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31 October 1972 D20-520

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 August 21, 1972 through October 31, 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 with ERTS Program Scientist, Dr. Arch B. Park.

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:

Primary efforts have been toward tasks outlined in Phase I, Data Analysis Preparation, shown in Figure 1. A brief statement of accomplishments to date is presented herein:

- The MSS Experiment Preparation, Sub-Phase I.1, has been concluded. For each media (land, water, air) possible MSS signatures for each environmental parameter has been examined and possible techniques using MSS data (imagery and tapes) have been reviewed in detail, (Task I.1.1) for use in Phases II and III.

  Data from existing Pennsylvania water and air quality monitoring programs has been determined and methods of obtaining a continued supply of these data to the project team have been established.

  Twenty-odd point and area experiment sites have been selected for detailed analysis for special land, water and/or air quality investigations, (Task I.1.2).

  Software procurement has been accomplished by entering into a subcontract relationship with Pennsylvania State University for services, (Task I.1.3). Services will include the use of all PSU remote sensing software suitable for multispectral analyses, and the use of the PSU computer in both a direct entry mode and a remote entry from our McLean office. Software has been checked out and is in a state of readiness to receive ERTS data. Services will also include the use of University personnel to assist in the determination of at least seven land use signatures, five water quality signatures, and four air quality signatures. Initiation of signature generation activity awaits first ERTS-1 imagery information. See Figure 2, for status of all imagery taken to date over test sites selected in Pennsylvania.

- The DCP Experimental Planning, Sub-Phase I.2, has also been conducted in this reporting period. Eight possible sites have been analyzed in detail for their advantages versus cost and value of such ground data to the program, (Task I.2.1). Five ground station design concepts have been developed.

  Design details and hardware procurement for these ground stations will be performed in the next period if required. Results of this effort point in the direction that sufficient in-site data from other sources exist to obviate the use of such ground stations. Final decision awaits two vital inputs (Harrisburg Air Quality Station and Renovo Water Quality Station) expected by early November.

- The MSS Implementation, Sub-Phase I.3, has been delayed pending arrival of first useful MSS data. No data has been delivered to date of sufficient quality to perform our analyses, (Tasks I.3.1, I.3.2, I.3.3).

- o Phase II, Preliminary Data Analysis Phase, has not been initiated as planned (Figure 1) due to the lack of ERTS-1 data, thus forcing a shifting of the beginning and end dates for Phase II and III day for day until first data arrives.

E. SIGNIFICANT RESULTS:

None.

F. PROBLEMS:

- o Delay of suitable ERTS-1 data is forcing the schedule to slide. Since Phases II and III require data in hand, a stretch-out of schedule shown in Figure 1 is required. No modification can be made to the schedule, however, until the delivery date is determined.

- o Our standing order for ERTS-1 has been established with a cloud cover criteria (25%) as the significant screening factor. However, imagery having less (20%) has proven to be unsatisfactory due to total cloud cover over subscene areas of interest. Therefore, it is suggested that cloud cover classification be done for each scene in at least quadrants thus improving the screening process and minimizing delays of useful imagery to the experimenters.

G. RECOMMENDATIONS FOR TECHNICAL CHANGES:

None.

H. ADEQUACY OF FUNDING:

No problem seen at this time.

I. CHANGES TO STANDING ORDER FOR DATA:

- o No change in standing order request.

- o A request for retrospective data was filed September 28, 1972. Scenes 100915241 and 100915244 were ordered following inspection in Users Browse File as GSFC. As stated above, the cloud cover was classified 40% yet scenes appear to be useful for our purposes.

J. PUBLICATIONS IN THE REPORTING PERIOD:

None.

K. WORK PLANNED FOR NEXT REPORTING PERIOD:

- o Decision on DCP installations or return of DCPs will be made.
- o Development of MSS signatures for land, water and air quality is expected to be initiated.

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
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RSG:EAW:jbr

