The Mahomet Aquifer of East-Central Illinois & Water Resources Planning in Illinois

Ed Mehnert, Ph.D.
Hydrogeology Section
Illinois State Geological Survey

March 26, 2007

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

ISGS Illinois State Geological Survey

ILLINOIS

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Ed Mehnert, Ph.D.
Hydrogeology Section
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Allen Wehrmann, P.E.
Center for Groundwater Science
Illinois State Water Survey

May 31, 2006

ISGS Illinois State Geological Survey

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

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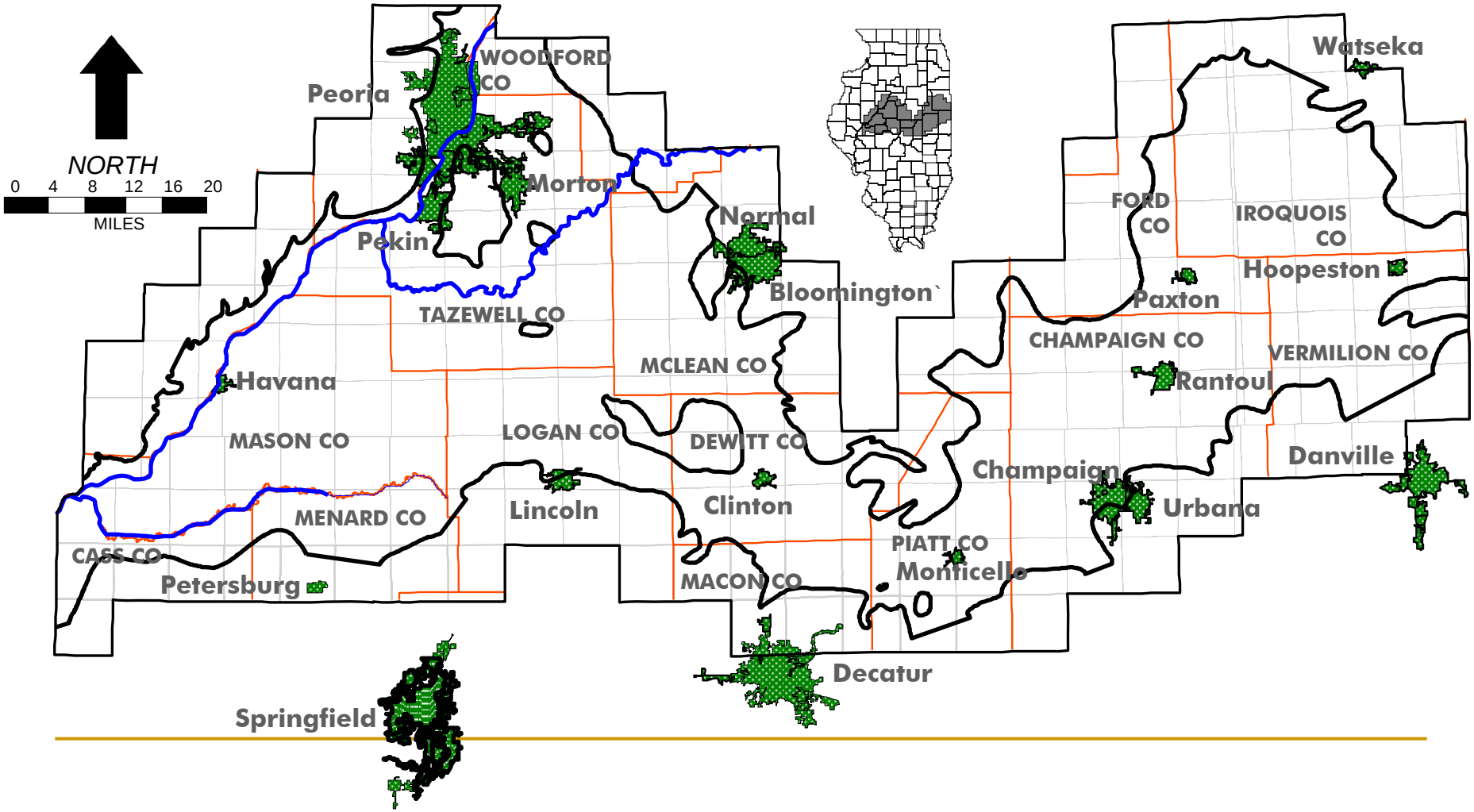
Illinois State WATER SURVEY

The Mahomet Aquifer Region

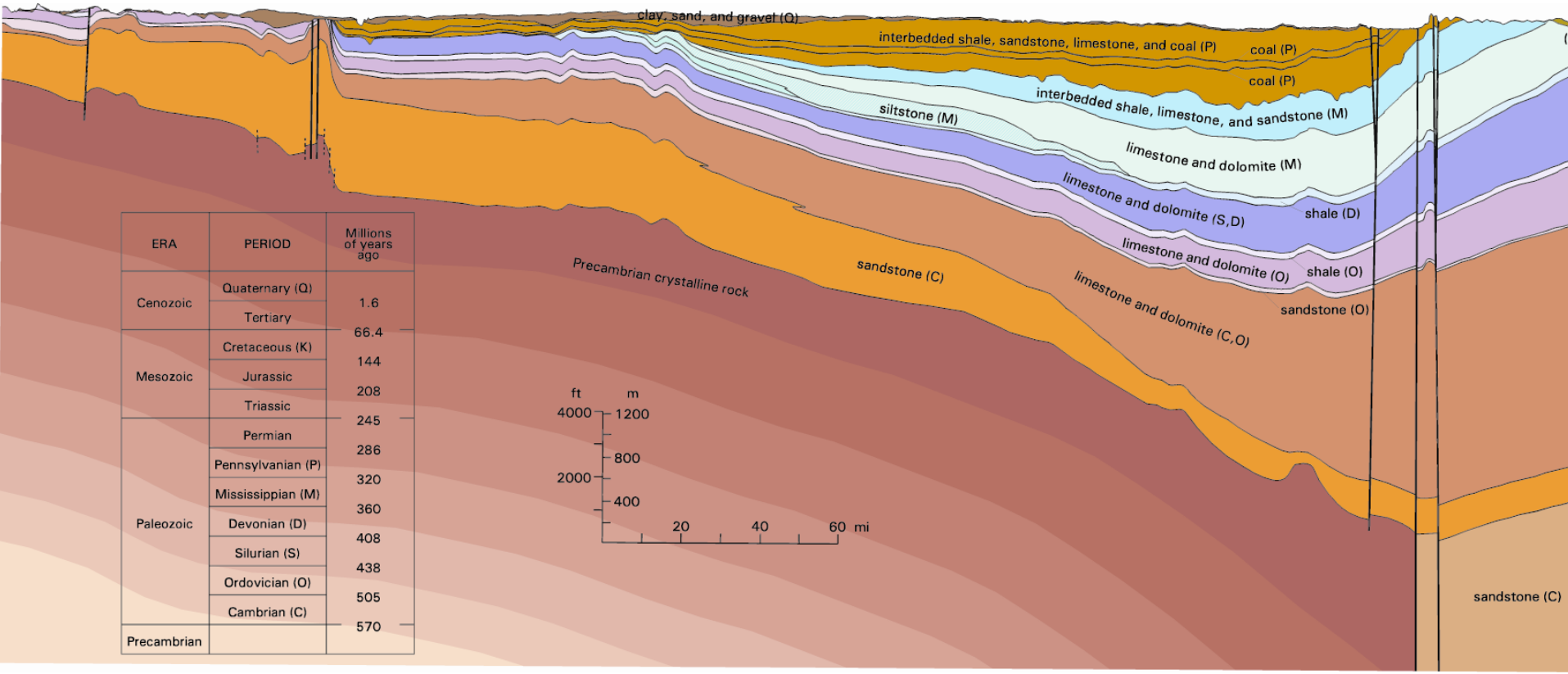


Illinois Geology

(N-S cross-section)

