DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1221
SHEET 1 OF 2

LINEAMENTS AND GEOLOGIC STRUCTURE OF THE NORTHERN PARADOX BASIN, COLORADO AND UTAH

By

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1980

E-2260-17124 (west half of frame)

E-5165-17030 (east half of frame)

Cisco Wash lineament
Little Dolores River fault
Sandflat graben
Dry Gulch fault graben
Ryan Creek fault zone
Salt Valley anticline
Salt Valley graben
Tenmile graben
Tenmile Canyon lineament
Courthouse syncline
Sagers Wash syncline
Yellowcat dome
Cottonwood graben
Ute Creek graben
Fisher Valley anticline
Moab anticline
King's Bottom syncline
Castle Valley anticline
Big Flat dome
Kane Springs Canyon anticline
Spanish Valley
La Sal Mts
Dolores River alinement
Sinbad Valley anticline
Nucla syncline
Shafer dome
Upheaval Dome
Lockhart anticline
Rustler dome
Pine Ridge anticline
Paradox Valley anticline
Coyote Wash syncline
Lisbon Valley anticline
Hatch Rock syncline
Gibson dome
Dry Creek syncline
Gypsum Valley anticline
Disappointment syncline
Shay graben

EXPLANATION

- LINEAMENT MAPPED FROM LANDSAT IMAGES THAT COINCIDES WITH A MAPPED FAULT
- MAPPED FAULT--From Williams (1964); Cashion (1973)
- CONCEALED OR INFERRED FAULT--From Williams (1964)
- LANDSAT LINEAMENT CONNECTING MAPPED FAULT SEGMENTS OR PROJECTION OF MAPPED FAULT
- AXIAL TRACE OF FOLD SHOWING DIRECTION OF PLUNGE--Modified from Williams (1964); Elston and Shoemaker (1961); dashed where inferred from geologic mapping or Landsat images
- Anticline
- Syncline
- MAJOR LINEAMENT MAPPED FROM LANDSAT IMAGES--Not previously mapped and generally more than 20 km in length
- LINEAMENT MAPPED FROM LANDSAT IMAGES
- ALINEMENT OF SHORT LINEAMENTS MAPPED FROM LANDSAT IMAGES
- OUTCROP OF CAPROCK OF PARADOX MEMBER, HERMOSA FORMATION--Modified from Elston and Shoemaker (1961)
- INTRUSIVE DOME CONTACT--Mapped from Landsat images
- NEEDLES FAULT ZONE--Closely spaced horsts and grabens; general trend is northeast

DISCUSSION

The definition of lineament as used here is that of O'Leary and others (1976) based on the usage introduced and amplified by Hobbs (1904; 1912): "A lineament is a mappable, simple or composite linear feature of a surface, whose parts are aligned in a rectilinear or slightly curvilinear relationship and which differs distinctly from the pattern of adjacent features and presumably reflects a subsurface phenomenon."

The likelihood that a mapped linear feature has a subsurface expression (that is, the reliability of interpretation of a linear feature) depends on two different sets of criteria: (1) spatial coincidence with geologically and geophysically mapped structures, and (2) morphology of the linear feature (for example, linearity, distinctness, continuity, tonal contrasts, stratigraphic or lithologic offset relations, topographic offsets, and linear geomorphic features, including alinements of drainage and landforms).

The plotted lineaments of highest reliability are those that coincide with faults mapped by geological field methods (see map explanation). The next, in decreasing order of reliability, are lineaments that connect segments of mapped faults or that constitute the projection of mapped faults. Also regarded as high in reliability are those lineaments that coincide with, or show clear proximity to concealed faults, or to faults inferred on the basis of geologic mapping.

Major linaments mapped from Landsat images, not previously mapped and generally more than 20 km in length, have been plotted primarily on the basis of linearity of landforms or of distinct tonal contrast with continuity over many kilometers.

Alinements of short lineaments represent natural features of undetermined origin, or those with little continuity in trend, and have a lower reliability. They may, however, represent tectonic features at greater depth.

The statistically dominant strike frequency of all lineaments mapped in this region, N40-50E, coincides with second-order gravity-field, third-order magnetic-field, and fourth-order fault trends (Friedman and others, 1979).

The northeast-trending lineaments, for the most part, represent (a) northeast-striking joint sets (Friedman and Simpson, 1978, p. 26-28), (b) extensional, vertical dilation fractures with little or no horizontal displacement (Hite, 1975), and (c), extensional high-angle faults of generally Laramide age with predominantly vertical displacement (Weir and others, 1961; Hinrichs and others, 1968). These structures are compatible with inferred directions of least stress in the Colorado Plateau tectonic province during Laramide time.

The numerically dominant strike frequency of major lineaments (those more than 20 km in length) is N40-60W. This trend coincides with first-order strike frequencies of geologically mapped faults and fold axes and gravity- and magnetic-field trends, and is generally parallel to the axes of the major salt anticlines, to the inferred southwestern boundary fault zone of the Uncompahgre uplift, and to northwest-striking joint sets.

The location and strike of both northeast and northwest lineament sets may reflect deep-seated control by tectonic trends and discontinuities of the Precambrian surface as delineated in the gravity and magnetic fields (Case and Joesting, 1972, Plates I-J).

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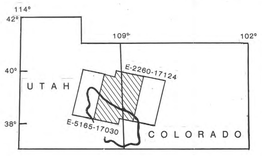
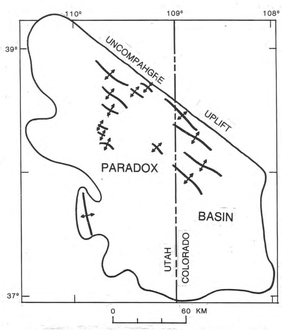


INDEX MAP SHOWING LOCATION OF LANDSAT IMAGES E-5165-17030 AND E-2260-17124 AND AREA OF MAPPING (PATTERNED), AND OUTLINE OF PARADOX BASIN



OUTLINE OF PARADOX BASIN SHOWING LOCATION OF MAJOR ANTICLINAL AXES

APPROXIMATE MEAN DECLINATION, 1964

Base from U.S. Geological Survey, Grand Junction, 1956-69; Moab, 1972

SCALE 1:250 000

5 0 5 10 15 20 25 MILES

5 0 5 10 15 20 25 KILOMETERS

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