

**GCOM-W/AMSR2 Level 3 Sea Ice Motion Vector
Product Description
(Research Product, Product ID: SIM, Version 100)
February 2022**

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1 Introduction

For AMSR2 SIM product, the two algorithms have been proposed by Prof. K. Shimada (Tokyo University of Marine Science and Technology, developer ID: Y) and by Dr. N. Kimura (Atmosphere and Ocean Research Institute of the University of Tokyo, developer ID: R), respectively. A specification of the product is given in Table 1. Since validation results using in situ data showed that outputs from the algorithms were achieved the goal accuracy, both algorithms were accepted for AMSR2 research products for future improvements of retrieval performances. Using the developer IDs, the products are hereinafter referred to as SIM(Y) and SIM(R), respectively. The purpose of this document is to describe a stored data set which is different between SIM(Y) and SIM(R).

Table 1 Product specification of AMSR2 SIM

Areas	Projection	Spatial resolution	Temporal resolution	Goal accuracy
Ocean at high latitudes *1	Polar stereographic (PS) *2	50 km	1 day	±6 cm/s

*1 Products for the northern hemisphere are now available, and those for the southern hemisphere are in preparation.

*2 Latitude and longitude information of SIM products is different from that of other AMSR2 products mapped onto the PS projection; likewise, the information is different between SIM(Y) and SIM(R). For details of SIM(Y) and SIM(R), please refer to Sect. 2.1 and 2.2, respectively.

2 Product description

Both SIM(Y) and SIM(R) are distributed by an HDF5 format. The structure of the HDF5 format is shown in Table 2.

Table 2 AMSR2 SIM product file structure

Structure		HDF Data	Content
Header	Product Metadata	Attribute	Describe unique information of the product data. *
Data		Data set	Contents of the stored data set of SIM(Y) and SIM(R) are shown in Table 3 and Table 4, respectively.

*For information on header and product metadata, as well as file name, dummy data, and projection, please refer to the GCOM-W1 AMSR2 Higher Level Product Format Specification

(https://gportal.jaxa.jp/gpr/assets/mng_upload/GCOM-W/AMSR2_Higher_Level_Product_Format_EN.pdf).

2.1 SIM(Y)

SIM(Y) products contain a data set listed in Table 3. The content and data array are completely different from those of other AMSR2 products as well as SIM(R).

Table 3 Data set list of SIM(Y)

Data	Data type	Dimension xc = 131, yc = 138, nc = 1.	Description	Scale factor	Unit	Remark
u	float	(yc, xc)	U component	1	cm/s	-
v	float	(yc, xc)	V component	1	cm/s	-
ve	float	(yc, xc)	Eastward component	1	cm/s	-
vn	float	(yc, xc)	Northward component	1	cm/s	-
x	float	(yc, xc)	X coordinate of PS projection	1	-	-
y	float	(yc, xc)	Y coordinate of PS projection	1	-	-
lat	float	(yc, xc)	Latitude	1	degrees north	Range: 44 ~ 90
lon	float	(yc, xc)	Longitude	1	degrees east	Range: -180 ~ 180
fp	float	(yc, xc)	Frequency and polarization	1	GHz (frequency)	Meanings: -18 : 18GHz (V), +18 : 18GHz(H), -23 : 23GHz (V), +23 : 23GHz(H), -36 : 36GHz (V), +36 : 36GHz(H), -89 : 89GHz (V), +89 : 89GHz(H),
ws	float	(yc, xc)	Window size to calculate cross correlation	1	km	-
xcorr	float	(yc, xc)	Cross correlation coefficient	1	-	-
qf	float	(yc, xc)	Quality flag	1	-	Meanings: 0 : normal, 1: spatial average or extrapolated value, 8 : ocean or land.
ct	string	(nc)	Central time	-	YYYYMMDD hh:mm	-
t	float	(yc, xc)	Time information	1	min	Time from ct

2.2 SIM(R)

SIM(R) products contain a data set listed in Table 4. Unlike SIM(Y), SIM(R) products are distributed with a same content and data array as other level 3 products but have the following two changes. First, the SIM(R) products have two additional data: “Geophysical Data EN” and “Polarstereo Coordinate”. Second, as shown in Figure 1a, a data value computed in a 50-km PS coordinate is stored in surrounding four grids in a 25-km PS coordinate used to distribute other AMSR2 products. By ignoring data values at grids in which dummy data of “Pixel data Quality” (PDQ) is stored (Fig. 1b), vectors can be mapped in the original 50-km resolution. It is noted that PDQ stores not quality flag but a “blend number” of retrieved SIM. Since a vector at a given grid is a spatially weighted average using retrieved data at surrounding 3×3 grids, the “blend number” in eight digits is defined to represents numbers of vectors derived from individual brightness temperature imageries used in this weighted averaging (Table 5). Its minimum and maximum values are 0 and 9, respectively.

To get latitude and longitude information of SIM(R), please download sample program or register through the user registration site. The information listed in Table 6 is stored in the file (SIM_R_latlon.dat).

Table 4 Data set list of SIM(R)

Data	Data type	Dimension xc = 448, yc = 304, nc = 2.	Description	Scale factor	Unit	Remark
Geophysical Data	signed int	(yc, xc, nc)	U component (nc = 1) V component (nc = 2)	0.1	cm/s	-
Geophysical Data EN	signed int	(yc, xc, nc)	Eastward component (nc = 1) Northward component (nc = 2)	0.1	cm/s	-
Time Information	signed int	(yc, xc)	Time information	1	min	Time from YYYYMMDD (on file name) 00:00
Pixel Data Quality	signed int	(yc, xc)	Blend number of retrieved SIM	1	-	-
Polarstereo Coordinate	signed int	(yc, xc, nc)	X coordinate of PS projection (nc = 1) Y coordinate of PS projection (nc = 2)	1	-	-



Figure 1 (a) Grid array and (b) stored data in PDQ of SIM(R).

Table 5 Description of blend number of retrieved SIM.

Digit	Frequency [GHz]	Polarization	Orbit
1	36	Horizontal	Descending
2	36	Vertical	Descending
3	36	Horizontal	Ascending
4	36	Vertical	Ascending
5	18	Horizontal	Descending
6	18	Vertical	Descending
7	18	Horizontal	Ascending
8	18	Vertical	Ascending

Table 6 Data set content of latitude and longitude information.

Data	Data type	Dimension xc = 448, yc = 304.	Description	Scale factor	Unit	Range
lat	float	(yc, xc)	Latitude	1	degrees north	33~ 90
lon	float	(yc, xc)	Longitude	1	degrees east	-180 ~ 180

Appendix Sample program

Sample programs of Python to output data set to screen are given as listed in Table A1.

Table A1 Python sample programs

File name	Description of sample program	Remark
sample_simy.py	Print the values of data set of SIM(Y) to output screen.	
sample_simr.py	Print the values of data set of SIM(R) to output screen.	