North

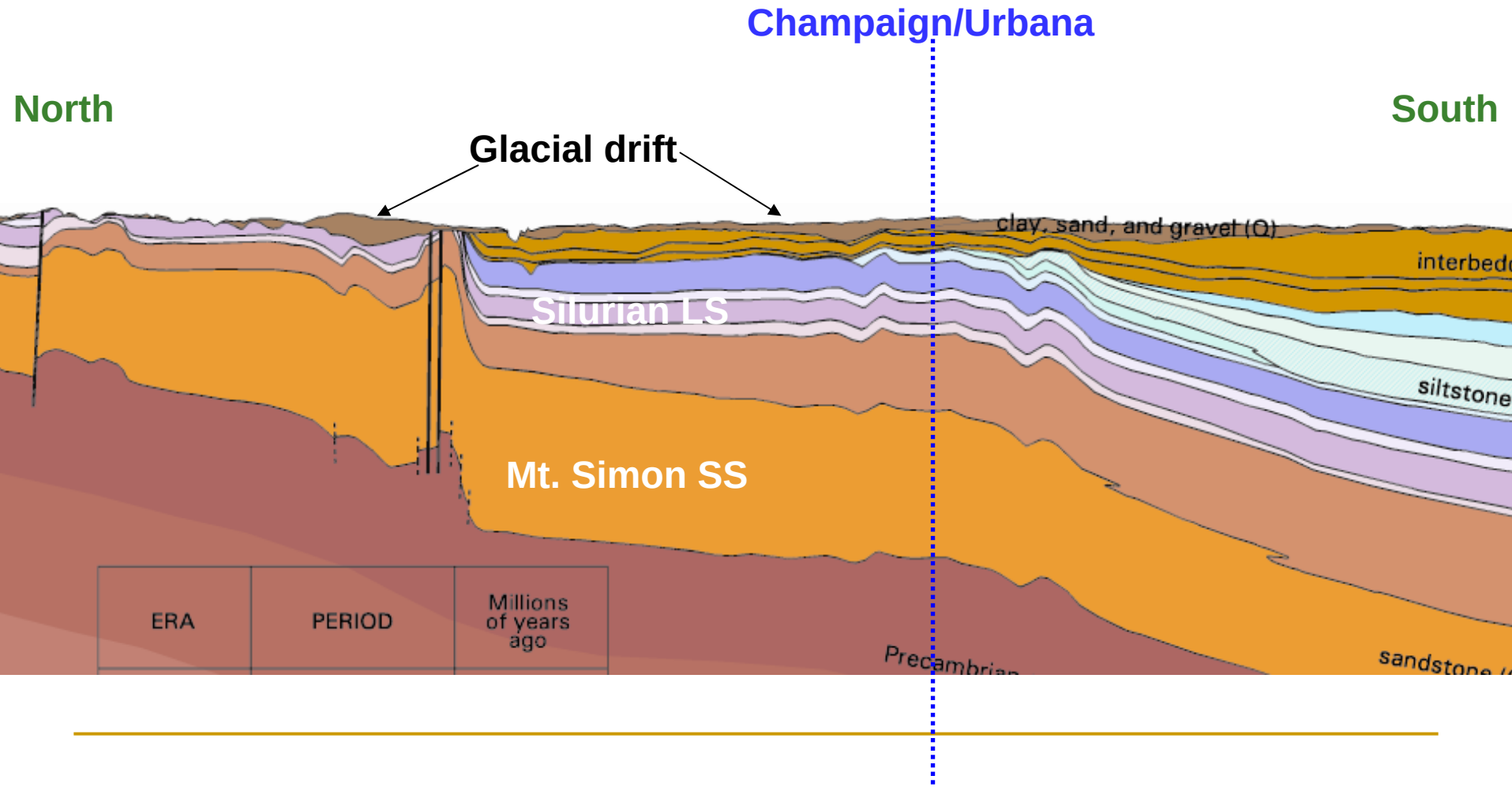
South



ERA	PERIOD	Millions of years ago
Cenozoic	Quaternary (Q)	1.6
	Tertiary	66.4
Mesozoic	Cretaceous (K)	144
	Jurassic	208
	Triassic	245
Paleozoic	Permian	286
	Pennsylvanian (P)	320
	Mississippian (M)	360
	Devonian (D)	408
	Silurian (S)	438
	Ordovician (O)	505
	Cambrian (C)	570
Precambrian		

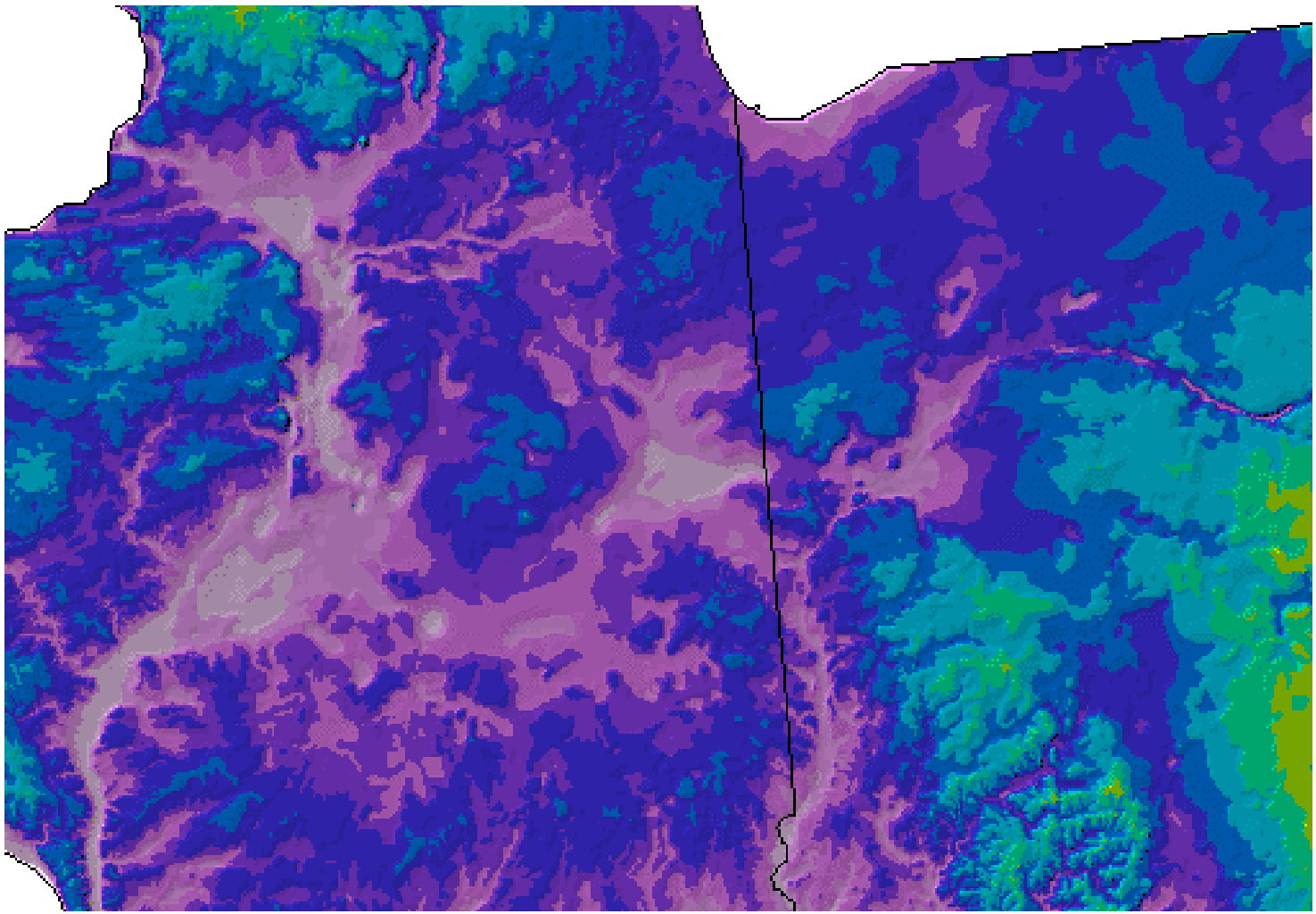
Illinois Geology

(N-S cross-section, zoomed in)

