



Base from U.S. Geological Survey State base map, Wyoming 1:500,000, 1987.
Scale 1:500,000
Geology modified from Love and others (1955) and Love and others (1979)

LINEAR FEATURES DETERMINED FROM LANDSAT IMAGERY IN WYOMING

By
Maurice E. Cooley
1983

IDENTIFICATION AND PLOTTING OF THE LINEAR FEATURES
This map is one of a series of linear-features maps compiled for the U.S. Geological Survey's Northern Great Plains Regional Aquifer System Analysis (U.S. Geological Survey, 1979). This map shows the linear features that were recognized in Wyoming. Other maps in the series cover South Dakota (Cooley, 1983a), Nebraska (Cooley, 1983b), and North Dakota (Cooley, 1983c).
Linear features occur on the Earth's surface as straight or slightly curved lines. These features often are referred to as linear trends or lineaments, some of which extend across Wyoming. 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 or other fluids through the rocks.
The linear features were determined from visual inspection of color-infrared composites of Landsat imagery at a scale of 1:500,000. The imagery used was the best available as determined by the Geological Survey BRIS Data Center at Stone Falls, South Dakota. The images were obtained during the spring and autumn and are free of cloud cover. All images had been enhanced to remove scale lines that tend to mask some of the features, including linear features.
Physiographic features and tonal differences in vegetation and soils observed on the imagery were used to identify the linear features. Physiographic features include straight segments of escarpments, ridges, canyons, and valleys, and the ridge-and-valley topography of badlands. Vegetation growing on flood plains accentuates the configuration of shallow valleys in areas of low relief. On plains and broad slopes that have slight surface relief, tonal contrasts in color patterns of different vegetation and soils helped in the recognition or extension of some of the linear features.
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 mountainous or upland areas, were usually the longest linear features.
The major and subordinate linear features were classified according to their length into the four groups shown on the map. Determination of the length of the linear features that extend beyond Wyoming 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., 1983a, Linear features determined from Landsat imagery in South Dakota and parts of adjacent states: U.S. Geological Survey Open-File Report 83-548, map, scale 1:500,000.
—, 1983b, Linear features determined from Landsat imagery in Montana: U.S. Geological Survey Open-File Report 83-534, map, scale 1:500,000, 2 sheets.
—, 1983c, Linear features determined from Landsat imagery in North Dakota: U.S. Geological Survey Open-File Report 83-537, map, scale 1:500,000.
Love, J. D., Christensen, A. C., Bown, T. W., and Earle, J. L., 1979, Preliminary geologic map of the Thermopila 1° by 2° quadrangle, central Wyoming: U.S. Geological Survey Open-File Report 79-962, scale 1:250,000.
Love, J. D., Wertz, J. L., and Rose, R. E., 1955, Geologic map of Wyoming: U.S. Geological Survey map, scale 1:500,000.
U.S. Geological Survey, 1979, Plan of study for the Northern Great Plains Regional Aquifer System Analysis in parts of Montana, North Dakota, South Dakota, and Wyoming: U.S. Geological Survey Water-Resources Investigations Report 79-34, 20 p.
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.

EXPLANATION
CORRELATION OF MAP UNITS
Quaternary
Tertiary
Cretaceous to Cambrian
Precambrian
DESCRIPTION OF MAP UNITS
Qd DUNE DEPOSITS OF QUATERNARY AGE—Unconsolidated, easily erodible dune sand forms a discontinuous mantle over the consolidated sedimentary rocks. The linear features may be masked locally by the discontinuous sand mantle.
Qn CLAY TO GRAVEL OF QUATERNARY AGE—Quaternary deposits occur principally near Red Desert, Yellowstone Lake, and in southeastern Wyoming. These deposits mask many of the linear features present in the underlying rocks.
Qtv SEDIMENTARY ROCKS OF QUATERNARY TO TERTIARY AGE—Clay, sand, gravel, shale, and sandstone. Tertiary rocks occupy broad areas in the plains areas of Wyoming. Quaternary rocks are present mainly in valleys of southeastern Wyoming. Linear features are easily seen on Landsat imagery in most areas underlain by the Quaternary to Tertiary rocks, except in areas where the surface relief is low and in the valleys of southeastern Wyoming.
Qv Rhyolite to basalt of Quaternary to Tertiary AGE—Volcanic rocks in northeastern Wyoming. Generally, linear features in the volcanic rocks are easily seen on Landsat imagery.
Tv Rhyolite to basalt of Tertiary AGE—These volcanic rocks are in widely separated parts of Wyoming, including intrusive rocks of the Black Hills. Generally, linear features in the volcanic rocks are easily seen on Landsat imagery.
Kv SEDIMENTARY ROCKS OF CRETACEOUS TO CAMBRIAN AGE—Shale, sandstone, and minor limestone. Cretaceous to Cambrian sedimentary rocks are exposed in large areas throughout Wyoming. Linear features in the sedimentary rocks are easily seen on Landsat imagery.
pkr BASEMENT ROCKS OF PRECAMBRIAN AGE—Granite, gneiss, and schist. Precambrian rocks are present in the cores of mountain ranges and highlands. The most conspicuous linear features in Wyoming observed on the Landsat imagery are in areas where these rocks are extensively dissected into canyons and narrow valleys.
CONTACT
GENERALIZED DIRECTION OF STRIKE AND DIP OF THE SEDIMENTARY ROCKS

LENGTHS OF LINEAR FEATURES
Less than 30 miles
30 to 200 miles
200 to 500 miles
More than 500 miles

U.S. GEOLOGICAL SURVEY
MAY 25 1983
LIBRARY

M2287
1483c
43-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935

93-935