Global Change Observation Mission Water
（GCOM-W1）

AMSR2 Higher Level Product Format Specification

This document is specification of AMSR2 Higher Level product file format. AMSR2 Higher Level product consists of two levels ,level 2 and level 3. This document consists of two parts, level 2 product file and level 3 product file as below.

- AMSR2 level 2 product file format specification
- AMSR2 level 3 product file format specification

AMSR2 Level 2 product format specification

Change record

Issue	Date	Sheet	Description of change
NC	2013/05	—	—
Rev.A	2013/12	—	The scale factor of PRC was modified from 0.1 to 0.01. Add notes for the two-layer structure of SND.
Rev.B	2015/03	—	Add notes for the two-layer structure of SST (addition of 10GHz SST).
Rev.C	2015/06	—	Pixel Data Quality Flag was modified.
Rev. D	2016/07	3-9	Add information about SWE (Scale factor / Units)
Rev. E	2017/01	3-10	Table 3.2-3 The scale factor of PRC was modified from 0.1 to 0.01.
Rev. F	2020/03	3-9,10	Table 3.2-2～Table 3.2-3 (*1) Add description about product compression.
Rev. G	2020/10	 3-9 4-14 4-15	The following items were updated, since the third layer was added to the standard sea surface temperature product according to the version-upgrade of higher-level product. - Added the description of Table 3.2-2 (Low resolution). - Updated the Table 4.2-5. - Added the Table 4.2-6.
Rev. H	2022/7	 4-14 4-15 4-16	According to the version-upgrade of higher-level product, the following tables were updated. - Updated the Table 4.2-5. - Added the Table 4.2-6. - Updated the Table 4.2-7.

-Content-

1 Introduction

1.1 Purpose

This format specification describes the format of AMSR2 level 2 product file which is produced at Japan Aerospace Exploration Agency (JAXA). This document describes the structure and contents of AMSR2 level 2 product file.

1.2 Overview

AMSR2 level 2 product stores the Geophysical quantity for water and quality data.

2 Applicable and reference documents

2.1 Applicable documents

- EIS granule ID prescription (NEB-060005B)

2.2 Reference documents

- AMSR-E Data Users Handbook(NCX-030021)
- AMSR-E Level 1 product format description (NEB-00011F)
- AMSR-E Level 2 format description (NDX-000272C)
- AMSR-E Level 2 Map format description (NDX-000273D)
- AMSR-E Level 3 format description (NDX-000274B)

3 Product description

AMSR2 Level 2 product stores the Geophysical quantity from the brightness temperature of level 1 product file and the geometric information as HDF5. The features of the product are shown as below.

3.1 Structure of product file

Table 3.1-1 shows the AMSR2 Level 2 product structure.

Table 3.1-1 AMSR2 Level 2 product file structure

Structure		HDF Data	Content
Header	Product Metadata	Attribute	Describe unique information of the product data. (Sensor specification, Engineering value coefficients…etc)
Data		Dataset	The stored data is shown as below. ・Scanning time ・Geophysical quantity ・Latitude/Longitude ・Quality information

3.2 Structure of data

Fig. 3.2-1 AMSR2 level 2 product data structure [Low resolution] and Fig. 3.2-2 AMSR2 level 2 product data structure [High resolution] shows structure of AMSR2 level 2 product data. Table 3.1-1 AMSR2 Level 2 product file structure shows data set specification of level 2 product data. In this regard, data size and number of records are values in case of standard operation.

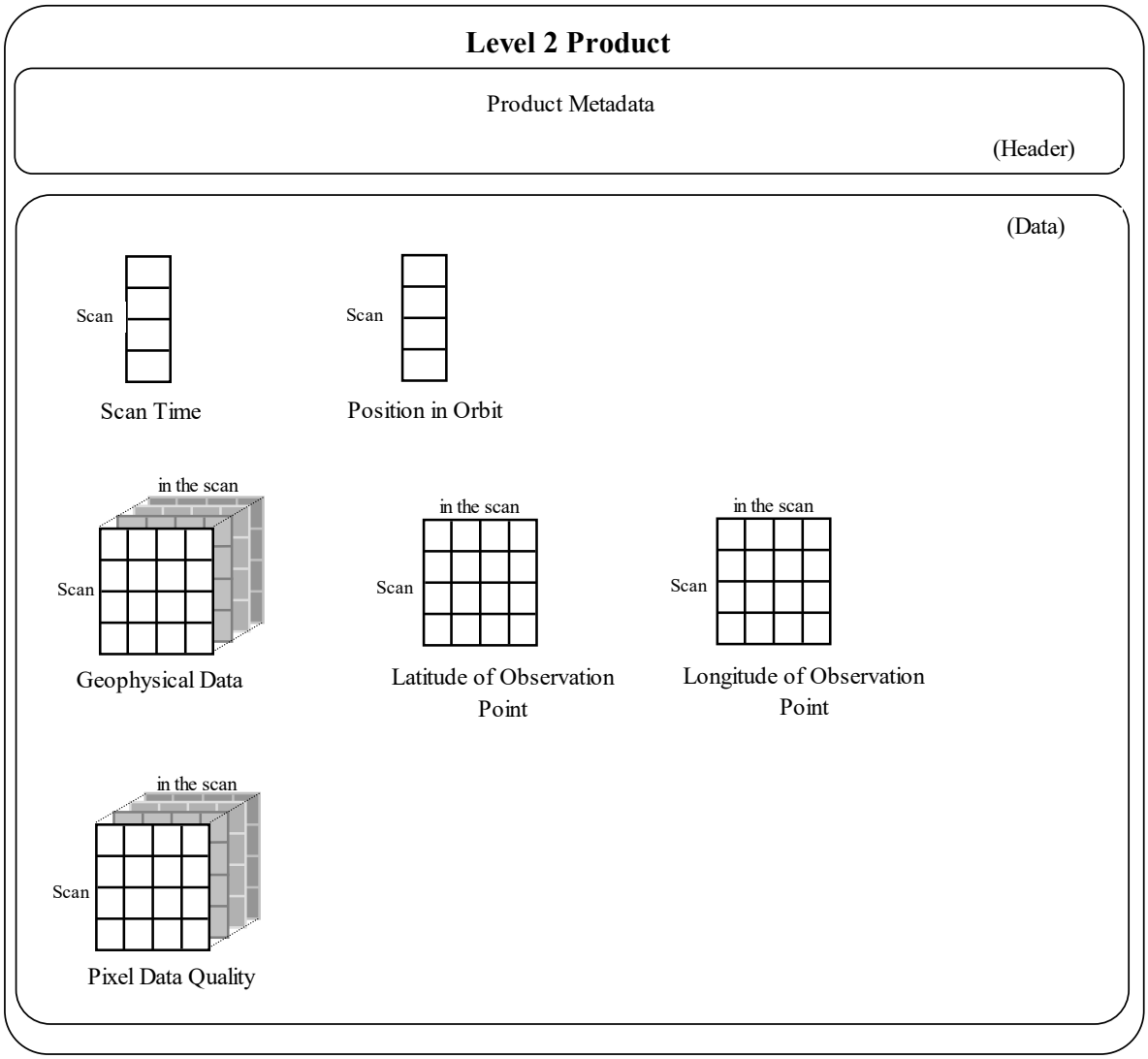


Fig. 3.2-1 AMSR2 level 2 product data structure [Low resolution]

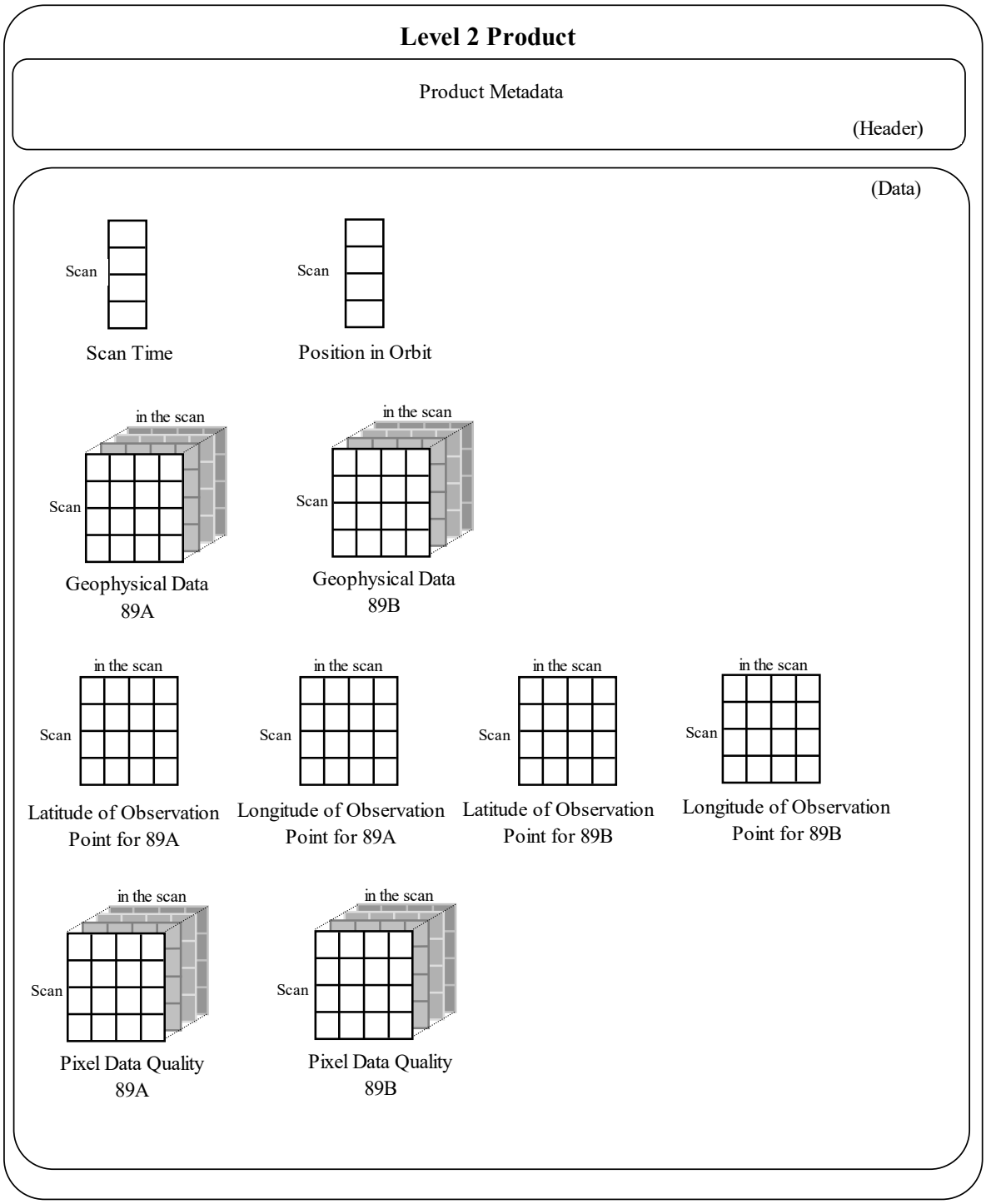


Fig. 3.2-2 AMSR2 level 2 product data structure [High resolution]

Table 3.2-1 Product metadata items

No	MetaDataName	Data Size (Max)	Explanation	Example or Range	Fixed/Variable
1	ProductName	12	Abbreviated name	[XXXXXXXXXXXX] AMSR2-L2	Variable
2	GeophysicalName	36	Geophysical quantity name	[XXXXXXXXXXXX] Total Precipitable Water Cloud Liquid Water Precipitation Sea Surface Temperature Sea Surface Wind speed Sea Ice Concentration Snow Depth Soil Moisture Content	Fixed
3	ProductVersion	1	Product version	[X] 0～Z	Variable
4	AlgorithmVersion	3	Algorithm version	[XXX] 000～999	Variable
5	ParameterVersion	3	Parameter version	[XXX] 000～999	Variable
6	ProductSize_MByte	8	Product size(MByte)	[XXXXX. X]（x1024x1024byte） 0. 0～99999. 9	Variable
7	GranuleID	64	Granule ID	[XXXXXXXXXXX]	Variable
8	Operation	22	Product type	[XXXXXXXXXXX] Standard : Standard operation NearRealTime(Global) : Near Real Time operation (Global area) NearRealTime(local) : Near Real Time operation (Local area)	Variable

No	MetaDataName	Data Size (Max)	Explanation	Example or Range	Fixed/Variable
9	ProductionDateTime	24	Product generate time and date (UTC)	[YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(milli-second)	Variable
10	ObservationStartDateTime	25	Start time and date of observation data（UTC）	[YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(milli-second)	Variable
11	ObservationEndDateTime	25	End time and date of observation data（UTC）	[YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(milli-second)	Variable
12	GringPointLatitude	80	Latitude of data effective range	Ex.) 83.71,73.23,34.10,-25.31,-84.97,-73.60,-23.13,36.52 See the section 4.2 for more information	Variable
13	GringPointLongitude	80	Longitude of data effective range	Ex.) 152.28,91.82,-10.34,-24.72,-39.30,-105.73,-40.70,-27.99 See the section 4.2 for more information	Variable
14	PGEName	20	Data processing software name	[XXXXXXXXXXX] XXXXXXXXXXX : Strings	Fixed
15	InputFileName	128	Input file name (Level1 data file name)	Ex.) R1540402SGS0221003170100.L0D, R1540402SGS0221005320100.L0D	Variable

No	MetaDataName	Data Size (Max)	Explanation	Example or Range	Fixed/Variable
16	ProcessingCenter	12	Data processing center	[XXXXXXXXXXXX] XXXXXXXXXXXX : Strings	Fixed
17	ContactOrganizationName	300	Contact organization name	[XXXXXXXXXXXX] XXXXXXXXXXXX : Strings	Fixed
18	ContactOrganizationTelephone	16	Contact telephone number	[+050-0000-0000] Strings	Fixed
19	StartOrbitNumber	6	Start orbit number	[XXXXX] 0～99999	Variable
20	StopOrbitNumber	6	End orbit number	[XXXXX] 0～99999	Variable
21	EquatorCrossingLongitude	8	Longitude at the time of equatorial passage	[XXXX.XX] -180.00～180.00	Variable
22	EquatorCrossingDateTime	25	Time and date of equatorial passage（UTC）	[YYYY-MM-DD T hh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(milli-second)	Variable
23	OrbitDirection	11	Orbit direction	[XXXXXXXXX] Ascending Descending	Variable
24	PassNumber	4	Pass number of observation start point	[XXX] 0～999	Variable
25	OrbitDataFileName	128	Support orbit file name	[XXXXX] Strings It may be blank, when the process didn’t use this file.	Variable
26	EphemerisMissingDataRate	5	Missing rate of orbit data	[XXXXX] Good Fair NG	Variable
27	AttitudeMissingDataRate	5	Missing rate of attitude data	[XXXXX] Good Fair NG	Variable

No	MetaDataName	Data Size (Max)	Explanation	Example or Range	Fixed/Variable
28	OrbitDataType	8	orbit data type	[XXXXXXXX] ONBOARD:On board data ELMD：Defined orbit data ELMP：Forecast orbit data	Variable
29	PlatformShortName	8	Platform name	[XXXXXXXX] GCOM-W1	Fixed
30	SensorShortName	8	Sensor names	[XXXXXXXX] AMSR2	Fixed
31	NumberOfScans	6	Number of scan	[XXXXX] 0～99999	Variable
32	NumberOfMissingScans	8	Number of missing scans	[XXXXX] 0～99999	Variable
33	AntennaRotationVelocity	4	Velocity of antenna rotation （30～40rpm）	[XX.X] 30.0～40.0	Variable
34	ECSDataModel	8	Meta data model name	[B.0] String	Fixed
35	NumberOfPackets	8	Number of level 0 packets	Blank	Fixed
36	NumberOfInputFiles	2	Number of input level 0 files	[X] 0～9	Variable
37	NumberMissingPackets	9	Number of missing packets	[XXXXX] 0～99999999	Variable
38	NumberOfGoodPackets	9	Number of packets	[XXXXX] 0～99999999	Variable
39	OverlapScans	3	Number of overlap scans(One side)	20	Fixed
40	QALocationOfPacketDiscontinuity	16	Continuity of Packet Sequence Counter	[XXXXXXXXXXXXXXXX] Continuation Discontinuation	Variable
41	EphemerisQA	3	Ephemeris limit check	[XX] OK NG	Variable
42	AutomaticQAFlag	5	Limit check by software	[XX] Good Fair NG	Variable
43	ScienceQualityFlag	8	Quality flag of calculating geophysical quantity	Blank * Blank in the Level 1 product	Fixed
44	ScienceQualityFlagExplanation	512	Explanation of	Blank	Fixed

No	MetaDataName	Data Size (Max)	Explanation	Example or Range	Fixed/Variable
			“ScienceQualityFlag”	* Blank in the Level 1 product	
45	AutomaticQAFlagExplanation	512	Explanation of limit check by software	1.MissingScanQA:Less than 21 is available->OK, 2.MissingDataQA:Less than 321 is available->OK, 3.AntennaRotationQA:Less than 21 is available->OK, 4.HotCalibrationSourceQA:Less than 21 is available->OK, 5.AttitudeDataQA:Less than 21 is available->OK, 6.EphemerisDataQA:Less than 21 is available->OK, 7.QualityofGeometricInformationQA:Less than 1 is available->OK, 8.BrightnessTemperatureQA:Less than 21 is available->OK	Variable
46	QAPercentMissingData	7	Number of missing data	[XXX.XX] 0～100,-9999	Variable
47	QAPercentOutofBoundsData	8	Percentage of out of bound data(%)	[XXX] 0～100	Variable
48	QAPercentParityErrorData	8	Percentage of parity error data	[XXX.XX] 0～100,-32768	Variable
49	ProcessingQADescription	12	Description of the processing error	[XXXXXXXXXXXXXXX] Strings	Variable
50	ProcessingQAAttribute	128	The attribute name which is abnormal by QA metadata	[XXXXXXXXXXXXXXX] Strings	Variable
51	GlobalMeteorologicalDataType	8	Used meteorological data	[XXX] Analysis : Process didn't use Analysis meteorological data Forecast : Process didn't use Forecast meteorological data None : Process didn't use meteorological data * Blank in the Level 1 product	Variable
52	AncillaryDataInformation	256	Information of ancillary data (Used data in Level 2 process)	[XXXXXX] Strings * Blank in the Level 1 product	Variable

Table 3.2-2 Data set list (Low resolution)

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	44	100	-	4,400	1	4,400	-	-
2	Scan Time	1	8	double	8	1,978	15,824	1	Sec
3	Position in Orbit	1	8	double	8	1,978	15,824	1	-
4	Geophysical Data	243	2	signed int	486	1,978	961,308	0.01 0.001 0.01 0.01 0.1 0.1 0.1	TPW:kg/m2 CLW:kg/m2 SSW:m/s SST:℃ SND: cm SMC: % SIC: %
5	Latitude of Observation Point	243	4	float	972	1,978	1,922,616	1	deg
6	Longitude of Observation Point	243	4	float	972	1,978	1,922,616	1	deg
7	Pixel Data Quality	243	1	unsigned char	243	1,978	480,654	-	-
	Total(Bytes)						5,323,242		
	Total(MB)						***5.08*** (*1)		

*Geophysical Data of SND has the two-layer structure. Primary SND is stored in the first layer. SWE, which is calculated from the SND (Snow water: Snow Water Equivalent) is stored in the second layer. So, the data size is also doubled. SWE: Scale factor = 0.1, Units = cm.

*Geophysical Data of SST has the three-layer structure. Primary SST observed by 6GHz is stored in the first layer. SST observed by 10GHz, which has higher spatial resolution than the primary SST (more pixels are available in coastal area), is stored in the second layer. Sea surface temperature synthesized by three frequencies (6.9GHz/7.3GHz/10GHz) (for research) is stored in the third layer. So, the data size is also tripled.

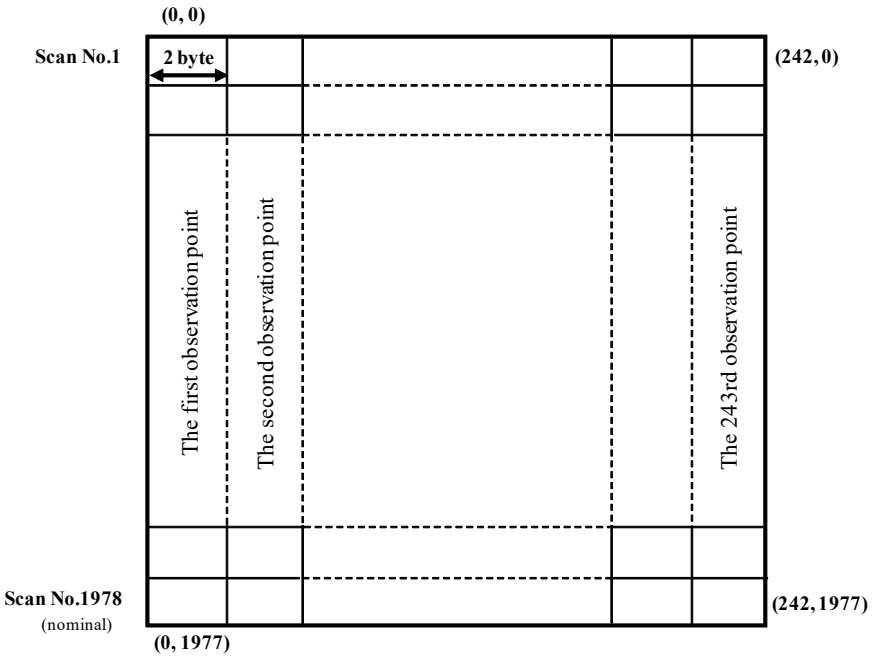
(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 50% to 70% of uncompressed.

Table 3.2-3 Data set list (High resolution)

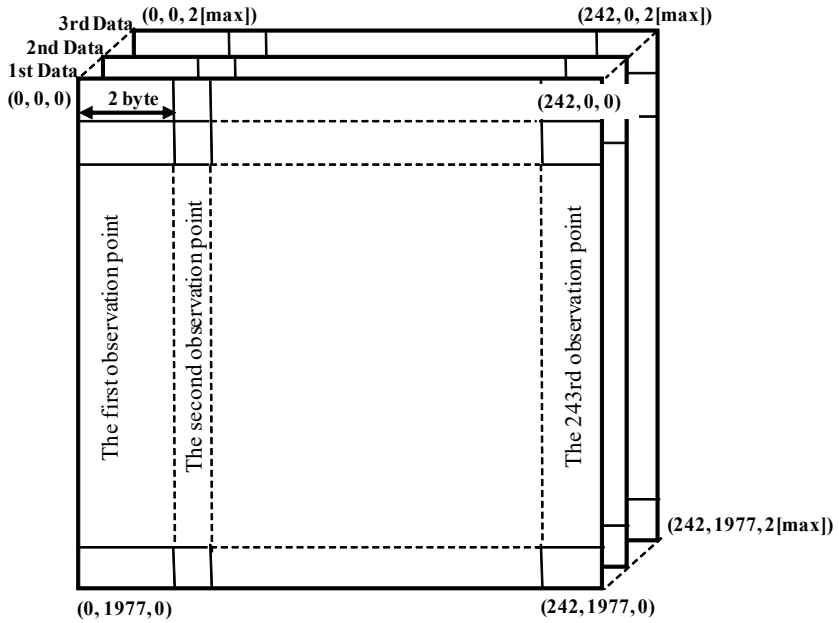
No.	Data	Sumples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	44	100	-	4,400	1	4,400	-	-
2	Scan Time	1	8	double	8	1,978	15,824	1	Sec
3	Position in Orbit	1	8	double	8	1,978	15,824	1	-
4	Geophysical Data for 89A	486	2	signed int	972	1,978	1,922,616	0.01	PRC:mm/h
5	Geophysical Data for 89B	486	2	signed int	972	1,978	1,922,616		
6	Latitude of Observation Point for 89A	486	4	float	1,944	1,978	3,845,232	1	deg
7	Longitude of Observation Point for 89A	486	4	float	1,944	1,978	3,845,232	1	deg
8	Latitude of Observation Point for 89B	486	4	float	1,944	1,978	3,845,232	1	deg
9	Longitude of Observation Point for 89B	486	4	float	1,944	1,978	3,845,232	1	deg
10	Pixel Data Quality for 89A	486	1	unsigned char	486	1,978	961,308	-	-
11	Pixel Data Quality for 89B	486	1	unsigned char	486	1,978	961,308	-	-
	Total(Bytes)						21,184,824		
	Total(MB)						***20.20*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 60% of uncompressed.

3.3 Architecture of data



In case of the product has 1
Geophysical Data.



In case of the product has some
Geophysical Data.

*The stored order of the data can different from this figure,
it depends on output by tools or libraries .

