data Usage Handbook (SGC-120010)

3. Product Description

3.1 Product Structure

The file structure of the AMSR3 Level 2 product is shown in Table 3.1-1 AMSR3 Level 2 product Files Structure.

Table 3.1-1 AMSR3 Level 2 product Files Structure

Structure		NetCDF-4/HDF5 Data Model	Contents
Header Section	Product Metadata	Attributes	Stores product-specific information (such as AMSR3 main raw data, engineering value conversion table, etc.)
Data Section		Data Set	Store the following data: • Scan Time • Physical Quantities • Latitude and Longitude Information • Quality Information • Orbit Information • Observation geometry information (incidence angle, azimuth angle) • Land Area Ratio

3.2 Data Structure

The data structure of the AMSR3 Level 2 product (medium resolution sampling) is shown in Figure 3.2-1, and the data structure of the AMSR3 Level 2 product (high resolution sampling) is shown in Figure 3.2-2. The product is composed of the product data in the header section shown in Table 3.2-1 and the data sets in the data section shown in Tables 3.2-2 to 3.2-3.

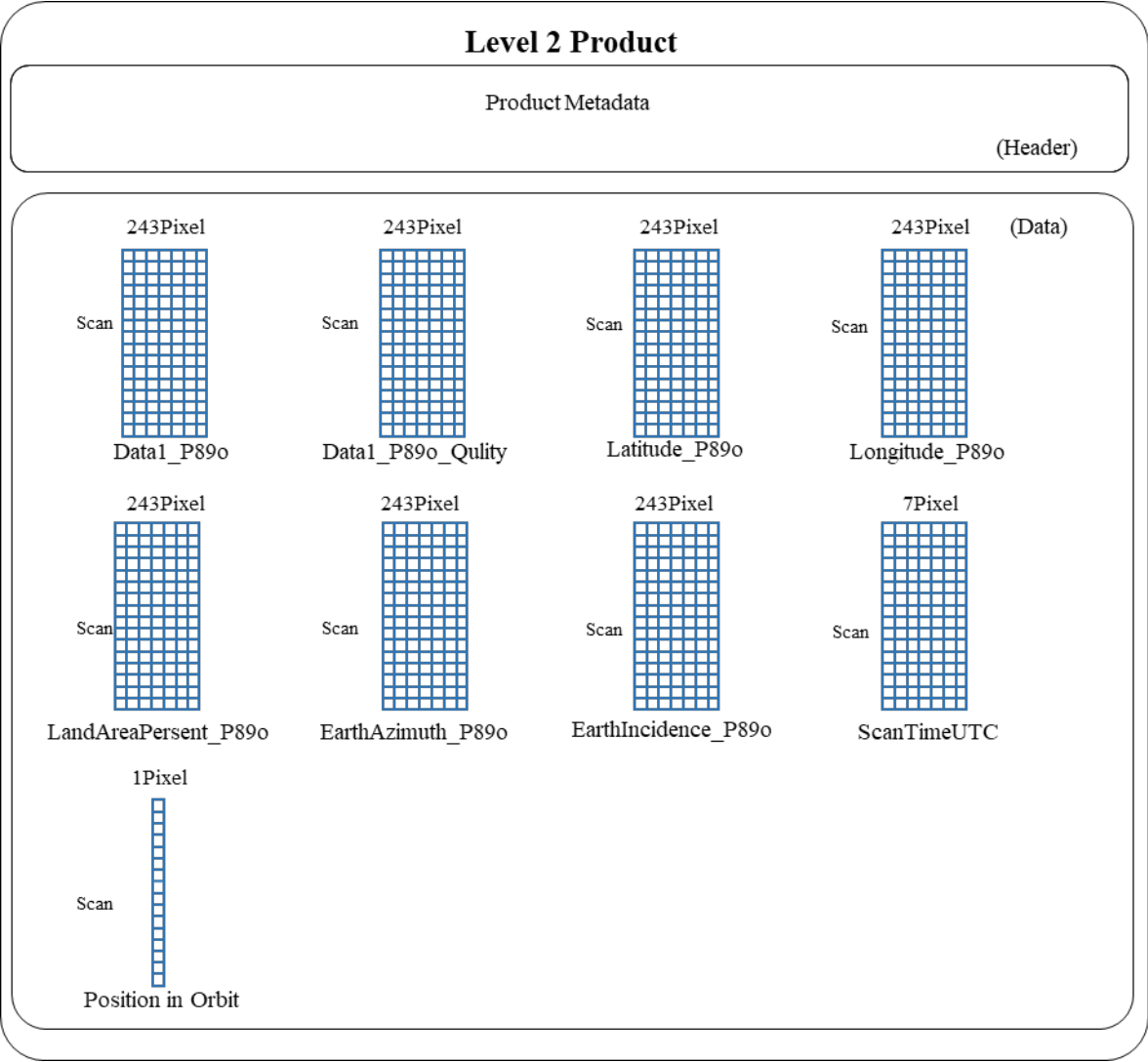


Figure 3.2-1 Data structure of AMSR3 Level 2 product (medium resolution sampling)

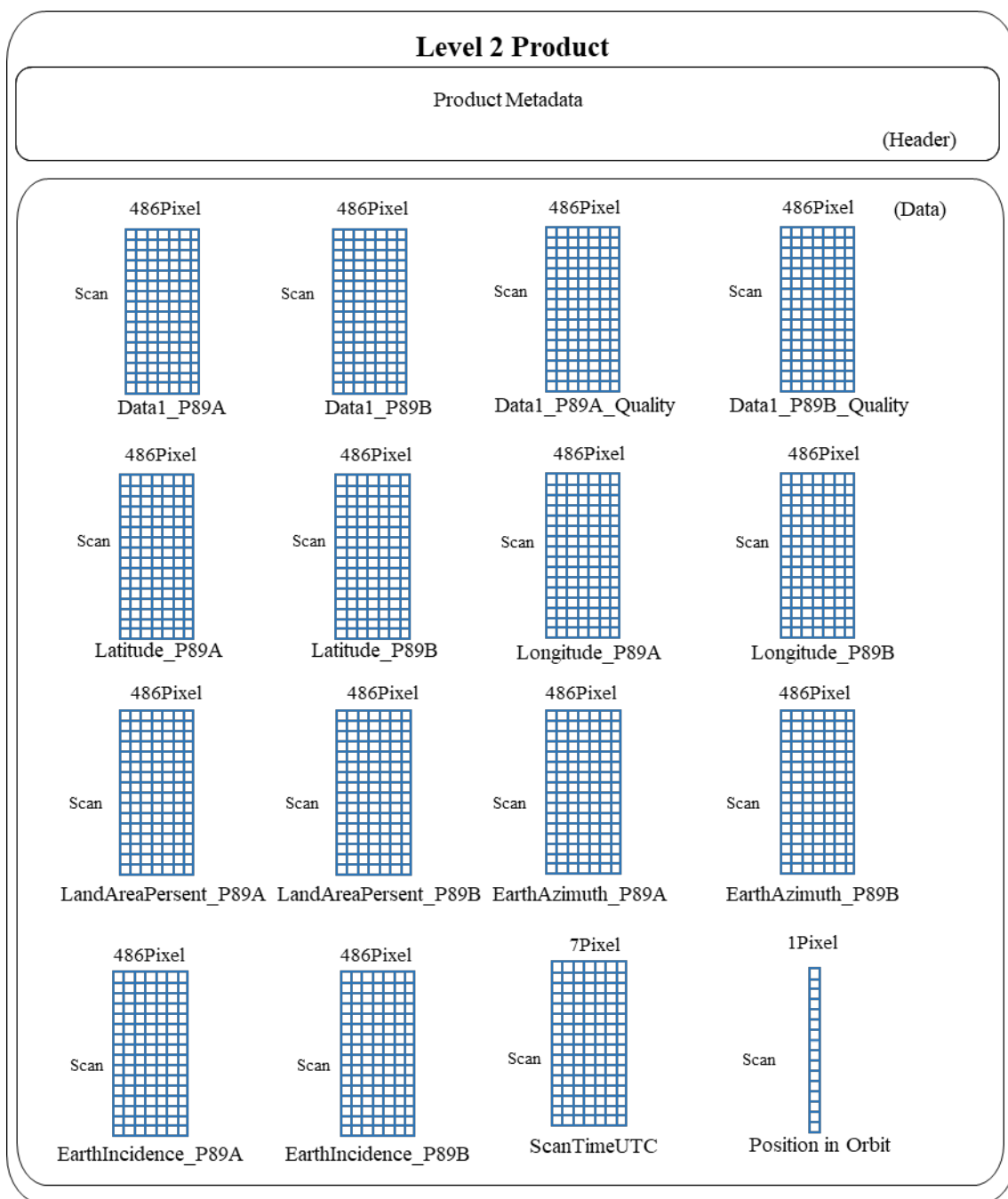


Figure 3.2-1 Data structure of AMSR3 Level 2 product (high resolution sampling)

When storing multiple data, data sets with names that increase the number after "Data", such as Data1_P89A, Data2_P89A, Data3_P89A, are added. However, for quality information (_Quality), it does not necessarily correspond to each stored data, so an arbitrary number of data sets are added.

