

## Future Projection by orbital debris evolutionary model

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### ● Abstract

Increase of space debris is a problem for reliability of future space activity. JAXA has researched for space debris removal technology. JAXA and Kyushu university developed an orbital debris evolutionary model named NEODEEM to predict numbers of future space objects. Analysis results from NEODEEM lead which object should be removed.

<http://www.kenkai.jaxa.jp/eng/research/debris/debris.html>

### ● Reasons for using of JSS2

NEODEEM predicts numbers of long-term future space objects by using Monte-Carlo method. We expect reduction of computation time.

### ● Achievements of the Year

In this year, preliminary tests for the NEODEEM computation were performed with SORA\_PP. An example of the computation results is shown in Fig. 1. NEODEEM was updated for parallel computing with OpenMPI. However, the updated model was not employed for this research because repeatability of computation results are not assured. Total analysis time was reduced by assigning Monte-Carlo run numbers to multiple cores. We will start NEODEEM computation for future orbital environment analysis from next year.

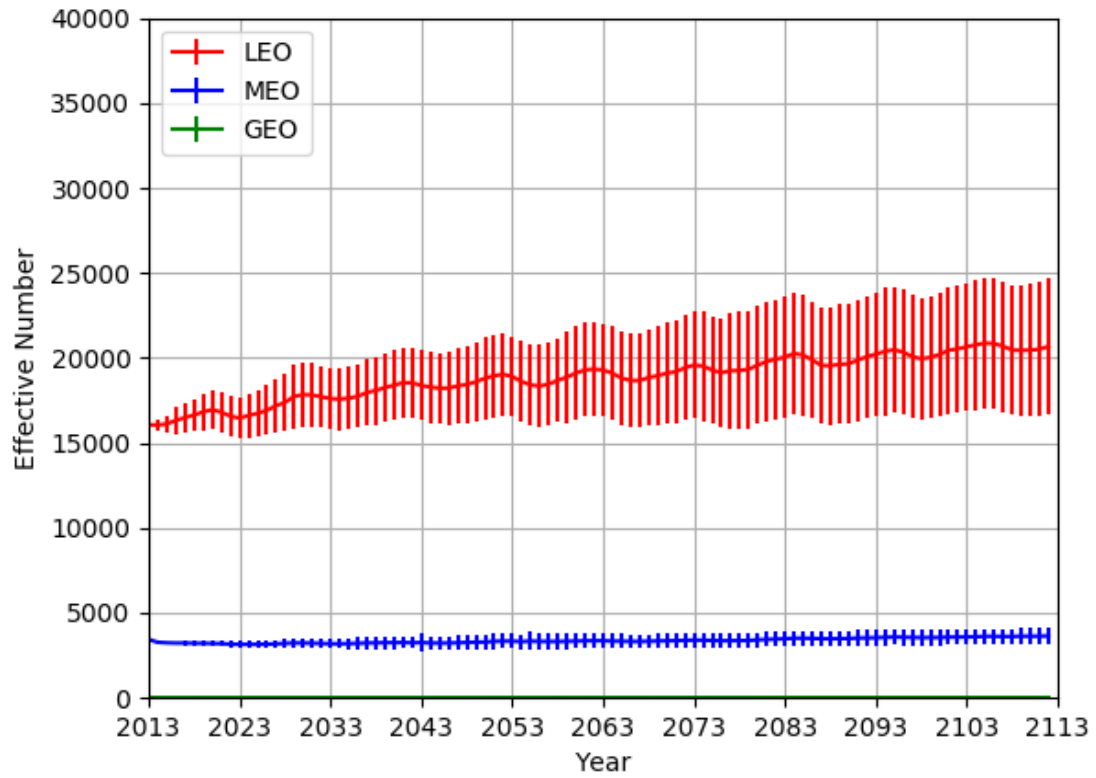


Fig.1 Prediction example of space object number for 100 years

● Publications

N/A

● Usage of JSS2

● Computational Information

Parallelization Methods	Assigning Monte-Carlo run numbers to multiple cores
Thread Parallelization Methods	N/A
Number of Processes	2 - 10
Elapsed Time per Case	60.00 hours

● Resources Used

Fraction of Usage in Total Resources\*1 (%): 0.01

Details

Computing Resources		
System Name	Amount of Core Time (core x hours)	Fraction of Usage*2 (%)
SORA-MA	0.00	0.00
SORA-PP	7,260.68	0.09
SORA-LM	0.00	0.00
SORA-TPP	0.00	0.00

File System Resources		
File System Name	Storage assigned(GiB)	Fraction of Usage*2 (%)
/home	023.84	0.02
/data	238.42	0.00
/ltmp	4,882.81	0.37

Archiver Resources		
Archiver System 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