ILLINOIS STATE GEOLOGICAL SURVEY
Prairie Research Institute
University of Illinois at Urbana-Champaign

Illinois Map 19
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GEOLOGIC CROSS SECTIONS ACROSS THE MAHOMET BEDROCK VALLEY
CHAMPAIGN, FORD, MCLEAN, PIATT, AND VERMILION COUNTIES, ILLINOIS

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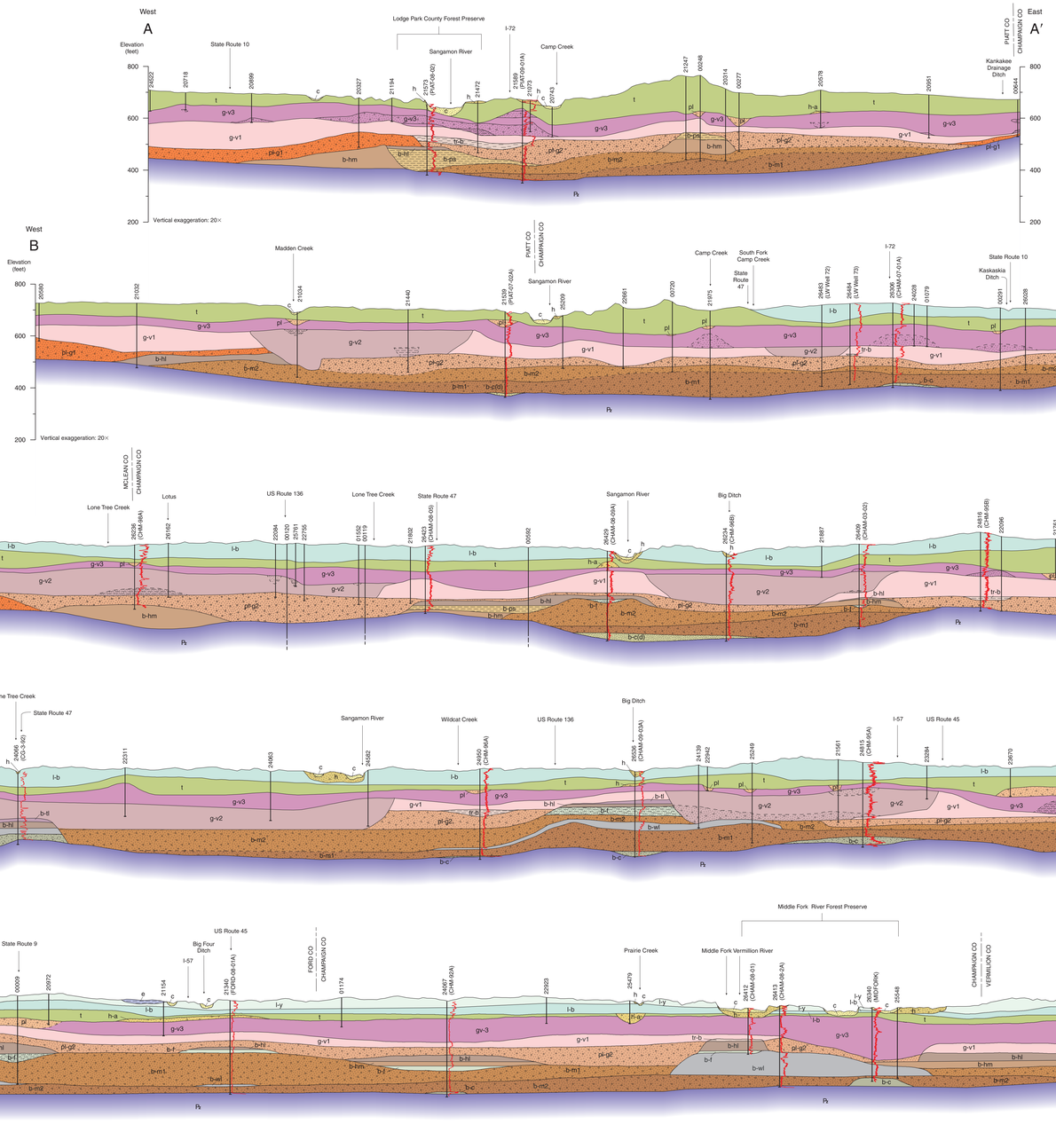
2015

CORRELATION OF MAPPING UNITS

* The procedure for applying the use of episodes is after Hansel and Johnson (1996) and Hansel and McKay (2010). Time periods are not to scale. The till units were deposited during separate ice advances, and their duration is not represented by the size of the boxes.