Fig. 3.3-1 Structure of Geophysical Data (Low resolution)

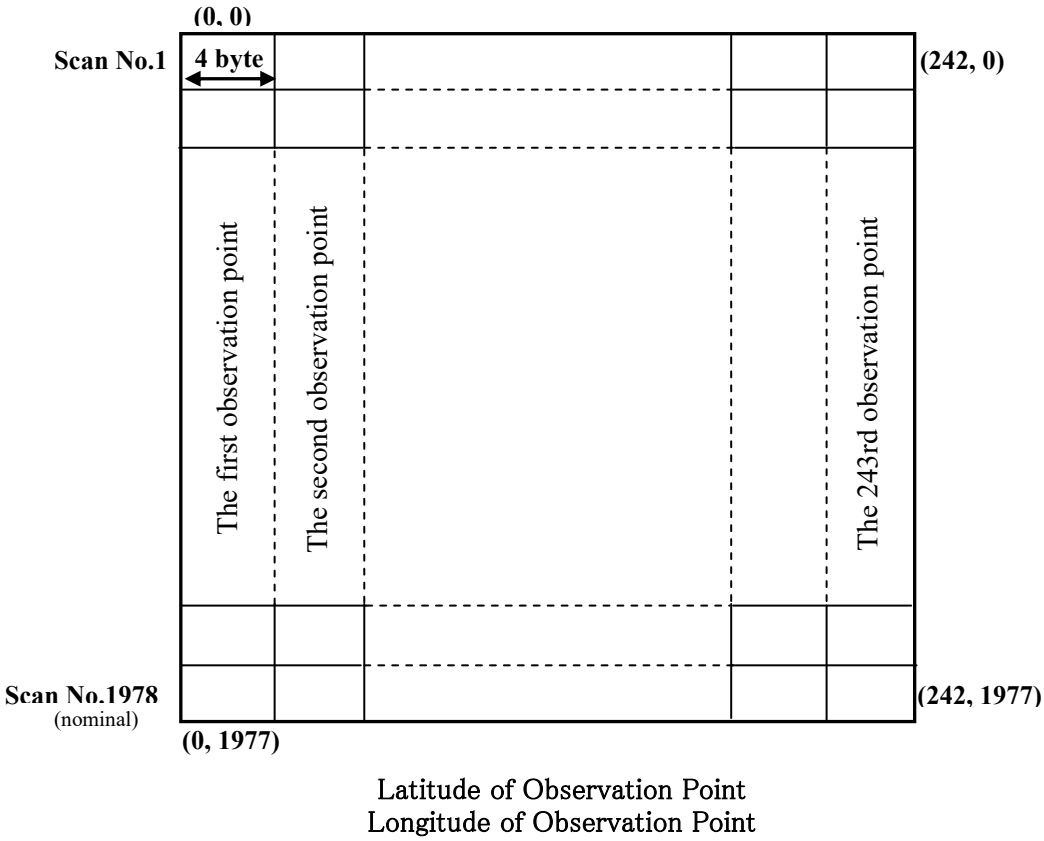
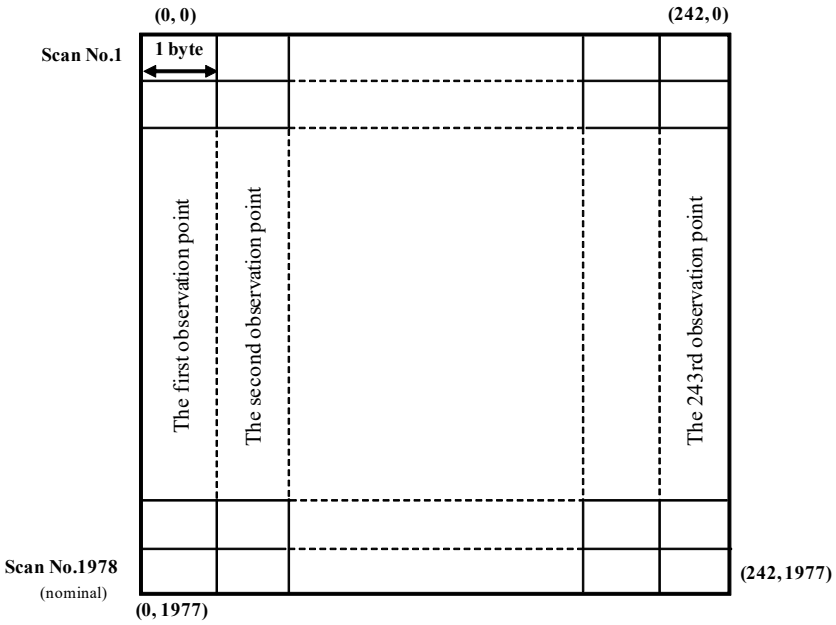
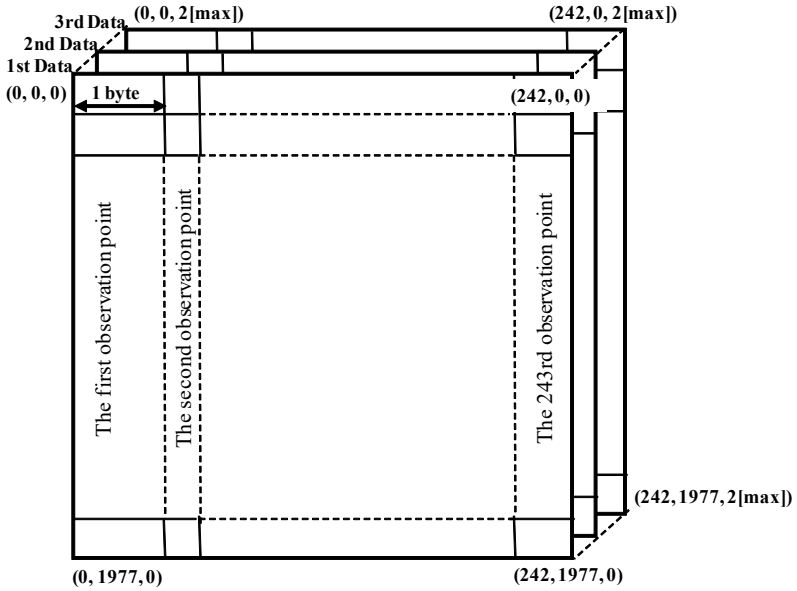


Fig. 3.3-2 Structure of Latitude and Longitude. of the observation point (Low resolution)



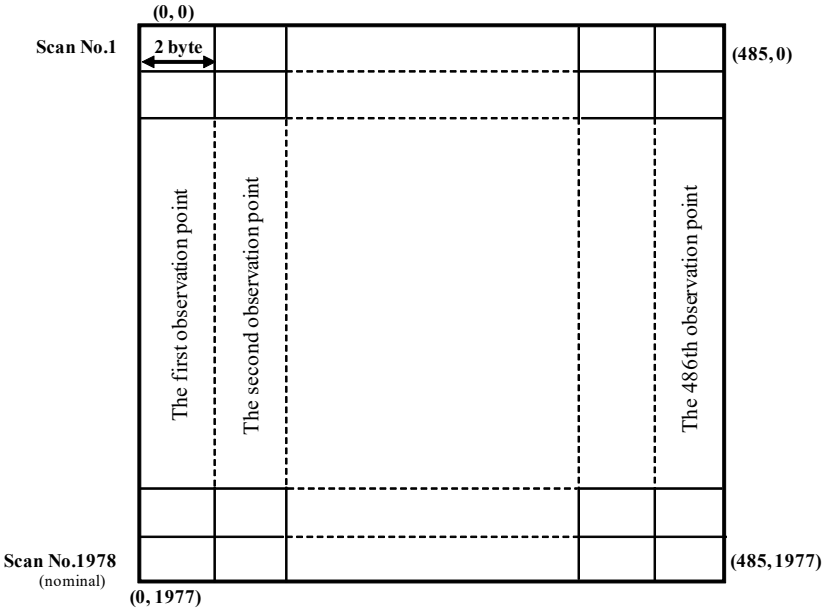
In case of the product has 1 Geophysical Data.



In case of the product has some Geophysical Data.

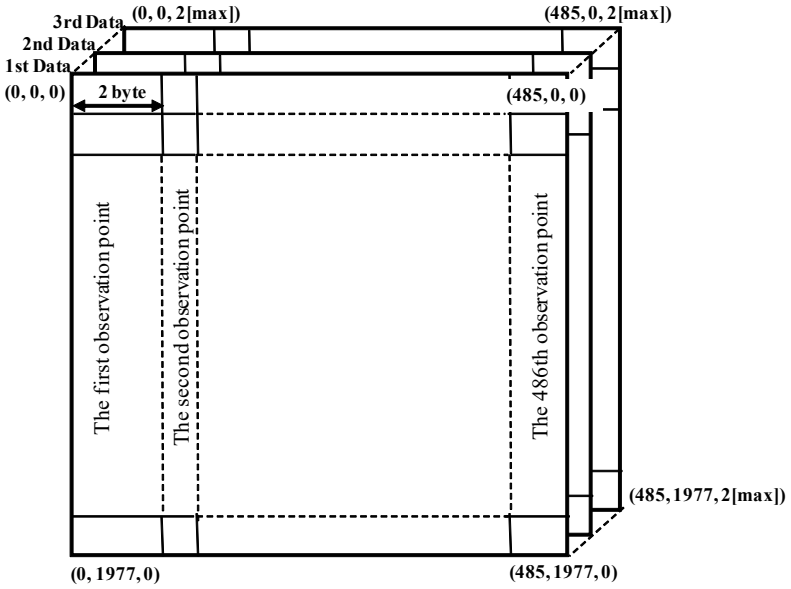
*The stored order of the data can different from this figure, it depends on output by tools or libraries .

Fig. 3.3-3 Structure of Pixel Data Quality (Low resolution)



Geophysical Data for 89A (In case of the product has 1 Geophysical Data.)

(89B have the same structure)



Geophysical Data for 89A
(In case of the product has some Geophysical Data.)

(89B have the same structure)

*The stored order of the data can different from this figure, it depends on output by tools or libraries .

Fig. 3.3-4 Structure of Geophysical Data (High resolution)

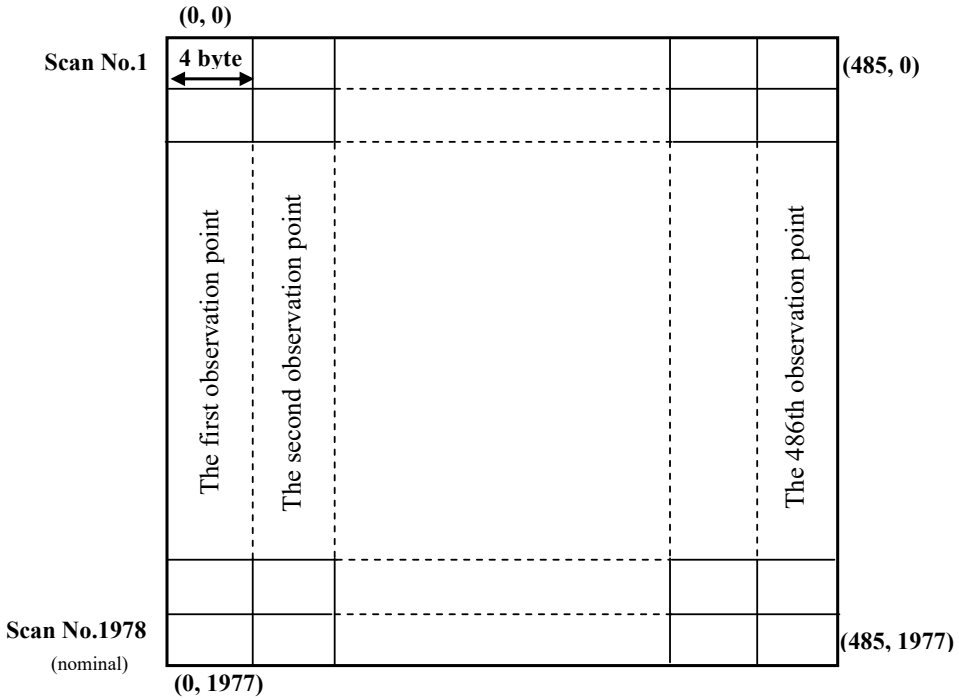
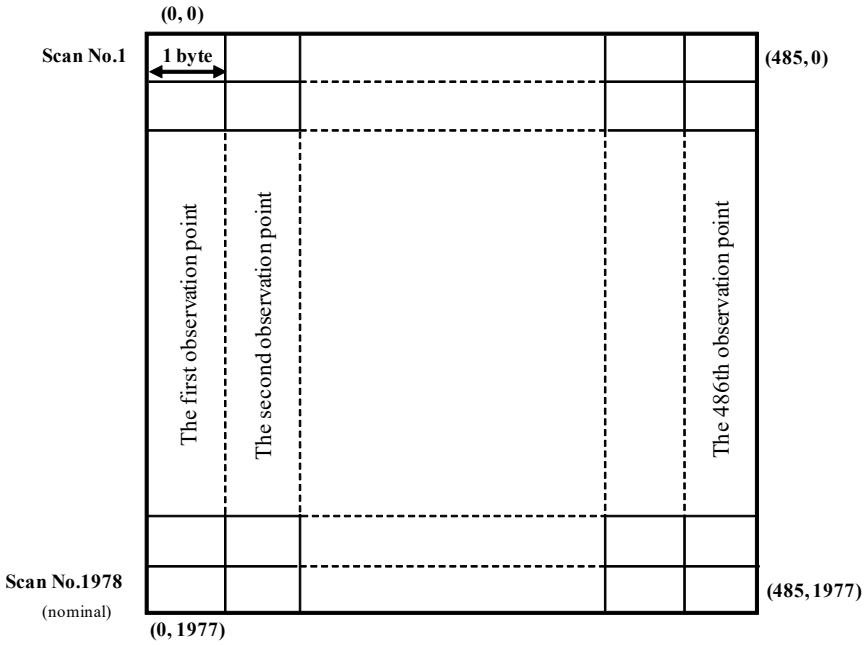
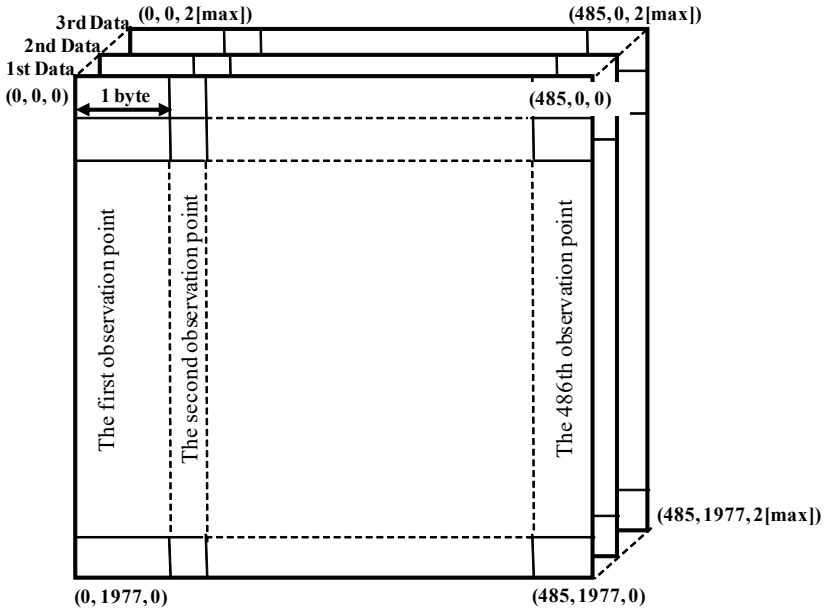


Fig. 3.3-5 Structure of Latitude and Longitude of Observation Point (High resolution)



Pixel Data Quality for 89A
(In case of the product has 1 Geophysical Data.)

(89B have the same structure)



Pixel Data Quality for 89A
(In case of the product has some Geophysical Data.)

(89B have the same structure)

*The stored order of the data can different from this figure,
it depends on output by tools or libraries .

Fig. 3.3-6 Structure of Pixel Data Quality

3.4 Special instruction

3.4.1 Product file name

AMSR2 level 2 product file follows the file naming convention in below. Granule ID is stated by reference documents.

File name = Granule ID + extension [.h5]

Scene ID Product ID

Byte Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
AMSR2	G	W	1	A	M	2		Y	Y	Y	Y	M	M	D	D	H	H	m	m		P	P	P	X		L	L	x	x	K	K	K	r	d	v	a	a	a	p	p	p

Scene ID ← → Product ID ← →

<Exp.> G W 1 A M 2 _ 2 0 1 1 1 1 1 3 2 3 4 5 _ 0 1 2 D _ L 1 D L A D N R _ 1 1 0 1 0 0 1

Scene ID

[Satellite] [Sensor] [Observation Start Time] [Pass Number] [Orbit Direction]

- Satellite : GW1（Fixed Value）
- Sensor : AM2（Fixed Value）
- Observation Start Time : YYYYMMDDHHmm（UTC）
- Pass Number : PPP（000～300）*Observation Start point
- Orbit Direction : X (A : Ascending, D : Descending)

Product ID

[Process Level] [Process Kind] [Product ID] [Resolution] [Developer ID] [Product version] [Algorithm version] [Parameter version]

- Process Level : LL（L1 : Level 1, L2 : Level 2）
- Process Kind : xx （SG : Standard operation product, SN : Near real time operation product (Global), SL : Near real time operation product (Local),
  RG : Research standard operation product, RN : Research Near real time operation product (Global),
  RL : Research Near real time operation product (Local), DL : For the Direct recieving station (Local area)）
- Product ID : KKK（<L1A> ADN : Digital Number, <L1B> BTB : Brightness Temperature, <L1R> RTB : Brightness Temperature,
  <L2> CLW : Cloud Liquid Water, TPW : Total Precipitable Water, PRC : Precipitation,
  SST : Sea Surface Temperature, SSW : Sea Surface Wind speed, SIC : Sea Ice Concentration,
  SND : Snow Depth, SMC : Soil Moisture Content）
- Resolution : r（<L1> R : Raw（Fixed Value）, <L2> L: Low [243 pixels], H : High[486 pixels]）
- Developer ID : d（<L1> _ : underscore（Fixed Value）, <L2> : A～Z）
- Product version : v（0～9, a～z）
- Algorithm version : aaa（000～999）

3.4.2 Coordinate system

AMSR2 level 2 product stores the observation position (latitude, longitude) and the orbit information of satellite. The observation positions are expressed in Greenwich coordinate system (Earth Fixed Coordinate). The range of the east longitude is from 0 to 180 degrees and the range of the west longitude is from 0 to -180 degrees. Similarly, the range of the north latitude is from 0 to 90 degrees, the range of the south latitude is from 0 to -90 degrees. Earth model of WGS84 is adopted for geometric calculation. The orbit information is stored as WGS84 earth fixed coordinate system.

3.4.3 Scaling factor

In order to make the data volume small, scaling factors are applied for some floating number in AMSR2 level 2product. AMSR2 dataset has scaling factor in the HDF5 file. The scaling factor is set for each dataset and stored with the data unit in the attribute information.

3.4.4 Dummy data

In Level2 processing geophysical quantity data is not estimated when the brightness temperature is abnormal or packet loss or the other reasons. For example, SST is not estimated in the land area because SST is the geophysical quantity data on the ocean.

Missing value: In case of the input data is missing [-32768]

Error value: In case of the input data is error value or it is out of order target[-32761～-32767]

4 Description of data

This chapter describes each data item in the AMSR2 level 2 product file.

4.1 Product metadata (Attribute)

The following describes each product metadata item in the AMSR2 level 2 product file. Some of them are common items with AMSR2 level 1 product.

(1) ProductName

Abbreviated name of the product is stored as below.

[AMSR2-L2]: AMSR2 level 2 process

(2) GeophysicalName

The geophysical quantity name is stored as below.

Item	Content	Remarks
GeophysicalName	[Total Precipitable Water] [Cloud Liquid Water] [Precipitation] [Sea Surface Temperature] [Sea Surface Wind speed] [Sea Ice Concentration] [Snow Depth] [Soil Moisture Content]	-

(3) ProductVersion

The product version is stored as below.

Item	Minimum	Maximum	Error value	Unit	Remarks
ProductVersion	0	Z	-	-	single-digit or alpha-numeral

(4) AlgorithmVersion

The algorithm version is stored as below.

Item	Minimum	Maximum	Error value	Unit	Remarks
AlgorithmVersion	000	999	-	-	3-digit numeral

(5) ParameterVersion

The parameter version is stored as below.

Item	Minimum	Maximum	Error value	Unit	Remarks
ParameterVersion	000	999	-	-	3-digit numeral

(6) ProductSize_MByte

The product size is stored as below.

Item	Minimum	Maximum	Error value	Unit	Remarks
ProductSize_MByte	0.0	99999.9	-	MByte	Mbyte(×1024×1024byte)

(7) GranuleID

The granule ID is stored. Granule ID is unique ID for product file. Please see the section 3.4.1 for more detail.

(8) Operation

The product kind is stored as below.

Standard: Standard operation
NearRealTime (Global): Near Real Time operation (Global area)
NearRealTime (local): Near Real Time operation (Local area)

(9) ProductionDateTime

The product creation time and date is stored as below.

Item	Format	Remarks
ProductionDateTime	[YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(millisecond)	When the leap second is updated, “ss” may show 60.

(10) ObservationStartDateTime

The start time and date of observation data is stored as below.

Item	Format	Remarks
ObservationStartTime	[YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(millisecond)	-

(11) ObservationEndDateTime

The end time and date of observation data is stored as below.

Item	Format	Remarks
ObservationEndTime	[YYYY-MM-DD T hh:mm:ss.uuuZ] YYYY : XXXX(Year) MM : 01～12(Month) DD : 01～31(Day) hh : 00～23(Hour) mm : 00～59(Minute) ss : 00～59(Second) uuu : 000～999(millisecond)	-

(12) GringPointLatitude, GringPointLongitude

Eight representative points (latitude and longitude) of the outline for the observation are stored. They are set as a clockwise from the scanning start position, and these positions are observation points of 89 GHz A-horn. Since the spatial information in a product cannot be expressed as a rectangle on the equidistant cylindrical projection map, it is expressed in polygon like "G". The stored data are delimited by comma [,].

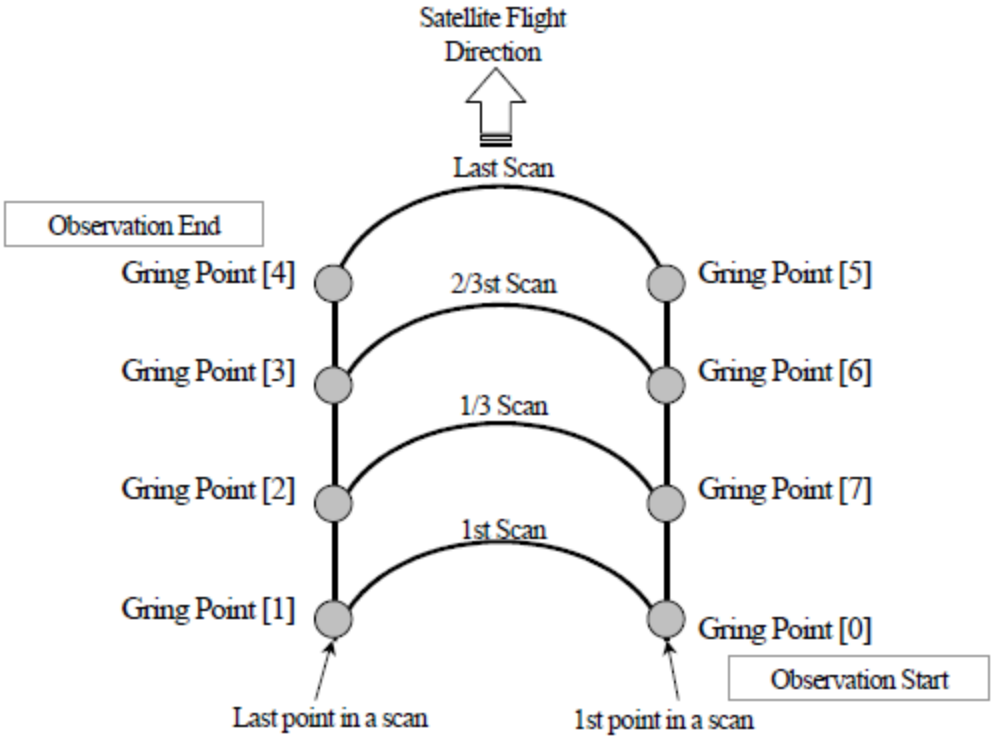


Fig. 4.1-1 The relationship between Gring Pointand data location

(13) PGEName

The apprication name is stored.

Item	Content	Remarks
PGEName	Application name	Maximum size of character is 20.

(14) InputFileName

The input file names are stored. If there are some input files, the stored data are delimited by comma [,].

Item	Content	Remarks
InputFileName	Input File Name	Maximum size of character is 128.

(15) ProcessingCenter, ContactOrganizationName, ContactOrganizationTelephone

The information of data processing center is stored.

Item	Content	Remarks
ProcessingCenter	Processing Center	Maximum size of character is 12.
ContactOrganizationName	Organization Name	Maximum size of character is 300.
ContactOrganizationTelephone	Organization Telephone number	Maximum size of character is 16.

(16) StartOrbitNumber, StopOrbitNumber

The orbit numbers at the observation start and end point in the product file are stored. The orbit number shows total orbit number. This number means integrated value from the GCOM-W1 satellite launch.

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
StartOrbitNumber	Start orbit number	0	99999	-9999	-	Under 5 digit number
StopOrbitNumber	End orbit number	0	99999	-9999	-	Under 5 digit number

(17) EquatorCrossingLongitude, EquatorCrossingDateTime

The equator crossing longitude, date and time (UTC) are stored. However, if the satellite does not pass through an equator (like near real time product or short product by the lack of observation data), it is filled with blank.

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
EquatorCrossing Longitude	The equator crossing longitude	-180.00	180.00	-9999.0	-	The longitude at the first crossing equator is stored in case of near real time operation.

Item	Content	Format	Remarks
EquatorCrossing DateTime	The equator crossing time	[YYYY-MM-DD T hh:mm:ss.uuuZ] YYYY : XXXX(Year) MM : 01～12(Month) DD : 01～31(Day) hh : 00～23(Hour) mm : 00～59(Minute) ss : 00～59(Second) uuu : 000～999(milli-second)	The time at the first crossing equator is stored in case of near real time operation.

(18) OrbitDirection

The orbit direction at the observation start point is stored.

Item	Content	Format	Remarks
OrbitDirection	Orbit direction	Ascending or Descending	Maximum size of character is 11.

(19) PassNumber

The pass number at the observation start point is stored.

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
PassNumber	Pass number	0	233	-99	-	Under 3 digit number

(20) OrbitDataFileName

If the L1 process used supplemental orbit data file, the orbit file name would be stored. If there are some input files, it would be stored with comma-delimited.

Item	Content	Format	Remarks
OrbitDataFileName	Supplemental orbit data file name	-	Maximum size of character is 128.

(21) EphemerisMissingDataRate, AttitudeMissingDataRate

The rate of lack with orbit data and attitude data are stored.

Item	Content	Format	Remarks
EphemerisMissingDataRate	The rate of lack with orbit data	[Good] [Fair] [NG]	Maximum size of character is 5.
AttitudeMissingDataRate	The rate of lack with attitude data		

(22) OrbitDataType

The orbit data type used in L1 process is stored.

Item	Content	Format	Remarks
OrbitDataType	Orbit data type	[ONBOARD] : On board data [ELMD] : Fixed orbit data [ELMP] : Predicted orbit data [NOMINAL] : Nominal orbit data	Maximum size of character is 8.

(23) PlatformShortName, SensorShortName

The satellite name [GCOM-W1] and sensor name [AMSR2] are stored.

(24) NumberOfScans, NumberOfMissingScans

The number of scans and lack of scans in product file are stored. “NumberOfScans” doesn’t include overlap scans. So you need to calculate sum of scans in product files as below.

Sum of scans in product files

＝OverlapScans×2+ NumberOfScans

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
NumberOfScans	Number of scans	0	99999	-9999	-	Under 5 digit number
NumberOfMissingScans	Number of lack scans					

(25) AntennaRotationVelocity

The observed rotating velocity of the AMSR2 antenna is stored.

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
AntennaRotationVelocity	Rotating velocity of the AMSR2 antenna	30.0	40.0	-999	rpm	-

(26) ECSDataModel

The metadata model name is stored.

Item	Content	Format	Remarks
MetaDataModel	Metadata model name	[B.0]	Maximum size of character is 8.

(27) NumberOfPackets

The number of packets is stored. But it is difficult to estimate correct value, so it is always set blank.

(28) NumberOfInputFiles

The number of input L0 files is stored. It is corresponding to the number of L0 files described to "(14) InputFileName".

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
NumberOfInputFiles	Number of input L0 files	0	9	-	-	1 digit number It is stored blank in case of near real time operation.

(29) NumberMissingPackets, NumberOfGoodPackets

The number of the lack packets and number of packets in the product file are stored.

