

AMSR-E Level 3(HDF5) Product Format Description

Jun, 2019

Japan Aerospace Exploration Agency (JAXA)

Change record

Issue	Date	Sheet	Description of change
NC	2019/06	—	<p>-AMSR-E Level 3 product version 8 format description was established.</p> <p><Major changes in the version 8 products> -Change of the AMSR-E level 2 algorithms. (Applied the AMSR-2 level 2 algorithms)</p> <p>-The data format and file naming convention of the AMSR-E compliance with AMSR-2 level 3 products (HDF5).</p>

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1 Introduction

1.1 Purpose

This format specification describes the format of AMSR-E level 3(HDF5) product version 8 which is produced at Japan Aerospace Exploration Agency (JAXA). This document describes the file format, data structure and data contents of AMSR-E level 3 product.

1.2 Overview

AMSR-E on the EOS Aqua which is planned to solve the mechanism of trend warming on the earth and so on, and it observes various bands of microwave radiation even if it is cloudy or at night. The AMSR-E products will be distributed to users. There are 5 kinds of products shown in Table 1.2-1.

Level 3 product contains the global data, which are the daily or monthly average data of each geophysical quantity, such as brightness temperature in level 1B product and level 2 product. The data in level 3 is calculated average daily or monthly in each directions, such as ascending or descending, and projected by equirectangular or polar stereo graphic.

Table 1.2-1 AMSR-E product processing levels

Level	Contents
Level 1A	<ul style="list-style-type: none">• Swath data with geolocation information• Scene counts• ½ orbit starting from northern/southern-most latitudes
Level 1B	<ul style="list-style-type: none">• Swath data with geolocation information• Brightness temperatures• ½ orbit starting from northern/southern-most latitudes
Level 1R	<ul style="list-style-type: none">• Swath data with geolocation information• Spatial-resolution matched brightness temperatures• 4 resolution sets (6,10,23,36GHz) and raw swath for 89GHz A/B• ½ orbit starting from northern/southern-most latitudes
Level 2	<ul style="list-style-type: none">• Swath data with geolocation information• Geophysical parameters (8 parameters)• ½ orbit starting from northern/southern-most latitudes
Level 3	<ul style="list-style-type: none">• Grid data with 0.1/0.25 degrees (10/25km) resolution• Brightness temperatures and geophysical parameters• Daily and monthly temporal average• Equidistant Cylindrical and Polar Stereo Projection

The major changes in level 3 product version 8 are the following two points.

1) Change of processing algorithm:

The algorithm developed for the AMSR2 onboard the GCOM-W was applied to AMSR-E data.

- 2) The data format and file naming convention of the AMSR-E compliance with AMSR-2 level 3 products (HDF5).

This document describes an outline of data in level 3 products and its data format.

2 Applicable and reference documents

2.1 Applicable documents

- AMSR-E product specifications (NDX-000184)
- AMSR2 higher level product format specification
- EIS granule ID prescription (NEB-060005B)

2.2 Reference documents

- AMSR-E Data Users Handbook (NCX-030021)
- AMSR-E Level 1B (HDF5) product format description (SAM-160173B)
- AMSR-E Level 1R (HDF5) product format description (SAM-160173B)
- AMSR-E Level 2 (HDF5) product format description (SAM-2019017 Appendix 2)
- Description of GCOM-W1 AMSR 2 Level 1R and Level 2 Algorithms (NDX-120015A)

3 Product description

3.1 Product type

AMSR-E level 3 product file stores the daily or monthly average data calculated level 1 or level 2 and static information. The AMSR-E level3 product is the nine kinds of geophysical quantity data shown below.

-Brightness Temperature (TB)

-6GHz (T06)

-7GHz (T10) *

-10GHz (T10)

-18GHz (T18)

-23GHz (T23)

-36GHz (T36)

-89GHz (T89)

-Total Precipitable Water (TPW)

-Cloud Liquid Water (CLW)

-Precipitation (PRC)

-Sea Surface Temperature (SST)

-Sea Surface Wind Speed (SSW)

-Sea Ice Concentration (SIC)

-Snow Depth (SND)

-Soil Moisture Content (SMC)

※ 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored as dummy data.

Table3.1-1 shows a list of geophysical quantity, projection method and grid resolution. Table3.1-2 shows static method for each geophysical quantity.

Table 3.1-1 Geophysical quantity and projection

Geophysical quantity	Projection	Data type	Resolution
Brightness Temperature T06,T07,T10,T18, T23,T36,T89	EQR	Daily / Monthly	High[0.1°] / Low[0.25°]
	Northern polar stereo	Daily / Monthly	High[10km] / Low[25km]
	Southern polar stereo	Daily / Monthly	High[10km] / Low[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[25km]
	Southern polar stereo	Daily / Monthly	High[10km] / Low[25km]
Soil Moisture Content	EQR	Daily / Monthly	High[0.1°] / Low[0.25°]
	Northern polar stereo	Daily / Monthly	High[10km] / Low[25km]

Table 3.1-2 Static method

Geophysical quantity	Static method
Brightness Temperature	Average
Sea Ice Concentration	
Snow Depth	
Soil Moisture Content	Overwrite by latest data
Total Precipitable Water	
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 HDF5 file

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

Table 3.2-1 AMSR-E Daily Level 3 product file structure

Structure		HDF Data	Content
Header	Product Metadata	Attribute	Describe unique information of the product data.
Data		Dataset	<p>The example of the stored data is shown as below.</p> <ul style="list-style-type: none"> • Averaged or overwritten data • Time information. <p>(Average case shows negative value, overwrite case shows the time overwritten.)</p>

Table 3.2-2 AMSR-E Monthly Level 3 product file structure

Structure		HDF Data	Content
Header	Product Metadata	Header	Describe unique information of the product data.
Data		Dataset	<p>The example of the stored data is shown as below.</p> <ul style="list-style-type: none"> • Averaged data • Static information • Standard deviation • Total number of data • Average data

3.3 Structure of data

Fig. 3.3-1 Structure of daily AMSR-E level 3 product shows structure of AMSR-E level 3 product data.

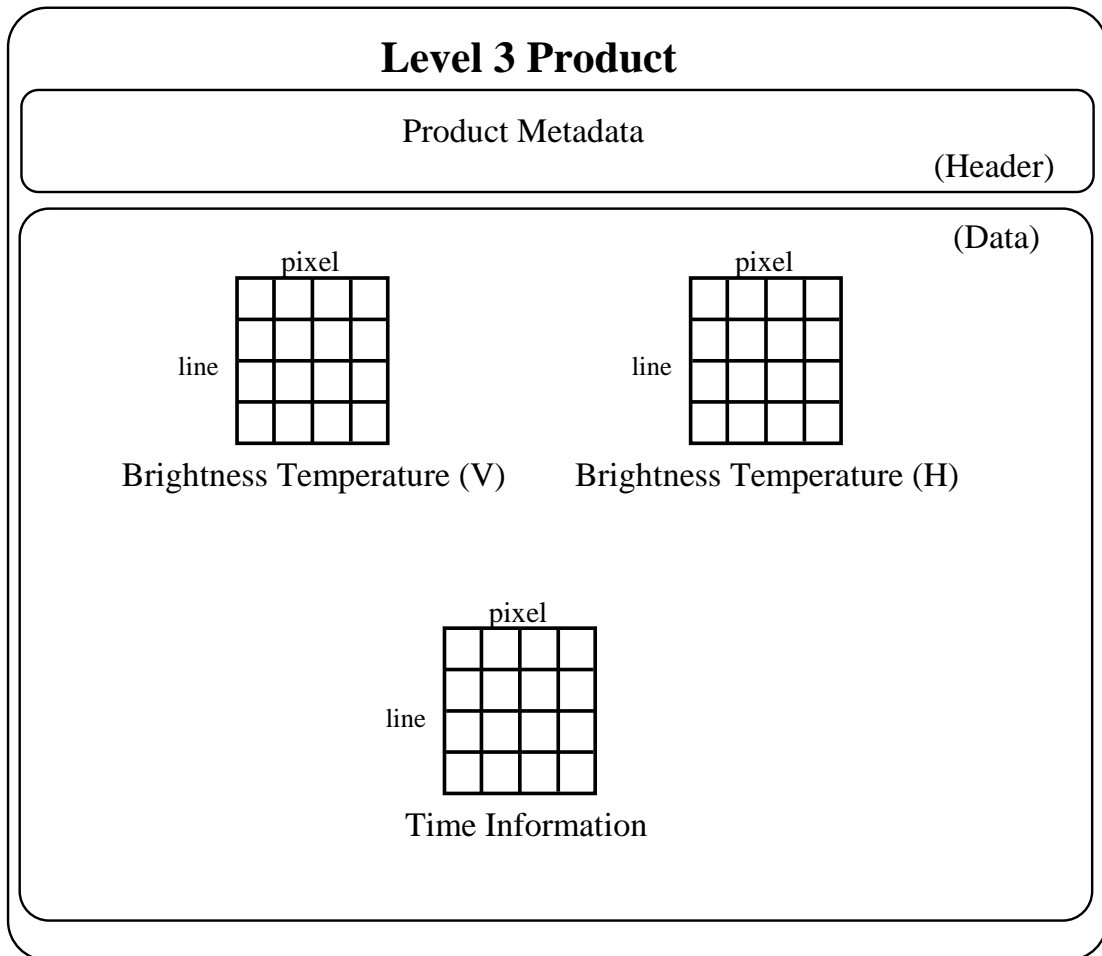


Fig. 3.3-1 Structure of daily AMSR-E level 3 product [Brightness temperature]

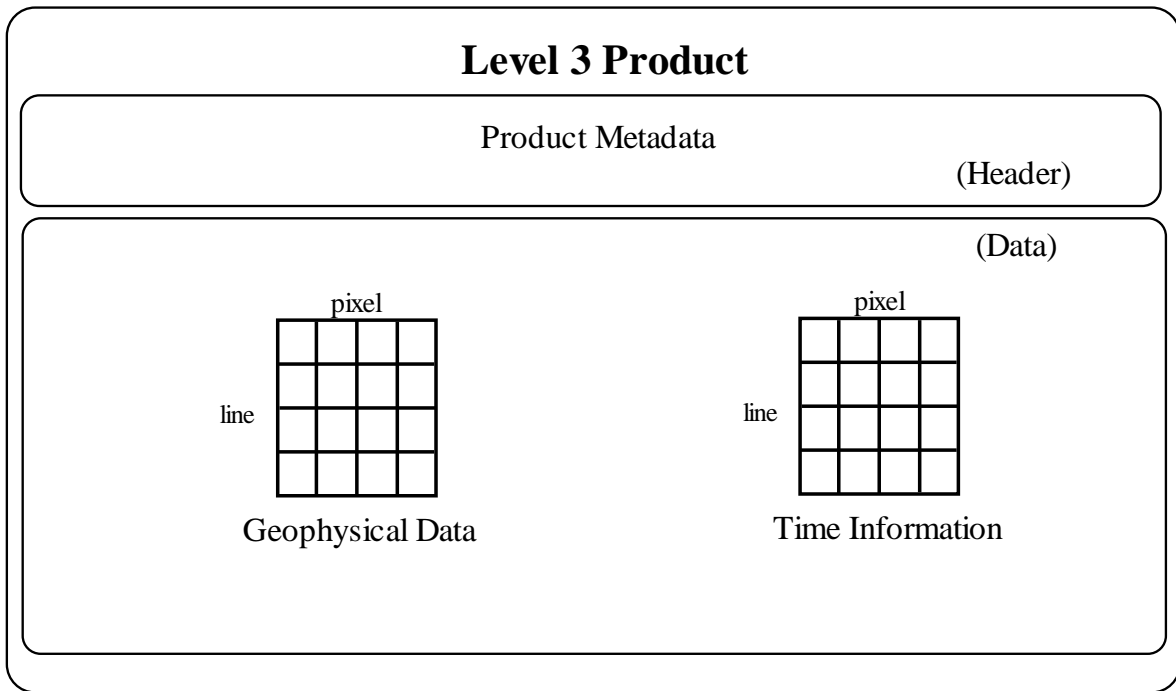


Fig. 3.7.1-2 Structure of daily AMSR-E level3 product [Geophysical quantity]

Level 3 Product

Product Metadata

(Header)

(Data)

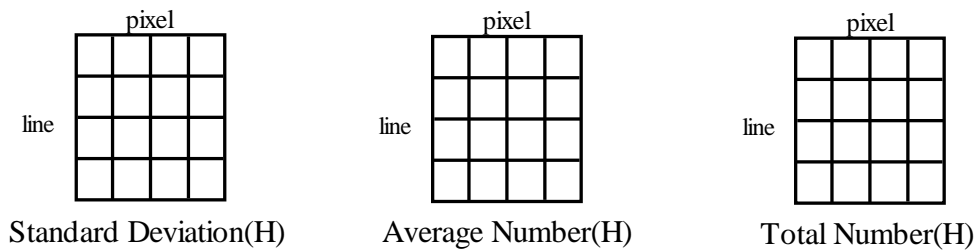
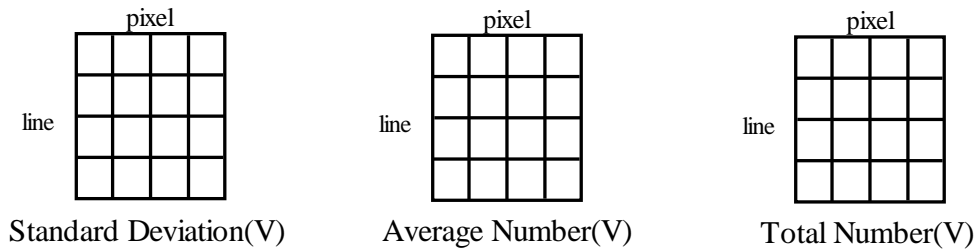
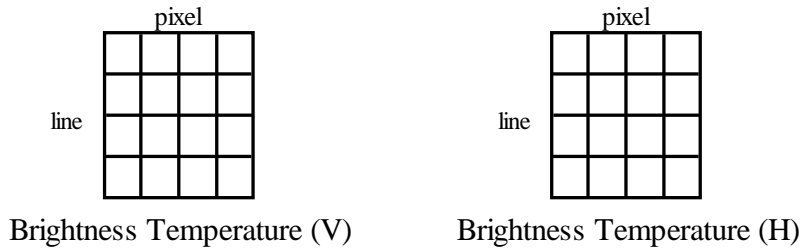


