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Quarterly Progress Report

Evaluation of SLAR and Thematic Mapper MSS Data for
Forest Cover Mapping Using Computer-Aided Analysis
Techniques

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Prepared by: Laboratory for the Applications of Remote Sensing
Purdue University
West Lafayette, Indiana 47906

Technical Monitor: Dr. D. L. Amsbury
NASA Mail Code SF5
Exploratory Investigations Branch
Houston, Texas 77058

Principal Investigator: Dr. Roger M. Hoffer
Ecosystems Program Leader
LARS/Purdue University
West Lafayette, Indiana 47906



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I. ACTIVITIES OF THE PAST QUARTER

A. Software Development for Degradation of the Spatial Resolution

As reported in the last quarterly progress report, the aircraft data has been successfully adjusted for geometric distortions due to look angle effect, and the scan lines have been flipped from south to north and east to west, resulting in a data set which can be displayed having the first scan line at the north end of the flight line and which can be displayed with proper geometric characteristics using the Varian display device. The adjusted data set has a nominal pixel of 15.2 meters, both in the along track and cross track dimensions.

Using the column normalizing technique described in the previous report, the data has also been adjusted for variations in the amplitude of the signal due to look angle effects with respect to solar zenith angle along the scan lines (i.e., across columns). Evaluation of the data set containing the geometric and radiometric adjustments, which we are referring to as the "adjusted" data set, indicated that the data set would be satisfactory for further processing and analysis.

The first step in the subsequent processing was to develop the software to degrade the spatial resolution of the adjusted data set to allow us to simulate the spatial resolution of data provided by the Thematic Mapper and Landsat systems. Software was developed for degrading the spatial resolution of the aircraft data to produce a total of four data sets for further analysis. These include spatial resolutions as follows:

15 meters x 15 meters (original NS-001 data)

30 meters x 30 meters (simulated Thematic Mapper spatial resolution)

45 meters x 45 meters

60 meters x 75 meters (simulated Landsat spatial resolution)

The degradation algorithm employed averages neighboring pixels with equal weights and therefore makes no attempt to compensate for the influence of the modulating transfer function that would be present if these degraded data sets were actually scanner products rather than computational products. The discrete nature of integer addresses of digital data and the small number of pixels employed in the computation was the basis for omitting this procedure. This software has been completed and all of the simulated spatial resolution data sets identified above have been generated.

B. Training and Test Field Selection

Data of different spatial resolutions results in a variation of either number of pixels or spatial extent and, therefore, location and comprehensiveness for both the training and test statistics. This results in the introduction of an unwanted variable in the experiment which could either contribute to or distract from otherwise significant differences due to the variables of interest. Several alternatives are being considered which avoid or reduce this confounding.

Preliminary analysis of the scanner data indicates that many of the cover types can be spectrally differentiated quite well. It would also appear that the smaller spatial resolution data sets allow a differentiation among more detailed cover type classes than will be the case with the Landsat spatial resolution. Some of these differences in the degree of information content that can be achieved with different data sets indicate that different approaches will be required in the final analysis to effectively compare the different data sets and their capabilities and limitations from a spatial resolution standpoint. Work on classification of the various data sets is progressing satisfactorily.

C. Processing of the Landsat Data

During the past quarter, we were pleased to receive the Landsat-2 CCT, May 13, 1979 data for the test site (scene ID 21572-15120). Quality of the data is good for channels four, five and six. However, channel seven was not present on the CCT received. The reason for the lack of the channel seven data is not known. After receiving the Landsat data, we reformatted it and have initiated analysis of the test site area. This activity is progressing satisfactorily.

D. Preparation for the Spring 1980 Aircraft Mission

Communication with the Aircraft Mission group at NASA/JSC indicates that our South Carolina test site is scheduled for a data collection mission by the NC 130 and the RB 57 during the week of April 14-20. If they are unable to collect the data during that week, the alternate dates include April 28-May 15. Preparations for the spring flight mission are progressing satisfactorily.

II. PROBLEMS ENCOUNTERED

No problems of significance were encountered during the past quarter. Minor difficulties were encountered in development of the software for effectively locating training and test areas within the data set, but these problems have been resolved.

III. PERSONNEL STATUS

The following personnel committed the respective percentages of time to the project during the past quarter:

<u>Name</u>	<u>Position</u>	<u>Ave. Monthly Effort (%)</u>
Anuta, Paul	Reformatting/Preprocessing	10
Crosley, Rodney	Research Assistant	20
Goodrick, Bud	Professional Assistant	30
Hoffer, Roger	Principal Investigator	40
Kline, Nancy	Secretary	2
Latty, Rick	Research Associate	67
Peterson, John	Associate Director	5
Prather, Brenda	Secretary	42

IV. ANTICIPATED ACCOMPLISHMENTS

The following are the anticipated accomplishments of the forthcoming quarter (March 1, 1980 - May 31, 1980):

- 1) Definition and selection of the final training and test data sets to be used in the evaluation.
- 2) Development of an evaluation procedure sensitive to classification accuracy differences among data sets of different spatial resolutions.
- 3) Continuation of the analysis of the four different spatial resolutions of the 1979 data.
- 4) Initiation of the analysis sequence to evaluate the spectral characteristics of the simulated Thematic Mapper data.
- 5) Carry out field work in conjunction with the April 1980 aircraft data mission.

No major problems are anticipated during the forthcoming quarter.