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
NumberMissingPackets	Number of lack packets	0	99999999	-9999999	-	Under 8 digit number
NumberOfGoodPackets	Number of packets					

(30) OverlapScans
The number of one side overlap scans is stored.

Item	Content	Number	Remarks
OverlapScans	Number of one side overlap scans	0	One side value

(31) QALocationOfPacketDiscontinuity
The consecutiveness of “Packet Sequence Counter” is stored.

Item	Content	Format	Remarks
QALocationOfPacket Discontinuity	The consecutiveness of “Packet Sequence Counter”	“Continuation” “Discontinuation”	Maximum size of character is 16.

(32) EphemerisQA
The quality of satellite orbit and attitude data checked by software is stored. The quality inspection result becomes NG, when either number of following limit check errors exceeds 20 % of the data. And it becomes OK in other cases. The calculating with limit check is shown as below.

Check the satellite orbit data

$$LowerLimit \leqq R \leqq UpperLimit$$

$$R = \sqrt{X^2 + Y^2 + Z^2}$$

Check the satellite attitude data

$$LowerLimit \leqq Roll, Pitch, Yaw \leqq UpperLimit$$

Check the satellite velocity data

$$LowerLimit \leqq V \leqq UpperLimit$$

$$V = \sqrt{V_x^{\,2} + V_y^{\,2} + V_z^{\,2}}$$

Item	Content	Format	Remarks
EphemerisQA	Ephemeris check	[OK] [NG]	Maximum size of character is 2.

(33) AutomaticQAFlag
The automatic inspection result of data processing is stored. The items of the automatic inspections are shown in the attribute “AutomaticQAFlagExplanation”. And the following value is stored.

Good	When all check items are in the state of ‘OK’.
Fair	When some check items are in the state of ‘NG’.
NG	When all check items are in the state of ‘NG’.

Item	Content	Format	Remarks
AutomaticQAFlag	The result checked by software.	Good Fair NG	Maximum size of character is 4.

(34) ScienceQualityFlag

The quality flag is stored when the L2 process calculates geophysical data. It is stored blank for the L1 product file.

Item	Content	Format	Remarks
ScienceQualityFlag	The quality flag of geophysical data	Strings	Maximum size of character is 8.

(35) ScienceQualityFlagExplanation

The explanation of ScienceQualityFlag is stored. It is stored blank for the L1 product file.

Item	Content	Format	Remarks
ScienceQualityFlag Explanation	The explanation of ScienceQualityFlag	Strings	Maximum size of character is 512.

(36) AutomaticQAFlagExplanation

The result checked by software automatically is stored.

Item	Content	Format	Remarks
AutomaticQAFlag Explanation	The result checked by software	See example below	Maximum size of character is 512.

＜AutomaticQAFlagExplanation の例＞

1.MissingDataQA:Less than 20 is available->OK,
2.MissingPacketQA:Less than 20 is available->OK,
3.AntennaRotationQA:Less than 20 is available->OK,
4.HotCalibrationSourceQA:Less than 20 is available->OK,
5.AttitudeDataQA:Less than 20 is available->OK,
6.EphemerisDataQA:Less than 20 is available->OK,
7.QualityofGeometricInformationQA:Less than 0 is available->OK,
8.BrightnessTemperatureQA:Less than 20 is available->OK,
All items are OK, 'PASS' is employed

(37) QAPercentMissingData

The rate of lack scan data is stored.

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
QAPercentMissingData	The lack of data	0	100	-99	%	Under 3 digit number

(38) QAPercentOutofBoundsData

The percentage of the limit error to all data is stored. It is judged as error when the antenna temperature and brightness temperature exceed the limit value.

* In the level 1A product, since brightness temperature conversion is not executed, it is filled with 0.
* In the level 1B, 1R product, abnormal brightness temperature is stored as negative value.

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
QAPercentOutofBoundsData	The percentage of the limit error	0	100	negative value	-	Under 3 digit number

(39) QAPercentParityErrorData

The percentage of parity error data is stored. It is judged as error whether the parity error flag exists in the raw observation data.

* When the observation data has parity error, -32768 is stored in the level 1B product.

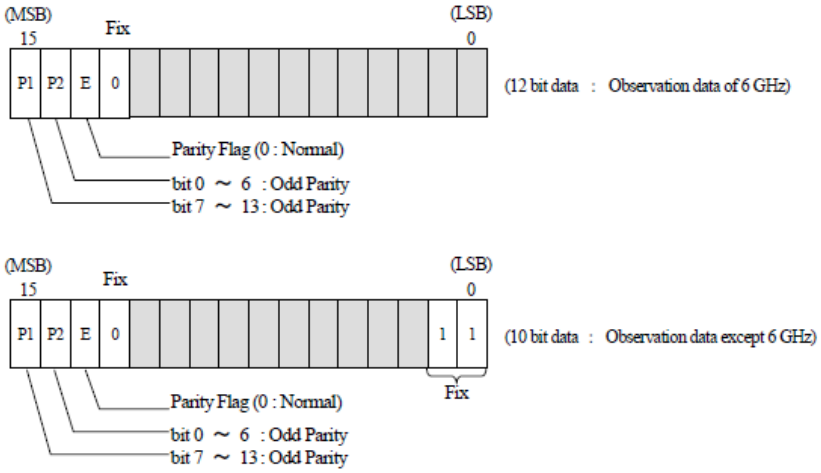


Fig. 4.1-2 Format of the raw observation data

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
QAPercentParityErrorData	The percentage of the parity error	0	100	-32768	-	Under 6 digit number

(40) ProcessingQADescription

The error message generated by data-processing software is stored. "PROC_COMP" is stored when processing software is completed normally.

Item	Content	Format	Remarks
ProcessingQADescription	The error information in the process error	[PROC_COMP] [*********]	Maximum size of character is 12.

(41) ProcessingQAAttribute

As the quality information of the processed data, the item name corresponding to the following standard of the anomaly judgment is stored.

Item	Error criteria
NumberofMissingPackets	In case of the lack of more than packet
EphemerisQA	In case of NG
QAPercentMissingData	In case of more than 1%
QAPercentOutofBoundsData	In case of more than 1%
QAPercentParityErrorData	In case of more than 1%

Item	Content	Format	Remarks
ProcessingQAAttribute	The attribute name of QA metadata in which occurred	[NumberofMissingPackets] [EphemerisQA] [QAPercentMissingData] [QAPercentOutofBoundsData] [QAPercentParityErrorData]	Maximum size of character is 128.

(42) GlobalMeteorologicalDataType

The meteorological data type used in L2process is stored. It is stored blank for the L1 product file.

Item	Content	Format	Remarks
Global Meteorological Type	The meteorological data type used in L2process	[XXX] Analysis : Analyzed meteorological data Forecast : Predicted meteorological data None : None use	Maximum size of character is 8 .* It is stored blank in the L1 product.

(43) AncillaryDataInformation

The ancillary data used in L2process is stored. It is stored blank for the L1 product file.

Item	Content	Format	Remarks
Ancillary Data Information	The ancillary data used in L2process	[XXXXXXXX]	Maximum size of character is 512 .* It is stored blank in the L1 product.

4.2 Dataset (Low resolution)

(1) Scan Time

The observation start time of 89GHz A-horn in every scan is stored. This time is a total second (TAI) from 0:00 (UTC) on January 1st, 1993.

(2) Position in Orbit

The satellite position on the orbit is stored. The position of a satellite consists of an orbit number and a position from the ascending node. This is expressed in the following formula.

Postion_in_Orbit = Total orbit number + Satellite position

Satellite position = (Scan_Time – Ascending node passage time) / (98.9 * 60)

Item	Minimum	Maximum	Error value	Unit	Remarks
Position in Orbit	0.0	99999.9999	-9999.0	-	-

(3) Geophysical Data

The geophysical quantity data processed by Level 2 algorithm is stored.

Item	geophysical quantity	Minimum	Maximum	Error value	Unit	Remarks
Geophysical Data	Total Precipitable Water	-327.60	327.67	-32761 ～ -32768	kg/m2	-
	Cloud Liquid Water	-32.76	32.77	-32761 ～ -32768	kg/m2	-
	Sea Surface Wind speed	-327.60	327.67	-32761 ～ -32768	m/s	-
	Sea Surface Temperature	-327.60	327.67	-32761 ～ -32768	℃	-
	Sea Ice Concentration	-3276.00	3276.70	-32761 ～ -32768	%	-
	Snow Depth	-3276.00	3276.70	-32761 ～ -32768	cm	Including snow water *1
	Soil Moisture Content	-3276.00	3276.70	-32761 ～ -32768	%	-

*1

Snow water equivalent (second layer) = SND (the first layer) * coefficient (Climate value of the density)

(For more detail information, refer to the algorithm Specification)

(4) Latitude of Observation Point

The latitude of the observation point on the earth surface at the odd number point of 89.0A horn is stored. (1 origin)

$$-90° < latitude \leq 90°$$

Item	Minimum	Maximum	Error value	Unit	Remarks
Latitude of Observation Point for 89A	-90.00	90.00	-9999.0	deg	Negative value shows south latitude. Positive value shows north latitude.

(5) Longitude of Observation Point

The longitude of the observation point on the earth surface at the odd number point of 89.0A horn is stored. (1 origin)

$$-180° < longitude \leq 180°$$

Item	Minimum	Maximum	Error value	Unit	Remarks
Longitude of Observation Point for 89A	-180.00	180.00	-9999.0	deg	Negative value shows west longitude. Positive value shows east longitude.

(6) Pixel Data Quality

The quality flag is stored for each observation point.

Table 4.2-1 Pixel Data Quality of TPW

No	Status	bit7～bit4 Error				bit3～bit0 Normal				Unsigned byte	Signed byte
01	Clear sky	0	0	0	0	0	0	0	0	**0**	**0**
02	Cloud	0	0	0	0	0	0	0	1	**1**	**1**
03	Light rain	0	0	0	0	0	0	1	0	**2**	**2**
04	Heavy rain	0	0	0	1	0	0	0	0	**16**	**16**
05	Abnormal calculation of TPW	0	0	1	0	0	0	0	0	**32**	**32**
06	Abnormal calculation of sea surface emissivity	0	0	1	1	0	0	0	0	**48**	**48**
07	Invalid retrieval or RFI	0	1	0	0	0	0	0	0	**64**	**64**
08	Invalid retrieval of sea ice	0	1	0	1	0	0	0	0	**80**	**80**
09	Invalid L1	0	1	1	0	0	0	0	0	**96**	**96**
10	Sea ice	0	1	1	1	0	0	0	0	**112**	**112**
11	Land	1	0	0	0	0	0	0	0	**128**	**-128**
12	L1 Land/Ocean Flag Error	1	0	0	1	0	0	0	0	**144**	**-112**

Table 4.2-2 Pixel Data Quality of CLW

No	Status	bit7～bit4 Error				bit3～bit0 Normal				Unsigned byte	Signed byte
01	Clear sky	0	0	0	0	0	0	0	0	**0**	**0**
02	Cloud	0	0	0	0	0	0	0	1	**1**	**1**
03	Light rain	0	0	0	0	0	0	1	0	**2**	**2**
04	Negative CLW	0	0	0	0	0	0	1	1	**3**	**3**
05	Heavy rain	0	0	0	1	0	0	0	0	**16**	**16**
06	Abnormal calculation of TPW	0	0	1	0	0	0	0	0	**32**	**32**
07	Abnormal calculation of sea surface emissivity	0	0	1	1	0	0	0	0	**48**	**48**
08	Invalid retrieval or RFI	0	1	0	0	0	0	0	0	**64**	**64**
09	Invalid retrieval of sea ice	0	1	0	1	0	0	0	0	**80**	**80**
10	Invalid L1	0	1	1	0	0	0	0	0	**96**	**96**
11	Sea ice	0	1	1	1	0	0	0	0	**112**	**112**
12	Land	1	0	0	0	0	0	0	0	**128**	**-128**
13	L1 Land/Ocean Flag Error	1	0	0	1	0	0	0	0	**144**	**-112**

Table 4.2-3 Pixel Data Quality of SMC

No	Status	bit7～bit4 Error				bit3～bit0 Normal				Unsigned byte	Signed byte
01	Retrieval done	0	0	0	0	0	0	0	0	**0**	**0**
02	Possible precipitation area	0	0	0	0	0	0	0	1	**1**	**1**
03	Invalid L1	0	0	0	1	0	0	0	0	**16**	**16**
04	L1 Land/Ocean Flag Error	0	0	1	0	0	0	0	0	**32**	**32**
05	Retrieval error	0	0	1	1	0	0	0	0	**48**	**48**

Table 4.2-4 Pixel Data Quality of PRC

No	Status	bit7～bit4 Error				bit3～bit0 Normal				Unsigned byte	Signed byte
01	Ocean	0	0	0	0	0	0	0	0	**0**	**0**
02	Land	0	0	0	0	0	0	0	1	**1**	**1**
03	Coast	0	0	0	0	0	0	1	0	**2**	**2**
04	Latitude is out of range	0	0	0	1	0	0	0	0	**16**	**16**
05	Regions of low temperatures	0	0	1	0	0	0	0	0	**32**	**32**
06	Regions of sea ice	0	0	1	1	0	0	0	0	**48**	**48**
07	TB out of range	0	1	0	0	0	0	0	0	**64**	**64**
08	Invalid TB (TB missing)	0	1	0	1	0	0	0	0	**80**	**80**
09	Satellite attitude out of range	0	1	1	0	0	0	0	0	**96**	**96**
10	L1 Land/Ocean Flag Error	0	1	1	1	0	0	0	0	**112**	**112**

Table 4.2-5 Pixel Data Quality of SST (6G SST)

No	Status	bit7～bit4 Error				bit3～bit0 Normal				Unsigned byte	Signed byte
01	Normal	0	0	0	0	0	0	0	0	0	0
02	strong wind (13 - 27 m/s)	0	0	0	0	0	0	0	1	1	1
03	light rain (below several mm/h)	0	0	0	0	0	0	1	0	2	2
04	satellite attitude out (incident angle: below 54 or over 56 degrees) (roll angle: above 0.01 degrees)	0	0	0	1	0	0	0	0	16	16
05	land area (above 2 %)	0	0	1	0	0	0	0	0	32	32
06	sea ice	0	0	1	1	0	0	0	0	48	48
07	sun glint (less than 25 degrees)	0	1	0	0	0	0	0	0	64	64
08	rain (above several mm/h)	0	1	0	1	0	0	0	0	80	80
09	abnormal SST (Sea Surface Temperature) or RFI (Radio Frequency Interference)	0	1	1	0	0	0	0	0	96	96
10	strong wind (above 27 m/s)	0	1	1	1	0	0	0	0	112	112
11	cold SST (Sea Surface Temperature) (below minus 2 degC)	1	0	0	0	0	0	0	0	128	-128

Notice: The Accuracy of the No.2, and No. 3 is worse than No.1.

Table 4.2-6 Pixel Data Quality of SST (10G SST)

No	Status	bit7～bit4 Error				bit3～bit0 Normal				Unsigned byte	Signed byte
01	Normal	0	0	0	0	0	0	0	0	**0**	**0**
02	strong wind (13 - 27 m/s)	0	0	0	0	0	0	0	1	**1**	**1**
03	SST (Sea Surface Temperature) below 9 degC	0	0	0	0	0	0	1	0	**2**	**2**
04	strong wind (13 - 27 m/s) and SST (Sea Surface Temperature) below 9 degC	0	0	0	0	0	0	1	1	**3**	**3**
05	satellite attitude out (incident angle: below 54 or over 56 degrees) (roll angle: above 0.01 degrees)	0	0	0	1	0	0	0	0	**16**	**16**
06	land area (above 2 %)	0	0	1	0	0	0	0	0	**32**	**32**
07	sea ice	0	0	1	1	0	0	0	0	**48**	**48**
08	sun glint (less than 25 degrees)	0	1	0	0	0	0	0	0	**64**	**64**
09	rain	0	1	0	1	0	0	0	0	**80**	**80**
10	abnormal SST (Sea Surface Temperature) or RFI (Radio Frequency Interference)	0	1	1	0	0	0	0	0	**96**	**96**
11	strong wind (above 27 m/s)	0	1	1	1	0	0	0	0	**112**	**112**
12	cold SST (Sea Surface Temperature) (below minus 2 degC)	1	0	0	0	0	0	0	0	**128**	**-128**

Notice: The Accuracy of the No.2, No.3 and No. 4 is worse than No.1.

Table 4.2-7 Pixel Data Quality of SST (Multi Band SST)

No	Status	bit7～bit4 Error				bit3～bit0 Normal				Unsigned byte	Signed byte
01	Normal	0	0	0	0	0	0	0	0	**0**	**0**
02	strong wind (13 - 27 m/s)	0	0	0	0	0	0	0	1	**1**	**1**
03	light rain (below several mm/h)	0	0	0	0	0	0	1	0	**2**	**2**
04	land area in 6GHz SST (Sea Surface Temperature)	0	0	0	0	0	1	0	0	**4**	**4**
05	satellite attitude out (incident angle: below 54 or over 56 degrees) (roll angle: above 0.01 degrees)	0	0	0	1	0	0	0	0	**16**	**16**
06	land area (above 2 %)	0	0	1	0	0	0	0	0	**32**	**32**
07	sea ice	0	0	1	1	0	0	0	0	**48**	**48**
08	sun glint (less than 25 degrees)	0	1	0	0	0	0	0	0	**64**	**64**
09	rain (above several mm/h)	0	1	0	1	0	0	0	0	**80**	**80**
10	abnormal SST (Sea Surface Temperature) or RFI (Radio Frequency Interference)	0	1	1	0	0	0	0	0	**96**	**96**
11	strong wind (above 27 m/s)	0	1	1	1	0	0	0	0	**112**	**112**
12	cold SST (Sea Surface Temperature) (below minus 2 degC)	1	0	0	0	0	0	0	0	**128**	**-128**

Notice: The Accuracy of No.2, No.3 and No. 4 is worse than No.1.

Table 4.2-8 Pixel Data Quality of SSW

No	Status	bit7～bit4 Error				bit3～bit0 Normal				Unsigned byte	Signed byte
01	Normal	0	0	0	0	0	0	0	0	**0**	**0**
02	Incident angle error	0	0	0	1	0	0	0	0	**16**	**16**
03	Land area	0	0	1	0	0	0	0	0	**32**	**32**
04	Sea ice	0	0	1	1	0	0	0	0	**48**	**48**
05	Sun glitter	0	1	0	0	0	0	0	0	**64**	**64**
06	Rain、abnormal TB	0	1	0	1	0	0	0	0	**80**	**80**
07	Abnormal wind speed	0	1	1	0	0	0	0	0	**96**	**96**
08	No data of w6 in correcting wind direction	0	1	1	1	0	0	0	0	**112**	**112**
09	RFI	1	0	0	0	0	0	0	0	**128**	**-128**

Table 4.2-9 Pixel Data Quality of SND

No	Status	bit7～bit4 Error				bit3～bit0 Normal				Unsigned byte	Signed byte
01	No snow	0	0	0	0	0	0	0	1	**1**	**1**
02	Wet snow	0	0	0	0	0	0	1	0	**2**	**2**
03	Dry snow	0	0	0	0	0	0	1	1	**3**	**3**
04	Cold snow	0	0	0	0	0	1	0	0	**4**	**4**
05	High elevation false snow (frozen ground)	0	0	0	0	0	1	0	1	**5**	**5**
06	Shallow snow	0	0	0	0	0	1	1	0	**6**	**6**
07	Ocean	0	0	0	1	0	0	0	0	**16**	**16**
08	Snow impossible	0	0	1	0	0	0	0	0	**32**	**32**
09	Permanent ice	0	0	1	1	0	0	0	0	**48**	**48**
10	Lake Ice	0	1	0	0	0	0	0	0	**64**	**64**
11	Lake	0	1	0	1	0	0	0	0	**80**	**80**
12	Tb out of range	1	1	0	0	0	0	0	0	**192**	**-64**
13	Satellite attitude out	1	1	0	1	0	0	0	0	**208**	**-48**
14	Missing Tb values	1	1	1	0	0	0	0	0	**224**	**-32**
15	No data snow density	1	1	1	1	0	0	0	0	**240**	**-16**

Table 4.2-10 Pixel Data Quality of SIC

No	Status	bit7～bit4 Error				bit3～bit0 Normal				Unsigned byte	Signed byte
01	Normal	0	0	0	0	0	0	0	0	**0**	**0**
02	SST mask	0	0	0	0	0	0	0	1	**1**	**1**
03	Latitude mask	0	0	0	0	0	0	1	0	**2**	**2**
04	Land filter target pixel	0	0	0	0	0	1	0	0	**4**	**4**
05	not used（will be used by RFI）	0	0	0	1	0	0	0	0	**16**	**16**
06	Land mask	0	0	1	0	0	0	0	0	**32**	**32**
07	Satellite attitude out	0	1	0	0	0	0	0	0	**64**	**64**
08	Invalid TB	1	0	0	0	0	0	0	0	**128**	**-128**
09	L1 Land/Ocean Flag Error	1	0	0	1	0	0	0	0	**144**	**-112**

4.3 Dataset (High resolution)

(1) Scan Time

See the “Scan time” of low resolution.

(2) Position in Orbit

See the “Position in Orbit” of low resolution.

(3) Geophysical Data for 89A

The geophysical quantity data processed by Level 2 algorithm is stored on the earth surface at 89GHz A-horn.

Item	geophysical quantity	Minimum	Maximum	Error value	Unit	Remarks
Geophysical Data	Precipitation	-327.60	327.67	-32761 ～ -32768	mm/h	-

(4) Geophysical Data for 89B

The geophysical quantity data processed by Level 2 algorithm is stored on the earth surface at 89GHz B-horn.

(5) Latitude of Observation Point for 89A

The latitude of the observation point on the earth surface at 89GHz A-horn is stored.

$$-90° < latitude \leq 90°$$

Item	Minimum	Maximum	Error value	Unit	Remarks
Latitude of Observation Point for 89A	-90.00	90.00	-9999.0	deg	Negative value shows south latitude. Positive value shows north latitude.

(6) Longitude of Observation Point for 89A

The longitude of the observation point on the earth surface at 89GHz A-horn is stored.

$$-180° < longitude \leq 180°$$

Item	Minimum	Maximum	Error value	Unit	Remarks
Longitude of Observation Point for 89A	-180.00	180.00	-9999.0	deg	Negative value shows west longitude. Positive value shows east longitude.

(7) Lat of Observation Point for 89B

The latitude of the observation point on the earth surface at 89GHz B-horn is stored. The data range and abnormal value are the same as 89 GHz A-horn.

(8) Long of Observation Point for 89B

The longitude to the observation point on the earth surface at 89GHz B-horn is stored. The data range and abnormal value are the same as 89 GHz A-horn.

(9) Pixel Data Quality for 89A

See the Table 4.2-4 Pixel Data Quality of PRC.

(10) Pixel Data Quality for 89B

See the Table 4.2-4 Pixel Data Quality of PRC.

AMSR2 Level 3 product format specification

Change record

Issue	Date	Sheet	Description of change
NC	2013/05	—	—
Rev.A	2013/12	—	The scale factor of PRC was modified from 0.1 to 0.01. Add notes for the two-layer structure of SND.
Rev.B	2015/03	—	Add notes for the two-layer structure of SST (addition of 10GHz SST). Correction of errors about Product metadata items count. Update description of Dataset Items.(Brightness Temperature/ Geophysical Data, Average Number, Total Number)
Rev. C	2016/07	3-14 3-15 3-18 3-19 3-22 3-23 3-26 3-27	Add information about SWE (Scale factor / Units)
Rev.D	2020/03	3-12～3-29	Table 3-6～Table 3-33 (*1) Add description about product compression.

-Content-

1 Introduction

1.1 Purpose

This format specification describes the format of AMSR2 level 3 product file which is produced at Japan Aerospace Exploration Agency (JAXA). This document describes the structure and contents of AMSR2 level 3 product file.

1.2 Overview

AMSR2 level 3 product file stores the daily or monthly average data calculated level 1B or level 2 and static information, and projected it on each map by equi-rectangular and polar stereo projection. There are two types of daily AMSR2 level 3 product file by the kind of geophysical quantities. One is a daily average data, another is overwrite data in the day.

2 Applicable and reference documents

2.1 Applicable documents

- EIS granule ID prescription（NEB-060005B）

2.2 Reference documents

- AMSR-E Data Users Handbook(NCX-030021)
- AMSR-E Level 1 product format description（NEB-00011F）
- AMSR-E Level 2 format description (NDX-000272C)
- AMSR-E Level 2 Map format description (NDX-000273D)
- AMSR-E Level 3 format description (NDX-000274B)

3 Product description

AMSR2 level 3 product file stores the daily or monthly average data calculated level 1B or level 2 and static information. The features of the product are shown as below.

3.1 Structure of product file

The structure of AMSR2 Level3 product file (Daily) is shown in Table3-1. And The AMSR2 Level3 product file (Monthly) is show in Table3-2.

Table 3-1 Daily AMSR2 Level 3 product file structure

Structure		HDF Data	Content
Header	Product Metadata	Attribute	Describe unique information of the product data.
Data		Dataset	The example of the stored data is shown as below. ・Averaged or overwritten data ・Time information. (Average case shows negative value, overwrite case shows the time overwritten.)

Table 3-2 AMSR2 Monthly AMSR2 Level 3 product file structure

Structure		HDF Data	Content
Header	Product Metadata	Header	Describe unique information of the product data.
Data		Dataset	The example of the stored data is shown as below. ・Averaged data ・Static information ・Standard deviation ・Total number of data ・Average data

Table 3-3 Geophysical quantity and projection

Geophysical quantity	Projection	Data type	Resolution
Brightness Temperature	EQR	Daily / Monthly	High[0.1°] / Low[0.25°]
	Northern polar stereo	Daily / Monthly	High[10km] / Low[0.25km]
	Southern polar stereo	Daily / Monthly	High[10km] / Low[0.25km]
Total Precipitable Water	EQR	Daily / Monthly	High[0.1°] / Low[0.25°]
Cloud Liquid Water	EQR	Daily / Monthly	High[0.1°] / Low[0.25°]
Precipitation	EQR	Daily / Monthly	High[0.1°] / Low[0.25°]
Sea Surface Wind speed	EQR	Daily / Monthly	High[0.1°] / Low[0.25°]
Sea Surface Temperature	EQR	Daily / Monthly	High[0.1°] / Low[0.25°]
Sea Ice Concentration	EQR	Daily / Monthly	High[0.1°] / Low[0.25°]
Snow Depth	Northern polar stereo	Daily / Monthly	High[10km] / Low[0.25km]
	Southern polar stereo	Daily / Monthly	High[10km] / Low[0.25km]
Soil Moisture Content	EQR	Daily / Monthly	High[0.1°] / Low[0.25°]
	Northern polar stereo	Daily / Monthly	High[10km] / Low[0.25km]

Table 3-4 Static method of daily level 3 product

Geophysical quantity	Static method
Brightness Temperature	Average
Sea Ice Concentration	
Snow Depth	
Soil Moisture Content	
Total Precipitable Water	Overwrite by latest data
Cloud Liquid Water	
Precipitation	
Sea Surface Wind speed	
Sea Surface Temperature	

* In case of monthly level 3 is processed by average method.