Table 3.2-1 Storage items of product metadata

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
1	Conventions	string	Variable	Convention (CFConvention, ACDDversion)	CF-1.7, ACDD-1.3
2	title	string	Variable	Product Name	GOSAT-GW/AMSR3 Level-2 <i>ProductName</i> <i>ProductName</i> Total Precipitable Water (2M) Cloud Liquid Water Content (2M) Precipitation (2H) Sea Surface Temperature (2M) Sea Surface Wind Speed (2M) Sea Ice Concentration (2M) High-Resolution Sea Ice Concentration (2H) Soil Moisture Content (2M) Snow Depth (2M) High-Resolution Sea Surface Temperature (2H) All-weather Sea Surface Wind Speed (2M)
3	institution	string	Variable	Organization Name	Japan Aerospace Exploration Agency (JAXA)
4	project	string	Variable	Project Name	JAXA GOSAT-GW Project

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
5	summary	string	Variable	Summary	Set a summary for each product.
6	license	string	Variable	Data Rights	https://gportal.jaxa.jp/gpr/index/eula?lang=en
7	creator_name	string	Variable	Product Creation Organization	Japan Aerospace Exploration Agency (JAXA)
8	creator_type	string	Variable	Organization Type	Institution
9	creator_email	string	Variable	Creation Organization Contact Email	z-gportal-support@ml.jaxa.jp
10	creator_url	string	Variable	Creation Organization Website	https://gportal.jaxa.jp/gpr/index/index?lang=en
11	keywords	string	Variable	Keywords	Set keywords that represent the contents of the file, separated by commas. Example : OCEANS, OCEAN TEMPERATURE, SEA SURFACE TEMPERATURE
12	standard_names_vocabulary	string	Variable	Glossary citing standard_name	CF Standard Name Table (v49, 12 February 2018)
13	id	string	Variable	Glanule ID	Set the granule ID.
14	naming_authority	string	Variable	Organization Name	jp.jaxa
15	source	string	Variable	Data Generation Method	Set the method used to generate the data. If it's observational data, set a description that characterizes the observation. If it's data made from some model, set the model name and version.
16	processing_level	string	Variable	Processing Level	Level 2

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
17	comment	string	Variable	Comments	Set information about the file that is not included in other attributes.
18	date_created	string	Variable	Data Creation Date and Time (UTC)	YYYY-MM-DD T hh:mm:ss.uuuZ
19	time_coverage_start	string	Variable	Observation Start Date and Time (UTC)	YYYY-MM-DD T hh:mm:ss.uuuZ
20	time_coverage_end	string	Variable	Observation End Date and Time (UTC)	YYYY-MM-DD T hh:mm:ss.uuuZ
21	geospatial_lat_min	32-bit floating point	4	Southernmost latitude in the observation range (deg)	-9999.0(Set missing values)
22	geospatial_lat_max	32-bit floating point	4	Northernmost latitude in the observation range (deg)	-9999.0(Set missing values)
23	geospatial_lon_min	32-bit floating point	4	Westernmost longitude in the observation range (deg)	-9999.0(Set missing values)
24	geospatial_lon_max	32-bit floating point	4	Easternmost longitude in the observation range (deg)	-9999.0(Set missing values)
25	geospatial_vertical_min	32-bit floating point	4	Minimum elevation in the observation range	-9999.0(Set missing values)
26	geospatial_vertical_max	32-bit floating point	4	Maximum elevation in the observation range	-9999.0(Set missing values)
27	geospatial_vertical_positive	string	Variable	Vertical direction identifier	Blank

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
28	geospatial_bounds	string	Variable	2D spatial range represented in OGC's Well-Known Text (WKT) Geometry format	Setting example : POLYGON ((176.78 84.34, 4.54 36.43, -8.09 -22.74, -70.24 -73.29, -7.09 -84.17, 7.67 -24.99, 21.99 33.92, 121.86 73.50, 176.78 84.34))
29	geospatial_bounds_crs	string	Variable	Coordinate Reference System (CRS) for point coordinates in the geospatial_bounds attribute	EPSG:4326
30	geospatial_vertical_bounds_crs	string	Variable	Coordinate Reference System (CRS) for altitude/depth direction of point coordinates in the geospatial_bounds attribute	Blank
31	language	string	Variable	Language used	en
32	topicCategory	string	Variable	Field code	Set the most appropriate field from the ISO19115 subject code table. If selecting multiple, list the codes separated by commas.
33	Role	string	Variable	Role code	Set the ISO19115 role code 003 (owner of the information).
34	history	string	Variable	File modification history	List the file modification history (date and time of modification, username, program name, and command line arguments).
35	characterSet	string	Variable	Character code	Set the ISO-19115 character code 004 (utf8).

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
36	acknowledgement	string	Variable	Supplementary information about the project	Set supplementary information about the project, etc.
37	publisher_name	string	Variable	Person in charge	JAXA GOSAT-GW Project
38	publisher_email	string	Variable	Person in charge email address	z-gportal-support@ml.jaxa.jp
39	publisher_url	string	Variable	Person in charge website URL	https://gportal.jaxa.jp/gpr/index/index?lang=en
40	DOI	string	Variable	Digital Object Identifier	Set the Digital Object Identifier to be assigned to the product.
41	DOIauthority	string	Variable	International DOI Foundation URL	http://doi.org/
42	AlgorithmDeveloper	string	Variable	Algorithm developer name	Set the algorithm developer code (A~Z).
43	AlgorithmVersion	string	Variable	Algorithm version	Set the algorithm version (000~999).
44	AncillaryDataInformation	string	Variable	Ancillary data information	Set the ancillary data information used at level 2.
45	AutomaticQAFlag	string	Variable	Program check	Set either Good, Fair, or NG.
46	AutomaticQAFlagExplanation	string	Variable	Program check description	p(pixel count of the target area)=NumberOfPixelsAll-NumberOfPixelsOutsideArea, a(valid data rate)=NumberOfPixelsRetrieved/p*100 (%); Good: p>0 and a>=80%; Fair: p>0 and a>0% and a<80%; NG: p=0 or NumberOfPixelsRetrieved=0;
47	ContactOrganizationEmail	string	Variable	Product creation agency email address	z-gportal-support@ml.jaxa.jp

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
48	ContactOrganizationName	string	Variable	Product creation agency name	Japan Aerospace Exploration Agency (JAXA)
49	DataCode	string	Variable	Abbreviation of stored data	Set the data code (Table 4.2-1). If there are multiple, separate them with a semicolon.
50	DataDatasetName	string	Variable	Stored dataset name	DataX_P89o X:1~ If there are multiple, separate them with a semicolon.
51	DataDynamicRange	string	Variable	Dynamic range of physical quantity	Set the measurement range of each product. ※If there are multiple layers, set the measurement range of the first layer dataset.
52	DataLongName	string	Variable	Stored data name:	Set the name of the stored data.
53	DataNumber	32-bit integer	4	Number of stored data	Set the number of data to be stored.
54	DataType	string	Variable	Stored data type	Set the type of data to be stored.
55	EarthEllipsoidName	string	Variable	Earth ellipsoid model	WGS84
56	EarthFlatteningRatio	string	Variable	Earth flattening	0.00335
57	EarthSemiMajorAxis	string	Variable	Earth equatorial radius	6378.1km
58	FileFormatType	string	Variable	Format type	NetCDF-4/HDF5 File Format
59	FileFormatVersionHDF	string	Variable	HDF5 format version	Setting example : HDF5-1.x.x
60	FileFormatVersionNC	string	Variable	NetCDF-4 format version	Setting example : NetCDF-4.x.x
61	FileSizeByte	32-bit integer	4	Product file size (byte)	0~

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
62	GranuleID	string	Variable	Granule ID	Set the granule ID.
63	GringPointLatitude	string	Variable	Data valid range latitude (deg)	Setting example : 84.32,73.53,33.95,-24.98,-84.06,-73.27,-22.74,36.43
64	GringPointLongitude	string	Variable	Data valid range longitude (deg)	Setting example : -174.88,123.71,23.67,9.40,-4.83,-68.15,-6.38,6.23
65	InputFileName	string	Variable	Input file name	Set the input file name. If there are multiple, separate them with a comma.
66	MeteorologicalDataType	string	Variable	Used meteorological data	Set the used meteorological data.
67	NumberOfAntennaRotationAnomalyScans	32-bit integer	4	Number of abnormal scans due to antenna rotation speed	0~
68	NumberOfAttitudeAnomalyScans	32-bit integer	4	Number of abnormal scans due to attitude angle/attitude angle error	0~
69	NumberOfGeometricErrorPixels	32-bit integer	4	Number of geometric information errors (counted independently for each channel, observation poi)	0~

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
70	NumberOfHTSAnomalyScans	32-bit integer	4	Number of abnormal scans due to high temperature calibration source temperature	0~
71	NumberOfInputFiles	32-bit integer	4	Number of inputs L1 files	1~
72	NumberOfMissingPackets	32-bit integer	4	Number of packet losses	0~
73	NumberOfMissingScans	32-bit integer	4	Number of missing scans	0~
74	NumberOfOrbitAnomalyScans	32-bit integer	4	Number of abnormal scans due to orbit position/speed	0~
75	NumberOfTbLimitErrorPixels	32-bit integer	4	Number of limit check errors (counted independently for each channel, observation point)	0~
76	NumberOfPackets	32-bit integer	4	Number of level 0 packets	Set (NumberOfScan $\times$ 16).
77	NumberOfParityError	32-bit integer	4	Number of parity errors	0~
78	NumberOfPixelsAll	32-bit integer	4	Total number of pixels	0~

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
79	NumberOfPixelsOutsideArea	32-bit integer	4	Number of out-of-area pixels	For ocean products, the pixel count is set to the number of land pixels; for land products, it is set to the total number of ocean pixels and the number of pixels in regions that are excluded from calculation by the algorithm.
80	NumberOfPixelsPerScan	32-bit integer	4	Number of pixels per scan	Medium resolution: 243 High resolution: 486
81	NumberOfPixelsRetrieved	32-bit integer	4	Number of valid data	Count as 1 if there is at least one data present when multiple physical quantities exist.
82	NumberOfPixelsRetrievedEachDS	string	20	Number of valid data per dataset	Set the number of valid data for each dataset. If there are multiple, separate them with a semicolon.
83	NumberOfScans	32-bit integer	4	Number of scans	1~
84	NumberOfScansOverlap	32-bit integer	4	Number of overlap scans (one side)	0
85	ObservationEndTime	string	Variable	Observation data end time (UTC)	YYYY-MM-DD T hh:mm:ss.uuuZ