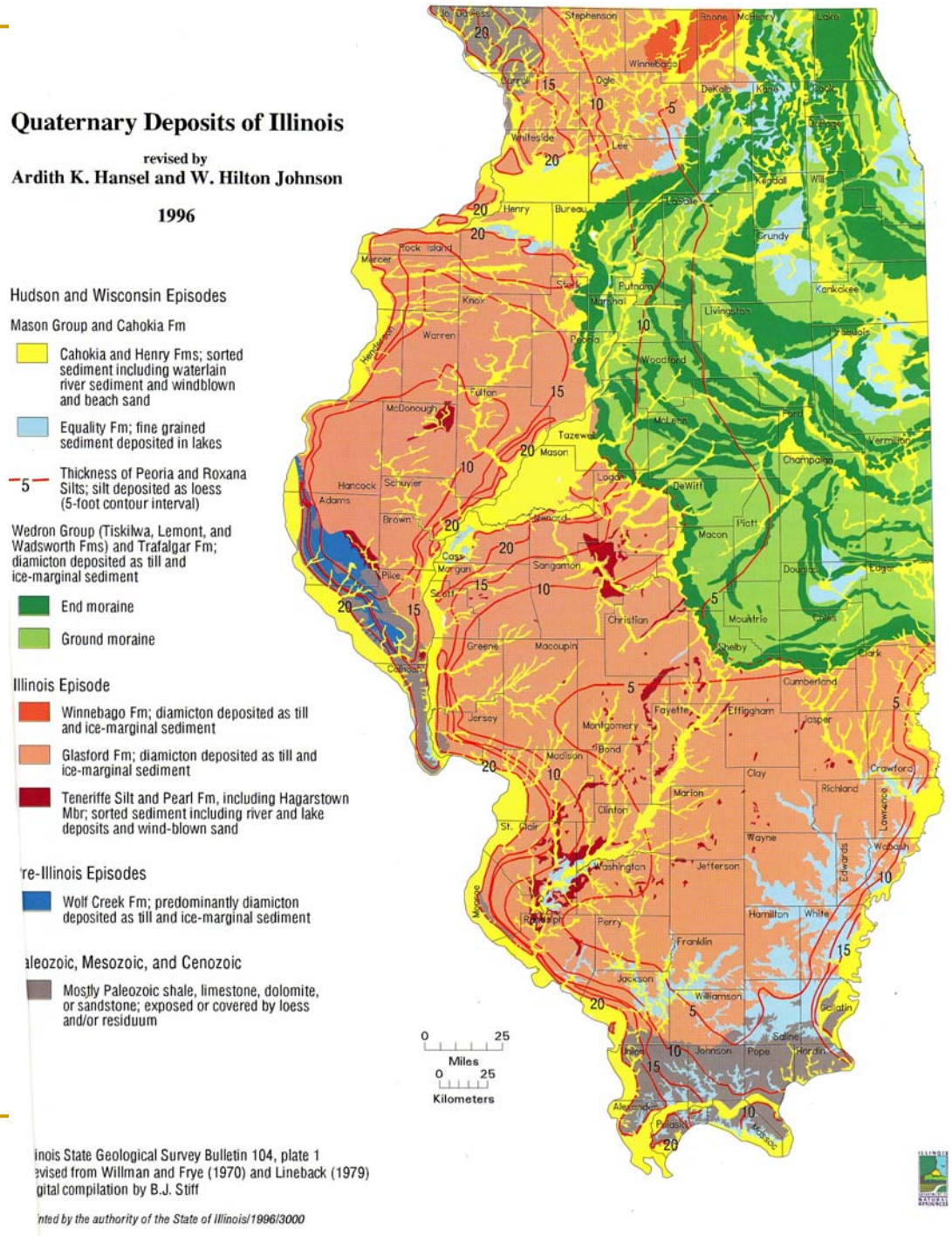


Regional Bedrock Topography

Green= higher elevations
Light violet= lower elevations

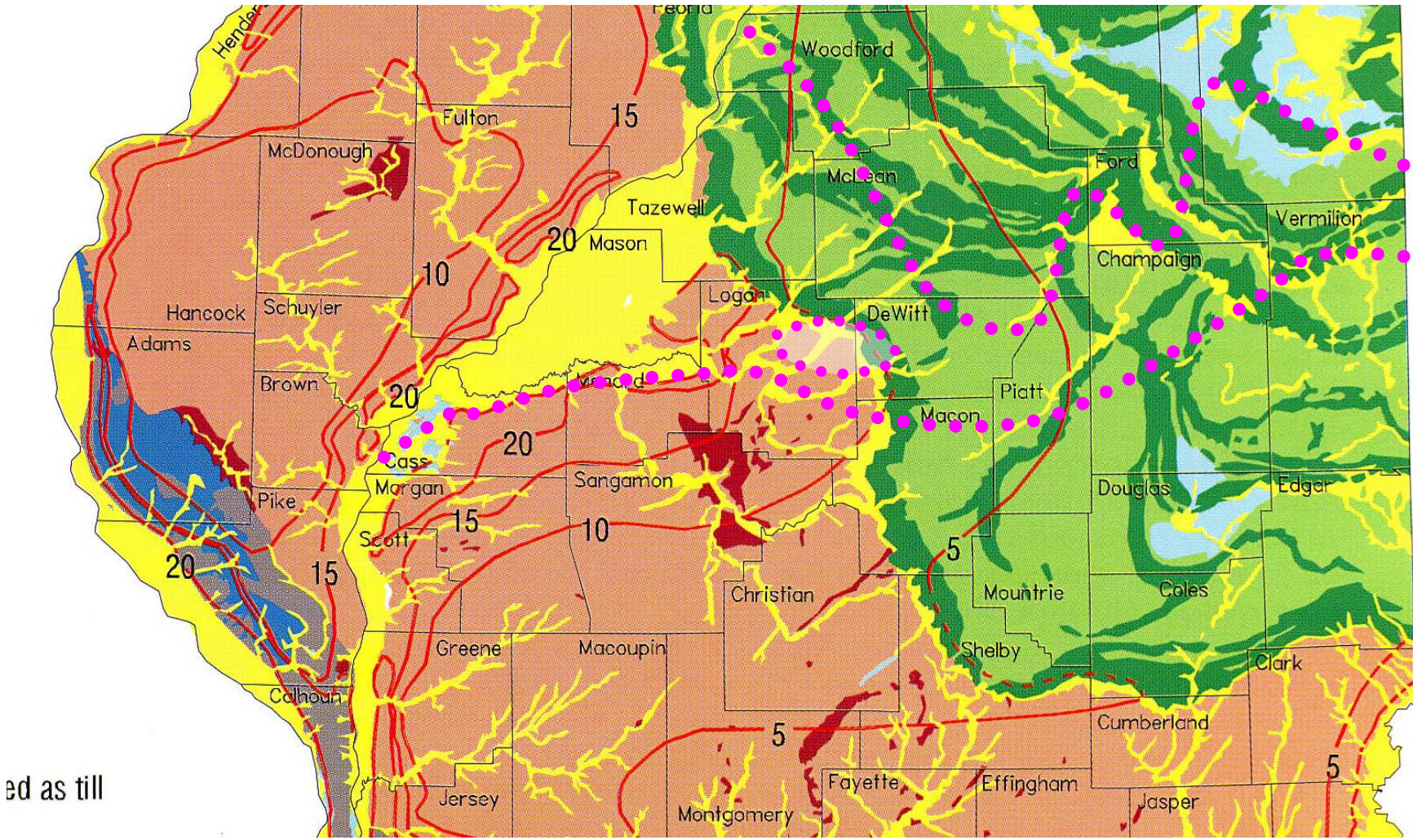


IL Geology– glacial materials

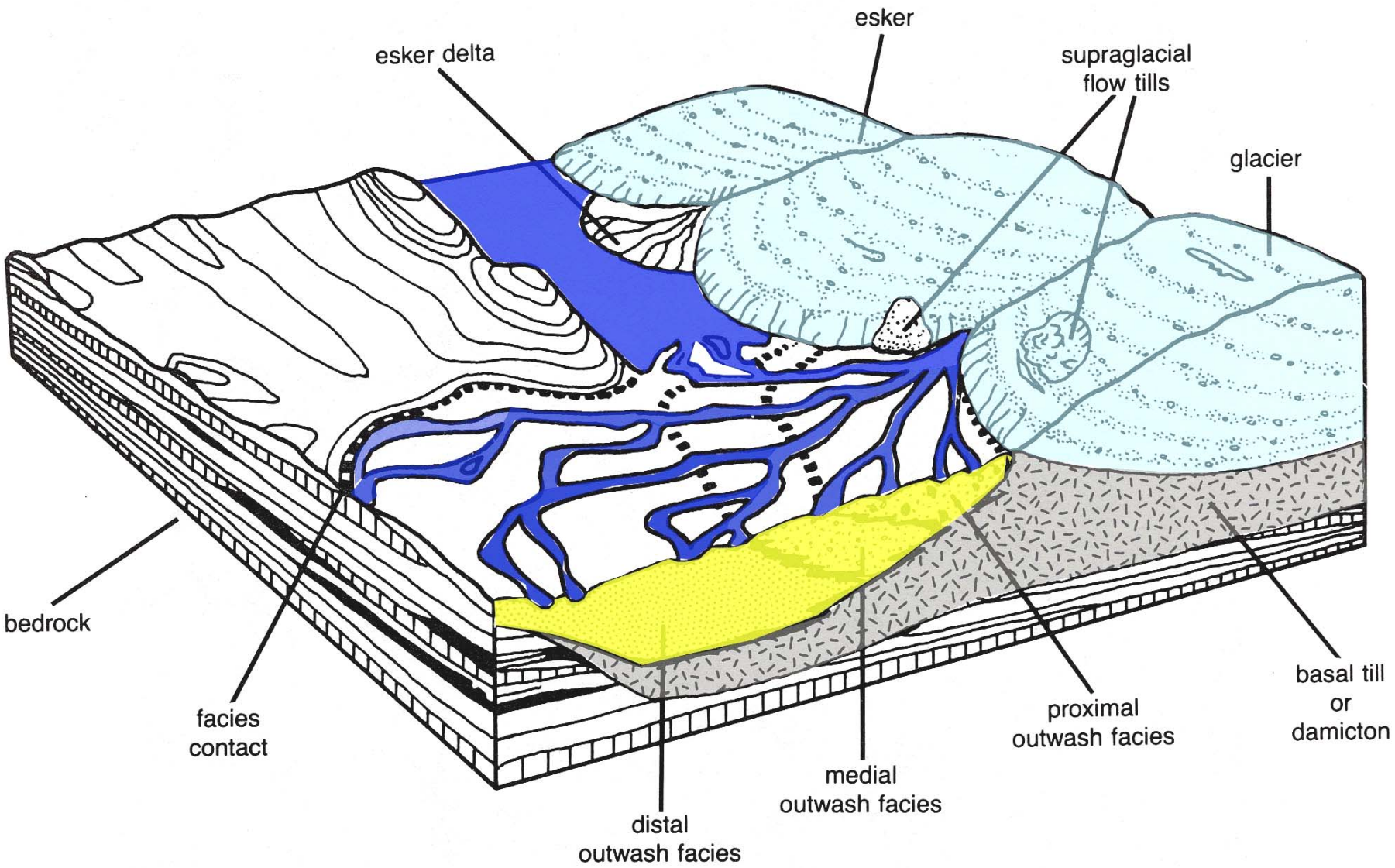


IL Geology–glacial materials

