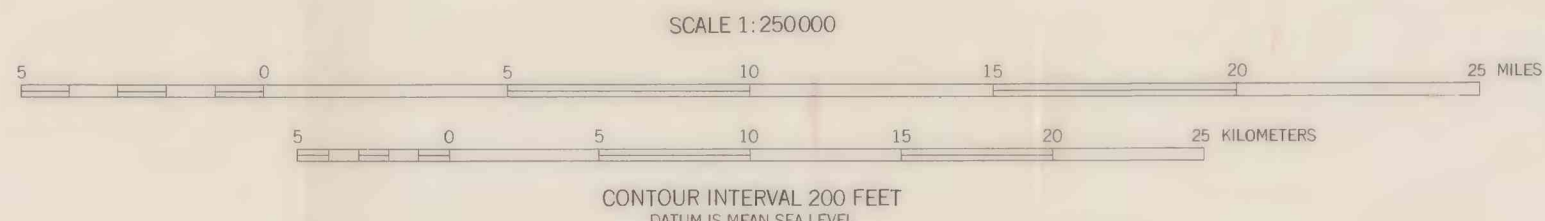


BASE FROM U.S. GEOLOGICAL SURVEY, 1956



EXPLANATION OF IMAGERY INTERPRETATION

A Lineament. Letters refer to features cited in "Discussion"

LINEAMENT MAP

PRELIMINARY MAPS SHOWING INTERPRETATION OF LANDSAT IMAGERY OF THE HEALY QUADRANGLE, ALASKA

by

James R. Le Compte

1981

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards

DISCUSSION

Landsat images of the Healy quadrangle were analyzed for lineaments, circular and arcuate features, and iron-oxide colored areas as a possible aid in the mineral resource assessment of the area. Reproduction of these maps compiled with generalized geologic base maps (De la Coste, Jr., and others, unpub. data, 1981) is planned as part of a folio of maps on the Healy quadrangle.

This study is a modified version of more detailed interpretative investigations conducted in other areas in Alaska (Albert, 1975; Albert and Steele, 1976a, b; Albert and others, 1976; Steele and Albert, 1976); the report is abridged and the methodology involved is similar to that used by Barnes (1977). Details concerning the different types of imagery used are given in "Table of Imagery Used in Analyses".

Although many lineaments and circular and arcuate features are observed from the imagery of the quadrangle, no marked relation between these features and known mineralization (Cobb, 1972) is apparent.

Noteworthy geologic correlations can be made, however, with many of the observed Landsat features noted in the quadrangle:

- (1) A well-defined, generally east-trending lineament (lineament map, sheet 1, feature D) marks the trace of the McKinley strand of the Denali fault across the central part of the quadrangle. Numerous subordinate lineaments that subparallel this main lineament probably correspond to separate fault traces comprising the Denali fault zone (Jagot Gilbert and others, unpub. data, 1981) in this region. Additionally, several lineaments (lineament map, sheet 1: features A-A', B-B', and C-C') which diverge from lineament D within Mt. McKinley tectonic zone in the west-central part of the quadrangle, give the appearance of being splays (?) of the McKinley strand of the Denali fault.

- (2) A generally northwest-trending lineament "zone" (i.e., zone of lineaments) (lineament map, sheet 1, feature D-D'), that is comprised of a number of moderately well-defined segments which extend approximately 380 km in overall length, transects the southern part of the quadrangle. This lineament zone shows good spatial coincidence with the margins of numerous gravity highs and lows in the Healy, Gulkana, and Nabesna quadrangles (Barnes, 1977). Correlations with other lineaments of similar lengths and affinities (geophysical) (Latham and Albert, 1976) suggest lineament zone D-D' as possibly related to a previously unrecognized (?) fundamental crustal feature underlying this region.

- (3) A number of moderately and well-defined circular features (circular and arcuate features map, sheet 2), which range in diameter from approximately 5 to 25 km, show good spatial coincidence with widespread areas underlain either by known (De la Coste, Jr., and others, unpub. data, 1981) or inferred (Andrew Grissom, unpub. data, 1981) plutonic and (or) volcanic rocks.