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
86	ObservationEquatorCrossingDateTime	string	Variable	Equator crossing time (UTC)	YYYY-MM-DDThh:mm:ss.uuuZ 【Standard processing】 Equator crossing time. 【Quasi-real-time processing (global)】 If there are multiple, set the first equator crossing time in the data. 【Quasi-real-time processing (around Japan)】 Leave blank if not crossing the equator.
87	ObservationEquatorCrossingLongitude	32-bit floating-point	4	Equator crossing longitude	【Standard processing】 Set the equator crossing longitude in the range of -180.00 to 180.00. 【Quasi-real-time processing (global)】 If there are multiple, set the first equator crossing longitude in the data. 【Quasi-real-time processing (around Japan)】 Leave blank if not crossing the equator.
88	ObservationStartDateTime	string	Variable	Observation data start time (UTC)	YYYY-MM-DDThh:mm:ss.uuuZ
89	OrbitArgumentPerigee	string	Variable	Argument of perigee of the satellite	Set "-".
90	OrbitDataFileName	string	Variable	Name of the orbit data file used	Translate the following into English. Set the name of the orbit data file used.

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
91	OrbitDataType	string	Variable	Type of orbit data	ONBOARD
92	OrbitDirection	string	Variable	Orbit direction	【Standard processing/Quasi-real-time processing (around Japan)】 Ascending orbit: Ascending Descending orbit: Descending 【Quasi-real-time processing (global)】 The first orbit direction in the data
93	OrbitEccentricity	string	Variable	Satellite orbit eccentricity	Frozen
94	OrbitInclination	string	Variable	Orbit inclination angle	98.06deg
95	OrbitNumberEnd	32-bit integer	4	Orbit end number	Orbit end number (cumulative number from launch)
96	OrbitNumberStart	32-bit integer	4	Orbit start number	Orbit start number (cumulative number from launch)
97	OrbitPeriod	string	Variable	Satellite period	98.2min
98	OrbitSemiMajorAxis	string	Variable	Satellite orbit semi-major axis	7035.552km
99	ParameterVersion	string	Variable	Parameter version	String of 000-999
100	PathNumber	32-bit integer	4	Path number	1-44 Path number at the start of processing
101	PGENAME	string	Variable	Data processing software name	GOSAT-GW Mission Operation System
102	PlatformShortName	string	Variable	Platform abbreviation	GOSAT-GW
103	ProcessingCenter	string	Variable	Data processing station	JAXA GOSAT-GW Project

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
104	ProcessingQAAttribute	string	Variable	Quality-related items that were determined to be abnormal	Set items with abnormalities in the quality-related items in GlobalAttribute. If no abnormalities have occurred, leave it blank.
105	ProcessingQADescription	string	Variable	Message in case of successful processing	Blank
106	ProductCreationDateTime	string	Variable	Product generation time (UTC)	YYYY-MM-DDThh:mm:ss.uuuZ
107	ProductName	string	Variable	Product abbreviation	AMSR3 L2 XXX (Level 2 product code) Refer to Table 3.4-2
108	ProductProcessingType	string	Variable	Product processing type	【Standard】 Standard Product (Global) 【Global Near Realtime】 Near Realtime Product (Global) 【Local Near Realtime】 Near Realtime Product (Local)
109	ProductSupplement	string	Variable	Product supplementary information	Set the product supplementary information managed by each module.
110	ProductVersion	string	Variable	Product version	VVv VV: 00-99 v: A single alphanumeric character from A to Z
111	QALocationOfPacketDiscontinuity	string	Variable	Packet Sequence Counter discontinuity	In case of continuation: Continuation In case of discontinuity: Discontinuation
112	QAPercentMissingData	32-bit floating-point	4	Data loss rate (%)	0.0-100.0 Set -9999.0 in case of abnormal value.

No	Attribute Name	Data Type	Data Size	Name	Configuration Description
113	SatelliteAltitude	string	Variable	Satellite altitude	665.96km
114	SatelliteOrbit	string	Variable	Satellite orbit	Sun-synchronous sub-recurrent
115	SatelliteRevisitTime	string	Variable	Regression days	3 days
116	SensorAlignment	string	Variable	Sensor alignment	Rx=-0.044000,Ry=-0.004000,Rz=0.015000
117	SensorAntRotationVelocity	string	Variable	Antenna (tacopulse) rotation speed	Set the rotation speed of the antenna (tacopulse) (30-40rpm).
118	SensorFOV	string	Variable	Spatial resolution	Set the spatial resolution ($Az \times El$) of each frequency.
119	SensorOffNadir	string	Variable	Off-nadir angle	Set the product supplementary information managed by each module.
120	SensorScanningPeriod	string	Variable	Scanning period	1.5sec
121	SensorShortName	string	Variable	Observation sensor abbreviation	AMSR3
122	SensorSwathWidth	string	Variable	Swath width	1535km

Table 3.2-2 Configuration and size of the data set in the data section (medium resolution sampling)

No.	Data set name	Data type	Unit	Array size
1	Data1_P89o	32-bit floating-point	※	NumberOfScans × 243
2	Data1_P89o_Quality	8-bit unsigned integer	-	NumberOfScans × 243
3	Latitude_P89o	32-bit floating-point	degrees_north	NumberOfScans × 243
4	Longitude_P89o	32-bit floating-point	degrees_east	NumberOfScans × 243
5	LandAreaPercent_P89o	8-bit unsigned integer	%	NumberOfScans × 243
6	EarthAzimuth_P89o	16-bit integer	degrees	NumberOfScans × 243
7	EarthIncidence_P89o	16-bit integer	degrees	NumberOfScans × 243
8	ScanTimeUTC	16-bit integer	{Year, Month, Day, Hour, Minute, Second, Millisecond}	NumberOfScans × 7
9	PositionInOrbit	64-bit floating-point	-	NumberOfScans

※Refer to Table 4.2-2.

When storing multiple data, additional data sets with names that increase the number after "Data", such as Data1_P89o, Data2_P89o, Data3_P89o, are stored.

表 3.2-3 Configuration and size of the data set in the data section (high resolution sampling)

No.	Data set name	Data type	Unit	Array size
1	Data1_P89A	32-bit floating-point	※	NumberOfScans × 486
2	Data1_P89A_Quality	8-bit unsigned integer	-	NumberOfScans × 486
3	Data1_P89B	32-bit floating-point	※	NumberOfScans × 486
4	Data1_P89B_Quality	8-bit unsigned integer	-	NumberOfScans × 486
5	Latitude_P89A	32-bit floating-point	degrees_north	NumberOfScans × 486
6	Longitude_P89A	32-bit floating-point	degrees_east	NumberOfScans × 486
7	Latitude_P89B	32-bit floating-point	degrees_north	NumberOfScans × 486
8	Longitude_P89B	32-bit floating-point	degrees_east	NumberOfScans × 486
9	LandAreaPercent_P89A	8-bit unsigned integer	%	NumberOfScans × 486
10	LandAreaPercent_P89B	8-bit unsigned integer	%	NumberOfScans × 486
11	EarthAzimuth_P89A	16-bit integer	degrees	NumberOfScans × 486
12	EarthAzimuth_P89B	16-bit integer	degrees	NumberOfScans × 486
13	EarthIncidence_P89A	16-bit integer	degrees	NumberOfScans × 486
14	EarthIncidence_P89B	16-bit integer	degrees	NumberOfScans × 486
15	ScanTimeUTC	16-bit integer	{Year, Month, Day, Hour, Minute, Second, Millisecond}	NumberOfScans × 7
16	PositionInOrbit	64-bit floating-point	-	NumberOfScans

※Refer to Table 4.2-2.

When storing multiple data, additional data sets with names that increase the number after "Data", such as Data1_P89o, Data2_P89o, Data3_P89o, are stored.

3.3 Description of Data Items

The structure of each item that makes up the data section is shown in Figure 3.3-1 to 3.3-5.

