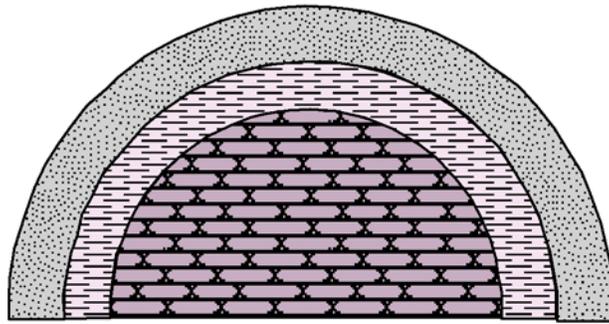


Glossary of Terms

Abyssal – a term applied to an ocean environment below 6,000 feet deep

Artesian – a natural flow of well or spring water to a height above the surface

Anticline – an upfold (arch) in sedimentary strata



Cross section view

Barite – a mineral composed of barium sulfate

Basement rock – igneous or metamorphic rock that underlies a sedimentary rock sequence

Basin – a structural (bowl-like) depression in the Earth's crust

Bedrock – solid rock that underlies the superficial covering of soil or alluvial deposits

Boxwork concretion – an accumulation of weathering-resistant mineral matter, usually an iron oxide, along fractures, resulting in a geometric pattern of ridges and hollows in rock outcrops, often in sandstones

Brackish water – mixed fresh and sea water

Calcite – a mineral composed of calcium carbonate, the principle mineral in limestone; also numerous types of fossils have this composition since numerous organisms have the ability to convert calcium, carbon, and oxygen present in sea water into shells and other types of structural framework

Carpet rock – a rock, usually sandstone, with a geometric pattern of ridges and “hollowed-out” depressions which were formed due to weathering of intersecting mineralized (hardened) fractures

Coal – a combustible, brown to black sedimentary or metamorphic rock

Ranks of coal arranged in increasing heat value per pound:

Lignite > Bituminous > Semi-anthracite > Anthracite (metamorphic)

Chaotic structure – a complex jumble of folded and faulted sedimentary rocks resulting from extreme tectonic forces

Chert – a microcrystalline variety of quartz (silicon dioxide)

Clastic – a term applied to sediment composed of weathered (broken) fragments of minerals or rocks, for example: gravel, sand, silt

Clay - a group of very fine-grained minerals produced by the weathering of igneous and metamorphic rocks, especially those containing feldspars, which are transported by rivers to basins of deposition where the clay is compacted and converted into shale by the heating and pressure provided by deep burial

Conglomerate – a sedimentary rock composed of large (greater than 2 millimeters in diameter) rounded mineral or rock fragments and finer sediment held together by a mineral cement

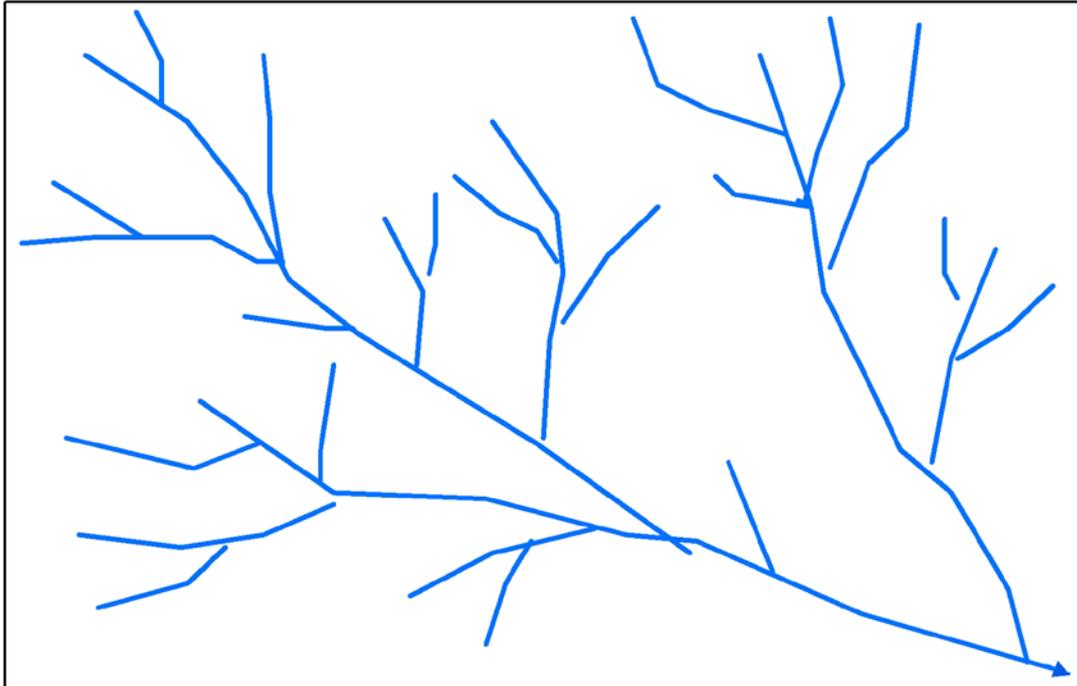
Continental shelf – a portion of a continent covered by shallow sea water (maximum depth of 600 feet)

