CR-137439

Quarterly Progress Report for Skylab/EREP Investigation

NASA Lewis Contract No. C- 21372 -C

Principal Investigator: Dr. David C. Sweet

State of Ohio (No. 433)

Reporting Period - January - February - March

Overall Status

During this reporting period major effort focused on analyzing SL2 and SL3 data for the Cleveland (839517) and Columbus (839513) study sites. Various analytical products have been produced demonstrating the extent Skylab/EREP S 190 A and S 190 B data can be used for regional and local land use planning and mapping activities. These demonstration products include USGS Level I and Level II land use maps of Cleveland/Cuyahoga County at a 1:125,000 scale which were derived from a S 190 B H.R. Color photograph of 5 August 1973 and selected land use analysis of urban areas at 1:48,000 and 1:24,000.

Also during this reporting period initial evaluations of the potential usefulness of Skylab data to individual programs and interests within various state agencies were undertaken. Approximately seventy visitors toured the Remote Sensing Applications Laboratory during this reporting period where Battelle and State personnel jointly analyzed Skylab imagery in association with existing State data needs and problems.

In combination with similar on-going ERTS activities, some effort was expended on preparing and conducting the Ohio ERTS/Skylab Data User Workshop held on March 4-5, 1974. The principal purpose of this two-day workshop was to present the significant application findings of the Ohio ERTS and Skylab program to date and to solicit user views as to the potential utility of satellite survey data to land use, resource management, and environmental quality problem areas at the local, regional, and state levels in Ohio. The workshop agenda, news release, and fact sheet have been included as attachments to this report. Over 100 persons attended various sessions of the two-day workshop and conclusions and recommendations derived from this workshop are being analyzed and will be presented in the final report. The Ohio Department of Economic and Community Development is planning to publish the proceedings of the Workshop.

Data Requests and Receipts

Table I correlates dates of various Skylab EREP data acquitions of Ohio areas received to date. (Imagery acquired during the SL4 mission is expected to be received shortly.) Table II describes the coverage and quality of each S 190 A, S 190 B, 70 MM handheld Hasselblad, and 35 MM handheld Nikon photograph that have been received. In Table III, all NASA aircraft underflight data received to date is listed and in Table IV requested data from the SL2 and SL3 missions that has not been received to date is listed.

TABLE I

SKYLAB COVERAGE AND DATA RECEIVED OF OHIO AREAS

	SL2 (12 June 73)
	(EREP Pass 9 Track No. 61)
S 190A*	Detroit-Cleveland-Pittsburgh
S 191	Cleveland to Pittsburgh
S 192*	Detroit-Cleveland-Pittsburgh
S 193	Detroit-Akron
S 194	Detroit-Cleveland-Pittsburgh
	SL3 (5 Aug 73)
	(EREP Pass 3 Track No. 61)
S 190A*	Detroit-Cleveland-Pittsburgh
S 190B*	Detroit-Cleveland-Pittsburgh
S 191	Cleveland-Pittsburgh
S 193	Detroit-Akron
S 194	Detroit-Cleveland-Pittsburgh
	SL3 (9 Aug 73)
	(EREP Pass 6 Track No. 47)
S 190A*	Fort Wayne-Columbus-Marietta
S 192	Fort Wayne-Columbus-Marietta
S 193	Fort Wayne to Lima
S 194	Fort Wayne-Columbus-Marietta
	SL3 (14 Sept 73)
	(EREP Pass 29 Track 1/2)
S 190A	Kokomo to Toledo
S 193	Fort Wayne to Toledo
S 194	Fort Wayne to Toledo
	SL3 (15 Sept 73)
	(EREP Pass 31 Track 15/16)
S 190A*	Georgetown to Stubenville
S 190B*	Georgetown to Stubenville
S 191	Georgetown to Stubenville
S 194	Georgetown to Stubenville
	SL3
	(EREP Pass 19 Track No 15)
S 190B	New Philadelphia to Youngstown
S 191	Washington Court House-Cols.-Youngstown
S 193	Cincinnati to Youngstown
S 194	Cincinnati to Youngstown
	(EREP Pass 18 Track No. 1)
S 191	Kokomo to Toledo
S 192	Fort Wayne to Toledo
S 194	Fort Wayne to Toledo

* Data received to date.

