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STUDY TO DEVELOP IMPROVED SPACECRAFT SNOW
SURVEY METHODS USING SKYLAB/EREP DATA

(EREP Investigation No. 420)

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Sixth Quarterly Progress Report
Covering the Period 15 June 1974 to 15 September 1974

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Prepared for:

Principal Investigations Management Office
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas 77958

Technical Monitor: Larry B. York Code TF6

Purpose of Investigation

The purpose of this investigation is to compare and evaluate Skylab data for mapping of snow cover. Visual interpretation of the S190 photographs will be performed to map areas that are snow-covered. The S192 imagery and digital printouts, S193 data, and S194 data will then be compared to the S190 photographs to determine how much additional information on areal extent of snow can be obtained from various spectral bands, thermal data, and microwave data. Snow-depth and area measurements taken routinely by various Government agencies in the Sierra Nevada, Cascades, and Great Plains shall provide ground truth. The relatively high-resolution EREP data will be compared with television and radiometric measurements from other satellites, and available aircraft imagery, to determine the optimum feature system for mapping the areal extent of snow. The results of this investigation will enable a more accurate assessment of the extent of snow cover in the United States and aid in prediction of runoff and better management of the country's water resources.

Accomplishments During Reporting Period

In July, James C. Barnes, Principal Investigator, and James H. Willand, Chief of Data Processing Systems at ERT, attended the EREP Data Meeting held at Johnson Space Center. At that time a meeting was held with the Technical Monitor to discuss the progress of the study to date and the schedule for completion based on the revised JSC data processing schedule.

In connection with the information provided at the EREP Data Meeting and the letter of 2 August from the Contracting Officer, a proposal for contract extension was submitted to the Technical Support Procurement Branch on 14 August. The proposal reflects the additional costs incurred to maintain the contract for the five-month extension in time specified in the letter (to 31 May 1975), and includes costs for additional processing and analysis of computer tapes. A substantial amount of effort and computer time has been lost in the processing of the earlier computer tapes, which subsequently were found to contain incorrect data. Moreover, the results

of the analysis of a limited sample of S-192 screening film are particularly promising (see interim report, ERT Doc. P-412-7, June, 1974). It is essential, therefore, that the corrected S-192 tapes for a number of cases be processed under the contract extension.

During this reporting period, S190A and S190B data from the SL-4 mission were received. The data are for Test Sites 318208, 318592, and 318107. The specific EREP passes and dates for which data were collected on the SL-4 mission for this investigation are given in a previous progress report (ERT Report P-412-6, May 1974). Two reprocessed S194 tapes from the SL-2 mission and S194 data books from the SL-2 and SL-4 missions were also received.

On 30 July, an additional request was submitted for S192 data for the SL-4 EREP pass over Test Site 318107. These data had not been requested earlier because we had been able to review only the S192 screening film at that time. Based on the review of the limited number of spectral bands (and relatively poor quality of the film), it appeared that this particular segment did not contain useful data.

Now, however, we have had a chance to see the corresponding S190A and S190B photographs (not received until July). These photographs show good snow cover and some clouds between Walker and Mono Lakes; the S192 data, therefore, should be extremely useful for investigating further the differences in reflectance between snow and clouds.

Travel Summary

The Principal Investigator and Mr. James H. Willand, Chief of Data Processing Systems at ERT, attended the EREP Data Meeting at JSC in July (see above).

Plans for the Next Reporting Period

Analysis of the S190A and S190B products from the SL-4 mission will be undertaken during the next reporting period, using the techniques described in the interim report. It will then be possible to compare the wintertime snow pattern with the patterns from the late spring of the previous year during the SL-2 mission.

Analysis of the S192 final film products will be carried out when these data are received. The snow extent visible in the various spectral bands will be carefully mapped to determine more precisely the magnitude of the band-to-band variations. It is anticipated that the SL-4 film will be useful for comparing the reflectance variations during winter with those observed in the film from the SL-2 mission; such a comparison might provide an indication of the effects of different snow conditions on the observed reflectance, since the winter snow would presumably be cold and dry; whereas the late spring snow would be in a melting condition.

Processing of the S194 taped data already received at ERT will be undertaken during the next reporting period. Processing of the other taped data products that have been requested will also be undertaken when the data are received.

Summary Outlook

We believe that the data collected during the latter part of the SL-4 mission, together with that from the earlier SL-2 mission, will form a total sample sufficient to enable the objectives of the study to be met successfully. It is essential, however, that all data products that have been requested be provided by JSC, and that the funds that have been requested in the contract extension proposal be provided, so that a meaningful data sample can be processed and analyzed.

Financial Report

In accordance with Appendix A of the Work Statement of the subject contract, the Financial Management Report is being submitted as a separate document.

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Discussion of Significant Results

No significant results were found during this reporting period.