STATE OF MISSOURI
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DEPARTMENT OF NATURAL RESOURCES
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GEOLOGIC MAP OF MISSOURI

2017

Compiled by
Edith A. Starbuck

N

0 5 10 20 30 40 Miles

MAP SCALE
1 INCH = 8 MILES
1:500,000

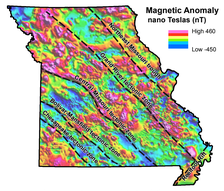
North American Datum of 1983 (NAD 83)
Transverse Mercator Projection

The first Geologic Map of Missouri was published in 1872 under the direction of George C. Swallow, the first Missouri State Geologist. Revised editions of the map were published in 1892, 1894, 1896, 1904, 1907, 1912, 1922, 1926, 1939, 1961, 1979 and 2003, each representing an improvement of the previous, as knowledge of Missouri geology grew steadily over time.

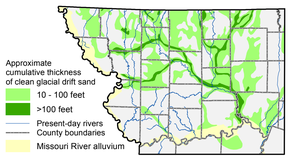
The 2017 map is the first Missouri statewide geologic map produced with a shaded-relief topographic base. The geology presented was updated from the 2003 map by including revisions from recent mapping along the eastern half of the Interstate 70 and Missouri River corridor and Lake of the Ozarks regions by the Missouri Geological Survey and in the south-central part of the state by the United States Geological Survey. Recent mapping by students and staff of Missouri State University and University of Missouri at Kansas City was also included. Modifications were made to geology in Crawford, Lincoln, McDonald, Pike, Randolph and Saline counties based on review of older mapping and well log information. Better spatial control for Precambrian outcrop areas was incorporated. Minor errors on the 2003 map in Cedar, Lincoln, Linn, Pike and St. Clair counties were corrected. Revisions to stratigraphic nomenclature are recognized; particularly noticeable is the change in Cenozoic nomenclature. Updated Chesterian/Meramecian contact locations in the St. Louis area are reflected. Revision in the age of the Bushberg Sandstone is manifested in wider distribution of Devonian in the St. Louis area as compared to previous Missouri state geologic maps. The name of the oldest Pennsylvanian units throughout the Northern and Southern Fire Clay districts in east-central Missouri was revised to "Basal Pennsylvanian" to reflect similarity of the deposits as well as uncertainty of their age.

This document was prepared for the presentation of geologic data at 1:500,000 scale and is not intended to replace site-specific investigations. The Missouri Geological Survey does not guarantee this document to be free from errors or inaccuracies and disclaims any responsibility or liability for inappropriate change of scale or interpretations or decisions based thereon. No warranty, expressed or implied, is made by the Missouri Department of Natural Resources as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

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Starbuck, E.A., 2017, Geologic map of Missouri; Missouri Department of Natural Resources, Missouri Geological Survey, scale 1:500,000.



Aeromagnetic surveys detect variations in the magnetic field caused by differences in mineralogy in basement (Precambrian) bedrock. This map depicts magnetic anomalies along with interpreted tectonic features in the Precambrian.
Scale is 1:6,500,000.



Sub-drift and modern drainage patterns in northwest Missouri
Glacial deposits mantle bedrock in much of northern Missouri. This inset depicts the results of a drilling program conducted in the 1950s to determine the thickness of glacial drift and amount of clean sand in the drift in northwestern Missouri. The pre-glacial and inter-glacial valleys where over 100 feet of clean sand have accumulated are most favorable for construction of wells that may have the capability to produce up to 1,000 gpm of water and can meet irrigation and public water supply needs.
Scale is 1:2,500,000.