TABLE II

COVERAGE AND QUALITY OF SKYLAB S 190 A PHOTOGRAPHY OF OHIO

Date	Frame	Area	Quality Comments*
6/12/73	151	Central Michigan	Good
6/12/73	152	Eastern Michigan, Detroit, Lake St. Clair, Western Lake Erie	Fair
6/12/73	153	Detroit, Toledo, Sandusky Bay, Western Lake Erie	Fair
6/12/73	154	Toledo to east of Cleveland	Fair
6/12/73	155	Sandusky Bay to Erie, Pa.	Fair
6/12/73	156	Cleveland area	Fair
6/12/73	157	Eastern Central Pennsylvania	Poor
6/12/73	158	South Eastern Pennsylvania	Very Poor
6/12/73	159	South Eastern Pennsylvania	Very Poor
6/12/73	160	West Virginia	Very Poor
8/5/73	184	Central Michigan, West of Detroit	Good
8/5/73	185	Eastern Michigan, Detroit, Lake St. Clair, Western Lake Erie	Very Good
8/5/73	186	Detroit, Toledo, Sandusky Bay, Western Lake Erie	Excellent
8/5/73	187	Sandusky Bay to Erie, Pa.	Excellent
8/5/73	188	Cleveland and Northeastern Ohio	Excellent
8/5/73	189	Eastern Ohio, Western Pennsylvania	Excellent
8/5/73	190	Eastern Ohio, Western Pennsylvania, Pittsburgh	Excellent
8/5/73	191	Southwestern Pennsylvania	Excellent
8/5/73	192	Central Pennsylvania	Excellent
8/9/73	016	Northern Indiana & Southern Mich.	Fair
8/9/73	017	Northern Indiana, Southern Michigan, and Western Ohio	Good
8/9/73	018	Western Ohio	Good
8/9/73	019	Central Ohio	Fair
8/9/73	020	Eastern Ohio	Fair
8/9/73	021	Eastern Ohio, Western Pennsylvania, and West Virginia	Good
8/9/73	022	Eastern Ohio, Western Pennsylvania, and West Virginia	Excellent
8/9/73	023	West Virginia	Good
8/9/73	024	West Virginia, Virginia	Fair
9/15/73	307	Indiana/Kentucky	Good
9/15/73	308	Central Kentucky/Indiana	Very Good
9/15/73	309	Southwestern Ohio	Very Good
9/15/73	310	Columbus & Southeastern Ohio	Fair
9/15/73	311	Eastern Ohio/Western Pennsylvania	Fair
9/15/73	312	Western Pennsylvania	Fair

TABLE II. (Continued)

COVERAGE AND QUALITY OF SKYLAB S 190 B PHOTOGRAPHY OF OHIO

Date	Type	Frame	Area	Quality Comments
8/5/73	H.R. Color	SL3-83-151	Central Michigan & Detroit	Good
8/5/73	H.R. Color	SL3-83-152	Detroit & Ontario, Canada	Good
8/5/73	H.R. Color	SL3-83-153	Lake St. Clair & Ontario, Canada	Excellent
8/5/73	H.R. Color	SL3-83-154	Cleveland, Lake Erie, and Canada	Excellent
8/5/73	H.R. Color	SL3-83-155	Cleveland	Excellent
8/5/73	H.R. Color	SL3-83-156	Cleveland & NE Ohio	Excellent
8/5/73	H.R. Color	SL3-83-157	NE Ohio & Western Pennsylvania	Excellent
8/5/73	H.R. Color	SL3-83-158	Eastern Ohio, West Virginia, and Western Pennsylvania	Excellent
8/5/73	H.R. Color	SL3-83-159	Western Pennsylvania	Excellent
8/5/73	H.R. Color	SL3-83-160	Western Pennsylvania	Excellent
8/5/73	H.R. Color	SL3-83-161	Central Pennsylvania, Applachians Mts.	Excellent
8/5/73	H.R. Color	SL3-83-162	Central Pennsylvania West Va.	Excellent
9/15/73	IR Color	SL3-87-051	Indiana/Kentucky	Excellent
9/15/73	IR Color	SL3-87-052	Kentucky/SW Ohio	Excellent
9/15/73	IR Color	SL3-87-053	Columbus & Southern Ohio	Excellent
9/15/73	IR Color	SL3-87-054	Columbus & Southeastern Ohio	Good
9/15/73	IR Color	SL3-87-055	Eastern Ohio	Poor
9/15/73	IR Color	SL3-87-056	Eastern Ohio/Western Pa.	Poor
9/15/73	IR Color	SL3-87-057	Western Pennsylvania	Fair