Fig. 3.7.1-3 Structure of monthly AMSR-E level3 product [Brightness temperature]

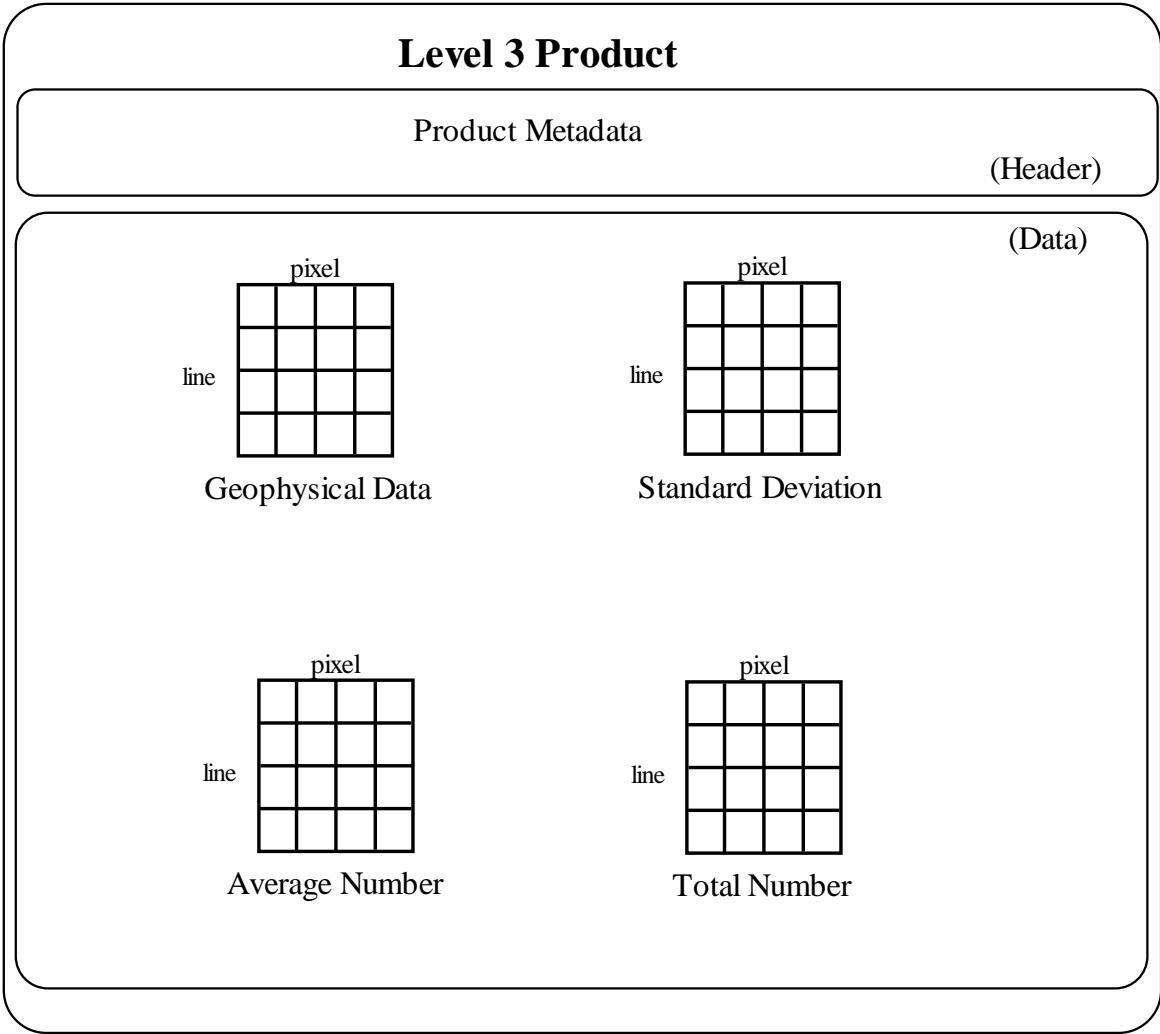


Fig. 3.7.1-4 Structure of monthly AMSR-E level3 product [Geophysical quantity]

3.4 Meta data

Table 3.2-1 AMSR-E Daily Level 3 product file structure shows the product metadata items.

Table 3.4-1 Product metadata items

No	Attribute Name	Max Size (Byte)	Explanation	Example	Fixed/Variable
1	ProductName	12	Abbreviated name	[Daily/Monthly] [XXXXXXXXXXXXXX] AMSR-E-L3	Fixed
2	GeophysicalName	36	Geophysical quantity name	[Daily/Monthly] [XXXXXXXXXXXXXXXXXXXX] Total Precipitable Water Cloud Liquid Water Precipitation Sea Surface Temperature Sea Surface Wind speed Sea Ice Concentration Snow Depth Soil Moisture Content Brightness Temperature (6GHz) Brightness Temperature (7GHz) Brightness Temperature (10GHz) Brightness Temperature (18GHz) Brightness Temperature (23GHz) Brightness Temperature (36GHz) Brightness Temperature (89GHz)	Variable
3	MeanType	16	Average method	[Daily/Monthly] [XXXXXXXXXX] DayMean : Daily average DayOverwrite : Daily overwrite MonthMean : Monthly average	Variable
4	Projection	5	Projection type	[Daily/Monthly] [XXXXXX] EQR : Equi-rectangular PS-N : Northern polar stereo PS-S : Southern polar stereo	Variable

No	Attribute Name	Max Size (Byte)	Explanation	Example	Fixed/Variable
5	Resolution	7	Resolution value	[Daily/Monthly] 0.1deg 0.25deg 10km 25km	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] 0. 0~99999. 9	Variable
10	AlgorithmDeveloper	8	Algorithm Developer code	[Daily/Monthly] [XXXXXXXXXXXXXX]	Variable
11	GranuleID	64	Granule ID	[Daily/Monthly] [XXXXXXXXXXXXXX]	Variable
12	ProductionDateTime	24	Product creation time and date (UTC)	[Daily/Monthly] [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

No	Attribute Name	Max Size (Byte)	Explanation	Example	Fixed/Variable
13	ObservationStartDateTime	25	Start time and date of observation data (UTC)	[Daily/Monthly] [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
14	ObservationEndDateTime	25	End time and date of observation data (UTC)	[Daily/Monthly] [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
15	PGENAME	20	Data processing software name	[Daily/Monthly] [XXXXXXXXXXXXX] AMSR-E Reprocessing System	Fixed
16	InputFileName	30000	Input file name (Level1 or Level2 data file name)	[Daily/Monthly] XXXXXXXXXXXXX Strings	Variable
17	ProcessingCenter	12	Data processing center	[Daily/Monthly] [XXXXXXXXXXXXX] JAXA-JSS2	Fixed
18	ContactOrganizationName	300	Contact organization name	[Daily/Monthly] [XXXXXXXXXXXXX] JAXA SAOC	Fixed
19	ContactOrganizationTelephone	16	Contact telephone number	[Daily/Monthly] Brank	Fixed

No	Attribute Name	Max Size (Byte)	Explanation	Example	Fixed/Variable
20	StartOrbitNumber	6	Start orbit number	[Daily/Monthly] [XXXXXX] 0~99999	Variable
21	StopOrbitNumber	6	End orbit number	[Daily/Monthly] [XXXXXX] 0~99999	Variable
22	OrbitDirection	11	Orbit direction	[Daily/Monthly] [XXXXXXXXXX] Ascending Descending	Variable
23	PlatformShortName	8	Platform name	[Daily/Monthly] [XXXXXXXXXX] AQUA	Fixed
24	SensorShortName	8	Sensor names	[Daily/Monthly] [XXXXXXXXXX] AMSR-E	Fixed
25	ECSDataModel	8	Meta data model name	[Daily/Monthly] [X.X] B.0	Fixed

3.5 Data size and Scaling factor

Data items, sizes and scaling factors are shown in Table 3.2-1 AMSR-E Daily Level 3 product file structure .

(1)Daily [High resolution]

Table 3.5-1 Data size and Scaling factor [EQR 0.1° - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-2 Data size and Scaling factor [Northern PS 10km - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-3 Data size and Scaling factor [Southern PS 10km - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-4 Data size and Scaling factor [EQR 0.1° - 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		

*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.

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Table 3.5-5 Data size and Scaling factor [Northern PS 10km - 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		

Table 3.5-6 Data size and Scaling factor [Southern PS 10km - 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		

Table 3.5-7 Data size and Scaling factor [Northern PS 10km - 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		

*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 Equi valent) is stored in the second layer. So, the data size is also doubled. SWE: Scale factor = 0.1, Units = cm.

(2)Daily [Low resolution]

Table 3.5-8 Data size and Scaling factor [EQR 0.25° - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-9 Data size and Scaling factor [Northern PS 25km - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-10 Data size and Scaling factor [Southern PS 25km - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-11 Data size and Scaling factor [EQR 0.25° - 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		

*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.

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Table 3.5-12 Data size and Scaling factor [Northern PS 25km - 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		

Table 3.5-13 Data size and Scaling factor [Southern PS 25km - 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		

Table 3.5-14 Data size and Scaling factor [Northern PS 25km - 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		

*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.

(3)Monthly [High resolution]

Table 3.5-15 Data size and Scaling factor [EQR 0.1° - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz.

7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-16 Data size and Scaling factor [Northern PS 10km - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-17 Data size and Scaling factor [Southern PS 10km - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-18 Data size and Scaling factor [EQR 0.1° - 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		

*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.

Table 3.5-19 Data size and Scaling factor [Northern PS 10km - 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		

Table 3.5-20 Data size and Scaling factor [Southern PS 10km - 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		

Table 3.5-21 Data size and Scaling factor [Northern PS 10km - 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		

*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.

(4)Monthly [Low resolution]

Table 3.5-22 Data size and Scaling factor [EQR 0.25° - 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)						3.84		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-23 Data size and Scaling factor [Northern PS 25km - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-24 Data size and Scaling factor [Southern PS 25km - 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		

* The TB Level 3 product stores one frequency channel in one product file and there are seven frequency channels in total at 6GHz, 7GHz, 10GHz, 18GHz, 23GHz, 36GHz and 89GHz. 7GHz data exist for maintaining compatibility with the product of AMSR2. In each area, 6GHz data before bias correction are stored.

Table 3.5-25 Data size and Scaling factor [EQR 0.25° - 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		

*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.

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Table 3.5-26 Data size and Scaling factor [Northern PS 25km - 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		

Table 3.5-27 Data size and Scaling factor [Southern PS 25km - SIC]

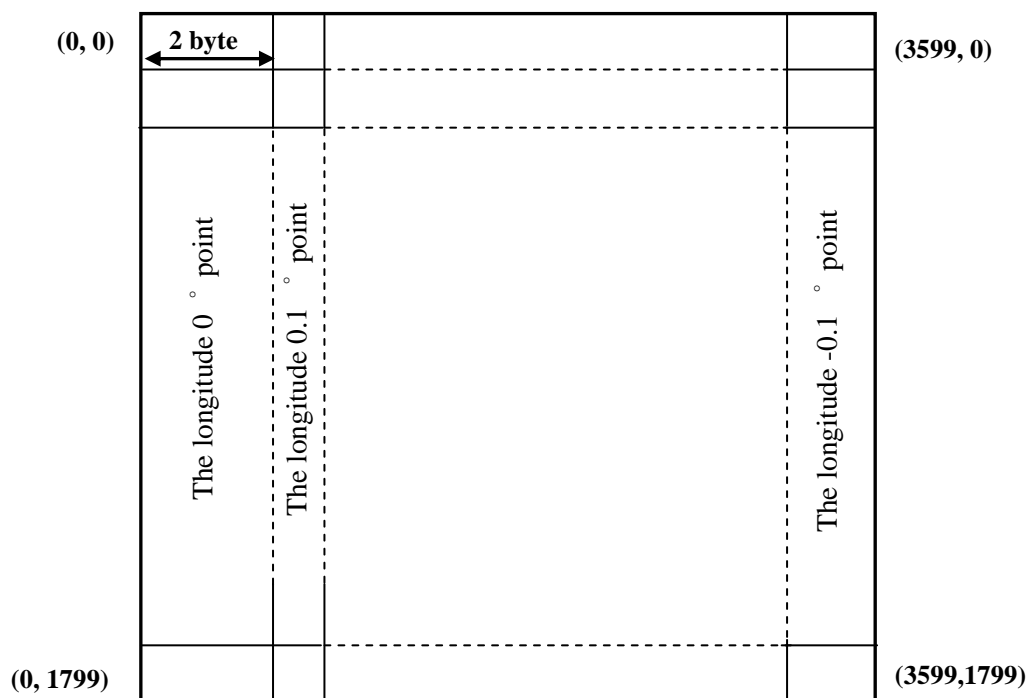
No.	Data	Samples	Bytes/ Sample	Type	Bytes/ Record	Records	Sum(bytes)	Scale factor	Units
1	Core Meta Data	25	100	-	2,500	1	2,500	-	-
2	Geophysical Data	316	2	signed int	632	332	209,824	0.1	SIC:%
3	Standard Deviation	316	2	signed int	632	332	209,824	0.01	-
4	Average Number	316	2	signed int	632	332	209,824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

Table 3.5-28 Data size and Scaling factor [Northern PS 25km - 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		

*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.

