

E7.2-10330  
CR-129644

# THE MITRE CORPORATION

WESTGATE RESEARCH PARK  
McLEAN, VIRGINIA 22101  
(703) 893-3500

31 December 1972

D20-667

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Mr. Arthur Fihelly, Code 430  
ERTS Technical Officer  
National Aeronautics and Space Administration  
Goddard Space Flight Center  
Greenbelt, Maryland 20771

Re: BI-MONTHLY PROGRESS REPORT, PR-568/MMC# 200, Environmental  
Indices from ERTS-1, NAS 5-21482

Gentlemen:

The MITRE Corporation is pleased to submit a progress report  
for the period of October 22, 1972 through December 21, 1972. To  
promote consistency and facilitate NASA review, MITRE has adopted  
this format for all future Type I Progress Reports.

A. TITLE:

Investigation of Environmental Indices from the Earth  
Resources Technology Satellites, PR-568/MMC# 200.

B. PRINCIPAL INVESTIGATOR:

Dr. Richard S. Greeley. Request for change in Principal  
Investigator has been filed (October 2, 1972) with ERTS  
Program Scientist, Dr. Arch B. Park. No reply has been  
received as of this date.

C. PROJECT OBJECTIVES:

MITRE will develop environmental indices covering land,  
water and air quality compatible with ERTS-1 imagery. Two  
sites in Pennsylvania have been selected for examination.  
Such indices will reveal the trends occurring in the  
environment and will prove useful to Federal, state and  
local governments in their management of the environment in  
other areas.

D. SUMMARY OF PROJECT STATUS:

Phase I activities have occurred in all four sub-phase  
areas (Figure 1) during this two-month effort. A brief  
statement of accomplishments in each are presented below.

(E72-10330) INVESTIGATION OF  
ENVIRONMENTAL INDICES FROM THE EARTH  
RESOURCES TECHNOLOGY SATELLITES Bimonthly  
Progress Report R.S. Greeley (Mitre  
Corp.) 31 Dec. 1972 7 p CSCL 08E  
N73-14318  
Unclas  
00330  
G3/13

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US Department of Commerce  
Springfield, VA. 22151

- o The Experiment Parameter Analysis (Task I.1.1) is being drafted and will be included in the Type II Report due February 21, 1973.
- o The Experiment Site Selection (Task I.1.2) completed in the last reporting period is shown in Figure 2. No additions or deletions have occurred and are not to be expected until the end of Phase II.
- o The Software Procurement (I.1.3) was completed during the previous reporting period. Procurement of the terminal and modem for remote job entry to the Pennsylvania State University (PSU) computer from MITRE's McLean facility has taken place. Installation and check-out will occur in the next reporting period. Present computer efforts are being conducted from terminals physically on the PSU campus.
- o The DCP Experiment Planning, Sub-Phase I.2, has been completed. After several iterations, it has decided to place one DCP on the Renovo water quality station and the other DCP on a water quantity station in Harrisburg. Arrangements have been made with USGS/Harrisburg to install and service these two DCP's. Such installations will support the Susquehanna River Basin Commission in its assessment of the river and the value of DCP's as a method of data handling. The DCP's were shipped to USGS/Harrisburg on November 20, 1972 and are expected to be in operation in the next reporting period.
- o The MSS Implementation, Sub-Phase I.3, was completed during this reporting period. Test runs using MSS imagery and tapes were performed using the August 1, 1972 (1009-15241) scene of the greater Harrisburg area as a sub-test site. Some minor tape errors were uncovered and corrected. This scene was the first data received. (Tapes were received November 6, 1972--imagery did not arrive until November 25, 1972). A comparison of the PSU digital data reduction techniques with the abilities of trained photo-interpreters was performed, with each instructed to perform his analysis without discussions with the other group. Our findings show that both analysis approaches are required at this juncture if we are to classify land use into the categories suggested in our proposal. Further experimentation is now underway with the cross-fertilization of results being allowed on the same sub-test site.

- o Phase II, Preliminary Data Analysis, is underway. Only one scene, out of the nine acceptable scenes (less than 25% cloud cover) received to date has been examined. See Figure 3 for dates of other acceptable scenes. Nine distinct land use categories have been determined for the Harrisburg sub-test site. Our next efforts are to examine the same sub-test site for another date, October 11, 1972 (1080-15185), in order to crystallize our Data Analysis Plan due January 31, 1973.

E. SIGNIFICANT RESULTS:

None.

F. PROBLEMS:

None. The delay in schedule felt to be necessary in the last progress report (October 31, 1972) is not expected to occur.

G. RECOMMENDATION FOR TECHNICAL CHANGES:

None.

H. ADEQUACY OF FUNDING:

No problems seen at this time.