TABLE II. (Continued)

SL-2 PHOTOGRAPHIC IDENTIFICATION LIST

5/25/73 to 6/22/73

70 MM HANDHELD HASSELBLAD CAMERA

SL2-5-390	Michigan, Ohio, Ontario, Lake Erie
SL2-5-391	Lake Erie, Ontario, New York, Lake Ontario
SL2-6-515	Michigan, Lake Huron, Detroit
SL2-6-516	Michigan/Ohio, Lake Erie, Toledo, Sandusky
SL2-6-517	NE Ohio, Lake Erie, Ontario, Cleveland
SL2-6-518	All of Ohio Except Cincinnati
SL2-6-519	Western Lake Erie, Pa, New York
SL2-6-520	Va., W. Va., Md, Pa., Allegheny Mt.
SL2-6-521	Ohio, Pa. Va. W.Va., Allegheny Mt.
SL2-6-522	Md, Va., D. C., Del., Pa., N. J.
SL2-6-523	Pa., N.Y., N.J., Appalachian Mts.
SL2-6-524	Pa., D. C., Md., W.Va., N. J.
SL2-6-559	Ohio, Ind., Michigan, Ontario, Lake Erie
SL2-6-569	Ohio, Pa., N. Y., Lake Erie, Valley Fog

35 MM HANDHELD NIKON CAMERA

SL2-102-902	Erie Pa., Lake Erie
SL2-103-959	New York, Lake Ontario
SL2-103-960	New York, Finger Lakes
SL2-103-992	Southern Ohio, Kentucky, Indiana
SL2-103-993	Ohio River, Kentucky, Indiana, Illinois
SL2-104-1051	Michigan,Lake Erie, Ontario
SL2-104-1052	Michigan, Lale Erie, Ontario
SL2-104-1053	Cleveland, Lake Erie
SL2-104-1054	Ashtabula, Lake Erie
SL2-104-1055	Sandusky, Lake Erie
SL2-106-1152	Sandusky, Ohio (out of focus)
SL2-106-1153	Toledo, Ohio (out of focus)

TABLE III

NASA SKYLAB AIRCRAFT UNDERFLIGHTS

MISSION 238: East Liberty to Dayton * 3 Flight Lines, good

Date	Roll	Type	Filter	Frames
6/13/73	74	Color Positive	2A (Haze)	92-179
6/15/73	59	Color IR	510	62-149
6/13-15/73	61	B&W HASS	58 (Green)	97-187
6/15/73	62	B&W HASS		97-189

MISSION 253: Cleveland 3 Flight Lines, good

Date	Roll	Type	Filter	Frames
8/5-6/73	4	Color Positive	AV	41-131
8/5-6/73	5	Color IR	510 MM	40-130
8/5-6/73	6	KA 62 B&W	57 (Green)	4-93
8/5-6/73	7	KA 62 B&W	25A (Red)	4-101
8/5-6/73	8	KA 62 B&W	89B (IR)	3-99

MISSION 247: Buckeye Lake Thru Columbus 3 Flight Lines, good

Date	Roll	Type	Filter	Frames
8/10-16/73	60	Color IR	510 MM	41-108
8/12-16/73	112	Color IR	510 MM	116-185
8/16-24/73	64	B&W HASS	58 (Green)	2-70
8/16/73	66	B&W HASS	89 (IR)	3-70
8/24-29/73	62	Color Positive	AV & 2A (Haze)	59-126
8/24/73	64	B&W HASS	25A (Red)	2-70
8/28/73	113	Color Positive	2A (Haze)	66-135
8/28-29/73	115	B&W HASS	25A (Red)	1-70
8/28-29/73	116	B&W HASS	57 (Green)	14-83
8/28-29/73	117	B&W HASS	89B (IR)	1-70

MISSION 258: Buckeye Lake Thru Columbus 3 Flight Lines, Excellent

Date	Roll	Type	Filter	Frames
1/25/74	125	Color Positive	CL AV (Haze)	1-74
1/25/74	126	Color IR	15 (Yellow)	1-76
1/25/74	127	B&W HASS	58 (Green)	1-74
1/25/74	128	B&W HASS	25-A (Red)	1-74
1/25/74	129	B&W HASS	89-B (IR)	1-74

* Incorrect acquisition - should have been Cleveland SL-2 underflight.

