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CR-135890

**URBAN AND REGIONAL LAND USE ANALYSIS:
CARETS AND CENSUS CITIES EXPERIMENT PACKAGE**

MONTHLY PROGRESS REPORT

SKYLAB/EREP INVESTIGATION NO. 469

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August 23, 1973

(E74-10049) URBAN AND REGIONAL LAND USE	N74-11170
ANALYSIS: CARETS AND CENSUS CITIES	}
EXPERIMENT PACKAGE Monthly Progress	
Report. (Geological Survey) 8 p HC	
\$3.00	Unclas
	00049
	CSSL 08B G3/13

**Prepared for:
Lyndon B. Johnson Space Center
Houston, Texas 77058**

Publication authorized by the Director, U.S. Geological Survey

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Monthly Progress Report: August 22, 1973
Investigation No. 469

a. Overall status, including problem areas and significant progress to date.

Skylab/EREP Investigation No. 469 is a program or team investigation conducted by staff members of the Geographic Applications Program, U.S. Geological Survey. That Program is currently developing and testing land use classification and analysis procedures for a proposed new nationwide land use information service, to provide timely data on land use and land use change as required by newly emerging cooperative arrangements between the Federal government and state and regional land use planning agencies. Remote sensing is expected to provide a major share of the required data input for the new land use information service. A proposed land use classification system is being tested in various regions and environmental situations for its utility as an overall vehicle for describing and encoding data from remote sensors (USGS Circular 671, "A Land Use Classification System for Use With Remote-Sensor Data", 1972).

The Skylab EREP is being examined, in this investigation, as a potential source of data for monitoring land use and its environmental impact. The investigation is being coordinated closely with ERTS investigations covering the same test sites, and both will benefit from high-altitude aircraft data provided by the NASA Earth Resources Aircraft Program.

Investigation 469 consists of two major components, the Central Atlantic Regional Ecological Test Site (CARETS) and the Census Cities projects. Each of the major components is further broken down into sub-projects, as follows:

- Project 1: CARETS
- Subprojects: a. Land use analysis
b. User services
c. Land use climatology

Project 2: Census Cities

Subprojects: (in desired priority order)

- a. San Francisco
- b. Washington
- c. Phoenix
- d. Tucson
- e. Boston
- f. New Haven
- g. Cedar Rapids
- h. Pontiac

The prior month (July-August) was spent in the preparation and collecting of ground truthing data for SL-3. Two passes were originally scheduled, however, due to a crew day off on August 10th only the pass on August 5th provided mission data for investigation site 676. With orbital changes back to the original planned path, our work efforts returned to the city of Baltimore. A large reservoir was chosen north of the city to monitor:

- 1) solar (global) radiation
- 2) albedo of the water
- 3) air temperature
- 4) water (surface-1 cm) temperature, and
- 5) infra-red (10 μ) radiant water temperature.

Data for these parameters were collected at 15 minute intervals starting at 10:30 EDT and continued to 14:00 EDT. This data take was performed for Track 61 - rev. 1197, August 5, 1973. The data collection was successful. Enclosed is a copy of the data.

Two problems arose to cause some investigator confusion. There appears to be an error in the track labeling of NASA Skylab Mission Chart (SMC) for SL-3. Track 62 is the labeled track over Baltimore, M.D., however, Track 61 is the nominal track for test site 676. In addition, no information was available as late as August 4, 1973, 16:00 EDT on the exact track path coordinates for the August 5th data pass.

The following sentences are added to clarify the report that was submitted July 17, 1973. The complications of Skylab II, especially the 1° longitude shift from the original orbit caused a reevaluation of test and calibration site. Instead of Baltimore, the southern section of the Washington metropolitan area was designated as the new test site. Calibration targets in this new area were difficult to locate and finally a water body along the southern edge of the orbital path scan was chosen. Burke Lake in Springfield, Va. just met minimal areal size requirements. One data pass (Track 61-orbit 416/17) was accomplished for this test site - on June 12, at 9:00 AM EDT. The ground truthing team was in the field at 8:00 AM EDT and monitored the needed climatic parameters at 15 minute intervals until 10:45 EDT. Enclosed is a copy of the monitored data, also.

