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An Interdisciplinary Analysis of MULTISPECTRAL
SATELLITE Data for Selected Cover Types in
the Colorado Mountains, Using Automatic Data
Processing Techniques.

EREP S398

For: October 1973

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Monthly Progress Report

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E74-10195) AN INTERDISCIPLINARY ANALYSIS
OF MULTISPECTRAL SATELLITE DATA FOR
SELECTED COVER TYPES IN THE COLORADO
MOUNTAINS, USING AUTOMATIC DATA PROCESSING
(Purdue Univ.)

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MONTHLY PROGRESS REPORT
For October 1973

A. Overall Status and Progress to Date

A.1 Ecological Inventory

Receipt of additional rolls of NASA Mission 248 enabled the vegetation mapping for areas surrounding the SL-2 and SL-3 data sites to be completed. There still remains some sectors in these areas that cannot be mapped.

SL-3 Site

The area mapped is mainly in the Weminuche Pass quadrangle directly south of the Finger Mesa quadrangle. Aircraft coverage of the site was included on NASA Mission 247, flown August 4, 1973. Overall coverage on both CIR and color positive imagery was excellent although cloud cover made photointerpretation of some portions of the quadrangle difficult and sometimes impossible.

The Weminuche Pass quad test area mapped for this reporting period has proved exceptional in displaying: 1) broad, homogeneous vegetative cover types, 2) ten observed riparian, forest-tundra communities, well differentiated and mapped into discrete categories, and 3) a lack of species mixing. These qualities combined to produce an "ideal" data base well suited for comparison with the ERTS-1 analog map.

Work to be carried out during the next reporting period will include data base mapping of Finger Mesa quad and Lemon Dam quad.

The development of the methodology for producing maps of potential permafrost occurrence has been completed. The portions of the San Juan Mountains covered by SL-2 and SL-3 data have been delimited. From these areas have been selected for which potential permafrost occurrence maps are being produced. One restriction on a complete map of the entire area included on SL-2 and SL-3 data is the lack of complete aircraft coverage in late summer. This is needed to locate areas of snow accumulation which have an insulating effect. These snow accumulation areas must be eliminated from the preliminary designated locations of potential permafrost occurrence.

A.2 Geological and Geomorphological Analysis

Lineament mapping (see Fig. 1) has been completed for the Colorado Mineral Belt, located in southwestern Colorado, for data collected during SL-1/SL-2. A northeast trending lineament zone coinciding with this mineral belt has been detected by using stereographic photointerpretation methods of S-190A imagery (GT34/REV318, EREP pass 5, GMT 6/5/73 1759:05, frames 16, 17 and 18). Detailed analysis of this test site cannot be completed until snow-free data from SL-1/SL-3 is received.

Tweto and Sims (1963) indicated that the mineral belt follows an ancient pre-cambrian zone of weakness and many of these lineaments probably reflect this zone.

A.3 Hydrological Features Survey

One of the limitations of the present ERTS-1 scanner system is the lack of spectral separability between clouds and snow which have both caused scanner saturation (see Type II Report, January 1 - June 30, 1973 for Contract NAS5-21880). This has caused restrictions in the accurate mapping of snow cover.

Preliminary analysis of S-192 data, i.e., visual interpretation (see Fig. 2) of the screening imagery, indicates that this separability may be achieved by using a detector in the 1.55-1.75 μ m wavelength band. A detailed analysis will be made when the S-192 data tapes are received.

B. Recommendations

Receipt of data tapes from the S-192 MSS is mandatory for the successful completion of this contract. To date we have not received data tapes from either SL-1/SL-2 or SL-1/SL-3 and assume neither have been processed. Since data from SL-1/SL-3 might have minimal snow cover in some areas and therefore be more suitable for initial geologic and vegetation analysis purposes than SL-1/SL-2 data, we would recommend that screening imagery of SL-1/SL-3 data be sent immediately for our review.

We will also recommend that a decision be made by NASA as to whether or not the original photography can be densitometered for comparison with S-192 data. This decision must be made so that we can properly modify our Milestone Plan, which is currently based on the assumption that original photography would be digitized. Since serious questions have been raised in the past few months concerning

the validity of results involving comparisons between duplicate photographic imagery and multispectral scanner data there is a question as to the analysis sequence to be pursued if the original photography cannot be digitized.

C. Expected Accomplishments

A detailed photointerpretation analysis of the S-190A and S-190B photography will be completed in the next thirty (30) days.

