Development and maintenance of AMSR3 research application system

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● **Abstract**

We develop parameters to be used in resampling process for homogenization of spatial resolution and center position of footprints, which are different to each channel, within Level 1 processing of the Advanced Microwave Scanning Radiometer 3 (AMSR3) to be onboard the Global Observation SATellite for Greenhouse gases and Water cycle (GOSAT-GW).

Ref. URL: https://www.eorc.jaxa.jp/AMSR/index_en.html

● **Reasons and benefits of using JAXA Supercomputer System**

Significant reduction of processing time needed to develop parameters by using parallel processes of JSS3. These parameters are constant ones in Level 1 operational processing, but a large number of CPUs is temporarily needed to produce them. Therefore, it takes extremely long time to produce them if we do same calculation in usual computer environment.

● **Achievements of the Year**

In Level 1 processing of the Advanced Microwave Scanning Radiometer 3 (AMSR3), resampling processing to modify spatial resolution is done to produce Level 1R, Level 1H, and Level 1C products. Resampling processing is to calculate weight of input brightness temperature to change its spatial resolution and observed position to those of output targets by using Backus-Gilbert method.

The Weight is needed to calculate for every combination of spatial resolution of input brightness temperature and output targets. In addition, relationship of observed position in each scan (from start to end position) varies since microwave imager observes the Earth surface with rotating. Therefore, we need to calculate each weight depending on relationship between spatial resolution of input brightness temperature and output target and relationship of observed position. Number of weights need to be calculated will be more than 100,000 for AMSR3 Level 1 processing. Since it takes 8-hour for calculating single weight, we need more than 90-year if we

calculate those weights in serial processing. We achieved significant reduction of processing time to about 90-day by using paralell processing in JSS3. This fiscal year, we produced prototype resampling filter of AMSR3 for all observation points by using sensor specifications of AMSR2 currently operating in the orbit. A similar prototpe filter was produced in JFY2023, but, in this fiscal year, we reexamined the geometric information of AMSR2 to improve its accuracy.

In addition to above modification, it was found that the observation positions of newly added channels (165 GHz and 183 GHz bands) in AMSR3 were far apart compared to those of other frequency channels. Therefore, we also created a resampling filter using the actual sensor specifications of AMSR3 and evaluated whether if the size of resampling filter for new channels fits within the size previously examined by using the sensor specifications of AMSR2.

● **Publications**

　N/A

● **Usage of JSS**

● 　　　**Computational Information**

Process Parallelization Methods	N/A
Thread Parallelization Methods	OpenMP
Number of Processes	1
Elapsed Time per Case	12 Hour(s)

● 　**JSS3 Resources Used**

Fraction of Usage in Total Resources[*1](%): 0.19

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage[*2](%)
TOKI-SORA	0.00	0.00
TOKI-ST	1,541,644.83	1.66
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	0.00	0.00
TOKI-TST	0.00	0.00
TOKI-TGP	0.00	0.00
TOKI-TLM	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage[*2] (%)
/home	0.00	0.00
/data and /data2	100.00	0.00
/ssd	0.00	0.00

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage[*2] (%)
J-SPACE	0.00	0.00

[*1]: Fraction of Usage in Total Resources: Weighted average of three resource types (Computing, File System, and Archiver).

[*2]: Fraction of Usage：Percentage of usage relative to each resource used in one year.

● **ISV Software Licenses Used**

ISV Software Licenses Resources		
	ISV Software Licenses Used (Hours)	Fraction of Usage[*2] (%)
ISV Software Licenses (Total)	0.00	0.00

[*2]: Fraction of Usage：Percentage of usage relative to each resource used in one year.