TABLE IV

SKYLAB DATA REQUEST FOR THE OHIO-SKYLAB PROGRAM (INVESTIGATOR NO. 433)

I. S192 SL-3 Data:

Site: Cleveland (839517)
Date: August 5, 1973
EREP Pass: 14
GMT: 73/8/5/15 2' 40" to 73/8/5/15 2' 55"
Channels: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13
Data Formats: Compatable Computer Tapes (CCT's) 9" x 9" Positive Transparancies and 9" x 9" Positive Prints

Site: Columbus (839513)
Date: August 9, 1973
EREP Pass: 17
GMT: 73/8/9/13 45' 38" to 73/8/9/13 46' 08"
Channels: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13
Data Formats: Compatable Computer Tapes (CCT's) 9" x 9" Positive Transparancies and 9" x 9" Positive Prints

II. SELECTED HANDHELD PHOTOGRAPHS

Magazine No.	Frame No.	NASA No.	Subject
	From Skylab 2: 35 MM Handheld Nikon Camera		
CI-27	6	SL2-103-958	Lakes Huron, Erie, Ontario, Detroit, Buffalo
CI-27	9	SL2-103-961	Lake Erie, Ontario, Buffalo, Finger Lakes
	From Skylab 3: 35 MM Handheld Nikon Camera		
CX-33	32	SL3-124-2723	Ohio, Scioto River
CX-31	27	SL3-128-2995	St. Clair Lake, Mich., Ontario
CX-31	28	SL3-128-2996	Lake Erie, Buffalo, Niagara Falls
CX-32	8	SL3-119-2207	Cincinnati, Ohio
CX-32	9	SL3-119-2208	Sandusky, Ohio
CX-32	20	SL3-119-2219	Canton, Ohio
CX-34	43	SL3-125-2806	Fort Wayne, Indiana, Ohio
CX-34	44	SL3-125-2807	Ann Arbor, Mich., Ohio
CX-34	45	SL3-125-2808	Ann Arbor, Mich., Ohio
CX-35	11	SL3-118-2142	Lake Erie, Ohio, Ontario
CX-35	52	SL3-118-2183	Mich., Ohio, Grand Rapids
CX-35	53	SL3-118-2184	Mich., Ohio, Ann Arbor
CX-35	54	SL3-118-2185	Mich., Ohio, Ann Arbor
CX-35	55	SL3-118-2186	Detroit, Mich., Ohio
CX-35	56	SL3-118-2187	Detroit, Mich., Ohio
CX-35	68	SL3-118-2199	Detroit, Mich., Ohio

TABLE IV. (Continued)

II. SELECTED HANDHELD PHOTOGRAPHS (Continued)

Magazine No.	Frame No.	NASA No.	Subject
	From Skylab 3: 70 MM Handheld Hasselblad Camera		
CX-10	66	SL3-114-1643	Skylab at Rendezvous- Ohio, Ky.
CX-10	96	SL3-114-1703	Michigan, Ohio, Ontario, Detroit-Windsor
CX-10	104	SL3-114-1711	Ill., Mich., Ohio, Indiana
CX-10	105	SL3-114-1712	Ill., Mich., Ohio, Indiana
CX-11	17	SL3-116-1947	Detroit, Lake Erie, Ohio
CX-11	18	SL3-116-1948	Detroit, Lakes Erie, Huron, and Ontario
CX-11	21	SL3-116-1951	Lake Erie, Ohio-Ontario,
CX-11	60	SL3-116-1990	Ill., Ky., Ohio R., St. Louis
CX-11	61	SL3-116-1991	Ohio, Indiana, and Ky.
CX-11	96	SL3-116-2026	Ontario, Ohio, Michigan, Lake Erie
CX-26	100	SL3-121-2408	Canada, Lake Erie, Ontario, Ohio
CX-26	115	SL3-121-2423	Ohio, Penn., Ontario, Lake Erie

Recommendations

None at this time. All recommendations will be included in the final report.

