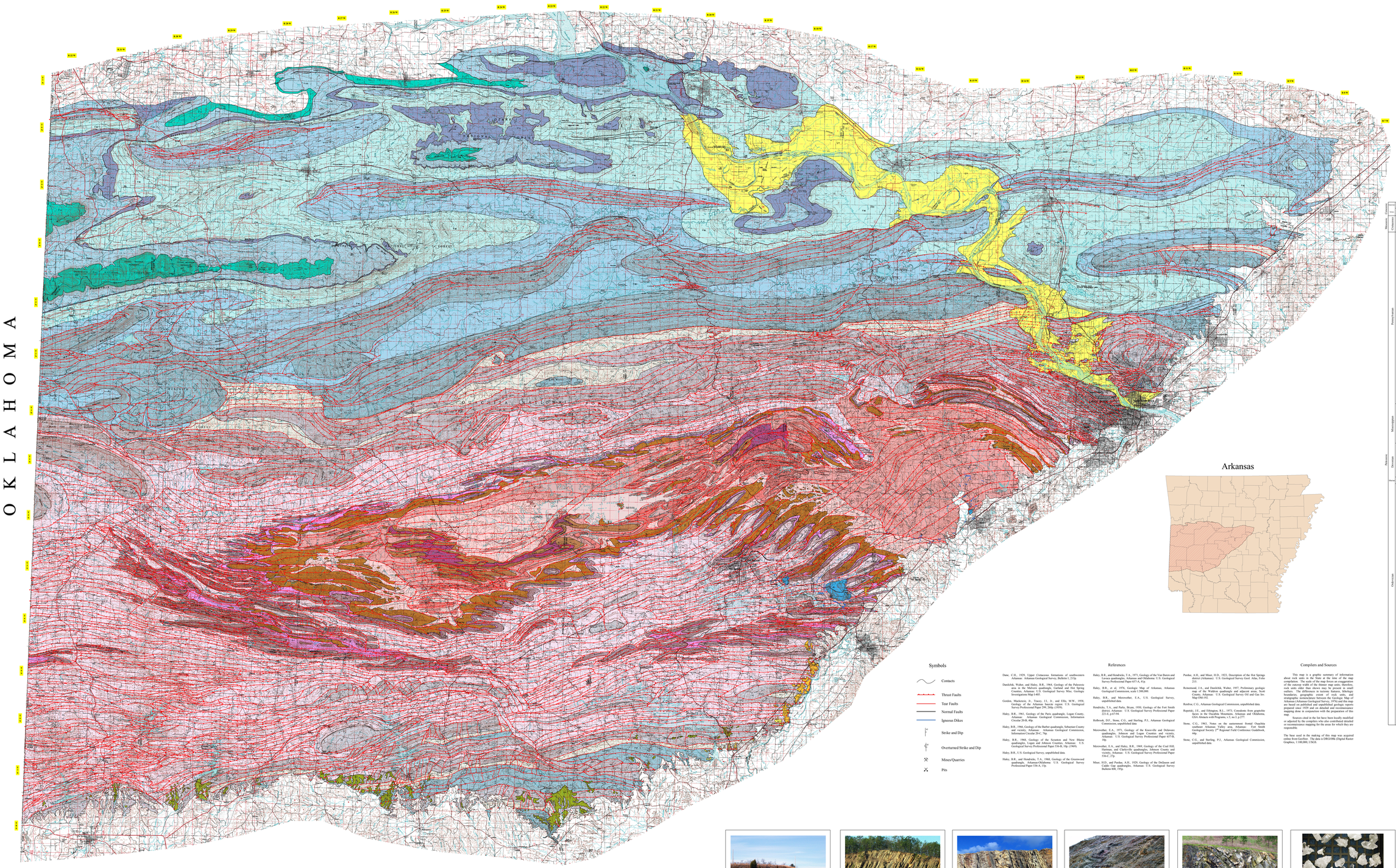
Digital Geologic Map Ouachita Mountains
DGM-OMR-001

Geologic Map of the Ouachita Mountain Region and a portion of the Arkansas Valley Region in Arkansas

Geology by Boyd R. Haley and Charles G. Stone
Edited by William D. Hanson
2006
Arkansas Geological Commission, Bekki White, State Geologist
Digital Compilation by William D. Hanson and Jerry W. Clark



Description of Map Units

Cenozoic — Quaternary

Qa Quaternary undifferentiated – Sand, silt, clay, and gravel.