3.6 Definition of grid



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

Fig. 3.6-1 Structure of BT by EQR [Daily - High resolution]

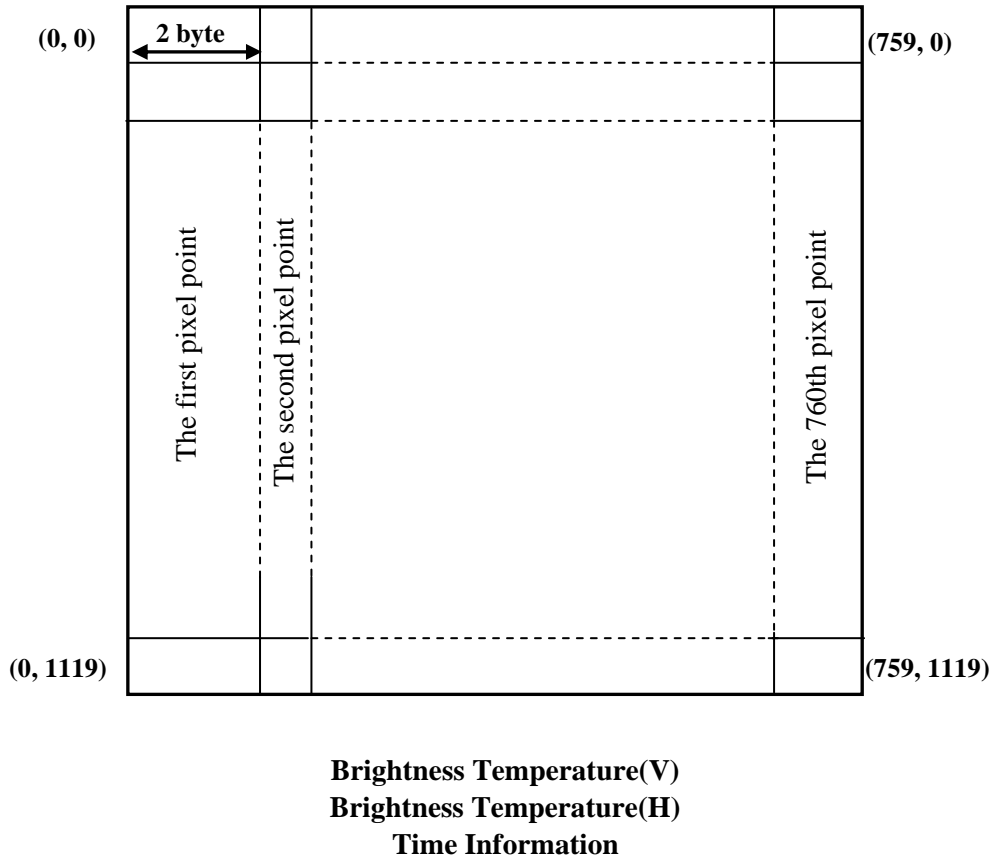
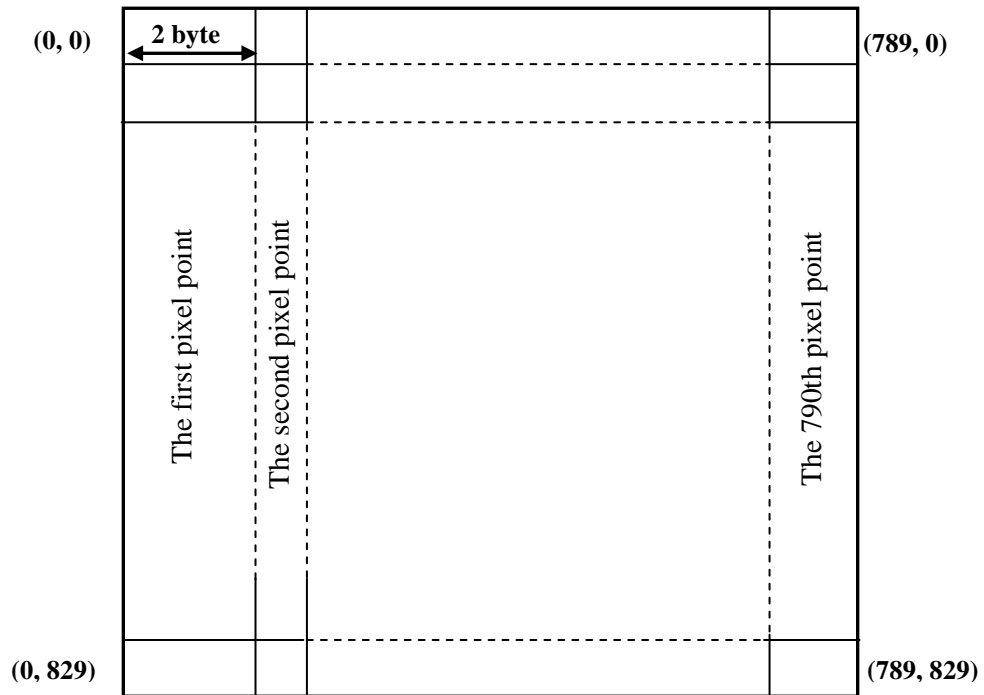
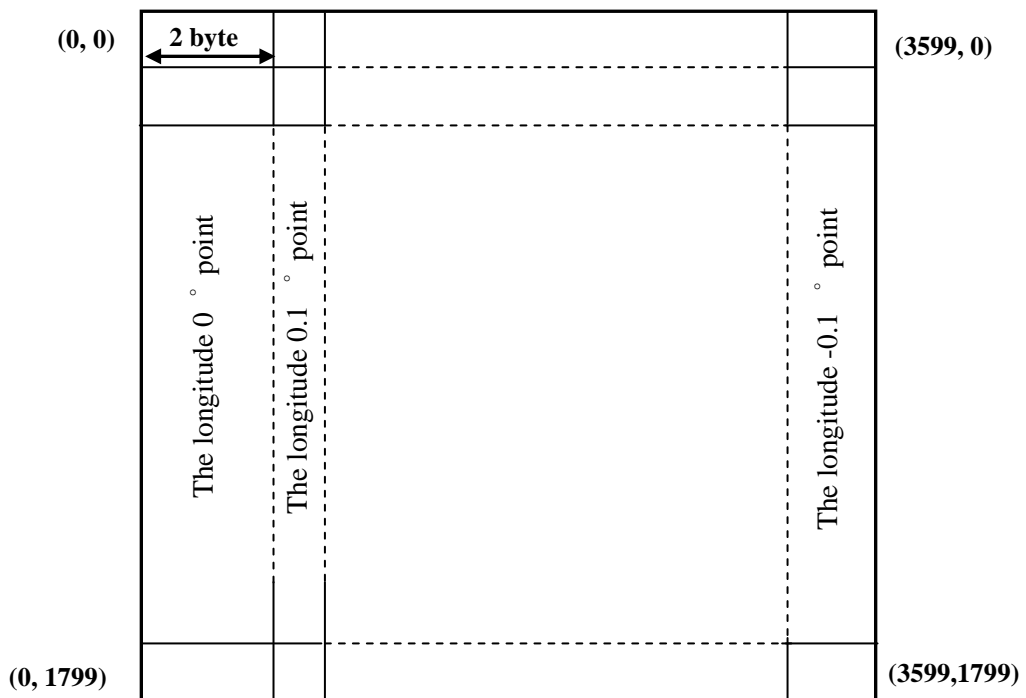


Fig. 3.6-2 Structure of BT by Northern PS [Daily - High resolution]



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

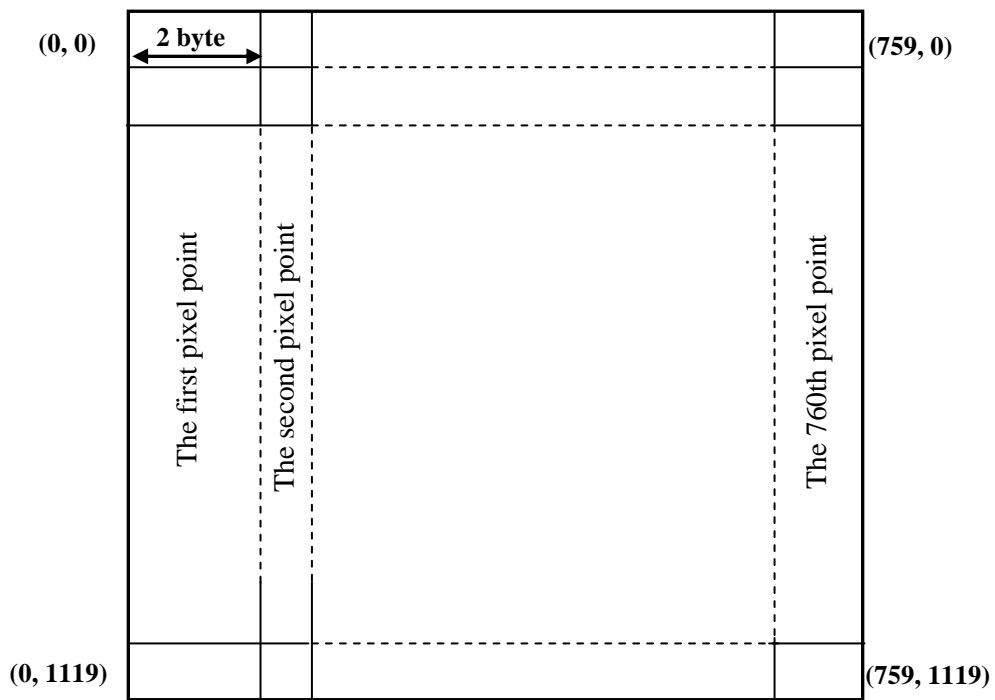
Fig. 3.6-3 Structure of BT by Southern PS [Daily - High resolution]



**Geophysical Data
Time Information**

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

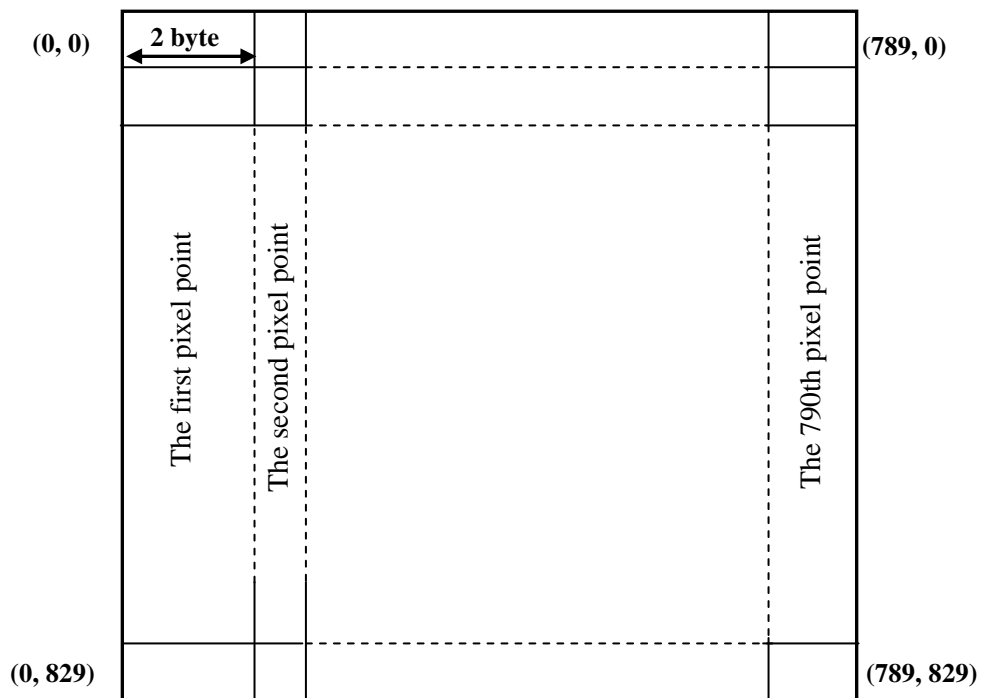
Fig. 3.6-4 Structure of Geophysical quantity BT by EQR [Daily - High resolution]



**Geophysical Data
Time Information**

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

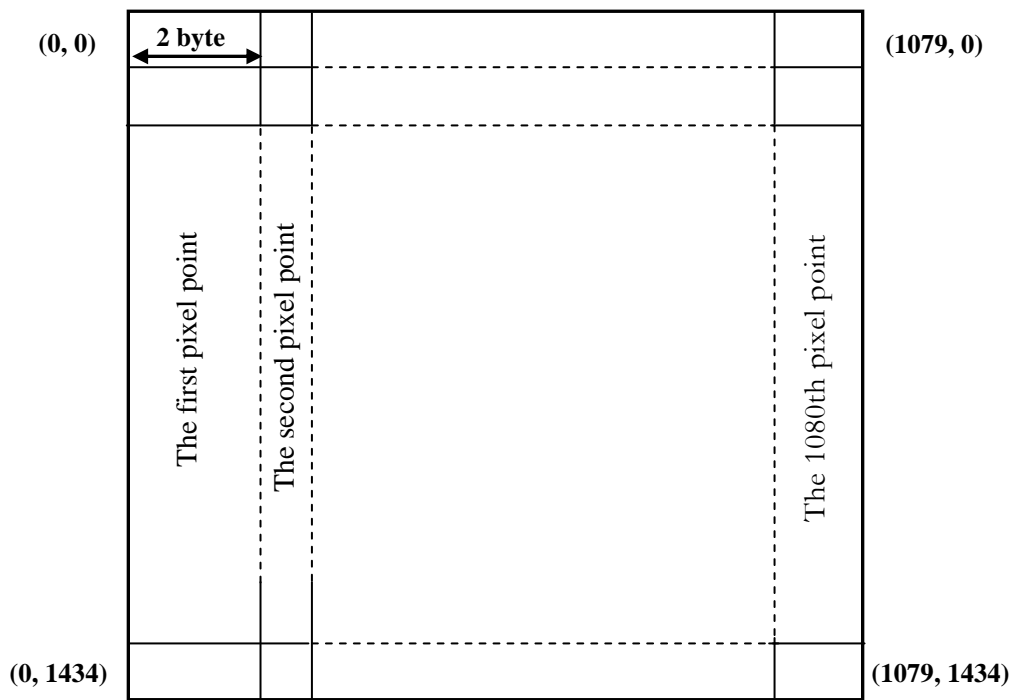
Fig. 3.6-5 Structure of SIC by Northern PS [Daily - High resolution]



