The Preflight Calibration of the Thermal Infrared Sensor (TIRS) on the Landsat Data Continuity Mission
(300 words)

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Abstract

The preflight calibration testing of TIRS evaluates the performance of the instrument at the component, subsystem and system level. The overall objective is to provide an instrument that is well calibrated and well characterized with specification compliant data that will ensure the data continuity of Landsat from the previous missions to the LDCM. The TIRS flight build unit and the flight instrument were assessed through a series of calibration tests at NASA Goddard Space Flight Center. Instrument-level requirements played a strong role in defining the test equipment and procedures used for the calibration in the thermal/vacuum chamber. The calibration ground support equipment (CGSE), manufactured by MEI and ATK Corporation, was used to measure the optical, radiometric and geometric characteristics of TIRS. The CGSE operates in three test configurations: GeoRad (geometric, radiometric and spatial), flood source and spectral. TIRS was evaluated though the following tests: bright target recovery, radiometry, spectral response, spatial shape, scatter, stray light, focus, and uniformity. Data were obtained for the instrument and various subsystems under conditions simulating those on orbit. In the spectral configuration, a monochromator system with a blackbody source is used for in-band and out-of-band relative spectral response characterization. In the flood source configuration the entire focal plane array is illuminated simultaneously to investigate pixel-to-pixel uniformity and dead or inoperable pixels. The remaining tests were executed in the GeoRad configuration and use a NIST calibrated cavity blackbody source. The NIST calibration is transferred to the TIRS sensor and to the blackbody source on-board TIRS. The onboard calibrator will be the primary calibration source for the TIRS sensor on orbit.

Key words: Landsat Data Continuity Mission, Calibration, Thermal Infrared Sensor, Remote Sensing

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