Approximate boundary of Mahomet aquifer

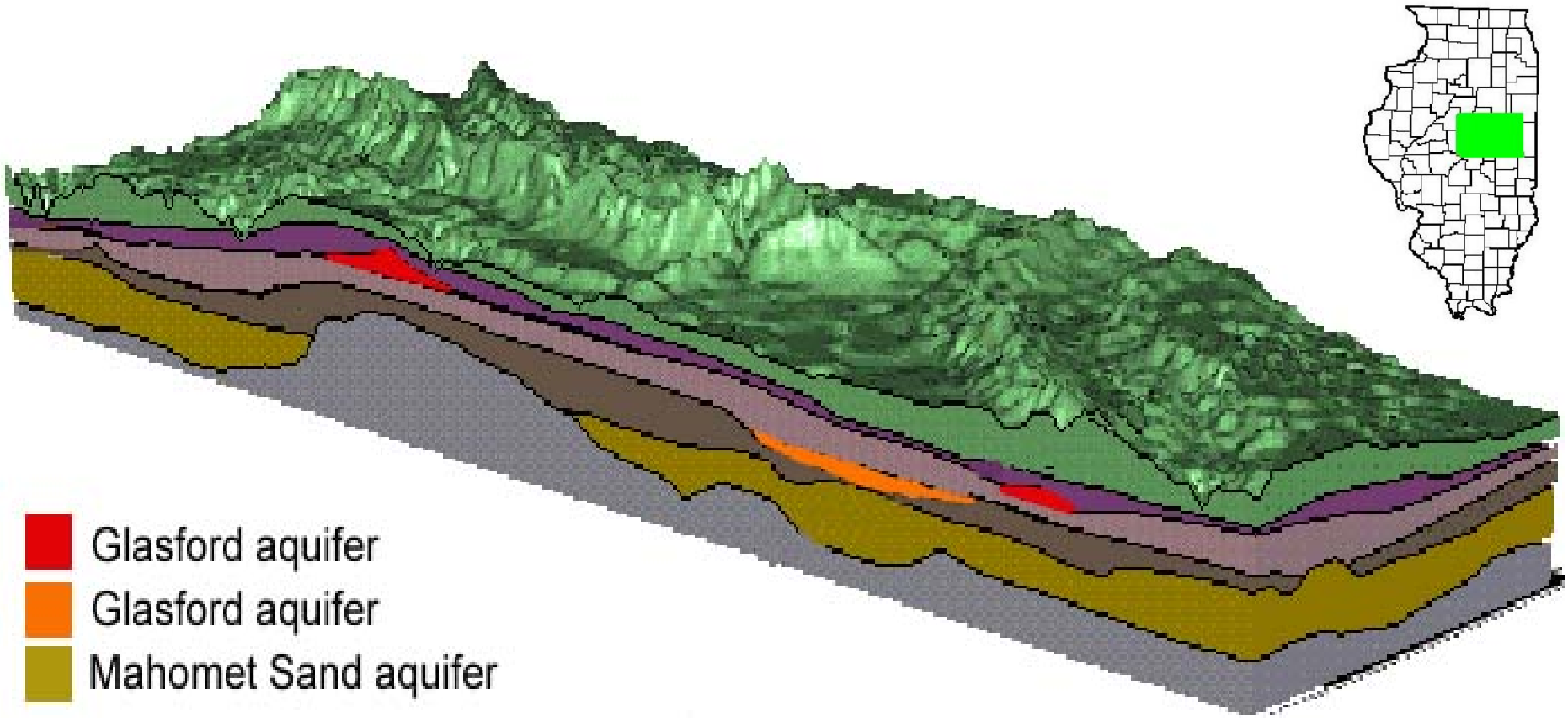


Glacial depositional processes

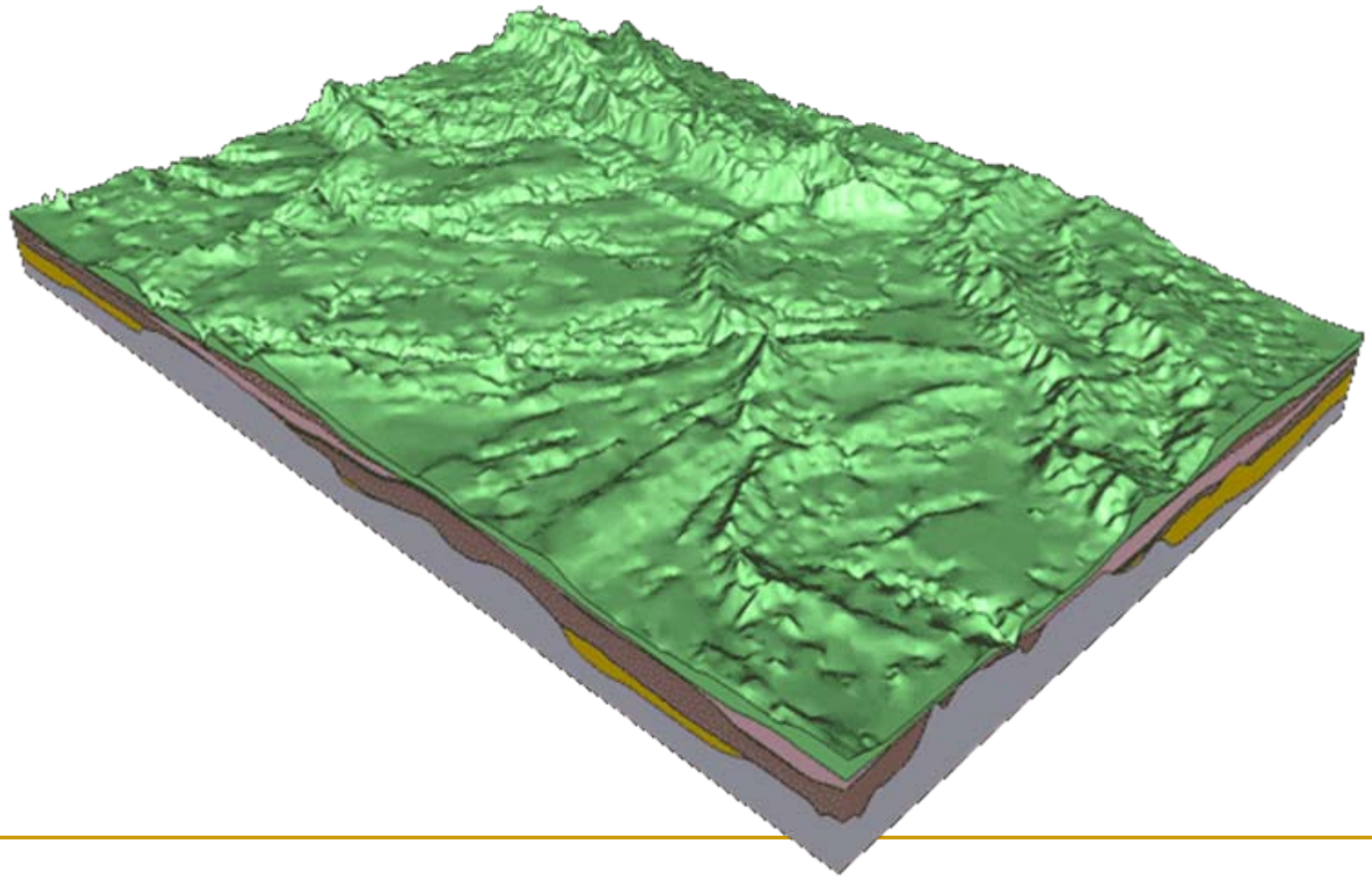


Glacial meltwater– high energy

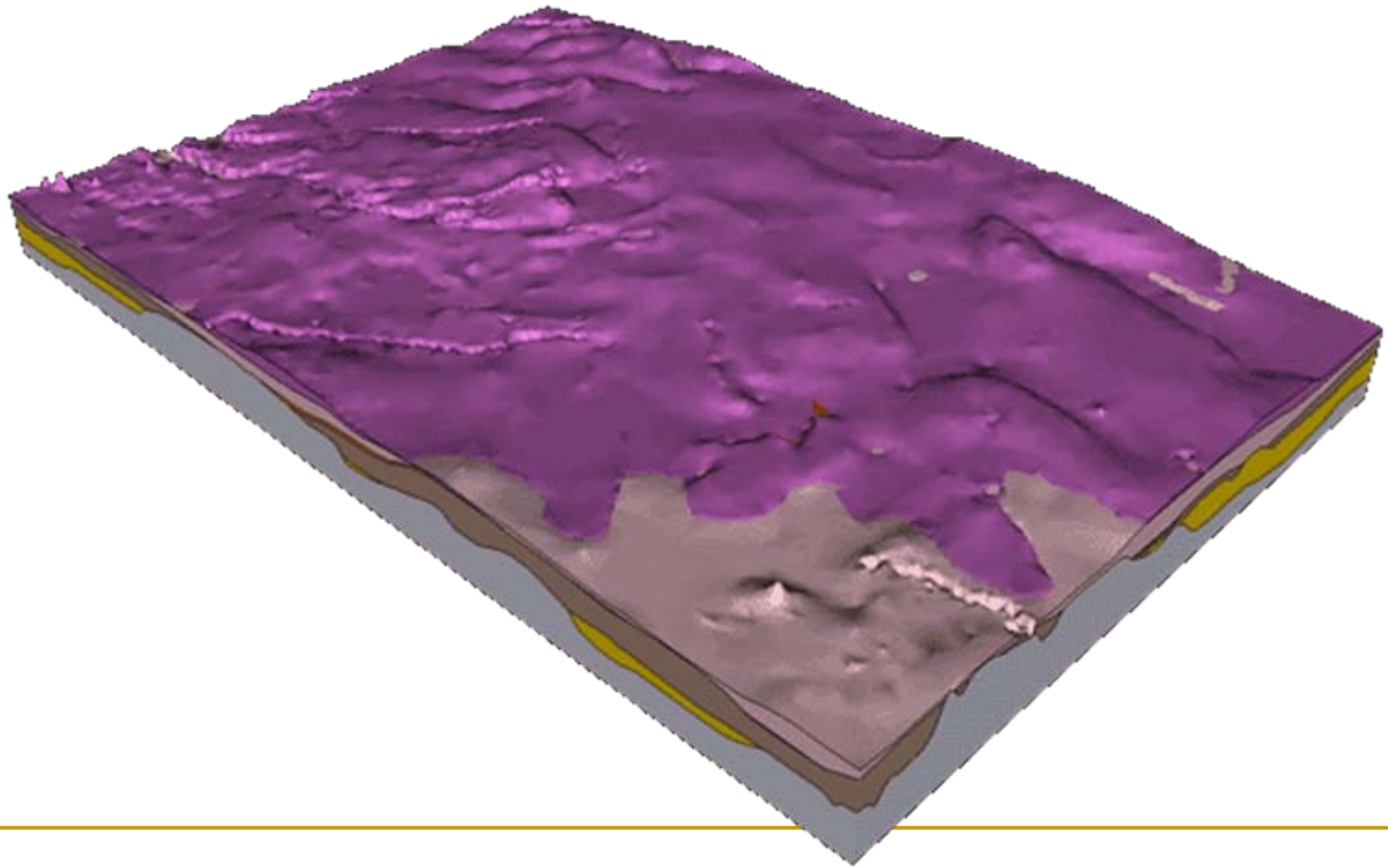
Geology of the Mahomet Aquifer