Core – the innermost zone of the Earth’s internal structure

Crust – the outermost rocky zone of the Earth’s internal structure, thickness from 3 to 43 miles (5 to 70 km)

Delta – a deposit of sediment formed at the mouth of a river upon entry to the ocean or a lake

Dendritic drainage pattern – streams that are arranged in a pattern that resembles the branching of a tree, usually developed across a rock or soil surface that is uniformly resistant to erosion, such as horizontal sedimentary rocks



Map view

Dickite – a clay mineral often present along fault surfaces; it is considered to indicate that hydrothermal fluids were present along the fault surface

Dike – an igneous intrusion (pluton) that has a tabular shape that cuts across surrounding rock structures

Dip – the angle of inclination (tilt) of a bed of sedimentary rock as measured from a horizontal plane to the surface of the bed; the positions of other geologic features (fault planes, veins of mineral matter, etc.) may also be described in the same manner

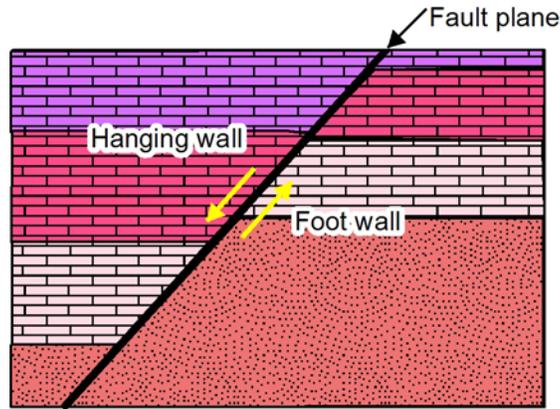
Dolostone – a sedimentary rock composed of dolomite (calcium-magnesium carbonate)

Dome – an upfold (inverted bowl) in the Earth's crust

Drag fold – a minor fold in sedimentary strata produced by friction as a result of faulting

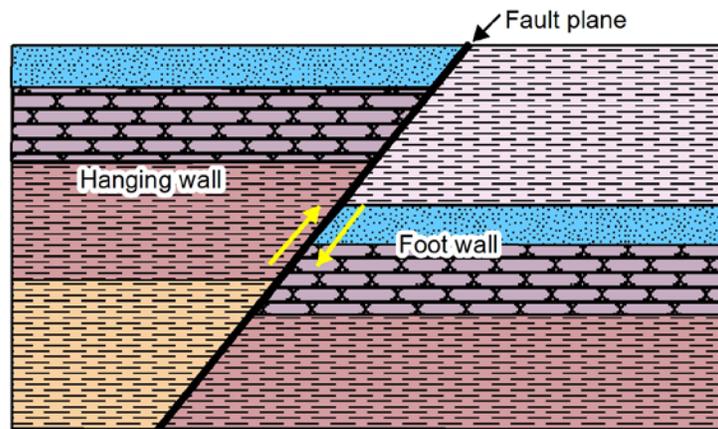
Faults –

Normal or Gravity fault – a rupture in rock material caused by tension and gravity, resulting in the rocks above the fault break (hanging wall) moving downwards



