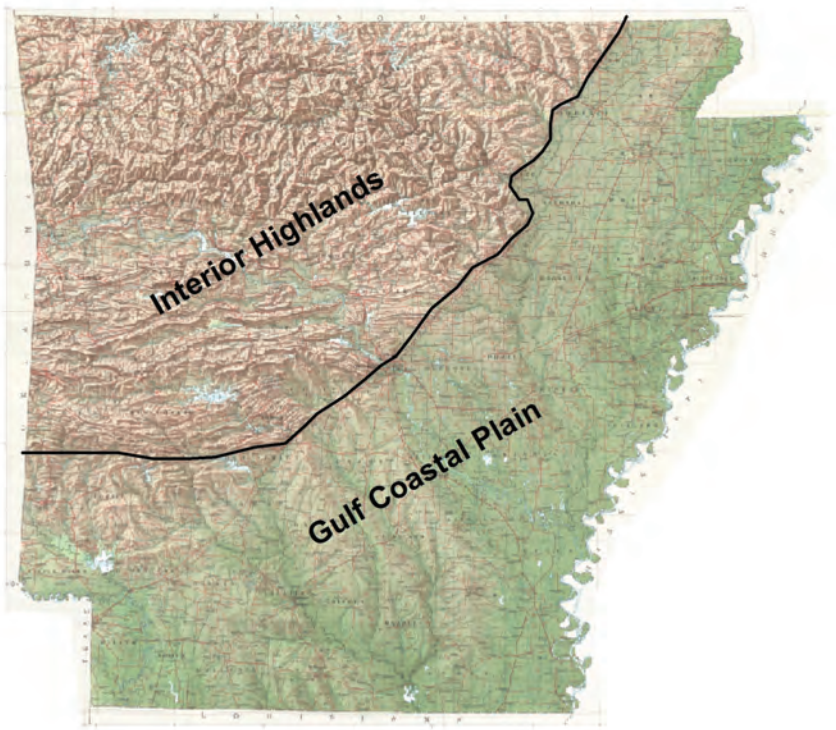
STATE OF ARKANSAS

ARKANSAS GEOLOGICAL SURVEY
BEKKI WHITE, DIRECTOR AND STATE GEOLOGIST

EDUCATIONAL WORKSHOP SERIES 03

Regions and Landforms in Arkansas



Angela Chandler

Little Rock, Arkansas
2009

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Acknowledgments

This laboratory manual is written for Arkansas teachers studying earth science. This was also written with the Arkansas Science Curriculum in mind so that students can meet the requirements and goals set for their age groups. Various staff at the Arkansas Geological Survey contributed material to this manual.

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Table of Contents

STATE OF ARKANSAS
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Regions and Landforms in Arkansas

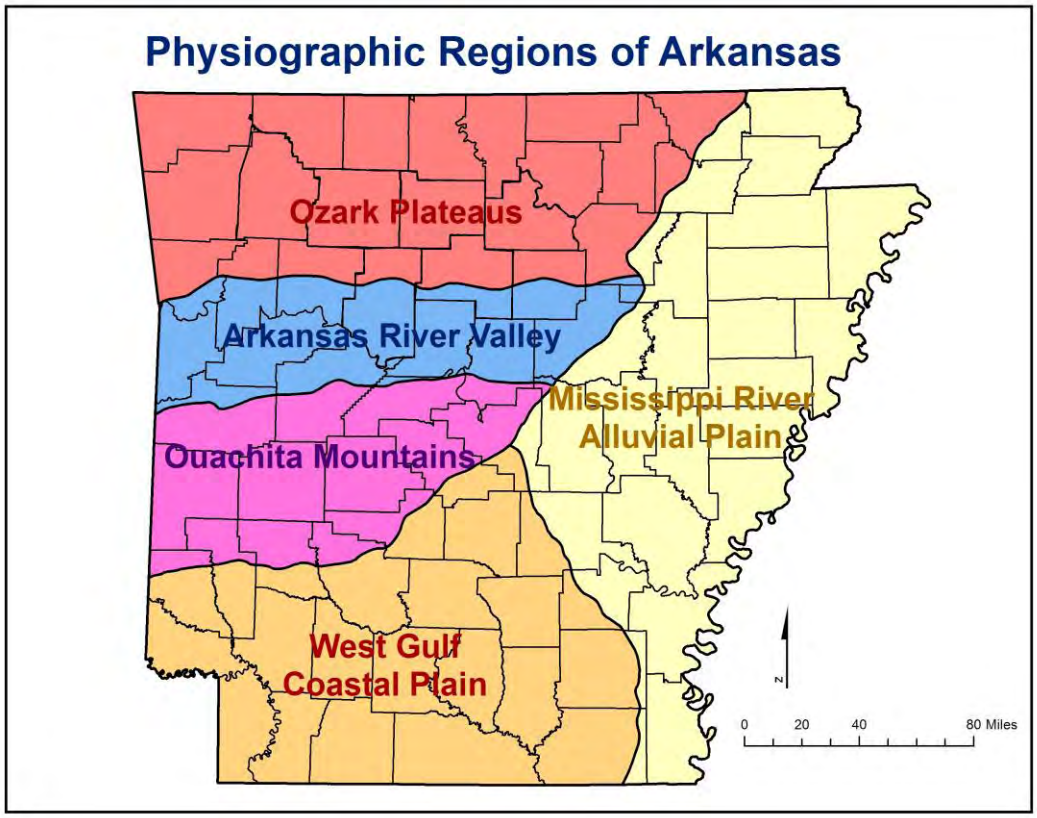
Introduction

A landform is defined as any physical, recognizable form or feature of the Earth's surface, having a characteristic shape, and produced by natural causes (Glossary of Geology, Third Edition, 1987). Arkansas contains a variety of landforms – from hilly landscapes and ridges and valleys to nearly flat terraced plains. The present day landforms in Arkansas are a result of the actions of past geologic processes, such as weathering and erosion that continue to the present day and the action of streams and rivers.

Landforms can be classified as depositional or erosional. Depositional landforms are those that have been deposited by water in the form of streams, rivers or oceans. These types of landforms, called alluvium and terrace deposits are usually unconsolidated (not rock) and consist of sand, silt, clay and gravel. Erosional landforms are those carved by the erosive forces of water, ice, and wind. These landforms include mountains and plateaus, are generally made up of rock and are controlled by the geology of the area.

Arkansas is divided topographically into two major regions along a northeast-southwest trending "fall line". This imaginary line divides resistant sedimentary Paleozoic rocks (*erosional landforms*) of the Interior Highlands from unconsolidated sediments (*depositional landforms*) of the Gulf Coastal Plain. Notice the contrasting landform patterns.

Arkansas is further divided into five physiographic regions as seen below.



Ozark Plateaus

The Ozark Plateaus region sits on the edge of a broad, asymmetrical dome (or uplift), with the center of the dome (oldest rocks; Precambrian basement) located in the St. Francis Mountains of southeast Missouri (see map on next page). The rock formations dip gently away from this area in all directions. The Ozarks of northern Arkansas form the southern flank of this dome.

This part of the state was periodically covered by a shallow marine sea from Ordovician through Mississippian geologic periods. Mostly carbonate rocks such as limestone and dolostones were deposited at this time. After the sea regressed during the Pennsylvanian period, mostly sandstones and shales were deposited. The rocks in the Ozarks are only very weakly deformed and generally flat lying. The Ozarks have been deeply dissected by stream erosion forming erosional mountains. Streams display a dendritic drainage pattern.

The Ozarks can be divided into **3 plateaus** (broad, flat-topped areas) that are separated from each other by steep slopes.
1) *Salem Plateau – capped by Ordovician age rocks, mostly dolostone*
2) *Springfield Plateau – capped by Mississippian age rocks, mostly limestone*
3) Boston Mountains Plateau – capped by Pennsylvanian age rocks, mostly sandstone

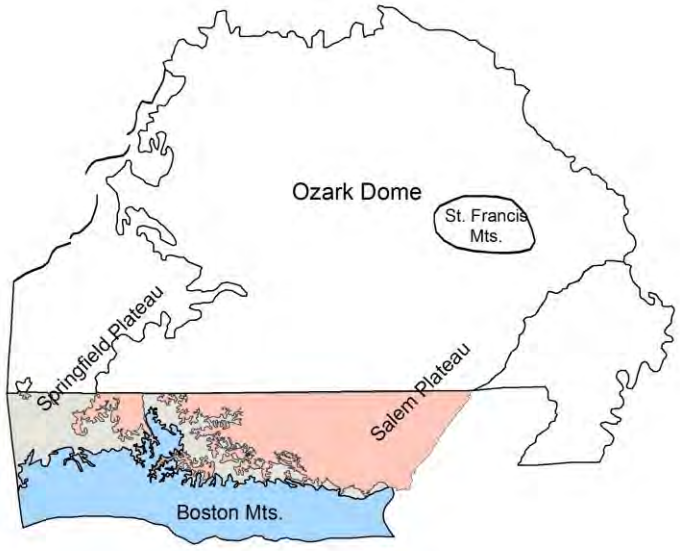
The plateaus become higher in elevation and expose younger rocks from north to south in Arkansas. *Refer to raised relief map to see plateau surfaces.*

Landforms in this region

The Ozark Region consists of three plateau surfaces that contain mostly canyons (called hollows), mountains, ridges, plateaus and valleys. Islands are present in Beaver and Greers Ferry Lake and along the White River. One named prairie is present in the Diamond City area.

Karst landforms are also present in the Ozark Plateaus Region. Karst is a type of topography that is formed on limestone, gypsum and other rocks by dissolution and that is characterized by sinkholes, caves and underground drainage. A majority of the region is made up of limestone and dolostone and contains caves, sinkholes and disappearing streams.

