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85-10030 NASA-CR-174121

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Task Assignment 110  
June 1984

NAS-22200

**LANDSAT INSTRUMENTS CHARACTERIZATION**  
GSFC ATR - Dr. J. Barker  
SAR Task Leader - Dr. Y. Lee

**Task Objective:**

The objective of this task is to provide analytical and programming support for both Landsat-4 and -5 Thematic Mapper (TM) and Multispectral Scanner (MSS) instrument characterization, with emphasis on the radiometric performance.

**Work Performed:**

The following work was performed in the areas indicated.

Revisions to the milestone schedules on a monthly basis were requested by the ATR and are included in the appendix.

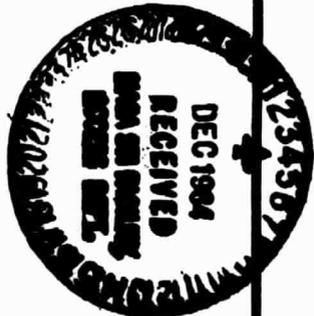
**210 Absolute Radiometry**

Absolute radiometric calibration for Landsat-5 TM under ambient conditions has been performed by using data collected on Aug. 30 and 31, and Sept. 1, 1983, at Santa Barbara Research Center (SBRC). Twenty-four BRU tapes have been processed twice to provide data support for this study. The TM Radiometric Algorithms and Performance Program (TRAPP) has been modified to create optional midscan data files and to match the TM Image Processing System (TIPS) algorithm for pulse determination. Several data reduction programs have been developed, including a linear regression and its plotted result. All parameters that must be provided to GE TIPS personnel are included in the calibration.

**340 Coherent Noises**

Task personnel have performed fast Fourier transformation (FFT) study on the resequenced TM data. The data sequence, with 102 samples per period, is as follows:

****	****	****	****	****	****
B1C1	B2C1	B3C1	B4C1	B5C1	B7C1
B1C3	B2C3	B3C3	B4C3	B5C3	B7C3
B1C5	B2C5	B3C5	B4C5	B5C5	B7C5
B1C7	B2C7	B3C7	B4C7	B5C7	B7C7
B1C9	B2C9	B3C9	B4C9	B5C9	B7C9
B1C11	B2C11	B3C11	B4C11	B5C11	B7C11
B1C13	B2C13	B3C13	B4C13	B5C13	B7C13
B1C15	B2C15	B3C15	B4C15	B5C15	B7C15
B1C2	B2C2	B3C2	B4C2	B5C2	B7C2
B1C4	B2C4	B3C4	B4C4	B5C4	B7C4
B1C6	B2C6	B3C6	B4C6	B5C6	B7C6
B1C8	B2C8	B3C8	B4C8	B5C8	B7C8
B1C10	B2C10	B3C10	B4C10	B5C10	B7C10
B1C12	B2C12	B3C12	B4C12	B5C12	B7C12
B1C14	B2C14	B3C14	B4C14	B5C14	B7C14
B1C16	B2C16	B3C16	B4C16	B5C16	B7C16



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The \*\*\*\* had been filled by taking the average of data before and after \*\*\*\*. The subscenes of homogeneous water of scenes over Pensacola, FL, had been used for test of the FFT on the resequenced data. In addition to the coherent noise peaks observed in the previous study, several high-frequency peaks appeared that were caused by the data resequence; for instance, the strong peak at about 1.5 pixel/cycle of Landsat-4 FFT spectra is caused by the odd-even differences. Further examination of the FFT spectra needs to be done. To make an image correction through FFT, an inverse FFT package is needed to bring the corrected data back to the pixel domain. The VAX 11/780 does not have this capability at the present time.

**450 Between-Date Smoothing**

The gain and pulse height stability study on Landsat-5 TM spectral bands has been performed. Seven plots were delivered to the ATR. The trend of gain decrease with time in the early stage of in-orbit data shows in the bands on the primary focal plane. This is similar to the Landsat-4 result. The cyclic patterns for the bands on the cold focal plane observed on Landsat-4 are not observed on Landsat-5 due to lack of data.

**710 Workshop/Scientific Meeting Support**

Task personnel were involved in the preparation of data that the ATR presented at the Brazil meeting. This included summarizing spectral response comparison of Landsat-4 and Landsat-5 TM in raw image and radiometric calibrated image, and summarizing Landsat-4 TM within-scene variability.

**720 Tapes and Output Organization**

A catalog has been created for tapes CALDUMP and CCT-AT (unity RLUT) received from the EROS data center, and CCT-AT from GE.

**810 RTOP and Plan Preparation**

Revision of the work plan is continuing under the supervision of the ATR.

**830 Scientific Reports, Papers, and Documentation**

Task personnel provided data support and analysis for updating the GE TIPS system, CSC May deliverable to GE, and CSC final report.

**900 Data Processing**

Twenty-eight BRU tapes were processed by task personnel.

**Problem Areas:**

None.

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**Schedule Conformance:**

**Work is proceeding as planned in the revised milestone schedules.**

**Work Planned for Next Month:**

**210 Absolute calibration will be continued to Landsat-5 thermal vacuum (TV), and to Landsat-4 ambient and TV if the data are available.**

**270 Five-file CALDUMP tapes will be processed.**

**Deliverables Submitted:**

**Plots: The Landsat-5 TM gain and pulse height stability  
Originator: Dr. Y. Lee**

**Plots: Linear regression fit of ACO2 tests  
Originator: Dr. Y. Lee**

**Tables: Absolute calibration parameter files  
Originator: Dr. Y. Lee**

**Tables: Spectral response comparison of Landsat-4 and Landsat-5 in raw and radiometric calibrated images  
Originator: Dr. Y. Lee**

**Tables: Summary of Landsat-4 TM within-scene variability  
Originator: Dr. Y. Lee**

**Tables: Coherent noises  
Originator: Dr. Y. Lee**

**Computer Utilization:**

**None.**