Vegetation maps for Finger Mesa and Lemon Reservoir quadrangles will be completed by INSTAAR as well as potential permafrost occurrence maps.

D. Significant Results

There are no author identified significant results in this report.

E. Summary Outlook

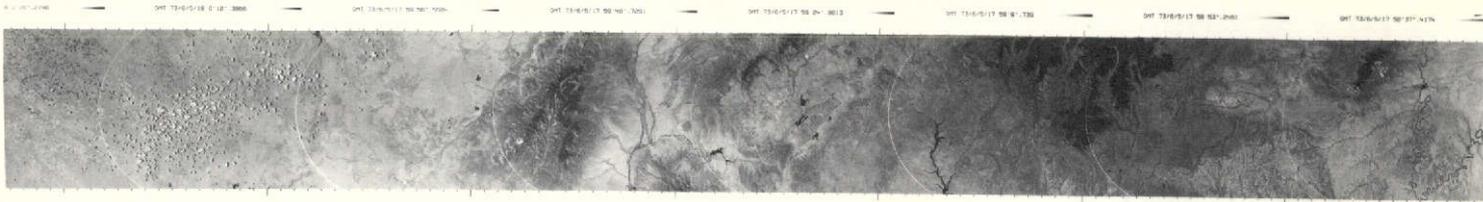
During the next 30 days the contract will be reviewed in order to ascertain what objectives can still be completed with the remaining time and funding. The contract has passed the half-way mark (seven months), and no S-192 data has been received (originally expected in early August) nor has any photographic data from SL-3 or NC-130 MSS data from SL-3 been received. Initial analysis goals and timetables for this contract will have to be revised. However, a new Milestone Plan cannot be developed until dates for availability of the various data sets have been established.

F. Travel Summary

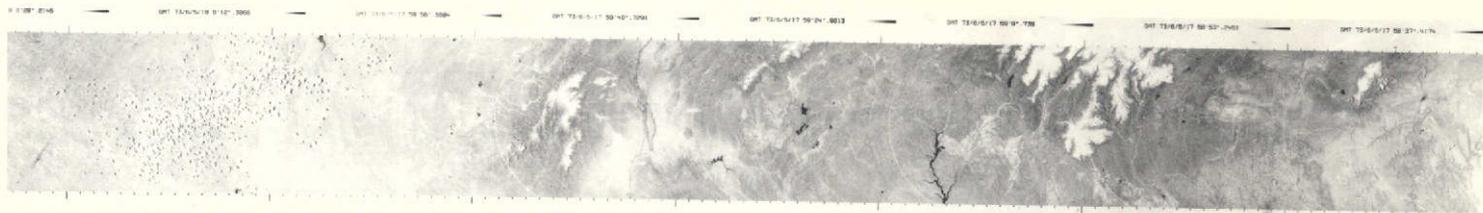
There were no contract travel funds used during this reporting period.



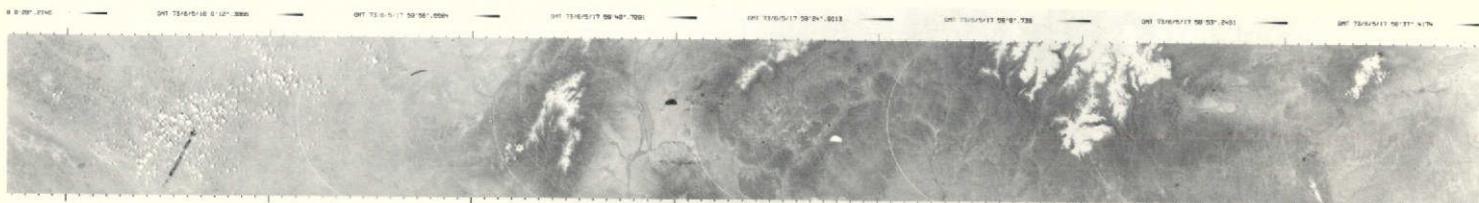
Figure 1



Screening Imagery from S-192 Channel 11, 1.55-1.75 μ m, Indicating Spectral Separation Between Clouds and Snow



Screening Imagery from S-192 Channel 7, 0.78-0.88 μ m, Indicating No Spectral Separation Between Clouds and Snow



Screening Imagery from S-192 Channel 2, 0.46-0.51 μ m, Indicating No Spectral Separation Between Clouds and Snow

Figure 2