3.2 Structure of data

Fig. 3.4.1-1 Structure of daily AMSR2level 3product ～Fig. 3.4.1-4 shows structure of AMSR2 level 3 product data. Table 3-5 ~ Table 3-33 Data set list [Northern PS - SND] shows data set specification of level 3 product data.

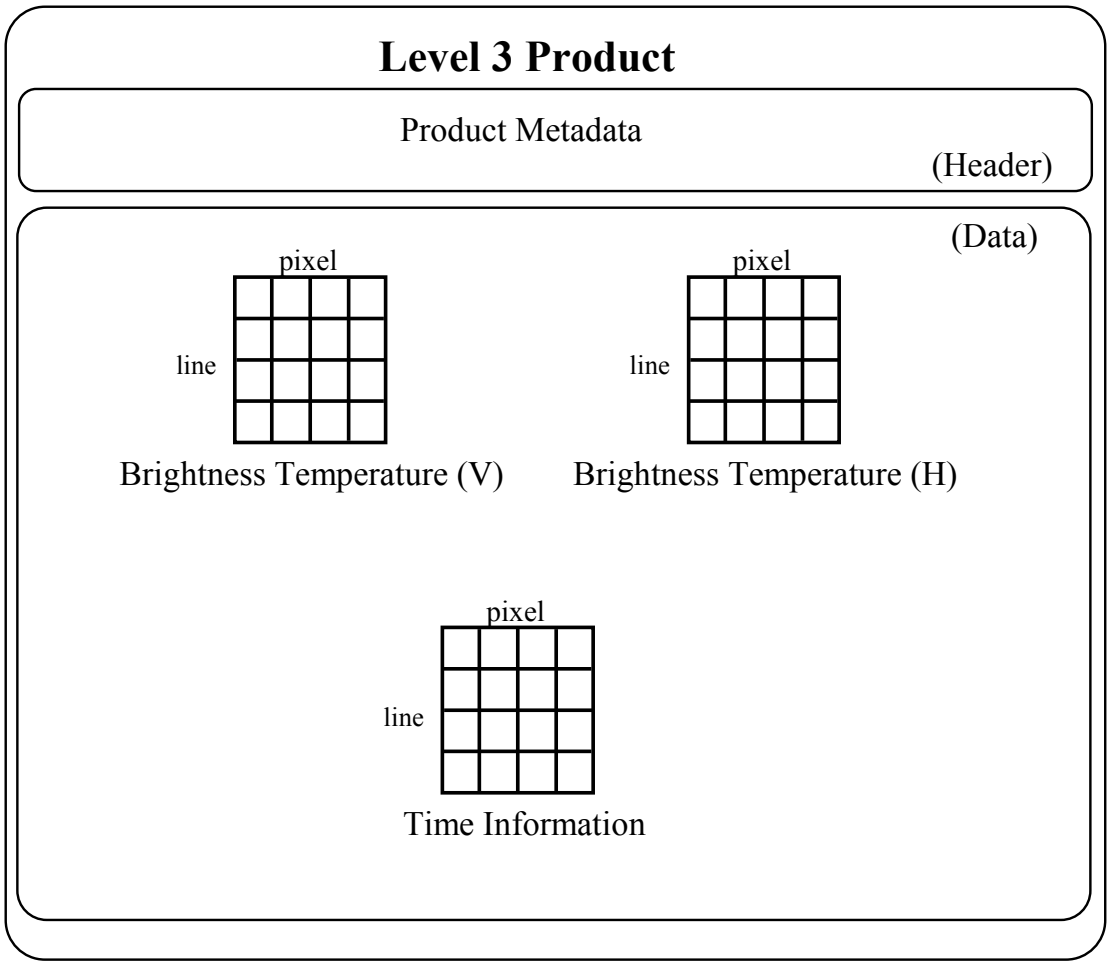


Fig. 3.4.1-1 Structure of daily AMSR2level 3product [Brightness temperature]

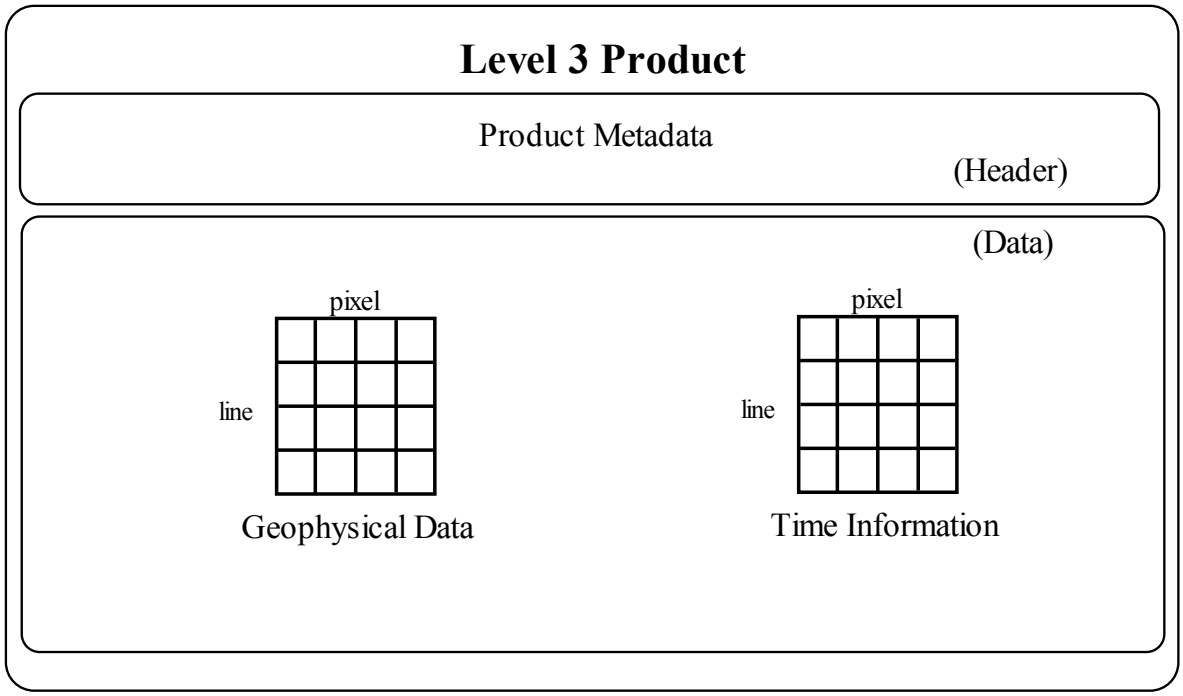


Fig. 3.4.1-2 Structure of daily AMSR2level 3product [Geophysical quantity]

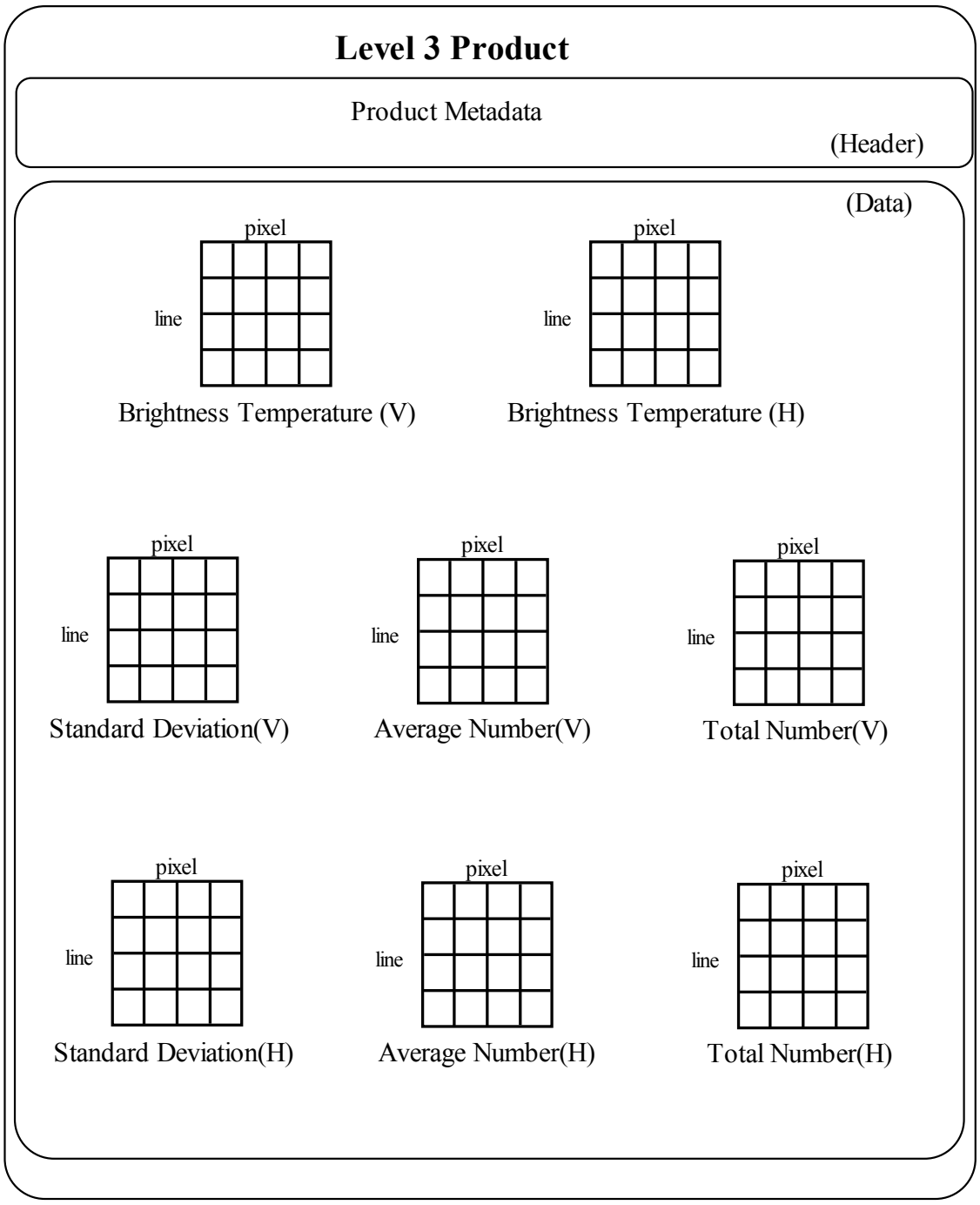


Fig. 3.4.1-3 Structure of monthly AMSR2level 3product [Brightness temperature]

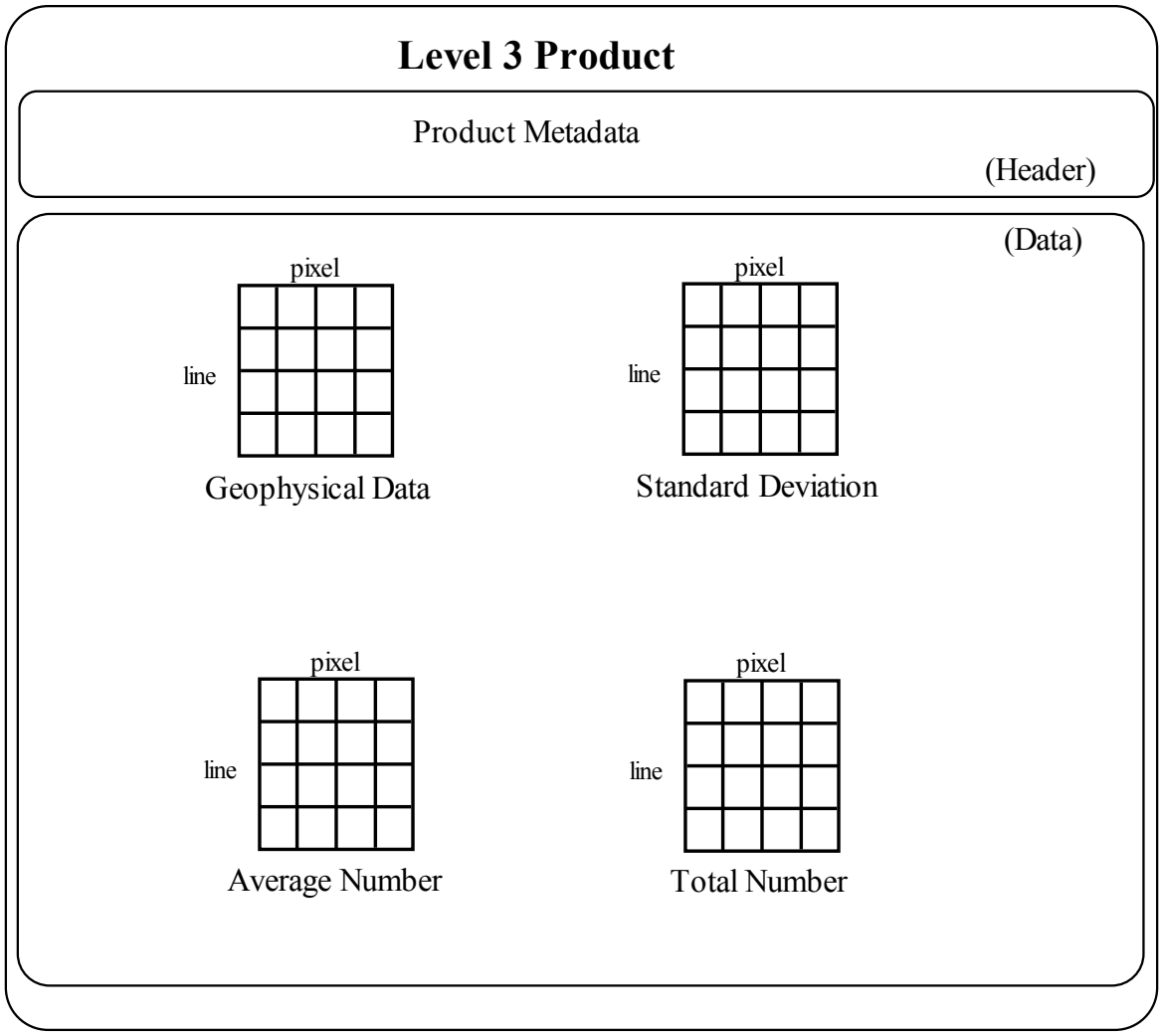


Fig. 3.4.1-4 Structure of monthly AMSR2level 3product [Geophysical quantity]

Table 3-5 Product metadata items

No	MetaDataName	Max Size (Byte)	Japanese Name	Explanation/Range	Fixed/Variable
1	ProductName	12	Abbreviated name	[Daily/Monthly] [XXXXXXXXXXXX] AMSR2-L3	Fixed
2	GeophysicalName	36	Geophysical quantity name	[Daily/Monthly] [XXXXXXXXXXXXXXXXX] Total Precipitable Water Cloud Liquid Water Precipitation Sea Surface Temperature Sea Surface Wind speed Sea Ice Concentration Snow Depth Soil Moisture Content Brightness Temperature (89GHz) etc	Variable
3	MeanType	16	Average method	[Daily/Monthly] [XXXXXXXXX] DayMean : Daily average DayOverwrite : Daily overwrite MonthMean : Monthly average	Variable
4	Projection	5	Projection type	[Daily/Monthly] [XXXXX] EQR : Equi-rectangular PS-N : Northern polar stereo PS-S : Southern polar stereo	Variable
5	Resolution	7	Resolution vslue	[Daily/Monthly] 0.1deg 0.25deg 10km 25km	Variable

No	MetaDataName	Max Size (Byte)	Japanese Name	Explanation/Range	Fixed/Variable
6	ProductVersion	1	Product version	[Daily/Monthly] [X] 0～Z	Variable
7	AlgorithmVersion	3	Algorithm version	[Daily/Monthly] [XXX] 0～999	Variable
8	ParameterVersion	3	Parameter version	[Daily/Monthly] [XXX] 0～999	Variable
9	ProductSize_MByte	8	Product size(MByte)	[Daily/Monthly] [XXXXX. X][x 1024 x 1024byte] 0. 0～99999. 9	Variable
10	AlgorithmDeveloper	8	Algorithm Developer code	[Daily/Monthly] [XXXXXXXXXXXX]	Variable
11	GranuleID	64	Granule ID	[Daily/Monthly] [XXXXXXXXXXXX]	Variable
12	ProductionDateTime	24	Product creation time and date (UTC)	[Daily/Monthly] [YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(milli-second)	Variable

No	MetaDataName	Max Size (Byte)	Japanese Name	Explanation/Range	Fixed/Variable
13	ObservationStartDateTime	25	Start time and date of observation data（UTC）	[Daily/Monthly] [YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(milli-second)	Variable
14	ObservationEndDateTime	25	End time and date of observation data（UTC）	[Daily/Monthly] [YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(milli-second)	Variable
15	PGEName	20	Data processing software name	[Daily/Monthly] [XXXXXXXXXXXX] XXXXXXXXXXXX : Strings	Fixed
16	InputFileName	30000	Input file name (Level1 or Level2 data file name)	[Daily/Monthly] Ex.) XXXXXXXXXXXX, XXXXXXXXXXXX	Variable
17	ProcessingCenter	12	Data processing center	[Daily/Monthly] [XXXXXXXXXXXX] XXXXXXXXXXXX : Strings	Fixed
18	ContactOrganizationName	300	Contact organization name	[Daily/Monthly] [XXXXXXXXXXXX] XXXXXXXXXXXX : Strings	Fixed
19	ContactOrganizationTelephone	16	Contact telephone number	[Daily/Monthly]	Fixed

No	MetaDataName	Max Size (Byte)	Japanese Name	Explanation/Range	Fixed/Variable
				[+050-0000-0000]	
20	StartOrbitNumber	6	Start orbit number	[Daily/Monthly] [XXXXX] 0～99999	Variable
21	StopOrbitNumber	6	End orbit number	[Daily/Monthly] [XXXXX] 0～99999	Variable
22	OrbitDirection	11	Orbit direction	[Daily/Monthly] [XXXXXXXXX] Ascending Descending	Variable
23	PlatformShortName	8	Platform name	[Daily/Monthly] [XXXXXXXX] GCOM-W1	Fixed
24	SensorShortName	8	Sensor names	[Daily/Monthly] [XXXXXXXX] AMSR2	Fixed
25	ECSDataModel	8	Meta data model name	[Daily/Monthly] [B.0] String	Fixed

(1)Daily [High resolution]

Table 3-6 Data set list [EQR - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	3,600	2	unsigned int	7,200	1,800	12,960,000	0.01	K
3	Brightness Temperature (H)	3,600	2	unsigned int	7,200	1,800	12,960,000	0.01	K
4	Time Information	3,600	2	signed int	7,200	1,800	12,960,000	1.00	min
	Total(Bytes)						38,882,500		
	Total(MB)						***37.08*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 40% to 50% of uncompressed.

Table 3-7 Data set list [Northern PS - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	760	2	unsigned int	1,520	1,120	1,702,400	0.01	K
3	Brightness Temperature (H)	760	2	unsigned int	1,520	1,120	1,702,400	0.01	K
4	Time Information	760	2	signed int	1,520	1,120	1,702,400	1.00	min
	Total(Bytes)						5,109,700		
	Total(MB)						***4.87*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 50% to 60% of uncompressed.

Table 3-8 Data set list [Southern PS - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	790	2	unsigned int	1,580	830	1,311,400	0.01	K
3	Brightness Temperature (H)	790	2	unsigned int	1,580	830	1,311,400	0.01	K
4	Time Information	790	2	signed int	1,580	830	1,311,400	1.00	min
	Total(Bytes)						3,936,700		
	Total(MB)						***3.75*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 50% to 60% of uncompr essed.

Table 3-9 Data set list [EQR - Geophysical quantity]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	3,600	2	signed int	7,200	1,800	12,960,000	0.01 0.001 0.01 0.01 0.01 0.1 0.1	TPW:kg/m2 CLW:kg/m2 PRC:mm/h SSW:m/s SST:˚C SND: cm SMC: %
3	Time Information	3,600	2	signed int	7,200	1,800	12,960,000	1.00	min
	Total(Bytes)						25,922,500		
	Total(MB)						***24.72*** (*1)		

*Geophysical Data of SND has the two-layer structure. Primary SND is stored in the first layer. SWE, which is calculated from the SND (Snow water: Snow Water Equivalent) is stored in the second layer. So, the data size is also doubled. SWE: Scale factor = 0.1, Units = cm.

*Geophysical Data of SST has the two-layer structure. Primary SST observed by 6GHz is stored in the first layer. SST observed by 10GHz, which has higher spatial resolution than the primary SST (more pixels are available in coastal area), is stored in the second layer So, the data size is also doubled.

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 1% to 20% of uncompressed.

Table 3-10 Data set list [Northern PS - SIC]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	760	2	signed int	1,520	1,120	1,702,400	0.1	SIC:%
3	Time Information	760	2	signed int	1,520	1,120	1,702,400	1.00	min
	Total(Bytes)						3,407,300		
	Total(MB)						***3.25*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 1% of uncompressed.

Table 3-11 Data set list [Southern PS - SIC]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	790	2	signed int	1,580	830	1,311,400	0.1	SIC:%
3	Time Information	790	2	signed int	1,580	830	1,311,400	1.00	min
	Total(Bytes)						2,625,300		
	Total(MB)						***2.50*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 1% of uncompressed.

Table 3-12 Data set list [Northern PS - SND]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	1,080	2	signed int	2,160	1,435	3,099,600	0.1	SND:cm
3	Time Information	1,080	2	signed int	2,160	1,435	3,099,600	1	min
	Total(Bytes)						6,201,700		
	Total(MB)						***5.91*** (*1)		

*Geophysical Data of SND has the two-layer structure. Primary SND is stored in the first layer. SWE, which is calculated from the SND (Snow water: Snow Water Equivalent) is stored in the second layer. So, the data size is also doubled. SWE: Scale factor = 0.1, Units = cm.

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 1% of uncompressed.

(2)Daily [Low resolution]

Table 3-13 Data set list [EQR - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	1,440	2	unsigned int	2,880	720	2,076,480	0.01	K
3	Brightness Temperature (H)	1,440	2	unsigned int	2,880	720	2,076,480	0.01	K
4	Time Information	1,440	2	signed int	2,880	720	2,076,480	1.00	min
	Total(Bytes)						6,231,940		
	Total(MB)						***5.94*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 40% to 50% of uncompressed.

Table 3-14 Data set list [Northern PS - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	304	2	unsigned int	608	448	272,384	0.01	K
3	Brightness Temperature (H)	304	2	unsigned int	608	448	272,384	0.01	K
4	Time Information	304	2	signed int	608	448	272,384	1.00	min
	Total(Bytes)						819,652		
	Total(MB)						***0.78*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 50% to 60% of uncompressed.

Table 3-15 Data set list [Southern PS - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	316	2	unsigned int	632	332	209,824	0.01	K
3	Brightness Temperature (H)	316	2	unsigned int	632	332	209,824	0.01	K
4	Time Information	316	2	signed int	632	332	209,824	1.00	min
	Total(Bytes)						631,972		
	Total(MB)						***0.60*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 60% of uncompressed.

Table 3-16 Data set list [EQR - Geophysical quantity]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	1,440	2	signed int	2,880	720	2,076,480	0.01 0.001 0.01 0.01 0.01 0.1 0.1	TPW:kg/m2 CLW:kg/m2 PRC:mm/h SSW:m/s SST:˚C SND: cm SMC: %
3	Time Information	1,440	2	signed int	2,880	720	2,076,480	1.00	min
	Total(Bytes)						4,155,460		
	Total(MB)						***3.96*** (*1)		

*Geophysical Data of SND has the two-layer structure. Primary SND is stored in the first layer. SWE, which is calculated from the SND (Snow water: Snow Water Equivalent) is stored in the second layer. So, the data size is also doubled. SWE: Scale factor = 0.1, Units = cm.
*Geophysical Data of SST has the two-layer structure. Primary SST observed by 6GHz is stored in the first layer. SST observed by 10GHz, which has higher spatial resolution than the primary SST (more pixe ls are available in coastal area), is stored in the second layer. So, the data size is also doubled.

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 1% to 20% of uncompr essed.

Table 3-17 Data set list [Northern PS - SIC]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	304	2	signed int	608	448	272,384	0.1	SIC:%
3	Time Information	304	2	signed int	608	448	272,384	1.00	min
	Total(Bytes)						547,268		
	Total(MB)						***0.52*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 1% of uncompressed.

Table 3-18 Data set list [Southern PS - SIC]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	316	2	signed int	632	332	209,824	0.1	SIC:%
3	Time Information	316	2	signed int	632	332	209,824	1.00	min
	Total(Bytes)						422,148		
	Total(MB)						***0.40*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 1% of uncompressed.

Table 3-19 Data set list [Northern PS - SND]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	432	2	signed int	864	574	495,936	0.1	SND:cm
3	Time Information	432	2	signed int	864	574	495,936	1	min
	Total(Bytes)						994,372		
	Total(MB)						***0.95*** (*1)		

*Geophysical Data of SND has the two-layer structure. Primary SND is stored in the first layer. SWE, which is calculated from the SND (Snow water: Snow Water Equivalent) is stored in the second layer. So, the data size is also doubled. SWE: Scale factor = 0.1, Units = cm.

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 1% of uncompressed.

(3)Monthly [High resolution]

Table 3-20 Data set list [EQR - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	3,600	2	unsigned int	7,200	1,800	12,960,000	0.01	K
3	Brightness Temperature (H)	3,600	2	unsigned int	7,200	1,800	12,960,000	0.01	K
4	Standard Deviation (V)	3,600	2	signed int	7,200	1,800	12,960,000	0.01	-
5	Average Number (V)	3,600	2	signed int	7,200	1,800	12,960,000	1.00	-
6	Total Number (V)	3,600	2	signed int	7,200	1,800	12,960,000	1.00	-
7	Standard Deviation (H)	3,600	2	signed int	7,200	1,800	12,960,000	0.01	-
8	Average Number (H)	3,600	2	signed int	7,200	1,800	12,960,000	1.00	-
9	Total Number (H)	3,600	2	signed int	7,200	1,800	12,960,000	1.00	-
	Total(Bytes)						103,682,500		
	Total(MB)						***98.88*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 20% to 30% of uncompressed.

Table 3-21 Data set list [Northern PS - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	760	2	unsigned int	1,520	1,120	1,702,400	0.01	K
3	Brightness Temperature (H)	760	2	unsigned int	1,520	1,120	1,702,400	0.01	K
4	Standard Deviation (V)	760	2	signed int	1,520	1,120	1,702,400	0.01	-
5	Average Number (V)	760	2	signed int	1,520	1,120	1,702,400	1.00	-
6	Total Number (V)	760	2	signed int	1,520	1,120	1,702,400	1.00	-
7	Standard Deviation (H)	760	2	signed int	1,520	1,120	1,702,400	0.01	-
8	Average Number (H)	760	2	signed int	1,520	1,120	1,702,400	1.00	-
9	Total Number (H)	760	2	signed int	1,520	1,120	1,702,400	1.00	-
	Total(Bytes)						13,621,700		
	Total(MB)						***12.99*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 20% to 30% of uncompressed.

