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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

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(E75-10072) AN INTERDISCIPLINARY ANALYSIS OF MULTISPECTRAL SATELLITE DATA FOR SELECTED COVER TYPES IN THE COLORADO MOUNTAINS, USING AUTOMATIC DATA PROCESSING (Purdue Univ.) 4 p HC \$3.25	CACL 05B	G3/43	N75-14191 Unclas 00072
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MONTHLY PROGRESS REPORT  
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A. Overall Status and Progress to Date

Ecological Inventory

A set of test fields to be used in evaluating all computer classifications of the Granite Peaks study site has been generated. Each test field selected, as defined in the October monthly report, has been identified using the INSTAAR derived type maps and the color infrared aerial photography. A total of 638 test fields were selected within the test site, this yields a 5.1% sample (11,717 acres) of the 229,372 acre test site.

Geological Assessment

A base map at a scale of 1:250,000 is being prepared with overlays showing: drainage; major linear features, published vs ERTS & SKYLAB; tectonic features, published vs ERTS & SKYLAB, and published lithology.

The photointerpretation mapping from the S-190B photography has been discontinued. The scale on the 4 1/2 x 4 1/2 inch makes accurate mapping difficult. 1:250,000 enlargements of the necessary frames have been ordered. This should allow direct transfer from the photograph to the base map.

Hydrological Features Survey

During the past month we have been working with the SL-2 S192 data collected over the Granite Peaks test site. The first step was to assess the quality of the data. This showed that most of the channels were good, except channels 1, 2 and 4.

Channel 1 (.41-0.46  $\mu\text{m}$ ) is useless because of excessive atmospheric scattering. Channels 2 (0.46-0.51  $\mu\text{m}$ ) and 4 (0.56-0.61  $\mu\text{m}$ ) show detector saturation even for the vegetation and water spectral responses. These cover types have relatively low reflectances in these portions of the spectrum.

The second step in the analysis of the S192 MSS data consisted in defining the maximum number of spectrally separable classes of snow present in the scene (Granite Peaks site). Through a clustering algorithm five classes of snow were defined and their statistics were completed and subsequently used as training classes.

Because of detector saturation in several channels (mean = 255 and variance = 0) the LARSYS standard classifier (\*CLASSIFYPOINTS) could not be used to classify the snow with the optimum set of channels. Therefore, a layered classification sequence was utilized and the results obtained showed that the areal distribution of the five different classes of snow corresponded to different topographic altitudes. These classes of snow were also found to closely correlate with the different proportions of snow and forest seen by the instantaneous field of view of the scanner. Furthermore, and worthy of notice, is the fact that these five different classes of snow showed a different thermal response in channel 13 (10.2-12.5  $\mu$ m). The snow at higher elevations was relatively cooler than the snow classes at lower elevations.

At the present time an attempt is being made to calibrate the thermal data to obtain absolute temperature measurements of the different snow classes.

#### B. Recommendations

The contract is now five months away from completion. If any analysis is to be accomplished on the SL-3 data it should be sent as soon as possible. Otherwise the contract will terminate before preprocessing and analysis can be attempted.

In order to determine the accuracy of the thermal band of the SL-2 S192 experiment, it would be helpful to have the MSS data from Mission 238 (NC-130 and 24 channel scanner) collected on June 6, 1973.

#### C. Expected Accomplishments

The preparation of the base map with overlays of published and ERTS features should be completed in January. The SKYLAB features will be added as they are mapped from the photography after its receipt.

Once the SL-2 S192 MSS data and the digital topographic map have been overlaid on the ERTS-1 MSS data, and once these data sets have been geometrically corrected, a more quantitative analysis of the relation between classes of snow and elevation will be carried on.

#### D. Significant Results

The utility of the middle infrared portion of the spectrum for snow cover mapping has been demonstrated. Also, the S192 thermal band seems to have a higher thermal detectivity than previously estimated and predicted.

E. Summary Outlook

Analysis of SL2 S192 will be started if the data has been overlayed with the topographic data on January 13, 1975.

A comparison of the Exotech spectra taken from the Silverton area rock samples will begin in January.

F. Travel

No travel funds were spent during this reporting period.