DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

OPEN-FILE REPORT 84-241

Base from U.S. Geological Survey base map, Kansas, 1962

SCALE 1:500,000

0 20 40 60 MILES

0 20 40 60 KILOMETERS

Geology modified by M.E. Cooley from State geologic map (Staff of State Geological Survey of Kansas, 1964)

LINEAR FEATURES DETERMINED FROM LANDSAT IMAGERY IN WESTERN KANSAS

By

Maurice E. Cooley

1984

EXPLANATION

CORRELATION OF MAP UNITS

Qds, Qs	Quaternary	CENOZOIC
QTs	Tertiary	
KFr	Cretaceous to Permian	MESOZOIC to PALEOZOIC

DESCRIPTION OF MAP UNITS

Qds DUNE-SAND DEPOSITS OF QUATERNARY AGE--Those northeast of Hutchinson, particularly, mask many of the linear features in the underlying rocks

Qs FLOOD-PLAIN ALLUVIUM, LOW-LEVEL TERRACE DEPOSITS, AND OTHER SURFICIAL DEPOSITS OF QUATERNARY AGE--Generally post-Kansan in age, these deposits are present stream valleys physiographically below the level of the Ogallala Formation and associated deposits. The linear features are not as well developed in these deposits as they are in the older deposits and sedimentary rocks. At many places the linear features are masked by the presence of cultivated fields, highways, railroads, and towns

QTs HIGH-LEVEL DEPOSITS OF QUATERNARY AGE AND OGALLALA FORMATION OF LATE TERTIARY AGE--These deposits underlie the broad interstream divide areas that form the principal part of the High Plains of Kansas. The Quaternary deposits are of Kansan age or older. Deposits include some flood-plain alluvium in the western part of the area. Generally the linear features are easily recognized in the Ogallala Formation and slightly less so in the associated high-level Quaternary deposits in areas of local relief bordering stream valleys. Widespread farming operations mask some of the linear features in the relatively flat divide areas between the principal streams

KFr SEDIMENTARY ROCKS OF CRETACEOUS TO PERMIAN AGE--Linear features are easily recognized in areas having local relief in hilly regions and bordering stream valleys. The presence of a discontinuous mantle of surficial deposits and cultivated fields mask some of the linear features in relatively flat areas

CONTACT

LENGTH OF LINEAR FEATURES

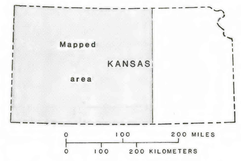
Less than 30 miles

More than 30 miles

URBAN AREA, INCLUDING AIRPORTS, DETERMINED FROM LANDSAT IMAGERY

CONVERSION FACTOR

Multiply	By	To obtain
mile	1.609	kilometer



LOCATION MAP

IDENTIFICATION AND PLOTTING OF LINEAR FEATURES

This map is one of two linear-features maps compiled for the U.S. Geological Survey's High Plains Regional Aquifer-System Analysis (Weeks, 1978). The other map covers the Texas and Oklahoma Panhandles (Cooley, 1984).

Linear features occur on the Earth's surface as straight or slightly curved lines. These features usually are referred to as linear trends or lineaments, some of which extend across western Kansas. The linear features shown on this map are not identified as to type or origin, although most probably reflect fractures or fracture zones, including joints and faults. Fracture zones affect the movement of water and other fluids through the rocks.

The linear features were determined from visual inspection of false-color composites of Landsat imagery at a scale of 1:500,000. The imagery used was from the Geological Survey EROS Data Center at Sioux Falls, South Dakota. The images are free of cloud cover, and, except for one image, have been enhanced to remove scan lines that tend to mask some of the features, including linear features.

The High Plains, distributed throughout most of western Kansas, consist of flat to gently rolling uplands with shallow valleys and a few undrained depressions. Physiographic features used to identify linear features include straight segments of low escarpments and ridges, shallow valleys, and dissected slopes including some badlands. Vegetation growing on flood plains accentuates the configuration of the shallow valleys. Tonal contrasts in color patterns indicating differences in vegetation, soils, or outcropping rocks helped in the recognition or extension of some of the linear features.

In parts of western Kansas, the linear features may be masked by the widespread farming. The rectangular patterns of cultivated fields and roads along section lines make it difficult to recognize linear features that trend generally eastward or northward (east-northeast to east-southeast and north-northeast to north-northeast). The general eastward orientation of the main highways and railroads also makes it difficult to recognize the generally eastward trending linear features. Therefore, there are fewer north-trending linear features and especially fewer east-trending features plotted on the map than linear features trending in other directions.

The linear features were plotted as dashed lines on transparent overlays on the Landsat images only in locations where they were observed. Dashed lines were used because most of the linear features were observed as discontinuous lines. The most conspicuous linear features were plotted first and, except for upland areas, usually were the longest linear features.

The major and subordinate linear features were classified according to their length into the two groups shown on the map. Determination of the linear features was aided by plotting the linear features from a mosaic of Landsat imagery of the United States (scale 1:5,000,000) compiled by the U.S. Soil Conservation Service (1974).

REFERENCES

Cooley, M. E., 1984, Linear features determined from Landsat imagery in the Texas and Oklahoma Panhandle: U.S. Geological Survey Open-File Report 84-589, map, scale 1:500,000.

Staff of State Geological Survey of Kansas (under supervision of J.M. Jewett), 1964, Geologic map of Kansas: State Geological Survey of Kansas map, scale 1:500,000.

U.S. Soil Conservation Service, 1974, Mosaic of imagery from Earth Resources Technology Satellite-1 of the conterminous United States: U.S. Geological Survey map, scale 1:5,000,000.

Weeks, J.B., 1978, Plan of study for the High Plains Regional Aquifer-System Analysis in parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming: U.S. Geological Survey Water-Resources Investigations Report 78-70, 28 p.