

A simulation study of gravity field recovery using realistic satellite orbit

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Some dedicated gravity satellite missions are operated and they can provide global gravity field data with extremely high precision.

One of the dedicated gravity satellite GRACE will be provide gravity field data as spherical harmonic coefficients biweekly to monthly throughout the mission lifetime.

By the analyses of the temporally varying gravity signal, various earth scientific phenomena are expected to be solved.

In this study, we assume the gravity field observation with a L-L SST-type dedicated gravity satellite and discuss the mission design for effective gravity field recovery. In previous study, the simulation was performed by assuming that the gravity field was known at the observed orbital altitude. Furthermore, the position of satellite was calculated based on the two-body problem.

Considering the real L-L SST observation, we improve the simulation program to the one using range rate data as the input and estimate the performance of the program.

Further, in consideration of the actual orbital pattern of a satellite changing with time, we study how the recovery precision of the gravity field changes with the temporally changing of the orbital pattern. As the satellite orbit, the orbit based on orbital calculation and the actual satellite orbit are used. Based on the obtained simulation results, we discuss the relation between the precision of the gravity field recovery and the satellite orbit.