Refer to the following quadrangles for landforms in the Ozarks: Alread, Beaver, Boxley, Brownsville, Cave City Cotter, Delaney, Diamond City, Eureka Springs, Fairfield Bay, Fiftysix, Hasty, Melbourne, Norfork Dam South, Onia, Rea Valley, Sylamore and War Eagle.



Map of Ozark Dome and plateau surfaces in northern Arkansas.

Arkansas River Valley

The Arkansas River Valley represents the northern extent of the Ouachita orogenic (mountain building) system in Arkansas (refer to physiographic regions map). This part of the state was also covered by a shallow sea from the Ordovician to Mississippian geologic periods. During the Mississippian and Pennsylvanian periods this region was a deep basin collecting sediment from the surrounding area to form sandstone and shale. Low-lying swamps developed during this time as well.

Once flat-lying, these Pennsylvanian sedimentary rocks have been compressed into well developed east-west trending open folds (anticlines and synclines) and faults, which gradually diminish northward into the Ozark Plateau Region.

The Arkansas River Valley is a low-lying region surrounding the valley of the Arkansas River and its major tributaries. The highest point in Arkansas (Mount Magazine – 2753 ft.) is found among several mountain ridges that rise above the lowlands in the southern portion of the river valley. The mountain ridges are separated by broad valleys.

Landforms in this region

The Arkansas River Valley contains mostly mountains, ridges and valleys although some islands and swamps are present near the Arkansas River and its tributaries. Refer to the following quadrangles for these landforms: Adona, Dardanelle, Chickalah Mountain East, Blue Mountain, Blue Mountain Dam, Magazine, Fort Smith and Van Buren.

Ouachita Mountains

The Ouachita Mountain Region (refer to physiographic regions map) contains thick sequences of sedimentary rocks deposited in a deep ocean basin that have been uplifted and compressed northward into east-west trending complex folds (anticlines and synclines) and thrust faults due to a major orogenic (mountain building) process called the Ouachita Orogeny. The most intensely deformed area is in the central portion of the fold belt.

This region consists of a series of sharp ridges, mostly east-west trending and often buckled and distorted, separated by narrow to broad valleys. Streams display a trellis drainage pattern due to the geologic structure in this region.

Landforms in this region

The Ouachita Mountain Region contains mountains, canyons, valleys, ridges and pinnacles. Some islands are present in Lake Ouachita. Refer to the following

quadrangles for these landforms: Crystal Springs, Fountain Lake, Hamilton and Pinnacle Mountain.

Mississippi River Alluvial Plain

The Mississippi River Alluvial Plain (refer to physiographic regions map) contains unconsolidated sediment such as sand, silt, clay, loess (silt deposited by wind) and gravel that was deposited by the Mississippi River and its tributaries from around 5 million years ago to present day. Around 1.5 million years ago, melt-water from glaciers to the north provided large amounts of water and sediment to the Mississippi River. At this time the Mississippi River eroded a deep valley west of Crowley's Ridge while the Ohio River eroded a valley east of Crowley's Ridge (Guccione, 1993). Eventually the Mississippi River cut through Crowley's Ridge near Cairo Illinois, captured the Ohio River and now flows on the east side of Crowley's Ridge.

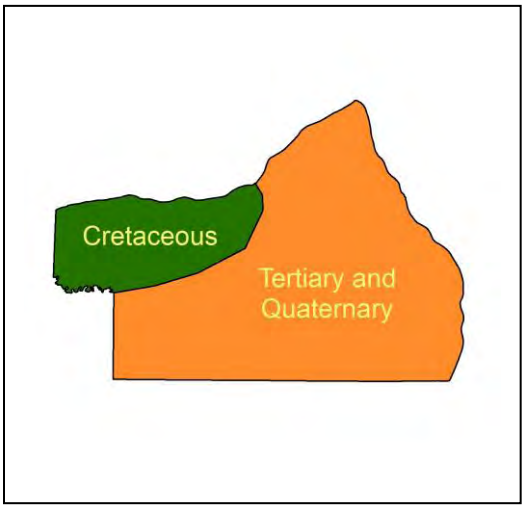
This region is a relatively level plain with elevations varying between 100-300 feet except for Crowley's Ridge with some of its highest points reaching 400-560 feet.

Landforms in this region

The Mississippi River Alluvial Plain is a plain that contains swamps, prairies, islands and one ridge – Crowley's Ridge. Refer to the following quadrangles for these landforms: De Valls Bluff, Des Arc East, Geridge, Lonoke and Walcott.

West Gulf Coastal Plain

The West Gulf Coastal Plain is a south sloping plain of gently rolling hills and can be divided into two areas based on the age of the rocks.



The area in green consists of Cretaceous sand, clay, gravel, marl, limestone, chalk and Quaternary sand and gravel. This area is characterized by gently southward-dipping sedimentary rocks deposited mostly in shallow marine water of the Gulf of Mexico that once extended into Arkansas. Alluvium deposits from older and present day streams are common.

The area in orange consists of Tertiary clays, sands and silts with lignite deposits and Quaternary gravels, sands and clays. This part of the state contains mostly early Tertiary rocks consisting of sands, silts and clays, deposited in streams, swamps and shallow marine water. Lignite beds occur throughout the sequence. Quaternary alluvium and terrace deposits

are present from rivers in the area. Underneath the Tertiary deposits are the sands, gravels, limestones, chalks and marls seen in the Cretaceous area.

Landforms in this region

The West Gulf Coastal Plain is a plain that contains swamps and islands. Refer to the following quadrangles for these landforms: Felsenthal Dam, Fulton, Reader, Lockhart and Whelen Springs.

Definitions (from Glossary of Geology, Third Edition, 1987) except for *pinnacle*.

Canyon – a long, deep, relatively narrow steep-sided valley confined between lofty and precipitous walls in a plateau or mountainous area, often with a stream at the bottom. It is characteristic of an arid or semiarid area (such as western U.S.) where stream downcutting greatly exceeds weathering.

Delta – the low, nearly flat, alluvial tract of land at or near the mouth of a river, commonly forming a triangular or fan-shaped plain of considerable area, crossed by many distributaries of the main river, perhaps extending beyond the general trend of the coast, and resulting from the accumulation of sediment supplied by the river in such quantities that it is not removed by tides, waves and currents. Most deltas are partly subaerial and partly below water.

Hill – a natural elevation of the land surface, rising rather prominently above the surrounding land, usually of limited extent and having a well-defined outline (rounded rather than peaked or rugged), and generally considered to be less than 300 m (1000 ft) from base to summit; the distinction between a hill and a mountain is arbitrary and dependent on local usage.

Islands – A tract of land smaller than a continent, surrounded by the water of an ocean, sea, lake or stream. B) An elevated piece of land surrounded by a swamp, marsh or alluvial land or isolated at high water or during floods.

Mountains – Any part of the earth's crust higher than a hill, sufficiently elevated above the surrounding land surface of which it forms a part to be considered worthy of a distinctive name, characterized by a restricted summit area (as distinguished from a plateau) and generally having comparatively steep sides and considerable bare rock surface; it can occur as a single isolated eminence or in a group forming a long chain or range and it may form by earth movements, erosion or volcanic action. Generally a mountain is considered to project at least 300 m (1000 ft) above the surrounding land.

Pinnacle - mountain peak**:** a natural peak, especially a distinctively pointed one on a mountain or in a mountain range

Plateaus – Broadly, any comparatively flat area of great extent and elevation; specif. an extensive land region considerably elevated (more than 150-300 m in

altitude) above the adjacent country or above sea level; it is commonly limited on at least one side by an abrupt descent, has a flat or nearly smooth surface but is often dissected by deep valleys and surmounted by high hills or mountains and has a large part of its total surface at or near the summit level. A plateau is usually higher and has a more noticeable relief than a plain.

Plain – any flat area, large or small, at a low elevation; specifically an extensive region of comparatively smooth and level or gently undulating land, having few or no prominent surface irregularities but sometimes having a considerable slope and usually at a low elevation with reference to surrounding areas. A plain may be either forested or bare of trees and may be formed by deposition or by erosion.

Prairie – a) an extensive tract of level to rolling grassland, generally treeless, in the temperate latitudes of the interior of North America (especially in the Mississippi Valley region) characterized by a deep fertile soil and by a covering of tall, coarse grass and herbaceous plants b) one of a series of grassy *plains*, into which the true prairies of the Mississippi Valley region merge on the west, whose treeless state is due to aridity.

Ridge – a general term for a long, narrow elevation of the Earth's surface, usually sharp-crested with steep sides, occurring either independently or as part of a larger mountain or hill. For example, an extended upland between valleys.

Swamp – An area of low, waterlogged ground having shrubs and trees, with or without the formation of peat.

Trenches – (Marine geo) A narrow elongate depression of the deep-sea floor with steep sides oriented parallel to the trend of the continent and between the continental margin and the abyssal hills.(Geomorph) A narrow, steep-sided canyon, gully or other depression eroded by a stream. A long straight commonly u-shaped valley or depression between two mountain ranges.

Valley – Any low-lying land bordered by higher ground; especially an elongate, relatively large, gently sloping depression of the Earth's surface, commonly situated between two mountains or between ranges of hills or mountains, and often containing a stream with an outlet. It is usually developed by stream erosion but may be formed by faulting.