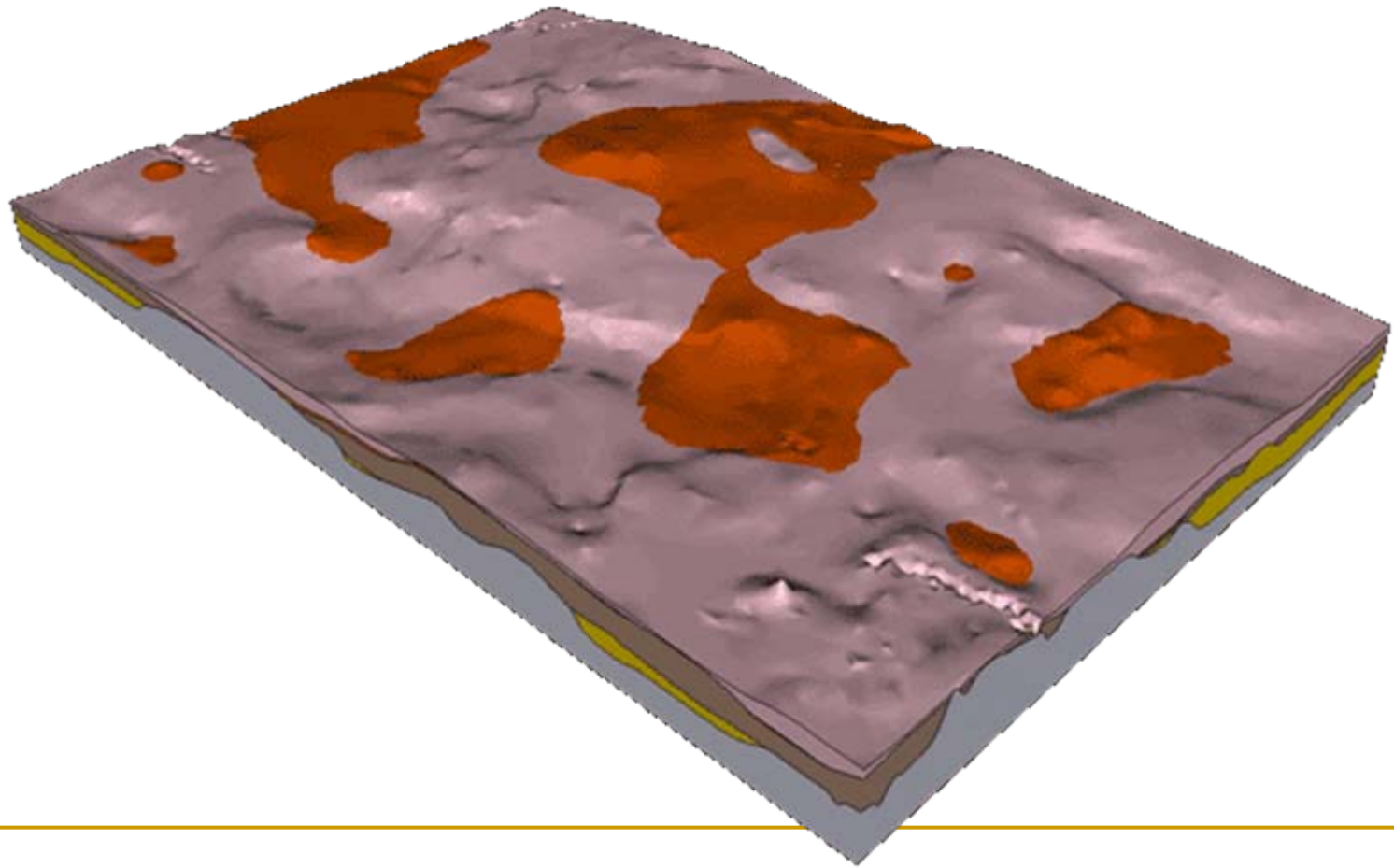
Land Surface, and top of Wisconsin Deposits (green)



Late Illinois Episode till (dark purple)



Late Illinois Episode basal sand (orange)



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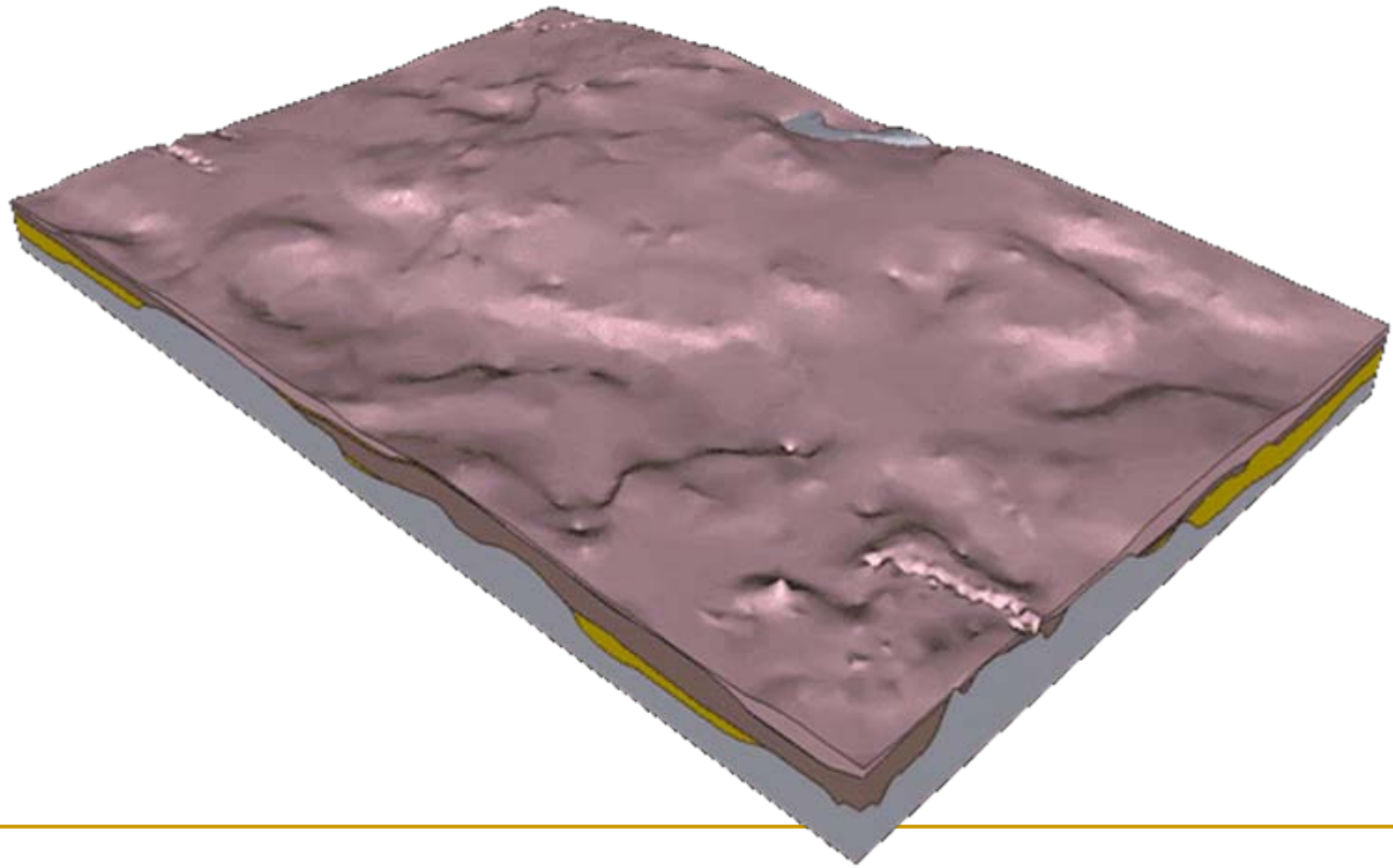

