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Topographic Exploration of the Moon by laser altimeter onboard SELENE (LALT)

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Laser altimeter (LALT) is one of the scientific instruments onboard SELENE lunar orbiter and of the three selenodetic missions of RISE group (Researches In SElenodesy) in National Astronomical Observatory of Japan.

LALT incorporates Q-switched Nd:YAG laser system which transmits laser pulses per 1 second with 1064nm in wavelength and 100mJ energy. Beam spot size on lunar surface is typically 40m when main orbiter altitude is 100km. Range accuracy between SELENE orbiter and the lunar surface is formally $\pm$5m but true performance seems attained $\pm$1m from the data of the simulated ranging tests during PFT 2^{nd} half electronic performance test.

Mission objective of LALT is summarized as making lunar global topographic model with the accuracy that has never been so far. New topography of the moon will contribute the following scientific topics: [1] determination of the lunar global figure, [2] internal structure and surface processes, and [3] exploration of the lunar pole regions especially for permanent shadow or illuminated zones. We are now preparing and evaluating data processing software for SELENE-LALT mission and developing algorithms for precise footprint positioning including a matching technique with DTM (digital terrain model) produce from SELENE-LISM (camera) group.

The manufacture of flight model of LALT (LALT-FM) was finished in March 2003. From Jul. 2006 to Jan. 2007 the final PFM integration test (PFT 2^{nd} half) of the SELENE main orbiter including several environmental, electronic performance and thermal vacuum tests was carried out successfully. After the performance tests of the main orbiter system on Feb. 2007, SELENE will be transferred to the Tanegashima space center for the final launching operations in this summer.