Landforms by Quadrangle

Ozarks

Alread Quad
Alum Cave Canyon, hollows, Pine Mountain, Trace Ridge
Beaver Quad
Various hollows and mountains
Boxley Quad
Hollows, Boxley Valley, Mountains, Cave Mt. Cave
Brownsville Quad
Islands, Silver Ridge Peninsula, Bear Mountain, Wildcat Hollow, Copperas Springs Hollow
Cave City Quad
Hills, springs, cave
Cotter Quad
Bayless Island, Cane Island, Bull Shoals Mountain
Delaney Quad
Mountains, Hollows, Hazel Valley
Diamond City Quad
Sugarloaf Prairie, hollows, springs
Eureka Springs Quad
Mountains, Springs, Livingston Hollow, Onyx Cave, springs
Fairfield Bay Quad
Sugar Loaf Mountain (Island), Boat Ridge Island, Mountains, Bailey Hollow
Fiftysix Quad
Blanchard Caverns, Rowland Cave, sinkholes, hollows, Cow Mountain, springs
Hasty Quad
Mountains, Caves, and springs (karst)
Melbourne Quad
Brushy Ridge, Hunters Mountain, Melbourne Cave
Norfork Dam South Quad
Bergren Cave, sinkholes near Pleasant Valley, Hopewell Hollow
Onia Quad
Sinkholes, Alexander Cave, Roper Mountain, Panther Mountain, springs, Boardtree Hollow
Rea Valley Quad
Mountains, hollows, Rea Valley
Sylamore Quad
Buck Island, Landers Island, hollows, Mountains, springs
War Eagle Quad
Un-named island in Beaver Lake

River Valley

Adona Quad
Mountains, Ada Valley
Blue Mountain Quad
Mountains, Magazine Mountain, Ridges
Blue Mountain Dam Quad
Un-named island, swamp, ridges, mountains
Chickalah Mountain East Quad
Mountains, Mount Nebo, Tater Hill, knobs, hollows, McCray Ridge, Christian Ridge
Dardanelle Quad
Mountains, Mount Nebo
Fort Smith Quad
Islands, swamps
Magazine Quad
Mountains, ridges, The Narrows (canyon)
Van Buren Quad
Swamps, un-named island

Ouachita Mountains

Crystal Springs Quad
Un-named islands, mountains
Fountain Lake Quad
Mountains, valley along creek
Hamilton Quad
Un-named islands, mountains, Ouachita Pinnacle
Pinnacle Quad
Mountains, un-named island, Pinnacle Mountain State Park

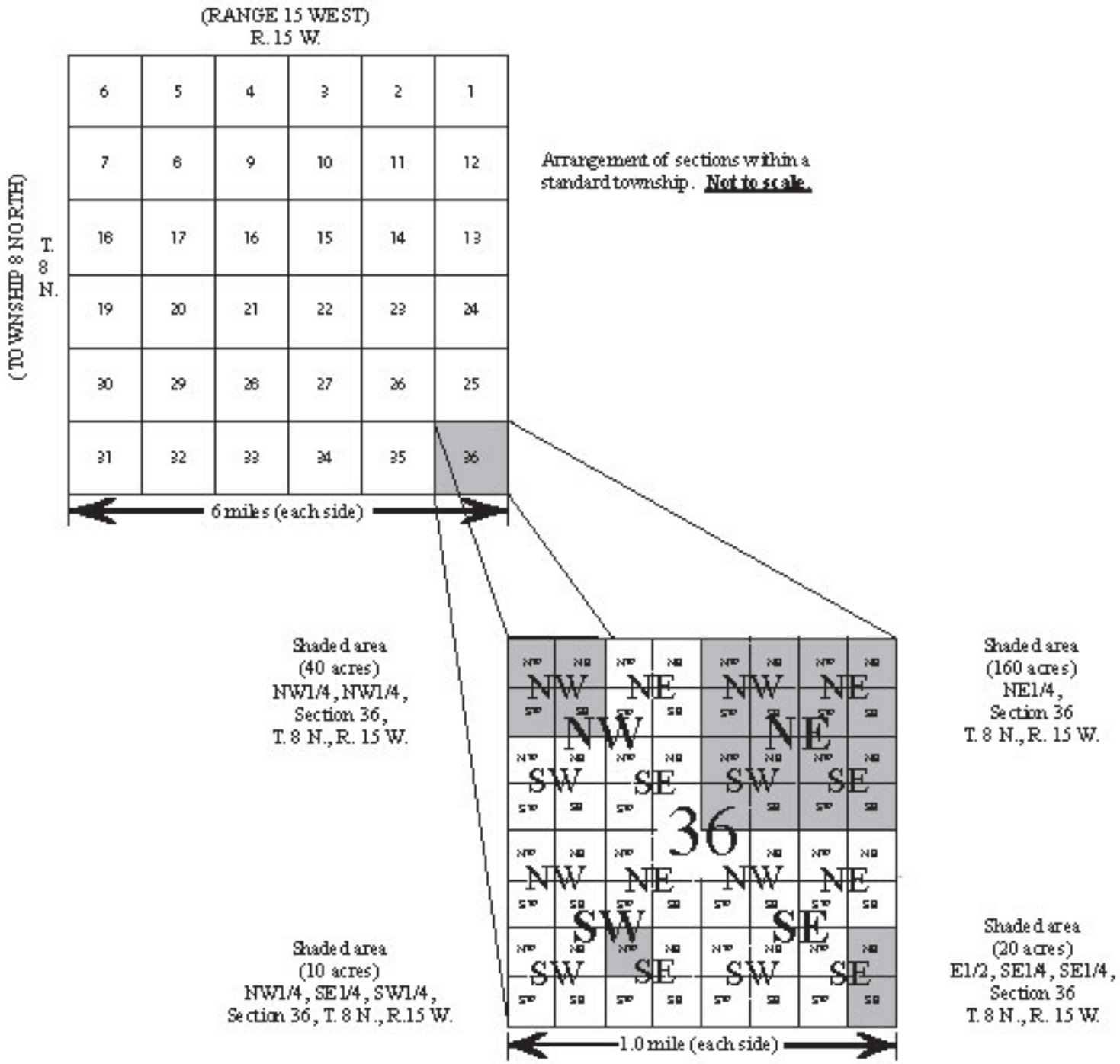
Mississippi River Alluvial Plain

De Valls Bluff Quad
The Basin Island, Pfennighausen Ridge, swamp
Des Arc East Quad
Swamps, island
Geridge Quad
Swamps, Long Prairie, Grand Prairie, Snake Island
Lonoke Quad
Grand Prairie, Long Prairie
Walcott Quad
Crowley's Ridge

West Gulf Coastal Plain

Felsenthal Dam Quad
Swamps, Pine Island, Three Beech Prairie, Russell Island, Big Mound Ridge
Fulton Quad
Swamps
Lockhart Quad
swamps
Reader Quad
Gores Peak, Polk Stinnet Hill
Whelen Springs Quad
Whetstone Mountain, un-named islands along Little Missouri River

DIVISIONS OF A STANDARD SECTION * OF LAND IN ARKANSAS
(For use with 1:24,000-scale maps.)



The divisions of a standard section. * Ideally a section is nearly square, one mile on each side, and covering 640 acres. Shown here at 1:24,000-scale (1 inch = 2,000 feet). In practice, few surveyed sections meet these requirements.

*As defined by the U.S. General Land Office.

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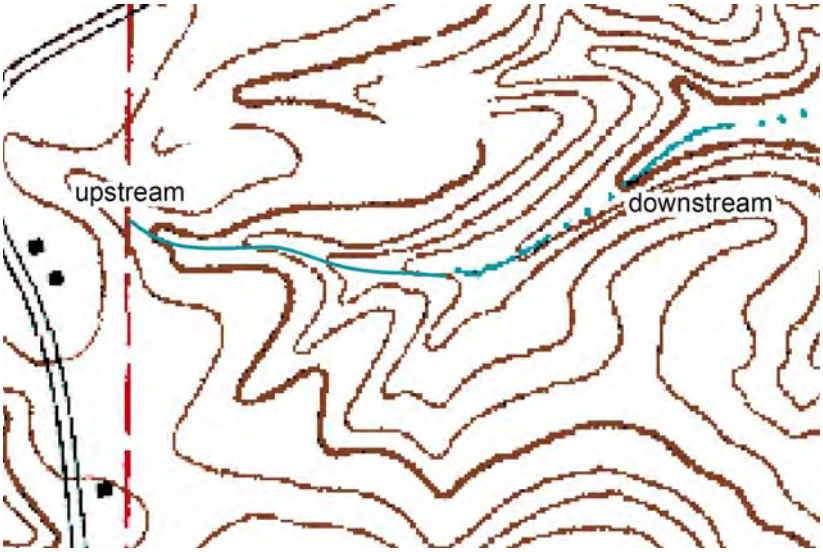
Topographic Map Reading

Topographic maps illustrate landforms by equal lines of elevation also called contour lines. There are several rules of contours that should be followed when reading topographic maps. Always know the contour interval of your map.

1) The closer the contour lines, the steeper the slope.
2) Contour lines are farther apart on more gentle slopes.
3) Contour lines will never cross one another but will merge where an overhanging cliff is present.
4) Contour lines will merge to form a single contour line where there is a vertical bluff.
5) A concentric series of closed contours represents a hill.

6) Depressions are represented by hatchure marks on the downhill side. The outermost depression contour line has the same value as the next lower normal contour line.

7) Contour lines form a V pattern when crossing streams. The V (upside down) always points upstream (uphill).



