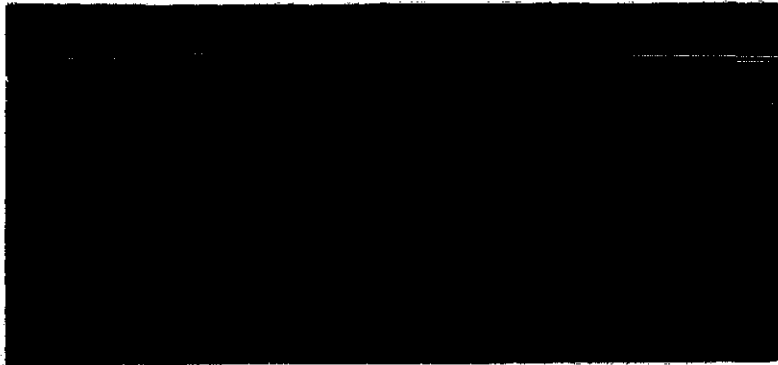


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E7.4-10595  
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| (E74-10595) GROUND PATTERN ANALYSIS IN<br>THE GREAT PLAINS Bimonthly Progress<br>Report, 1 Feb. - 30 Mar. 1974 (Kansas<br>Univ. Center for Research, Inc.) | N74-27781                         |
| \$4.00   | Unclas<br>10 CSCL 08B 63/13 00595 |

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KANSAS ENVIRONMENTAL AND  
RESOURCE STUDY: A GREAT PLAINS  
MODEL

MARCH 1974

Type I Progress Report for the  
Period February 1, 1974-March 30, 1974

Prepared for:  
National Aeronautics and Space Administration  
Goddard Space Flight Center  
Greenbelt, Maryland 20771  
Contract No. NAS 5-21822



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KANSAS ENVIRONMENTAL AND RESOURCE STUDY:  
A GREAT PLAINS MODEL

Ground Pattern Analysis in the Great Plains

F. T. Ulaby, Principal Investigator (Acting)  
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March 1974  
Type I Progress Report for the Period February 1, 1974 through March 30, 1974  
Report No. 2266-10

Prepared for:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
GODDARD SPACE FLIGHT CENTER  
GREENBELT, MARYLAND 20771

Contract No. NAS 5-21822, Task 6

BIMONTHLY ERTS-A INVESTIGATION REPORT

Type I Progress Report  
For The Period Ending: March 30, 1974

NASA Contract NAS 5-21822

Title of Investigation: Ground Pattern Analysis in the Great Plains

ERTS-A Proposal Number: 60-8

Task Number: 6

Co-Investigators: John C. Davis and Fawwaz T. Ulaby

NASA-GSFC PI ID Number: UN 657

Report Prepared by: \_\_\_\_\_

James L. McNaughton  
Research Engineer

Report Approved by: \_\_\_\_\_

Fawwaz T. Ulaby  
Co-Investigator

## I. RESEARCH OBJECTIVES:

The two program objectives of this study may be defined as:

- A. Use of multispectral imagery to map the areal geology of selected sites in Kansas, and to identify anomalous patterns;
- B. Search for large-scale ground patterns by spatial frequency analysis.

## II. PROBLEMS:

None.

## III. WORK PERFORMED DURING THIS REPORT PERIOD:

The current phase of this investigation is concerned with the quantitative analysis of the spatial frequency data obtained from the optical data processing of ERTS-A images. Specifically, parameters, derived from the spatial frequency and orientational data, are used as the input to pattern classification algorithms. A block diagram of the optical data processing and pattern recognition system is shown in Figure 1.

The pattern recognition experiment has not been concluded at this time, but the results of this experiment will be included in the final report on this investigation due in June, 1974.

Also during this report period, an experiment was performed to determine the bands of spatial frequencies that contain the most information with respect to discriminating between physiographic categories. Additional data from the optical processing of the ERTS image sample areas was taken using a reduced spatial frequency scale. The results of this experiment are being analyzed at the present time.