Table 3-22 Data set list [Southern PS - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	790	2	unsigned int	1,580	830	1,311,400	0.01	K
3	Brightness Temperature (H)	790	2	unsigned int	1,580	830	1,311,400	0.01	K
4	Standard Deviation (V)	790	2	signed int	1,580	830	1,311,400	0.01	-
5	Average Number (V)	790	2	signed int	1,580	830	1,311,400	1.00	-
6	Total Number (V)	790	2	signed int	1,580	830	1,311,400	1.00	-
7	Standard Deviation (H)	790	2	signed int	1,580	830	1,311,400	0.01	-
8	Average Number (H)	790	2	signed int	1,580	830	1,311,400	1.00	-
9	Total Number (H)	790	2	signed int	1,580	830	1,311,400	1.00	-
	Total(Bytes)						10,493,700		
	Total(MB)						***10.01*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 20% to 30% of uncompressed.

Table 3-23 Data set list [EQR - Geophysical quantity]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	3,600	2	signed int	7,200	1,800	12,960,000	0.01 0.001 0.01 0.01 0.01 0.1 0.1	TPW:kg/m2 CLW:kg/m2 PRC:mm/h SSW:m/s SST:˚C SND: cm SMC: %
3	Standard Deviation	3,600	2	signed int	7,200	1,800	12,960,000	0.01	-
4	Average Number	3,600	2	signed int	7,200	1,800	12,960,000	1.00	-
5	Total Number	3,600	2	signed int	7,200	1,800	12,960,000	1.00	-
	Total(Bytes)						51,842,500		
	Total(MB)						***49.44*** (*1)		

*Geophysical Data of SND has the two-layer structure. Primary SND is stored in the first layer. SWE, which is calculated from the SND (Snow water: Snow Water Equivalent) is stored in the second layer. So, the data size is also doubled. SWE: Scale factor = 0.1, Units = cm.

* Geophysical Data of SST has the two-layer structure. Primary SST observed by 6GHz is stored in the first layer. SST observed by 10GHz, which has higher spatial resolution than the primary SST (more pixels are available in coastal area), is stored in the second layer So, the data size is also doubled.

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 1% to 30% of uncompressed.

Table 3-24 Data set list [Northern PS - SIC]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	760	2	signed int	1,520	1,120	1,702,400	0.1	SIC:%
3	Standard Deviation	760	2	signed int	1,520	1,120	1,702,400	0.01	-
4	Average Number	760	2	signed int	1,520	1,120	1,702,400	1.00	-
5	Total Number	760	2	signed int	1,520	1,120	1,702,400	1.00	-
	Total(Bytes)						6,812,100		
	Total(MB)						***6.50*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 1% of uncompressed.

Table 3-25 Data set list [Southern PS - SIC]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	790	2	signed int	1,580	830	1,311,400	0.1	SIC:%
3	Standard Deviation	790	2	signed int	1,580	830	1,311,400	0.01	-
4	Average Number	790	2	signed int	1,580	830	1,311,400	1.00	-
5	Total Number	790	2	signed int	1,580	830	1,311,400	1.00	-
	Total(Bytes)						5,248,100		
	Total(MB)						***5.00*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 1% of uncompressed.

Table 3-26 Data set list [Northern PS - SND]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	1,080	2	signed int	2,160	1,435	3,099,600	0.10	SND: cm
3	Standard Deviation	1,080	2	signed int	2,160	1,435	3,099,600	0.01	-
4	Average Number	1,080	2	signed int	2,160	1,435	3,099,600	1.00	-
5	Total Number	1,080	2	signed int	2,160	1,435	3,099,600	1.00	-
	Total(Bytes)						12,400,900		
	Total(MB)						***11.83*** (*1)		

*Geophysical Data of SND has the two-layer structure. Primary SND is stored in the first layer. SWE, which is calculated from the SND (Snow water: Snow Water Equivalent) is stored in the second layer.So, the data size is also doubled. SWE: Scale factor = 0.1, Units = cm.

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about 1% of uncompressed.

(4)Monthly [Low resolution]

Table 3-27 Data set list [EQR - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	1,440	2	unsigned int	2,880	720	2,076,480	0.01	K
3	Brightness Temperature (H)	1,440	2	unsigned int	2,880	720	2,076,480	0.01	K
4	Standard Deviation (V)	1,440	2	signed int	2,880	720	2,076,480	0.01	-
5	Average Number (V)	1,440	2	signed int	2,880	720	2,076,480	1.00	-
6	Total Number (V)	1,440	2	signed int	2,880	720	2,076,480	1.00	-
7	Standard Deviation (H)	1,440	2	signed int	2,880	720	2,076,480	0.01	-
8	Average Number (H)	1,440	2	signed int	2,880	720	2,076,480	1.00	-
9	Total Number (H)	1,440	2	signed int	2,880	720	2,076,480	1.00	-
	Total(Bytes)						16,614,340		
	Total(MB)						***15.84*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 30% to 50% of uncompressed.

Table 3-28 Data set list [Northern PS - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	304	2	unsigned int	608	448	272,384	0.01	K
3	Brightness Temperature (H)	304	2	unsigned int	608	448	272,384	0.01	K
4	Standard Deviation (V)	304	2	signed int	608	448	272,384	0.01	-
5	Average Number (V)	304	2	signed int	608	448	272,384	1.00	-
6	Total Number (V)	304	2	signed int	608	448	272,384	1.00	-
7	Standard Deviation (H)	304	2	signed int	608	448	272,384	0.01	-
8	Average Number (H)	304	2	signed int	608	448	272,384	1.00	-
9	Total Number (H)	304	2	signed int	608	448	272,384	1.00	-
	Total(Bytes)						2,181,572		
	Total(MB)						***2.08*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 40% to 60% of uncom pressed.

Table 3-29 Data set list [Southern PS - BT]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	ProductMeta Data	25	100	-	2,500	1	2,500	-	-
2	Brightness Temperature (V)	316	2	unsigned int	632	332	209,824	0.01	K
3	Brightness Temperature (H)	316	2	unsigned int	632	332	209,824	0.01	K
4	Standard Deviation (V)	316	2	signed int	632	332	209,824	0.01	-
5	Average Number (V)	316	2	signed int	632	332	209,824	1.00	-
6	Total Number (V)	316	2	signed int	632	332	209,824	1.00	-
7	Standard Deviation (H)	316	2	signed int	632	332	209,824	0.01	-
8	Average Number (H)	316	2	signed int	632	332	209,824	1.00	-
9	Total Number (H)	316	2	signed int	632	332	209,824	1.00	-
	Total(Bytes)						1,681,092		
	Total(MB)						***1.60*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 40% to 60% of uncompressed.

Table 3-30 Data set list [EQR - Geophysical quantity]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	Core Meta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	1,440	2	signed int	2,880	720	2,076,480	0.01 0.001 0.01 0.01 0.01 0.1 0.1	TPW:kg/m2 CLW:kg/m2 PRC:mm/h SSW:m/s SST:˚C SND: cm SMC: %
3	Standard Deviation	1,440	2	signed int	2,880	720	2,076,480	0.01	-
4	Average Number	1,440	2	signed int	2,880	720	2,076,480	1.00	-
5	Total Number	1,440	2	signed int	2,880	720	2,076,480	1.00	-
	Total(Bytes)						8,308,420		
	Total(MB)						***7.92*** (*1)		

*Geophysical Data of SND has the two-layer structure. Primary SND is stored in the first layer. SWE, which is calculated from the SND (Snow water: Snow Water Equivalent) is stored in the second layer. So, the data size is also doubled. SWE: Scale factor = 0.1, Units = cm.

*Geophysical Data of SST has the two-layer structure. Primary SST observed by 6GHz is stored in the first layer. SST observed by 10GHz, which has higher spatial resolution than the primary SST (more pixels are available in coastal area), is stored in the second layer So, the data size is also doubled.

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 1% to 30% of uncompressed.

Table 3-31 Data set list [Northern PS - SIC]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	Core Meta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	304	2	signed int	608	448	272,384	0.1	SIC:%
3	Standard Deviation	304	2	signed int	608	448	272,384	0.01	-
4	Average Number	304	2	signed int	608	448	272,384	1.00	-
5	Total Number	304	2	signed int	608	448	272,384	1.00	-
	Total(Bytes)						1,092,036		
	Total(MB)						***1.04*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 1% to 5% of uncompressed.

Table 3-32 Data set list [Southern PS - SIC]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	Core Meta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	316	2	signed int	632	332	209,824	0.1	SIC:%
3	Standard Deviation	316	2	signed int	632	332	209,824	0.01	-
4	Average Number	316	2	signed int	632	332	209,824	1.00	-
5	Total Number	316	2	signed int	632	332	209,824	1.00	-
	Total(Bytes)						841,796		
	Total(MB)						***0.80*** (*1)		

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 1% to 5% of uncompressed.

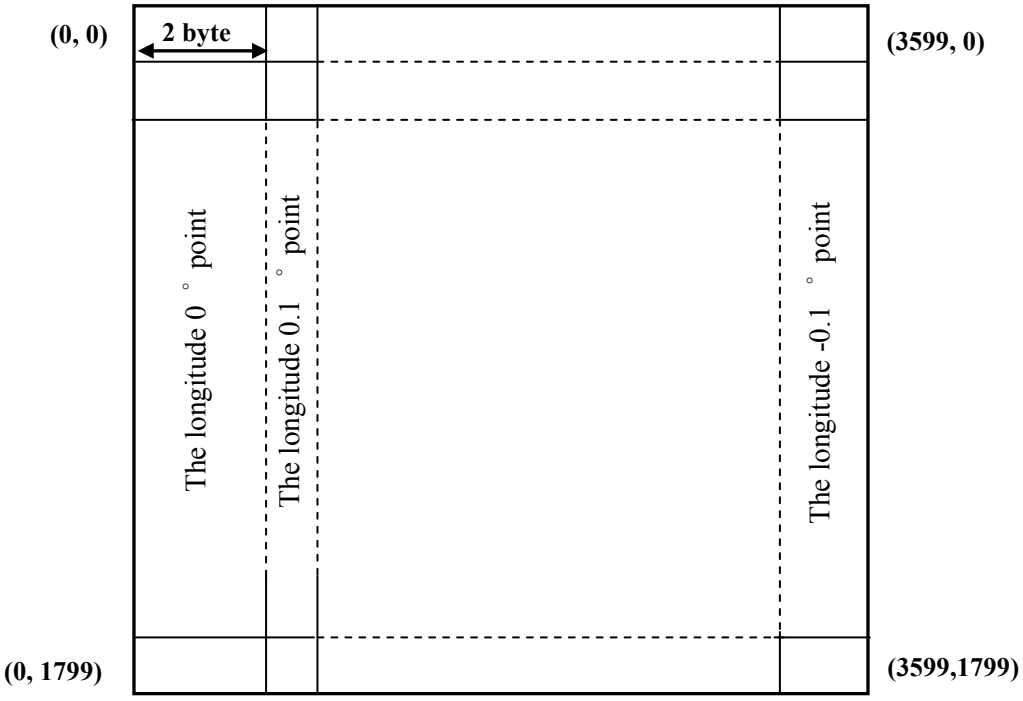
Table 3-33 Data set list [Northern PS - SND]

No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	Core Meta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	432	2	signed int	864	574	495,936	0.10	SND: cm
3	Standard Deviation	432	2	signed int	864	574	495,936	0.01	-
4	Average Number	432	2	signed int	864	574	495,936	1.00	-
5	Total Number	432	2	signed int	864	574	495,936	1.00	-
	Total(Bytes)						1,986,244		
	Total(MB)						***1.89*** (*1)		

*Geophysical Data of SND has the two-layer structure. Primary SND is stored in the first layer. SWE, which is calculated from the SND (Snow water: Snow Water Equivalent) is stored in the second layer. So, the data size is also doubled. SWE: Scale factor = 0.1, Units = cm.

(*1) The version 04.061 or later of MOS provides the internal compression function. The size of product file will be reduced to about from 1% to 5% of uncompressed.

3.3 Architecture of data



Brightness Temperature(V)
Brightness Temperature(H)
Time Information

Fig. 3.4.1-1 Structure of BT by EQR [Daily - High resolution]

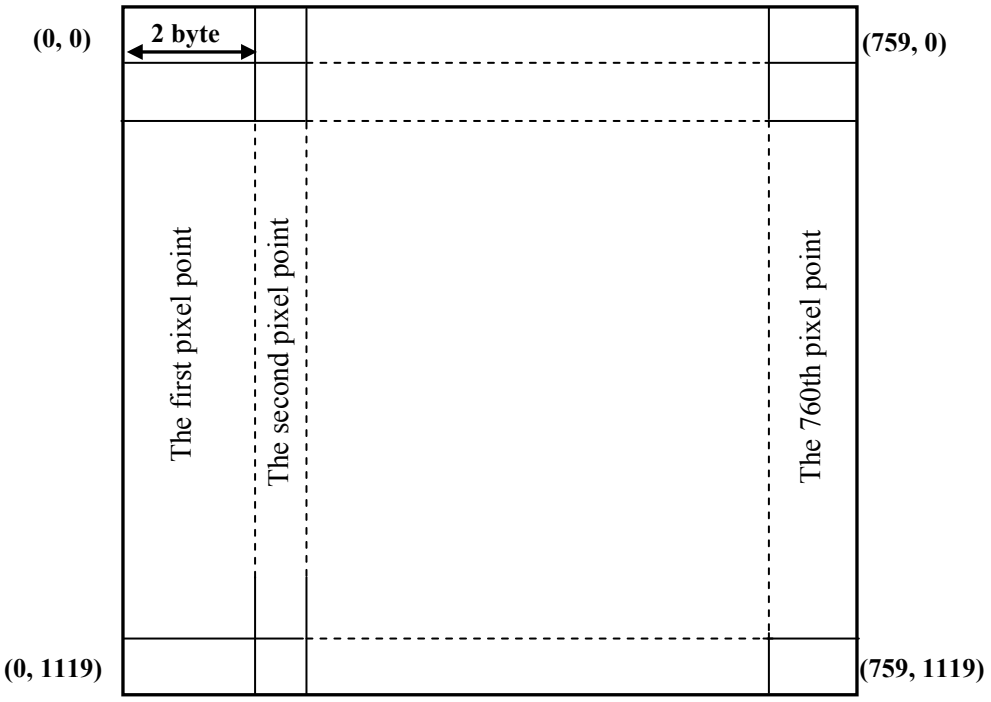
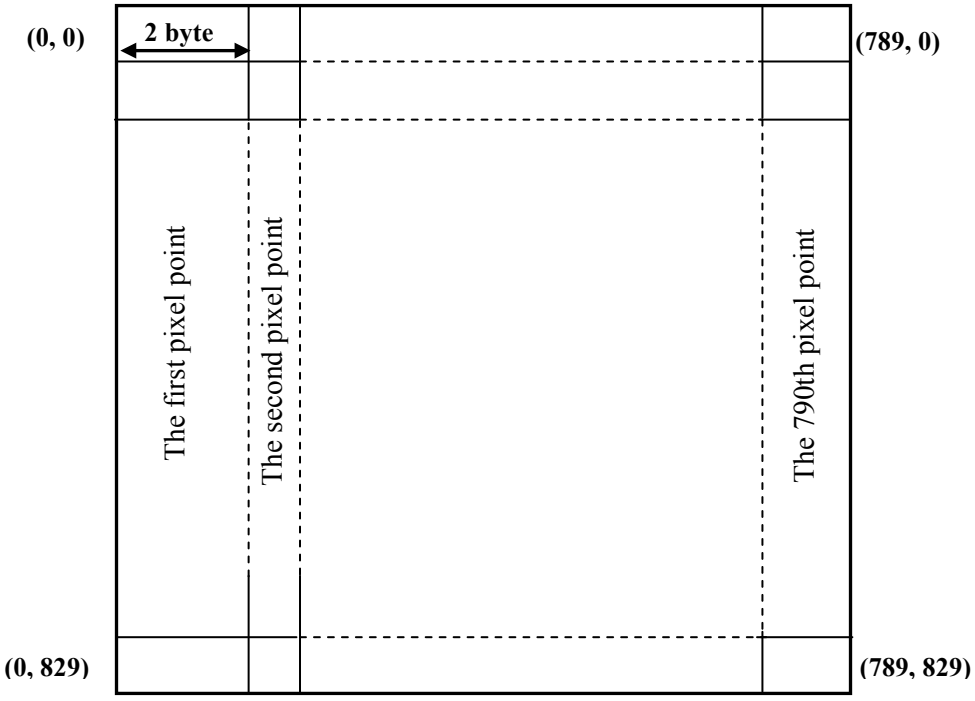
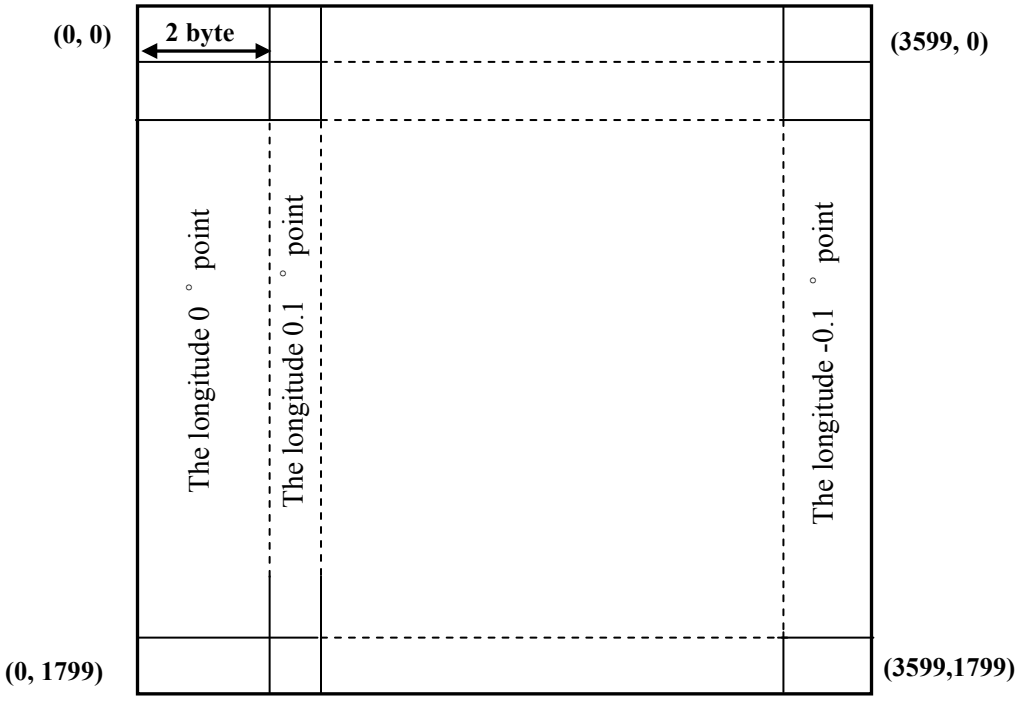


Fig. 3.4.1-2 Structure of BT by Northern PS [Daily - High resolution]



Brightness Temperature(V)
Brightness Temperature(H)
Time Information

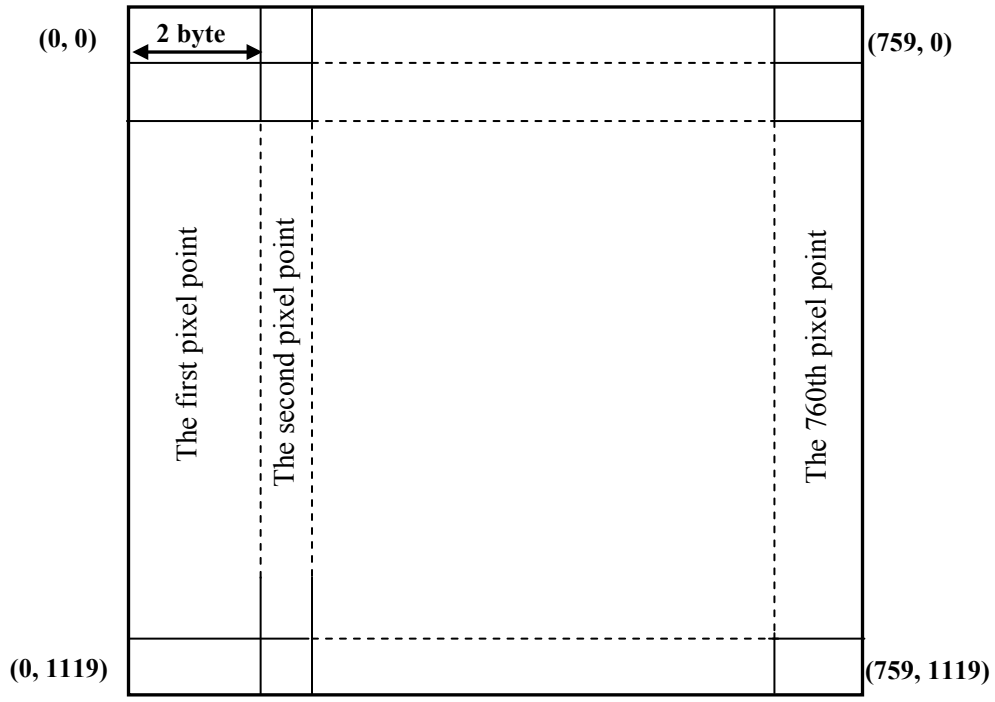
Fig. 3.4.1-3 Structure of BT by Southern PS [Daily - High resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

Fig. 3.4.1-4 Structure of Geophysical quantity BT by EQR [Daily - High resolution]

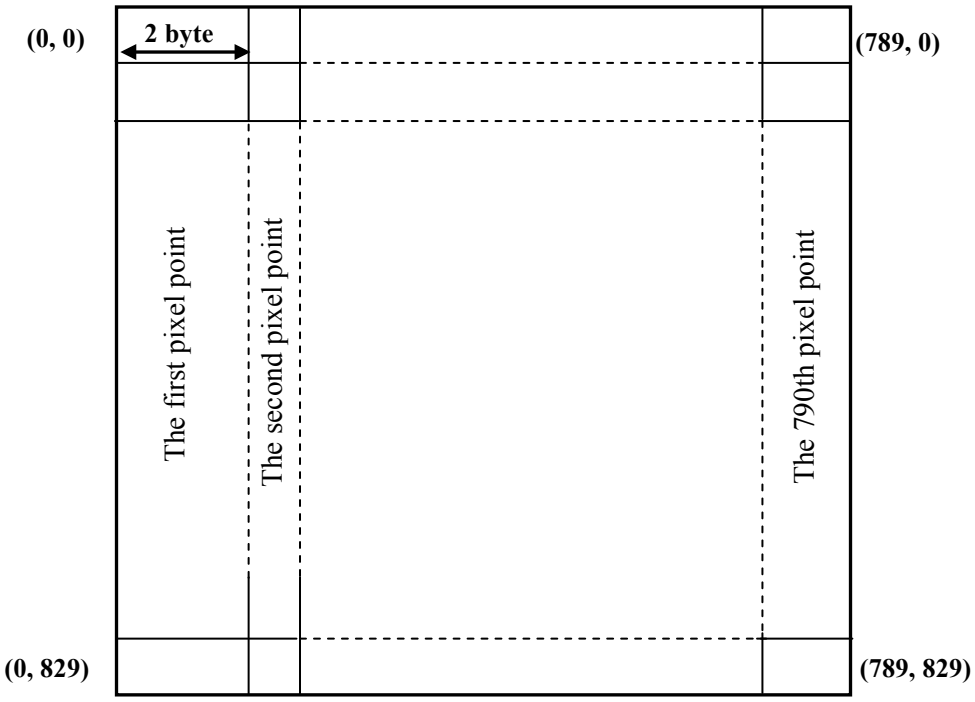


Geophysical Data
Time Information

*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

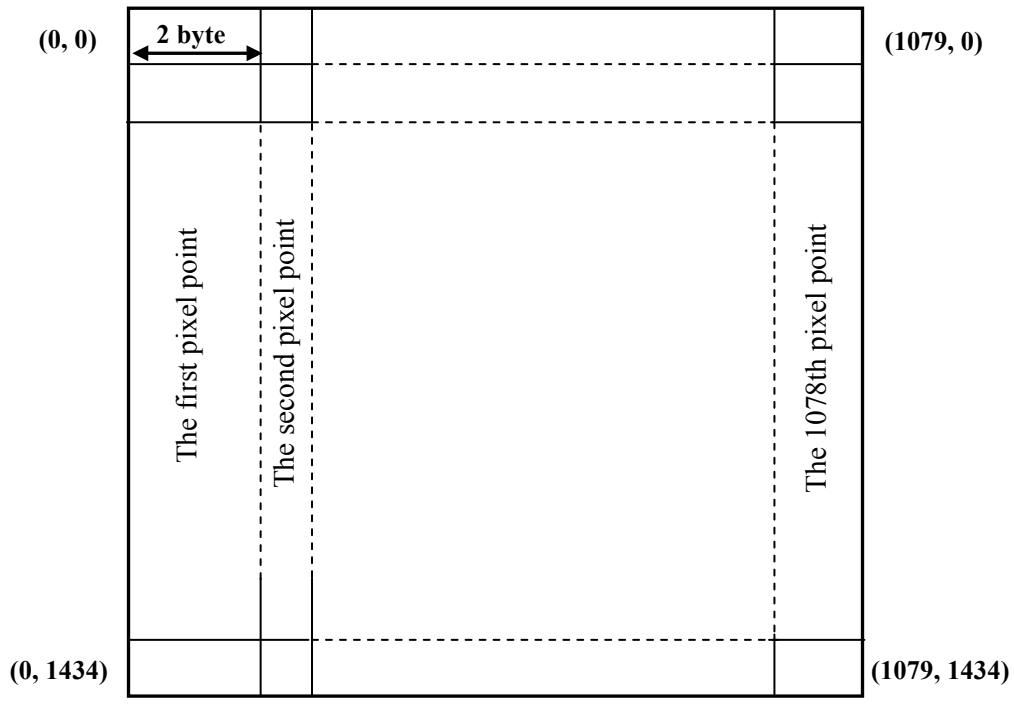
Fig. 3.4.1-5 Structure of SIC by Northern PS [Daily - High resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