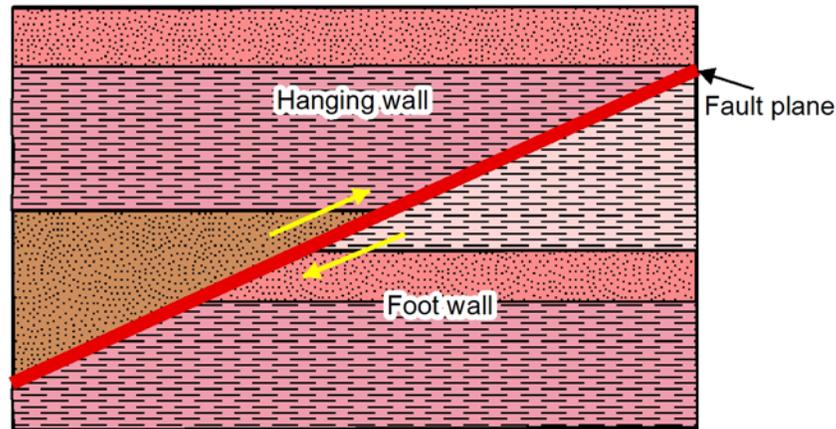
Cross section view

Reverse fault – a rupture in rock material caused by compression, resulting in rocks above the fault break (hanging wall) moving upwards along the break at an angle greater than 45 degrees to the horizon



Cross section view

Thrust fault – a rupture in rock material caused by extreme compression, resulting in movement (at an angle less than 45 degrees) of rock masses over once adjacent rocks, perhaps for many miles



Cross section view

Feldspar – the most abundant mineral family in igneous and metamorphic rocks; including: orthoclase – albite (potassium – sodium aluminosilicate) and plagioclase (sodium – calcium aluminosilicate)

Fissile -- thin-bedded rock, usually shale, that splits into layers less than 2 mm thick

Flysch – a sequence of thinly-bedded marine sediments (clay-rich limestone, calcite-rich shale, conglomerate, coarse sandstone, and a “dirty” sandstone (greywacke) containing a wide variety of mineral types characteristic of igneous and metamorphic rocks); formed as a result of erosion of a rising landmass, prior to the main stage of mountain building activity

Footwall – the rocks below a fault plane

Formation – a term that is applied to a group of sedimentary strata (sandstone, shales, etc.) that form at approximately the same time

Fossils:

Algae – an aquatic nonvascular plant (seaweed, pond scum, stoneworts)

Annelid – marine worm

Brachiopod – “lampshells”, a marine invertebrate with two unequal shells that are symmetrical on either side of a mid-dividing line

Bryozoa - “moss animals”, small invertebrate marine animals (less than 1 mm in length) that live in colonies and build calcareous skeletons of many, often branching forms

Cephalopod – a marine mollusk with an external calcareous straight or coiled shell that is divided into successively larger chambers as the animal grows

Coral – a large, varied group of colony-forming, bottom-dwelling marine organisms that secrete a calcareous external skeleton

Crinoid – “sea lily”, a bottom-dwelling marine organism of the phylum Echinodermata, class Crinodia, commonly-found fossils are of the column or stem of the organism which supported a calyx (head)

Conodont – small, tooth-like in appearance, but of uncertain function or type of parent organism; however they are very distinctive and useful as geologic time markers from Cambrian to Upper Triassic

Echinoderms – marine invertebrates with radial symmetry like “starfish”; that do not form colonies; crinoids are a member of this group

Gastropods – “snail”; mollusks that form a single spiral-form shell that is not divided into chambers

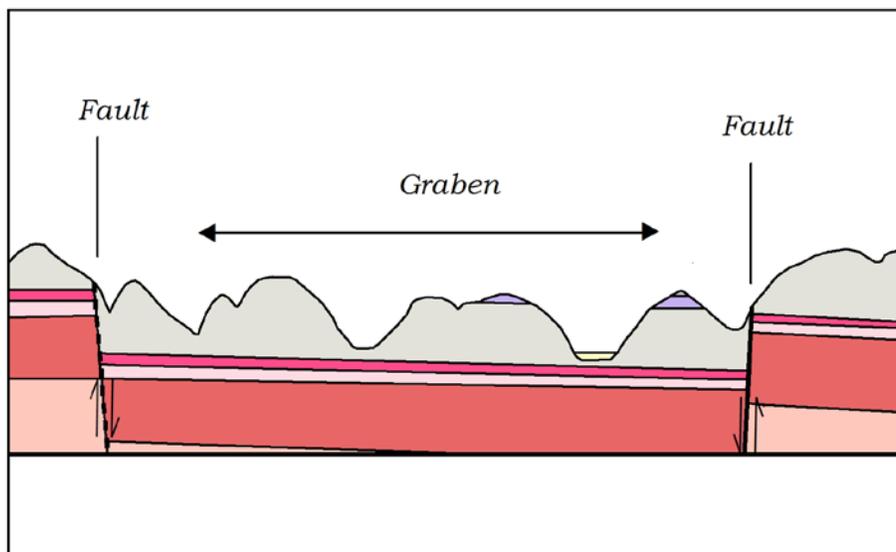
Lycopod – a land plant related to modern “club moss”

