

Development Status and Preparation of Data Analysis for SELENE / Terrain Camera

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In this paper, we report the development status of Terrain Camera (TC) installed on SELENE, which will be launched in FY 2007.

1. Outlook of TC

The TC is a mission instrument to image the moon surface with a spatial resolution of 10m from the SELENE nominal altitude of 100km. TC consists of two slant optical heads; a forward (+15-degree)-looking head and an aft (-15-degree)-looking head. Each head is equipped with a one-dimensional CCD detector of 4096 pixels covered by a pan-chromatic filter of 430 to 850 nm. TC has three swath modes: full, nominal, and half swath modes corresponding to 4096, 3500, and 1750 active pixels. Overlapped areas will exist in TC sequential strip data at the nominal swath mode. The TC data will be compressed by the DCT method to be about 30% of its volume.

2. Hardware development status

In FY 2004, we finished the flight model (FM) fabrication. Using the FM, we acquired the optical performance data and confirmed that the scientific requirements will be achieved: the signal-to-noise ratio at radiance factor of 0.02 far exceeds 100, the modulation transfer function is more than 100, and the vegeetting is less than 15%.

The preliminary integration tests to check the interface of other mission instruments and the SELENE bus system were carried out from December in 2003 to March in 2004. No critical problem has not been found for TC.

3. Software development status

We are developing three data processing systems for TC data: 1)the level 2A processing system which will carry out the fundamental processing such as depacket of raw data in the form of CCSDS packet, the decompression, the extraction of data quality information, the scene cutting, and the attachment of the data label in the format of Planetary Data System, 2)the level 2B, 2C, and 3 processing system which will carry out the radiometric calibration, geometric correction and photometric correction, 3)the DTM production system which will provide relative DTMs.

The design phase of level 2A processing system has been finished in this February. The design phase of the DTM production system and the level 2B, 2C, and 3 processing system will be finished in this May and July, respectively. The preparation of validation of TC data with past or current other missions including Apollo data is starting.

4. TC operation planning

The TC operation is roughly classified into two types: 1) stereo imaging operation activating two detectors and 2) single imaging operation activating one detector. At the solar elevation angle of around 30-degrees, the stereo imaging operation will be carried out for three latitude regions: 1)low latitude (from -30 to +30-degrees), 2)middle latitude (from -60 to -30-degrees, and from +30 to +60-degrees), and 3) high latitude (from -90 to -60-degrees, and from +60 to +90-degrees). At the solar elevation angle of lower than 30-degrees in morning time and evening time, the single operation will be carried out for the low and middle latitude (from -60 to +60-degrees) regions. Since some regions may be left to be imaged by some problems, we may need to execute compensation imaging. To make adequate additional operation plans swiftly in the mission period, we are constituting a guide line for TC operation.

5. The preparation status of analysis

To extract sufficient results from TC data, we are assigning some persons who are responsible for preparation of fundamental tools such as mosaic of large areas, extraction of information of crater characteristics, and analysis of stray light. Study themes are classified into four levels in the view point of required data amount: 1) global data, 2) large mosaic and/or DTM data of about a latitude range of about 60-degrees, and of width of about 2000km, 3) plural scene data and 4) one scene data. We are also assigning persons who prepare more detailed scientific themes.