Many anomalously-colored areas are noted from the imagery of the quadrangle (circular and arcuate features map, sheet 2). One of these areas (locality X) is named by a known, mineralized "altered porphyry intrusive" (Donald Stevens, oral commun., 1980) in the shallow subsurface. The areas are typically marked by iron-oxide stained (gossan-like) surface colorations similar to those observed for other Alaskan localities (Albert, 1975; Albert and Steele, 1976a, b; Steele and Le Compte, 1976; Le Compte, 1981), many of which have proved to be sites of hydrothermally-altered rocks, i.e., mainly volcanic and plutonic rocks.

REFERENCES CITED

Albert, N.R.D., 1975, Interpretation of Earth Resources Satellite imagery of the Nabesna quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-6553, 2 sheets, scale 1:250,000.

Albert, N.R.D., Le Compte, J.R., and Steele, W.C., 1978, Map showing interpretation of Landsat imagery of the Gulkana quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-6783, 2 sheets, scale 1:250,000.

Albert, N.R.D., and Steele, W.C., 1976a, Interpretation of Landsat imagery of the McCarthy quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-7731, 3 sheets, scale 1:250,000.

—, 1976b, Interpretation of Landsat imagery of the Tanacross quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-7672, 3 sheets, scale 1:250,000. Supercedes Open-File Report 76-850.

Barnes, D.F., 1977, Gravity map of the eastern part of southern Alaska: U.S. Geological Survey Open-File Report 77-169-C, scale 1:250,000.

Condit, C.D., and Chavez, P.S., Jr., 1978, Basic concepts of computerized digital image processing for geologists: U.S. Geological Survey Bulletin 1469.

Latham, E.H., and Albert, N.R.D., 1974, Significance of space image lineaments in Alaska, in Proceedings, First International Conference on the New Basement Tectonics, Salt Lake City: Utah Geological Association, Salt Lake City, Utah, p. 11-26.

Le Compte, J.R., 1981, Maps showing interpretation of Landsat imagery of the Survey Pass quadrangle, Brooks Range, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-1176H, 2 sheets, scale 1:250,000.

Raines, G.L., 1976, Porphyry copper exploration model for northern Sonora, Mexico: U.S. Geological Survey Journal of Research, v. 6, no. 1, p. 51-58.

Steele, W.C., and Albert, N.R.D., 1978, Interpretation of Landsat imagery of the Talkeetna quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-6700, 2 sheets, scale 1:250,000.

Steele, W.C., and Le Compte, J.R., 1978, Map showing interpretation of Landsat imagery of the Talkeetna Mountains quadrangle, Alaska: U.S. Geological Survey Open-File Report 78-558D, 2 sheets, scale 1:250,000.

TABLE OF IMAGERY USED IN ANALYSES

Images used for computer-enhancement and photo-optical enhancement are 2945-20143 and 2945-20150, both taken August 24, 1977. Computer-compatible tapes were processed by Pat S. Chavez, Jr., and Ellen Sanchez, U.S. Geological Survey, Flagstaff, Arizona; descriptions of this type of enhancement (simulated natural color) are given in Albert and Steele (1976a, b) and Condit and Chavez (1978). Imagery is available from EOS Data Center, Sioux Falls, SD 57196 (specify P40 number when ordering). Example of imagery is shown in Figure 2.

IMAGE TYPE	COMPUTER-ENHANCED	BANDS AND COLORS USED	PROJECTION	P40 NUMBER	SCENE ID NUMBER	TRANSPARENCY SCALE	PRINT SCALE
U.S.D.A. Alaska mosaic	No	7 Black and white	Alber's equal area	this item not available from EOS Data Center	N/A	N/A	1:1,000,000
Simulated natural color	Yes	4 Green 5 Red 6 Blue	Orthographic	E-794-67CT	Composite (2945-20143, 2945-20150)	1:1,070,000	1:250,000
False-color (POE) - north	No	4 Blue 5 Green 7 Red	Space cylindrical	E-1220-59CT	2945-20143	1:1,007,500	1:250,000
False-color (POE) - south	No	4 Blue 5 Green 7 Red	Space cylindrical	E-1221-59CT	2945-20150	1:1,005,000	1:250,000

POE = photo-optically enhanced



Figure 1. Map showing location of Landsat imagery used in analyses of the Healy quadrangle. Dashed lines indicate boundaries of composite (simulated natural color) image noted in "Table of Imagery Used in Analyses".