Trilobite – a marine arthropod with a three-lobed outer shell (head, mid-section, tail) that is divided lengthwise into central (axial) and side regions; became extinct in the Permian Period

Geosyncline – a very large downwarp in the basement rock into which extremely thick masses of sediments (several tens of thousands feet) may accumulate, formed in subduction zones where ocean crust is downwarped adjacent to a continent

Glaucinite – a green-colored mica-like mineral, containing iron and potassium, that forms in a marine environment, sometimes called “greensand”

Graben – a down-dropped block of the Earth’s crust between two normal faults



Cross section view

Granite – a coarse-grained (phaneritic) igneous rock composed of quartz and alkali feldspars (orthoclase, microcline, and albite); that cooled (solidified) in a deep plutonic setting

Hanging wall – the rocks above a fault plane

Hematite – a mineral composed of iron oxide, usually formed by the weathering (oxidization) of iron-bearing rocks and minerals

Hornfels – a dark gray to black, brittle, hard, non-foliated metamorphic rock, often formed due to heat promoting recrystallization of shale at the contact between the shale and an intruding magma

Igneous – rocks that crystallize from a molten material (magma in the subsurface or lava on the surface) upon cooling

Inlier – an outcropping of younger rock strata surrounding an exposure of older rocks; often caused by erosion of an anticline or thrust fault resulting in an exposure of the underlying core of older strata

Joint – a fracture in rocks along which there is no significant movement, except a “pull-apart” of a few inches or less

Karst topography – a type of landscape that develops in an area with soluble bedrock (limestone, dolostone, gypsum, halite) causing the formation of caves, sinkholes, springs, and other unique features

Limestone – a chemically-precipitated sedimentary rock composed of calcite (calcium carbonate)

Limonite – a non-crystalline variety of hydrous iron oxide that may form during the weathering of iron-rich rocks and minerals

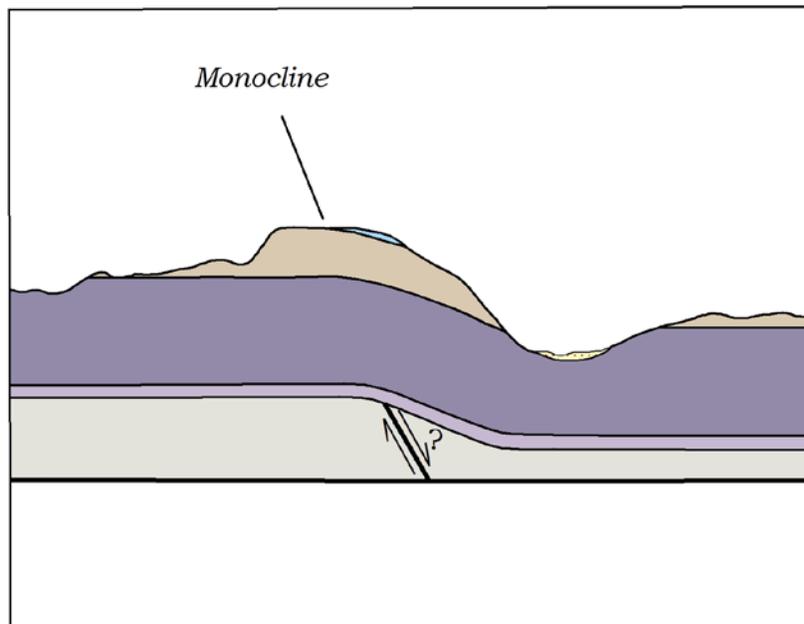
Liesegang banding – rings or bands of color developed in rocks due to the rhythmic precipitation of iron oxides or other minerals during weathering

Magma – molten rock material below the Earth’s surface that when cooled and crystallized becomes igneous rock

Mantle – the intermediate zone of the Earth’s internal structure from 43 to 1,800 miles (70 to 2,900 km) below the surface, composed of silicate rock, comprises 82 percent of the Earth’s volume

Metamorphic – a family of rocks that develops after earlier-formed rock is exposed to increased heat, pressure, and/or chemically active fluids, and as a result undergo changes in composition, texture, and structure

Monocline – a step-like fold in sedimentary strata



Cross section view

Nappe – a large mass of rock moved forward one mile or more by thrust faulting or overturned folding

