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IDENTIFICATION AND INTERPRETATION OF TECTONIC FEATURES

ERTS-A IMAGERY

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Prepared for

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In the area from Goldfield and Beatty, Nevada, to south of Las Vegas, ERTS and Skylab imagery have been examined together to study an apparent correlation of mineralized areas with suspected hydrothermal alteration effects. Correlation of information from both ERTS and Skylab imagery is continuing. It's observed that areas of mineralization are of complex structure, usually cut by many fractures, and sometimes have a similar mottled or variegated appearance. The old gold and silver mines in the Beatty mineral district occur in terrain characterized by high albedo signatures. Study of geological maps shows that the high albedo areas occur within Tertiary rhyolites, rhyolitic, and andesitic tuffs. Areas known for hydrothermal alteration and bleaching were found to have the brightest signatures in both ERTS and Skylab imagery.

Although the Beatty-Rhyolite mining district is now largely inactive, we have identified several analogous areas not known to be mineralized. It must be realized that identification of specific mineral prospects within general targets requires extensive field work and detailed geophysical exploration.

Published Articles: None

Recommendations: No change in plans

Plans for Next Period: We plan to pursue studying mineralized terrain characteristics in the southwest and will carry out some exploratory field checking.

Practical Applications: Reconnaissance phases of mineral exploration

TYPE I PROGRESS REPORT FOR PERIOD DECEMBER 1, 1973 THROUGH JANUARY 31, 1974

TITLE: Identification and Interpretation of Tectonic Features from ERTS-A Imagery

NASA Contract No. NAS5-21767

GSFC ID No.: PR001, Dr. Monem Abdel-Gawad  
Principal Investigator

Problems: None

Accomplishments:

- 1) Known mineral deposits were plotted on selected ERTS images in Nevada, southeastern California, and western Arizona. (Local and regional tectonic and geologic structures observed in ERTS imagery were correlated with the mineralized areas.)
- 2) Regional structures, such as fault lines and intersections, linear features and areas characterized by complex deformations were identified and mapped onto overlays for each ERTS scene in the study area.
- 3) Geologic structures observed in ERTS imagery were correlated to known mineral districts and to local structures reported in the literature. A set of criteria believed to characterize mineralized areas was inferred. Criteria gained by studying known deposits were applied to identify areas of comparable composition, structures, terrain texture, and color signatures.
- 4) We selected a number of targets for field checking.

Significant Results:

A set of criteria characterizing known mineralized areas are:  
1) occurrence at structural bends, discontinuities, complex deformations along fault zones and intersections, 2) complex terrain textures produced by fracture intersections, 3) color and tone anomalies produced by igneous intrusives, alteration effects and oxidation. Significant fracture systems which appear to be most commonly related to mineralization in central and northeastern Nevada trend northeast-southwest, north-south, and north-northwest.

In MSS 1018-17592, for example, the gold, silver, copper, and lead mining areas of Battle Mt., Betty O'Neil area, Cortez Mts., and Eureka are all located in mountainous areas where known faults control the mountain structures in a north-northeast-southwest to north-south direction. ERTS imagery shows a broad fault belt of north-northwest trend along which these mineral districts are located. These areas are also characterized by terrain texture caused by intersecting northeast-southwest features and striking similarities in color and tonal visual appearance.