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TEXAS A&M UNIVERSITY
REMOTE SENSING CENTER
COLLEGE STATION TEXAS 77843

College of Agriculture
College of Engineering
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TYPE I PROGRESS REPORT-NUMBER 6

Period: November 28, 1973 to January 27, 1974

TITLE: MONITORING THE VERNAL ADVANCEMENT AND RETROGRADATION (GREEN WAVE EFFECT) OF NATURAL VEGETATION (MMC 667) (Contract No. NAS5-21857)

PRINCIPAL INVESTIGATOR: Dr. J. W. Rouse, Jr. (UN220)
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PROJECT DESCRIPTION:

This regional study monitors the vernal advancement and retrogradation of natural vegetation (green wave effect) using ERTS observations throughout the Great Plains Corridor. The green wave effect is charted by using the relatively homogeneous rangeland vegetation systems of the Mixed Prairie region in the central United States as phenological indicators. ERTS multispectral scanner data and ground observations collected from the network of ten test sites are used to measure vegetation changes during the life-time of ERTS-1. Attention is given to observing seasonal drought and other bioclimatic influences which impact upon management and production in agriculture. The overall objective of this investigation is to determine the effectiveness of ERTS-type data in monitoring the vegetation conditions of direct concern to rangeland management and agri-business decisions in this region.

E74-10274) MONITORING THE VERNAL
 ADVANCEMENT AND RETROGRADATION (GREEN WAVE
 EFFECT) OF NATURAL VEGETATION Progress
 Report, 28 Nov. 1973 - 27 Jan. (Texas
 A&M Univ.) 10 p HC \$3.00
 N74-17068
 Unclas
 G3/13 00274
 CSCI 06F

ACCOMPLISHMENTS:

During the period covered by this report the following tasks were accomplished:

- a) Test site characterization has been completed for all ten Great Plains Corridor test sites.
- b) "Masks" for overlaying soil and vegetation resource and land use information onto ERTS greymaps of MSS data have been completed for all ten test sites.
- c) Location information of masked site areas has been coded, keypunched, and masks verified for routine extraction and analysis of ultimate subsite MSS data for all of the test sites.
- d) In an effort to evaluate the effectiveness of the masks, initial analyses have been made for the College Station (most heterogeneous) and Throckmorton (most homogeneous) test sites. Six data sets for College Station and 13 data sets for Throckmorton have been completed.
- e) Computer analyses of MSS digital data were continued during this reporting period for

routinely located and extracted 7km X 7km areas including the test sites. Means, covariances, band ratio parameters, and the TVI (transformed vegetation index) values, have been calculated for these ERTS-1 data sets.

- f) Image Descriptors were assigned for ERTS-1 imagery containing good quality Great Plains Corridor network test site data not previously described (Appendix).
- g) Ground data summaries were updated to include all data acquired through December 31, 1973.
- h) Weather information reported by the cooperators for the 1972 and 1973 data collection periods has been compiled, and additional climatic and weather data are being accumulated for each test site area.

SUMMARY OF SIGNIFICANT FINDINGS:

Primary emphasis during this reporting period has been given to completing the resource and land use mask overlays for ultimate subsite MSS data extraction and analysis, refining the computer mask program, verifying resultant masks, and evaluating the initial subsite data.

Standard deviations for the selected subsites were generally reduced significantly when compared to the values for the overall 7km X 7km test site areas. This indicates that the masking technique has been successful in reducing the variability of the ERTS-1 MSS data for ultimate subsite comparisons with ground data.

The techniques used to locate the 7km X 7km test site areas and extract masked subsite data apparently limit the ability to reliably locate identical very small subsite areas for temporal comparisons. Current evidence indicates that areas which include less than about four pixel elements in either dimension are probably unreliable.

DATA PRODUCT SUMMARY:

The ERTS-1 imagery and tape receipts and orders "quick-look" chart on the following two pages shows the status of ERTS-1 data inventory and retrospective data requests by the end of this reporting period.

Four retrospective data requests were placed during the period covered by this report. These orders were sent on November 30, December 10, December 18, 1973, and January 11, 1974.

Currently, standing order black-and-white positive transparencies are being received six to seven

ERTS-1 IMAGERY AND TAPE

RECEIPTS AND ORDERS

GREAT PLAINS CORRIDOR TEST SITES

CYCLE	DATES	COLLEGE STATION	SONORA	THROCKMORTON	WOODWARD	HAYS	SAND HILLS	COTTONWOOD	MANDAN	WESLACO	CHICKASHA
0	7/25/72 7/30										
1	8/1 - 8/17										
2	8/19 - 9/4										
3	9/6 - 9/22										
4	9/24 - 10/10										
5	10/12 - 10/28										
6	10/30 - 11/15										
7	11/17 - 12/3										
8	12/5 - 12/21										
9	12/23 - 1/8/73										
10	1/10 - 1/26										
11	1/28 - 2/13										
12	2/15 - 3/3										
13	3/5 - 3/21										
14	3/23 - 4/8										
15	4/11 - 4/26										
16	4/29 - 5/14										
17	5/17 - 6/2										
18	6/4 - 6/19										
19	6/22 - 7/7										
20	7/10 - 7/25										