Nodule – an irregularly-shaped mass of mineral matter of different composition than the surrounding rock material

Novaculite – a massively-bedded sedimentary rock composed of microcrystalline chert (silicon dioxide)

Orogeny – the process, usually involving intense compressive forces being applied to thick masses sediment, leading to the formation of folded and thrust-faulted mountains

Outcrop – a surface exposure of bedrock; not soil or alluvium

Peneplain – a low-elevation large area land surface lacking significant topographic relief, formed by long-term weathering and erosion nearly to sea level, that later was uplifted as a unit to form a plateau, thus allowing streams to begin another erosion cycle

Physiographic – relating to the landform features of the Earth's surface

Plate – a continental-size, solid portion of the Earth's crust that can move across the semi-solid material below the crust

Plate tectonics – a theory developed in the 1960's that explains the structure of the Earth's crust and phenomena such as earthquakes, volcanoes, and mountains, as the result of the crust being divided into solid-rock plates that move across hotter, less rigid underlying rock (mantle)

Plunging folds – since folds are three-dimensional structures their crests or troughs do not always remain the same in respect to the horizon, so plunging folds tilt down or up when compared to an imaginary horizontal plane

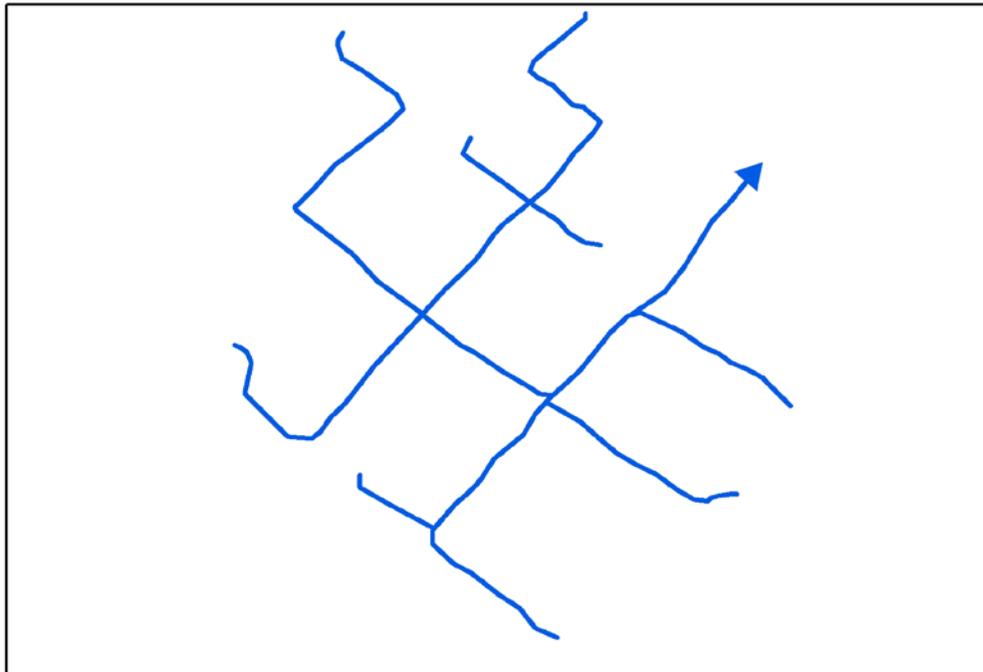
Pluton – a general term applied to any size or shape of igneous rock mass within the Earth's crust, for example: dike, sill, stock, etc.

Plutonic – a type of igneous rock that forms when magma cools deep underground allowing crystals to form that can be seen without magnification

Quartz – a mineral composed of silicon dioxide, varieties include: chalcedony (agate), chert, flint, jasper, novaculite, smoky, and crystal

Recrystallize – a process whereby a mineral may resume the crystallization process because of being placed in a higher temperature, or higher pressure, often fluid-rich environment; resulting in the growth of some minerals at the expense of others

Rectangular drainage – a stream pattern controlled by fractures or faults that intersect at nearly a right angle



Map view

Rifting – a tectonic process caused by tension in the Earth’s crust that results in the formation of rift valleys (grabens) on continents and the sea floor

Rhyolite – a fine-grained (aphanitic) igneous rock that cooled quickly at or near the surface of the Earth and is the volcanic equivalent of granite (quartz and alkali feldspars)

Rock cleavage – a regular fracture pattern in rocks due to tectonic forces, not related to cleavage in minerals