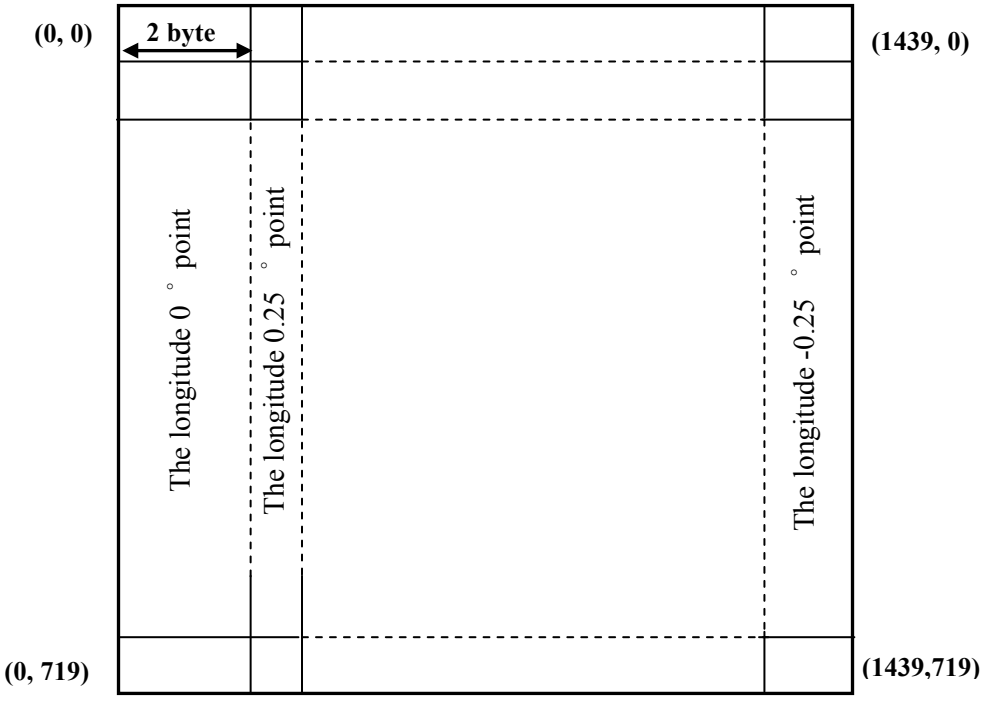
Fig. 3.4.1-6 Structure of SIC by Southern PS [Daily - High resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

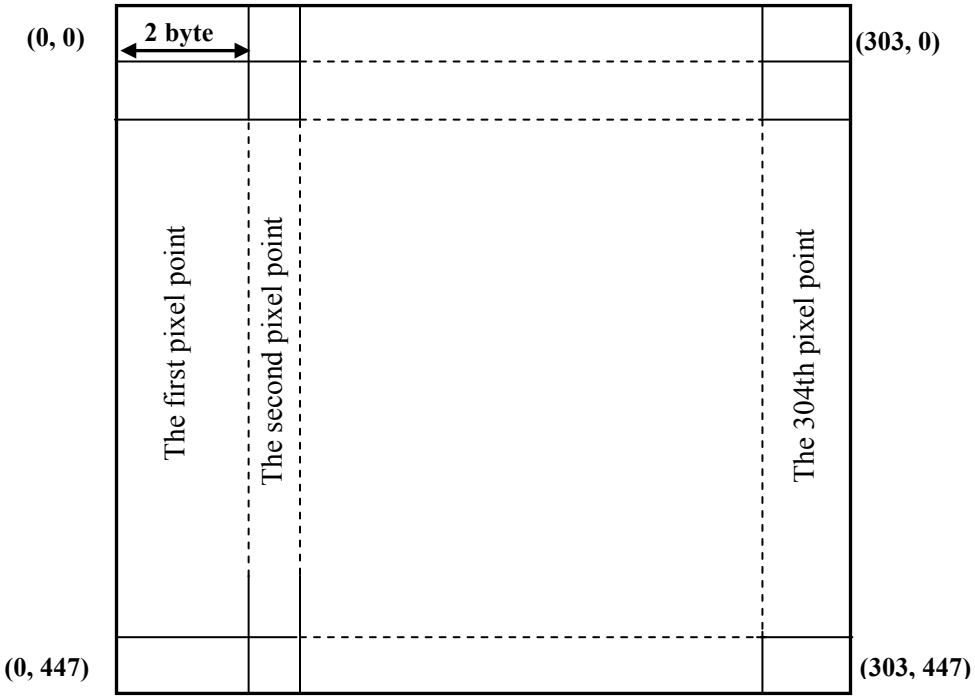
(Maximum 3 layers)

Fig. 3.4.1-7 Structure of SND by Northern PS [Daily - High resolution]



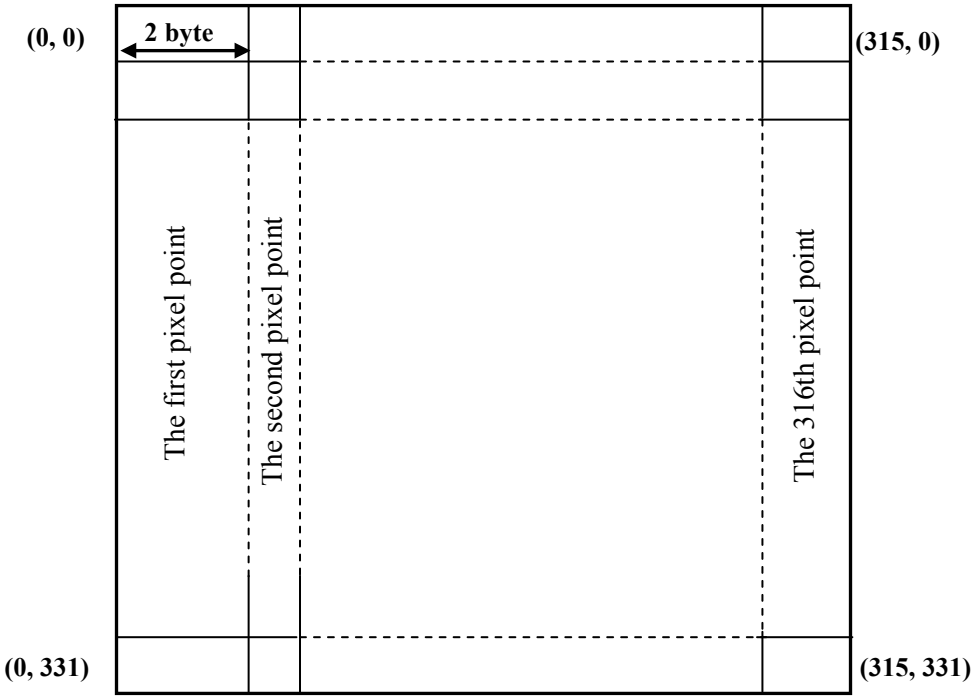
Brightness Temperature(V)
Brightness Temperature(H)
Time Information

Fig. 3.4.1-8 Structure of BT by EQR [Daily - Low resolution]



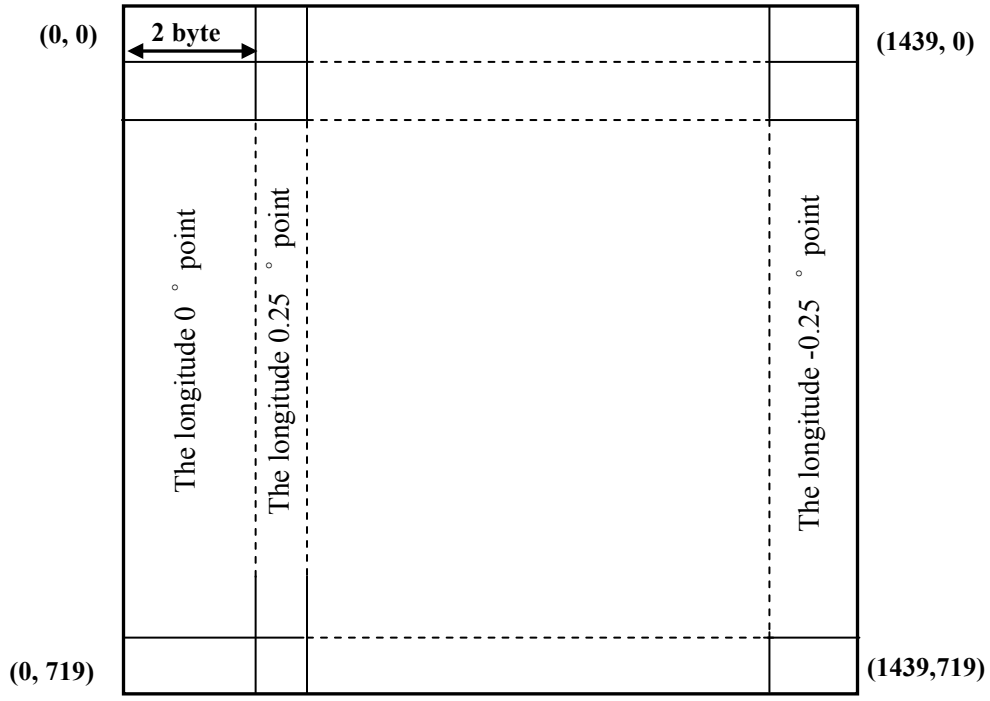
Brightness Temperature(V)
Brightness Temperature(H)
Time Information

Fig. 3.4.1-9 Structure of BT by Northern PS [Daily - Low resolution]



Brightness Temperature(V)
Brightness Temperature(H)
Time Information

Fig. 3.4.1-10 Structure of BT by Southern PS [Daily - Low resolution]

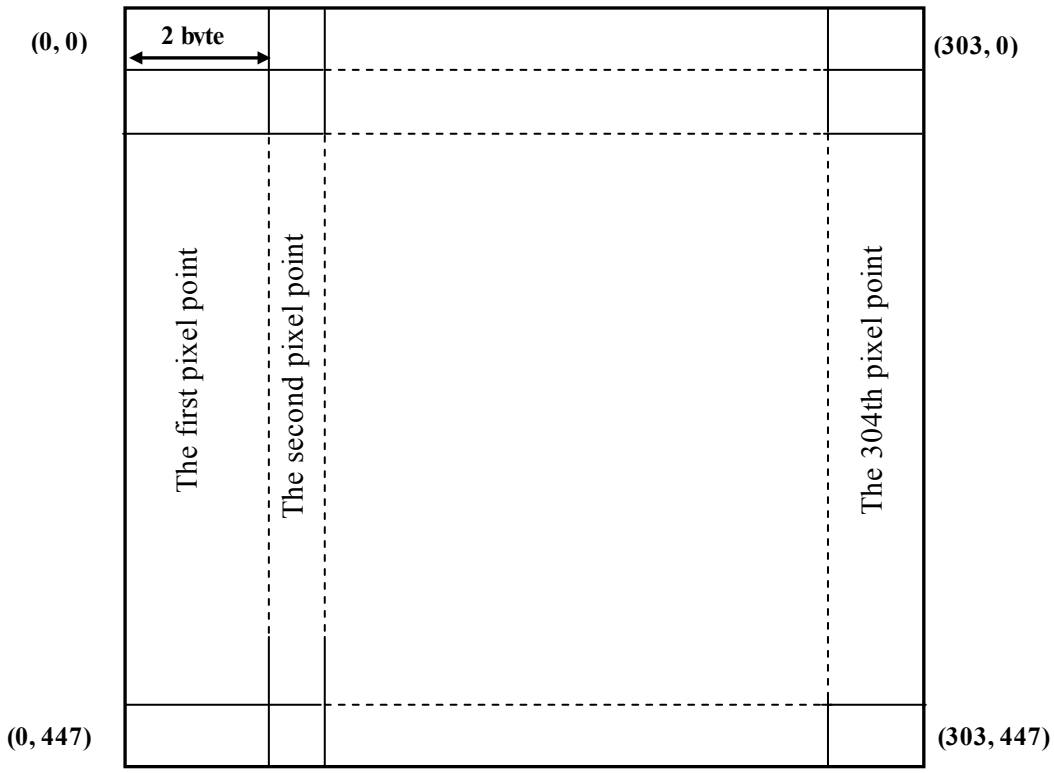


Geophysical Data
Time Information

*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

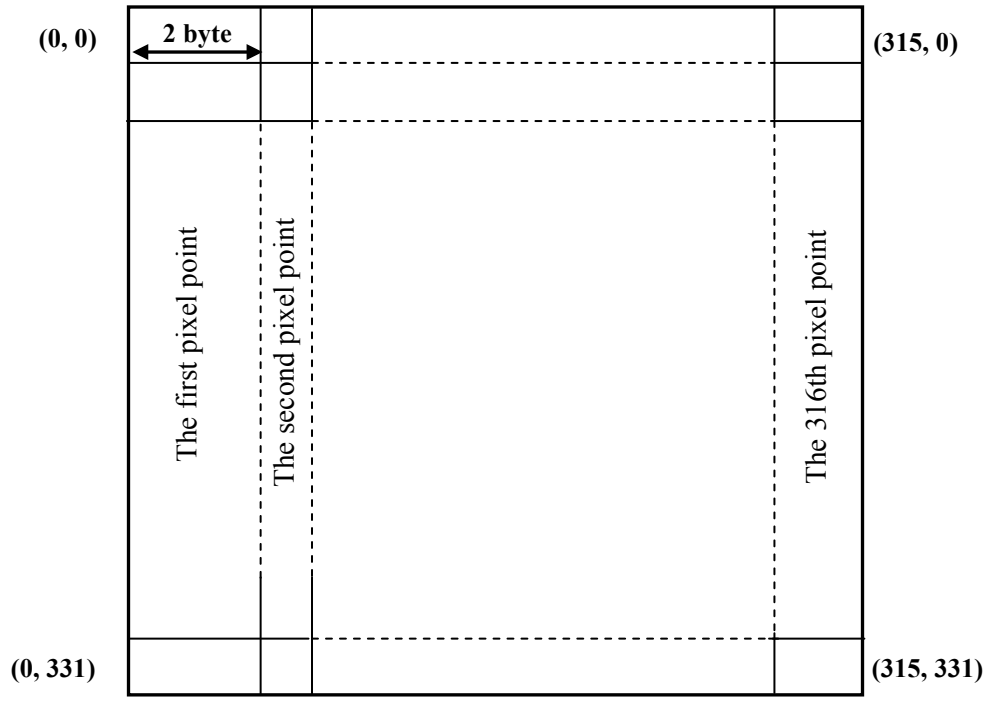
Fig. 3.4.1-11 Structure of Geophysical quantity by EQR [Daily - Low resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

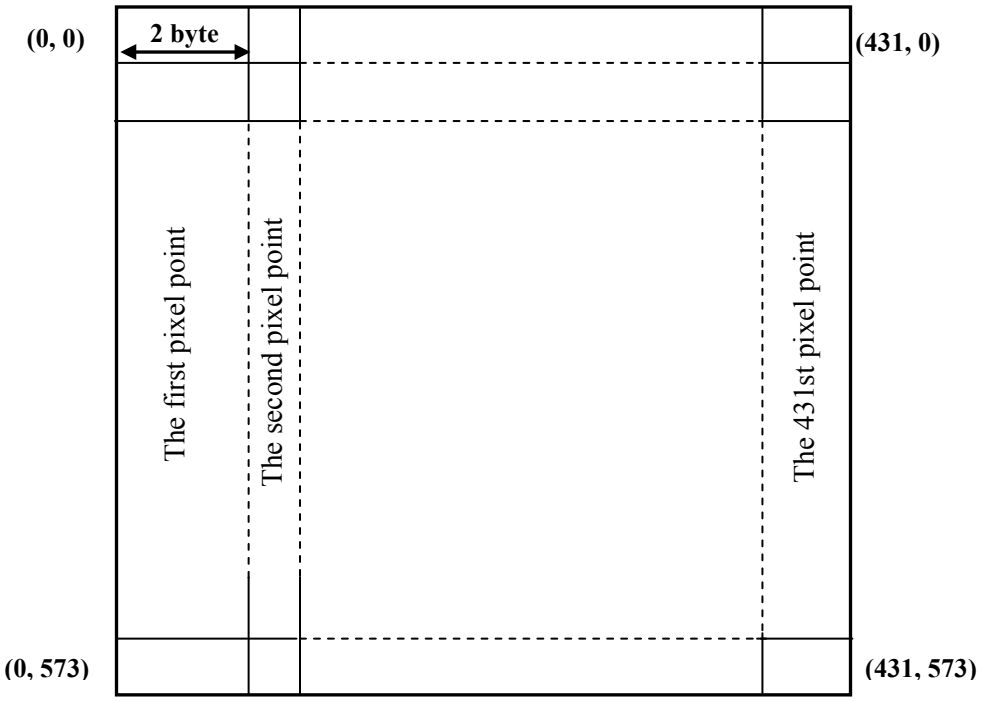
Fig. 3.4.1-12 Structure of SIC by Northern PS [Daily - Low resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

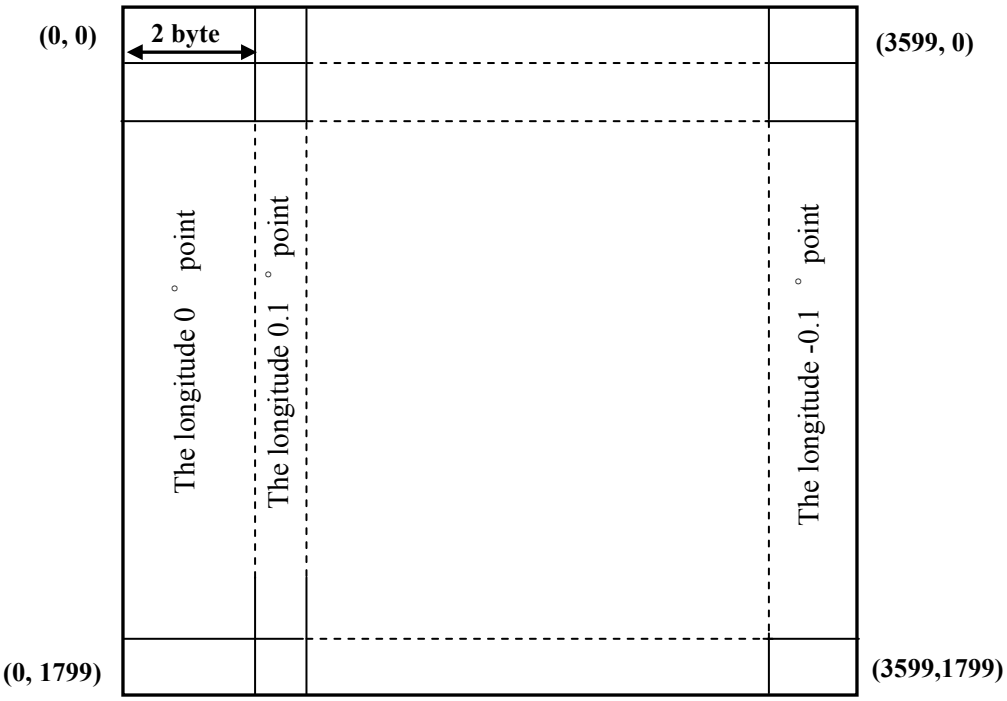
Fig. 3.4.1-13 Structure of SIC by Southern PS [Daily - Low resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

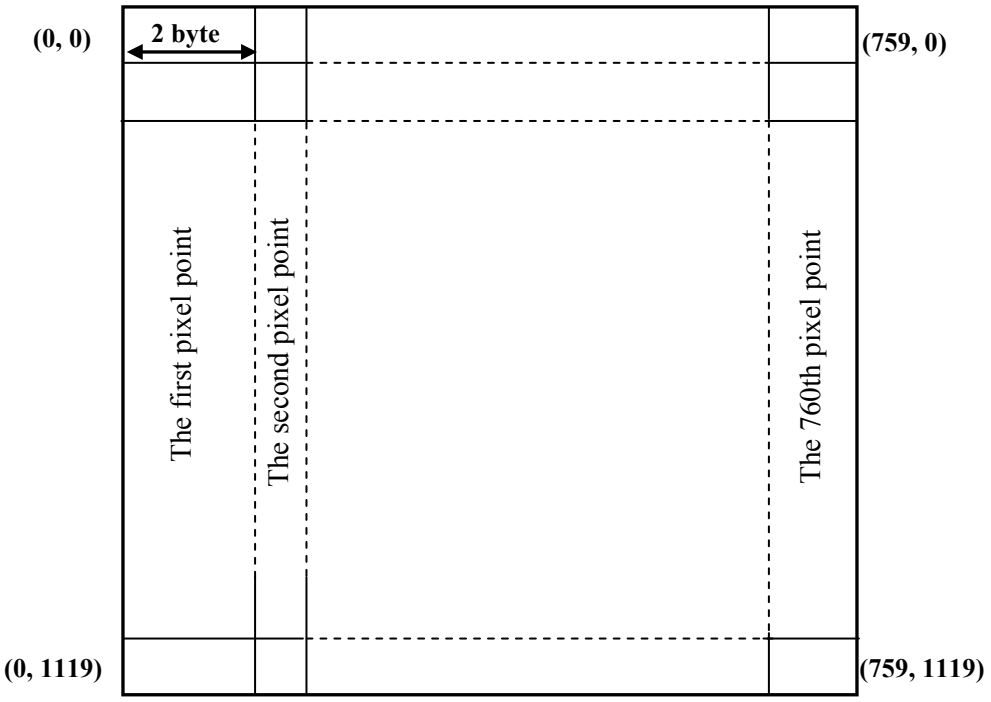
(Maximum 3 layers)

Fig. 3.4.1-14 Structure of SND by Northern PS [Daily - Low resolution]



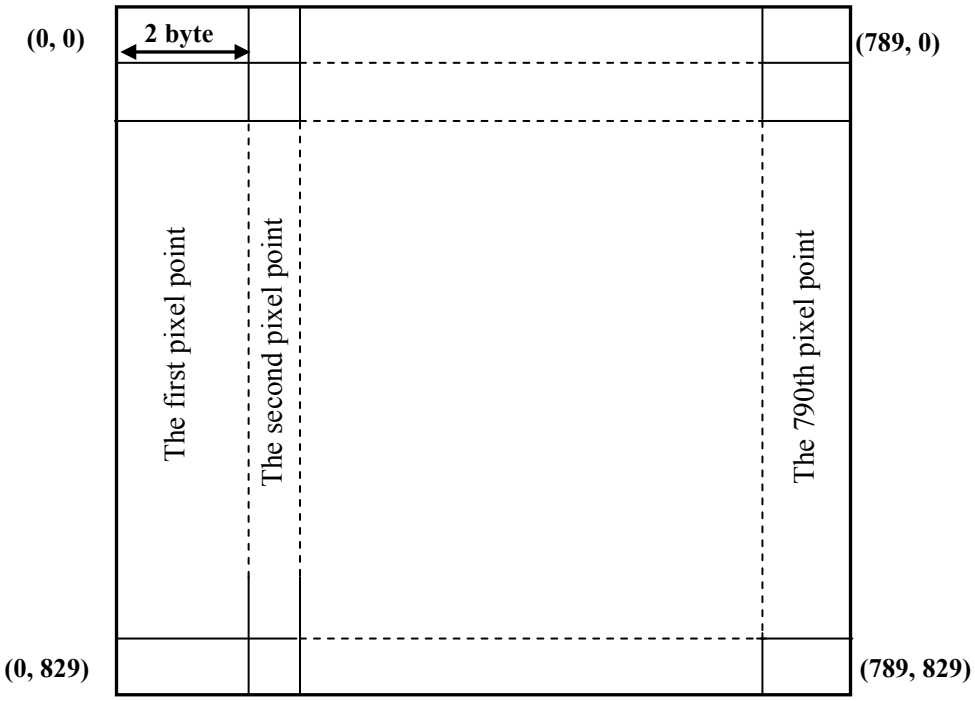
Brightness Temperature(V)
Brightness Temperature(H)
Standard Diviation (V)
Average Number (V)
Total Number (V)
Standard Diviation (H)
Average Number (H)
Total Number (H)

Fig. 3.4.1-15 Structure of BT by EQR [Monthly - High resolution]



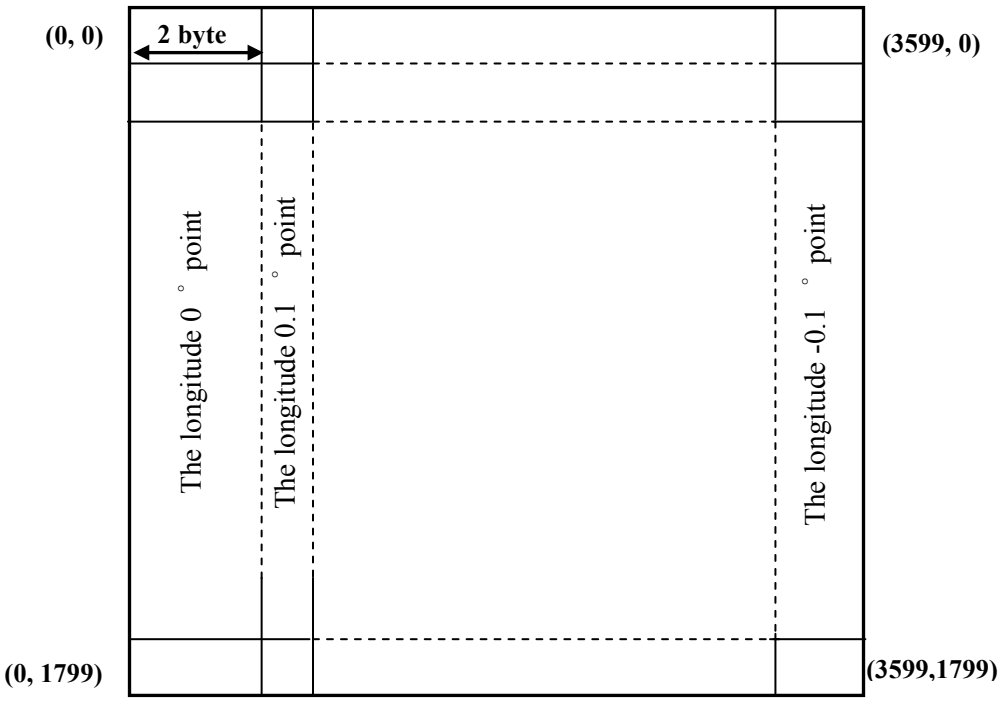
Brightness Temperature(V)
Brightness Temperature(H)
Standard Diviation (V)
Average Number (V)
Total Number (V)
Standard Diviation (H)
Average Number (H)
Total Number (H)

Fig. 3.4.1-16 Structure of BT by Northern PS [Monthly - High resolution]



Brightness Temperature(V)
Brightness Temperature(H)
Standard Diviation (V)
Average Number (V)
Total Number (V)
Standard Diviation (H)
Average Number (H)
Total Number (H)

