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

College of Agriculture
College of Engineering
College of Geosciences
College of Science

TYPE I PROGRESS REPORT-NUMBER 5

Period: September 28, 1973 to November 27, 1973

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

PRINCIPAL INVESTIGATOR: Dr. J. W. Rouse, Jr. (UN220)
Remote Sensing Center
Texas A&M University
College Station, Texas   77843

PROJECT DESCRIPTION:

This regional study monitors the vernal advance-
ment 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
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.

INTERDISCIPLINARY TEACHING AND RESEARCH

ACCOMPLISHMENTS:

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

    a) Ground data summaries were updated to
       include the summer and autumn of 1973.
       Computer programs developed previously
       were used to prepare accumulative summaries
       of vegetation data obtained from the ten
       network test sites.

    b) Routine updating of ERTS-1 imagery and
       aerial photography logs has been accomplished.

    c) Intensive field sampling initiated in April,
       1973 at the Throckmorton test site was
       continued in October.

    d) Three stages of large-scale color-IR and
       one scale of color ektachrome aerial
       photography were taken at Throckmorton in
       conjunction with the October ground data
       collection period and satellite overpass.

    e) Test site characterization has been emphasized
       during this reporting period and "masks" for
       overlaying soil and vegetation resource
       and land use information onto ERTS greymaps
       have been completed for seven of the ten
       test sites.

f) Location information of masked areas has
    been coded and keypunched in preparation
    for routine extraction and analysis of
    ultimate subsite data for six of the test
    sites.

g) 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, and the band ratio parameter,
    TVI (transformed vegetation index), have
    been calculated for these ERTS-1 data sets.

h) Work has continued on the interpretation
    of statistical analysis of ground and ERTS-1
    MSS data from G.P.C. test sites.

i) Special data summaries and visual aids
    were prepared for the NASA review of the
    Great Plains Corridor project at NASA/GSFC.

j) Image descriptors were assigned for ERTS-1
    imagery containing good quality Great Plains
    Corridor network test site data not
    previously described (Appendix).

SUMMARY OF SIGNIFICANT FINDINGS:

Emphasis during this reporting period has been

given to an inventory of land resource types and land use at the ten Great Plains Corridor test sites. A resource and land use classification system was developed which uses available soil survey information and interpretations from NASA obtained high flight aerial photography to locate discrete areas of similar rangeland vegetation. Existing classification systems, even those developed for use with remote sensor data, were found to be inadequate for this project. This system is expected to be of general use for remote sensing related to land use and management. It has specific applicability to any effort aimed at regional use of ERTS-1 MSS digital data products.

A preliminary assessment of the relative importance of rangelands in the Great Plains Corridor states indicates that the value of the livestock industry supported by this resource exceeds 23 billion dollars. The development of a "Rangeland Feed Conditions" index for this region could be used by more than 400,000 farm and ranch operators involved in the production of more than 40% of the nation's beef and much of the country's grain.

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.

Three retrospective data requests were placed during the period covered by this report. These orders were sent on October 1, October 8, and October 26, 1973.

Standing order black-and-white products are being received from four to ten weeks following date of acquisition. The bulk of the images are received from seven to eight weeks following ERTS-1 acquisition. Receipt of color composite and digital data products has been varying from about eight to sixteen weeks following retrospective orders.

The quality of the color composite products produced by GSFC are generally much improved over those produced during the first few month's of operation. They are generally more interpretable due to better color balance and exposure.