QUATERNARY DEPOSITS

Description	Unit	Interpretation[1]
HUDSON EPISODE [~14,600 years before present (B.P.) to today][2]		
Sand, silt, clay, and gravel; massive to stratified; locally oxidized; poorly sorted; contains beds of organic material; up to 15 feet thick	Cahokia Formation c	**Alluvium (stream deposits);** mapped in floodplains along creeks and drainageways and in fan-shaped deposits where streams emerge from the moraines onto lower gradient slopes
HUDSON AND WISCONSIN EPISODES (~23,000 years B.P. to today)		
Silt and clay; stratified to massive; grayish brown; calcareous; may contain beds of diamicton, sand, or gravel; 5 to 20 feet thick	Equality Formation e	**Proglacial and postglacial lake deposits;** fills depressions or low-lying areas
WISCONSIN EPISODE (~23,000–14,600 years B.P.)		
Sand and gravel; contains some beds of silt and pebbles; brown to yellowish brown; calcareous; well to poorly sorted; up to 25 feet thick	Henry Formation h	**Glaciofluvial sediment (outwash);** deposited by glacial meltwater in streams and rivers that flowed from glaciers that deposited the Yorkville, Batestown, and Tiskilwa tills
Diamicton; silt loam to silty clay; gray to brown; calcareous; contains beds of sand and gravel; 10 to 60 feet thick	Yorkville Member, Lemont Formation l-y	**Till and associated sediment;** encountered only northeast of a line running through Gibson City and Gifford
Diamicton; sandy loam to silt loam; gray to grayish brown; calcareous; contains beds of sand, silt, and gravel; 25 to 75 feet thick	Batestown Member, Lemont Formation l-b	**Till and associated sediment;** in the subsurface, directly underlies the Yorkville Member
Diamicton; loam; grayish brown to reddish gray; calcareous; very stiff; 10 to 130 feet thick	Tiskilwa Formation t	**Till and associated sediment;** in the subsurface directly underlies the Batestown Member
Sand and gravel with silt; contains pebbles and cobbles; brown to grayish brown; calcareous; well to poorly sorted; 5 to 75 feet thick	Ashmore Tongue, Henry Formation h-a	**Glaciofluvial sediment (outwash);** deposited by glacial meltwater streams and rivers that flowed from Tiskilwa ice; not consistently differentiable from underlying deposits of sand and gravel correlated with the Pearl Formation
ILLINOIS EPISODE (~200,000–130,000 years B.P.)		
Fine to coarse sand with gravel; yellowish brown to grayish brown; calcite-cemented in places; upper part may contain weathered sand and gravel with silt and clay that is part of the Sangamon Geosol; 10 to 150 feet thick	Pearl Formation pl	**Glaciofluvial sediment (outwash);** deposited by glacial meltwater in streams and rivers that flowed from Vandalia ice; inset into the Vandalia Member (upper unit) of the Glasford Formation; contains the Sangamon Geosol in the upper part, except where eroded
Diamicton, sand and gravel, and silt and clay; interstratified; includes sediments assigned to the Berry Clay, Hagarstown, Radnor, and Toulon Members, or Roby Silt; upper part contains weathered silty to clayey materials that are part of the Sangamon Geosol; 15 to 200 feet thick	Vandalia Member, Glasford Formation upper unit[3] g-v3	**Proglacial or ice-contact sediment;** deposited by glacial meltwater or sediment gravity flows (debris flows) on or in front of Vandalia ice; contains the Sangamon Geosol in the upper part, except where eroded