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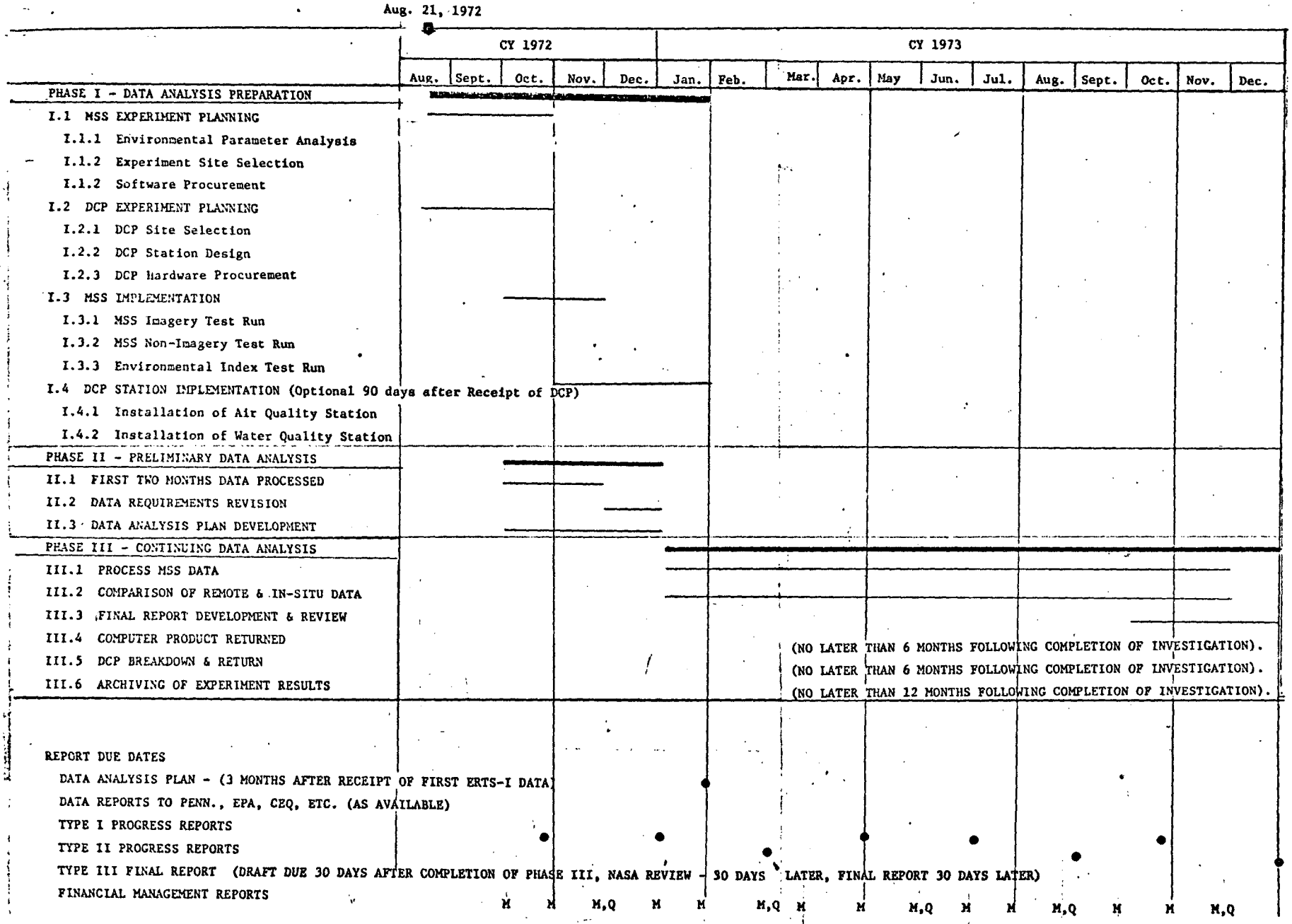
FIGURE 1

ERTS ENVIRONMENTAL INDICES PROGRAM SCHEDULE



LEGEND: M = Monthly

Q = Quarterly

FIGURE 2

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

I.D. Number					Cloud Cover (%)	Orbit No.	RBV			MSS				Date	Site No.		Remarks
Satel-lite No.	Days Since Launch	Hr.	Min.	Tens of Seconds			1	2	3	4	5	6	7		1	2	
10	07	15	12	4	100	96	G	G	G	G	G	G	G	Jul 30		X	-
10	07	15	13	1	100	96	F	F	F	F	F	F	F	Jul 30	X		-
10	08	15	18	0	100	111	G	G	G	G	F	G	G	Jul 31		X	-
10	08	15	18	3	100	111	P	P	P	G	F	G	G	Jul 31	X	X	-
10	08	15	18	5	100	111	G	G	G	G	G	G	G	Jul 31	X		-
10	09	15	24	1	40	124	G	G	G	G	G	G	P	Aug 01	X		Special Ordered, 9/28/72
10	09	15	24	4	20	124	G	G	G	G	G	G	P	Aug 01	X		Special Ordered, 9/28/72
10	25	15	12	4	100	347	-	-	-	F	G	G	G	Aug 17		X	-
10	25	15	13	0	100	347	-	-	-	G	G	G	G	Aug 17	X		-
10	26	15	18	0	90	361	-	-	-	G	G	G	G	Aug 18		X	-
10	26	15	18	2	80	361	-	-	-	G	G	G	G	Aug 18	X	X	-
10	26	15	18	5	80	361	-	-	-	G	G	G	G	Aug 18	X		-
10	27	15	24	2	60	375	-	-	-	G	G	G	G	Aug 19	X		Reviewed at GSFC, No Good
10	27	15	24	5	60	375	-	-	-	G	G	G	G	Aug 19	X		Reviewed at GSFC, No Good
10	43	15	13	0	70	612	-	-	-	G	G	P	G	Sep 05	X	X	Reviewed at GSFC, No Good
10	44	15	18	2	50	626	-	-	-	G	G	P	G	Sep 06	X	X	-
10	44	15	18	5	90	626	-	-	-	F	F	P	G	Sep 06	X		-
10	45	15	24	3	10	640	-	-	-	G	G	P	G	Sep 07	X		-
10	61	15	12	5	30	863	-	-	-	G	G	G	G	Sep 23		X	-
10	62	15	18	1	20	877	-	-	-	G	G	P	G	Sep 24		X	Cloud Cover 100% over Site 2
10	62	15	18	4	40	877	-	-	-	G	G	P	G	Sep 24	X		Cloud Cover 100% in Center
10	63	15	24	2	90	891	-	-	-	G	G	G	G	Sep 25	X		-
10	80	15	18	3	0	1128	-	-	-	G	G	G	G	Oct 12		X	-
10	80	15	18	5	0	1128	-	-	-	G	G	G	G	Oct 12	X	X	-
10	80	15	19	2	0	1128	-	-	-	G	G	G	G	Oct 12	X		-