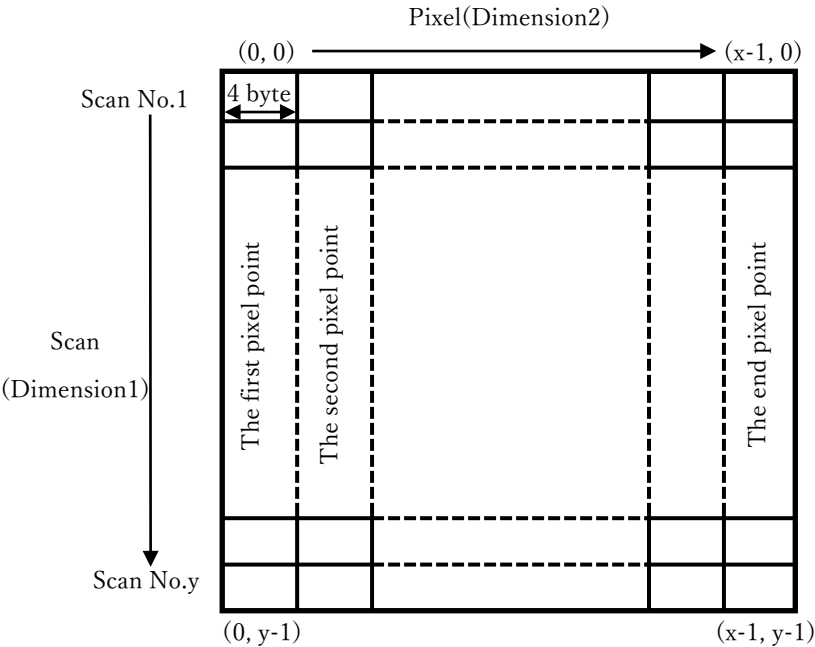


Figure 3.3-1 Structure of Data<n>_P89o, Latitude_P89o, Longitude_P89o($x=243[\text{pix}]$) and Structure of Data<n>_P89A(B), Latitude_P89A(B), Longitude_P89A(B) ($x=486[\text{pix}]$)

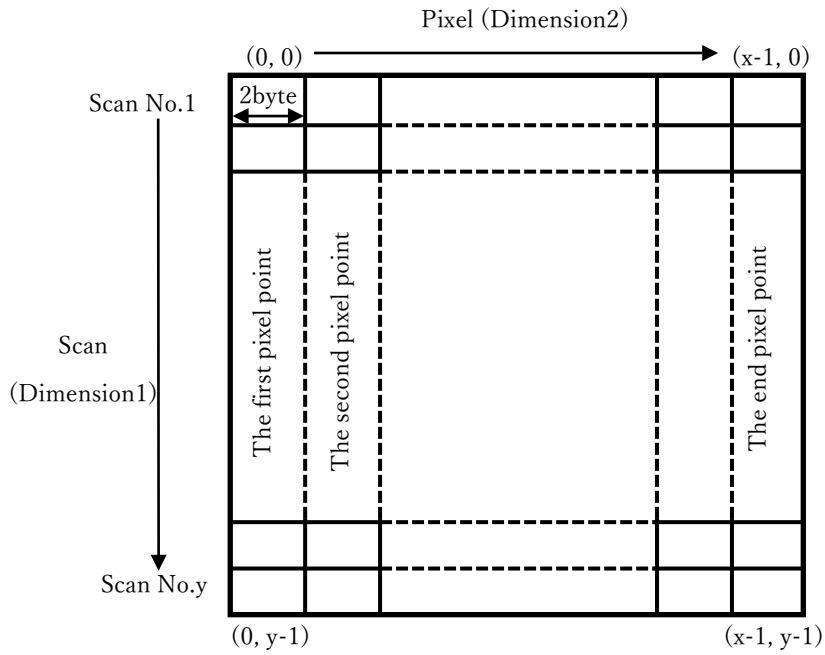


Figure 3.3-2 Structure of EarthAzimuth_P89o, EarthIncidence_P89o(x=243[pix]) and Structure of EarthAzimuth_P89A(B), EarthIncidence_P89A(B) (x=486[pix])

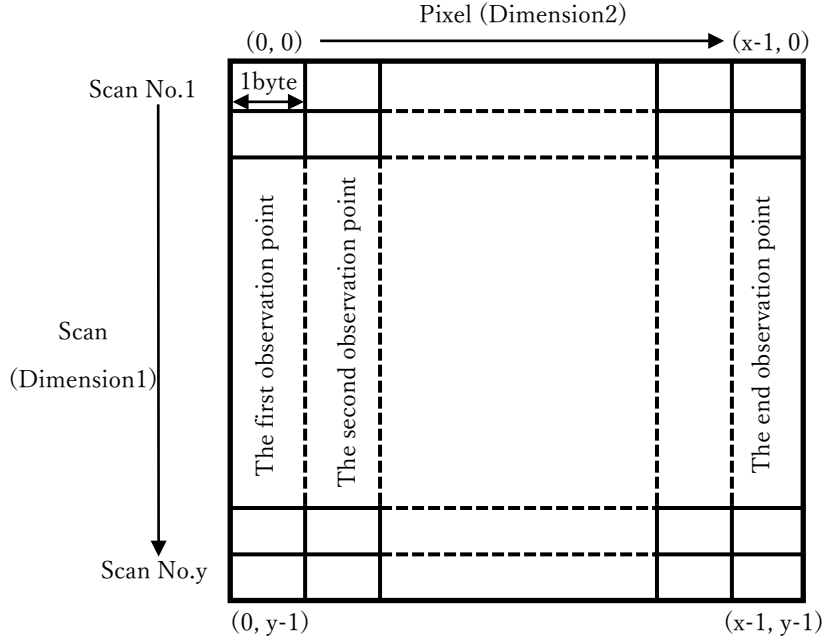


Figure 3.3-3 Structure of Data<n>_P89o_Quality, LandAreaPercent_P89o (x=243[pix]) and Data<n>_P89A(B)_Quality, LandAreaPercent_P89A(B) (x=486[pix])

3.4 Others

3.4.1 Granule ID

The filename of the AMSR3 Level 2 product is the granule ID with the extension ".nc" added. The convention for the granule ID is shown below.

```

      - - - - + - - - - 1 - - - - + - - - - 2 - - - - + - - - - 3 - - - - + - - - - 4 -
Character 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
position
FileName G G W A M 3 _ Y Y Y Y M M D D H H m m X P P P _ x L L K K K A A d V V v y y d d d
sample   G G W A M 3 _ 2 0 2 3 0 9 0 7 1 2 1 6 D 0 6 8 _ S 2 M S S T G 0 A 0 1 A 2 3 2 5 0

```

Table 3.4-1 Level 2 Product File Naming Convention

String	Character position	Description
GGW	1-3	Satellite name (fixed to GGW)
AM3	4-6	Sensor type (fixed to AM3)
YYYYMMDDHHmm	8-19	Start date and time of statistical period (year in AD, time in UT)
X	20	Orbit A: Ascending orbit D: Descending orbit B: Both
PPP	21-23	Path number (001-044, path number at start)
x	25	Processing type S: Standard product/standard processing (global) N: Standard product/near real-time processing (global) L: Standard product/near real-time processing (local) R: Research product/standard processing (global) Q: Research product/near real-time processing (global) P: Research product/near real-time processing (local)
LL	26-27	Processing level and observation point code 2M: Calculated at low frequency (36.42GHz or below) or 89.0GHz odd points (starting from 1) 2H: Calculated at 89.0GHz-A and 89.0GHz-B observation points

String	Character position	Description
KKK	28-30	Product code: Refer to Table 3.4-2
AA	31-32	Area/Reception code 【Global processing】 GA: Global, GO: Global Ocean, GL: Global Land, PO: Polar Ocean 【Local processing】 J0: All of Japan (received at Katsuura and Okinawa (Masuda) stations) J1: Eastern Japan (received only at Katsuura station) J2: Western Japan (received only at Okinawa (Masuda) station) 00: Default (no reception station code)
d	33	Developer code A-X
VV	34-35	Major version number (00-99) Updated when significant changes are made, such as recalibration of brightness temperature, changes in input data, revisions of algorithms, etc. When updating the major version, past products are reprocessed.
v	36	Minor version number (A-Z) Updated when minor changes are made within the range that compatibility with current existing products can be maintained. In principle, past products are not reprocessed when updating the minor version.
yyddd	37-41	Creation date yy: last two digits of the year ddd: day of the year

Figure 3.4-2 Level 2 Product Code

Code	Name (English)	Name (Japanese)
TPW	Total Precipitable Water	Total Water Vapor Amount
CLW	Could Liquid Water Content	Total Cloud Water Amount
PRC	Precipitation	Precipitation Amount
SST	Sea Surface Temperature	Sea Surface Temperature
SSW	Sea Surface Wind Speed	Sea Surface Wind Speed
ASW	All-weather Sea Surface Wind Speed	All-Weather Sea Surface Wind Speed
SIC	Sea Ice Concentration	Sea Ice Concentration
HSI	High-resolution Sea Ice Concentration	High Resolution Sea Ice Concentration
SMC	Soil Moisture Content	Soil Moisture Content
SND	Snow Depth	Snow Depth
HST	High-resolution Sea Surface Temperature	High Resolution Sea Surface Temperature

3.4.2 Projection Method

In AMSR3 products, the items related to location are the observation position (latitude, longitude) and the satellite's orbit information. The observation position is stored in the Greenwich coordinate system (Earth-fixed coordinate system), with values of 0° to 180° for east longitude, -180° to 0° for west longitude, 0° to 90° for north latitude, and -90° to 0° for south latitude. The Earth model used for geometric correction in position calculation is WGS84.

3.4.3 Dummy Data

In Level 2 processing, there may be cases where physical quantities are not calculated due to reasons such as brightness temperature anomalies in Level 1 products, packet loss, and areas not subject to calculation (for example, since the calculation target area for SST is the sea, calculation is not performed for land areas).

-9999.0 : Points where physical quantities are not calculated within the swath

-9998.0 : Points within the swath but outside the observation target area

3.4.4 Scale Factor and Offset

The data in AMSR3 products use scale factors and offsets for data such as floating-point numbers to reduce data volume. The values of the scale factor and offset can be referred to in the attributes `scale_factor` and `add_offset` of each data set.

4. Data Description

4.1 Product Metadata

The following explains the items of product metadata for the AMSR3 Level 2 product.

(1) Conventions

The common format convention adheres to the CF and ACDD standards, which are set as fixed values. This convention is revised in accordance with updates to the CF Convention and ACDD, applying the latest versions of the CF Convention and ACDD.

(2) title

It indicates the product name.

(3) institution

It indicates the name of the organization that created the product, setting it as "Japan Aerospace Exploration Agency (JAXA)".

(4) project

It indicates the name of the project that created the product, setting it as "JAXA GOSAT-GW Project".