Tertiary

Ta Tertiary undifferentiated – Sand, silt, and clay.

Cretaceous

Ku Cretaceous undifferentiated – Sand, gravel, and clay.

Ki Cretaceous igneous rocks – Cretaceous igneous intrusions of alkalic rocks.

Pennsylvanian

Psv Savanna Formation (*Pennsylvanian*) – Buff to black, often silty, shale, buff to brown sandstone, at least six coal beds, and coal balls. The formation ranges from about 1,100 to 1,600 feet in thickness.

Pmc McAlester Formation (*Pennsylvanian*) – Gray to black shale, brown sandstone, and coal beds. The formation ranges from about 1,800 to 2,300 feet in thickness.

Phs Hartshorne Formation (*Pennsylvanian*) – White to gray, clean, fine- to coarse-grained, thin-to-thick bedded sandstone with minor gray silty shale. Extensive cross-bedding and migrating stream channels characterize some exposures. The formation ranges from about 50 to 300 feet in thickness.

Pao Atoka Formation (upper) (*Pennsylvanian*) – Gray-black shale with brown, micaceous, silty, fine- to coarse-grained, lenticular sandstone. Few coal beds and fossiliferous limestone concretions are rare in the Atoka ranges from about 3,800 to over 6,500 feet in thickness.

Pam Atoka Formation (middle) (*Pennsylvanian*) – Gray-black shale with three thick brown, micaceous, fine to medium-grained, massive sandstones in the upper portion of the sequence. This part of the Atoka ranges from about 4,100 to over 6,200 feet in thickness.

Pal Atoka Formation (lower) (*Pennsylvanian*) – Gray-black shale with brown, micaceous, silty, fine- to coarse-grained sandstones, which are often lenticular. This part of the Atoka ranges from about 5,500 to over 10,000 feet in thickness. Limited faunal data suggest that some of the basal lower Atoka is late Morrowan age.

Fy Johns Valley Formation (*Pennsylvanian*) – Gray-black shale with brown, micaceous, silty, fine- to massive-bedded, brownish-gray sandstone. Some siliceous shale and chert are present – notably near the top of the unit. Exotic Arbuckle and Ordovician limestone blocks and masses occur in western Arkansas. True thickness is difficult to estimate, but is about 1,200 to 1,500 feet.

Fj Jackfork Formation (*Pennsylvanian*) – Light brown to gray, fine-grained, quartzitic sandstone, blue, black to brown siltstone and gray-black shale. Fossils, plant fragments, and conglomerates are present but not common within this unit. The formation ranges about 7,500 feet in thickness.

Mississippian

Ms Stanley Formation (*Mississippian*) – Interbedded gray-black to brownish-green shale with minor quantities of siliceous shale and chert, and thin-to-thick bedded brown-to-gray sandstone. Some thin black siliceous shales and cherts are also present. Minor conglomeratic and tuff beds occur in the lower part of the unit. Bedded barite is known to occur in the basal part of the unit in the Hot Springs and Glenwood, AR area. The formation ranges from about 1,000 to 12,000 feet in thickness.

Mbn Arkansas Novaculite Formation (*Mississippian-Devonian*) – White, light gray and black novaculite with lesser amounts of gray chert, olive-green to black shale, white to gray siltstones and sandstones. Novaculite is a nearly pure quartzite. In the Ouachita Mountains, the unit can be split into three members; the lower massive-bedded part, the middle black siliceous shale rich part, and the upper thin-bedded part. The formation ranges from about 60 to 900 feet in thickness. The best known use for novaculite is as a raw material for whetstones and tripoli.

Devonian

DO Missouri Mountain, Blaylock and Polk Creek Formations (*Silurian-Ordovician*) – The Missouri Mountain is typically olive, maroon, buff to gray shale with minor novaculite, siltstone, and sandstone. The Missouri Mountain formation ranges from about 40 to 200 feet in thickness. The Blaylock Formation consists of thin, brownish-gray, very fine- to fine-grained sandstone and gray shale layers. The formation ranges from about 5 to 1,200 feet in thickness. The Polk Creek Shale is black, fissile shale with minor thin chert layers or nodules, and a thin gray limestone. Graptolites are common in some layers. The formation ranges from about 50 to 225 feet in thickness.