Sand – refers to the size of sediment having grains between 2 and 1/16 millimeters in diameter

Sandstone – a sedimentary rock composed of sand-sized (2–1/16 millimeters) mineral grains

Sediment – loose mineral grains that are weathered from rocks, transported by wind, water, and/or glacial ice, and deposited a distance from their source

Sedimentary – a family of rocks that form from weathered rock residue or are chemically precipitated from water, which characteristically display bedding or layering

Shale – a very fine-grained sedimentary rock often with thin laminations resulting in a flaky habit

Sill – a tabular-shaped, igneous intrusion (pluton) that is parallel to the enclosing sedimentary rocks

Silt – sediment that is finer grained than sand

Siltstone – a clastic sedimentary rock composed of silt-size particles (less than 1/16 millimeter in diameter)

Slate – a platy, fine-grained, hard metamorphic rock that often breaks into plate-like pieces

Slickensides – a polished surface, often with ridges and grooves, on a fault plane indicating the direction of movement of the adjacent rock masses

Sole thrust fault – the lowest thrust fault in a shingle-like stack of faults

Strata – layers of sedimentary rock

Stratigraphy – the study of sedimentary rock layers, including: composition and size of mineral and rock grains, cementing material, bedding plane patterns, fossil content, regional distribution, bed succession, and age of deposition

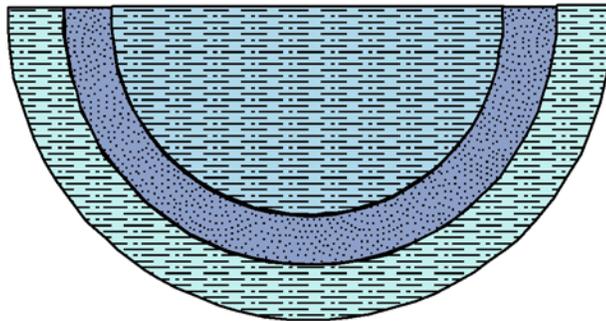
Strike – the compass direction a sedimentary bed or fault makes upon intersecting the horizontal plane

Subduction – a process that results in a plate of the Earth's crust, usually ocean basin crust, being drawn below another plate of the crust, usually continental crust

Submarine fan – a fan-shaped marine deposit of sediment carried down a continental slope by turbidity flow of water and sediment of mixed grain sizes

Syenite – a coarse-grained (plutonic) igneous rock composed of alkali feldspar (orthoclase and albite) and a minor amount of dark minerals (hornblende or biotite), similar to granite in texture and mineral content except for the absence of quartz since the parent magma was deficient in silica. It is the most common plutonic rock exposed in Arkansas.

Syncline – a downfold (trough) in sedimentary strata

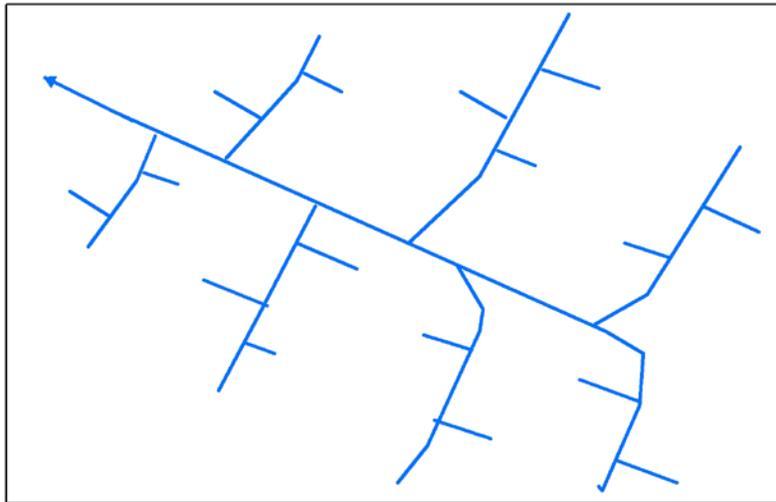


Cross section view

Tectonic – forces or processes that change the structure of the Earth's crust

Terrace – an elevated flat area of alluvium situated above the present-day floodplain, formed as a previous floodplain prior to the river eroding its channel to a lower level

Trellis drainage – a stream drainage pattern consisting of a main channel with numerous tributary channels that enter at nearly right angles, resulting from stream erosion of strata with alternating resistant and non-resistant characteristics