Legend

Phanerozoic Eonothem
Cenozoic Erathem

Quaternary System
- Qal — **Holocene Series**, alluvium of major rivers and Southeast Lowlands
- Qp — **Pleistocene Series**, loess and glacial drift (shown only on cross section)

Neogene System (previously upper Tertiary)
- N — Mounds Gravel

Paleogene System (previously lower Tertiary)
- Pl — Wilcox Group; Midway Group

Mesozoic Erathem
- K — **Cretaceous System**, Upper (Gulfian) Series

Paleozoic Erathem
Carboniferous System
Pennsylvanian Subsystem

Virgilian Stage
- Ic — Indian Cave Sandstone exposures in northwest Missouri
- IPw — Wabaunsee Group
- IPs — Shawnee Group

Missourian Stage
- IPdo — Douglas Group
- IPl — Lansing Group
- IPkc — Kansas City Group
- IPp — Pleasanton Group
- IPpwm — Weldon River Sandstone Member

Desmoinesian Stage

Western Missouri		Eastern Missouri
IPm — Marmaton Group	IPcs — Pennsylvanian channel sandstones uncertain age	IPb — Basal Pennsylvanian, undifferentiated uncertain age
IPc — Cherokee Group, Cabaniss Subgroup		
IPka — Cherokee Group, Krebs Subgroup; Atokan Stage		

Atokan Stage

Morrowan Stage
- H — Hale Sandstone, restricted to isolated exposure in McDonald County, southwest Missouri

Mississippian Subsystem

	Southwest	Central	Northeast	East-Central	Southeast
			Chesterian Stage		
Mc	Fayetteville Shale; Batesville Formation; Hindsville Limestone				Vienna Limestone; Tar Springs Sandstone; Glen Dean Formation; Hardinsburg Formation; Golconda Formation; Cypress Formation; Paint Creek Formation; Yankeetown Sandstone; Renault Formation; Aux Vases Sandstone; Ste. Genevieve Limestone
			Ste. Genevieve Limestone	Ste. Genevieve Limestone	Ste. Genevieve Limestone
			Meramecian Stage		
Mm	St. Louis Limestone; Salem Formation; upper Warsaw Formation	upper Warsaw Formation	St. Louis Limestone; Salem Formation; upper Warsaw Formation	St. Louis Limestone; Salem Formation; upper Warsaw Formation	St. Louis Limestone; Salem Formation; upper Warsaw Formation
			Osagean Stage		
Mo	lower Warsaw Formation; Keokuk Limestone; Burlington Limestone; Elsey Formation; Reeds Spring Formation; Pierson Limestone	lower Warsaw Formation; Keokuk Limestone; Burlington Limestone; Pierson Limestone	lower Warsaw Formation; Keokuk Limestone; Burlington Limestone	lower Warsaw Formation; Keokuk Limestone; Burlington Limestone; Fern Glen Formation	lower Warsaw Formation; Keokuk Limestone; Burlington Limestone; Fern Glen Formation
			Kinderhookian Stage		
Mk	Northview Shale; Compton Limestone; Bachelor Formation	Northview Shale; Sedalia Formation; Compton Limestone; Bachelor Formation	Chouteau Group limestone; Hannibal Shale; Horton Creek Limestone	Chouteau Group limestone; Bachelor Formation	Chouteau Group limestone; Bachelor Formation

Devonian System

	Southwest	Central	Northeast	East-Central	Southeast
			UPPER SERIES		
D	Chattanooga Shale; Sylamore Sandstone	Holts Summit Sandstone; Snyder Creek Shale	Louisiana Limestone; Sawyerton Shale; Grassy Creek Shale; Turpin Sandstone	Bushberg Sandstone; Glen Park Limestone	
			MIDDLE SERIES		
	Fortune Formation	Cedar Valley Limestone	Cedar Valley Limestone		
			LOWER SERIES		

Avon Volcanic District (Mellititic diatremes, dikes and plugs)
St. Laurent Limestone; Beauvais Sandstone; Grand Tower Limestone
Clear Creek Chert; Little Saline Limestone; Grassy Knob Chert; Bailey Formation

Silurian System

	Southeast	Northeast
		WENTLOCKIAN-LUDLOVIAN SERIES
		LLANDOVERIAN SERIES
S	Bainbridge Formation; Sexton Creek Limestone	Joliet Limestone; Bowling Green Dolomite; Bryant Knob Formation