Ordovician

Ob Bigfork Formation (*Ordovician*) – Gray to black, thin-bedded fractured chert, dense gray limestone, gray siltstone, and black shale. Graptolites are common in some layers. The formation ranges from about 450 to 750 feet in thickness. The unit is utilized as an aggregate resource and for water production.

Ow Womble Formation (*Ordovician*) – Dark gray to black shale with thin layers of blue-gray limestone, calcareous siltstone and some brownish-gray sandstone. Exotic masses occur in the Little Rock area of metagabbro and soapstone-serpentinite. Limestones yield conodonts which have been extensively studied, and quartz veins are common. The formation ranges from about 900 to 1,200 feet in thickness.

Om Blakely Formation (*Ordovician*) – Brownish-gray, thin to massive, fine- to medium-grained, sometimes silty or calcareous sandstones, black, gray, and olive shales, micritic blue gray limestone and some conglomeratic sandstones. Conodonts occur in some limestones and have been extensively studied, and quartz veins are common. The formation ranges from a feathers edge to about 700 feet in thickness. Quartz veins and clear quartzcrystals occur and are mined *some places*.

Omn Mazarn Formation (*Ordovician*) – Mostly black shale with some interbedded olive-green shale, laminated gray siltstone, brownish-gray sandstone, dense blue-gray limestone, and black chert. Conodonts, graptolites, and trace fossils occur in the unit. The formation ranges from about 0 to 2,500 feet in thickness. Quartz veins are common near intensely sheared and ruptured sequences.

Ocm Crystal Mountain Formation (*Ordovician*) – Light-gray to orange-brown, medium-grained sandstone interbedded with black, gray, and buff shales with conglomeratic and brecciated intervals, dense blue-gray limestone, and black chert. Conodonts have been extensively studied. The formation ranges from 500 to 850 feet thick but thins in places to about 50 feet or less of thin sandstone, shale and chert. Clear quartz crystal deposits occur in veins and cavities in the Mt. Ida to Jessieville area.

Ocf Collier Shale (*Ordovician*) – Gray to black shale interbedded with thin to thick intervals of dense, very fine-grained bluish-gray limestone which sometimes maybe sandy to pellatsiled or conglomeratic. Minor amounts of black chert, gray siltstone, brownish-gray sandstone, conglomerate and breccia also occur in the unit. Trilobite and conodonts have fossils occurring in some of the limestones represent several late Cambrian biozone zones. The formation is about 1000 feet in thickness, but this is difficult to estimate due to complex structural relationships. The Collier is the oldest rock unit occurring in the Ouachita Mountains of Arkansas. Clear quartz crystal deposits occur in veins and cavities in sheared and faulted intervals.

References

Dane, C.H., 1929, Upper Cretaceous formations of southwestern Arkansas: Arkansas Geological Survey, Bulletin 1, 213p.

Dunckleb, Walter, and Haley, B.R., 1964, Geology of the Paleozoic area in the Gaston quadrangle, Garland and Hot Spring Counties, Arkansas: U.S. Geological Survey Misc. Geologic Investigations Map I-405.

Gordon, Mackenzie Jr., Tracey, J.I., Jr., and Ellis, M.W., 1958, Geology of the Arkansas Valley in Oklahoma: U.S. Geological Survey Professional Paper 299, 268p. (1959).

Haley, B.R., 1961, Geology of the Paris quadrangle, Logan County, Arkansas: Arkansas Geological Commission, Information Circular 20-C, 30p.

Haley, B.R., 1968, Geology of the Scranton and New Blaine quadrangles, Logan and Johnson Counties, Arkansas: U.S. Geological Survey Professional Paper 593-B, 10p. (1969).

Haley, B.R., U.S. Geological Survey, unpublished data.

Haley, B.R., and Hendricks, T.A., 1968, Geology of the Greenwood quadrangle, Arkansas-Oklahoma: U.S. Geological Survey Professional Paper 536-A, 15p.