(5) summary

It provides a summary of the file name.

(6) license

It indicates the rights and usage conditions of the data.

(7) creator_name

It indicates the name of the organization that created the product, setting it as "Japan Aerospace Exploration Agency (JAXA)".

(8) creator_type

It indicates the type of entity that created the product, setting it as "institution".

(9) creator_email

It indicates the contact email of the entity that created the product.

(10)creator_url

It indicates the URL of the website of the entity that created the product.

(11)keywords

It indicates keywords that represent the contents of the file.

(12)standard_names_vocabulary

Set the "CF Standard Name Table", which is a glossary that cites the standard_name.

(13)id

Indicates the granule ID. Refer to section 3.4.1 for the granule ID.

(14)naming_authority

Indicates the name of the organization providing the product, setting it as "jp.jaxa".

(15)source

Set the method by which the data was generated. If it is observational data, set a description that characterizes the observation, and if it is data made from some model, set the model name and version.

(16)processing_level

Indicates the processing level of the product. In the case of Level 2, set it as "Level 2".

(17)comment

Set comments about the product as needed.

(18)date_created

Indicate the product creation date and time (UTC) in the following format.

「YYYY-MM-DDThh:mm:ss.uuuZ」

YYYY: AD

MM: 01-12 (month)

DD: 01-31 (day)

hh: 00-23 (hour)

mm: 00-59 (minute)

ss: 00-59 (second) (※may be 60 when a leap second occurs)

uuu: 000-999 (millisecond)

(19)time_coverage_start

Indicates the start date of the product's observation (UTC). The format is the same as

(18) date_created.

(20)time_coverage_end

Indicates the end date of the product's observation (UTC). The format is the same as (18) date_created.

(21)geospatial_lat_min, geospatial_lat_max, geospatial_lon_min, geospatial_lon_max

Set the missing value (-9999.0), regardless of whether it is a standard product or a quasi-real-time product.

(22)geospatial_vertical_min, geospatial_vertical_max

Set the missing value (-9999.0) for this item.

(23)geospatial_vertical_positive

Leave this item blank.

(24) geospatial_bounds

It indicates a two-dimensional spatial range represented in the Well-Known Text (WKT) Geometry format of the OGC.

The polygon defining the location information of the observation data area is set in latitude and longitude (deg) counterclockwise, with 26 points on each side (including the four corners) in the scan direction and 11 points on each side (including the four corners) in the pixel direction. The latitude and longitude correspond to the center position of the 89GHz A scan surface scan. Using the relationship between the product data position and the polygon shown in Figure 4.1-1, it is set in the following format.

```
"POLYGON ((longitude latitude of POLYGON[0], longitude latitude of POLYGON[1], longitude latitude of POLYGON[2], longitude latitude of POLYGON[3], longitude latitude of POLYGON[4], ..., longitude latitude of POLYGON[70]))"
```

Specified pixel																					
1		50		98		147		195		244		292		341		389		438		486	
指定ライン	L	P0, P70	P69	P68	P67	P66	P65	P64	P63	P62	P61	P60									
	L + round(N × 0.0075)	P1																		P59	
	L + round(N × 0.0150)	P2																		P58	
	L + round(N × 0.0225)	P3																		P57	
	L + round(N × 0.0300)	P4																		P56	
	L + round(N × 0.0375)	P5																		P55	
	L + round(N × 0.0450)	P6																		P54	
	L + round(N × 0.0950)	P7																		P53	
	L + round(N × 0.1450)	P8																		P52	
	L + round(N × 0.1950)	P9																		P51	
	L + round(N × 0.2700)	P10																		P50	
	L + round(N × 0.3450)	P11																		P49	
	L + round(N × 0.4200)	P12																		P48	
		~																			~
	L + round(N × 0.5800)	P13																			P47
	L + round(N × 0.6550)	P14																			P46
	L + round(N × 0.7300)	P15																			P45
	L + round(N × 0.8050)	P16																			P44
	L + round(N × 0.8550)	P17																			P43
	L + round(N × 0.9050)	P18																			P42
	L + round(N × 0.9550)	P19																			P41
	L + round(N × 0.9625)	P20																			P40
	L + round(N × 0.9700)	P21																			P39
	L + round(N × 0.9775)	P22																			P38
	L + round(N × 0.9850)	P23																			P37
	L + round(N × 0.9925)	P24																			P36
	M	P25	P26	P27	P28	P29	P30	P31	P32	P33	P34	P35									

L: The first scan number in the product where valid latitude and longitude are stored

M: The last scan number where valid latitude and longitude are stored

Figure 4.1-1 Relationship of data positions within the product

- (25)geospatial_bounds_crs
Set the Coordinate Reference System (CRS) of the point coordinates in the geospatial_bounds attribute as a fixed value "EPSG:4326".
- (26)geospatial_vertical_bounds_crs
Leave this item blank.
- (27)language
language Indicate the language used, set to "en".
- (28)topicCategory
Set the most appropriate field from the ISO19115 subject code table. If selecting multiple, separate the codes with commas.
- (29)Role
Set the ISO19115 role code 003 (owner of the information).
- (30)history
Indicate the file modification history.
- (31)characterSet
Set the ISO-19115 character code 004 (utf8).
- (32)acknowledgement
Indicate supplementary information about the project.
- (33)publisher_name
publisher_name Indicate the person responsible for data publication, set to "JAXA GOSAT-GW Project".
- (34)publisher_email
Indicate the email address of the person responsible for data publication, set to "z-gportal-support@ml.jaxa.jp".
- (35)publisher_url
Indicate the website URL of the person responsible for data publication, set to "https://gportal.jaxa.jp/gpr/index/index?lang=en".
- (36)DOI
Indicate the Digital Object Identifier to be assigned to the product.
- (37)DOIauthority
Indicate the URL of the IDF (International DOI Foundation) that operates the DOI, set to "http://doi.org/".
- (38)AlgorithmDeveloper
Set the algorithm developer code as the algorithm developer name
- (39)AlgorithmVersion
Indicate the algorithm version.

(40)AncillaryDataInformation

Indicate the ancillary data information used in Level 2 processing.

(41)AutomaticQAFlag

Indicate the automatic inspection results of data processing in product creation. The automatic inspection in data processing is judged based on the criteria indicated in AutomaticQAFlagExplanation, and the following fixed values are set as results.

However, when the L1 AutomaticQAflag is "Fair", the L2 AutomaticQAflag shall be either "Fair" or "NG".

When the L1 AutomaticQAflag is "NG", the L2 AutomaticQAflag shall be "NG".
In other words, the L2 AutomaticQAflag shall not exceed the L1 AutomaticQAflag.

Item	Set Value	Explanation
AutomaticQAFlag	Good	The number of valid data is 80% or more of the target area pixel count.
	Fair	The number of valid data is less than 80% of the target area pixel count.
	NG	The number of valid data or the target area pixel count is 0.

(42)AutomaticQAFlagExplanation

Indicate the judgment formula and criteria for AutomaticQAFlag.

$p(\text{pixel count of the target area}) = \text{NumberOfPixelsAll} - \text{NumberOfPixelsOutsideArea}$,

$a(\text{valid data rate}) = \text{NumberOfPixelsRetrieved} / p * 100 (\%)$;

Good: $p > 0$ and $a \geq 80\%$;

Fair: $p > 0$ and $a > 0\%$ and $a < 80\%$;

NG: $p = 0$ or $\text{NumberOfPixelsRetrieved} = 0$;

(43)ContactOrganizationEmail

Indicate the contact email address and set it to "z-gportal-support@ml.jaxa.jp".

(44)ContactOrganizationName

Indicate the contact organization name and set it to "Japan Aerospace Exploration Agency (JAXA)".

(45)DataCode

Indicate the data code corresponding to the stored data, separated by semicolons.

(46)DataDatasetName

Indicate the stored Data set name, separated by semicolons.

(47)DataDynamicRange

Set the measurement range for each product. If there are multiple layers, set the measurement range for the first layer of the data set.

(48)DataLongName

Indicate the name of the data to be stored, separated by semicolons.

(49)DataNumber

Indicate the number of data sets to be stored.

(50)DataType

Indicate the type of data set to be stored, separated by semicolons if there are multiple.

(51)EarthEllipsoidName, EarthFlatteningRatio, EarthSemiMajorAxis

Indicate the definition of the Earth ellipsoid used in the AMSR3 data processing software.

Item	Content	Setting Value
EarthEllipsoidName	Earth Ellipsoid Model	WGS84
EarthSemiMajorAxis	Equatorial Radius	6378.1km
EarthFlatteningRatio	Flattening Ratio	0.00335

(52)FileFormatType

Set the format type to "NetCDF-4/HDF5 File Format".

(53)FileFormatVersionHDF

Indicate the HDF5 format version.

(54)FileFormatVersionNC

Indicate the NetCDF-4 format version.

(55)FileSizeByte

Indicate the product size (unit: Byte). Since the product size is calculated before all product metadata is set, there may be a difference from the actual size.

(56)GranuleID

Indicate the granule ID. For the granule ID, refer to section 3.4.1.

(57)GringPointLatitude, GringPointLongitude

Set the same points as (24) geospatial_bounds separately for latitude and longitude, separated by commas.

(58)InputFileName

Indicate the input file name. If there are multiple input files, set them separated by commas.

(59)MeteorologicalDataType

Indicate the type of meteorological data used.

Item	Format
MeteorologicalDataType	Analysis : Global objective analysis value Forecast : Global forecast value Blank : Not used

(60)NumberOfAntennaRotationAnomalyScans

Indicate the number of abnormal scans due to antenna rotation speed.