Diamicton, with layers of sand and gravel and silt and clay; diamicton is less compacted than unit g-v1; includes sediments assigned to the Berry Clay, Radnor Member, Toulon Member, or Roby Silt; 25 to 175 feet thick	Vandalia Member, Glasford Formation middle unit[3] g-v2	**Subglacial or ice-contact sediments;** derived directly from glacial ice or deposited by glacial meltwater; deposition is interpreted to have occurred within an area of fast-flowing ice, possibly an ice stream, and is associated with the deglacial phase of the Illinois Episode
Diamicton; silt loam to loam; grayish brown; calcareous; contains beds of sand, silt, and gravel; hard; 5 to 100 feet thick	Vandalia Member, Glasford Formation lower unit[3] g-v1	**Till and associated sediment;** overlain by deposits that accumulated on, in front of, or beneath Vandalia ice; nearly continuous deposit
Silt, sand, and clay; stratified; gray to brown; calcareous; may contain beds of diamicton; in some places organic rich; 5 to 20 feet thick	Bellflower tongue, Teneriffe Silt[4] tr-b	**Glaciolacustrine sediment;** deposited in front of Vandalia ice; fills depressions or channels
Sand and gravel; pebbly; grayish brown; contains some beds of silt or diamicton; calcareous; well to moderately well sorted; 25 to 125 feet thick	Pearl Formation[4, 5] Grigg tongue 2 pl-g2 Grigg tongue 1 pl-g1	**Fluvial and glaciofluvial sediment;** deposited in front of Vandalia ice and may include sediments deposited by outflows from lakes ponded behind the glaciers; over the Mahomet Bedrock Valley (MBV) not consistently differentiable from the underlying Mahomet Sand Member when intervening till s or lake sediment of the Banner Formation are absent; includes deposits of sand and gravel (pl-g1) mapped over and outside the MBV, deposited before unit pl-g2
Silt, sand, clay, and diamicton; stratified to massive; gray to brown; calcareous; 20 to 60 feet thick	Petersburg Silt pb	**Proglacial sediment;** deposited in slackwater lakes or ice-marginal lakes
PRE-ILLINOIS EPISODE (>1,000,000–430,000 years B.P)[6]		
Diamicton; silt loam to loam; grayish brown; calcareous; hard; upper part may contain weathered material that is part of the Yarmouth Geosol; 5 to 15 feet thick	Tilton Member, Banner Formation b-tl	**Till and associated sediment;** may contain Yarmouth Geosol weathering profile in upper 10 feet (typically truncated); unit not well preserved.
Diamicton; loam; reddish brown to grayish brown; calcareous; contains beds of sand, silt, or gravel; hard; upper part contains weathered material that are part of the Yarmouth Geosol; 5 to 35 feet thick	Hillery Member, Banner Formation b-hl	**Till and associated sediment;** may contain Yarmouth Geosol weathering profile in upper 10 feet (typically truncated)
Silt, clay, and fine sand; bedded or massive; reddish brown; calcareous; clayey at the bottom of the unit; may contain beds of diamicton; 5 to 80 feet thick	Pesotum silt, Banner Formation[4] b-ps	**Deposits of a large proglacial lake;** this lake that inundated part of the MBV and tributary valleys; associated with glaciers that deposited the Hillery Member till
Diamicton; loam to silt loam; grayish brown to light olive brown; calcareous; contains beds of sand, silt, or gravel; contains numerous clasts of the local bedrock; hard; 5 to 100 feet thick	Harmattan Member, Banner Formation b-hm	**Till and associated sediment;** encountered most often in tributary bedrock valleys of the MBV