Expected Accomplishments

Battelle's final report for the State of Ohio funded program will be completed in April, 1974. A joint State of Ohio/Battelle Columbus follow-on Skylab data analysis proposal is being prepared and will be coordinated with NASA/LeRC personnel in April.

The Ohio ERTS/Skylab earth resources survey programs will be the subject of a paper presented at the Ninth International Symposium on Remote Sensing of Environment by State of Ohio and Battelle personnel on April 15-19, 1974 in Ann Arbor, Michigan. A summary of the paper entitled "Multidisciplinary Applications of ERTS and Skylab Data in Ohio" has been included as an attachment to this report.

Significant Results

None at this time. All results will be included in the final report.

Summary Outlook

Representative Skylab/EREP imagery for selected portions of Ohio has been received and initial analyses performed to show potential data use for State land use planning interests. More detailed and additional descipline data analyses efforts will be required to maximize the utility of this unique data base.

Attachment 1

AGENDA
OHIO ERTS/SKYLAB DATA USER WORKSHOP

Stouffers University Inn
3025 Olentangy River Road
Columbus, Ohio. 43202

March 4-5, 1974
9:00 A.M. - 3:30 P.M.

Monday, March 4, 1974

PLENARY SESSION - Moderator - Larry L. Long, Chief, Bureau of Land Use Planning, DECD

9:00 A.M. Introduction and Welcome - David C. Sweet, Director of the Ohio Department of Economic and Community Development

Skylab and ERTS Films - NASA

Coffee Break

ERTS Background and Status - NASA Representative (Fred Gordon and Dr. Herman Mark)

Skylab Background and Status - NASA Representative (James Powers)

Ohio Satellite Program Summary - Paul Pincura, ERTS/Skylab Coordinator, DECD

Battelle Program Involvement - George E. Wukelic, Battelle Columbus Laboratories

11:30 A.M. Lunch

1:00 P.M. Air and Water Applications - George B. Garrett, Ohio Environmental Protection Agency

Surface Mining Reclamation Implications and Smoke Plume Detection - Wayne Pettyjohn, Ohio State University

Natural Resource Applications with Emphasis on Strip Mining - Clemens J. Meier, Department of Natural Resources

Land Use Applications - Terry Wells, Department of Natural Resources

Coffee Break

Transportation Applications - Lloyd O. Herd, Ohio Department of Transportation

Forestry and Vegetation Applications - Dennis Anderson, Ohio Biological Survey

Applications for Agriculture - James Dowdy, Ohio State University

Orbital Survey Data Operational Implications - Richard C. Gerhan, Baldwin-Wallace College

3:15 P.M. Local User Comments - Paul Baldridge, Columbus Department of Community Development; Ray Kuchling, Mid-Ohio Regional Planning Commission; David Hinson, Soil Conservation Service

Tuesday, March 5, 1974

LABORATORY PROBLEM-SOLVING SESSIONS - Note: Laboratory equipment designed to enhance satellite imagery will be present along with corresponding data to provide workshop participants an opportunity to apply ERTS/Skylab data to their regions and discipline interests.

9:00 A.M. Discipline Applications - Water Resources, Land Use, Forestry/Agriculture, Environmental Quality, and Mapping.

10:00 A.M. Functional Applications - Planning, Policy Formulation, and Legislation *

10:45 A.M. Area Analysis - Local Regional, and State *

11:30 A.M. Lunch

1:00 P.M. Utility Evaluation Sessions - Paul Pincura, DECD; George Wukelic, BCL

Open Discussion and Comment Upon Data Utility - Workshop participants

*Sessions will be conducted in concert with DECD and Battelle personnel.

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FOR IMMEDIATE RELEASE:

COLUMBUS, MARCH 1--The potential state, regional, and local uses of the NASA Earth Resources Technology Satellite (ERTS) and Skylab data will be the topic of a workshop to be held March 4 and 5 in Columbus.

The workshop, sponsored jointly by the Ohio Department of Economic and Community Development and Battelle's Columbus Laboratories, will be held at Stouffers University Inn, Olentangy River Rd.

Major objectives of the workshop are to broaden potential user awareness of the nature and availability of the Ohio satellite data and to undertake a comprehensive evaluation of its potential statewide use.