(61)NumberOfAttitudeAnomalyScans

Indicate the number of abnormal scans due to attitude angle and attitude angle error.

(62)NumberOfGeometricErrorPixels

Indicate the number of geometric information errors (counted independently for each channel, observation point).

(63)NumberOfHTSAnomalyScans

Indicate the number of abnormal scans due to high temperature calibration source temperature.

(64)NumberOfInputFiles

Indicate the number of Level 1 data files. This should match the number of file names stored in InputFileName.

(65)NumberOfMissingPackets

Indicate the number of missing packets in the product.

(66)NumberOfMissingScans

Indicate the number of missing scans in the observation data.

(67)NumberOfOrbitAnomalyScans

Indicate the number of abnormal scans due to orbit position and speed.

(68)NumberOfTbLimitErrorPixels

Indicate the number of limit check errors (counted independently for each channel, observation point).

(69)NumberOfPackets

Indicate the total number of packets in the product. The total number of packets is calculated as NumberOfScan x 16.

(70)NumberOfParityError

Indicate the number of parity errors.

(71)NumberOfPixelsAll

Indicate the total number of pixels.

(72)NumberOfPixelsOutsideArea

Indicate the number of pixels outside the area for physical quantity calculation.

(73)NumberOfPixelsPerScan

1 Indicate the number of pixels per scan.

(74)NumberOfPixelsRetrieved

Indicate the number of pixels with valid values stored in the target area as the number of valid data. If there are multiple physical quantities, it is counted if data is stored for at least one of them.

(75)NumberOfPixelsRetrievedEachDS

Indicate the number of valid data for each stored data set.

(76)NumberOfScans

Indicate the number of scans excluding overlap scans.

(77)NumberOfScansOverlap

Indicate the number of overlap scans (one side).

(78)ObservationEndTime

Indicate the observation end date and time (UTC) of the data stored in the product. The format is the same as (18) date_created.

(79)ObservationEquatorCrossingDateTime

Indicate the time (UTC) when the satellite passed the equator. The format is the same as (18) date_created.

(80)ObservationEquatorCrossingLongitude

Indicate the longitude at which the satellite passed the equator. However, for products that pass the equator more than twice in the quasi-real-time product (Global), set the longitude at the first pass. Even if there is a missing equator crossing timing, set the interpolated value. However, if the equator is not crossed, leave it blank.

(81)ObservationStartTime

Set the observation start date and time (UTC) of the data stored in the product in the following format. The format is the same as (18) date_created.

(82)OrbitArgumentPerigee

Indicate the argument of perigee of the satellite.

(83)OrbitDataFileName

Indicate the name of the orbit data file used for processing. If the orbit data file was not used, leave it blank. If there are multiple inputs, set the file names separated by commas.

(84)OrbitDataType

Indicate the orbit data type and set "ONBOARD".

(85)OrbitDirection

Indicate the orbit direction corresponding to the observation range of the product. If

the ascending and descending directions are not constant in the quasi-real-time product (Global), set the orbit direction at the start.

Ascending: Ascending direction

Descending: Descending direction

(86) OrbitEccentricity

Indicate the satellite orbit eccentricity and set "Frozen".

(87) OrbitInclination

Indicate the orbit inclination and set "98.06deg".

(88) OrbitNumberEnd, OrbitNumberStart

Indicate the satellite's orbit number at the first and last scan positions of the product.

The orbit number is a serial number from the GOSAT-GW launch.

(89) OrbitPeriod

Indicate the satellite period and set "98.2min".

(90) OrbitSemiMajorAxis

Indicate the satellite's orbit semi-major axis and set "7035.552km".

(91) ParameterVersion

Indicate the version of the parameter.

(92) PathNumber

Set the path number. In the case of quasi-real-time products, set the path number at the start.

(93) PGENAME

Indicate the name of the data processing software and set "GOSAT-GW Mission Operation System".

(94) PlatformShortName

Set the satellite name as "GOSAT-GW".

(95) ProcessingCenter

Set the data processing station as "JAXA GOSAT-GW Project".

(96) ProcessingQAAttribute

As quality information for the processed data, indicate the setting values corresponding to the following abnormal occurrences. If no abnormality has occurred, leave it blank.

Setting value	Abnormality judgment criterion
AntennaRotationAnomaly	NumberOfAntennaRotationAnomalyScans is 1 or more.
AttitudeAnomaly	NumberOfAttitudeAnomalyScans is 1 or more.
GeometricError	NumberOfGeometricErrorPixels is 1 or more.
HTSAnomaly	NumberOfHTSAnomalyScans is 1 or more.
MissingPackets	NumberOfMissingPackets is 1 or more.
MissingScans	NumberOfMissingScan is 1 or more.
OrbitAnomaly	NumberOfOrbitAnomalyScan is 1 or more.
TbLimitError	NumberOfTbLimitErrorPixel is 1 or more.
ParityError	NumberOfParityError is 1 or more.

(97) ProcessingQADescription

Always left blank.

(98) ProductCreationDateTime

Set the product creation date and time (UTC) in the following format. The format is the same as (18) date_created.

(99) ProductName

Indicate the sensor name, processing level, and product code, and set "AMSR3 L2 XXX" (XXX: product code).

(100) ProductProcessingType

Indicate the type of processing and set one of the following unique values.

【Standard Processing】

Standard product (Global)

【Global Near Real Time Processing】

Standard product (Near real time processing, Global)

【Local Near Real Time Processing】

Standard product (Near real time processing, Local)

(101) ProductSupplement

Indicate the supplementary information of the product.

(102) ProductVersion

Indicate the version of the product.

(103) QALocationOfPacketDiscontinuity

Indicate the continuity or discontinuity of the Packet Sequence Counter.

Item	Setting Value	Explanation
QALocationOfPacketDiscontinuity	Continuation	Continuous
	Discontinuation	Discontinuous

(104) QAPercentMissingData

Indicate the percentage of missing data in all observation data in the product.

Item	Minimum Value	Maximum Value	Abnormal Value
QAPercentMissingData	0.0	100.0	-9999.0

(105) SatelliteAltitude, SatelliteOrbit, SatelliteRevisitTime

Indicate the specifications of the satellite (GOSAT-GW).

Item	Contents	Setting Value
SatelliteOrbit	Satellite Orbit	Sun-synchronous_sub-recurrent
SatelliteAltitude	Satellite Altitude	665.96km
SatelliteRevisitTime	Revisit Days	3days

(106) SensorAlignment

Indicate the sensor alignment.

Item	Setting Value
SensorAlignment	Rx=-0.044000,Ry=-0.004000,Rz=0.015000

(107) SensorAntRotationVelocity

Indicate the actual measured value of the tachopulse rotation speed.

(108) SensorFOV

Indicate the spatial resolution ($Az \times El$). The spatial resolution for each frequency band is as follows.

Item	Frequency band	Setting Value
SensorFOV	6.925GHz	33km $\times$ 57km
	7.3GHz	33km $\times$ 57km
	10.25GHz	22km $\times$ 38km
	10.65GHz	22km $\times$ 38km
	18.7GHz	12km $\times$ 21km
	23.8GHz	14km $\times$ 24km
	36.42GHz	6km $\times$ 11km
	89.0GHz-A	3km $\times$ 5km
	89.0GHz-B	3km $\times$ 5km
	165.5GHz	5km $\times$ 10km
	183.31 $\pm$ 3GHz	5km $\times$ 9km
	183.31 $\pm$ 7GHz	5km $\times$ 9km

(109) SensorOffNadir

Indicate the off-nadir angle.

Item	CH	Setting Value
SensorOffNadir	Except 89GHz-B	47.5deg
	89GHz-B	47.0deg

(110) SensorScanningPeriod

Indicate the scanning cycle and set it to "1.5sec".

(111) SensorShortName

Indicate the name of the observation sensor and set it to "AMSR3".

(112) SensorSwathWidth

Indicate the Swath width and set it to "1535km".

4.2 Data Part (Medium Resolution Sampling)

Explain the items in the data part of the AMSR3 Level 2 product (medium resolution sampling).

(1) Data1_P89o

The physical quantity data calculated by Level 2 processing is stored. If multiple data are stored, they are assigned numbers after "Data", such as Data1_P89o, Data2_P89o, Data3_P89o. The data codes stored in each product are as shown in Table 4.2-1.

Table 4.2-1 List of Stored Data (Medium Resolution Sampling)

Product Code	Data1	Data2	Data3
TPW	TPW_Ocean	TPW_Land	-
CLW	CLW	-	-
SSW	SSW	-	-
SST	SST_6G	SST_10G	SST_Multi
SIC	SIC	-	-
SND	SND	SND_SWE: Snow Water Equivalent	
SMC	SMC	-	-
ASW	ASW	-	-

The minimum, maximum, and unit of each data are as shown in Table 4.2-2.

Table 4.2-2 Minimum, Maximum, and Unit of Stored Data
(Medium Resolution Sampling)

Data Code	Data Name	Minimum Value	Maximum Value	Unit
TPW_(Ocean/Land)	Total Precipitable Water over (Ocean/Land)	0	10000	kg/m ²
CLW	Cloud Liquid Water Content	0	10000	kg/m ²
PRC_PrecipRate	Precipitation Rate	0	10000	mm/h
PRC_SnowProb	Snow Probability	0	100	%
SSW	Sea Surface Wind Speed	0	10000	m/s

Data Code	Data Name	Minimum Value	Maximum Value	Unit
SST_(6G/10G/Multi)	(6GHz/10GHz/Multi-band) Sea Surface Temperature	-100	100	degree_Celsius
SIC	Sea Ice Concentration	0	100	%
SND	Snow Depth	0	10000	cm
SND_SWE	Snow Water Equivalent	0	10000	mm
SMC	Soil Moisture Content	0	100	%
ASW	All-weather Sea Surface Wind Speed	0	10000	m/s

Also, set the following information in the attributes of the data set.