Ordovician System

	Southeast	Northeast	Cross Section Only
	UPPER SERIES Cincinnatian Stage		
Omk — Maquoketa Group; Kimmswick Limestone	Leemon Formation; Maquoketa Group; Cape Limestone	Nox-Cyrene Limestone; Maquoketa Shale	Oum — Middle and Upper Ordovician above St. Peter Sandstone
	MIDDLE SERIES Mohawkian Stage		
Odp — Decorah Group; Plattin Group			
Oj — Joachim Dolomite	Ojd — Joachim Dolomite; Dutchtown Formation		
Osp — St. Peter Sandstone	Ospe — St. Peter Sandstone; Everton Formation	Whiterockian Stage	
LOWER SERIES Ibexian Stage			
Ocj — Smithville Dolomite; Powell Dolomite; Cotter Dolomite; Jefferson City Dolomite			
Or — Roubidoux Formation			
Og — Gasconade Dolomite			

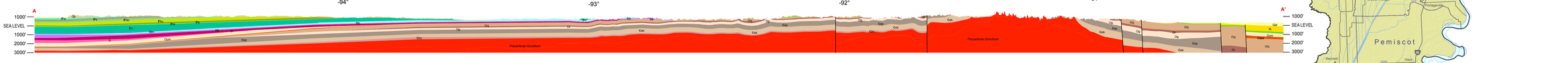
Cambrian System

	Southeast
	UPPER SERIES
Cep — Eminence Dolomite; Potosi Dolomite	Derby-Doe Run Formation; Davis Formation
Ceb — Elvins Group; Bonneterre Formation	
	MIDDLE SERIES
Clm — Lamotte Sandstone	V Volcaniclastics

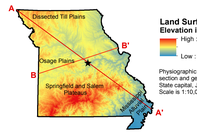
Precambrian Eonothem
Mesoproterozoic Erathem
- d — Diabase dikes and sills
- i — St. Francois Mountains Intrusive Terrane
- v — St. Francois Mountains Volcanic Terrane

SYSTEM	SUB-SYSTEM	GLOBAL SERIES	GLOBAL STAGE	Regional Stage North America
CARBONIFEROUS	PENNSYLVANIAN	UPPER	GZHELIAN	Virgilian
			KASIMOVIAN	Missourian
		MIDDLE	MOSCOVIAN	Desmoinesian
				Atokan
		LOWER	BASHKIRIAN	Morrowan
	MISSISSIPPIAN	UPPER	SERPUKHOVIAN	Chesterian
		MIDDLE	VISEAN	Meramecian
				Osagean
		LOWER	TOURNASIAN	Kinderhookian

Stratigraphic nomenclature conforms to International Commission on Stratigraphy, International Chronostratigraphic Chart v2013/01 except that regional stage names are used for the Carboniferous. The above table (from Kansas Geological Survey, Current Research in Earth Sciences, Bulletin 256, part 1) indicates correlation. Please note areas mapped as Meramecian Stage in southwest, central and northeast Missouri include the entire Warsaw Formation and therefore very likely include some Osagean Stage bedrock. The Meramec and Osage stage boundary is uncertain in these areas.



Fault traces
County boundaries
Roads
Cross section locations
Streams and rivers
Southern limit of glaciation (approximate)

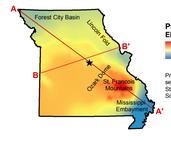


Land Surface Elevation in feet
High : 1,700
Low : 230

Physiographic sections of Missouri with lines of cross section and generalized surface elevation. State capital, Jefferson City, is marked by a star. Scale is 1:10,000,000.

CROSS SECTION HORIZONTAL SCALE: 1 INCH = 12 MILES
VERTICAL EXAGGERATION = 16





Precambrian Surface Elevation in feet
High : 1,700
Low : -6,200

Principal tectonic features of Missouri with lines of cross section and generalized Precambrian surface elevation. State capital, Jefferson City, is marked by a star. Scale is 1:10,000,000.

