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GEOLOGIC AND MINERAL AND WATER RESOURCES INVESTIGATIONS

IN WESTERN COLORADO, USING SKYLAB EREP DATA

Monthly Progress Report

December 1973

EREP Investigation 380

Contract NAS-13394

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## INTRODUCTION

The primary objective of the CSM Skylab Program is to analyze EREP data for geologic information. To this end, the research has been subdivided into the following tasks;

- Task I. The PI shall assist NASA/MSC in mission planning activities related to the proposed investigation.
- Task II. The investigator will screen all EREP data obtained over Colorado and will select frames for detailed study.
- Task III. The investigator will prepare photogeologic maps using selected S-190 photographs, and will analyze them to determine what geologic information may be contained in them.
- Task IV. The geological interpretations obtained in Task 3 will be compared to interpretations obtained from S-192 imagery, and to interpretations made from ERTS-I imagery.
- Task V. The geological interpretations will be verified by means of interpretation of aerial photographs, published geological reports, and field observations.
- Task VI. The investigator will prepare recommendations for the optimum type, scale, and resolution of imagery to be used for studies of regional geology and exploration for mineral deposits and water resources.

## PROGRESS

### Overall Status

With this report, Milestones 1 through 9 have been achieved. The project is behind schedule because of late delivery of data.

### Past Month's Activities

Work continued on the compilation of the Bonanza Test Site geologic map. The compilation is now essentially complete, with only minor additions necessary on a continuing basis, as source maps become available. Some editing will no doubt be necessary. Drafting of the map, at least on a work-map basis, was started during late December, and is continuing into January. Time expenditure on this map compilation has been significant; more than anticipated.

Fracture analysis programs were made operational. Fracture data sets from the Southern Front Range are on computer cards and are being reformatted for input into the analysis program.

During the month of December we received S192 screening film from SL2, T.34, and SL3, T.30. These will be enlarged for analysis.

The evaluation of the Colorado Mineral Belt by remote sensors was continued, and experiments were conducted comparing the different bands to determine which is best for viewing, and which contains unique information not on other bands. By viewing an equivalent area on each of six S190A positive transparencies, it was determined that the order of viewing, from best to worst, is color infrared, color, red (>600 nm), green (490-600 nm), and photo-infrared (700-830 nm and >790 nm). To test whether there was any subjective inconsistency, two

overlays of the red band were made one month apart. These were then compared, and only 24% of the linears were the same, suggesting that the subjective bias introduced by one worker's interpretation is significant.

One frame of S190A photography, taken 11 June 1973, was enlarged to 18 x 18 inch and 27 x 27 inch positive prints (8X and 12X enlargements). Preliminary evaluation indicates one can see tonal details without the aid of instruments that one could only see at 12X magnification using the original frame and a zoom stereoscope. A drawback is that the view of the blowups is not in stereo, and so it loses topographic relief, making it harder to see topography - related structures (eg. volcanic domes).

#### Planned Activities for Current Month

We are still awaiting the LSAP underflight of Skylab 4.

Plans for January are to finish the compilation map drafting linework, and much of the labeling and legend; the latter may extend into February. A map should be available by early February, but with a few blank areas that will have to be added as source maps become available.

Because of the large volume of fracture data, effort in the next reporting period will be devoted to computer analysis. Evaluation of EREP data and comparison with geologic data will continue.

Positive-negative masking (sharp masks) of selected S190A frames will be attempted to determine whether (a) in-register masks are capable of separating spectral differences and (b) non-registered masks enhance photo-lineaments.

#### Travel

There was no travel during December.

No travel is anticipated during January.

Outlook and Recommendations

Research will continue behind schedule. Milestone 10 (interim technical report) will be delayed.



Keenan Lee

Principal Investigator