Relief

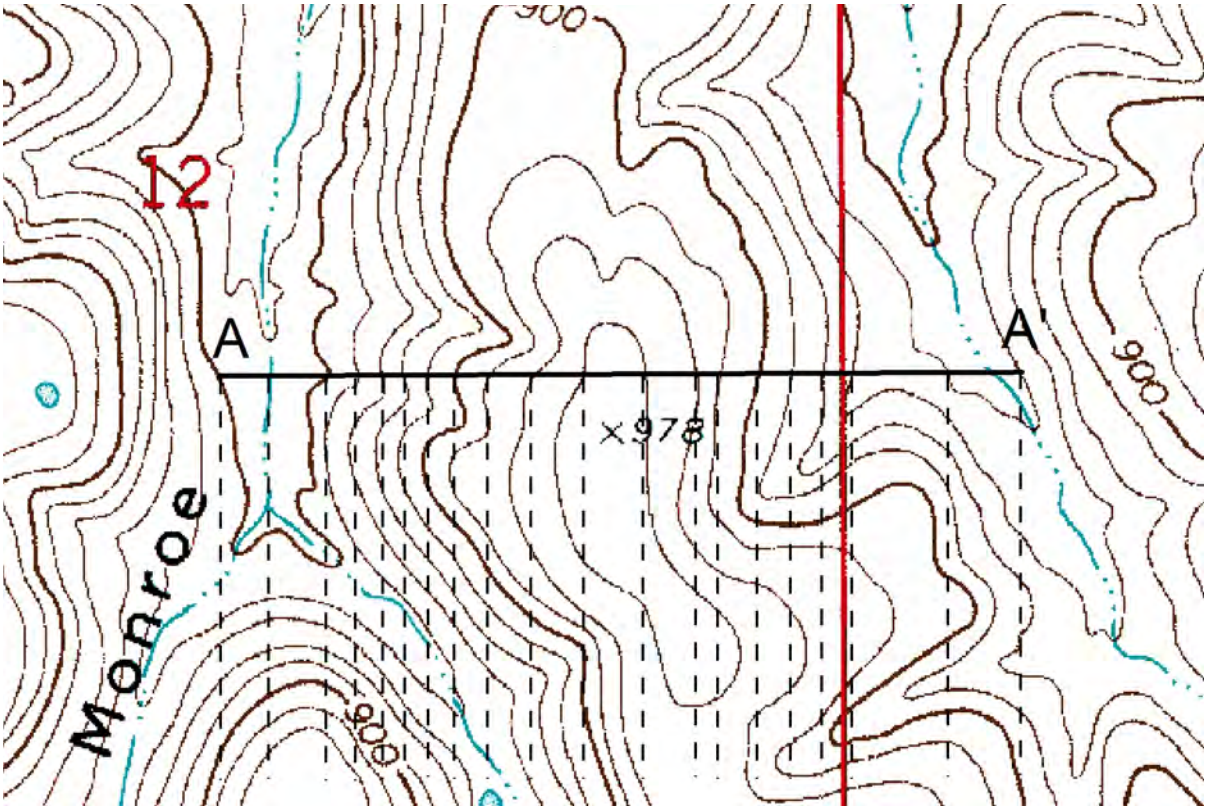
Relief is the difference in elevation between two points on a map and can be determined by using contours. Total relief on a map is the difference in elevation between the highest and lowest points on a map.

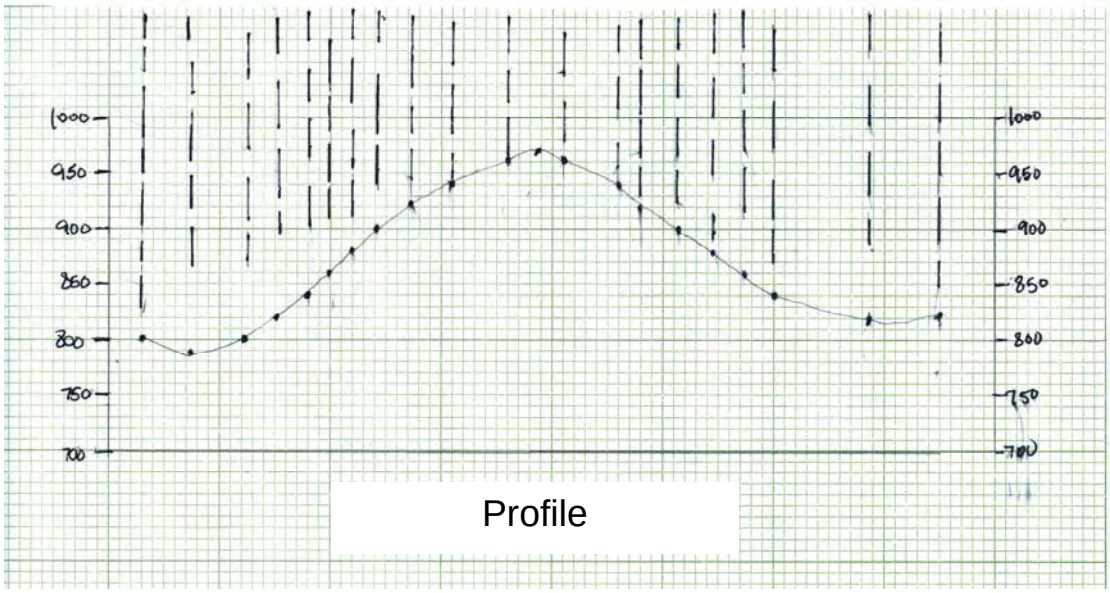
Topographic Profile

A topographic profile is a cross-section that shows the elevations and slopes along a given line. One can also think of it as a profile or silhouette of landforms as seen against the sky. To produce a profile, draw a line across specific landforms on a map then do the following.

1) Take the edge of a piece of graph or white paper and place it along the line on the map.
2) Mark on the paper the exact place where each contour line meets the piece of paper and number the elevation.
3) Also indicate any steam or landform locations on the paper as well.
4) Extend the marked lines to the correct elevation on the piece of graph paper.
5) Connect the dots to complete the profile.

Map





The cross-section above shows the profile along A-A' in the upper diagram. The edge of the paper (lower diagram) should be placed directly along the line of the profile and the contour line values marked.

Topographic Map Exercises

Exercise 1

Refer to the Melbourne Topographic Quadrangle and Geologic Worksheet to answer the following questions.

1. Determine the following:

    A. Contour Interval_____
    B. Elevation between Index Contours_____

2. Locate a gravel pit:
    A. What is the map symbol for a gravel pit?_____
    B. How many gravel pits do you see on the map?_____

3. Locate a spring:
    A. What is the map symbol for a spring?_____
    B. How many springs do you see on the map?_____

4. Locate Melbourne Cave:
    A. What is the location in the Land Grid System?_____
    B. What is the map symbol for a cave?_____
    C. Does this quadrangle contain karst topography?_____
    Why?_____
    _____
    _____

Exercise 2

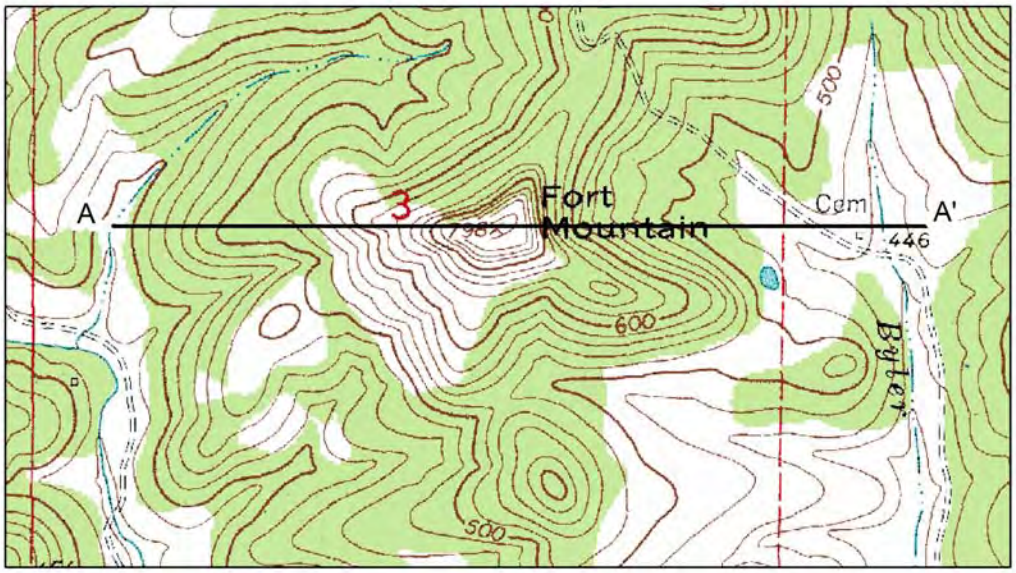
Refer to the Guion Topographic Quadrangle and Geologic Worksheet to answer the following questions.

1. Locate the mines in the town of Guion:
    A. What is the map symbol for a mine?_____
    B. What is being mined?_____