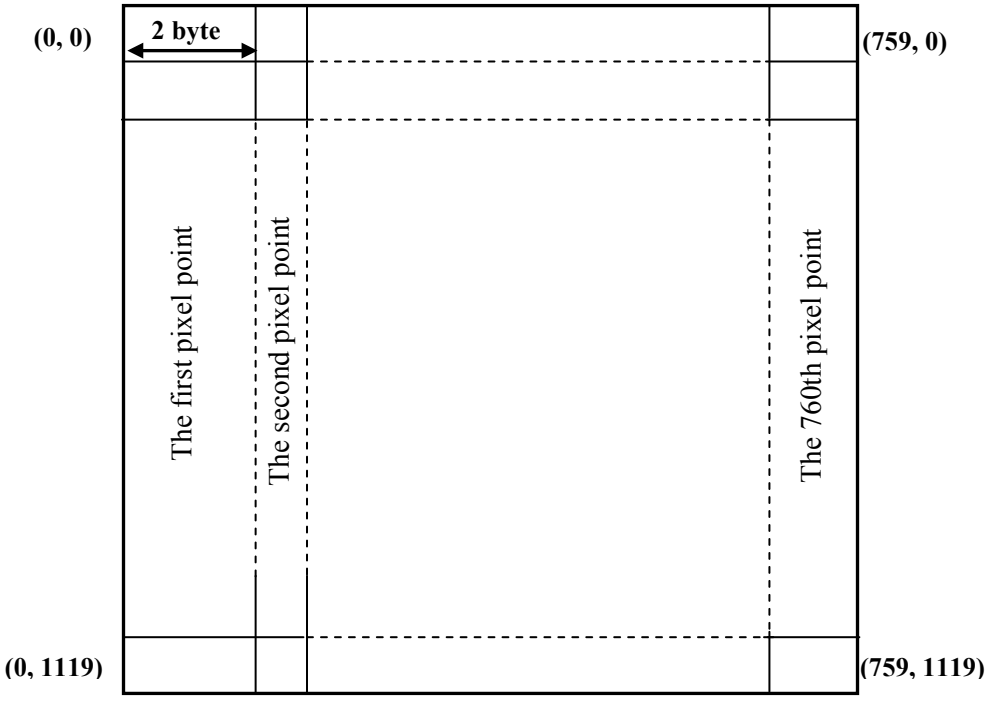
Fig. 3.4.1-17 Structure of BT by Southern PS [Monthly - High resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

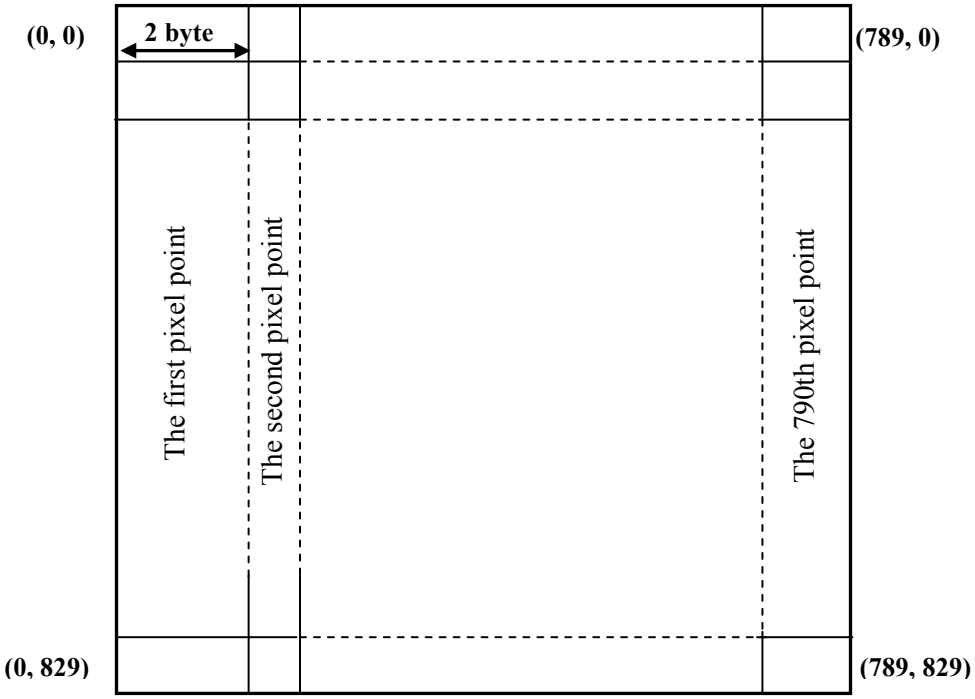
Fig. 3.4.1-18 Structure of Geophysical quantity by EQR [Monthly - High resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

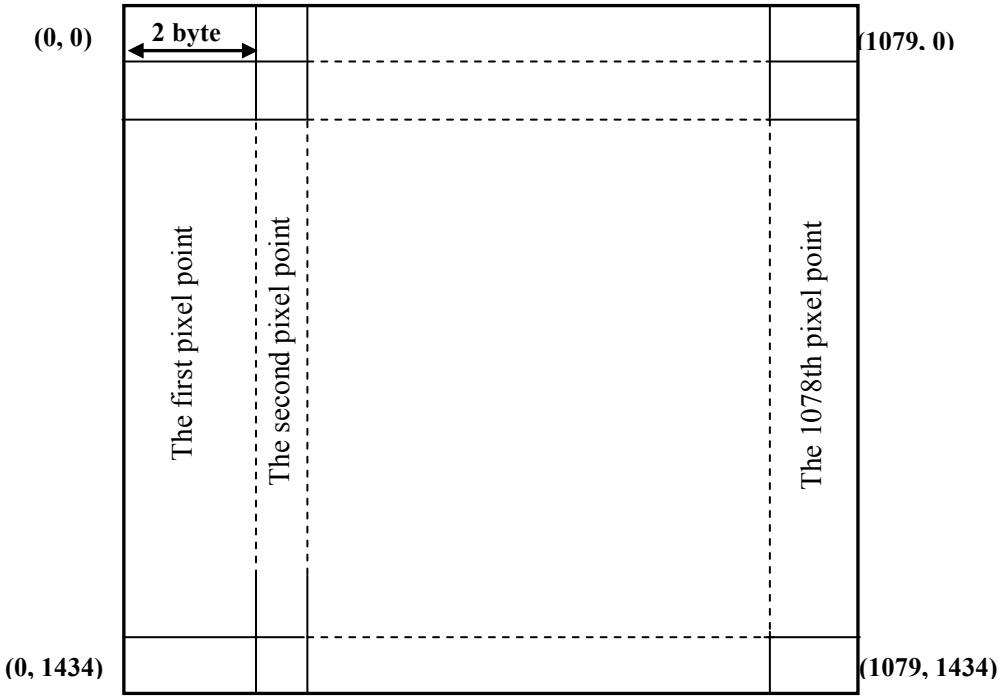
Fig. 3.4.1-19 Structure of SIC by Northern PS [Monthly - High resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

Fig. 3.4.1-20 Structure of SIC by Southern PS [Monthly - High resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

Fig. 3.4.1-21 Structure of SND by Northern PS [Monthly - High resolution]

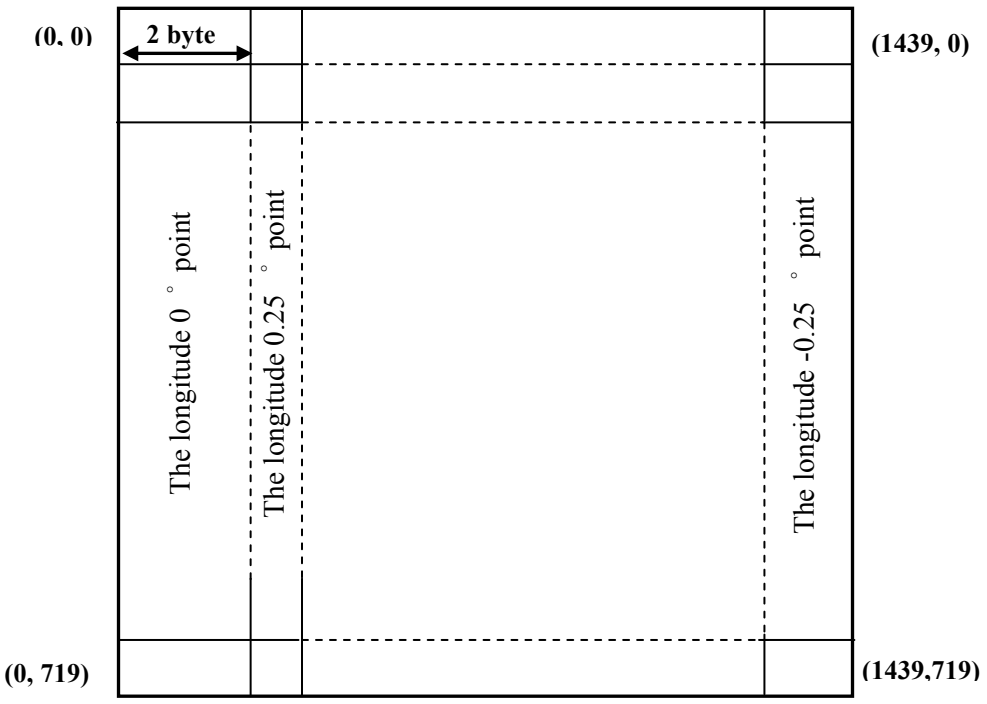
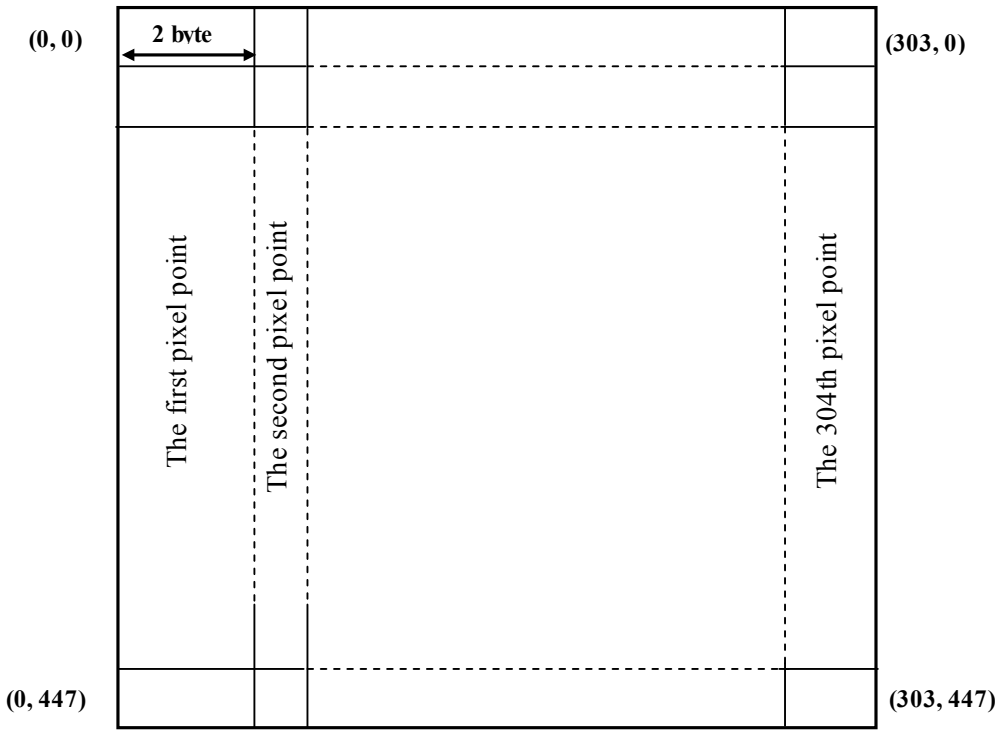
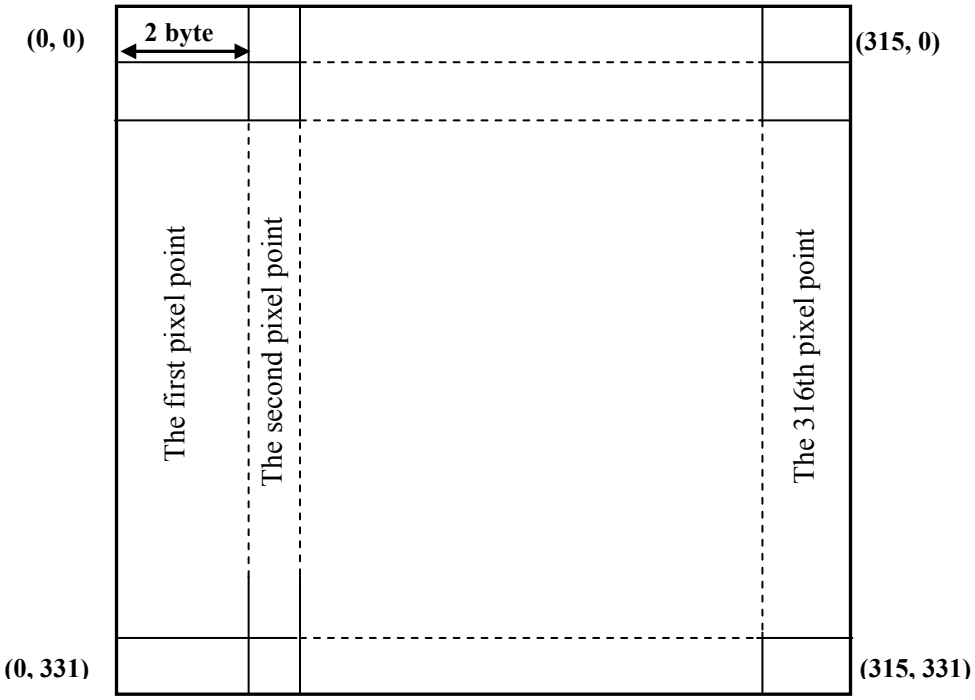


Fig. 3.4.1-22 Structure of BT by EQR [Monthly - Low resolution]



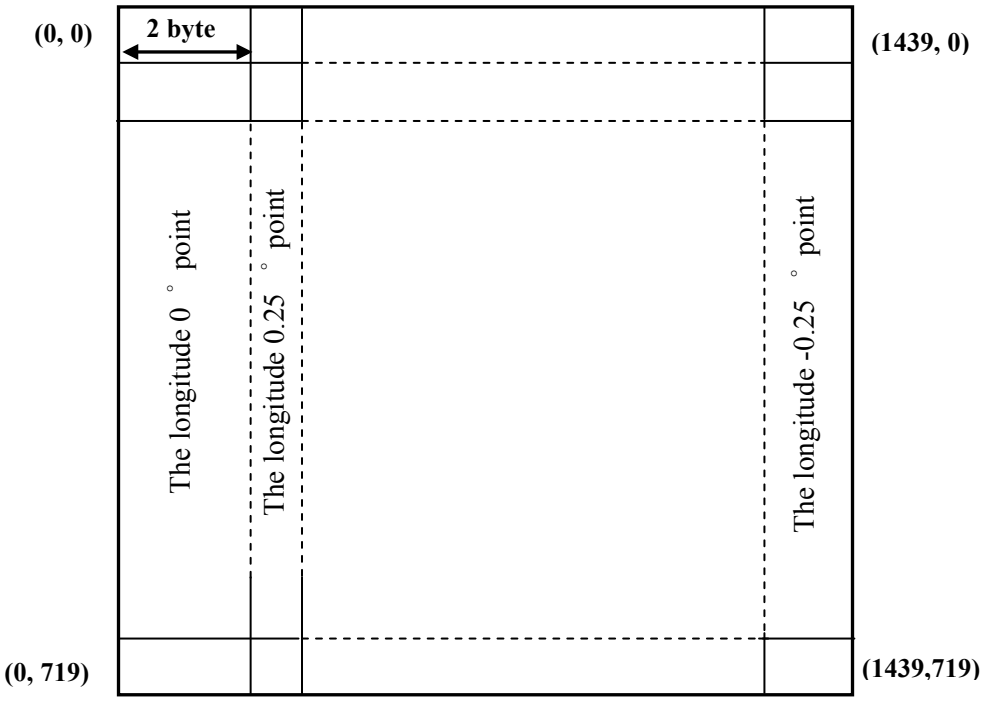
Brightness Temperature(V)
Brightness Temperature(H)
Standard Diviation (V)
Average Number (V)
Total Number (V)
Standard Diviation (H)
Average Number (H)
Total Number (H)

Fig. 3.4.1-23 Structure of BT by Northern PS [Monthly - Low resolution]



Brightness Temperature(V)
Brightness Temperature(H)
Standard Diviation (V)
Average Number (V)
Total Number (V)
Standard Diviation (H)
Average Number (H)
Total Number (H)

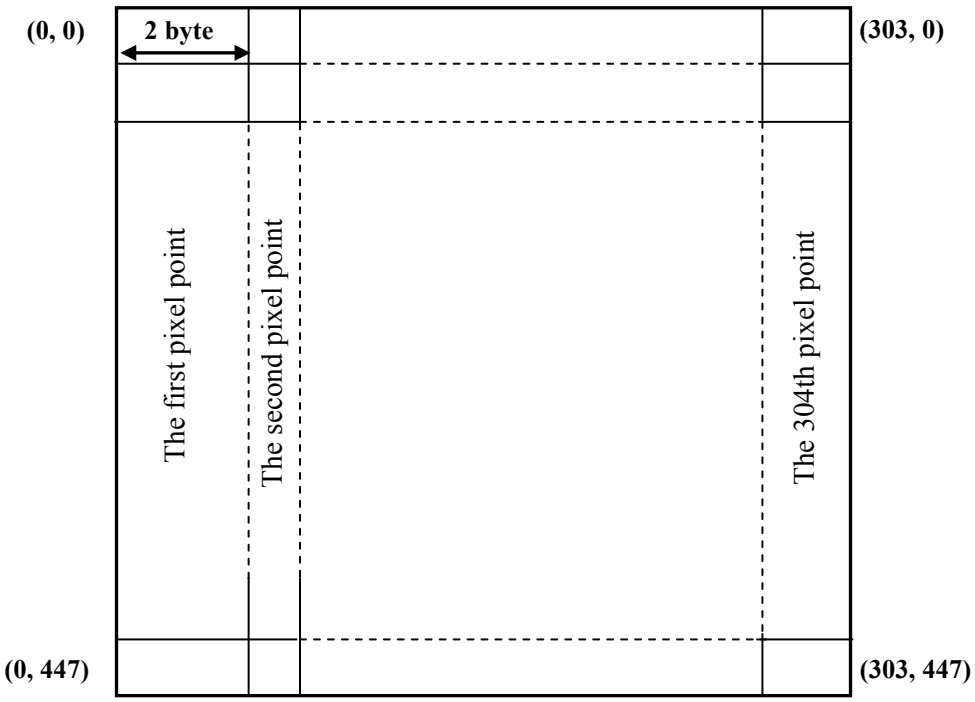
Fig. 3.4.1-24 Structure of BT by Southern PS [Monthly - Low resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

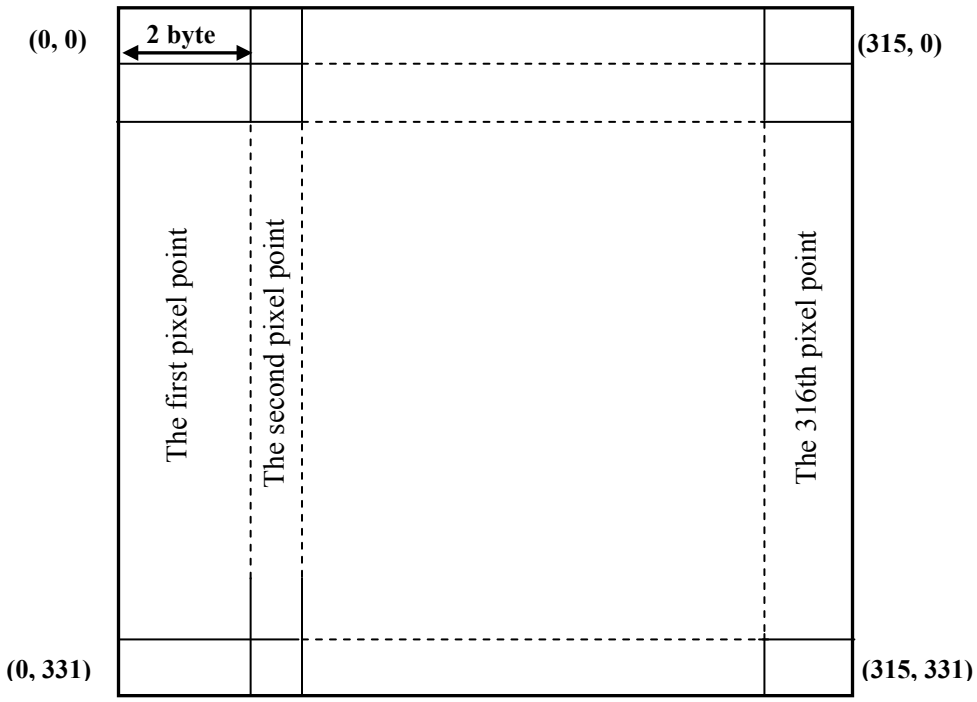
Fig. 3.4.1-25 Structure of Geophysical quantity by EQR [Monthly - Low resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

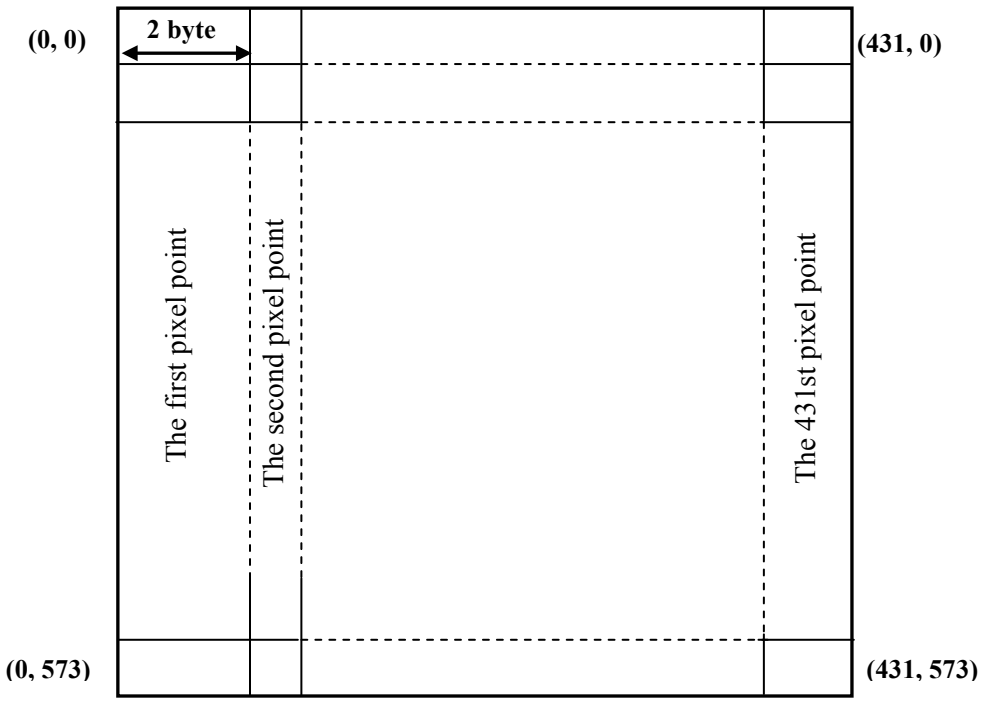
Fig. 3.4.1-26 Structure of SIC by Northern PS [Monthly - Low resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

Fig. 3.4.1-27 Structure of SIC by Southern PS [Monthly - Low resolution]



*In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

Fig. 3.4.1-28 Structure of SND by Northern PS [Monthly - Low resolution]

3.4 Special instruction

3.4.1 Product file name

AMSR2 level 3 product file follows the file naming convention in below. Granule ID is stated by reference documents.

File name = Granule ID + extension [.h5]

Scene ID_Product ID

Byte Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
AMSR2	G	W	1	A	M	2	_	Y	Y	Y	Y	M	M	D	D	_	t	t	t	_	P	P	W	X	_	L	L	x	x	K	K	K	r	d	v	a	a	a	p	p	p

Scene ID ← → Product ID

<Exp.> G W 1 A M 2 _ 2 0 1 1 1 1 1 3 _ 0 1 D _ E Q O D _ L 3 S G T 8 9 H A 1 1 0 1 0 0 1

Scene ID

[Satellite] [Sensor] [Observation Start Time] [Static period] [Projection] [Static means] [Orbit Direction]

Satellite	: GW1（Fixed Value）
Sensor	: AM2（Fixed Value）
Observation Start Time	: YYYYMMDDHHmm（UTC）
Static period	: ttt (01D : daily product, 01M : monthly product)
Projection	: PP (EQ : EQR, PN : North Polar Stereographic projection, PS : South Polar Stereographic projection)
Static means	: W (M : Mean, O : Overwrite)
Orbit Direction	: X (A : Ascending, D : Descending)

Product ID

[Process Level] [Process Kind] [Product ID] [Resolution] [Developer ID] [Product version] [Algorithm version] [Parameter version]

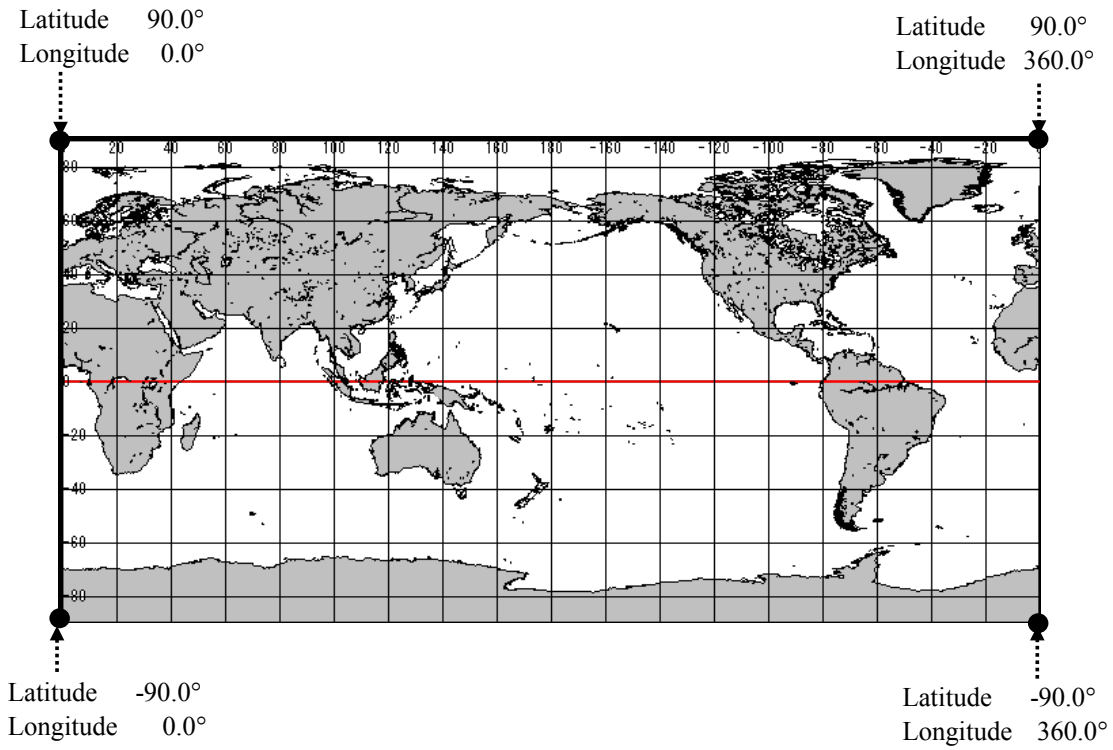
Process Level	: LL（L3 : Level 3）
Process Kind	: xx （SG : Standard operation product, RG : Research standard operation product）
Product ID	: KKK（<L3> T06 : TB 6GHz, T07 : TB 7GHz, T10 : TB 10GHz, T18 : TB 18GHz, T23 : TB 23GHz, T36 : TB 36GHz, T89 : TB 89GHz, CLW : Cloud Liquid Water, TPW : Total Precipitable Water, PRC : Precipitation, SST : Sea Surface Temperature, SSW : Sea Surface Wind speed, SIC : Sea Ice Concentration, SND : Snow Depth, SMC : Soil Moisture Content）
Resolution	: r (L : Low [25km or 0.25deg], H : High [10km or 0.1deg])
Developer ID	: d（<L1> _ : underscore（Fixed Value）, <L2> : A～Z）
Product version	: v（0～9, a～z）
Algorithm version	: aaa（000～999）

3.4.2 Specification of the projection

Table 3-34 The number of pixels for each projection shows the number of pixels for each projection. Fig. 3.4.2-1 Definition of the EQR projection ~ Fig. 3.4.2-4 Definition of the Northern polar stereo projection [TB/SND] show definition of the each projection.

