E74-10099
CR-136090

Type 1 Progress Report
for Period Ending October 15, 1973

A. A study to explore the use of remote sensing to determine native arid plant distribution, MMC #250

B. GSFC #UN613

C. Problems: None

Accomplishments during the reporting period:

1. Analysis of linear density data

The linear density transparencies were received and were analyzed on a Macbeth TD504 densitometer (courtesy of Joel Gray). Although the imagery has much greater contrast at the light end of the density scale than the usual ERTS transparencies, the radiance levels of each step in the gray scale did not vary linearly with density as reported in ERTS investigators Bulletin, Vol. A, No. 15. Instead, for linear density transparencies, the linear portion of the density vs. radiance curve was shifted toward the light end of the scale, resulting in better definition of light toned areas.

2. Ground truth reflectivity measurements of calibration areas

Ground truth reflectivity measurements of our calibration areas were obtained June 25, 1973 with the help of Dana M. Slaymaker (MMC #327, Desert Plant Species Identification by Spectral Signatures: C. H. Lowe, Principal Investigator). These measurements, along with radiance measurements that will be obtained from enlarged linear density ERTS imagery, will allow us to calculate a factor to convert June 25 ERTS radiance measurements to reflectivity values. This method is explained in our Type II Progress Report of February 16, 1973.

E. Accomplishments planned for the next reporting period:

1. Analysis of calibration point data

The portions of June 25, 1973 linear density ERTS transparencies, including calibration areas, will be enlarged so that radiance measurements obtained from the ERTS data using a Macbeth TD504 densitometer can be used to calculate the radiance value-reflectivity value conversion factor.

2. Developments of technology and hardware for airborne radiometric data collection

In the past, our research on radiometric interpretation of ERTS data has been limited to the ground. We have measured reflectance values for the various components of a desert scene, i.e., desert plants, soils, and litter. This information is useful for determining phenological variations of individual plants and for determining what radiometric effects individual components have on the whole scene.

Since we wish to investigate the total integrated radiometric properties of our test sites in relation to ERTS, we are in the midst of developing the technology and hardware to collect radiometric data from a low altitude aircraft flying at an altitude of 500-1000 feet. From this height, it is possible to integrate directly the effects of plants, shadows, litter, and soil on the radiometric character of a scene.

The procedure was developed by Co-Investigator L.K. Lepley and is being actualized through the efforts of Evan Rosen, a member of the investigation team. Additional ideas were contributed by A.N. Williamson of the Environmental Characterization Branch, Army Corps of Engineers.

By the method developed, the terrain below the aircraft is photographed with a videotape recorder which looks down the spotting scope of an Exotech ERTS radiometer. Simultaneously, the data from the four channels of the radiometer plus spoken comments and coded by frequency modulation and entered on the sound track of the videotape. In this way, a permanent, continuous record of ground truth data can be recorded. The system, when complete, will probably be adaptable to most radiometer video recorder combinations.

E. Significant Results: none

F. Papers, etc.: none

G. Recommendations: none

H. Changes in Standing Order Forms: none

I. ERTS Image Descriptor Forms: none

J. Data Request Forms: none

K. Other Information: none