2. What is the highest elevation on the map?_____
3. Which is the steeper drainage?

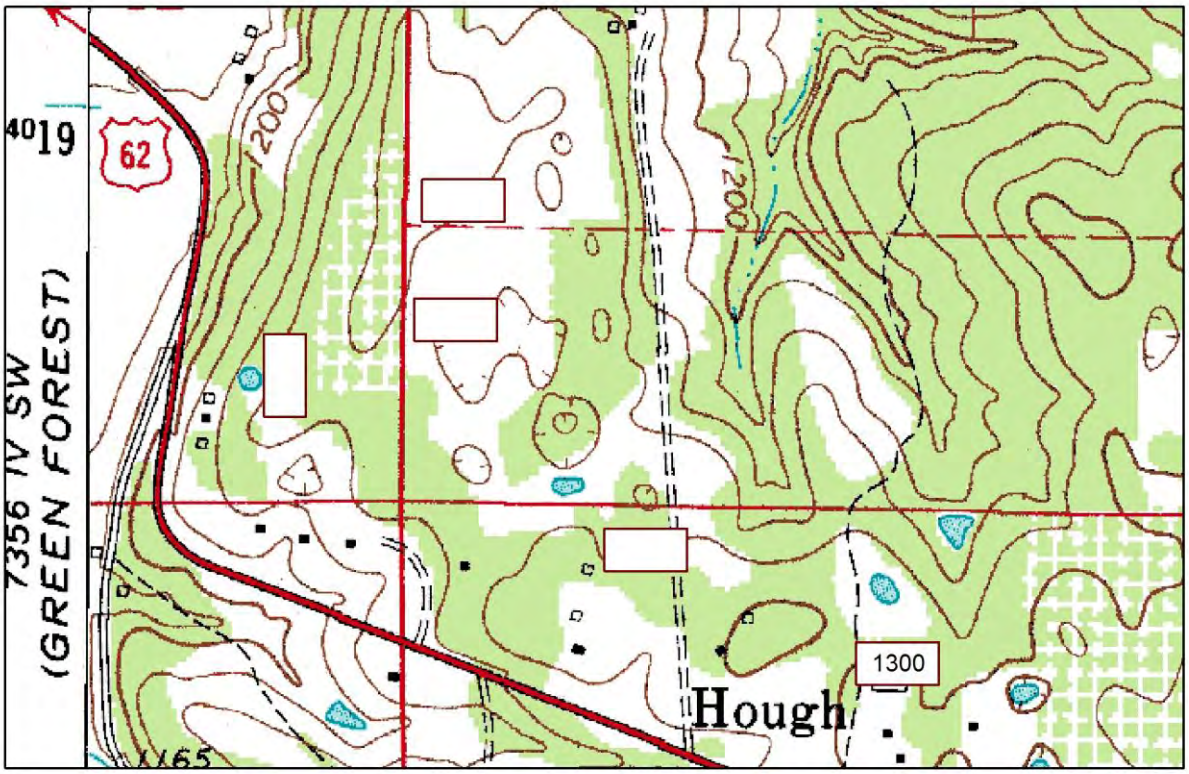
    Rock Castle Hollow or Beckham Hollow

4. What is the Relief of these two mountains?
   Wolf Den Mountain_____
   Meeks Mountain_____
5. Create a topographic profile across Fort Mountain from A-A' (see full size map for more details).



Exercise 3

The map below contains contour lines that represent depressions or sink holes. The contour interval is 20 feet. A couple of elevations are shown at 1200 and 1300 feet. Use standard contour intervals to fill in the correct elevations for the contour lines.



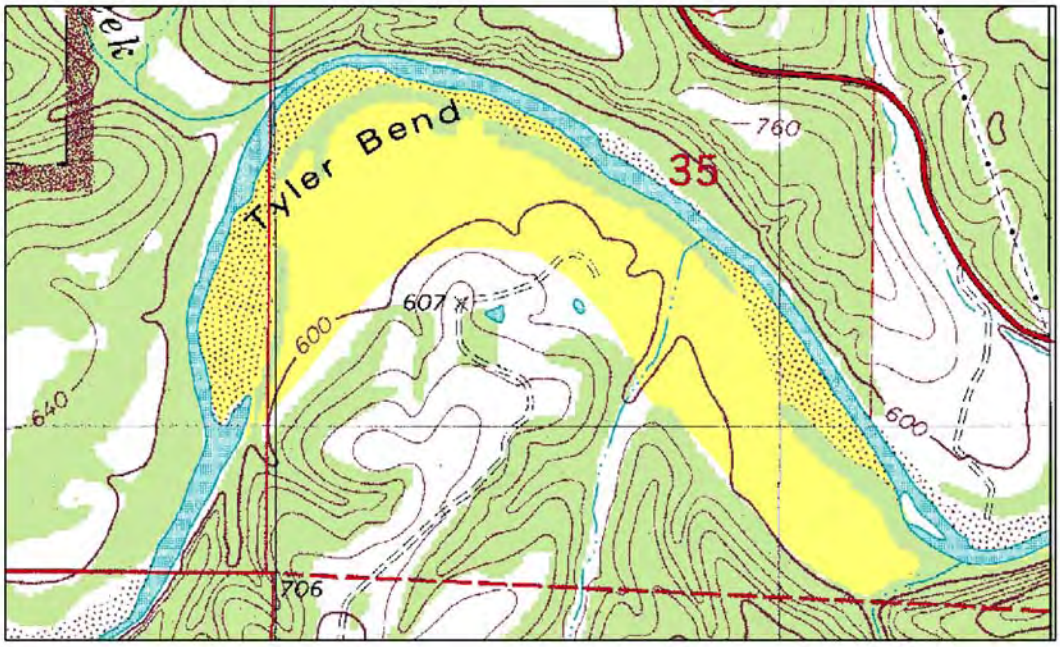
Interpretation of streams and landforms

Topographic maps allow users to examine large areas of the earth's surface. Streams and landforms as well as geologic structures are more easily viewed for geologic interpretation.

In this exercise we are going to investigate streams and their drainage patterns and landforms and learn about the geologic processes that formed them.

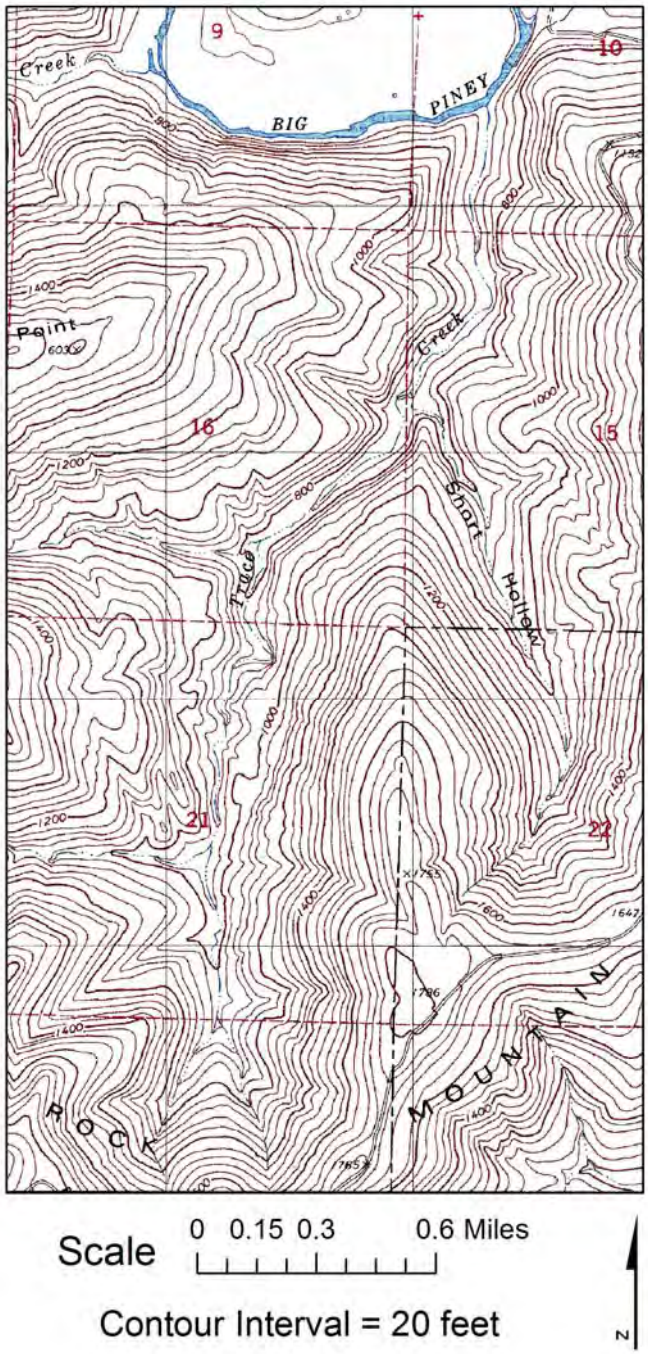
All definitions are from the Glossary of Geology, 1987.

Flood plain – The surface or strip of relatively smooth land adjacent to a river channel constructed by the present river in its existing regimen and covered with water when the river overflows its banks. It is built of alluvium carried by the river during floods and deposited in the sluggish water beyond the influence of the swiftest current. A river has one flood plain and may have one or more terraces representing abandoned flood plains.



