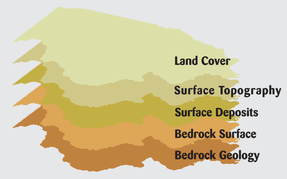
Beneath Illinois Roads:
From the Surface to Bedrock



LAND COVER
- forested—deciduous
- forested—coniferous
- wetland
- urban, high density
- urban, medium density
- urban, low density
- urban grassland
- rural grassland
- agriculture, row crops
- agriculture, small grains
- agriculture, orchards and nurseries
- barren and exposed land
- water

Land Cover

The land cover map, compiled from 1990s satellite data, gives some idea of how Illinois land is used. Agriculture and grassland areas constitute about 77% of the land cover; forested areas account for 11%; and wetlands, lakes, and rivers 6%. Although urban areas account for only 6% of the surface area, they are rapidly expanding.

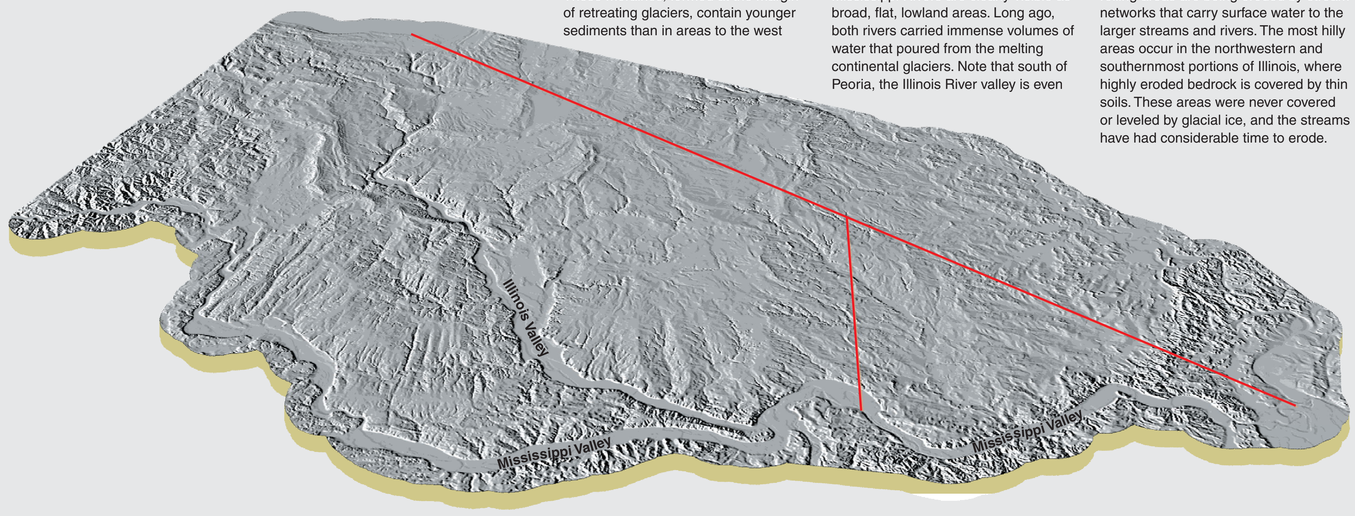
Much of today's cropland was once prairie. As the native prairie grasses decomposed annually, they contributed to the formation of the state's thick, dark, organic-rich soils. These fertile soils developed in windblown silt, called loess, that was deposited over much of the state during the last glacial event.

Surface Topography

This map shows the present-day landscape, which was shaped by both continental glaciers and eroding rivers and streams. In northeastern Illinois, the many broad curved ridges visible on upland areas are called end moraines. These moraines, formed at the margin of retreating glaciers, contain younger sediments than in areas to the west and south. In the older areas, stream erosion has acted upon the landscape, producing a well developed drainage network.

The large floodplains of the Illinois and Mississippi Rivers are clearly visible as broad, flat, lowland areas. Long ago, both rivers carried immense volumes of water that poured from the melting continental glaciers. Note that south of Peoria, the Illinois River valley is even broader than that of the Mississippi, indicating that the Illinois River once carried far more water than it does today.

Above the lowland areas, flat to gently rolling areas are being eroded by stream networks that carry surface water to the larger streams and rivers. The most hilly areas occur in the northwestern and southernmost portions of Illinois, where highly eroded bedrock is covered by thin soils. These areas were never covered or leveled by glacial ice, and the streams have had considerable time to erode.



