New lunar gravity field from SELENE (KAGUYA) gravity experiment using two subsatellites

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SELENE (KAGUYA) was launched successfully on September 14th, 2007. Two small spin-stabilized subsatellites, Rstar (OKINA) and Vstar (OUNA) were deployed in October. Using RSAT (a satellite-to-satellite Doppler tracking sub-system) and VRAD (artificial radio sources for VLBI), we can track the three satellites by new methods: 4-way Doppler tracking between the main satellite and Rstar for the far-side gravity and multi-frequency differential VLBI tracking between Rstar and Vstar. The global lunar gravity field with unprecedented accuracy will be obtained.

The 4-way Doppler tracking for the farside gravity started on November 5th during initial check out phase. We estimated residuals of observed Doppler data from a prediction based on LP100K lunar gravity model. Over the nearside, the variation of the residuals is smaller than 5 mm/s. In contrast, the variation over the far side is as large as 30 mm/s, which should be due to currently unmodelled far-side gravity anomaly. We also confirmed the validity and accuracy of the multi-frequency differential VLBI tracking between Rstar and Vstar using VERA and international VLBI network. The 4-way Doppler measurement has already covered nearly all region of the lunar farside by January. The A preliminary gravity map will be presented at the meeting.

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