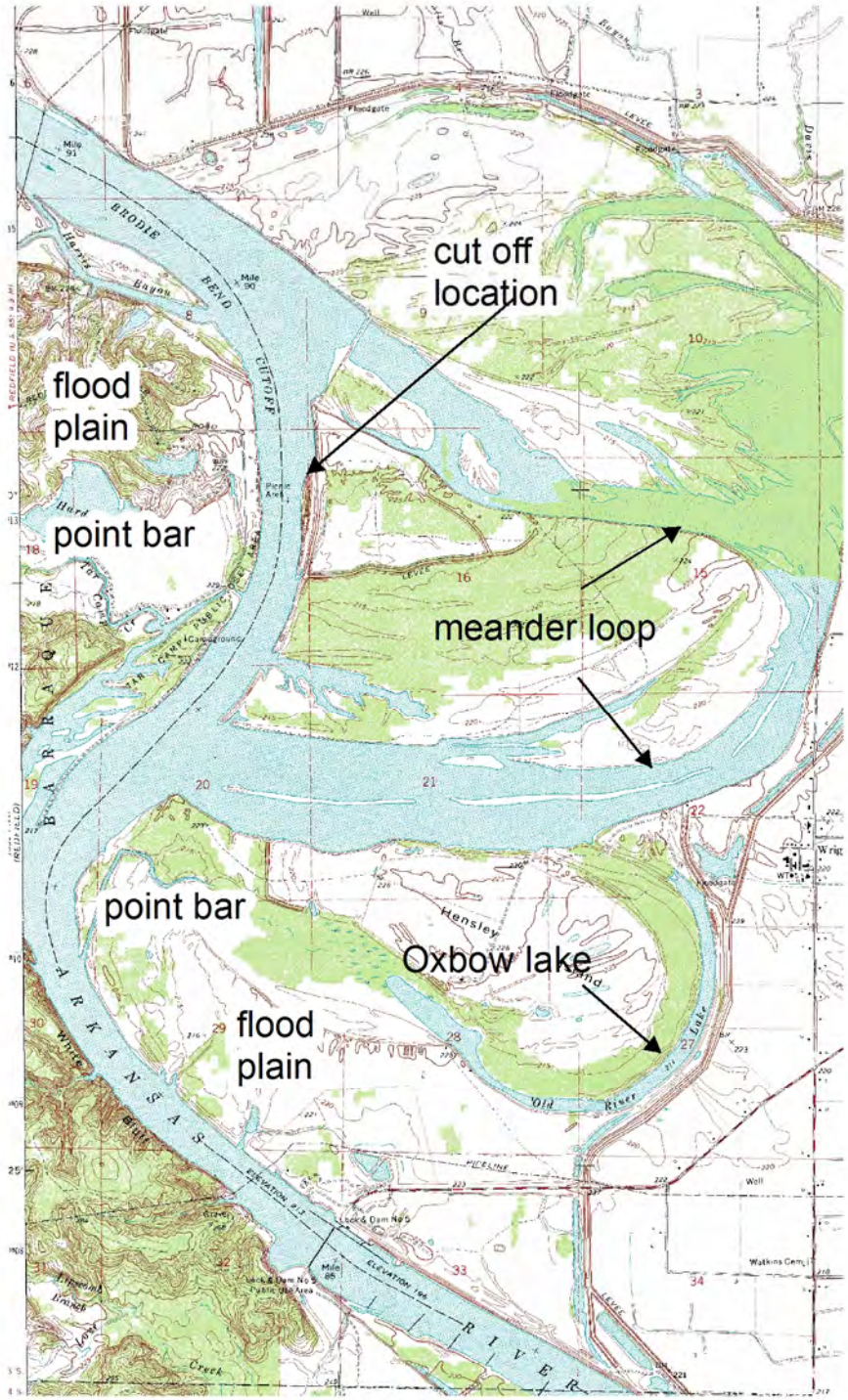
The map above shows the Buffalo River at Tyler Bend. The flood plain is colored in yellow. Notice the elevation of the floodplain compared to the surrounding terrain.

Gradient – A degree of inclination or rate of ascent or descent. The gradient of a stream is the steepness of the slope on which the stream flows. It is expressed as a ratio and measured in feet of fall per mile of travel. *To determine the gradient of a stream first measure the distance of the stream in miles. Next determine the difference in elevation (feet) between the headwaters of the stream and the ending of the stream. Divide the length of the stream in miles by the total number of feet.*

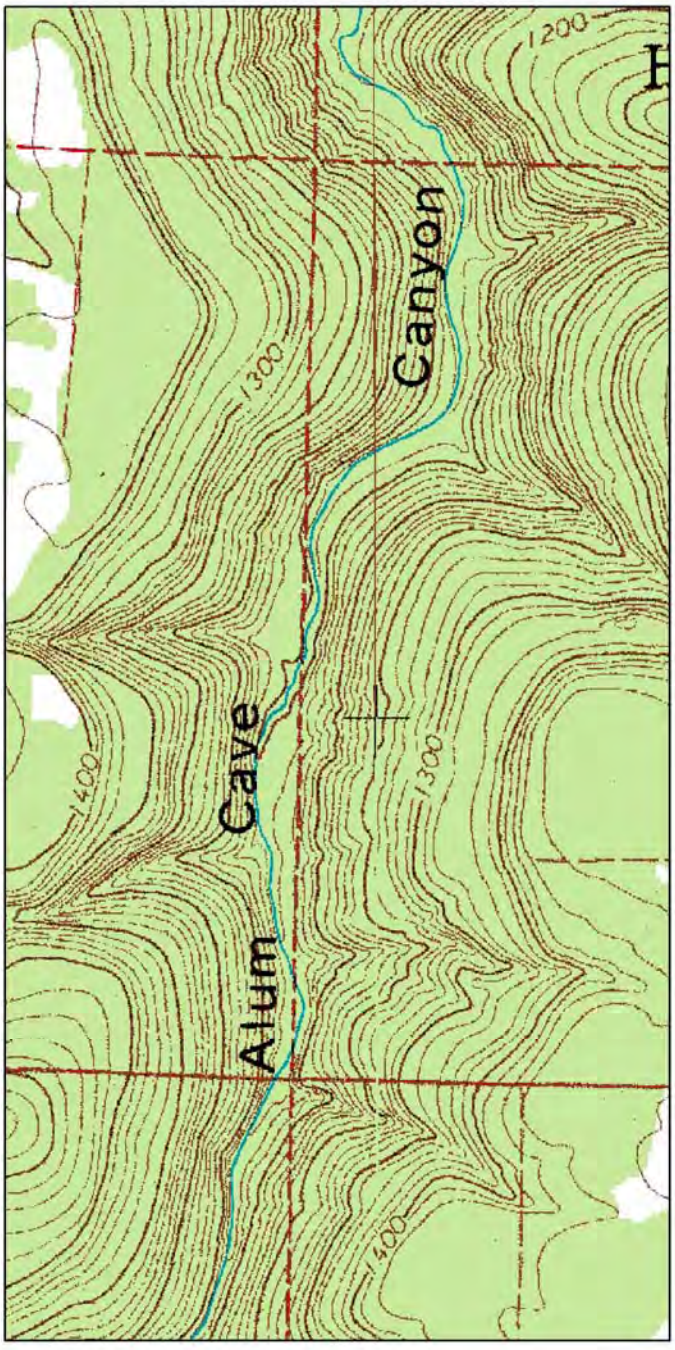


From the map we will calculate the gradient of Trace Creek. First measure the distance from the headwaters to Big Piney Creek. Use a string to measure off the mileage. The creek mileage is approximately 3 miles. Next subtract the elevation at Big Piney Creek from the higher elevation in the headwaters. The difference in elevation from the headwaters to the Big Piney is 680 feet. Therefore 680/3 = 227 ft per mile. We now know that Trace Creek descends 680 feet over a distance of 3 miles or 227 ft per mile.

Meandering stream – A mature stream that swings from side to side as it flows across its flood plain or shifts its course. A meandering stream develops sinuous curves, bends, loops, turns, or windings. A stream having a pattern of successive meanders.



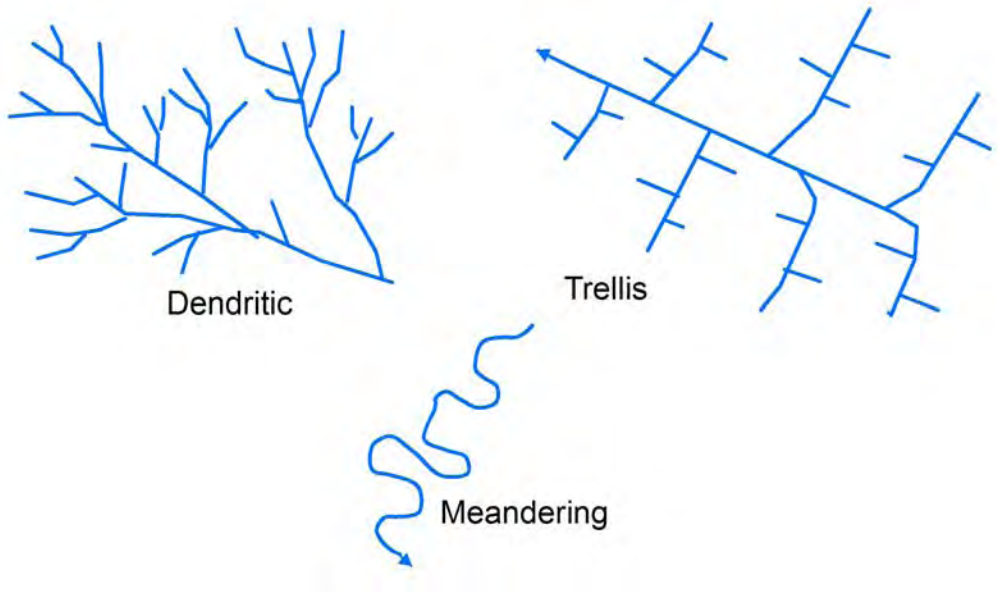
V-shaped valley – A valley having a pronounced cross profile suggesting the form of the letter “V”, characterized by steep sides and short tributaries; specif. a young, narrow valley resulting from downcutting by a stream. The “V” becomes broader as the amount of mass wasting increases.



This map shows an excellent example of a v-shaped valley. Notice the steep sides, approximately 300-400 feet of relief, and the short tributaries. Alum Cave Canyon is located near Alread Arkansas in the Ozark Plateaus Region.

Imagine a topographic profile from west to east across the canyon.