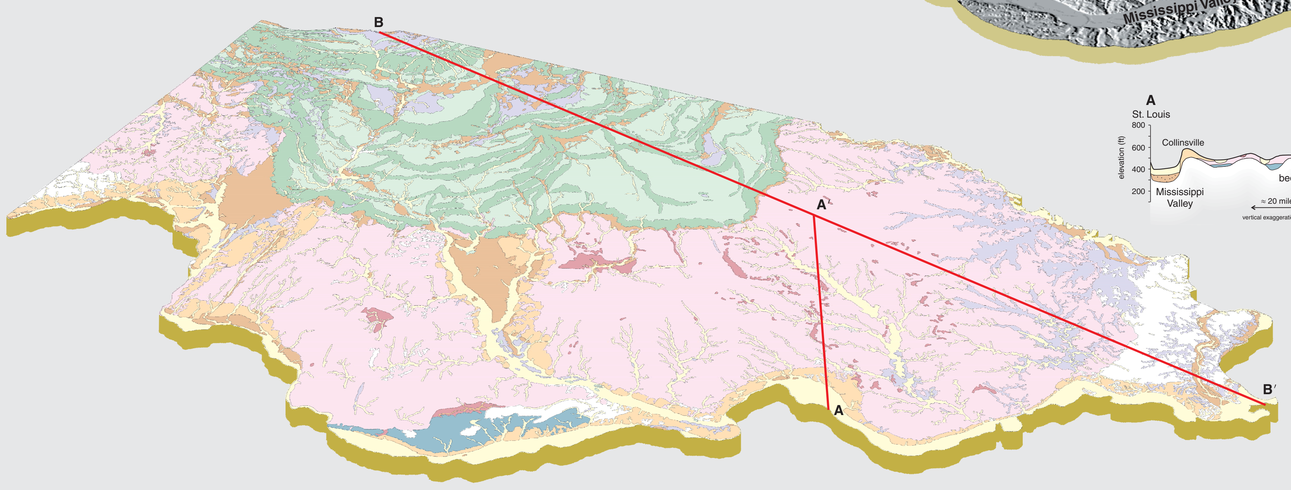
SURFACE DEPOSITS

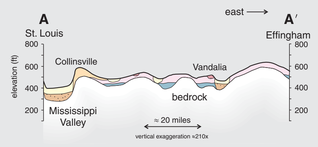
Wisconsin Episode and Postglacial Deposits
- Modern stream sediments in valleys (recent)
- Windblown silt (loess) generally thicker than 20 feet blankets upland surfaces in these areas (last glaciation)
- Lake silt and clay on flat plains or terraces (mainly last glaciation)
- Glacial outwash (sand and gravel) and dune sands (last glaciation)
- Mostly glacial till (an unsorted mixture of clay, silt, sand, and gravel) in moraines (last glaciation); moraines not colored in cross sections
- Mostly glacial till in flat landscapes (last glaciation)

Illinois Episode Deposits
- Sorted sediment including sand and gravel, and lake deposits
- Mostly glacial till in flat to gently rolling landscapes; some sand and gravel at depth

Pre-Illinois Episode Deposits
- Mostly glacial till in flat landscapes to rolling hills; some sand and gravel occurs in bedrock valleys

Near-Surface Bedrock
- Mostly limestone, dolomite, shale, and coal in hilly to steep terrains





Surface Deposits

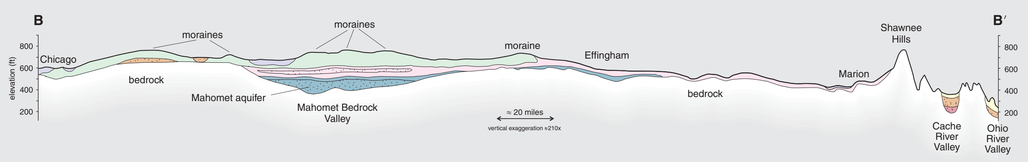
The surficial materials map and cross sections reveal the types of materials in a particular area, their relative age, and the way in which they were deposited. This map is a simplified version of the larger highway map on the front side.

