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APPLICATION AND EVALUATION OF SATELLITE REMOTE SENSING  
DATA AND AUTOMATIC PROCESSING TECHNIQUES FOR STATE-WIDE  
LAND USE AND OTHER RESOURCE MANAGEMENT

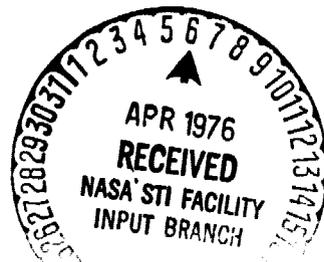
LANDSAT FOLLOW-ON INVESTIGATION #20820  
(CONTRACT NO. NAS5-20918)

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PROGRESS REPORT FOR QUARTER ENDING JANUARY 21, 1976

Prepared for  
GODDARD SPACE FLIGHT CENTER  
GREENBELT, MARYLAND 20771



(E76-10231) APPLICATION AND EVALUATION OF  
SATELLITE REMOTE SENSING DATA AND AUTOMATIC  
PROCESSING TECHNIQUES FOR STATE-WIDE LAND  
USE AND OTHER RESOURCE MANAGEMENT Progress  
Report, period (Mississippi State Office of G3/43

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## INTRODUCTION

This report summarizes activities under the State of Mississippi's LANDSAT Follow-on Investigation, for the period ending January 21, 1976. This effort involves joint activities with the NASA/JSC Earth Resources Laboratory at Bay St. Louis, Mississippi, and with a number of key state agencies. The Office of Science and Technology (Office of the Governor) provides overall project management, and coordinates the multi-agency participation.

This reporting period constitutes the third quarter of operations under the contract. During this period, significant objectives have been accomplished in the conversion of NASA-developed pattern-recognition software for use on state-owned computers. There has also been continued progress in the joint activities with the field personnel and resource management discipline specialists of the participating state agencies. In summary, efforts are proceeding toward achieving the major objectives of the investigation - the software conversion and subsequent production of specific resource inventories.

The contents of this report are organized consistent with prior reports and will serve as an update, with minimum repetition of previously reported information.

A. PROBLEMS

During this quarter a problem was encountered in the software conversion effort that threatened to seriously impede the entire investigation. However, the problem was resolved, and there are no significant problems open at this time. A brief discussion of the software problem and its resolution is included below, under "B. Accomplishments."

B. ACCOMPLISHMENTS

Progress continues in the major task areas of the investigation, as follows:

1. Statewide Ground Truthing Effort. The second statewide ground truthing effort, which was initiated July 1, 1975, is complete as of this report. This effort included the participation of 140 individuals located in all areas of the state. Ground truth data was obtained on 541 sample sites across the state, representing the surface features of interest--e.g., crops, forest cover, wetlands, extractive sites, etc. The field observations were made by County Agents, County Foresters, Game Biologists, and other state agency personnel in the course of their normal duties. According to figures furnished by the participants themselves, the average time required to make the observations and fill out the ground truth data forms was 33 minutes per sample site.

2. Software Conversion Effort. Significant objectives have been accomplished this quarter in the conversion of NASA-developed pattern recognition software for use on the State Computer Center's IBM 370/155 system.

Conversion of the PATREC (PATtern RECOgnition) Module, consisting of six distinct programs, has been completed. The programs have been checked out on the state computers, utilizing sample tapes provided by NASA/ERL for test runs.

During the course of the test runs, however, a problem was surfaced: program ASSIGN, the final program in the PATREC Module, required 240 minutes of computer time to classify one LANDSAT tape into 17 classes. This was a very serious problem because of the high cost of computer time (as much as \$1,000 per hour during peak loads), and the fact that a statewide classification involves the processing of 20 - 30 LANDSAT tapes. Unresolved, this problem could have jeopardized the entire investigation due to prohibitive costs.

The problem was discussed with data processing specialists at NASA/ERL and at the State Computer Center. Then, by obtaining timing information on discrete parts of program ASSIGN, Office of Science and Technology computer specialists isolated portions of the code that ran slowly on the IBM system. These portions were subsequently modified, and computer time for ASSIGN was cut from 240 minutes to 24 minutes per tape. With this improvement, the PATREC Module runs as fast, or slightly faster, on the state's computer as on NASA/ERL's computer system, and cost projections for a statewide classification are reasonable.

Successful conversion of the PATREC Module is a major milestone. With the conversion of the GEOREF (GEOgraphic REferencing) Module, expected to be completed during the next quarter, the State of Mississippi will have the processing capability necessary to perform computer-assisted surface cover classifications from LANDSAT digital data, and to reference these classifications to UTM coordinates. A statewide classification from newly-acquired LANDSAT data is planned to begin during the next quarter, to be carried through by state personnel utilizing state computers.

3. Acquisition of Aircraft Data. During this period, aircraft data for Subsite 2, the Gulf Coast and Coastal counties, was received and indexed. With this order, we now have scanner data and color infrared imagery for four subsites within the state. A set of the color IR imagery for each subsite is maintained by the OST for use by various state agencies, as needed. The digital data is to be processed by NASA/ERL to produce high resolution products of selected areas. The processing of the digital data is being delayed due to the physical transfer of NASA/ERL from the National Space Technology Laboratories at Bay St. Louis, Mississippi, to the Slidell Computer Complex at Slidell, Louisiana. This move will take place during February, 1976.

4. Acquisition of Spacecraft Data. As a result of our evaluation of LANDSAT-2 imagery received per our Standing Request with Sioux Falls, a set of cloud-free data over the entire state was identified. This data was acquired on contiguous passes October 11, 12, 13, and 14, 1975. The corresponding CCT's for these frames were ordered in January, 1976, and are expected to be received during the coming quarter. As soon as the tapes are received, a statewide computer-assisted classification will be initiated.

C. SIGNIFICANT RESULTS

None to report as yet.

D. PUBLICATIONS

None to report as yet.

E. RECOMMENDATIONS

None to report as yet.

F. FUNDS EXPENDED

Total vouchered cost as of January 21, 1976, is \$30,558.00 out of the \$125,000.00 funded by NASA/GSFC to the State of Mississippi. The value of the state's contribution is placed at \$43,103.00.

G. DATA USE

Through January 30, 1976, the tabulation is as follows:

	<u>Value of Data Allowed</u>	<u>Value of Data Ordered</u>	<u>Value of Data Received</u>
Aircraft	\$11,376	\$11,178	\$11,178
Spacecraft	\$7,700	\$2,630	\$630

H. AIRCRAFT DATA

Under this investigation, high resolution products from aircraft data are to be utilized in three ways: (1) To evaluate the accuracy of the products produced from LANDSAT data; (2) for evaluation from a standpoint of using satellite data from various spectral bands; and (3) providing high resolution data of critical areas for applications evaluations. To date, the investigation has not progressed far enough in the processing of either aircraft or spacecraft data to make an assessment of the usefulness of the aircraft data for the purposes described above. This assessment will be made and reported in the latter phases of the investigation.