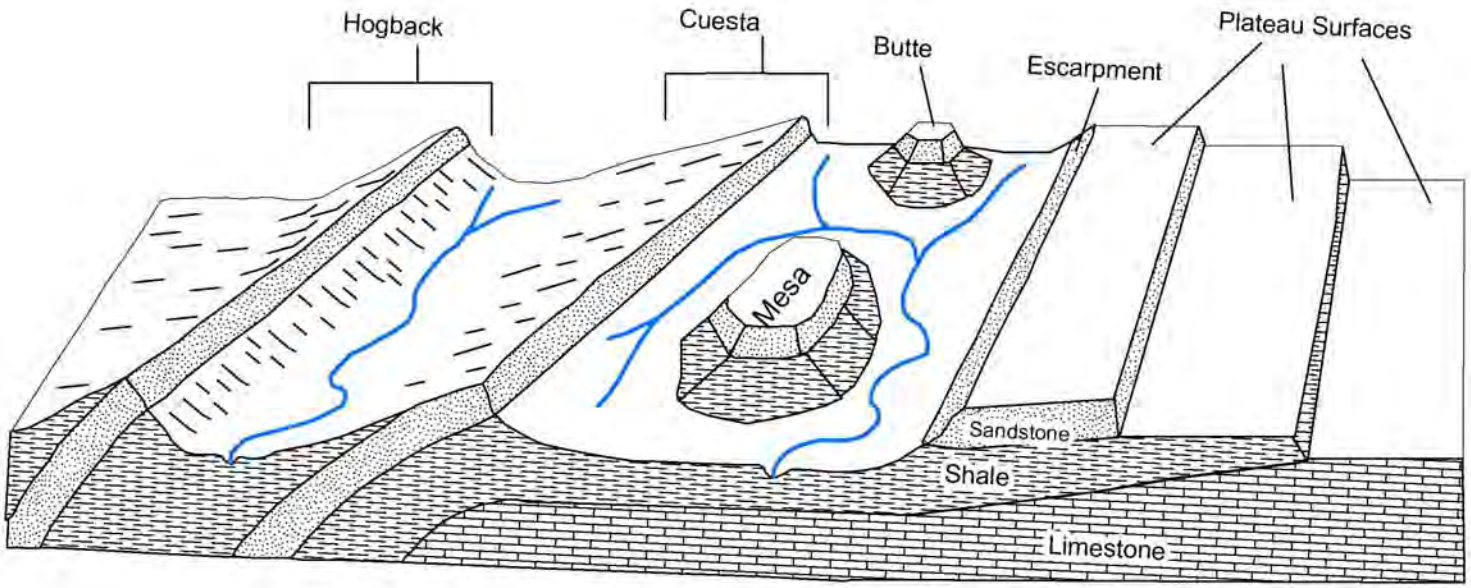
Stream Drainage Patterns



Varying stream patterns develop according to the underlying geology of an area. By familiarizing oneself with the different patterns a quick look at streams will allow for easier interpretation of the evolution of a landscape. The figure above shows the major stream drainage patterns observed in map view. The most common drainage pattern is dendritic, resembling the branches of a tree or root system. This drainage pattern is typical of streams that develop in regions underlain by relatively flat-lying or uniformly eroded sedimentary rock. A trellis pattern will result where rocks have been folded and bent into long folds and eroded into resistant ridges and valleys. A meandering stream develops in areas of relatively low relief.

Landforms

The landscapes that we see around us today were formed first by geologic forces in the past and from erosion and weathering by water, wind and ice, that continues today. The steepness of hillsides and gradient of rivers are controlled by the erosional resistance of the underlying rock. Generally speaking sandstone is more resistant to weathering and erosion than shale or limestone. Shale tends to form more gentle slopes and valleys where sandstone forms the caprock of hills and produce steep slopes. The figure below illustrates how the erosional resistance and orientation of rock layers controls the formation of landforms.



This diagram illustrates different landforms that were created by erosion and weathering in response to the underlying geology. Modified from Vanarsdale, 1991.

Landform definitions (Glossary of Geology, 1987)

Butte – a conspicuous, usually isolated, generally flat-topped hill or small mountain with relatively steep slopes or precipitous cliffs, often capped with a resistant layer of rock and bordered by talus and representing an erosion remnant carved from flat-lying rocks; the summit is smaller in extent than that of a mesa.

Cuesta – a hill or ridge with a gentle slope on one side and a steep slope on the other; an asymmetric ridge; the formation of the ridge being controlled by the differential erosion of the gently inclined strata.

Escarpment – a long more or less continuous cliff or relatively steep slope facing in one general direction, breaking the continuity of the land by separating two level or gently sloping surfaces and produced by erosion or by faulting.

Hogback – any ridge with a sharp summit and steep slopes of nearly equal inclination on both flanks, and resembling in outline the back of a hog; specifically a sharp-crested ridge formed by the outcropping edges of steeply inclined resistant rocks and produced by differential erosion.

Plateau - Plateaus – Broadly, any comparatively flat area of great extent and elevation; specif. an extensive land region considerably elevated (more than 150-300 m in altitude) above the adjacent country or above sea level; it is commonly limited on at least one side by an abrupt descent, has a flat or nearly smooth surface but is often dissected by deep valleys and surmounted by high hills or mountains and has a large part of its total surface at or near the summit level. A plateau is usually higher and has a more noticeable relief than a plain.

References:

Vanarsdale, Roy, 1991, Geologic interpretation of remote sensor imagery and Topographic maps, *in* Methods and Practices of Physical Geology, Third Edition, by Konig and Zachry, Jr., University of Arkansas.

Exercise 1 (Refer to Moore Quadrangle)

Calculate the gradient of Long Devils Fork from its headwaters to its confluence with big Devils Fork in the western portion of the quadrangle.

Calculate the distance of the stream_____

Calculate the elevation difference_____

Gradient_____

Do you expect this stream to have waterfalls?_____

Compare the floodplain of both Devils Forks to the floodplain of Richland Creek.

What is the difference and why?_____

Exercise 2 (Refer to Beaver Quad)

Which drainage pattern is present in the southern portion of this quadrangle?

What can you infer about the underlying geology of this region?

Exercise 3 (Refer to Nichols Mountain Quadrangle)

Which drainage pattern is represented on this quadrangle?_____

Why is this?_____

Exercise 4 (Refer to De Valls Bluff Quadrangle)

Calculate the gradient of the White River from the northern edge of the quadrangle to the southern edge of the quadrangle.

Calculate the distance_____

Calculate the difference in elevation_____

Calculate the gradient_____

Compare the gradient of the White River with the gradient of Long Devils Fork from Exercise 1.

What is the difference and why?_____

_____

In which physiographic regions are each stream located?_____

_____

Exercise 5 (Refer to Casa Quadrangle)

Look at Cove Mountain and Rose Creek Mountain. Observe the shape of the mountains and answer the questions below.

Which side of the mountain is the steepest?_____
Is this feature shaped like a canoe upside down or right side up?_____

Examine the drainages south of Cove Mountain and north of Rose Creek Mountain. Which direction can we infer that the rock is dipping?_____

Which geologic structure would this be? Anticline or syncline?_____

_____

Exercise 6 (Refer to Caddo Valley Quadrangle)

Compare the landforms and stream pattern on the northwestern portion of the quadrangle to those on the southeastern portion of the quadrangle.

Imagine a line separating the two different regions. Which physiographic regions are represented in this quadrangle?

_____

Exercise 7 (Refer to Perryville Quadrangle)

Compare the streams and landforms in the northern part of the map to those in the southern part of the map.

Imagine a line separating the two different regions along Highway 10 running east to west. Which physiographic regions are represented on this quadrangle?

_____

Exercise 8 (Refer to landforms diagram and Prairie Grove Quadrangle)

Compare the landforms in the northwest portion of the quadrangle to the small hill south of Prairie Grove and to Stevenson Mountain.

Which landform names can be applied to these hills?

_____

What can you infer from the landforms and the stream pattern?

Exercise 9 (Refer to landforms diagram and Ferndale Quadrangle)

Examine the ridge created by Brush Mountain in the southern portion of the quadrangle. Notice the steepness of both sides of the ridge.

Which landform name can be applied to this ridge?_____

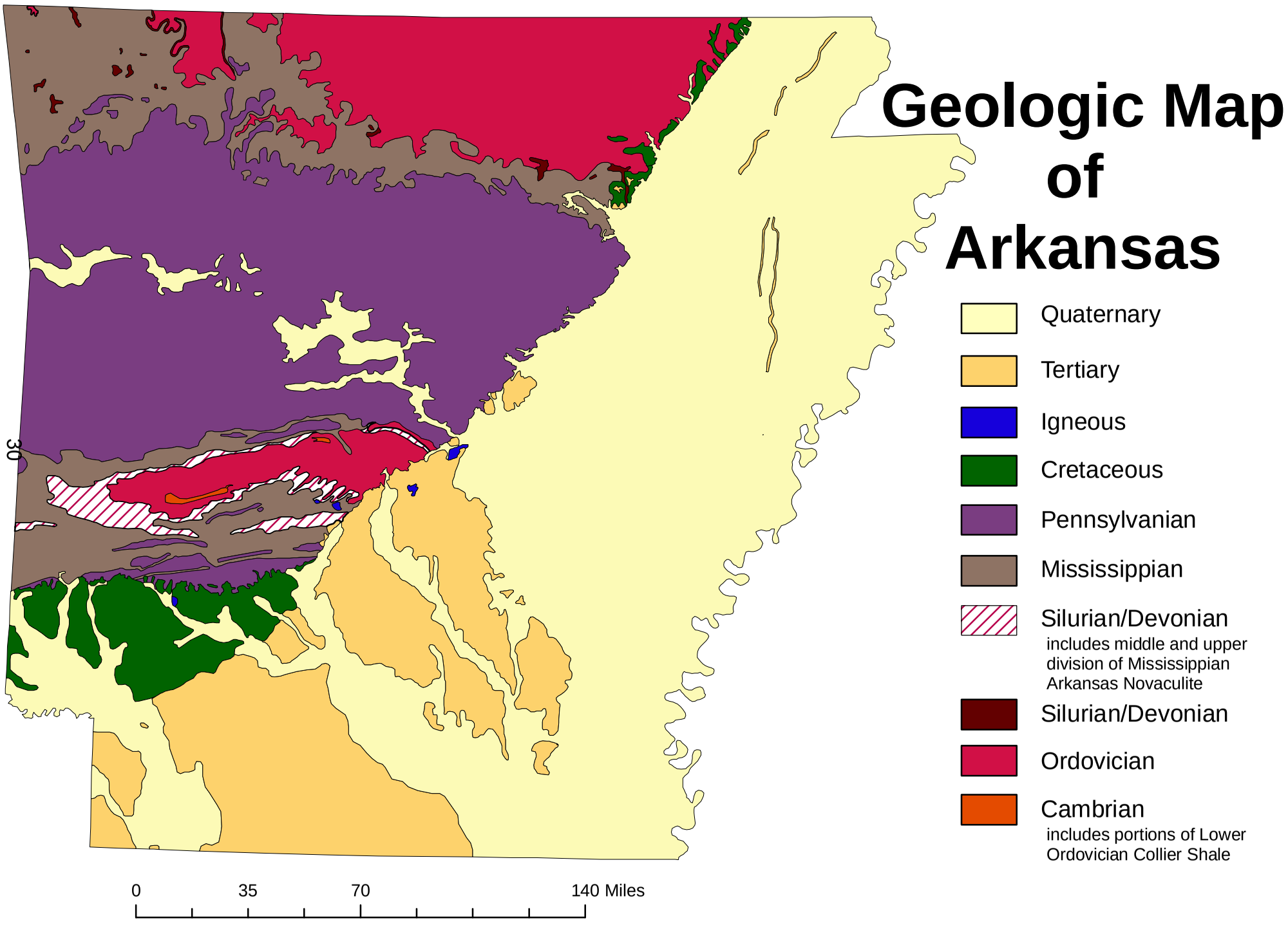
What can you infer from these features and the stream pattern?_____