The CARETS project of the Geographic Applications Program received its first Skylab data on August 8 and 9, 1973. Data received was from the S-190 experiment and included in the package of 70 mm film were duplicate copies of magazines 14, 15, 16, 17, 18 and a single copy of magazine 13. Also included were, what appeared to be, reprocessed photos of magazines 15 and 16 (CIR and Color). These reprocessed photos are much superior to the untouched transparencies which were quite faded and far less useful.

Of the nine frame strips only five frames on each strip are sufficiently cloud free to provide useable data. The cloud free region extends from northwest of Washington and north of the Chesapeake Bridge south-east of Cape Charles except for a band of clouds in Accomac and King and Queen Counties.

b. Recommendations concerning decision and/or actions required to ensure the attainment of the experiment's scientific objectives.

We have performed a cursory investigation of the S-192 screening data for 3 bands (2,7,11). The quality of the data looks very good. Band 2 does have some haze, which appears to be due to atmospheric effects rather than in the data processing.

It would be very helpful (almost essential) if we could screen band 13 of S-192 as soon as possible. The screening of band 13 would be preferred for all the Skylab missions.

c. Expected accomplishments during the next report periods.

Most of the effort for the next reporting period, will be spent in ground truthing for the tentatively scheduled passes on September 2, 7, 12, 1973. Some effort will be channeled into the analysis of thermal imagery of the city of Baltimore that was flown under NASA aircraft mission 55m through the Environmental Research Institute of Michigan.

d. Significant results and their relationship to practical applications or operational problems. - N/A

e. Summary outlook for the remaining effort to be performed.

With the first look of the S-192 data, we are encouraged concerning the feasibility of using these kinds of data for land use climatology in metropolitan areas; therefore, we are optimistic and hopeful that data from the other missions will be of similar quality. If so, we feel that we can satisfactorily achieve the goals of this investigation.

f. Travel summary and plans.

Travel during the past month included trips to field sites in and around Baltimore in preparation and for the collections of data concerning the SL-3 pass on August 5, 1973. Next expected travel is for similar measurements for SL-3 passes in September, 1973. Also, John Lewis will travel to Ann Arbor, Michigan to consult with Professor Sam I. Outcalt during the 3rd week in September concerning the analysis of the Baltimore thermal imagery (55m).

AT 10:45 RATIO OF GLOBAL TO DIFFUSE RADIATION = 33%

Burke Lake
Fairfax, Virginia

Skylab Ground
Test Data

June 12, 1973

Solar Rad. ly/min	Albedo ly/min	Air Temperature °F	Ir-Water °C	Time EDT
.45	.2 22%	80	28.7	8:15
.51	.2	81	28.7	8:30
.59	.2	81	28.7	8:45
.64	.2	82	29	9:00
.71	.2	83	29	9:15
.75	.2	86	29	9:30
.82	.2	85	29	9:45
.82	.2	86	29	10:00
.90	.2	85	29	10:15
.95	.3 (?)	86	29.5	10:30
1.1	.2 7%	85	29	10:45

Time EDT	SR Solar Radia- tion ly/min	Water Temp. °F	Air Temp. °F	Water Surface Radiant Temp. °C	August 5 1973
10:30	1.07	78°F	91	26.0	
10:45	1.17	80°F	91	26.0	
11:00	1.19	81°F	92	26.0	
11:15	1.23	82°F	91	26.5	
11:30	1.26	82°F	95 (?)	26.0	
11:45	1.29	80°F	92	27.0	
12:00	1.33	78°F	90	27.0	
12:15	1.29	79°F	90	27.0	
12:30	1.29	80°F	91	27.0	
12:45	1.29	83°F	93	27.0	
13:00	1.29	81°F	93	28.0	
13:15	1:33	81°F	92	28.0	
13:30	1:31	82°F	94	28.0	
13:45	1.29	84°F	95	27.0	
14:00	1.26	82°F		27.0	

Cloud cover at 11:00 EDT = .10%-15% Cumulus Humilus

Time	Diffuse Rad. ly/min	Albedo of Water ly/min
11:30	(.22)	(.10)
12:30	(.24)	(.14)
1:30	(.22)	(.12)