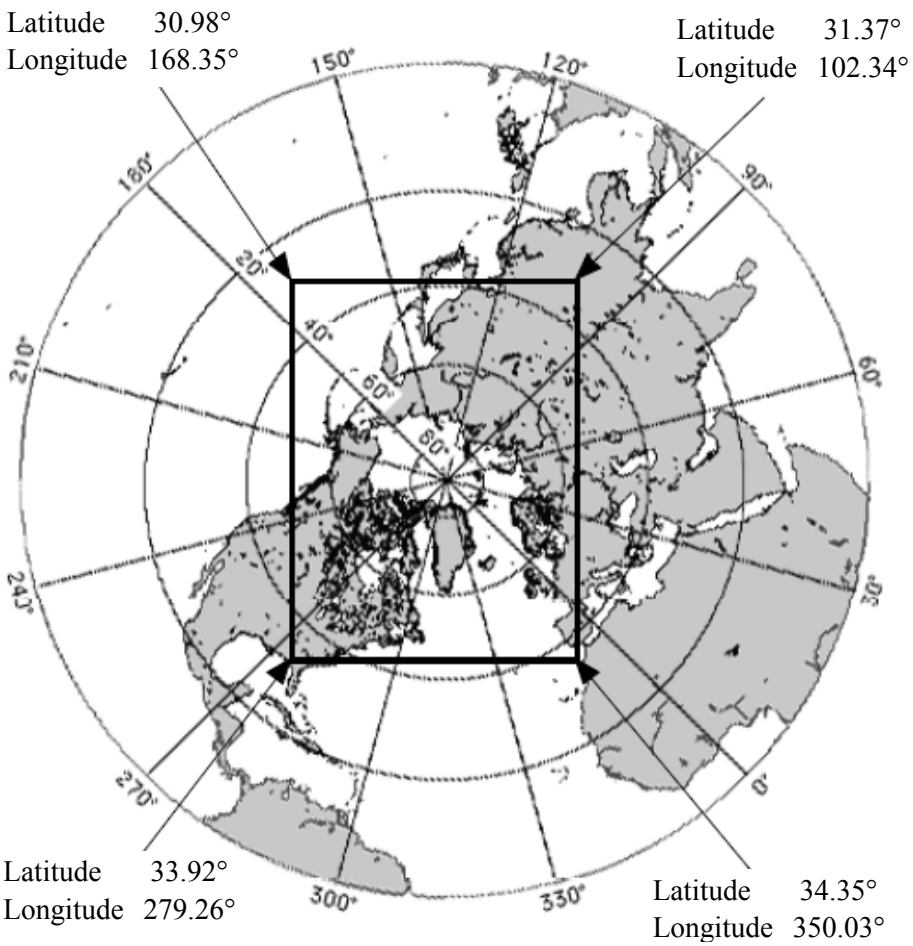
Table 3-34 The number of pixels for each projection

	Low resolution interval [EQR0.25°/PS 25km]		High resolution interval [EQR0.1°/PS10km]	
	Length number [Latitude direction]	Width number [Longitude direction]	Length number [Latitude direction]	Width number [Longitude direction]
EQR [TB/SIC]	720	1440	1800	3600
Northern PS [TB/SIC]	304	448	760	1120
Northern PS [SND]	432	574	1080	1435
Southern PS [TB/SIC]	316	332	790	830



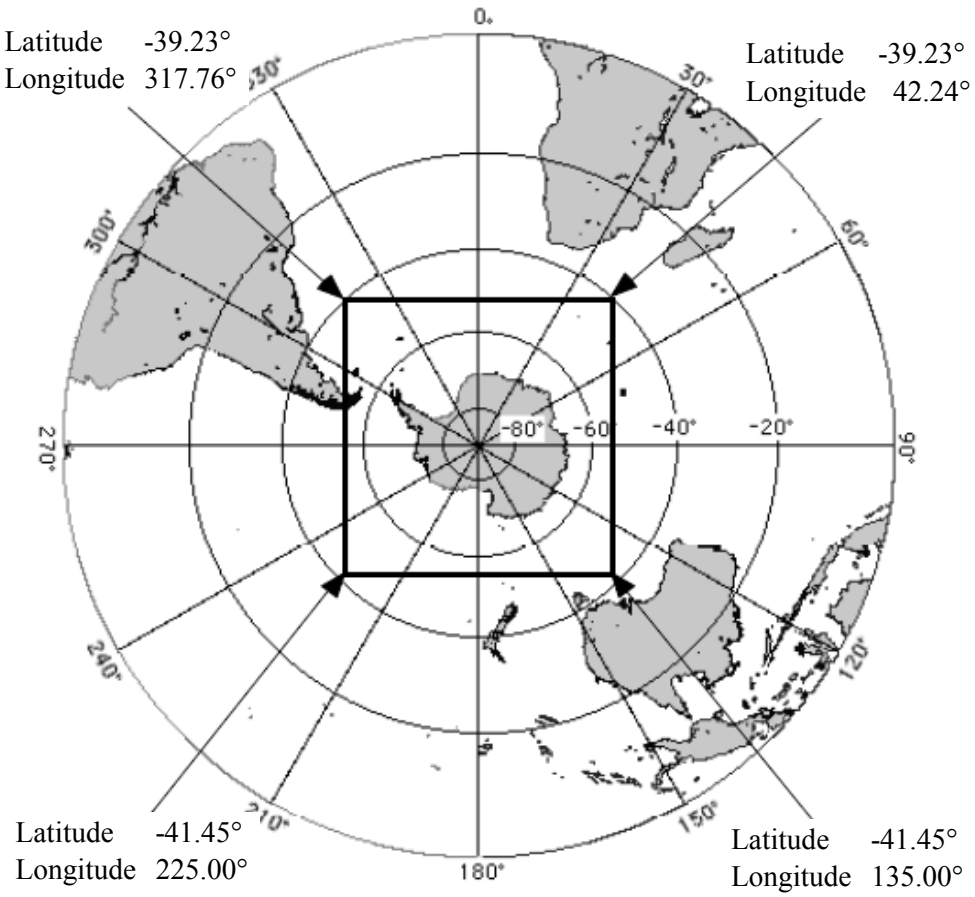
*The latitude and longitude in this figure indicate the position at the edge of the pixel.

Fig. 3.4.2-1 Definition of the EQR projection



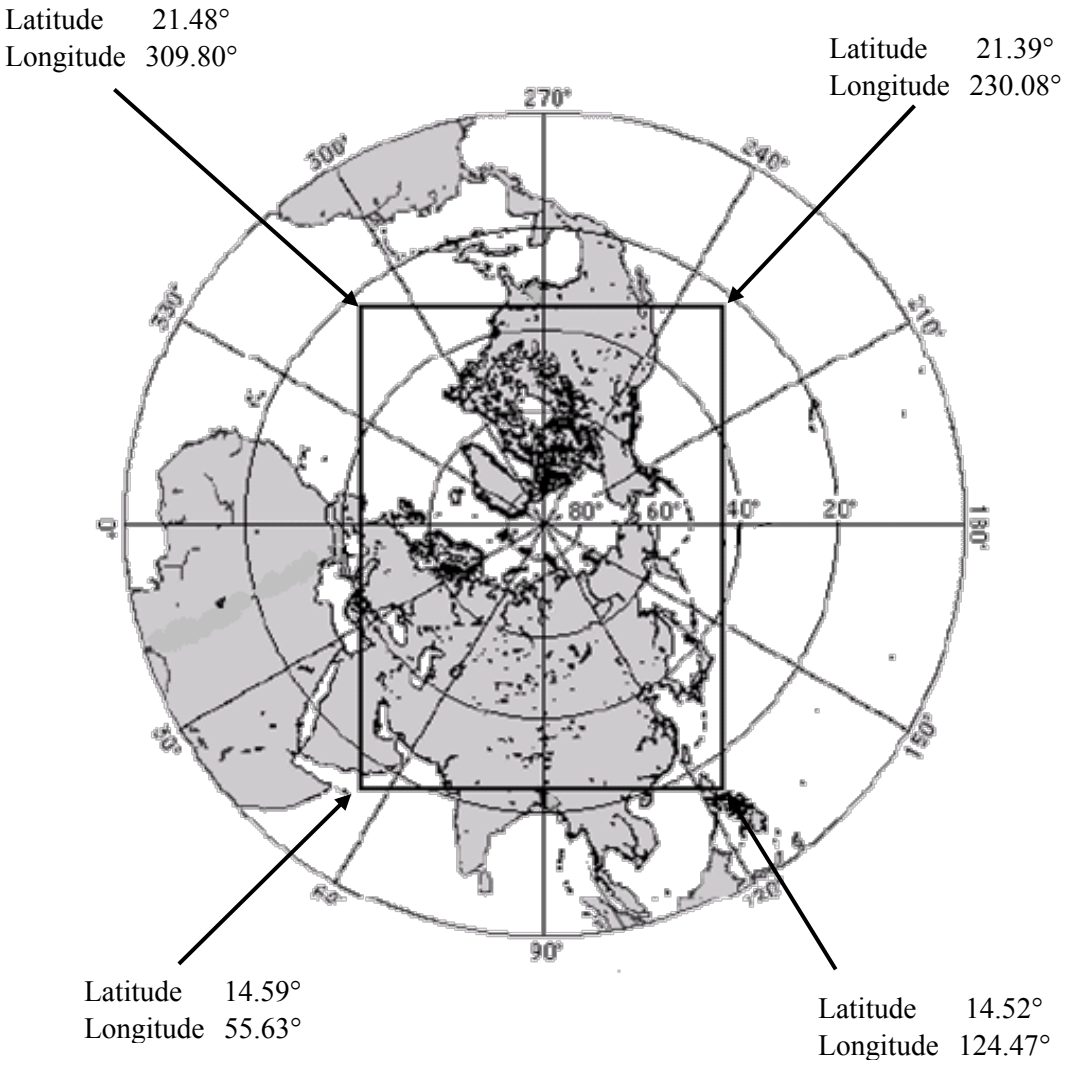
*The latitude and longitude in this figure indicate the position at the edge of the pixel.

Fig. 3.4.2-2 Definition of the Northern polar stereo projection [TB/SIC]



*The latitude and longitude in this figure indicate the position at the edge of the pixel.

Fig. 3.4.2-3 Definition of the Southern polar stereo projection [TB/SIC]



*The latitude and longitude in this figure indicate the position at the edge of the pixel.

Fig. 3.4.2-4 Definition of the Northern polar stereo projection [TB/SND]

3.4.3 Dummy data

This chapter describes the dummy data in the Level 3 product file.

<Brightness temperature>

Missing value : 65535

Error value : 65531～65534

<Geophysical quantity>

Missing value : -32768

Error value : -32761～-32767

Missing values : When there is no geophysical data within observation swath This value is set up when computing neither the case where the amount of geophysics is incomputable (a packet loss, the abnormalities in brightness temperature of level 1B, the amount calculation error of geophysics, etc.) , nor the amount of geophysics (This case is based on conditions peculiar to the amount of physics. For example, in the case of the amount of geophysics for marine [, such as SST,], the area of land does not compute the amount of geophysics.).

Error value : It is outside observation swath data.

- *In some cases, it is 3 dimensions structure by kind of Geophysical quantity.

(Maximum 3 layers)

- Fig. 3.4.1-5 shows sample of daily L3 SST product.

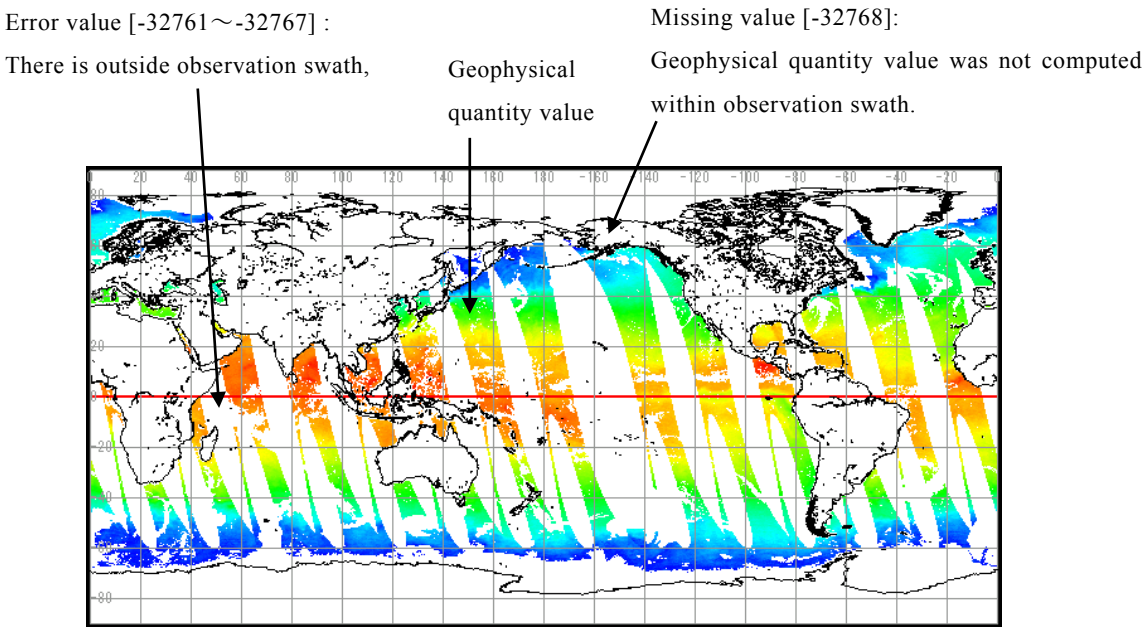


Fig. 3.4.3-1 The example image of level 3 SST product file

3.4.4 89GHz Images

This chapter describes the temporal spatial grid algorithm at the AMSR2 level 3 product of 89 GHz image. It is necessary for making the AMSR2 level 3 image to merge 89A horn and 89B horn data into one image. We describe the method that is how to merge 89A horn and 89B horn data.

1) The merging mode of the brightness temperature data

In case of the brightness temperature, the average value of the 89GHz A and B horn data The correction model of incidence angle is linear equation as below. (The coefficient and model may be arranged after the satellite launches.)

$tb\_a' = G\_a \times tb\_a + O\_a$
$tb\_b' = G\_b \times tb\_b + O\_b$

tb_a', tb_b' : The brightness temperature after corrected incidence angle [A/B horns]
tb_a, tb_b : The brightness temperature before corrected incidence angle [A/B horns]
G_a, O_a : The compensation coefficient for A horn [temporary value 1.0, 0.0]
G_b、O_b : The compensation coefficient for B horn [temporary value 1.0, 0.0]

2) The merging mode of the geophysical quantity

In case of the geophysical quantity, the overwriting or average process using A/B horn data is done without A/B horn correcting.

* The situation in which merging is needed

Fig. 3.4.4-1 shows the relation between input data file and output data file at the level 3 process. The level 3 process outputs the brightness temperature level 3 product of each frequency. The 89GHz data needs to be merged A, B horn, because the product doesn't have layer for A, B horn.

Also in case of high resolution level 3 products that have layers, they needs to be merged A, B horn each layer, respectively.

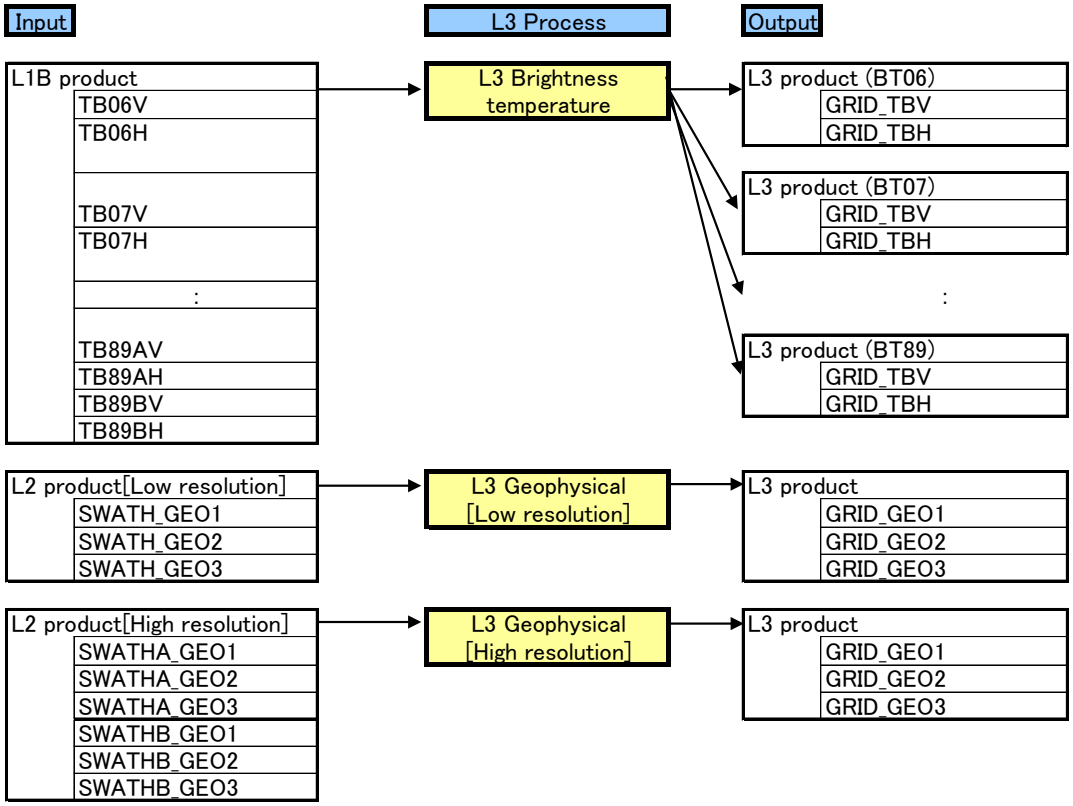


Fig. 3.4.4-1 The relationship of input and output data

4 Description of data

This chapter describes each data item in the AMSR2 level 3 product file.

4.1 Product metadata (Attribute)

(1) ProductName

Abbreviated name of the product is stored as below.

[AMSR2-L3] : AMSR2 level 3 process

(2) GeophysicalName

The geophysical quantity name is stored as below.

Item	Format	Remark
GeophusicalName	[Total Precipitable Water] [Cloud Liquid Water] [Precipitation] [Sea Surface Temperature] [Sea Surface Wind speed] [Sea Ice Concentration] [Snow Depth] [Soil Moisture Content] [Brightness Temperature (89GHz)] … etc	-

(3) MeanType

The static method is stored as below.

Item	Format	Remark
MeanType	[XXXXX] DayMean : Daily average static DayOverwrite : Overwrite static MonthMean : Monthly average static	Maximum size of character is 16.

(4) Projection

The projection type is stored as below.

Item	Format	Remark
Projection	[EQR] : equi-rectangular projection [PS-N] : Northern polar stereo projection [PS-S] : Southern polar stereo projection	Maximum size of character is 5.

(5) Resolution

The resolution is stored as below.

Item	Format	Remark
Resolution	[0.1deg] : The each pixel shows 0.1deg.[High resolution of EQR] [0.25deg]: The each pixel shows 0.25deg.[Low resolution of EQR] [10km] : The each pixel shows 10km.[High resolution of PS] [25km] : The each pixel shows 25km.[Low resolution of PS]	Maximum size of character is 7.

(6) ProductVersion

The product version is stored as below.

Item	Minimum	Maximum	Error value	Unit	Remarks
ProductVersion	0	Z	-	-	single-digit or alpha-numeral

(7) AlgorithmVersion

The algorithm version is stored as below.

Item	Minimum	Maximum	Error value	Unit	Remarks
AlgorithmVersion	000	999	-	-	3-digit numeral

(8) ParameterVersion

The parameter version is stored as below.

Item	Minimum	Maximum	Error value	Unit	Remarks
ParameterVersion	000	999	-	-	3-digit numeral

(9) ProductSize_MByte

The product size is stored as below.

Item	Minimum	Maximum	Error value	Unit	Remarks
ProductSize_MByte	0.0	99999.9	-	MByte	Mbyte(×1024×1024byte)

(10) AlgorithmDeveloper

The algorithm developer code is stored.

Item	Format	Remarks
AlgorismDeveloper	[XXXXXXXX]	Maximum size of character is 8.

(11) GranuleID

The granule ID is stored. Granule ID is unique ID for product file. Please see the section 3.4.1 for more detail.

(12) ProductionDateTime

The product creation time and date is stored as below.

Item	Format	Remarks
ProductionDateTime	[YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(millisecond)	When the leap second is updated, “ss” may show 60.

(13) ObservationStartDateTime

The start time and date of observation data is stored as below.

Item	Format	Remarks
ObservationStartTime	[YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(millisecond)	-

(14) ObservationEndDateTime

The end time and date of observation data is stored as below.

Item	Format	Remarks
ObservationEndTime	[YYYY-MM-DDＴhh:mm:ss.uuuZ] YYYY：XXXX(Year) MM：01～12(Month) DD：01～31(Day) hh：00～23(Hour) mm：00～59(Minute) ss：00～59(Second) uuu：000～999(millisecond)	-

(15) PGEName

The application name is stored.

Item	Content	Remarks
PGEName	Application name	Maximum size of character is 20.

(16) InputFileName

The input file names are stored. If there are some input files, the stored data are delimited by comma [,].

Ex.)

GW1AM2_201207110007_183D_L1SGBTBR_0000000.h5,GW1AM2_201207110146_199D_L1SGBTBR_0000000.h5

Item	Content	Remarks
InputFileName	Input File Name	Maximum size of character is 30000.

(17) ProcessingCenter, ContactOrganizationName, ContactOrganizationTelephone

The information of data processing center is stored.

Item	Content	Remarks
ProcessingCenter	Processing Center	Maximum size of character is 12.
ContactOrganizationName	Organization Name	Maximum size of character is 300.
ContactOrganizationTelephone	Organization Telephone number	Maximum size of character is 16.

(18) StartOrbitNumber, StopOrbitNumber

The orbit numbers at the observation start and end point in the product file are stored. The orbit number is numbered serially after the GCOM-W1 satellite launch.

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
StartOrbitNumber	Start orbit number	0	99999	-9999	-	Under 5 digit number
StopOrbitNumber	End orbit number	0	99999	-9999	-	Under 5 digit number

(19) OrbitDirection

The orbit direction at the observation start point is stored.

Item	Content	Format	Remarks
OrbitDirection	Orbit direction	Ascending or Descending	Maximum size of character is 11.

(20) PlatformShortName, SensorShortName

The satellite name [GCOM-W1] and sensor name [AMSR2] are stored.

(21) ECSDataModel

The metadata model name is stored.

Item	Content	Format	Remarks
MetaDataModel	Metadata model name	[B.0]	Maximum size of character is 8.

4.2 Dataset

This chapter describes dataset in L3 product file.

(1) Brightness Temperature / Geophysical Data

The static valid value included in the grid(except error and missing) of brightness temperature or geophysical quantity (or latest data *See Table 3-4) is stored.

Item	Geophysical quantity	Minimum	Maximum	Error value	Unit	Remarks
Brightness Temperature	Brightness Temperature	10	500	65535 [Missing data]	K	
				65534 [Parity error]		
Geophysical Data	Total Precipitable Water	-327.60	327.67	-32761 ～ -32768	kg/m2	
	Cloud Liquid Wat	-32.76	32.77	-32761 ～ -32768	kg/m2	
	Sea Surface Wind speed	-327.60	327.67	-32761 ～ -32768	m/s	
	Precipitation	-327.60	327.67	-32761 ～ -32768	mm/h	
	Sea Surface Temperature	-327.60	327.67	-32761 ～ -32768	C	
	Sea Ice Concentration	-3276.00	3276.70	-32761 ～ -32768	%	
	Snow Depth	-3276.00	3276.70	-32761 ～ -32768	cm	Including snow water *1
	Soil Moisture Content	-3276.00	3276.70	-32761 ～ -32768	%	

*1
Snow water equivalent (second layer) = SND(the first layer) * coefficient(Climate value of the density)
(For more information, refer to the algorithm Statement)

(2) Time Information

The time information of observation data is stored as total minutes in the day (start origin 0:00). There are 2 types time information in the daily level 3 product file. In case of overwriting product, the updated time is stored. In case of daily average product, the calculated average time multiplied by -1 is stored. The overwriting or average product depends on kind of geophysical quantity.

Item	Minimum	Maximum	Error value	Unit	Remarks
TimeInformation	-1440	0	-32761～-32768	-	In case of average
	0	1440	-32761～-32768	-	In case of overwrite

(3) Standard Deviation

The standarad deviation value for each pixel is stored. This item is only stored in monthly product.

Item	Minimum	Maximum	Error value	Unit	Remarks
Standard Deviation	-327.60	327.67	-32761～-32768	-	-

(4) Average Number

This is the number of valid physical quantity data(except error and missing) which was used to determine “Geophysical Data”. This item is only stored in monthly product.

Item	Minimum	Maximum	Error value	Unit	Remarks
Average Number	-32760	32767	-32761～-32768	-	-

(5) Total Number

This is the number of physical quantity data included in the grid(include valid and invalid). This item is only stored in monthly product.

Item	Minimum	Maximum	Error value	Unit	Remarks
Total Number	0	32767	-32761～-32768	-	-