

Orbit Determination Analysis Operation Tool for Spiral Orbit Raising Phase

Report Number: R23EAUB0500

Subject Category: Space and Astronautical Science

URL: <https://www.jss.jaxa.jp/en/ar/e2023/23643/>

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● Abstract

Perform Monte Carlo simulations of orbit planning and orbit determination operations during the spiral orbit raising phase of DESTINY⁺.

Ref. URL: <https://destiny.isas.jaxa.jp/>

● Reasons and benefits of using JAXA Supercomputer System

Parallel computation is possible, thus reducing analysis time.

● Achievements of the Year

Monte Carlo simulations of orbit planning and orbit determination operations during the spiral orbit raising phase of DESTINYplus are being conducted to evaluate the required ground station path assignment, ground station observation volume, IES outage period required for acquisition operations, the consistency rate between long-term and short-term station adjustments, and optimization of parameters in orbit determination, which will be reflected in the spacecraft operation design.

Based on the above results, we plan to evaluate the effectiveness of the on-board trajectory propagation function, improve path assignment consistency, and evaluate the logic of Yaxis reversal control.

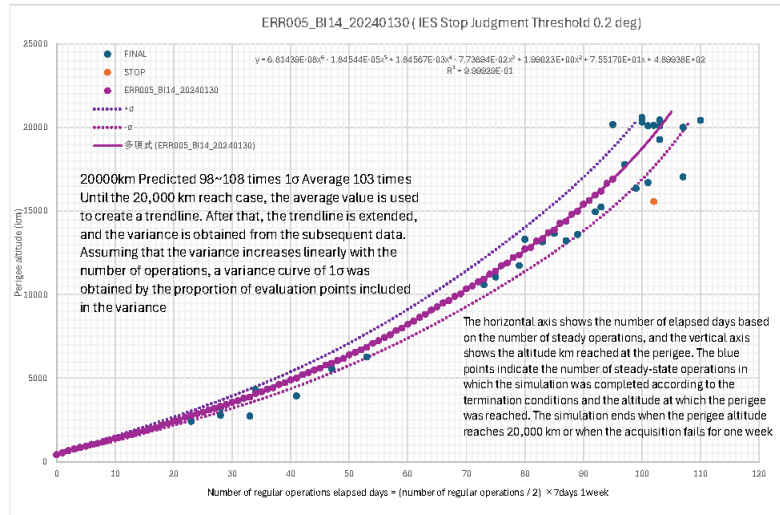


Fig. 1: Monte Carlo simulation results of perigee altitude reached by the number of operations of orbit determination.

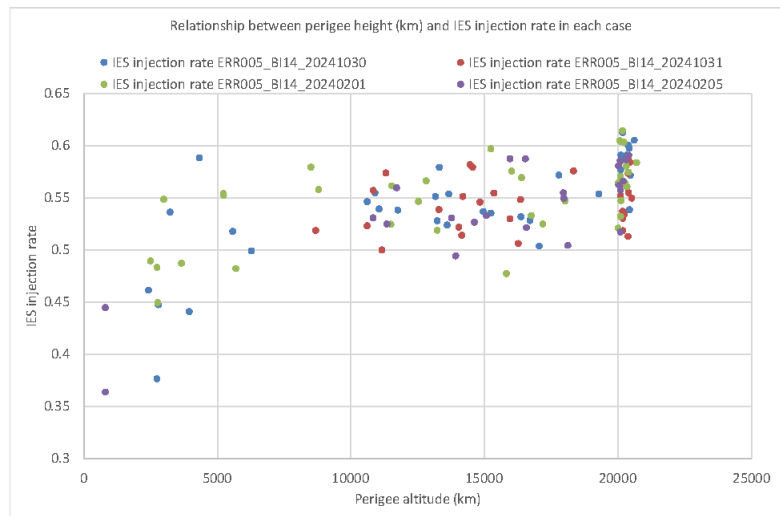


Fig. 2: Relationship between ERR perigee height (km) and IES injection rate in each case

● Publications

N/A

● Usage of JSS

● Computational Information

Process Parallelization Methods	Parallelization in the process control shell
Thread Parallelization Methods	N/A
Number of Processes	1 - 108
Elapsed Time per Case	240 Hour(s)

● JSS3 Resources Used

Fraction of Usage in Total Resources*1(%): 0.05

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage *2(%)
TOKI-SORA	0.00	0.00
TOKI-ST	359,670.17	0.39
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	1,990.00	1.65
/data and /data2	203,100.00	1.25
/ssd	15,060.00	1.42

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage*2 (%)
J-SPACE	0.20	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.