**Geophysical Data
Time Information**

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

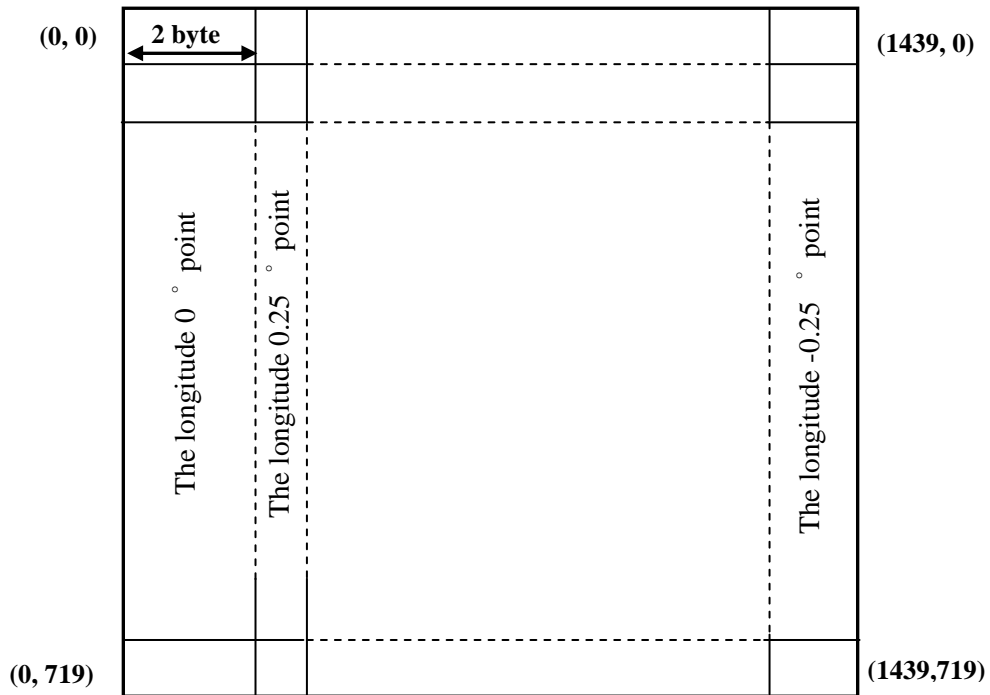
Fig. 3.6-6 Structure of SIC by Southern PS [Daily - High resolution]



**Geophysical Data
Time Information**

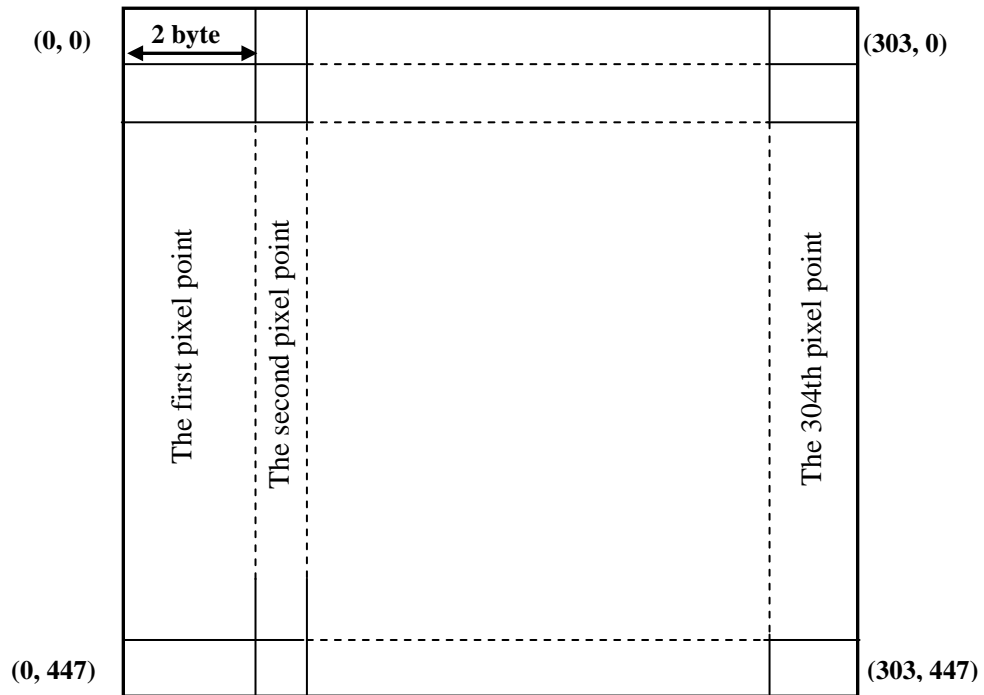
*In some cases, it is 3 dimensions structure by kind of Geophysical quantity. (Maximum 3 layers)

Fig. 3.6-7 Structure of SND by Northern PS [Daily - High resolution]



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

Fig. 3.6-8 Structure of BT by EQR [Daily - Low resolution]



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

Fig. 3.6-9 Structure of BT by Northern PS [Daily - Low resolution]

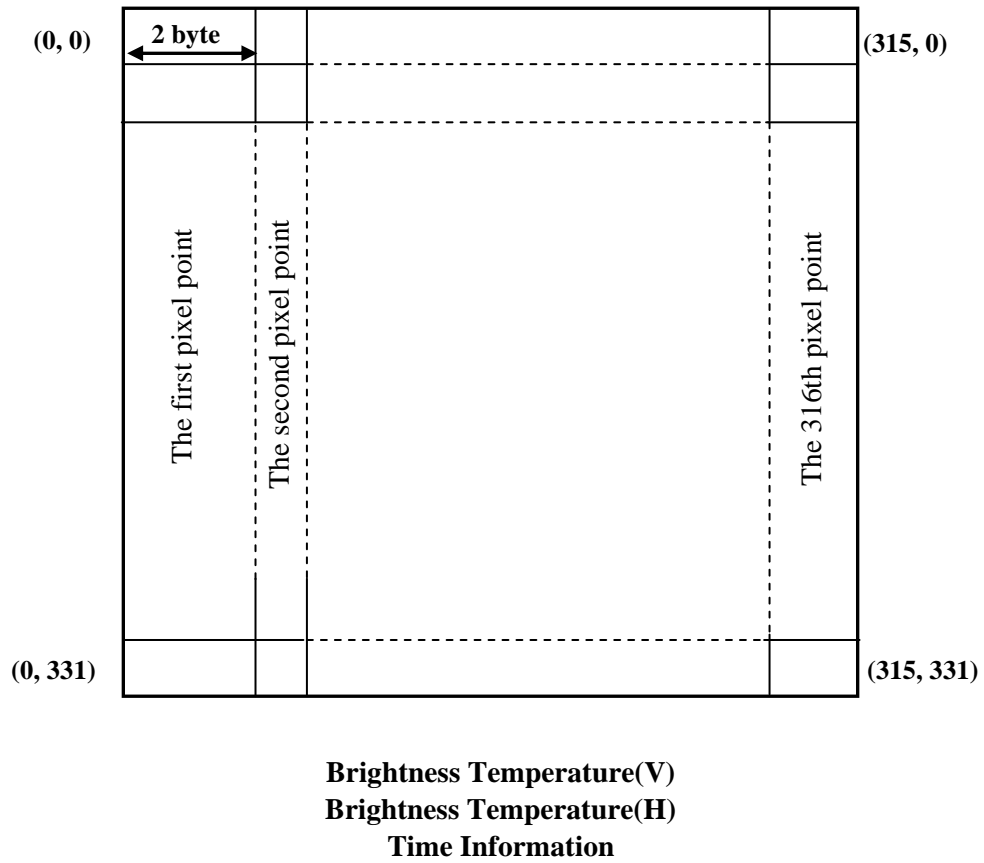
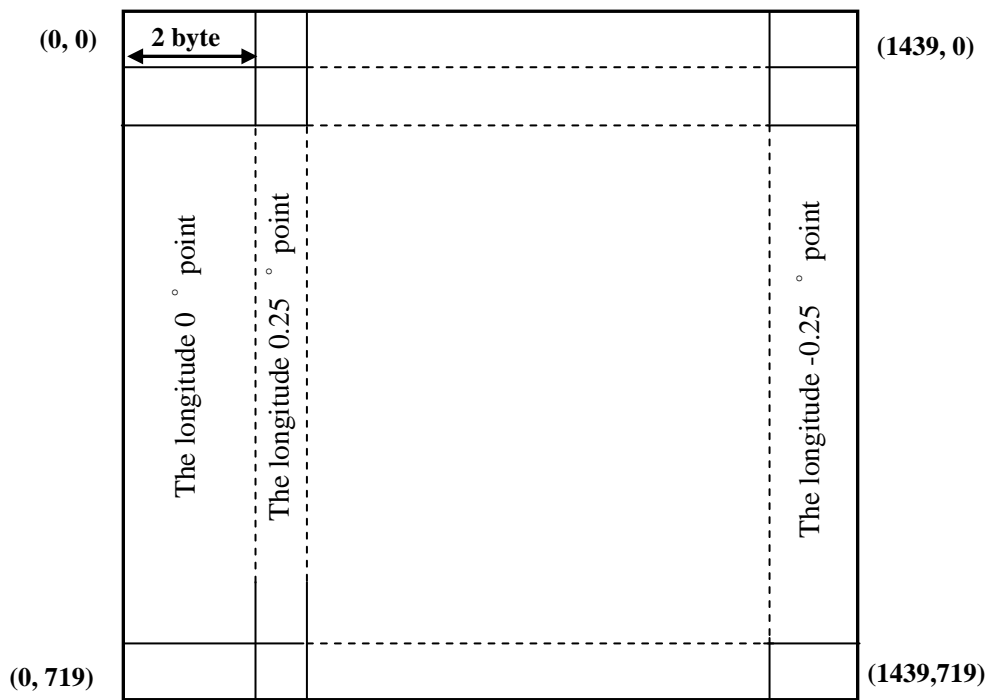


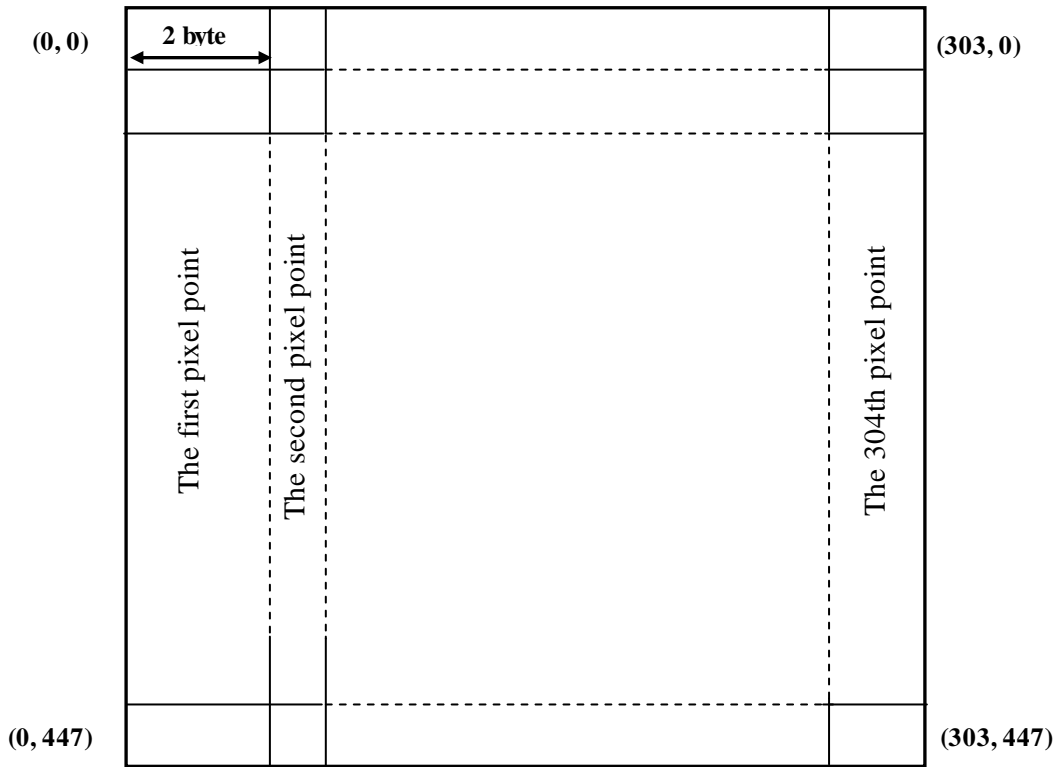
Fig. 3.6-10 Structure of BT by Southern PS [Daily - Low resolution]



**Geophysical Data
Time Information**

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

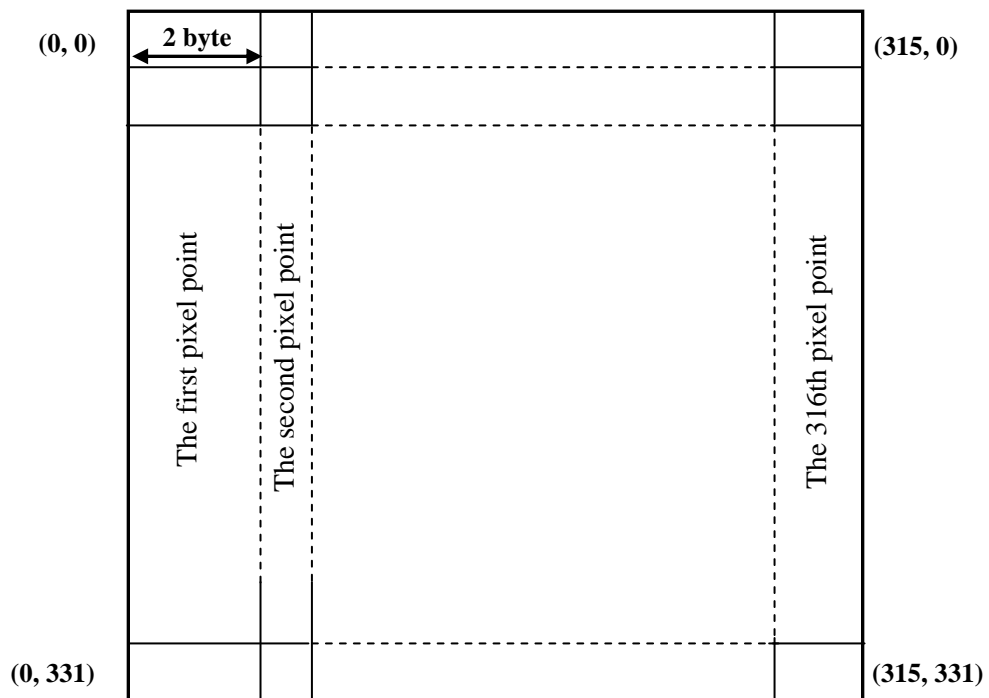
Fig. 3.6-11 Structure of Geophysical quantity by EQR [Daily - Low resolution]



