Objectives and expected results of initial data analyses for the Multiband Imager

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Introduction: The Lunar Imager/SpectroMeter (LISM) is an instrument being developed for the SELENE project that will be launched in 2007. LISM consists of the three subsystems, the Terrain Camera (TC), Multiband Imager (MI), and Spectral Profiler (SP). Those three systems share some components and electronics.

Hardware and software status: Manufacturing and integration of MI flight model have been completed and pre-flight test as SELENE satellite is underway. Measurements of MTF, viewing vector, sensor linearity, (brief) stray light and electrical noise level were carried out after the MI integration. Measured data indicate that MI will provide sufficient MTF, low noise and low stray light spectral imaging data as estimated in the MI designing phase. On-ground data processing systems of LISM have been established as a part of SELENE Operation and Analyses Center (SOAC) which is located in a JAXA Sagamihara Campus.

Objectives of initial data analyses: MI is a high-resolution multiband imaging instrument and will obtain the lunar global mapping of mineral distribution in nine bands. Biggest advantage of the LISM data is its capability of combination of topographic (TC), spectral mapping (MI) and hyper-spectral (SP) data to understand precise lunar surface mineralogy and chemical composition. From scientific priority viewpoints and to maximize MI's instrumental advantage, we are planning to investigate steep slope area such as crater central peak and crater wall.

Expected results of initial data analyses: In this presentation we are going to introduce our pre-flight verification results of MI data. Our verification procedures are as follows; i) make lunar topography data which will be used as true value from Apollo and Lunar Orbiter mission data, ii) give artificial reflectance value to each pixel of the topography, iii) make simulated MI images according to the selected observation conditions, iv) process the simulated MI images using established on-ground data processing systems, v) evaluate a difference between processed results with true value given in step i). In the procedure we adopt several errors originate in MI hardware and also errors within determined SELENE orbit and attitude value. The results show that position and slope estimation errors are less than 40 m and 1 degree respectively except for a specific case in which shadowed area in one image is as high as 80 %. The above results correspond to a reflectance error is less than 0.5 % according to the reflectance value (which correspond to an iron content error is less than 0.3 wt%) and it is good enough to do detail study of crater central peaks and walls.