For the past 18 months the Department of Economic and Community Development has been leading a multiagency and multidisciplinary study of possible future operational uses of experimental ERTS and Skylab data currently being acquired on Ohio in the areas of environmental quality, land-use planning and resource management. The study is funded by NASA.

Battelle, which is assisting the state in the laboratory analysis of the ERTS and Skylab photographs, will provide the necessary equipment to make workshop studies of satellite data use possible.

According to Dr. David C. Sweet, development department director and principal investigator for both NASA programs, the workshop's opening day activities will provide background information and brief statements of potential ERTS and Skylab data applications.

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On the second day workshop participants will have an opportunity to discuss potential public and private sector benefits of such satellite survey data. Also on the second day "participant suggested" problem-solving experiments will be conducted in which Ohio ERTS and Skylab photographs will be analyzed in association with existing air and water quality, surface mining, land use, transportation, agriculture, and mapping problems.

Sweet said his department expects more than 100 invited participants from the public and private sectors to attend the two-day, free session in Columbus. Agencies participating in the workshop include the Departments of Natural Resources, Transportation, Department of Economic and Community Development; Environmental Protection Agency; Ohio State University; Battelle; Ohio Biological Survey; NASA Lewis Research Center; and Baldwin Wallace College.

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STATE OF OHIO
DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT
MARCH 1, 1974
03-062

ACCOMPANYING MATERIAL

FACT SHEET

OHIO-ERTS/SKYLAB DATA USER WORKSHOP - MARCH 4-5, 1974

Since 1972, the state of Ohio has been participating in two NASA programs designed to benefit Ohio citizens by studying how satellite data can be used to inventory and manage the state's natural and cultural resources.

These on-going multiagency and multidisciplinary programs involve studies of the potential value of satellite photography of Ohio which have been automatically and repetitively (every 18 days) acquired by the first Earth Resources Technology Satellite (ERTS-1) since July, 1972, and the more precise and sophisticated photographs taken over selected portions of Ohio by astronauts during the three recent manned Skylab missions.

According to Dr. David C. Sweet, director of the Department of Economic and Community Development (Lead Agency) and principal investigator of both the ERTS and Skylab programs, participating state agencies, assisted by Battelle's Columbus Laboratories, have clearly identified and demonstrated several significant uses of such data in Ohio's environmental quality, land use planning, and resource management activities. However, Sweet said numerous other application possibilities remain unexamined.

In order to profit from the experience of individuals from organizations throughout the state which are confronted every day with environmental and resource management problems, the Department of Economic and Community Development and Battelle's Columbus Laboratories have planned a statewide ERTS/Skylab Data User Workshop at Stouffers University Inn, Columbus, Ohio on March 4-5, 1974.

Representatives from nearly every facet of Ohio environmental protection, resource management, and land use planning, including planners and officials from state agencies, regional planning organizations, and local planning and policy agencies, have been invited to participate in the two-day workshop. The objectives of the workshop are: 1) to review potential uses of Ohio satellite data established to date and 2) to test the appropriateness of the data to particular problem-solving interests and needs of the

The opening session on March 4 will treat the status of efforts to use ERTS and Skylab data in Ohio and other states and countries. Speakers include Sweet; George Wukelic of Battelle; Paul Pincura, Ohio ERTS/Skylab Coordinator; Fred Gordon of NASA's Goddard Space Flight Center; and Dr. Herman Mark of NASA Lewis Research Center. Larry Long of the development department will serve as session moderator.

In the afternoon, the following representatives of major potential user agencies will summarize their views as to satellite survey data application possibilities.

*Mr. George Garrett of the Ohio Environmental Protection Agency will discuss the air and water quality implications especially in relation to modeling and managing Lake Erie processes.

*Prof. Wayne Pettyjohn of OSU (another ERTS-1 principal investigator) will highlight his independent findings for using satellite data for strip mining reclamation activities.

*Mr. Clemens Meier and Mr. Terry Wells of the Ohio Department of Natural Resources will discuss natural resources and land use application of satellite data respectively.

*Mr. Lloyd Herd of the Ohio Department of Transportation will relate the department's interests in applying satellite data to transportation planning and mapping activities.

*Mr. Dennis Anderson of the Ohio Biological Survey and Mr. James Dowdy of OSU will discuss forestry and agricultural applications.

*Prof. Richard Gerhan of Baldwin Wallace College will address the state-level operational implications of satellite survey data.