**Geophysical Data
Time Information**

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

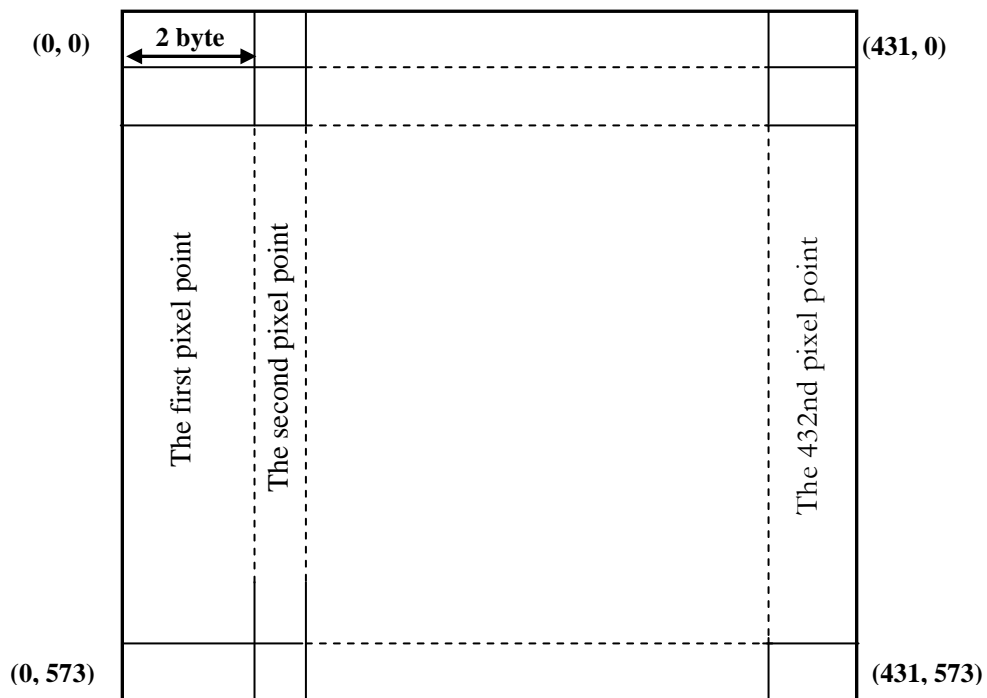
Fig. 3.6-12 Structure of SIC by Northern PS [Daily - Low resolution]



**Geophysical Data
Time Information**

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

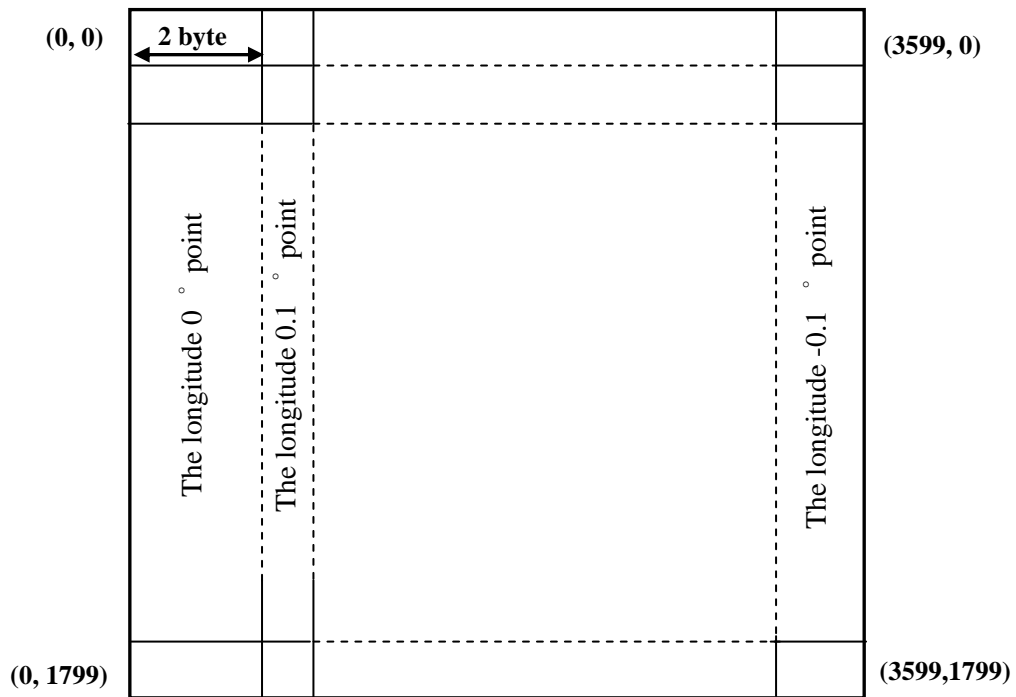
Fig. 3.6-13 Structure of SIC by Southern PS [Daily - Low resolution]



**Geophysical Data
Time Information**

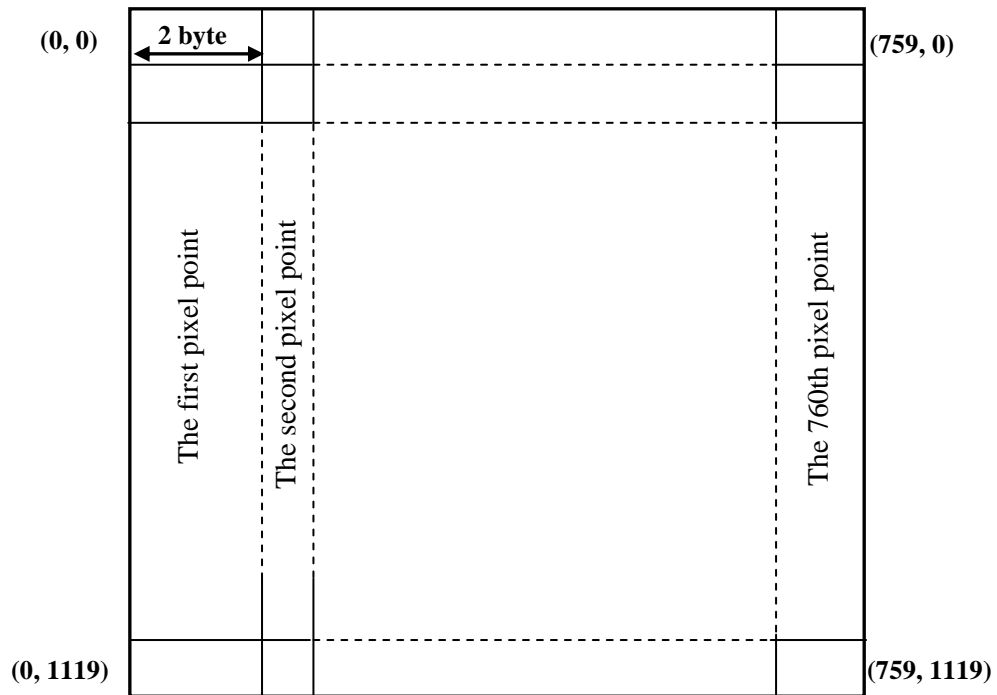
*In some cases, it is 3 dimensions structure by kind of Geophysical quantity. (Maximum 3 layers)

Fig. 3.6-14 Structure of SND by Northern PS [Daily - Low resolution]



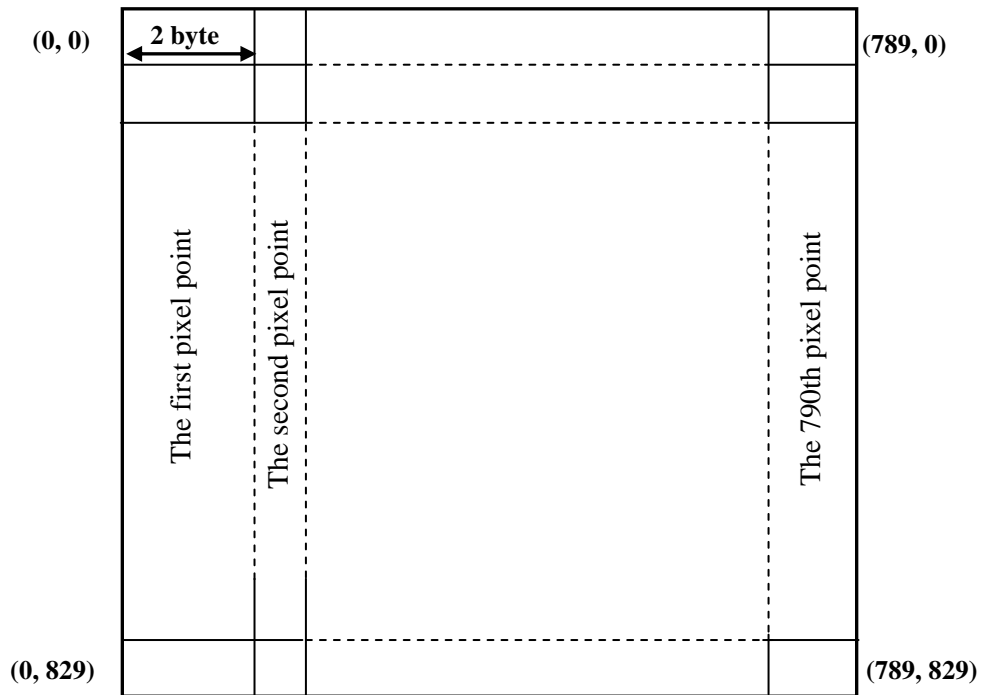
Brightness Temperature(V)
Brightness Temperature(H)
Standard Diviation (V)
Average Number (V)
Total Number (V)
Standard Diviation (H)
Average Number (H)
Total Number (H)

Fig. 3.6-15 Structure of BT by EQR [Monthly - High resolution]



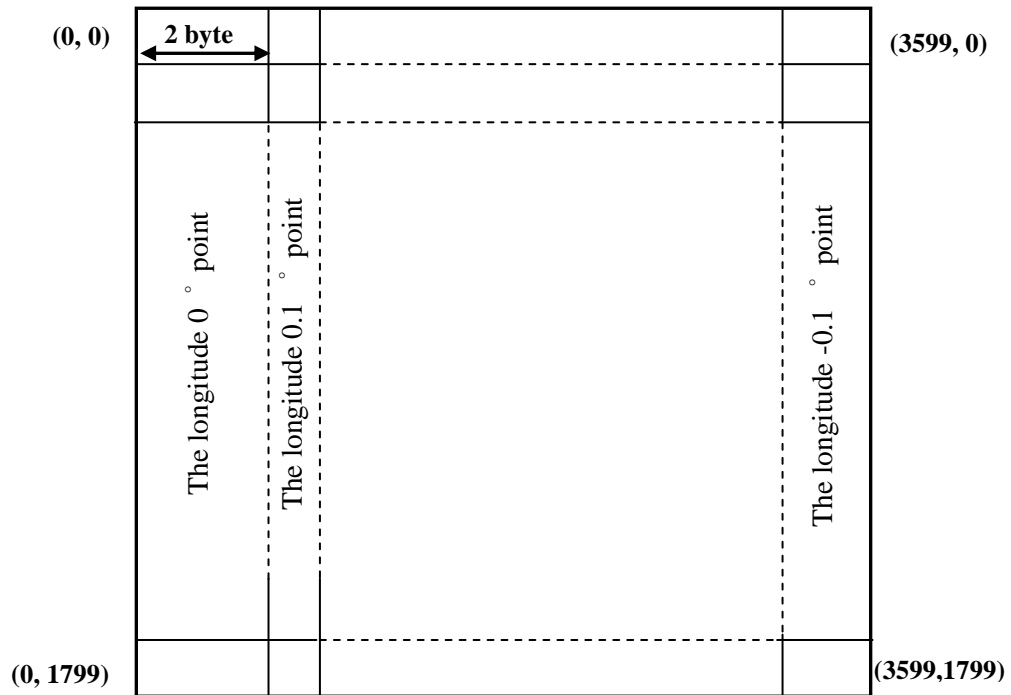
Brightness Temperature(V)
Brightness Temperature(H)
Standard Diviation (V)
Average Number (V)
Total Number (V)
Standard Diviation (H)
Average Number (H)
Total Number (H)

Fig. 3.6-16 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)

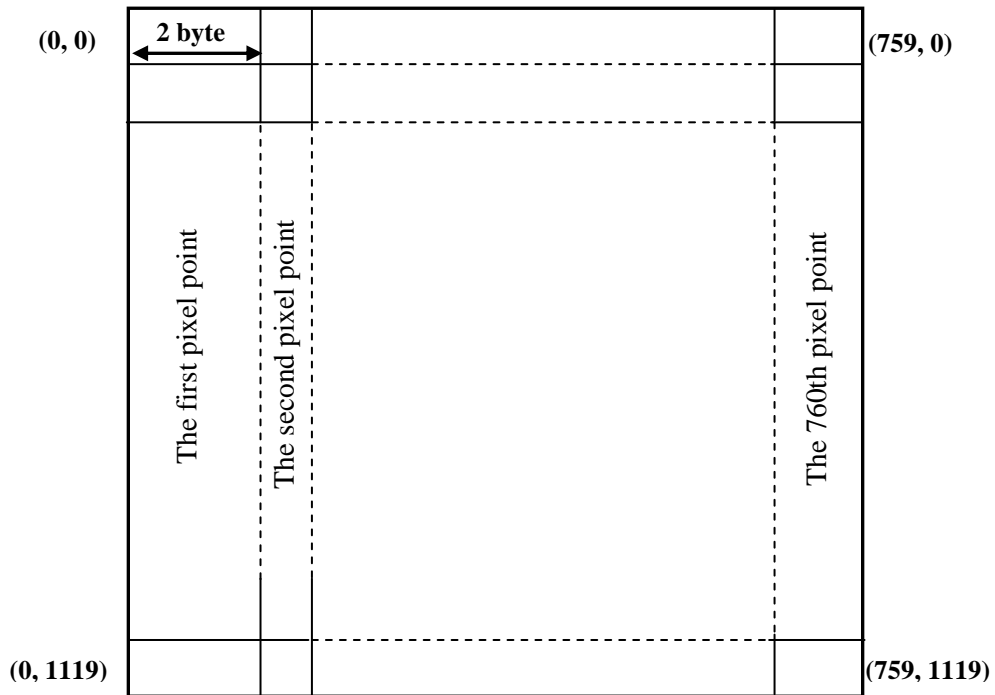
Fig. 3.6-17 Structure of BT by Southern PS [Monthly - High resolution]



