Initial results and pespectives of Terrain Camera on Kaguya (SELENE)

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On 14 September 2007, the Japanese Moon explorer KAGUYA (SELENE) was successfully launched from the Tanegashima Space Center. On the KAGUYA, the high-resolution stereo-camera Terrain Camera (TC) is installed. The TC and other two optical mission instruments (Mulitband Imager (MI) and Spectral Profiler (SP)) are collectively called LISM (Lunar Imager/SpectroMeter). KAGUYA is a polar orbiter of an inclination of about 90deg. with 14 mission instruments and are planned to continue its mission until the end of October, 2008.

The TC acquired the first data on November 3, 2007, in the initial checkout operation period of KAGUYA. Since then, we continued the initial checkout for TC. Analyzing initial check-out data, we confirmed that TC had not been damaged during launch and the cruising phase and was functioning properly in orbit around the Moon. On December 21, 2007 after completion of the initial checkout phase, the TC transitioned to the normal operation phase with other LISM sister and brother instruments, MI and SP.

The TC is a push-broom stereoscopic imager with two optical heads TC1 and TC2. The space craft changes the its flight direction in every 6 months. Thus, TC1 and TC2 change their roles as forward-looking and aft-looking every 6 months. The slant angles is of +/- 15 deg. from the nadir vector. The spatial resolution of TC is 10m/pixel from the KAGUYA nominal altitude of 100km. The exposure time are chosen from three levels: 6.5ms (long), 3.25ms (middle), and 1.675ms (short). The A/D rate is 10bit. On the other words, the dynamic range of both of TC is 1023 DN. The saturation level is corresponding to 8%, 16%, and 32% reflection (radiance factor defined by Hapke, exactly saying) of solar radiance, for long, middle, and short exposure times. The TC executes data compression onboard to reduce the data volume. The compression method is a DCT compression with compression tables chosen from 32 patterns by commands. The TC will provide (1) global/local high-contrast mosaicked maps and (2) DTMs for the Moon's entirety with relative height resolution of a few tens of meters or better and ultimately a DEM with absolute height information.

Since the middle of December 2007 till the begin of January, TC had carried out high-latitude (more than 30deg. and less than -30deg.) area observations and acquired high resolution stereoscopic data including the Polar regions. During the mid-latitude observation period, the high resolution data set in 10m spatial resolution for far side and western hemisphere regions where have not been completed 10m scale observation are acquired. TC data is powerful to improve the accuracy of the crater chronology, recognize the geological unit distribution in detail, and explore the enigmatic areas (e.g. swirls, lava tubes, recently erupted areas). In this presentation, we introduce the LISM/TC initial results and perspectives.