

# Possible Contribution to the Selenodesy by CE-1 lunar Mission

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The first Chinese lunar orbiter Chang'E-1 mission is planned to launch and inject into circle quasi-polar orbit in next Spring. During the half year normal mission period, S-band R&RR and S/X band dual frequency VLBI tracking techniques will be used to measure the S/C for precise orbiter determination. The tracking data will also be useful to recover the lunar global gravity anomalies. On board the S/C, laser altimeter will shoot 1Hz ranging pulse to measure the surface altitude of the Moon with an error of several dozen meters. Lunar topography with higher resolution after Clementine mission will be straightly expected. In this two measurement ways, CE-1 will contribute to Selenodesy independently.

A simulation analysis for CE-1 OD and lunar gravity recovery is carried out using GSFC/NASA GEODYNII and SOLVE code. Different combinations of Chinese new VLBI network and space tracking station are tested. By introducing the Kaula's thumb constraint into the data analysis, a model through full  $70 \times 70$  degrees and orders can be estimated from the 200km altitude CE-1 mission. However, the occultation of S/C by the Moon and the distribution of regional tracking network limited the tracking configuration and tracking time seriously. For best condition, the error power spectra for the lunar gravity field obtained from CE-1 mission can reach the same lever as LP100J at low (2-3) and high ( $>15$ ) orders and degrees; for middle items of 3-15 orders and degrees, it is about 1 orders worse than LP100J. The situation is expected to improve by a joint OD observation of SELENE-1 and CE-1 between SHAO and NAOJ.

Because of CE-1 will be inject to a quasi-polar orbit, different from Clementine and other lunar missions, the crossover observable of laser altimetry will be obtained first time. It will benefit both of the lunar topographical study and lunar gravity recovery. The distribution of crossover points and its possible contribution to lunar topography is predicted and estimated. A possible data analyzing system is designed and developed for this special study.