Geophysical Data
Standard Diviation
Average Number
Total Number

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

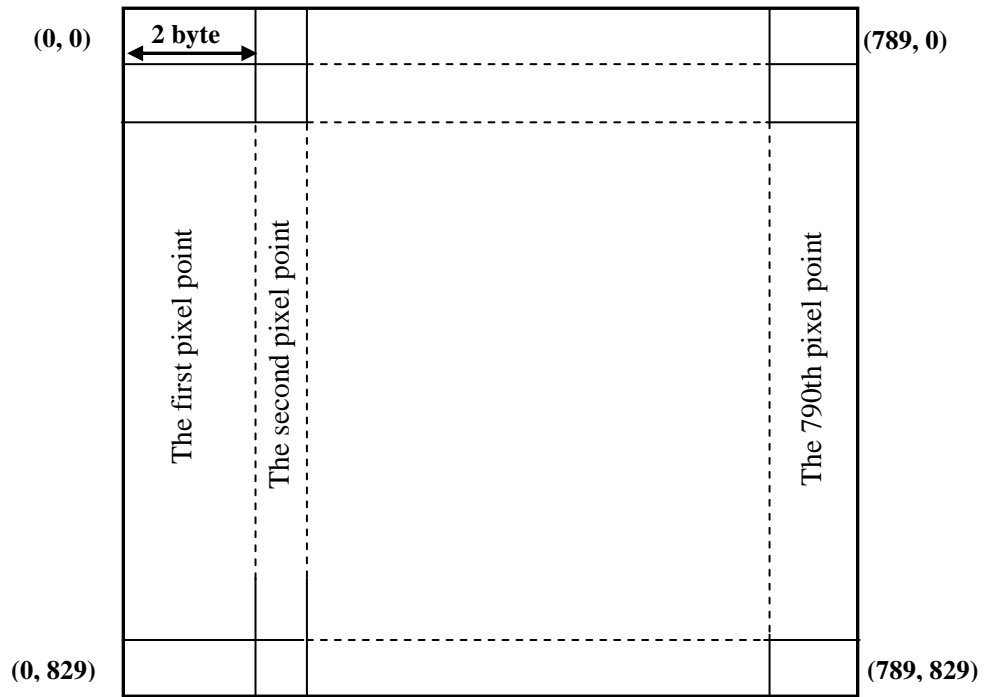
Fig. 3.6-18 Structure of Geophysical quantity by EQR [Monthly - High resolution]



Geophysical Data
Standard Diviation
Average Number
Total Number

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

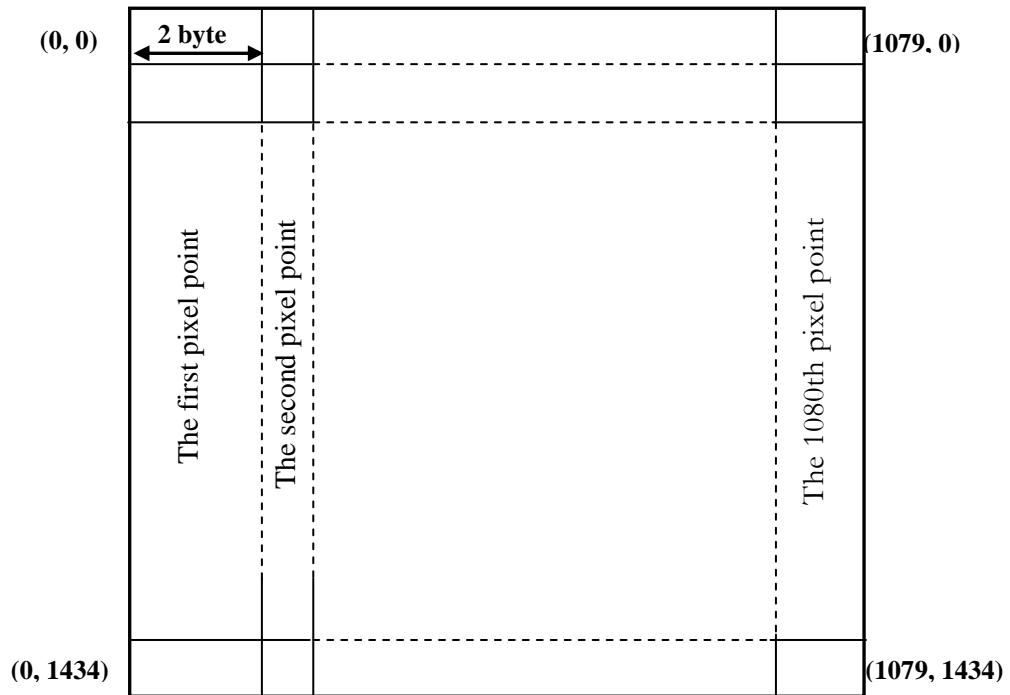
Fig. 3.6-19 Structure of SIC by Northern PS [Monthly - High resolution]



Geophysical Data
Standard Diviation
Average Number
Total Number

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

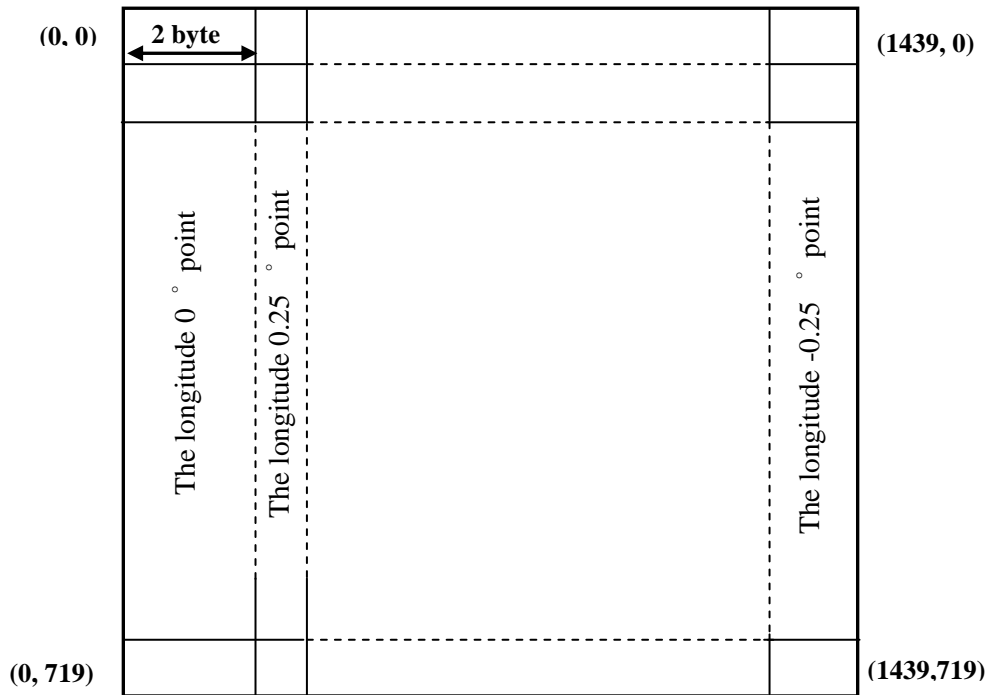
Fig. 3.6-20 Structure of SIC by Southern PS [Monthly - High resolution]



Geophysical Data
Standard Diviation
Average Number
Total Number

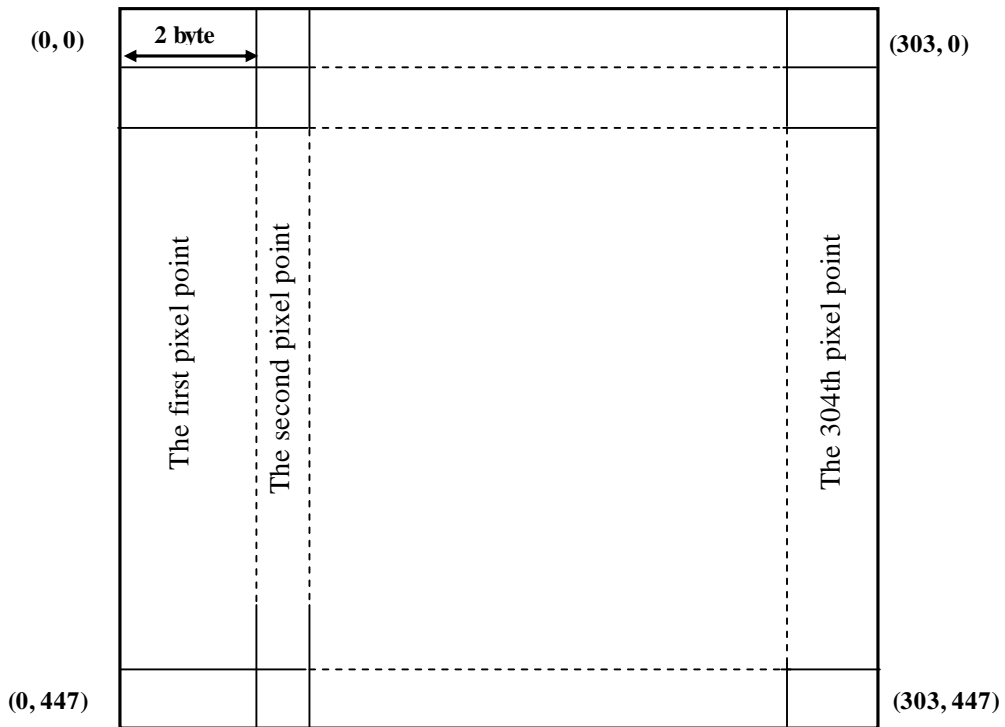
*In some cases, it is 3 dimensions structure by kind of Geophysical quantity. (Maximum 3 layers)

Fig. 3.6-21 Structure of SND by Northern PS [Monthly - High resolution]



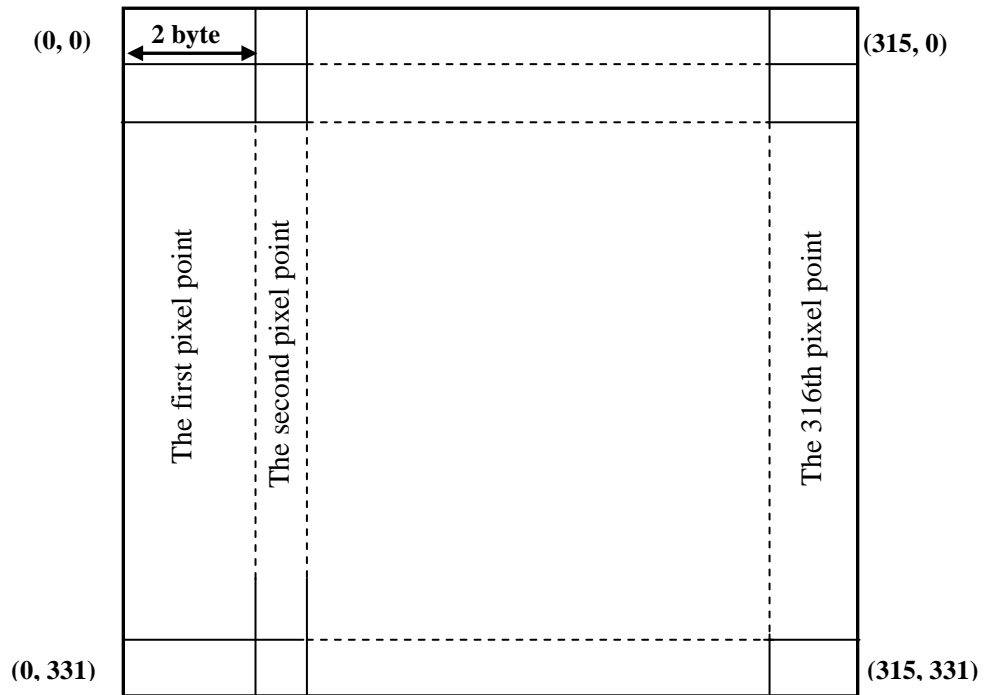
- Brightness Temperature(V)**
- Brightness Temperature(H)**
- Standard Diviation (V)**
- Average Number (V)**
- Total Number (V)**
- Standard Diviation (H)**
- Average Number (H)**
- Total Number (H)**

Fig. 3.6-22 Structure of BT by EQR [Monthly - Low resolution]



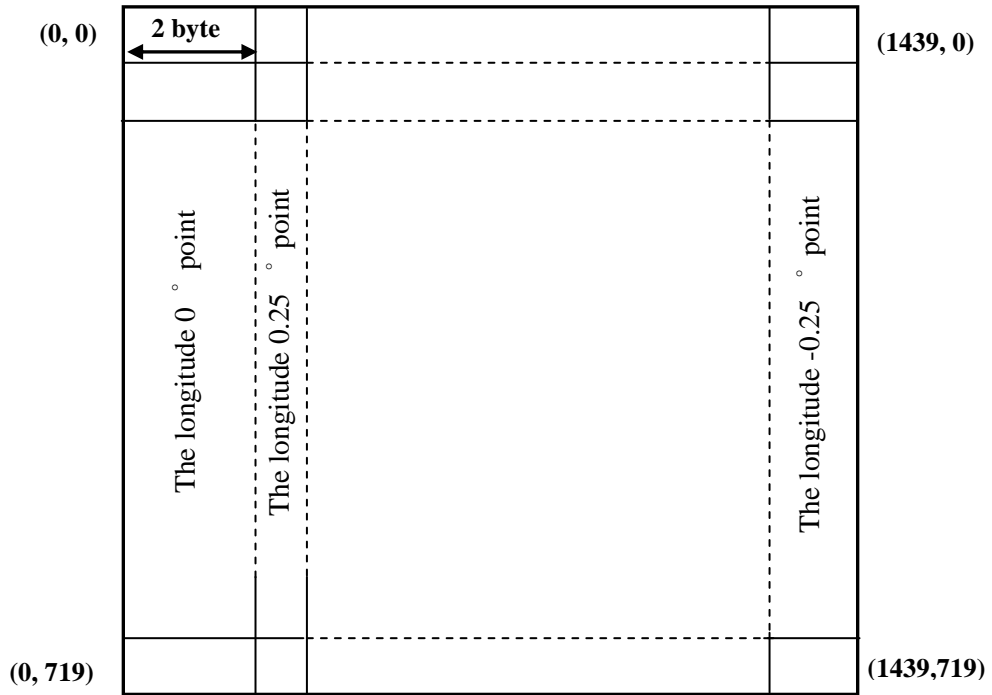
- Brightness Temperature (V)**
- Brightness Temperature (H)**
- Standard Deviation (V)**
- Average Number (V)**
- Total Number (V)**
- Standard Deviation (H)**
- Average Number (H)**
- Total Number (H)**

