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Date: November 9, 1973

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Re: Progress Report (Type I)

The following progress report summarizes work accomplished for the 2-month period ending October 31, 1973 with reference to Article II, Item 3 of the contract schedule outlined in #NAS5-21839.

a. Remote Sensing in Iowa Agriculture (MMC #249).

b. GSFC Identification Number of the Principal Investigator (UN-611).

c. Any problems that are impeding the progress of the investigation:
No major problems are impeding the progress of this investigation at this time, except that ERTS-1 coverage at one test site has been limited to one time during June. This limited coverage has been due to cloud cover.

d. Accomplishments during this reporting period and those planned for the next reporting period:

i) Cropland inventory

1) Successful ERTS-1 imagery has been received covering 2 test sites in Iowa at critical crop calendar times during the 1973 crop growing season. Spectral responses of known fields are being examined to establish a crop calendar which will be analyzed to provide maximum separation of Iowa's major crop types. Analysis procedures include examination of black and white enlargements, color infrared renditions and miniadcol produced color products which are both multi-date and multi-spectral.

(E74-10020) REMOTE SENSING IN IOWA
AGRICULTURE Progress Report, period
ending 31 Oct. 1973 (Iowa State Univ. of
Science and Technology) 3 p HC \$3.00

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- 2) NASA provided underflights have been received. This is excellent imagery. Acreage estimates will be determined from this imagery and will be correlated with the ERTS-1 imagery.
- 3) Skylab imagery covered two test sites during June of 1973. This imagery has been ordered and will be correlated with both the ERTS-1 imagery and the NASA provided underflights.
- 4) Additional underflight imagery has been acquired over other test sites through another project. This imagery will serve as additional ground truth.

ii) Soils inventory

- 1) Soil association maps are being overlaid on to spring time ERTS-1 black and white enlargements of MSS7 covering central Iowa and are being visually correlated with the soil association maps. Initial analysis shows a good correlation. Additional areas will be examined using the black and white enlargements and, also, miniadcol produced color products which integrate the spectral response of other wavelengths besides MSS7.
- 2) More specific soil mapping research continues using the NASA provided spring time underflight imagery. Other photographic products, besides normal black and white, are being examined.

iii) Forestland inventory

- 1) Inventory estimates of forestland cover in the Des Moines River drainage basin have been reported in previous reports. These estimates were based on the spectral response of one wavelength at one time. Presently, we are investigating the use of multi-date and multi-spectral color additive products to more precisely define the forest land and take advantage of multi-spectral response differences.
- 2) Analysis of the underflight imagery provided by NASA and other sources are being examined to determine times and imagery types which best discriminate forestry and habitat types from low level platforms.

iv) Crop diseases

- 1) Crop diseases have not been widespread during 1973. Therefore, analysis of ERTS-1 imagery for this purpose has not been most promising. Some diseases caused visual changes coinciding with normal senescence. Additional low level imagery has been acquired over test plots in order to determine the ability to detect specific crop diseases from low-level platforms.

v) General

- 1) ERTS-1 imagery has been acquired which covers the entire state of Iowa during May and June of 1973. A mosaic is being constructed from this imagery using MSS7. This mosaic will be used for general land-use inventories of the natural resources of Iowa.

- 2) In central Iowa the surface coverage of a major reservoir (Red Rock Reservoir) has been monitored using multi-date ERTS-1 imagery. From September of 1972 to May of 1973 a dramatic increase in the surface coverage was noted.
- 3) Researchers in the above sub-projects have indicated that direct analysis of digital tapes containing ERTS-1 imagery would be useful in attaining their research objectives. Therefore, ERTS-1 digital tapes are being requested for different dates covering central Iowa.

e. Discussion of significant results and their relationship to practical applications or operational problems: Significant results during this reporting period include the estimation of forested and crop vegetation acreages using the ERTS-1 imagery. The methods used to achieve these estimates still require refinement, but the results appear promising. Practical applications would be directed toward achieving current land use inventories of these natural resources. This data is presently collected by sampling type surveys. If ERTS-1 can observe this and area estimates can be determined accurately, then a step forward has been achieved. Cost-benefit relationship will have to be favorable. Problems still exist in these estimation techniques due to the diversity of the scene observed in the ERTS-1 imagery covering other parts of Iowa. This is due to the influence of topography and soils upon the adaptability of the vegetation to specific areas of the state. The state mosaic produced from ERTS-1 imagery shows these patterns very well. Research directed to acreage estimates will continue.

f. There are no published articles, and/or papers, pre-prints, etc. at this time.

g. We have requested digital tapes at two selected times covering central Iowa. Other than this change, no recommendations concerning practical changes in operations are suggested at this time.

h. No additions to the standing order are requested at this time.

j. Data request forms have been submitted to obtain 1 set of ERTS-1 covering the entire state of Iowa. Digital tapes have been requested for two different scenes covering central Iowa. In addition, 2 sets of winter time ERTS-1 imagery have been requested for the soils and forestry research.