Haley, B.R., and Hendricks, T.A., 1971, Geology of the Van Buren and Fort Smith quadrangles, Arkansas-Oklahoma: U.S. Geological Survey Professional Paper 615-A, 45p.

Haley, B.R., et al, 1976, Geologic Map of Arkansas, Arkansas Geological Commission, scale 1:500,000.

Haley, B.R., and Merewether, E.A., U.S. Geological Survey, unpublished data.

Hendricks, T.A., and Parks, Bryan, 1950, Geology of the Fort Smith district, Arkansas: U.S. Geological Survey Professional Paper 221-E, p.67-94.

Holbrook, D.F., Stone, C.G., and Sterling, P.J., Arkansas Geological Commission, unpublished data.

Merewether, E.A., 1971, Geology of the Knoxville and Delaware quadrangles, Johnson and Logan Counties and vicinity, Arkansas: U.S. Geological Survey Professional Paper 657-B, 19p.

Merewether, E.A., and Haley, B.R., 1969, Geology of the Coal Hill, Hartman, and Clarksville quadrangles, Johnson County and vicinity, Arkansas: U.S. Geological Survey Professional Paper 536-C, 27p.

Miser, H.D., and Purdue, A.H., 1929, Geology of the DeQueen and Caddo Gap quadrangles, Arkansas: U.S. Geological Survey Bulletin 808, 195p.

Purdue, A.H., and Miser, H.D., 1923, Description of the Hot Springs District (Arkansas): U.S. Geological Survey Geol. Atlas, Folio 221.

Remersonal, J.A., and Dunckleb, Walter, 1957, Preliminary geologic map of the Waldron quadrangle and adjacent areas, Scott County, Arkansas: U.S. Geological Survey Oil and Gas Inv. Map OM-194.

Renfroe, C.G., Arkansas Geological Commission, unpublished data.

Repenski, J.E., and Ethington, R.L., 1973, Conodonts from graptolite facies in the Ouachita Mountains, Arkansas and Oklahoma: GSA Abstracts with Programs, v.5, no.3, p.277.

Stone, C.G., 1963, Notes on the easternmost frontal Ouachita southeast Arkansas Valley area, Arkansas: Fort Smith Geological Society 2nd Regional Field Conference Guidebook, 44p.

Stone, C.G., and Sterling, P.J., Arkansas Geological Commission, unpublished data.

Compilers and Sources

This map is a graphic summary of information about rock units in the Ouachita Mountains of the map compilation. The scale of the map forces an exaggeration of the outcrop width of the thinner map units; therefore, rock units older than shown may be present in small outcrops. The differences in various features, lithologic contacts, structural contacts, and other features, including stratigraphic nomenclature between the Geologic Map of Arkansas (Arkansas Geological Survey, 1976) and this map are due to the use of more recent data and interpretations prepared since 1929 and on detailed and reconnaissance mapping done in conjunction with the preparation of this map.

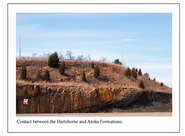
Sources cited in the list have been locally modified or accepted by the compilers who also contributed detailed or reconnaissance mapping for the areas for which they are responsible.

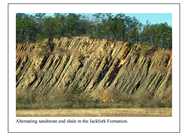
The base used in the making of this map was acquired online from GeoNet. The data is DRG100k (Digital Raster Graphics, 1:100,000, USGS.

Disclaimers

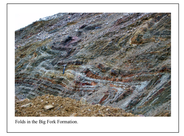
Although this map was compiled from digital data that was meticulously checked, using computer system using ArcGIS 9.0 at the Arkansas Geological Commission (AGC), no warranty, expressed or implied, is made by AGC regarding the unity of the data on any other system, nor shall the act of distribution constitute any such warranty. AGC does not guarantee the accuracy of digital data to be free of errors or liability for interpretations from this map or digital data, or decisions based thereon.

The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the author either expressed or implied, of the Arkansas Geological Commission.


Contact between the Hartshorne and Atoka Formations.


Alternating sandstone and shale in the Jackfork Formation.

Turbidite sequence in the Jackfork Formation.


Folds in the Big Fork Formation.

Folds in the Stanley Formation.

Quartz crystals occurring in the Ouachita Mountains.