Fig. 3.6-23 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)

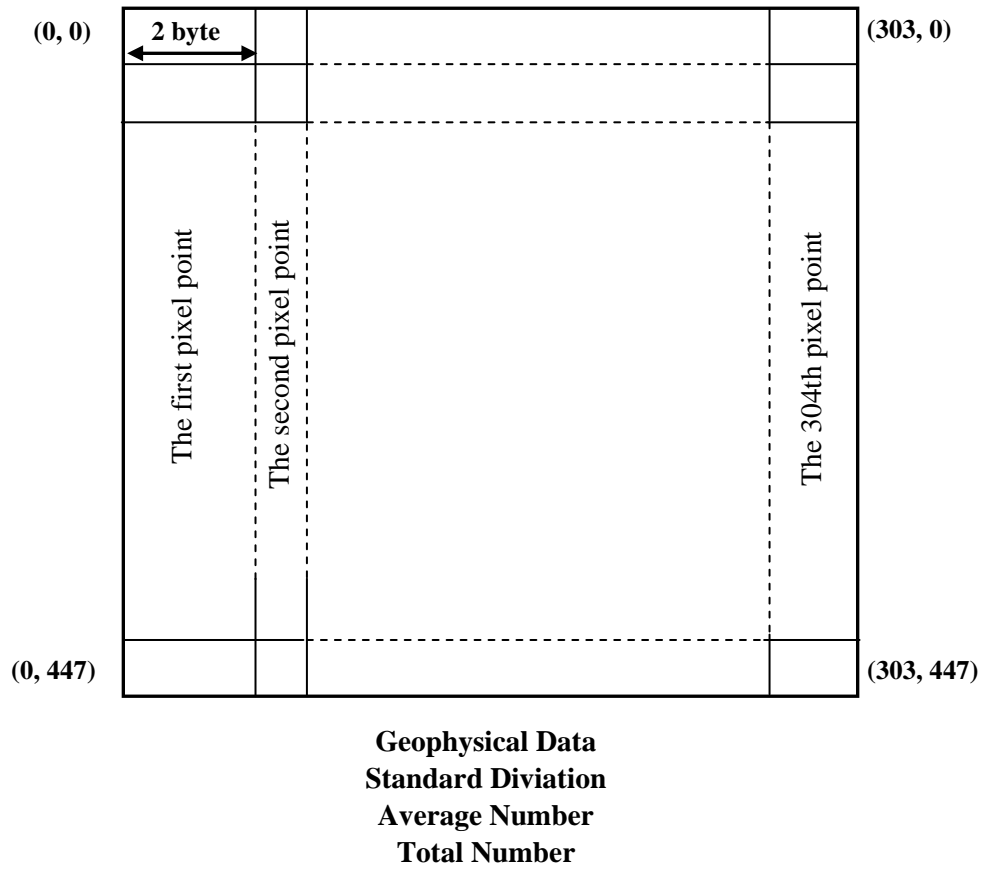
Fig. 3.6-24 Structure of BT by Southern PS [Monthly - Low resolution]



Geophysical Data
Standard Diviation
Average Number
Total Number

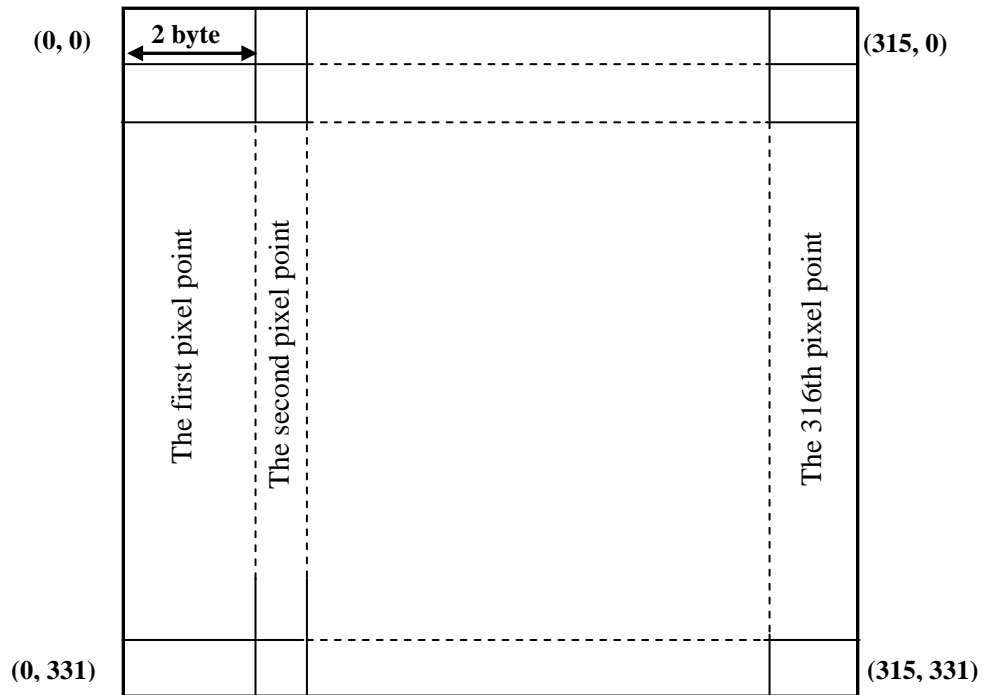
*In some cases, it is 3 dimensions structure by kind of Geophysical quantity. (Maximum 3 layers)

Fig. 3.6-25 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)

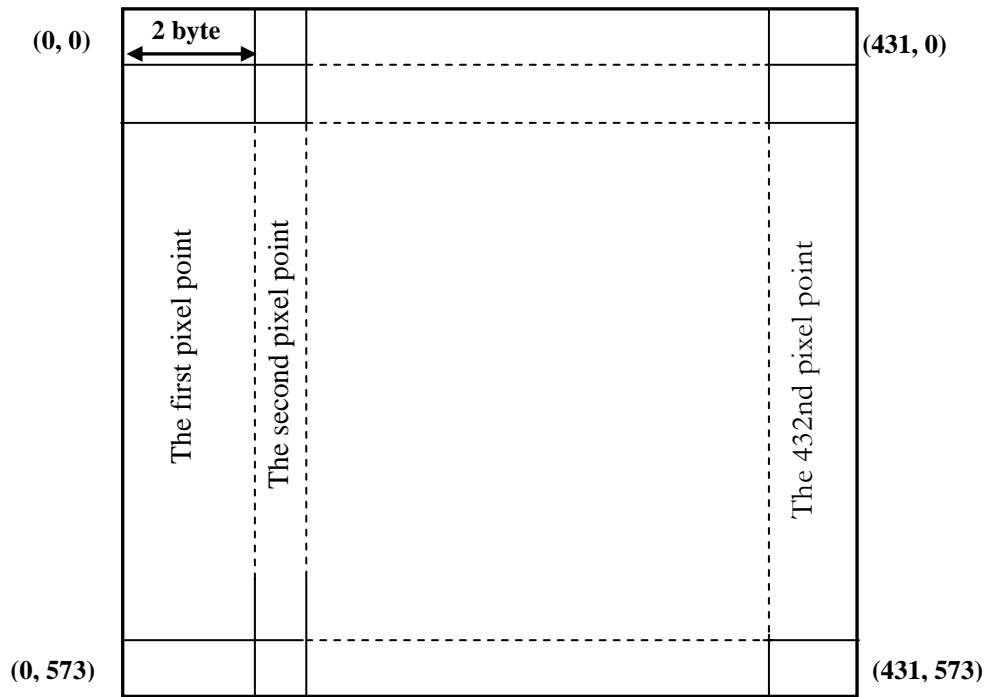
Fig. 3.6-26 Structure of SIC by Northern PS [Monthly - Low resolution]



Geophysical Data
Standard Diviation
Average Number
Total Number

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

Fig. 3.6-27 Structure of SIC by Southern PS [Monthly - Low resolution]



Geophysical Data
Standard Diviation
Average Number
Total Number

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

Fig. 3.6-28 Structure of SND by Northern PS [Monthly - Low resolution]

3.7 Special instruction

3.7.1 File naming convention

AMSR-E 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
AMSR-E	P	M	1	A	M	E	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				

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

Scene ID

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

Satellite : PM1 (Fixed Value)
 Sensor : AME (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]

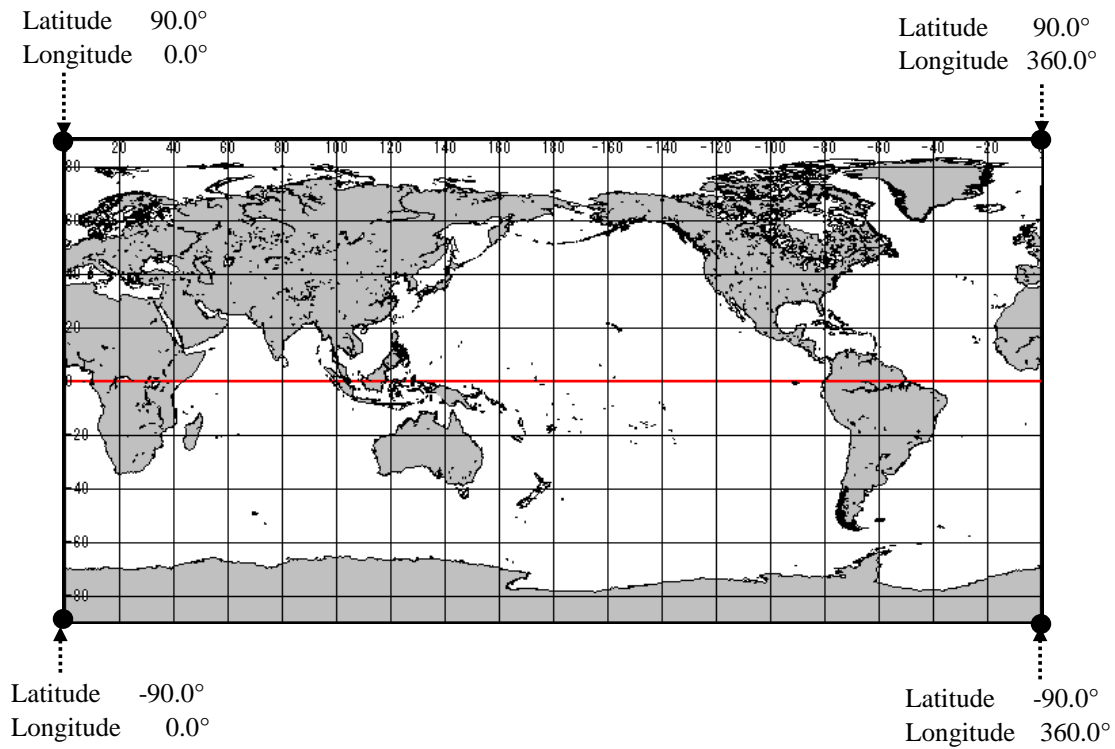
Process Level : LL (L3 : Level 3)
 Process Kind : xx (SG : Standard operation product, RG : Research standard operation product)
 Product ID : KKK (<L3> T06 : TB 6GHz, T07 : TB 7GHz, T10 : TB 10GHz, T18 : TB 18GHz, T23 : TB 23GHz, T36 : TB 36GHz, T89 : TB 89GHz, CLW : Cloud Liquid Water, TPW : Total 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)
 Parameter version : ppp (000~999)

3.7.2 Map projection

Table 3.7-1 Map projection and image size shows the number of pixels for each projection. Fig. 3.7.2-1 Definition of the EQR projection ~ Fig. 3.7.2-4 Definition of the Northern polar stereo projection [TB/SND] show definition of the each projection.