Silt, sand, and clay; bedded to massive; olive brown to gray; calcareous; 10 to 35 feet thick	Belgium Member, Banner Formation b-b	**Glaciolacustrine sediment;** deposited primarily in the MBV and tributary valleys; associated with the Harmattan ice
Sand, diamicton, and silt; sandy loam to silty clay loam; very dark gray to greenish gray; weakly calcareous to leached; may contain humus, peat, wood, and/or fossil snails; hard; these materials were previously assigned to Lierle Clay unit (e.g., Soller et al. 1999); 5 to 40 feet thick	Fisher member, Banner Formation[4] b-f	**Fluvial or lacustrine sediment;** deposited on a former interglacial floodplain of a river flowing in the MBV; the land surface was poorly drained and occasionally covered by overbank deposits, slope wash, or debris flows
Sand and gravel; brown to grayish brown; contains some beds of silt; calcareous; well to moderately well sorted; 20 to 150 feet thick	Mahomet Sand Member, Banner Formation[3] upper unit b-m2	**Glaciofluvial sediment (outwash);** deposited in the MBV by glacial meltwater flowing from West Lebanon ice during the retreat phase; glaciers were located northeast of the area
Diamicton; sandy loam to clay loam; brown to pinkish gray; calcareous; includes basal fine and coarse facies of sand and gravel or silt and clay; hard; 5 to 90 feet thick	West Lebanon Member[7] Banner Formation b-wl	**Till and associated sediment;** deposited by glaciers flowing into the area from a northeastern or eastern ice source
Sand and gravel; pebbly to cobbly; brown; locally contains beds of silt or diamicton; calcareous; well to moderately well sorted; 30 to 150 feet thick	Mahomet Sand Member, Banner Formation[3] lower unit b-m1	**Glaciofluvial sediment (outwash);** deposited in the MBV by glacial meltwater flowing from West Lebanon ice during the advance phase; glaciers were located northeast of the area
PRE-ILLINOIS EPISODE AND OLDER		
Sand with gravel; brown to gray; calcareous or leached; contains a higher proportion of fragments of the local bedrock; encountered in the deepest channel of the MBV; often contains mussel and gastropod shells; 5 to 20 feet thick	Canteen member, Banner Formation[4, 8] Dewitt facies b-c(d)	**Fluvial sediment;** deposited in the MBV prior to the earliest pre-Illinois Episode glaciation
Silt, clay, and diamicton; crudely stratified; olive brown to brownish gray; calcareous or leached; contains a higher proportion of fragments of the local bedrock; 10 to 60 feet thick	Canteen member, Banner Formation[8] b-c	**Lacustrine sediment, slope wash, or weathered bedrock;** formed or accumulated in the MBV and tributary valleys during preglacial times
Shale, siltstone, limestone, sandstone, and dolomite; Pennsylvanian rocks include relatively thin, but continuous units of of black shale, limestone, shale, siltstone, sandstone, coal, and claystone that may be soft, fissile, and fractured; rocks locally contain siderite nodules, plant and marine fossils, and paleosol features	Pennsylvanian, Mississippian, Devonian, Silurian bedrock P$_z$	**Bedrock;** includes strata of both marine and terrestrial origin; the upper surface of bedrock is undulating or irregular (including paleovalleys and paleocuplands) shaped by multiple cycles of erosion; rocks Silurian in age and younger are warped into structural highs, expressed on the bedrock surface along the La Salle Anticlinorium, a significant structural feature of Illinois