Exercise 10 (Refer to landforms diagram and Rich Mountain Quadrangle)

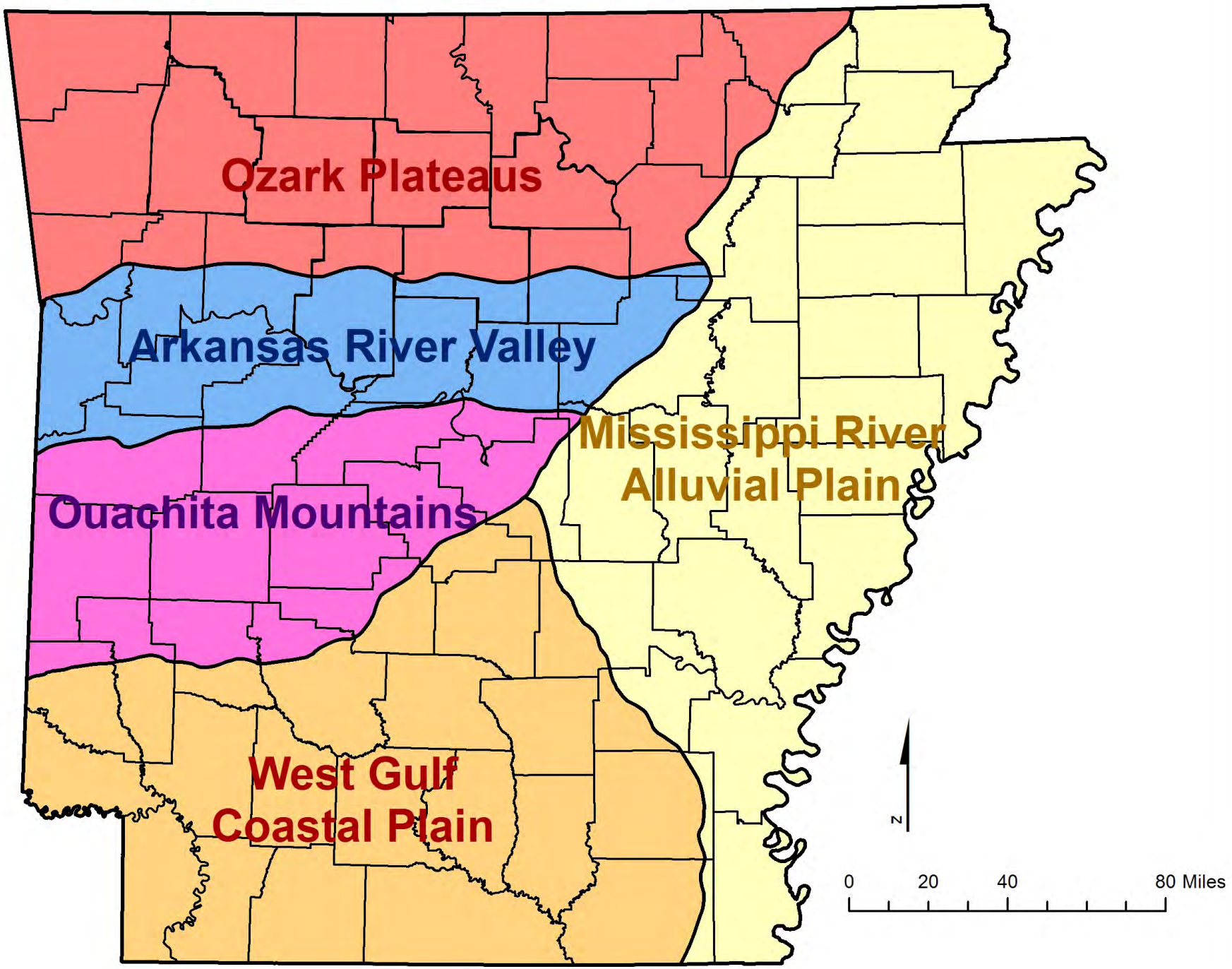
Examine Rich Mountain. Follow Highway 88 (Skyline Drive) and notice the steepness on both sides of the ridge.

Which landform name can be applied to this ridge?_____

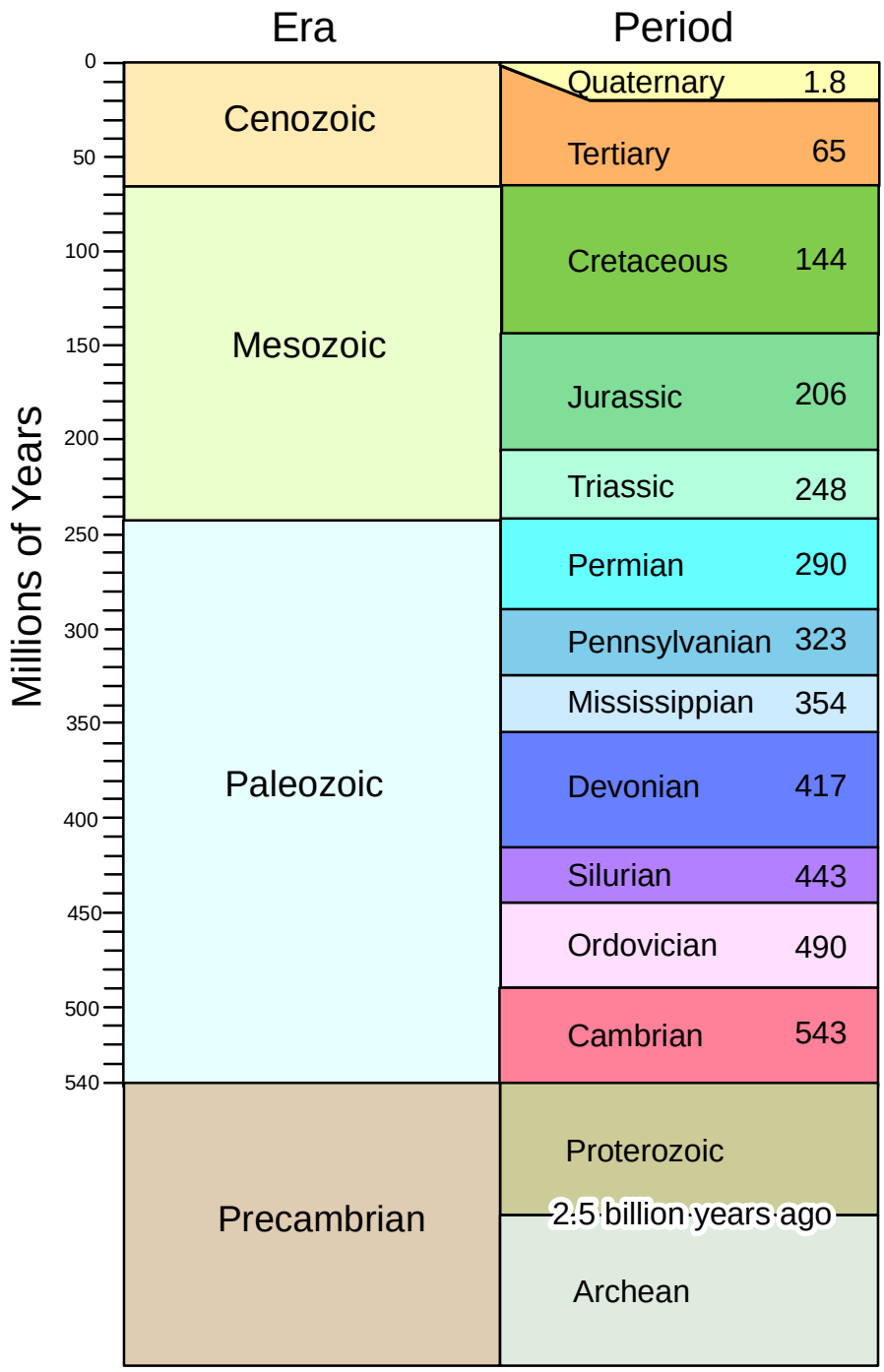
In which physiographic region is the feature located? _____
_____


Geologic Map of Arkansas
Quaternary
Tertiary
Igneous
Cretaceous
Pennsylvanian
Mississippian
Silurian/Devonian
includes middle and upper division of Mississippian Arkansas Novaculite
Silurian/Devonian
Ordovician
Cambrian
includes portions of Lower Ordovician Collier Shale
30
0
35
70
140 Miles

Physiographic Regions of Arkansas



Geologic Time Scale



Based on 1999 Geologic Time Scale
Geological Society of America