Second day workshop activities will include informal exchanges on the value to the private and public sector of satellite data applications identified to date on problem-solving experiments in which workshop participants will have an opportunity to examine Ohio satellite data in relation to their specific discipline or geographic area of interest. Joe Stephan, Harry Smail, and Tom Ebbert of Battelle will assist participants in the operation of the specialized photographic equipment provided at the workshop for conducting the data analysis experiments.

Ohio has received more than 100 usable ERTS-1 photographs showing all areas during most seasonal variations. Higher resolution Skylab imagery is limited mostly to Cleveland, Columbus, and eastern and southeastern Ohio areas and has only recently become available.

In addition to the satellite photographs, an extensive collection of recent aerial photography acquired to support these programs is available for selected areas of Ohio to qualified user groups.

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Attachment 2

MULTIDISCIPLINARY APPLICATIONS OF ERTS AND SKYLAB DATA IN OHIO*

D. C. Sweet(1), P. G. Pincura(1),
C. J. Meier(2), G. B. Garrett(3), L. O. Herd(4),
J. M. Dowdy(5), D. M. Anderson(6)

State Government of Ohio

G. E. Wukelic, J. G. Stephan,
H. E. Smail, and T. F. Ebbert

Battelle, Columbus Laboratories
Columbus, Ohio

SUMMARY

Since July, 1972, the State Government of Ohio in conjunction with Battelle's Columbus Laboratories, and with funding assistance from NASA has been involved in a multidisciplined and multiagency study of the state-level utility of ERTS-1 and Skylab data. This study involves (1) user awareness, (2) application analyses and demonstration, and (3) utility assessment functions.

User awareness efforts have focused on interacting with the hundreds of government planners, educators, researchers, and decision makers that represent potential users of satellite earth resources survey data. Active participation by way of Laboratory visitations was extensively encouraged and was highly successful in that it provided a mechanism for linking current problems and programs with recently acquired satellite data. Passive, but less effective, techniques included preparation of "Ohio-ERTS Data Users Handbook", formal presentations at potential user agencies, and press releases for promoting general ERTS/Skylab data awareness throughout the public sector, including industry.

Application analyses and demonstration efforts have accounted for the majority of efforts expended to date and involve correlative satellite, aircraft, and on-site data analysis using manual and machine-assisted techniques. Positive results have been achieved and documented in the disciplines of environmental quality, land-use planning, and resource management.

Although major smoke plumes are discernible and are being looked at for state air quality modeling implications, most promising environmental quality data use candidates relate to land quality (surface mining inventorying and monitoring) and water quality (Lake Erie modeling) applications.

For land use, available satellite data are more than adequate for seasonally mapping and inventorying major natural and cultural surface features at scales of 1:24,000 and smaller and at less cost and with better accuracies than with previous techniques. Efforts to date have demonstrated the types of ERTS and Skylab data analysis techniques and products that can be performed operationally for solving land-use problems, for general land-use planning, and for meeting the longer range requirements of the pending National Land Use Policy Act.

An example of satellite data use in inventorying resources was the generation of a thematic transparency of mature forested areas in southeast Ohio in excess of 25 acres. The transparency clearly illustrates the significant changes that have occurred in Ohio's forestry resources since 1968 (when compared to 1:250,000 topographic map). For selected study-site areas, the transparency is over 95 percent accurate, and although the accuracy has not as yet been determined in extrapolated regions, it appears comparable to the USGS 1:24,000 maps and more accurate than the 1:250,000, especially for urbanized areas.

* Summary of this paper to be presented at Ninth International Symposium on Remote Sensing of Environment, Ann Arbor, Michigan, April 15-19, 1974.

Other possible data uses, such as lake ice monitoring, transportation planning, floodplain monitoring, and educational and communications implications are under study.

Utility assessment efforts range from individual state agency personnel judgements resulting from in-the-laboratory evaluation of problem-solving usefulness of available satellite data to group opinions formulated at a recently held 2-day statewide "Ohio ERTS/Skylab Data User Workshop". The latter was successful in its purpose of broadening user group participation in assessing the value of all potential application candidates.

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(1) Department of Economic and Community Development.
(2) Department of Natural Resources.
(3) Ohio Environmental Protection Agency.
(4) Department of Transportation.
(5) The Ohio State University.
(6) Ohio Biological Survey.