Lunar explorer 'KAGUYA' Laser Altimeter instrument: Analysis properties of returned pulses intensity

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On September 14 (JST), 2007, the Japanese lunar explorer, KAGUYA (SELENE), was launched from the Tanegasima Space Center, an island located in Kagosima prefecture in the southern part of Kyusyu. After a successful initial check out, the spacecraft transitioned to normal operations on December 21 (JST), 2007. The Laser Altimeter (LALT), one of the 15 instruments onboard KAGUYA, has been continuously collecting the range date at the present moment.The LALT emits a single laser beam to the lunar surface every second, and it estimates the distance between the spacecraft and the lunar surface by logging the timing delay. The range of precision is $\pm$5 meters, which is significantly more accurate than the 40 meters resolution of its predecessor, the American lunar craft Clementine. In addition, the precise topographic data of the polar regions above 75 degrees are obtained for the first time, which enable us to compose the global topographic map.

Moreover, the intensity data of returned pulses contains terrain properties such as *(1)* the surface reflectance, *(2)* the roughness and *(3)* the slop. So assuming the reflectance and the slop, the roughness is estimated, which would reflect the maturity of the lunar surface. Consequently, we will report the initial results of the analysis of returned pulses intensity.