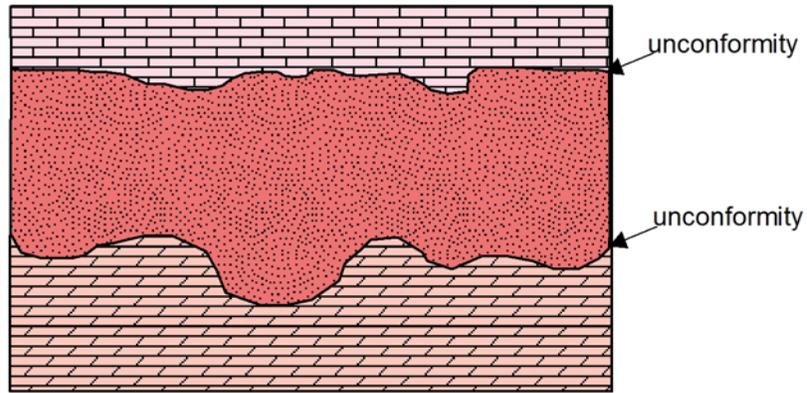
Map view

Tuff – a rock composed of compacted volcanic ash

Turbidite – a sedimentary deposit (submarine fan) formed because of a turbidity current down the continental slope

Turbidity current – a flow of mixed sizes of sediment and water as a “slurry” (like fresh cement) that, due to its higher density than water, will stay in contact with the bottom and not significantly mix with water being displaced by the flow

Unconformity – a zone of erosion or non-deposition in a sedimentary sequence of strata, marking a gap (missing sediments, thus a time gap) in the sedimentary record



Cross section view

Vein – a mineral-filled fracture

Water gap – a stream valley that cuts across a ridge of resistant rock strata

References -

Publications

Blakey, R.C., Paleogeography and Geologic Evolution of North America, Northern Arizona University, <http://www2.nau.edu/rcb7/RBC.html>

Bush, W.V., Haley, B.R., Stone, C.G., and McFarland, III, J.D., 1978, A Guidebook to the Atoka Formation in Arkansas, Arkansas Geological Commission, 62 p.

Bush, W.V., Haley, B.R., Stone, C.G., Holbrook, D.F., and McFarland, III, J.D., 1980, A Guidebook to the Geology of the Arkansas Paleozoic Area: Arkansas Geological Commission, Guidebook 77-1, Revised 1980, 79 p.

Clardy, B.F., and Bush, W.V., 1978, Mercury District of Southwest Arkansas: Arkansas Geological Commission, Information Circular 23, 57 p.

Cline, L. M., Hilseweck, W.J., and Feray, D.E., Editors, 1959, The Geology of the Ouachita Mountains – A Symposium: Dallas Geological Society and Ardmore Geological Society, 208 p.

Flawn, P.T., Goldstein, Jr., A., King, P.B., and Weaver, C.E., 1961, The Ouachita System: Bureau of Economic Geology, The University of Texas, Austin, Publication Number 6120, 399 p.

Franks, K.A., and Lambert, P.F., 1982, Early Louisiana and Arkansas Oil – A Photographic History 1901-1946: Texas A&M University Press, 243 p.

Fridleifsson, I.B., et al., 2009, The Possible Role and Contribution of Geothermal Energy to the Mitigation of Climate Change, International Geothermal Association Website.

Guccione, M.J., 1993, Geologic History of Arkansas Through Time and Space: Geology Department, University of Arkansas, available on website of Arkansas Geologic Survey, 46 p.

Headrick, K.N., and Wise, O.A., Editors, 1973, Contributions to the Geology of the Arkansas Ozarks: Arkansas Geological Commission, 106 p.

Howard, J.M., 1987, Mineral Species of Arkansas: Arkansas Geological Commission, Bulletin 23, 140 p.

Howard, J.M., Colton, G.W., and Prieo, W.L., Editors, 1997, Mineral, Fossil-Fuel, and Water Resources of Arkansas, Arkansas Geological Commission, Bulletin 24, 115 p.

Lumbert, D., 1983, Minerals in Arkansas: Arkansas Energy Office, 178 p.

McFarland, J.D., revised 2004, Stratigraphic Summary of Arkansas: Arkansas Geological Commission, Information Circular 36, 38 p.

Owens, D. R., 2010, Encyclopedia of Arkansas, History and Culture, www.encyclopediaofarkansas.net, entry ID= 5915.

Slatt, R.M., and Stone, C.G., 2010, Geology of the DeGray Spillway, Arkansas: A Geologic Excursion Through Rocks Deposited in an Ancient Ocean Basin: Arkansas Geological Survey, Guidebook 2010-2, 29 p.