I. CHANGES TO STANDING ORDER FOR DATA:

None.

J. PUBLICATIONS IN THE REPORTING PERIOD:

None.

K. WORK PLANNED FOR NEXT REPORTING PERIOD:

- o DCP will be installed and put into operation at Renovo and Harrisburg.
- o Repeat of the signature analysis for the sub-test site area of Site 1 will be performed for at least two other scenes (dates) using both digital and photo-interpretation techniques.
- o Data Analysis Plan will be completed and forwarded to NASA for approval.


Mr. Arthur Fihelly

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31 December 1972  
D20-667

Questions concerning this report should be directed to the undersigned at (703) 893-3500, extension 2771, or to Mr. Edward A. Ward at (703) 893-3500, extension 2237.

Sincerely,



Richard S. Greeley  
Principal Investigator  
Associate Technical Director  
Systems Development Division

RSG:EAW:jbr

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Code 245  
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Greenbelt, Maryland 20771

Dr. William Nordberg  
ERTS Project Scientist  
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Greenbelt, Maryland 20771

✓ NASA Scientific and Technical  
Information Facility  
Attention: Earth Resources  
P. O. Box 33  
College Park, Maryland 20740

FIGURE 1

ERTS ENVIRONMENTAL INDICES PROGRAM SCHEDULE

Aug. 21, 1972

	CY 1972						CY 1973										
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
PHASE I - DATA ANALYSIS PREPARATION																	
I.1 MSS EXPERIMENT PLANNING																	
I.1.1 Environmental Parameter Analysis																	
I.1.2 Experiment Site Selection																	
I.1.3 Software Procurement																	
I.2 DCP EXPERIMENT PLANNING																	
I.2.1 DCP Site Selection																	
I.2.2 DCP Station Design																	
I.2.3 DCP Hardware Procurement																	
I.3 MSS IMPLEMENTATION																	
I.3.1 MSS Imagery Test Run																	
I.3.2 MSS Non-Imagery Test Run																	
I.3.3 Environmental Index Test Run																	
I.4 DCP STATION IMPLEMENTATION (Optional 90 days after Receipt of DCP)																	
I.4.1 Installation of Air Quality Station																	
I.4.2 Installation of Water Quality Station																	
PHASE II - PRELIMINARY DATA ANALYSIS																	
II.1 FIRST TWO MONTHS DATA PROCESSED																	
II.2 DATA REQUIREMENTS REVISION																	
II.3 DATA ANALYSIS PLAN DEVELOPMENT																	
PHASE III - CONTINUING DATA ANALYSIS																	
III.1 PROCESS MSS DATA																	
III.2 COMPARISON OF REMOTE & IN-SITU DATA																	
III.3 FINAL REPORT DEVELOPMENT & REVIEW																	
III.4 COMPUTER PRODUCT RETURNED																	
III.5 DCP BREAKDOWN & RETURN																	
III.6 ARCHIVING OF EXPERIMENT RESULTS																	
REPORT DUE DATES																	
DATA ANALYSIS PLAN - (3 MONTHS AFTER RECEIPT OF FIRST ERTS-I DATA)																	
DATA REPORTS TO PENN., EPA, CEQ, ETC. (AS AVAILABLE)																	
TYPE I PROGRESS REPORTS																	
TYPE II PROGRESS REPORTS																	
TYPE III FINAL REPORT (DRAFT DUE 30 DAYS AFTER COMPLETION OF PHASE III, NASA REVIEW - 30 DAYS LATER, FINAL REPORT 30 DAYS LATER)																	
FINANCIAL MANAGEMENT REPORTS																	

or

(NO LATER THAN 6 MONTHS FOLLOWING COMPLETION OF INVESTIGATION).  
 (NO LATER THAN 6 MONTHS FOLLOWING COMPLETION OF INVESTIGATION).  
 (NO LATER THAN 12 MONTHS FOLLOWING COMPLETION OF INVESTIGATION).