RECEIPTS AND ORDERS

GREAT PLAINS CORRIDOR TEST SITES

CYCLE	DATES	COLLEGE STATION	SONORA	THROCK-MORTON	WOOD-WARD	HAYS	SAND-HILLS	COTTON-WOOD	MANDAN	WES-LACO	CHICK-ASHA
21	7/28/73-8/12										
22	8/15-8/30										
23	9/2-9/17										
24	9/20-10/4										
25	10/8-10/22										
26	10/26-11/10										
27	11/13-11/27										
28	12/1-12/15										

SYMBOLS:

- NO DATA PRODUCTS RECEIVED
- 9" B&W POSITIVE TRANSPARENCIES RECVD.(STANDING ORDER)
- B&W PRODUCTS ORDERED (NOT RECEIVED FROM STANDING ORDER)
- BULK PROCESSED DIGITAL TAPES ORDERED
- MAGNETIC TAPES RECEIVED
- NO FURTHER PRODUCT ORDERS ANTICIPATED
- BULK COLOR COMPOSITE PRINT ORDERED RECEIVED
- BULK COLOR COMP. TR. ORDERED RECEIVED
- PRECISION COLOR COMP ORDERED RECEIVED
- PRECISION COLOR COMP. TR. ORDERED RECEIVED

weeks following date of acquisition. Generally, color composite products are being received approximately eight weeks and magnetic tapes (CCTs) from five to six weeks following retrospective orders.

During this reporting period an increased number of data sets have been observed to have "bad" or missing data for one or more of the four MSS bands. This has caused problems in getting retrospective orders filled for CCTs. Following communication with GSFC User Services, a special request was placed for processing the CCTs for a request which had originally been returned from GSFC with the explanation that it could not be produced (band 6 data was bad). This special request tape (Obs. I.D. No. 1455-16450) has been received and successfully processed in a routine manner. The data and greymaps for Bands 4,5, and 7 appear to be very good. The standard deviation for Band 6 data was very high and the greymap showed many lines of missing or otherwise abnormal data.

It is anticipated that other scenes having good data for Bands 5 and 7 that have been returned as being "unprocessable" would provide good data for our purposes. Consequently, these several tapes will be special requested. It is anticipated that the number of "special requests" will be minimal.

SCHEDULED ACTIVITIES:

The following activities are scheduled for the next reporting period:

- a) Ultimate subsite MSS data extraction will be completed for all data sets previously processed for the 7km X 7km test site areas.
- b) As ERTS-1 MSS digital data products are received from GSFC, they will be routinely processed for the selected subsites using the masking technique.
- c) Band ratios other than those used in routinely calculating the Band Ratio Parameter and Transformed Vegetation Index (TVI) will be calculated and compared with ground truth data for possible correlation.
- d) Statistical analyses using ultimate subsite data will be completed for all G.P.C. test sites for all dates received and processed.
- e) Weather data will be computer formatted and stored in the computer. Analyses will be initiated to evaluate the degree of correlation between the covariant weather variables, ground measurements, and ERTS-1 data.
- f) Preparation will be made for spring sampling at the Corridor test sites, and pre-greenup

samples will be taken at the southern sites.

- g) During the next reporting period primary emphasis will be given to data analysis, interpretation and report writing.

ERTS IMAGE DESCRIPTOR FORM

APPENDIX

(See Instructions on Back)

DATE January 27, 1974

PRINCIPAL INVESTIGATOR J. W. Rouse, Jr.

GSFC U220

ORGANIZATION Remote Sensing Center

NDPF USE ONLY	
D	_____
N	_____
ID	_____

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Range- land	Pasture	Grass- land	
1452-16284	X	X	X	River, Lake, Sediment
1319-16465	X	X	X	Lake, Scattered Clouds
1455-16455	X	X	X	Plateau
1455-16450	X	X	X	Cropland
1508-16385	X	X	X	Lakes, Fire Damage
1455-16441	X	X	X	River, Dune
1455-16432	X	X	X	Cropland
1455-16432	X	X	X	Cropland
1421-16543	X	X	X	Dune, Irrigation
1457-16533	X	X	X	Dune, River, Irrigation
1457-16540	X	X	X	Dune
1452-16300	X	X	X	Cropland, Gulf, Marsh
1416-16310	X	X	X	Cropland, Gulf
1453-16354	X	X	X	Lake, Mountain
1508-16383	X	X	X	River, Cropland

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

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 301-982-5406