SCHEDULED ACTIVITIES:

The following activities are scheduled for the next reporting period.

a) Routine site location on ERTS-1 MSS greymaps and analysis of data as set forth

in the Data Analysis Plan for the Great
Plains Corridor investigation will be
continued as data products are received.

b) Resource and land use overlays for the
G.P.C. sites will be completed by continuing
to utilize photography on file in conjunction
with field validation. CCT masks will be
developed for all test sites.

c) Mask location accuracy will be checked,
and modifications in the masks will be
made as necessary to achieve maximum
efficiency in land resource and land use
extraction.

d) Ultimate subsite extraction and analyses
of subsite MSS data will be completed for
all data sets for which 7km X 7km processing
has been completed.

e) Ground data summaries will be updated to
include all data acquired through December
31, 1973.

f) Weather information for the 1972 and 1973
data collection periods will be compiled
and summarized.

g) Correlation of weather information with
ground data and ERTS-1 MSS data will be

initiated and emphasis given to isolating covariant variables associated with ERTS-1 data products.

h) Field sampling will be continued during the winter dormant season at the College Station and Throckmorton test sites when vegetation changes are anticipated or when weather conditions indicate good satellite data acquisition.

i) Emphasis will be given to an analysis of the characteristics of the "transformed vegetation index" and the possibilities for using ERTS-1 MSS data for measuring vegetation conditions on rangelands.

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE ___September 28, 1973___

PRINCIPAL INVESTIGATOR ___J. W. Rouse, Jr.___

GSFC ___U220___

ORGANIZATION ___Remote Sensing Center___

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS* Range-land	Pasture	Grass-land	DESCRIPTORS
1361-16245	X	X	X	Clouds, Lakes
1362-16304	X	X	X	City, Forest
1346-16422	X	X	X	Brush, Clouds
1365-16475	X	X	X	Lake, Dormant Vegetation
1347-16480	X	X	X	Brush
1364-16420	X	X	X	Lake
1311-16482	X	X	X	Dormant Vegetation
1346-16413	X	X	X	Brush, Lakes
1357-16462	X	X	X	Cropland
1330-16513	X	X	X	Cropland, Fallow Fields
1348-16511	X	X	X	Lakes, Cropland
1347-16453	X	X	X	Irrigation, Clouds
1365-16452	X	X	X	Cropland, Dormant Vegetation
1368-17011	X	X	X	Dunes, River
1385-16551	X	X	X	Irrigation, Dunes

*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).

MAIL TO   NDPF USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

GSFC 37-2 (7/72)

DATE ___September 28, 1973___

PRINCIPAL INVESTIGATOR ___J. W. Rouse, Jr.___

GSFC ___U220___

ORGANIZATION ___Remote Sensing Center___

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS* Range-land	Pasture	Grass-land	DESCRIPTORS
1351-17064	X	X	X	Badlands
1296-17020	X	X	X	Cropland
1368-17011	X	X	X	Irrigation
1333-17070	X	X	X	Clouds, Badlands
1351-17055	X	X	X	Lake, Cropland, River
1369-17054	X	X	X	Clouds, River
1333-17061	X	X	X	Fallow Fields, Lake
1362-16315	X	X	X	Cropland, Lakes
1346-16410	X	X	X	Clouds, Dormant Vegetation, Lakes
1164-16310	X	X	X	Forest, Lake
1397-16242	X	X	X	Forest
1436-16395	X	X	X	Brush
1382-16410	X	X	X	Brush
1401-16453	X	X	X	Lake
1439-16541	X	X	X	Dunes
1436-16393	X	X	X	River

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GSFC __U220__

ORGANIZATION __Remote Sensing Center__

NDPF USE ONLY
D _____
N _____
ID _____

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS* Range-land	Pasture	Grass-land	DESCRIPTORS
1439-16543	X	X	X	Dunes
1403-16545	X	X	X	Dunes, Irrigation
1405-17060	X	X	X	Badlands
1422-17001	X	X	X	Badlands
1387-17061	X	X	X	Badlands
1386-17010	X	X	X	Badlands
1402-16503	X	X	X	Cropland
1400-16402	X	X	X	River
1401-16444	X	X	X	Cropland
1383-16455	X	X	X	River
1383-16450	X	X	X	Cropland

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GSFC 37-2 (7/72)

ERTS-1 IMAGERY AND TAPE

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
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										

ERTS-I IMAGERY AND TAPE
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										

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