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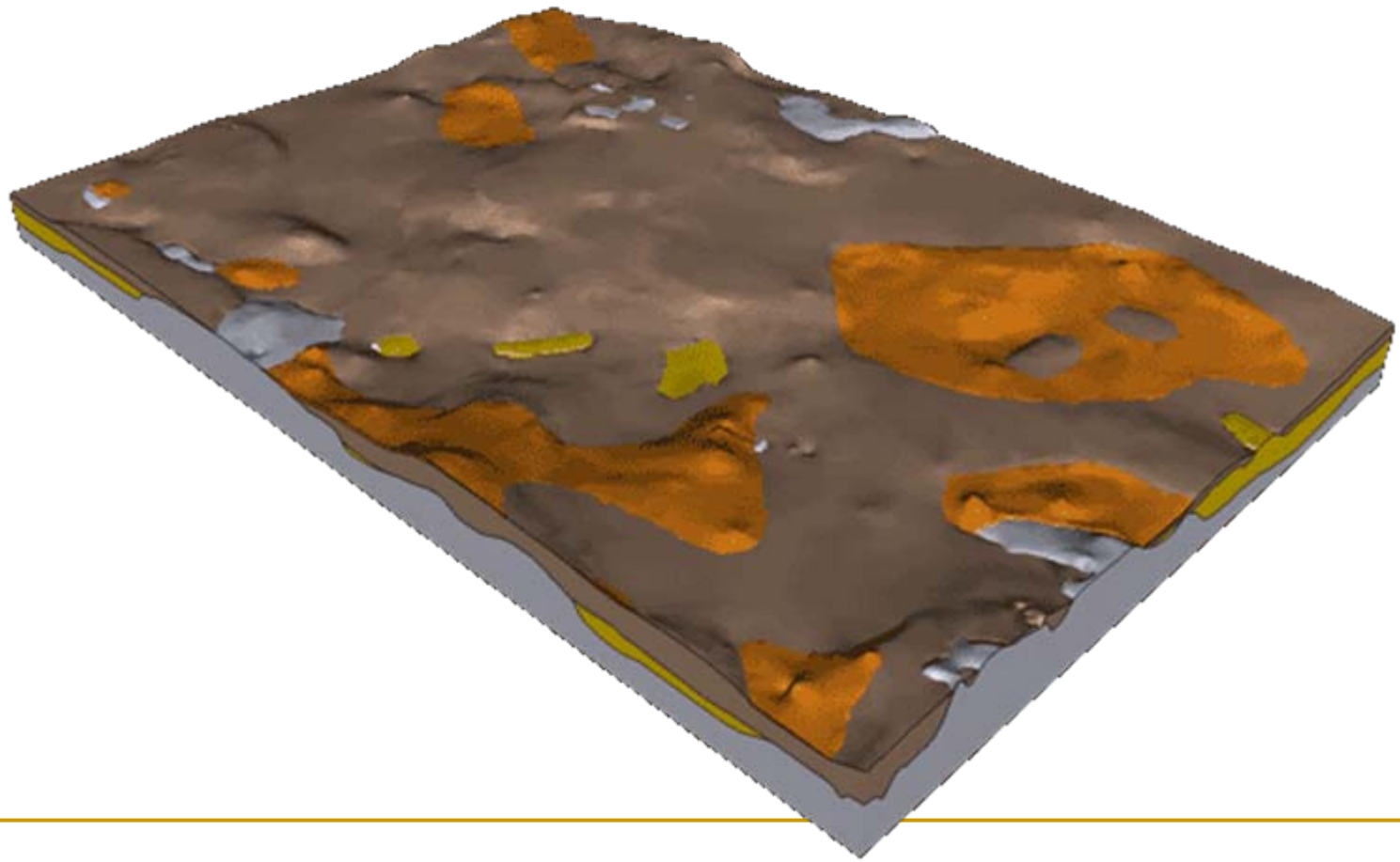
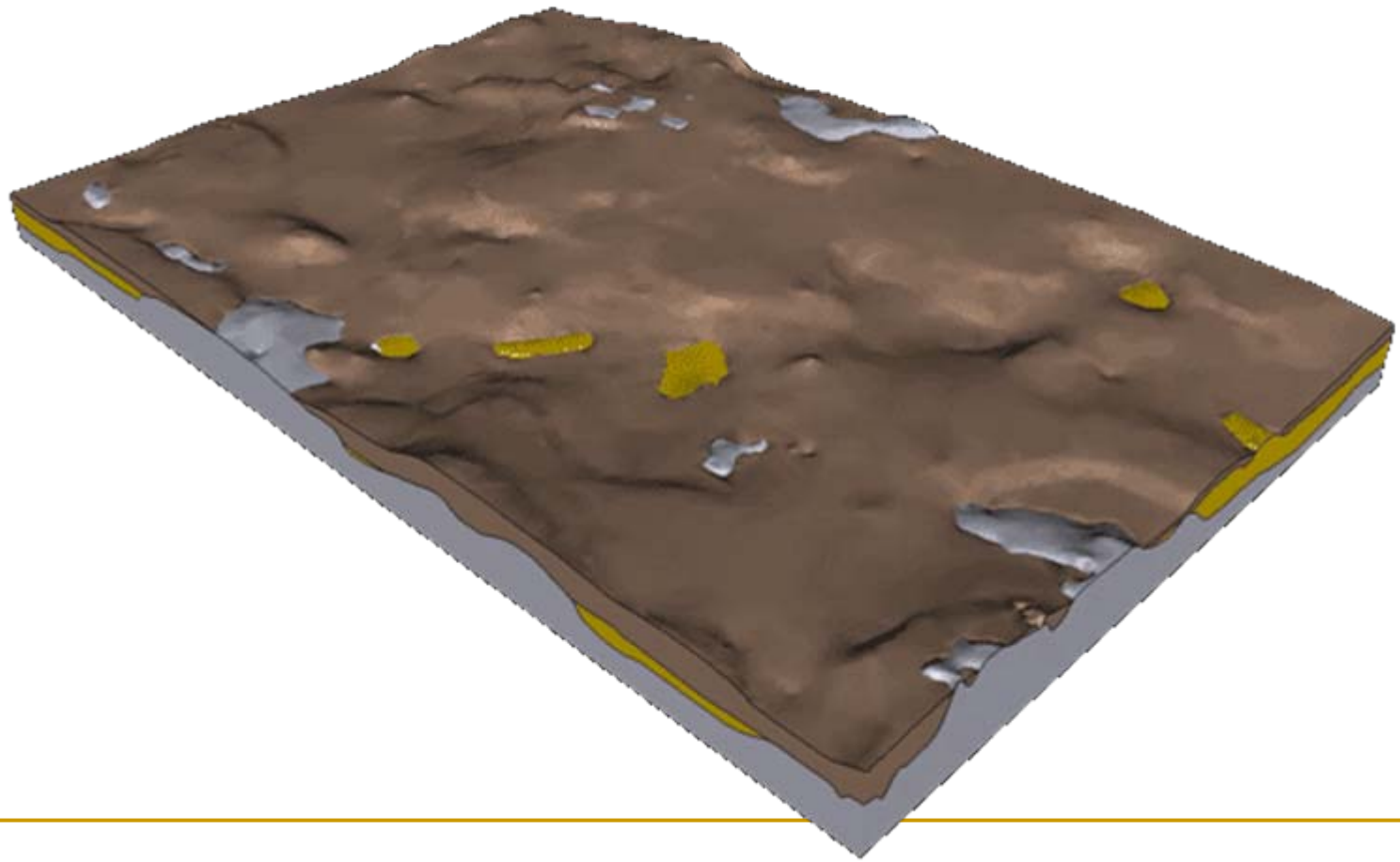
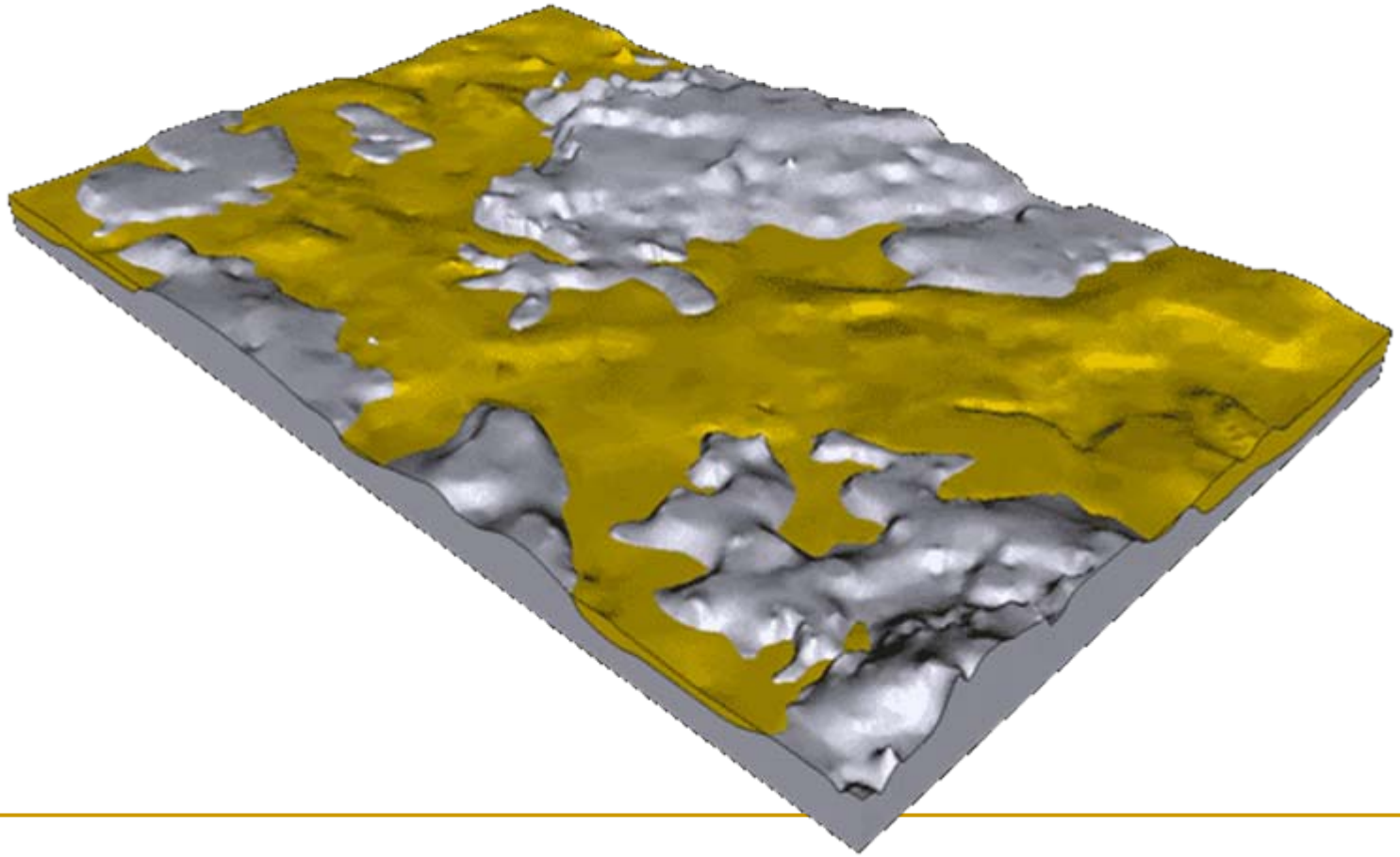