Stone, C. G., Haley, B.R., and Viele, G.W., 1973, A Guidebook to the Geology of the Ouachita Mountains, Arkansas: Arkansas Geological Commission, 114 p.

Stone, C.G., Editor, 1977, Symposium on the Geology of the Ouachita Mountains, Volume 1: Arkansas Geological Commission, 174 p.

Stone, C. G., and McFarland, III, J.D., 1981, Field Guide to the Paleozoic Rocks of the Ouachita Mountain and Arkansas Valley Provinces, Arkansas: Arkansas Geological Commission, Guidebook 81-1, 140 p.

Stone, C.G., and Haley, B.R., 1984, A Guidebook to the Geology of the Central and Southern Ouachita Mountains, Arkansas: Arkansas Geological Commission, Guidebook 84-2, 131 p.

Stone, C.G., Howard, J.M., and Haley, B.R., 1986, Sedimentary and Igneous Rocks of the Ouachita Mountains of Arkansas, A Guidebook with Contributed Papers, Part 1: Arkansas Geological Survey, Guidebook 86-2, 151 p.

Stone, C.G., Haley, B.R., 1986, Sedimentary and Igneous Rocks of the Ouachita Mountains of Arkansas, Part 2, Arkansas Geological Survey, Guidebook 86-2, 99 p.

Stone, C.G., Haley, B.R., and Davis, M.H., 1994, Guidebook to Paleozoic Rocks in the Eastern Ouachita Mountains, Arkansas: Arkansas Geological Commission, Guidebook 94-1, 46 p.

Stroud, R. B., Arndt, R.H., Fulkerson, and Diamond, W.G., 1969, Mineral Resources and Industries of Arkansas: U.S. Department of the Interior – Bureau of Mines, Bulletin 645, 418 p.

Wise, O. A., and Caplan, M., 1979, Silurian and Devonian Rocks of Northern Arkansas, Arkansas Geological Commission, Information Circular 25, 14 p.

Radar Mosaics

Radar Mosaic, Russellville, AR, Scale: 1/250,000, 1986, U.S. Geological Survey, Contract no. 14-08-0001-22987

Radar Mosaic, Arkansas Valley, Scale: 1/500,000, 1986, Simulation Systems, Inc, Contract no. 14-08-0001-22987

Geologic Maps (1/100,000 to 1/500,000 scales)

Arkansas Shaded Relief, 1/100,000, 1990: U.S. Geological Survey

Geologic Map of Arkansas, 1/500,000, Haley, B.R., 1993: Arkansas Geological Commission

Geologic Map of the Ouachita Mountain Region and a Portion of the Arkansas Valley Region in Arkansas, 1/100,000, Haley, B.R., and Stone, C.G., 2006: Arkansas Geological Commission

Geologic Maps (1/24,000 scale)

Arkadelphia Quadrangle, Clark County, Hanson, W.D., and Clardy, B.F., 1/24,000, 1994: Arkansas Geological Commission

Deer Quadrangle, Newton County, Arkansas, 1/24,000, Braden, A.K. and Smith, J.K., 2004: Arkansas Geological Commission

Jasper Quadrangle, Newton and Boone Counties, Arkansas, 1/24,000, Hudson, M.R., Murray, K.E., and Pezzutti, D., 2001: U. S. Geological Survey

Hot Springs, Hot Springs South, Fountain Lake, and Lake Catherine Quadrangles, Garland, Hot Spring, and Saline Counties, Arkansas, 1/24,000, Johnson, T.C., and Hanson, W.D., 2011: Arkansas Geologic Survey

Lurton Quadrangle, Newton County, Arkansas, 1/24,000, Braden, A.K., and Smith, J.K., 2004: Arkansas Geological Survey

Parthenon Quadrangle, Newton County, Arkansas, 1/24,000, Braden, A.K., and Ausbrooks, S.M., 2003: Arkansas Geological Commission

Simpson Quadrangle, Pope County, Arkansas, 1/24,000, Chandler, A.K., and Hutto, R. S., 2006: Arkansas Geological Commission

Geologic Work Sheets (1/24,000 scale)

Bergman	Nimrod, Southeast
Dardanelle	Ola
Diamond City	Russellville, East
Dover	Russellville, West
Jessieville	Simpson
Lee Mountain	Treat
Nimrod	Zinc
Nimrod Dam	

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