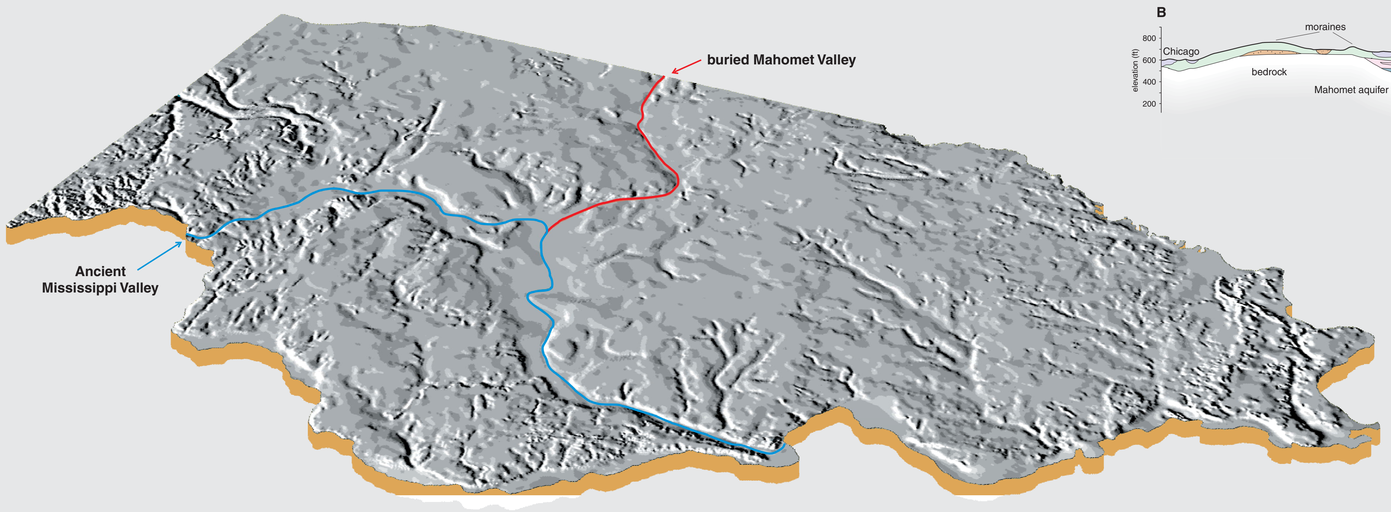
The glaciers that flowed across the surface of Illinois many times over the past 1 million years deposited sediments (gravel, sand, silt, and clay) in various combinations and thicknesses. Immense volumes of meltwater flowed away from the retreating glaciers, filling ancient river valleys with sand and gravel that are now excellent sources of groundwater, called aquifers.

Generalized cross sections, shown as slices from surface to bedrock, help to illustrate the layers of glacial deposits beneath the state's surface. The cross section locations are shown as red lines on the land cover, surface topography, and surface geology maps. The exaggerated vertical thickness shows the relationships among materials more clearly. Deposits less than 20 feet thick are not shown.

Slice A trends west to east along I-70. Till deposits here are thinner and older than in areas to the northeast. The oldest sediments were preserved for hundreds of thousands of years in low areas on the bedrock surface. Thick layers of windblown silt, along the bluffs of the Mississippi River near East St. Louis, were derived from meltwater sediments in the Mississippi Valley during the last glaciation.

Slice B trends north to south along I-57. Note that till of the last glaciation is as much as 100 feet thick in central Illinois. Glacial ice of the next to last glaciation deposited till as far south as Marion. This ice advance was stopped by areas of high bedrock in the Shawnee Hills. Older sand and gravel in the Mahomet Valley, a major aquifer for central Illinois, is deeply buried and protected by younger glacial sediments.





Bedrock Surface

Underneath the glacial sediment cover, the bedrock surface appears as shown here. This landscape shows about how Illinois appeared prior to glaciation.

Many valleys shown coincide with present-day valleys (compare with surface topography), yet many other valleys are now buried and filled in with sediments. Many of the buried valleys contain glacial sand and gravel and are prolific sources of groundwater.

The wide valley running from east to west (red line) contains the Mahomet aquifer. The blue line traces the ancient Mississippi River valley, which extends from the Iowa-Illinois border to a broad lowland area in the center of the state, where it intersects the present-day Illinois River valley. The northern portion of this buried valley, east of Rock Island, contains another buried aquifer. About 20,000 years ago, ice of the last glaciation blocked this former path of the Mississippi River and caused the river to shift to its present course.

