Ground data processing of Lunar Imager/SpectroMeter (LISM)

Naru Hirata[1], Jun'ichi Haruyama[2], Hirohide Demura[3], LISM Working Group Haruyama Jun-ichi

[1] JST, [2] LUMIREC,NASDA, [3] NASDA

http://moon.nasda.go.jp/

Through the history of the Moon exploration, imaging and spectroscopic data of the Lunar surface have been the most fundamental information for discussing lunar geology and the origin of the Moon. Unfortunately, the datasets acquired by past lunar missions, such as Lunar Orbiter, Apollo, Galileo, Clementine and some ground-based observations, are incomplete in spatial resolution, spectral band coverage, spectral resolution, and global area coverage. Lunar Imager/SpectroMeter (LISM) is an integrated optical instrument for imaging, multiband spectral mapping and profiling in the Selenological and Engineering Explorer (SELENE) project. LISM consists of three subsystems, the Terrain Camera (TC), Multiband Imager (MI) and Spectral Profiler (SP), to gather topographic and mineralogical data of the lunar surface with higher quality and greater coverage than on the past missions. Simultaneously with the LISM hardware development, we started designing of a ground data processing system for the LISM data. LISM data will be processed at the SELENE Operation and Analysis Center (SOAC) in ISAS, Kanagawa, Japan. SOAC will also work as a data archive and distribution center of all SELENE data.

The level-0 and level-1 stages of processing are included in the SELENE system ground data processing, so we will start the LISM data processing from level-2. The LISM raw telemetries shall be depacketized and decompressed into raw images at the level2a processing stage. Instrument supplement data and spacecraft ancillary data are also added at the level-2a process. The level-2a raw image dataset is the starting point of all higher level processing and analysis of the LISM data. The next major level of the LISM datasets is controlled mosaic. The LISM controlled mosaics are radiometrically calibrated, and geometrically and photometrically corrected. There are three options on geometric correction. The first option is an 'as-is' method that is based on an original ancillary data. It is a quick way to obtain mosaic images, but has some errors due to uncertainties of spacecraft ancillary data, sensor information and local topography of the lunar surface. The second option is a correction based on a matching technique between two LISM images. This method has a potential to correct an effect of local topography, but it can't remove ancillary error. The third option is a correction based on a newly defined geometric control network. This is the best way , but it will need of huge manpower and long time.