

## Production of the Hapke parameter maps and the multi-band color mosaic of lunar polar regions

Report Number: R21EB0101

Subject Category: Space Exploration

URL: <https://www.jss.jaxa.jp/en/ar/e2021/18475/>

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### ● Abstract

Using existing multiband image data, we calculated the Hapke parameter map for the lunar polar region (over 60 degrees in latitude for both northpole and southpole) and used it to calculate the photometrically normalized color mosaic maps. These data products are necessary to study landing sites and travel routes for JAXA's up coming lunar polar missions.

Ref. URL: [https://jlpeda.jaxa.jp/index\\_e.html](https://jlpeda.jaxa.jp/index_e.html)

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

To process large amounts of planetary remote-sensing data ranging from terabytes to petabytes and to obtain high-resolution results in a relatively short time scale, a parallel computer with a very large number of cores, such as JSS3, is very effective.

### ● Achievements of the Year

We created the color mosaic maps of the north and south poles of the Moon using the data from Wide Angle Camera (WAC) onboard NASA Lunar Reconnaissance Orbiter (LRO) and Multi-Band Imager onboard JAXA's lunar explorer SELENE. The use of topographic data with higher precision and resolution, and an improved calculation algorithm for the Hapke parameter, enabled more accurate photometric correction. The new polar color map revealed many young sediments such as the ejecta and rays that had not been recognized previously. The Hapke parameter map calculated by the new algorithm also led to an understanding of the optical properties of the lunar surface layer.

● **Publications**

- Poster Presentations

Sato H., Ohtake M., South Polar Color Analyses of the Moon by Kaguya MI., 53rd Lunar Planet. Sci. Conf., Abst #1501, 2022.

● **Usage of JSS**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	Manual parallelization by own script
Number of Processes	12 - 36
Elapsed Time per Case	1 Hour(s)

● **JSS3 Resources Used**

Fraction of Usage in Total Resources\*1(%): 0.00

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage*2(%)
TOKI-SORA	0.00	0.00
TOKI-ST	4,233.33	0.01
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	306.09	0.30
/data and /data2	61,631.86	0.66
/ssd	30,878.33	7.98

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.