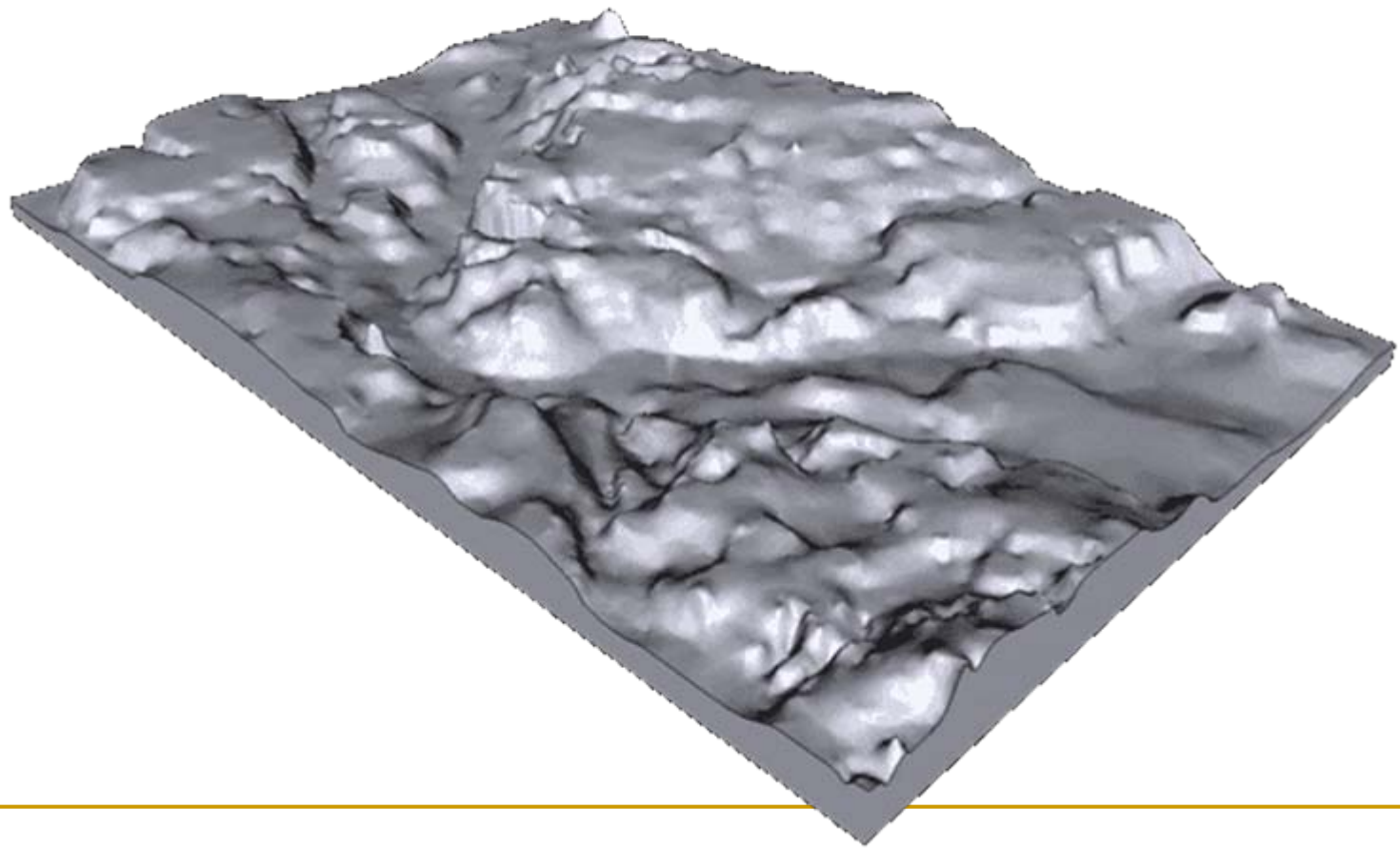
Late pre-Illinois Episode tills (brown)



Pre-Illinois Episode Mahomet Sand (yellow)



Topography of the Bedrock Surface



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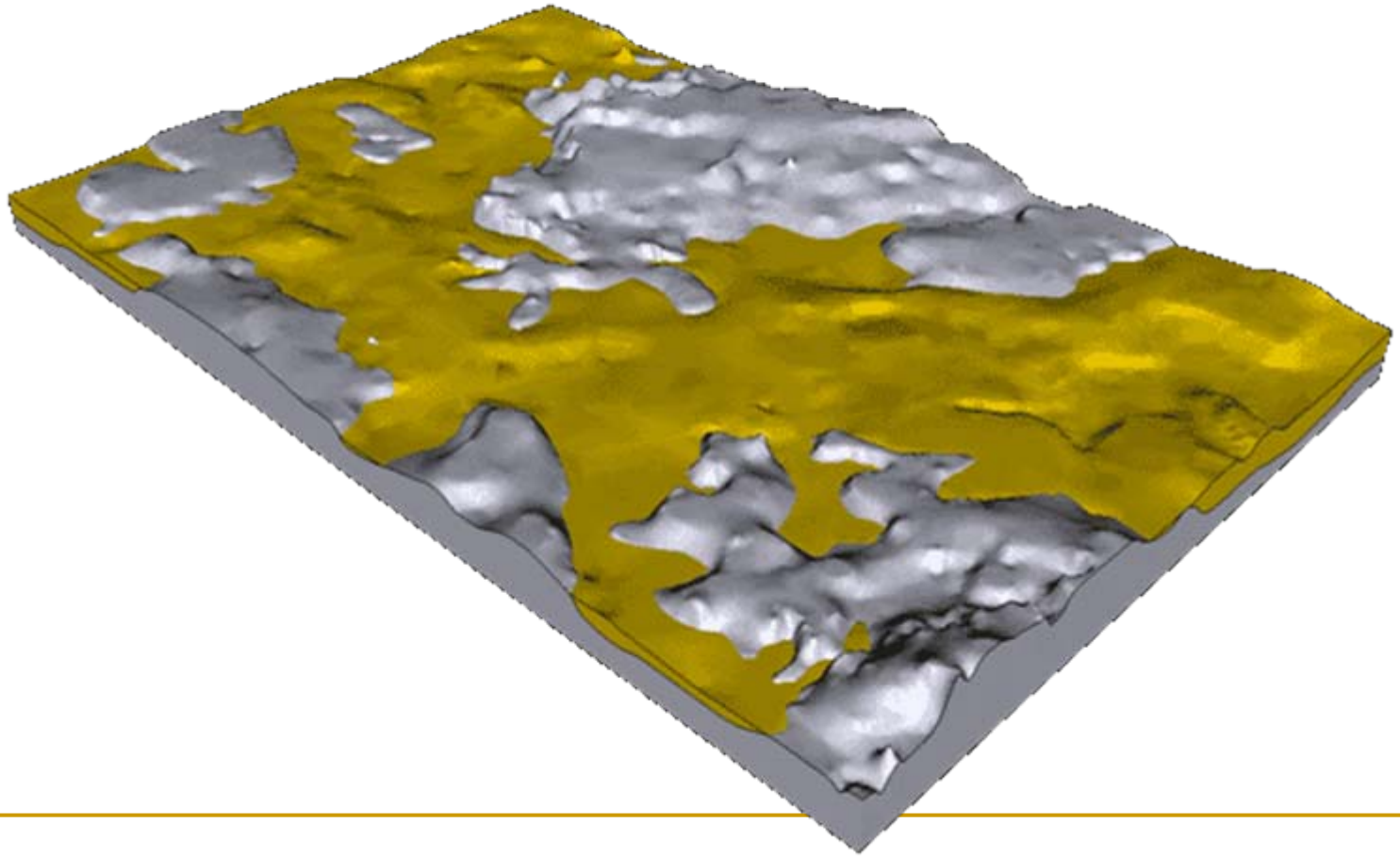