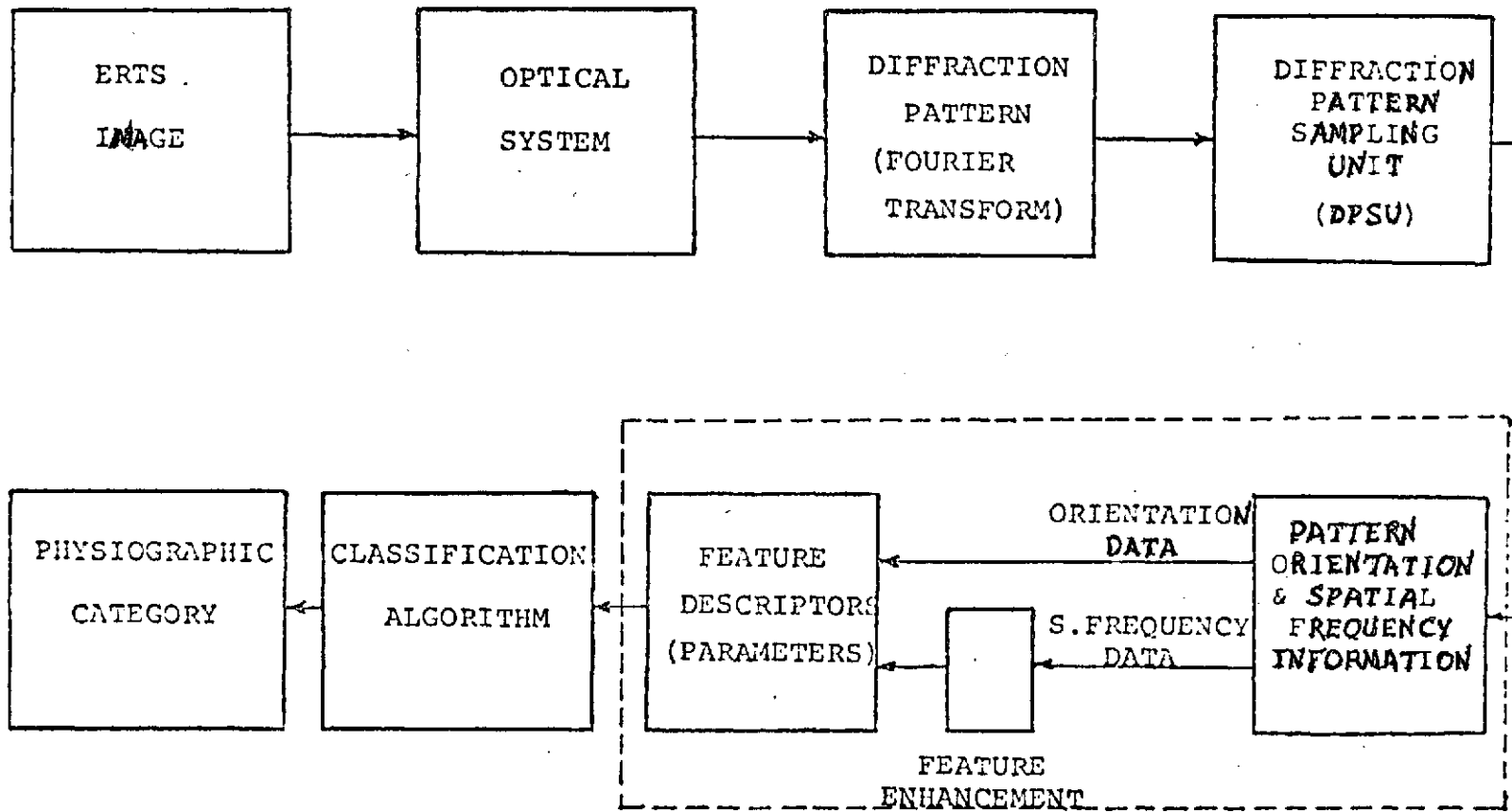


Figure 1. Block diagram of optical processing and pattern recognition system.

#### IV. PLANNED WORK NEXT REPORT PERIOD:

During the next report period we will be concluding this investigation. A final report will be issued which will summarize the work done on this investigation, the results, and our conclusions.

Work will be concluded on the pattern recognition experiment that is presently being conducted. This experiment is based on the quantitative information mentioned above. Using various pattern recognition algorithms, we hope to accurately classify large-scale ground patterns and anomalous patterns in Kansas.

#### V. RELIABILITY EFFORTS:

None.

#### VI. SIGNIFICANT RESULTS:

Spatial frequency analysis of ERTS-A images appears to be useful in discriminating between large-scale ground patterns in Kansas. Using parameters derived from the optical data processing of ERTS-A images, sample areas from large physiographic categories have been accurately identified.

#### VII. COST BENEFITS OF SIGNIFICANT RESULTS:

Unkown.

VIII. PUBLISHED PAPERS, ARTICLES, REPORTS:

McCauley, J. R., D. Egbert, F. T. Ulaby, J. L. McNaughton, "A Study of Kansas Stream Patterns Using Optical Data Processing of ERTS-A Imagery", presented at 8th Annual Meeting of the South-Central Section of the Geological Society of America, Oklahoma State University, Stillwater, Oklahoma, March 7-9, 1974.

Egbert, D. J. R. McCauley, F. T. Ulaby, J. L. McNaughton, "Optical Data Processing Analysis of Stream Patterns Exhibited on ERTS-A Imagery", Proceedings Ninth International Symposium on Remote Sensing of Environment, University of Michigan, Ann Arbor, Michigan, April 15-19, 1974.

IX. RECOMMENDATIONS REGARDING MAXIMUM UTILIZATION OF ERTS SYSTEM:

None.

X. CHANGES IN STANDING ORDER FORMS:

None.

XI. ERTS IMAGE DESCRIPTOR FORMS (ATTACHMENT B):

None.

XII. DATA REQUEST FORMS SUBMITTED:

None.



**XIII. FUNDING:**

Funding is adequate.

**XIV. CHANGE IN PERSONNEL:**

None.

## **CRINC LABORATORIES**

**Chemical Engineering Low Temperature Laboratory**

**Remote Sensing Laboratory**

**Flight Research Laboratory**

**Chemical Engineering Heat Transfer Laboratory**

**Nuclear Engineering Laboratory**

**Environmental Health Engineering Laboratory**

**Information Processing Laboratory**

**Water Resources Institute**

**Technical Transfer Laboratory**

**Air Pollution Laboratory**

**Satellite Applications Laboratory**