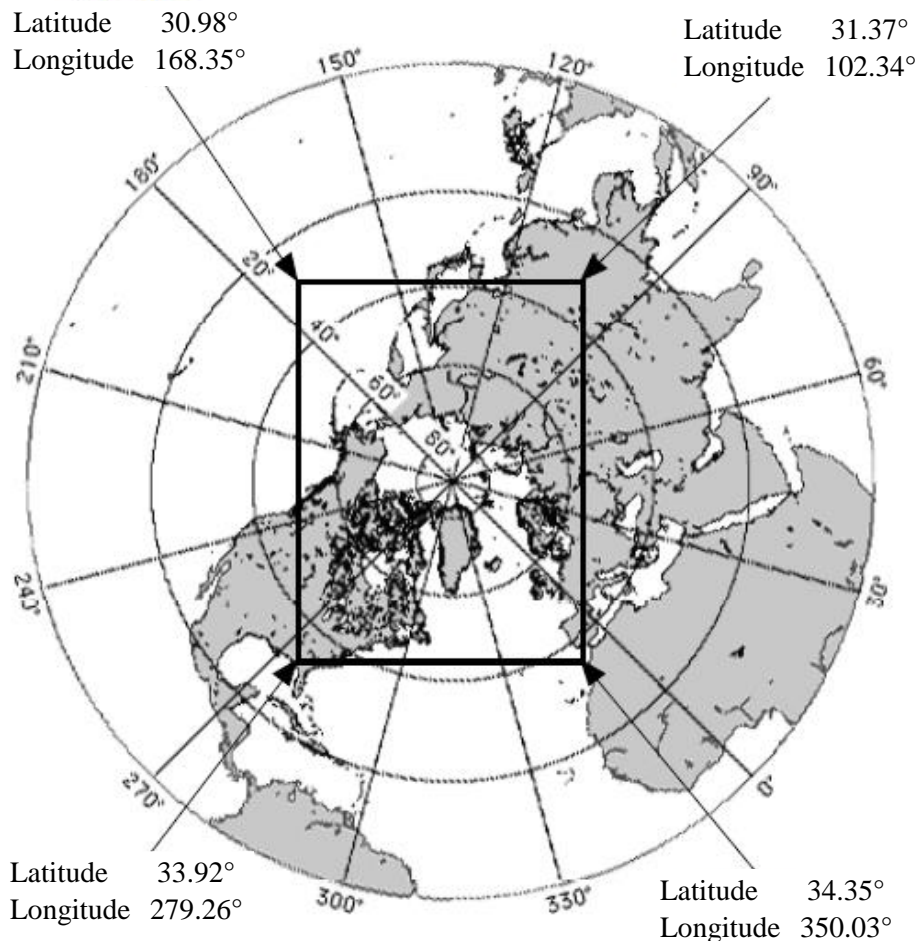
Table 3.7-1 Map projection and image size

	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



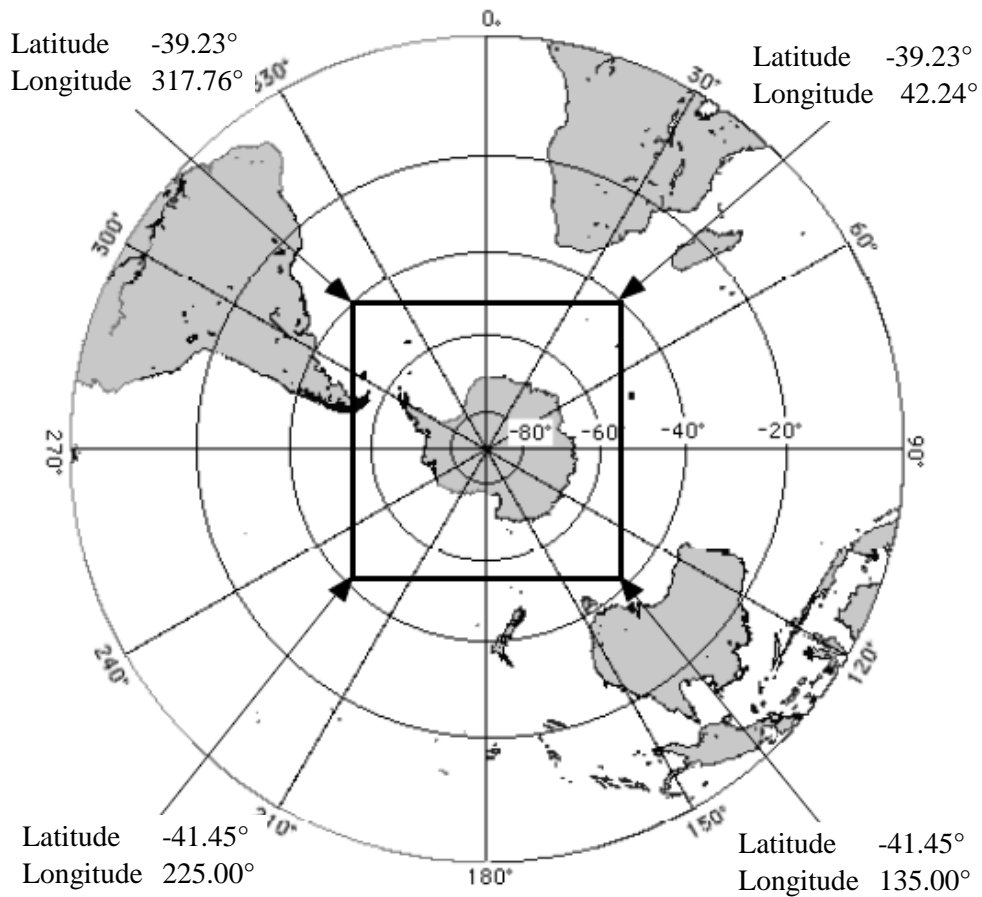
*The latitude and longitude in this figure indicate the position at the edge of the pixel.

Fig. 3.7.2-1 Definition of the EQR projection



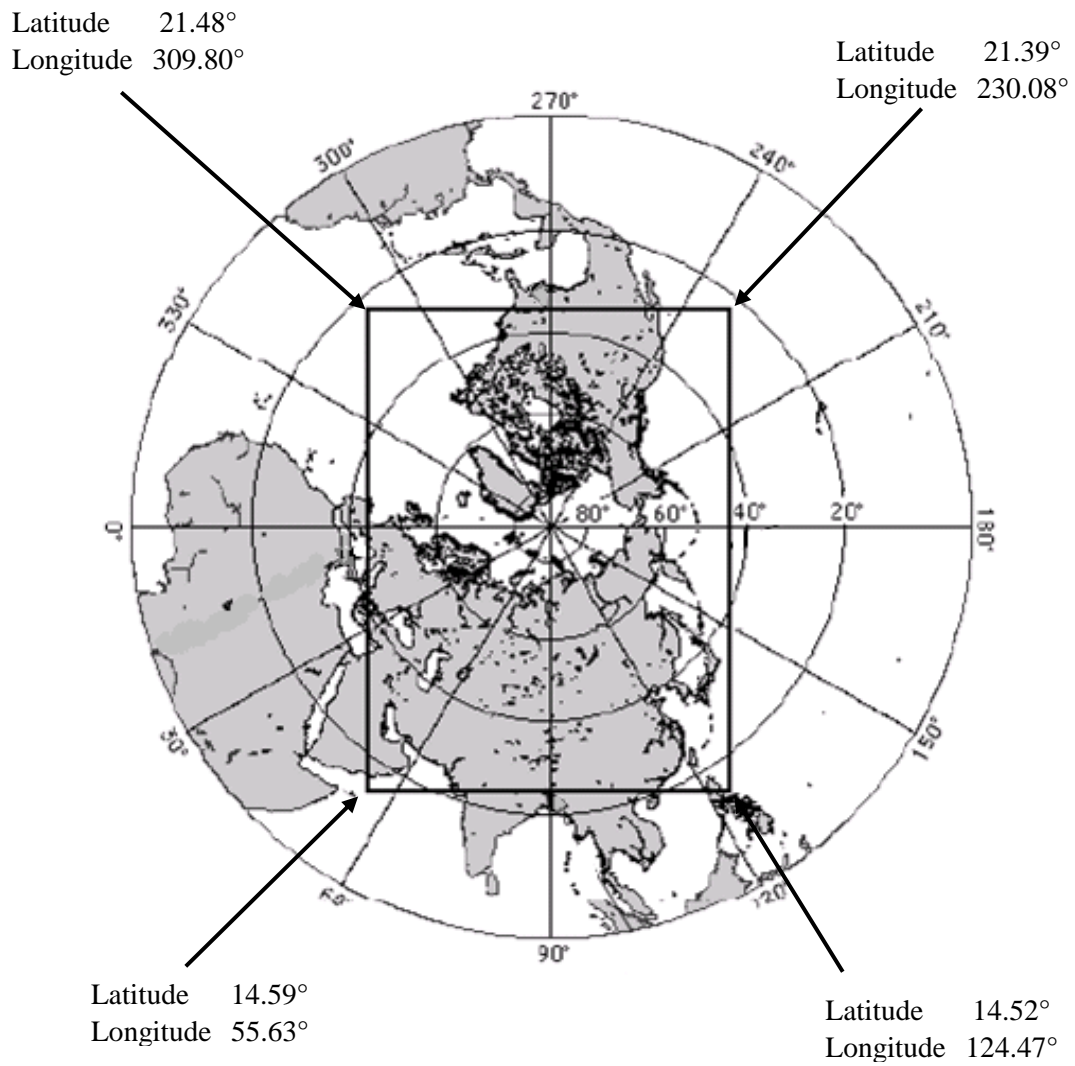
*The latitude and longitude in this figure indicate the position at the edge of the pixel.

Fig. 3.7.2-2 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. 3.7.2-3 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. 3.7.2-4 Definition of the Northern polar stereo projection [TB/SND]

3.7.3 Missing and Error value

This chapter describes the missing and error value in the Level 3 product file. Fig.3.7.3 -5 shows sample of daily L3 SST product.

(1)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.).

(2)Error values

It is outside observation swath data.

(3)Actual missing/error values

<Brightness temperature>

Missing value : 65535

Error value : 65531 ~ 65534

<Geophysical quantity>

Missing value : -32768

Error value : -32761 ~ -32767

Error value [-32761 ~ -32767] :

There is outside observation swath,

Geophysical
quantity value

Missing value [-32768]:

Geophysical quantity value was not computed
within observation swath.

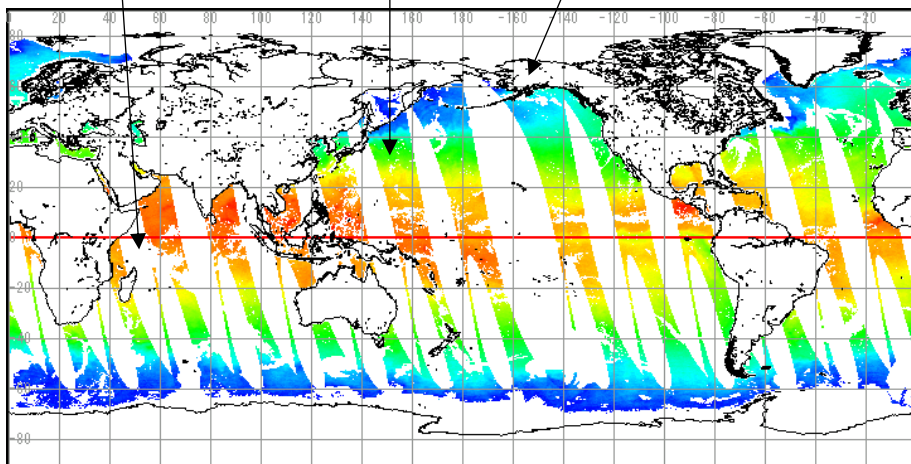


Fig. 3.7.3-5 The example image of level 3 SST product file

3.7.4 Handling of 89GHz A/B horn data in level 3 process

This chapter describes the temporal spatial grid algorithm at the AMSR-E level 3 product of 89 GHz image. It is necessary for making the AMSR-E 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

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.

4 Description of data

This chapter describes each data item in the AMSR-E level 3 product file.

4.1 Product metadata (Attribute)

(1) ProductName

Abbreviated name of the product is stored as below.

[AMSR-E-L3] : AMSR-E level 3 process

(2) GeophysicalName

The geophysical quantity name is stored as below.

Item	Format	Remark
<u>GeophysicalName</u>	[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
<u>MeanType</u>	[XXXXXX] 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
<u>Projection</u>	[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
<u>Resolution</u>	[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
<u>ProductVersion</u>	0	Z	-	-	single-digit or alpha-numeral

(7) AlgorithmVersion

The algorithm version is stored as below.

Item	Minimum	Maximum	Error value	Unit	Remarks
<u>AlgorithmVersion</u>	000	999	-	-	3-digit numeral

(8) ParameterVersion

The parameter version is stored as below.

Item	Minimum	Maximum	Error value	Unit	Remarks
<u>ParameterVersion</u>	000	999	-	-	3-digit numeral

(9) ProductSize_MByte

The product size is stored as below.

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

(10) AlgorithmDeveloper

The algorithm developer code is stored.

Item	Format	Remarks
<u>AlgorismDeveloper</u>	[XXXXXXXXX]	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
<u>ProductionDateTime</u>	[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)	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
<u>ObservationStartTime</u>	[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)	-

(14) ObservationEndTime

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

Item	Format	Remarks
<u>ObservationEndTime</u>	[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)	-

(15) PGENAME

The application name is stored.

Item	Content	Remarks
<u>PGENAME</u>	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.)

PM1AME_201007110007_183D_L2SGSSTLB830300.h5,PM1AME_201007110146_199D_L2SGSSTLB830300.h5

Item	Content	Remarks
<u>InputFileName</u>	Input File Name	Maximum size of character is 30000.

(17) ProcessingCenter, ContactOrganizationName, ContactOrganizationTelephone

The information of data processing center is stored.

Item	Content	Remarks
<u>ProcessingCenter</u>	Processing Center	Maximum size of character is 12.
<u>ContactOrganizationName</u>	Organization Name	Maximum size of character is 300.
<u>ContactOrganizationTelephone</u>	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 Aqua satellite launch.

Item	Content	Minimum	Maximum	Error value	Unit	Remarks
<u>StartOrbitNumber</u>	Start orbit number	0	99999	-9999	-	Under 5 digit number
<u>StopOrbitNumber</u>	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
<u>OrbitDirection</u>	Orbit direction	Ascending or Descending	Maximum size of character is 11.

(20) PlatformShortName, SensorShortName

The satellite name [AQUA] and sensor name [AMSR-E] are stored.

(21) ECSDDataModel

The metadata model name is stored.

Item	Content	Format	Remarks
<u>ECSDDataModel</u>	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) is stored.

Item	Geophysical quantity	Scaling factor	Valid range	Error value (DN value)	Remarks
<u>Brightness Temperature</u>		0.01	10~500 K	65535 [Missing data]	
				65534 [Parity error]	
<u>Geophysical Data</u>	Total Precipitable Water	0.01	0~70 kg/m2	-32761 ~ -32768	
	Cloud Liquid Water	0.001	0~1.0 kg/m2	-32761 ~ -32768	
	Sea Surface Wind speed	0.01	0~30 m/s	-32761 ~ -32768	
	Precipitation	0.01	0~20 mm/h	-32761 ~ -32768	
	Sea Surface Temperature	0.01	-2~35 °C	-32761 ~ -32768	Two layer structure *1
	Sea Ice Concentration	0.1	0~100 %	-32761 ~ -32768	
	Snow Depth	0.1	0~100 cm	-32761 ~ -32768	Two layer structure *2
	Soil Moisture Content	0.1	0~40 %	-32761 ~ -32768	

*1

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.

*2

Geophysical Data of SND has the two-layer structure. Primary SND is stored in the first layer. SWE(Snow Water Equivalent), which is calculated from the SND is stored in the second layer.

SWE: Scale factor = 0.1, Units = cm.density

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

(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
<u>TimeInformation</u>	-1440	0	-32761~-32768	-	In case of average
	0	1440	-32761~-32768	-	In case of overwrite

(3) Standard Deviation

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

Item	Minimum	Maximum	Error value	Unit	Remarks
<u>Standard Deviation</u>	-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
<u>Average Number</u>	-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
<u>Total Number</u>	0	32767	-32761~-32768	-	-