

## Anticipated accuracy of lunar gravity field model from RSAT/VRAD mission

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We will report the result of feasibility study for lunar gravity field recovery mission in SELENE to be launched in 2005. Many lunar gravity field models have been developed so far, but they are based on 2-way Doppler measurement in the near-side only. We propose two new satellite tracking methods in SELENE to improve lunar gravity field model; (1) 4-way Doppler measurement by relaying Doppler signal to/from the main orbiter by means of a relay satellite (RSAT mission), and (2) differential VLBI measurement between artificial radio source on board the relay satellite and a VLBI satellite (VRAD mission). The former enables direct measurement of lunar gravity field in the far-side, and the latter contributes to more complete understanding of structure of lunar gravity field by adding sensitivity normal to the line-of-sight direction.

It is almost impossible to carry out feasibility study by analytical method because the problem is so complicated involving multi tracking methods of multi target satellites by multi tracking stations. We numerically estimated anticipated accuracy of lunar gravity field model from SELENE by using GEODYN II and SOLVE software. Limitations on tracking data acquisition become clear as the mission goes into the detailed design phase. They include operation condition of tracking stations, duration of sunshine on satellites, satellite visibility, antenna beam pattern, and so on. The latest analysis counting in such limitation on data acquisition shows that accuracy of lunar gravity coefficients of degrees 2-35 will be improved by one order of magnitude compared to LP100J.