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FIGURE 2

ERTS PRELIMINARY TARGETS

SITE	TARGET AREA	TARGET QUANTITIES	LAND AIR, OR WATER	SUGGESTED BY
1	HOLTWOOD DAM LAKE	ALGAE, THERMAL, SILT	W	EPA REGION III; PA. W.Q.
1	CONOWINGO DAM LAKE	" " "	W	" " " "
1	SAFE HARBOR LAKE	" " "	W	" " " "
1	CODORUS CREEK LAKE (INDIAN ROCK)	" " SILT	W	" " " "
1	BRUNNER ISLAND EFFLUENT	THERMAL, CHEMICALS, SILT	W	" " " "
1	CONEWAGO CREEK MOUTH	THERMAL, SILT	W	" " " "
1	LIME KILN AT ANNVILLE	PLUME DYNAMICS & LONG TERM EFFECT ON VEG.	W	" " " "
1	HARRISBURG	HAZE, ALL AIR & WATER QUALITY PARAMETERS	A, W	" " " "
1	SUSQUEHANNA RIVER-SUNBURY TO MD.	WATER QUALITY	W	" " " "
1	LANCASTER	HAZE, ALL AIR QUALITY PARAMETERS	A	STATE OF PA.
1	YORK	" " "	A	" " " "
1	SWATARA CREEK MOUTH	SILT	W	USGS/HARRISBURG
1	CONESTOGA CREEK MOUTH	SILT, OIL	W	" / " "
1	JUNIATA RIVER MOUTH	SILT	W	" / " "
1	THREE MILE ISLAND	ALL AIR & WATER QUALITY PARAMETERS	A, W	PSU
1	ALL OF SITE 1	LAND USE	W, L	STATE OF PA.
1	ALL OF SITE 1	ANY DENUDEU AREAS	L	" " " "
2	ALL OPEN PIT MINES	LINEAR DIM., AREA, & VOLUME; PH, THERMAL	L, W	EPA REG. III; PA. W.Q.O.
2	" REFUSE BANKS	" " " " & " " "	L, W	" " " "
2	SUSQUEHANNA RIVER	ALL WATER QUALITY PARAMETERS	W	" " " "
2	" " AT DANVILLE.	" " " " "	W	" " " "
2	" " AT HUNLOCK CREEK	" " " " "	W	" " " "
2	SCRANTON	HAZE, ALL AIR QUALITY PARAMETERS	A	STATE OF PA.
2	WILKES-BARRE	" " " " "	A	" " " "
2	ALL OF SITE 2	LAND USE	W, L	" " " "
2	" " " 2	ANY DENUDEU AREAS	L	STATE OF PA.

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FIGURE 3

ERTS-1 IMAGERY LOG FOR SITES I (HARRISBURG) & 2 (SCRANTON)

SATEL- LITE NO.	I. D. NUMBER				ORBIT NO.	RBV							MSS							DATE	SITE NO.		REMARKS	DATE RECEIVED					
	DAYS SINCE LAUNCH	HR.	MIN.	TENS OF SECONDS		CLOUD COVER (%)															1	2		TAPE	IMAGES				
							1	2	3	4	5	6	7	1	2	3	4	5	6							7			
1	007	15	12	4	100	G	F	G	G	G	G	G	G	G	G	G	G	G	X	X	-	-	-	-	-	-	-	-	-
1	007	15	13	1	100	F	F	G	G	G	G	G	G	G	G	G	G	G	X	X	-	-	-	-	-	-	-	-	-
1	007	15	18	0	100	G	F	G	G	G	G	G	G	G	G	G	G	G	X	X	-	-	-	-	-	-	-	-	-
1	008	15	18	3	100	P	P	G	G	G	G	G	G	G	G	G	G	G	X	X	-	-	-	-	-	-	-	-	-
1	008	15	18	5	100	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	-	-	-	-	-	-	-	-	-
1	009	15	24	1	40	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	-	-	-	-	-	-	-	-	-
1	009	15	24	4	20	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	-	-	-	-	-	-	-	-	-
1	025	15	12	4	100	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	025	15	13	0	100	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	025	15	18	0	90	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	026	15	18	2	80	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	026	15	18	5	80	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	027	15	24	2	60	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	027	15	24	5	60	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	043	15	13	0	70	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	044	15	18	2	50	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	044	15	18	5	90	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	045	15	24	3	10	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	061	15	12	5	30	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	062	15	18	1	20	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	062	15	18	4	40	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	063	15	24	2	90	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	079	15	13	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	079	15	13	3	10	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	080	15	18	3	0	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	080	15	18	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	080	15	19	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	080	15	19	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	081	15	24	4	100	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	081	15	25	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	081	15	25	3	100	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	081	15	25	5	100	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	098	15	18	1	100	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	098	15	19	3	100	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	099	15	24	3	90	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	099	15	25	0	70	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	115	15	13	4	100	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	116	15	19	0	50	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	116	15	19	2	10	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
1	117	15	25	1	70	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-

Special Ordered 9/28/72  
Special Ordered 9/28/72

Reviewed at GSFC (No Good)  
Reviewed at GSFC (No Good)  
Reviewed at GSFC (No Good)

Tape Ordered 10/27/72

Cloud cover 100% over Site 2  
Cloud cover 100% in ctr. Site 1

Prods. not rec'd as of 12/31/72

7

12/6/72  
12/6/72  
12/5/72  
12/5/72  
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10/30/72

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