Item	Setting Value	Explanation
product_code	Product Code	Indicate the product code.
DataCode	Data Code	Indicate the data code.
long_name	Data Name	Indicate the data name.
standard_name	In the case of SST "sea_surface_temperature"	Set the name selected from the CF Convention's standard name table.
units	Unit	Indicate the unit.
valid_min	Minimum Value	Indicate the minimum value.
valid_max	Maximum Value	Indicate the maximum value.
scale_factor	Scale Factor	Indicate the scale factor.
add_offset	Offset	Indicate the offset.
coordinates	Latitude_P89o Longitude_P89o	Set "Latitude_P89o Longitude_P89o".
cell_methods	point	For L2 products, set "point".

(2) Data1_P89o_Quality

Store the quality of calculated physical quantity data for each observation point.

When storing multiple data, not necessarily corresponding to each stored data, an arbitrary number of data sets are added. The name of the data set at that time is increased to any number after "Data".

The set values of each physical quantity data are shown in Appendix 1. Also, set the following information in the attributes of the data set.

Item	Setting Value	Explanation
long_name	<Data Name> (P89o, Quality)	Indicate the quality data name. Set the long_name of Data1 in.
standard_name	quality_flag	Set the name selected from the CF Convention's standard name table.
units	Blank	Leave it blank.
_FillValue	255	Indicate the missing value.
coordinates	Latitude_P89o Longitude_P89o	Set "Latitude_P89o Longitude_P89o".
flag_values*	Refer to Appendix 1	List all the values that data elements in the data set can take in the attribute flag_values (an array of integers).
flag_meanings	Refer to Appendix 1	Describe flag_values for each item, separated by spaces.
cell_methods	point	Set "point".

(3) Latitude_P89o

Store the latitude corresponding to the ground observation point of the ground observation data. The number of observation data for one scan is 243 points.

Set the following information in the attributes of the dataset.

Item	Setting Value	Explanation
long_name	latitude	Define as latitude.
standard_name	latitude	Set the name selected from the CF Convention's standard name table.
units	degrees_north	Indicate the unit.
_FillValue	-9999.0	Indicate the missing value.
scale_factor	1.0	Indicate the scale factor.
add_offset	0.0	Indicate the offset.
cell_methods	point	Set "point".

(4) Longitude_P89o

Store the longitude corresponding to the ground observation point of the ground observation data. The number of observation data for one scan is 243 points.

Set the following information in the attributes of the dataset.

Item	Setting Value	Explanation
long_name	longitude	Define as latitude.
standard_name	longitude	Set the name selected from the CF Convention's standard name table.
units	degrees_east	Indicate the unit.
_FillValue	-9999.0	Indicate the missing value.
scale_factor	1.0	Indicate the scale factor.
add_offset	0.0	Indicate the offset.
cell_methods	point	Set "point".

(5) LandAreaPercent_P89o

Store the proportion (%) of land corresponding to the ground observation point of the ground observation data. The number of observation data for one scan is 243 points.

Set the following information in the attributes of the dataset.

Item	Setting Value	Explanation
long_name	Land Area Percent (P89o)	Define as the proportion of land.
standard_name	land_area_fraction	Set the name selected from the CF Convention's standard name table.
units	%	Indicate the unit.
_FillValue	255	Indicate the missing value.
scale_factor	1.0	Indicate the scale factor.
add_offset	0.0	Indicate the offset.
coordinates	Latitude_P89o Longitude_P89o	Set "Latitude_P89o Longitude_P89o".
cell_methods	point	Set "point".

(6) EarthAzimuth_P89o

Store the ground azimuth angle corresponding to the ground observation point of the ground observation data. The number of observation data for one scan is 243 points.

Set the following information in the attributes of the dataset.

Item	Setting Value	Explanation
long_name	Earth Azimuth Angle (P89o)	Define as azimuth angle.
standard_name	sensor_azimuth_angle	Set the name selected from the CF Convention's standard name table.
units	degrees	Indicate the unit.
_FillValue	-32768	Indicate the missing value.
scale_factor	0.01	Indicate the scale factor.
add_offset	0.0	Indicate the offset.
coordinates	Latitude_P89o Longitude_P89o	Set "Latitude_P89o Longitude_P89o".
cell_methods	point	Set "point".

(7) EarthIncidence_P89o

Store the ground incidence angle corresponding to the ground observation point of the ground observation data. The number of observation data for one scan is 243 points.

Also, set the following information in the attributes of the dataset.

Item	Setting Value	Explanation
long_name	Earth Incidence Angle (P89o)	Define as incidence angle.
standard_name	sensor_incidence_angle	Set the name selected from the CF Convention's standard name table.
units	degrees	Indicate the unit.
_FillValue	-32768	Indicate the missing value.
scale_factor	0.01	Indicate the scale factor.
add_offset	0.0	Indicate the offset.
coordinates	Latitude_P89o Longitude_P89o	Set "Latitude_P89o Longitude_P89o".
cell_methods	point	Set "point".

(8) ScanTimeUTC

The time of the observation start position of the 89GHzA scan in each scan is stored.

The storage position in the dataset is as follows.

Storage position (0 origin)	Item
0	Year
1	Month
2	Day
3	hour
4	Minute
5	Second
6	Millisecond

Also, set the following information in the attributes of the dataset.

Item	Setting Value	Explanation
long_name	Scan Time (UTC)	Define as scan time.
standard_name	Blank	Leave it blank.
units	year, month, day, hour, minute, second, milli_second	Indicate the unit.
_FillValue	-32768	Indicate the missing value.
scale_factor	1.0	Indicate the scale factor.
add_offset	0.0	Indicate the offset.
cell_methods	point	Set "point".

(9) PositionInOrbit

Store the position on the satellite orbit. The position of the satellite is determined by the orbit number and the position from the ascending node. For details, refer to the "GOSAT-GW/AMSR3 Level 1 Product Format Description".

Set the following information in the attributes of the dataset.

Item	Setting Value	Explanation
long_name	Position in Orbit	Define as "Position in Orbit ".
standard_name	Blank	Leave it blank.
units	Blank	Leave it blank.
_FillValue	-9999.0	Indicate the missing value.
scale_factor	1.0	Indicate the scale factor.
add_offset	0.0	Indicate the offset.
coordinates	Blank	Leave it blank.
cell_methods	point	Set "point".

4.3 Data Part (High Resolution Sampling)

This explains the items in the data section (high-resolution sampling) of the AMSR3 Level 2 product.

(1) Data1_P89A

Each physical quantity data calculated by Level 2 processing using 89GHz A horn data as input is stored. If multiple data are stored, they are assigned numbers after "Data", such as Data1_P89A, Data2_P89A, Data3_P89A. The data codes stored in each product are as shown in Table 4.3-1.

Table 4.3-1 List of stored data (high-resolution sampling)

Product code	Data1	Data2
PRC	PRC_PrecipRate : Precipitation intensity	PRC_SnowProb : Snowfall probability
HST	HST_10G	HST_6G
HSI	HSI	-

The minimum and maximum values and units of each stored data are as shown in Table 4.3-2.

Table 4.3-2 Minimum, maximum values, and units of stored data (high-resolution sampling)

Data code	Data name	Minimum value	Maximum value	Unit
PRC_PrecipRate	Precipitation Rate	0.0	10000	mm/h
PRC_SnowProb	Snow Probability	0.0	100	%
HST_(10G/6G)	High-resolution Sea Surface Temperature /6GHz High-resolution Sea Surface Temperature	-100	100	°C
HSI	High-resolution Sea Ice Concentration	0	100	%

Also, set the following information in the attributes of the dataset.

Item	Setting Value	Explanation
product_code	Product code	Indicates the product code.
DataCode	Data code	Indicates the data code.
long_name	Data name	Indicates the data name.
standard_name	In the case of HST: "sea_surface_temperature"	Set the name selected from the CF Convention's standard name table. Unit: Indicates the unit.
units	unit	Indicates the unit
valid_min	Minimum value	Indicates the minimum value.
valid_max	Maximum value	Indicates the scale factor.
scale_factor	Scale factor	Indicates the scale factor.
add_offset	Offset	Indicates the offset.
coordinates	Latitude_P89A Longitude_P89A	Set "Latitude_P89A Longitude_P89A".
cell_methods	point	Set "point" for L2 products.

(2) Data1_P89B

Each physical quantity data calculated by Level 2 processing using 89GHz B horn data as input is stored. If multiple data are stored, they are assigned numbers after "Data", such as Data1_P89B, Data2_P89B, Data3_P89B. The data range, missing values, units, and attributes of the stored data are the same as Data1_P89A.

(3) Data1_P89A_Quality

The quality of the calculated physical quantity data for each observation point is stored. When storing multiple data, not necessarily corresponding to each stored data, an arbitrary number of datasets are added. The name of the dataset at that time is increased to any number after "Data". The attributes stored in the dataset are the same as the medium-resolution sampling Data1_P89o_Quality.

(4) Data1_P89B_Quality

The quality of the calculated physical quantity data for each observation point is stored. When storing multiple data, not necessarily corresponding to each stored data, an arbitrary number of datasets are added. The name of the dataset at that time is increased to any number after "Data". The attributes stored in the dataset are the same as the medium-resolution sampling Data1_P89o_Quality.

(5) Latitude_P89A

The latitude corresponding to the ground observation point of the 89GHz A horn is stored. The attributes stored in the dataset are the same as the medium-resolution sampling Latitude_P89o.

