

Lunar Global Topography by Laser Altimeter (LALT) on board SELENE

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We report current status of laser altimeter (LALT) mission on board SELENE (2007) especially on recent development, data products, and sciences.

During thermal vacuum test of LALT flight model (LALT-FM) in December 2004, laser firing trouble had occurred in low temperature condition. This is because pyro electric effects for Pockels cell which is polarizing element in NdYAG laser oscillator unit in LALT, which has been turned out through many experiments and document investigations. This trouble is turned out to be avoided by keep warming the Pockels cell, so some modification of LALT heating system had been carried out in autumn 2005 so as to keep temperature of the laser oscillation unit more than 21 centigrade. The next trouble was flaking off of the multi-coating material had been discovered on the prime parabolic mirror of receiving telescope unit probably occurred in the period of the same thermal vacuum test. This might be because grinding wound by old type grinding machine could not be erased perfectly on the prime mirror during the next figuring step by the anxiety of the optical engineer about degrading optical accuracy of the prime mirror. After all remanufacturing of the mirror has been performed successfully in January 2006. LALT had been operated normally in the SELENE proto flight test (1st half) that had been performed from May to October 2005. In future several environmental tests of LALT including thermal vacuum test will be tried again in February and March 2006, then LALT will be join to SELENE proto flight test (2nd half).

Range performance (accuracy) of LALT is determined mainly by internal clock accuracy (temperature characteristics), peak positioning etc. Calibration data necessary for the range performance of 5m accuracy has been acquired experimentally.

LALT range data will be used for the production of range data time series, topography time series, grid topographic data of the Moon (global and two polar regions), spherical harmonic coefficients of lunar topography (360 degrees, TBR). These products except range time series are generated in combination with the orbit and attitude data of SELENE main orbiter. Some investigations of how to make these products and about characteristics of products will be reported and related scientific topics will be discussed in this presentation.