BEDROCK GEOLOGY

Tertiary (youngest)
- clay and sand, gravel

Cretaceous
- sand, silt, clay

Pennsylvanian
- shale, sandstone, limestone, thin coal beds
- shale, sandstone limestone, thick coal beds
- sandstone, siltstone, shale, thin coal

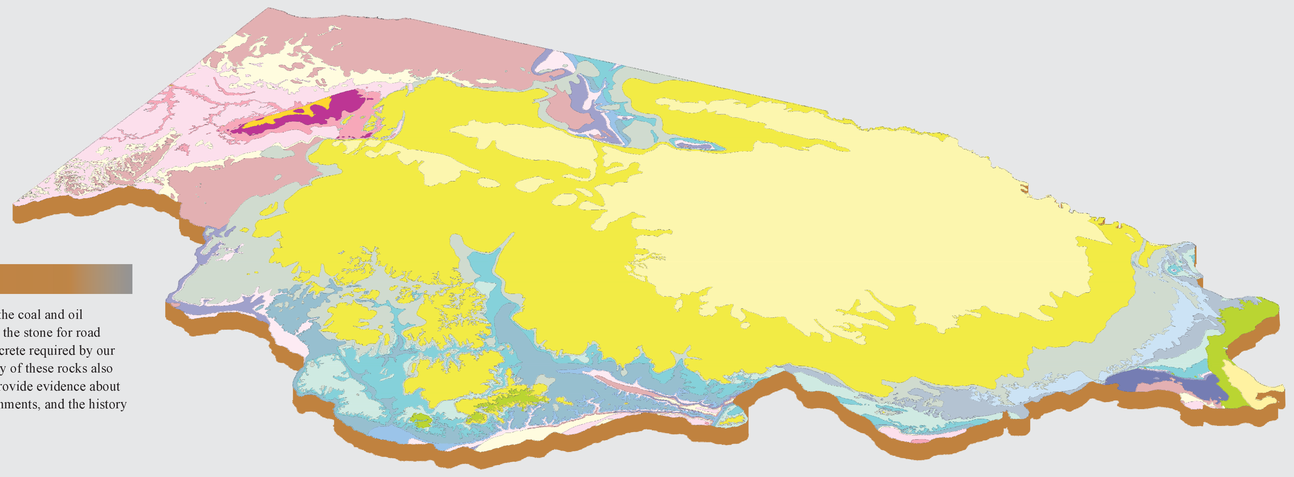
Mississippian
- shale, sandstone, limestone
- limestone, shale, sandstone
- limestone
- shale, siltstone, limestone
- limestone
- limestone, shale

Devonian
- shale
- limestone
- limestone, chert

Silurian
- dolomite, limestone

Ordovician
- shale and limestone
- limestone, dolomite, shale
- sandstone, shale, dolomite, limestone
- dolomite, chert

Cambrian (oldest)
- sandstone and dolomite



Bedrock Geology

This map shows the types of bedrock in Illinois, mostly found underneath glacial sediments that bury the rocks with up to 400 feet of material. Bedrock is composed of sedimentary rocks, most of which formed from materials deposited in a coastal plain or inland sea that covered most of the North American Midcontinent hundreds of millions of years ago.

These rocks contain the coal and oil resources and supply the stone for road construction and concrete required by our modern society. Many of these rocks also contain fossils that provide evidence about past climates, environments, and the history of life.

For more detailed information about Illinois geology, see these and other maps, and related publications of the Illinois State Geological Survey (http://www.isgs.uiuc.edu or call 1-217-333-4747).

Data Sources

The above maps are smaller, slightly modified versions of previously published maps. To see the maps in more detail, consult the full-size, original maps, available from the ISGS:

Land cover - Luman, D.E., M.G. Joselyn, and Liane Suloway, 1997, Land cover of Illinois, 1:500,000 (approximately 1 inch = 8 miles); 30 × 51 inches.

Surface topography - Abert, C.C., 1996, Shaded relief map of Illinois: Illinois Map 6, 1:500,000; 36 × 59 inches.

Surface deposits - Lineback, J.A., 1979, Quaternary deposits of Illinois, 1:500,000; 40 × 56 inches, color.
or - Stiff, B.J., Compiler, 2000, Surface deposits of Illinois, Open File Series 2000-7, 1:500,000; 35 × 60 inches.

Bedrock surface - Herzog, B.L., B.J. Stiff, C.A. Chenoweth, K.L. Warner, J.B. Sieverling, and C. Avery, 1994, Buried bedrock surface of Illinois: Illinois Map 5, 1:500,000, 34 × 60 inches.

Bedrock geology - Willman, H.B., et al., 1967, Geologic map of Illinois, 1:500,000; 40 × 56 inches, color.