(6) Latitude_P89B

The latitude corresponding to the ground observation point of the 89GHz B horn is stored. The attributes stored in the dataset are the same as the medium-resolution sampling Latitude_P89o.

(7) Longitude_P89A

The longitude corresponding to the ground observation point of the 89GHz A horn is stored. The attributes stored in the dataset are the same as the medium-resolution sampling Longitude_P89o.

(8) Longitude_P89B

The longitude corresponding to the ground observation point of the 89GHz B horn is stored. The attributes stored in the dataset are the same as the medium-resolution sampling Longitude_P89o.

(9) LandAreaPercent_P89A

The percentage of land area (%) corresponding to the ground observation point of the 89GHz A horn is stored. The attributes stored in the dataset are the same as the medium-resolution sampling LandAreaPercent_P89o.

(10) LandAreaPercent_P89B

The percentage of land area (%) corresponding to the ground observation point of the 89GHz B horn is stored. The attributes stored in the dataset are the same as the medium-resolution sampling LandAreaPercent_P89o.

(11) EarthAzimuth_P89A

The earth azimuth angle corresponding to the ground observation point of the 89GHz A horn is stored. The attributes stored in the dataset are the same as the medium-resolution sampling EarthAzimuth_P89o.

(12) EarthAzimuth_P89B

The earth azimuth angle corresponding to the ground observation point of the 89GHz B horn is stored. The attributes stored in the dataset are the same as the medium-resolution sampling EarthAzimuth_P89o.

(13) EarthIncidence_P89A

The earth incident angle corresponding to the ground observation point of the 89GHz A horn is stored. The attributes stored in the dataset are the same as the medium-resolution sampling EarthIncidence_P89o.

(14) EarthIncidence_P89B

The earth incident angle corresponding to the ground observation point of the 89GHz B horn is stored. The attributes stored in the dataset are the same as the medium-resolution sampling EarthIncidence_P89o.

(15) ScanTimeUTC

The time of the observation start position of the 89GHz A scan in each scan is stored. The attributes stored in the dataset are the same as the medium-resolution sampling ScanTimeUTC.

(16) PositionInOrbit

The position on the satellite orbit is stored. The position of the satellite is determined by the orbit revolution number and the position from the ascending node. For details, refer to the "GOSAT-GW/AMSR3 Level 1 Product Format Description". The attributes stored in the dataset are the same as the medium-resolution sampling PositionInOrbit.

Appendix 1 Data Quality of Each Physical Quantity Data

(1) TPW_Ocean

flag_values	flag_meanings
0	Good.clear_sky
1	Good.cloud
2	Good.light_rain
128	NoData.heavy_rain
129	NoData.abnormal_calculation_of_TPW
130	NoData.abnormal_calculation_of_sea_surface_emissivity
131	NoData.invalid_retrieval_of_sea_ice
132	NoData.sea_ice
133	NoData.land
134	NoData.invalid_retrieval_or_RFI
161	NoData.invalid_L1
163	NoData.L1_land-ocean_flag_error

(2) TPW_Land

flag_values	flag_meanings
0	Good.normal
128	NoData.ocean
129	NoData.forest_region--23G
130	NoData.forest_region--36G
131	NoData.low_surface_temperature--below_5degree
132	NoData.cloud
133	NoData.abnormal_calculation_of_TPW
161	NoData.invalid_L1

(3) CLW

flag_values	flag_meanings
0	Good.clear_sky
1	Good.cloud
2	Good.light_rain
64	LowQuality.negative_CLW
128	NoData.heavy_rain
129	NoData.abnormal_calculation_of_TPW
130	NoData.abnormal_calculation_of_sea_surface_emissivity
131	NoData.invalid_retrieval_of_sea_ice
132	NoData.sea_ice
133	NoData.land
134	NoData.invalid_retrieval_or_RFI
161	NoData.invalid_L1
163	NoData.L1_land-ocean_flag_error

(4) PRC_PrecipRate

flag_values	flag_meanings
0	Good.ocean
1	Good.land
2	Good.coast
3	Good.land_with_snowcover
4	Good.sea_ice
32	Good.orographic_precipitation_condition_ocean
33	Good.orographic_precipitation_condition_land
34	Good.orographic_precipitation_condition_coast
128	NoData.retrieval_error
129	NoData.regions_of_low_temperatures
130	NoData.regions_of_sea_ice
131	NoData.TB_out_of_range_in_precipitation_retrieval
160	NoData.satellite_attitude_out
161	NoData.abnormal_L1-TB_or_RFI
163	NoData.L1_land-ocean_flag_error

(5) PRC_SProb

flag_values	flag_meanings
0	Good.rain
1	Good.snow
128	NoData.precipitation_phase_indeterminable

(6) SST_6G

flag_values	flag_meanings
0	Good.normal
64	LowQuality.strong_wind_15-23m_s
65	LowQuality.light_rain
128	NoData.land_area
129	NoData.sea_ice
130	NoData.sun_glint
131	NoData.rain_or_abnormal_TB
132	NoData.strong_wind
133	NoData.cold_SST--below_minus_2_degC
160	NoData.satellite_attitude_out
161	NoData.abnormal_L1-TB_or_RFI

(7) SST_10G

flag_values	flag_meanings
0	Good.normal
1	Good.SST_below_9_degC
64	LowQuality.strong_wind_15-23_m_s
65	LowQuality.light_rain
66	LowQuality.strong_wind_15-23_m_s_and_SST_below_9_degC
128	NoData.land_area
129	NoData.sea_ice
130	NoData.sun_glint
131	NoData.rain_or_abnormal_TB
132	NoData.strong_wind_above_23_m_s
133	NoData.cold_SST--below_minus_2_degC
160	NoData.satellite_attitude_out
161	NoData.abnormal_L1-TB_or_RFI

(8) SST_Multi

flag_values	flag_meanings
0	Good.normal
64	LowQuality.strong_wind_15-23_m_s
65	LowQuality.light_rain
67	LowQuality.land_area_in_6GHz-SST
128	NoData.land_area
129	NoData.sea_ice
130	NoData.sun_glint
131	NoData.rain_or_abnormal_TB
132	NoData.6G_strong_wind_10G_strong_wind_above_23_m-s
133	NoData.cold_SST--below_minus_2_degC
160	NoData.satellite_attitude_out
161	NoData.abnormal_L1-TB_or_RFI

(9) HST_10G

flag_values	flag_meanings
0	Good.normal
1	Good.SST_below_9_degC
64	LowQuality.strong_wind_15-23_m_s
65	LowQuality.light_rain
66	LowQuality.strong_wind_15-23_m_s_and_SST_below_9_degC
128	NoData.land_area
129	NoData.sea_ice
130	NoData.sun_glint
131	NoData.rain or abnormal_TB
132	NoData.strong_wind_above_23_m_s
133	NoData.cold_SST--below_minus_2_degC
160	NoData.satellite_attitude_out
161	NoData.abnormal_L1-TB_or_RFI

(10) HST_6G

flag_values	flag_meanings
0	Good.normal
64	LowQuality.strong_wind_15-23_m_s
65	LowQuality.light_rain
128	NoData.land_area
129	NoData.sea_ice
130	NoData.sun_glint
131	NoData.rain_or_abnormal_TB
132	NoData.strong_wind_above_23_m_s
133	NoData.cold_SST--below_minus_2_degC
160	NoData.satellite_attitude_out
161	NoData.abnormal_L1-TB_or_RFI

(11) SSW

flag_values	flag_meanings
0	Good.normal
128	NoData.land_area
129	NoData.sea_ice
130	NoData.sun_glint
131	NoData.rain
132	NoData.abnormal_wind_speed
133	NoData.no_correction_of_wind_direction
134	NoData.no_MGDSST
160	NoData.incident_angle_error
161	NoData.abnormal_L1-TB_or_RFI

(12) ASW

flag_values	flag_meanings
0	Good.normal
64	LowQuality.Land_0.01-1.0_percent_coast
128	NoData.land_area
129	NoData.sea_ice
130	NoData.sun_glint
134	NoData.no_MGDSST
161	NoData.abnormal_L1-TB_or_RFI

(13) SIC

flag_values	flag_meanings
0	Good.normal
1	Good.SST_mask
2	Good.latitude_mask
4	Good.land_filter_target_pixel
128	NoData.land_mask
131	NoData.not_used--will_be_used_by_RFI
160	NoData.satellite_attitude_out
161	NoData.invalid_TB
163	NoData.L1_land-ocean_flag_error

(14) HSI

flag_values	flag_meanings
0	Good.normal
3	Good.ice_mask
128	NoData.land_mask
129	NoData.coastal_mask
130	NoData.lat_limit
161	NoData.invalid_TB
163	NoData.L1_land-ocean_flag_error

(15) SMC

flag_values	flag_meanings
0	Good.normal
64	LowQuality.possible_precipitation_area
128	NoData.ocean_and_coastal_area
160	NoData.satellite_attitude_out
161	NoData.abnormal_L1-TB_or_RFI
163	NoData.abnormal_L1-LandAreaPercent

(16) SND

flag_values	flag_meanings
0	Good.No_snow
1	Good.Dry_snow
2	Good.cold_snow--mostly_at_high_latitude
3	Good.shallow_snow
4	Good.wet_snow
5	Good.previous_snow
6	Good.Permanent_ice
7	Good.snow_impossible
64	LowQuality.high_elevation_false_snow
128	NoData.ocean
129	NoData.lake_ice
130	NoData.lake
160	NoData.satellite_attitude_out
161	NoData.abnormal_L1-TB_or_RFI
162	NoData.abnormal_latitude-longitude

(17) SWE

flag_values	flag_meanings
0	Good.Processed