[1] The materials mapped at the land surface may be overlain by 1 to 5 feet of wind-deposited silt (loess).
[2] The time periods for the Wisconsin and Hudson Episodes are reported in calibrated radiocarbon years before present (where "present" is considered to be 1950). Radiocarbon ages were calibrated with the online program Calib 7.1 (Stuiver et al. 2015) using the IntCal13 correction curve (Reimer et al. 2013).
[3] Materials are assigned to subunits or facies to account for their stratigraphic position, changes in lithology, or mode of deposition.
[4] New (informal) lithostratigraphic unit introduced by Stumpf and Dey (2012).
[5] Correlative to glacial meltwater deposits (outwash) mapped in southwest Illinois by Grimley and Webb (2010).
[6] The lower subdivision of the pre-Illinois Episode is based on dates from terrestrial cosmogenic nuclide analyses (TCN) conducted on quartz sand grains sampled in the lower unit of the Mahomet Sand Member and Dewitt facies of the Canteen member in Piatt County (unpublished data).
[7] The West Lebanon Member till was previously mapped only in west-central Indiana by Bleuer (1975).
[8] Correlative to preglacial deposits mapped in southwest Illinois by Phillips (2004).

Location map base data from Champaign County GIS, 2013.

Digital cartography by Jennifer E. Carrell, Andrew J. Stumpf, and Deette Lund, Illinois State Geological Survey.

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Introduction

This map product was developed as part of a study by the Illinois State Geological Survey (ISGS) to improve our understanding of the hydrogeology and geology of the Mahomet aquifer in east-central Illinois (Stumpf and Dey 2012), with a specific focus on Champaign County and adjacent counties. The geologic cross sections portray the unconsolidated sediments and bedrock in two dimensions, in such a way that they can be viewed as a vertical slice through the earth's surface down to bedrock. To represent the stratigraphic and lithologic relationships in the subsurface at the scale shown, the vertical scale was exaggerated 20 times. Also, to make it easier to cross reference information shown on the profiles, the cross sections are arranged so that the deepest channel of the Mahomet Bedrock Valley (MBV) is aligned with the center of the page. The cross sections show the distribution and thickness of geologic materials and how they relate to one another. Bold vertical lines on the cross section locate boreholes where information about the surface and subsurface geology was collected. The boreholes were drilled for several different purposes, including geologic mapping, engineering testing, construction of water wells, and oil, gas, and coal exploration.

The cross sections were drawn to document the geologic diversity in the MBV and adjacent areas. Each cross section depicts sequences of deposits that resulted from a complex and varied history of sediment erosion and deposition during the Quaternary Period. The age and location of such events significantly influenced the preservation and modification of the glacial and postglacial deposits and topography of the bedrock surface.

The geologic mapping units portrayed on the cross sections and described in the accompanying legend were defined in a revised geological framework for the region developed by Stumpf and Dey (2012) and Atkinson et al. (2014). Several new informal mapping units were introduced for deposits encountered in the region. The revisions were necessary to classify deposits of glacial and nonglacial sediments (1) not encountered or identified in the past; (2) not differentiated in the previous classification systems of Willman and Frye (1970), Willman et al. (1975), and Kempton et al. (1991); or (3) reinterpreted and correlated with other lithostratigraphic units. The cross sections were primarily drawn along lines connecting a series of boreholes. However, in some places where subsurface information was sparse or not available, the geological and geophysical information from boreholes adjacent to the lines was used to construct the profiles. In addition, where data are scarce or not available, unit boundaries are primarily drawn with dashed lines.

Methods

A customized tool for the ESRI ArcMap software programmed by the ISGS (Carrell 2015) was used to generate georeferenced profiles for the mapping units. For mapping units h-a, g-v3, pl-g1, pl-g2, b-m2, and P$_z$, grids of the unit's upper surfaces in a 3-D geologic model were imported into ArcMap. For additional graphical editing, the profile lines were imported to Adobe Illustrator via the MAPublisher software of Avenza Systems Incorporated (version 8.4). The final cross sections were exported from Adobe Illustrator as ESRI shapefiles so they could be further analyzed using ArcMap software.

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Fieldwork necessary to collect additional subsurface data was undertaken between 2007 and 2009 by A.J. Stumpf, W.S. Dey, T.C. Young, and T.O. Hodson. Some borehole logs of natural gamma radiation shown are from Burch (2008).

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Figure 1 Location of geologic cross sections in Champaign County and adjacent areas. The cross section lines lie over a shaded relief map of the bedrock surface. This map was compiled from bedrock topography maps published by Stumpf and Dey (2012), Soller et al. (1999), and Herzog et al. (1994).

Cross Sections

- Sand and gravel
- Mainly sand; may contain some gravel or silt
- Laminated silt and clay
- Sand, diamicton, and silt; organic-rich
- Mixture of loam, sand and gravel, diamicton, and/or silty clay
- Diamicton, massive silt, or other fine-grained sediment
- Contact
- Inferred contact

Borehole Information

Note:
Boring labels indicate the county identification number and field identification number (in parentheses). The county number is a portion of the 12-digit API number on file at the ISGS Geological Records Unit that references records in the ISGS Institutional Database. Most reports for the boreholes are available from the ISGS website (https://www.isgs.illinois.edu).

Horizontal scale: 1:48,000 (1 inch = 4,000 feet)
Vertical scale: 1 inch = 200 feet
Vertical exaggeration: 20×