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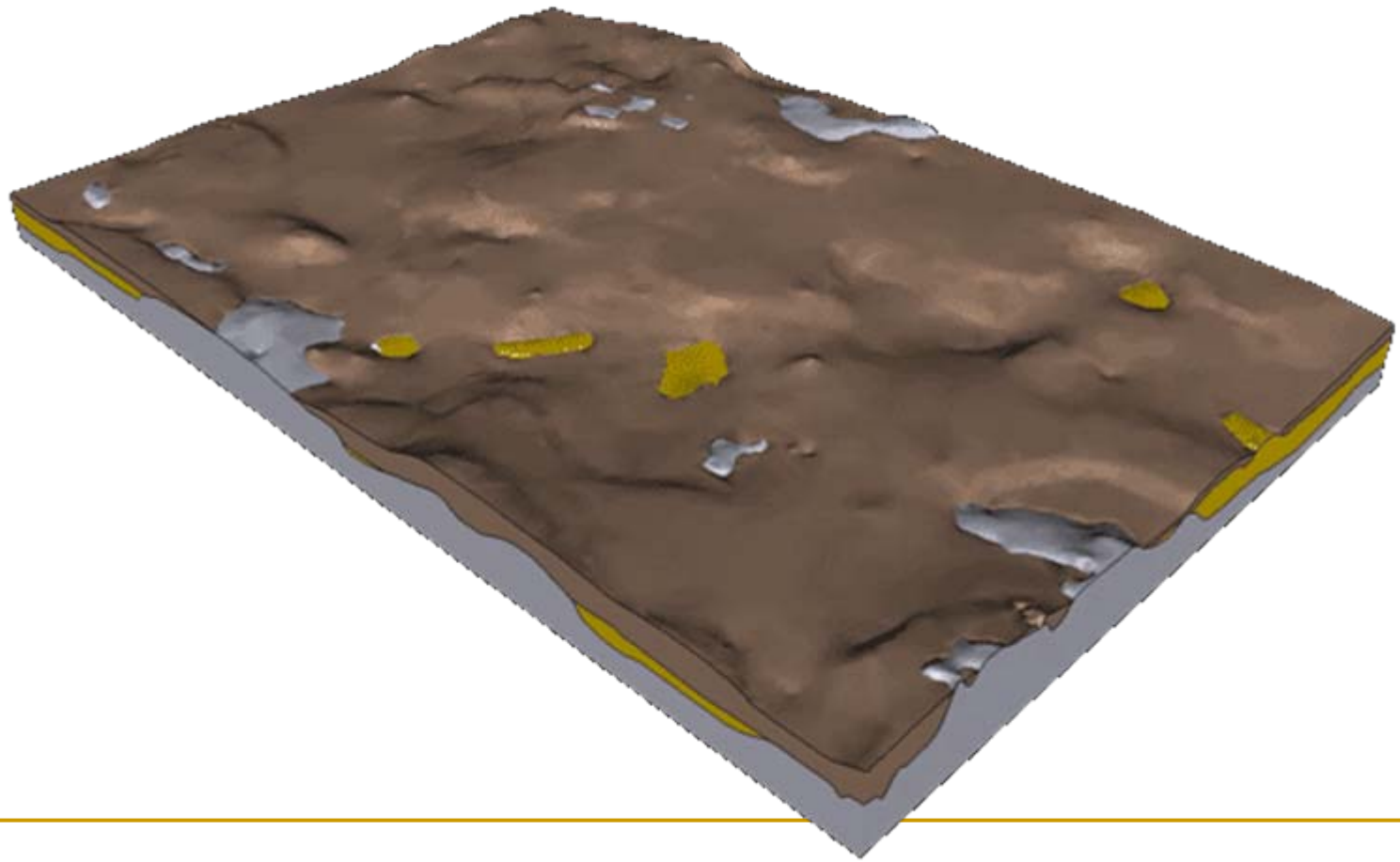

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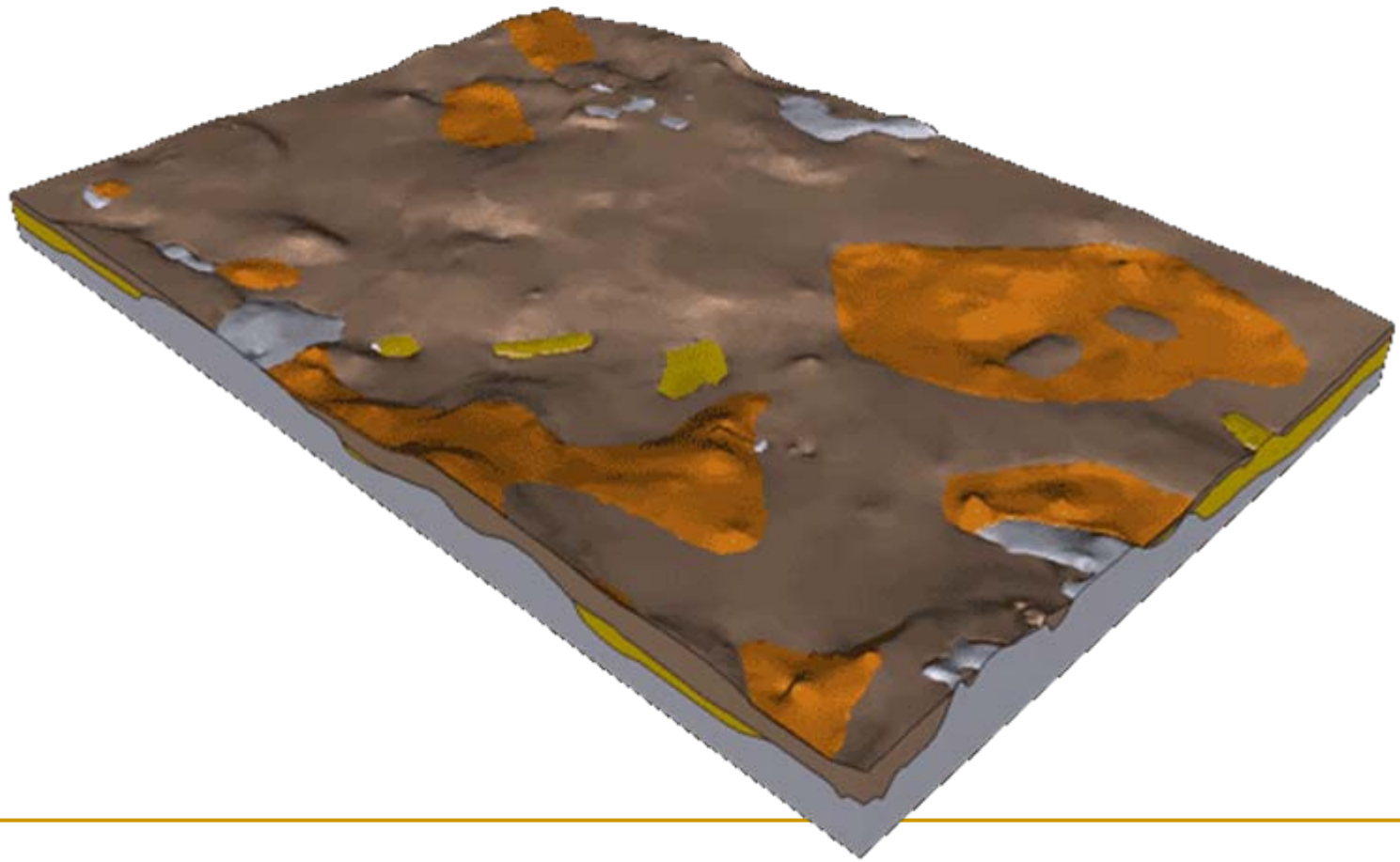

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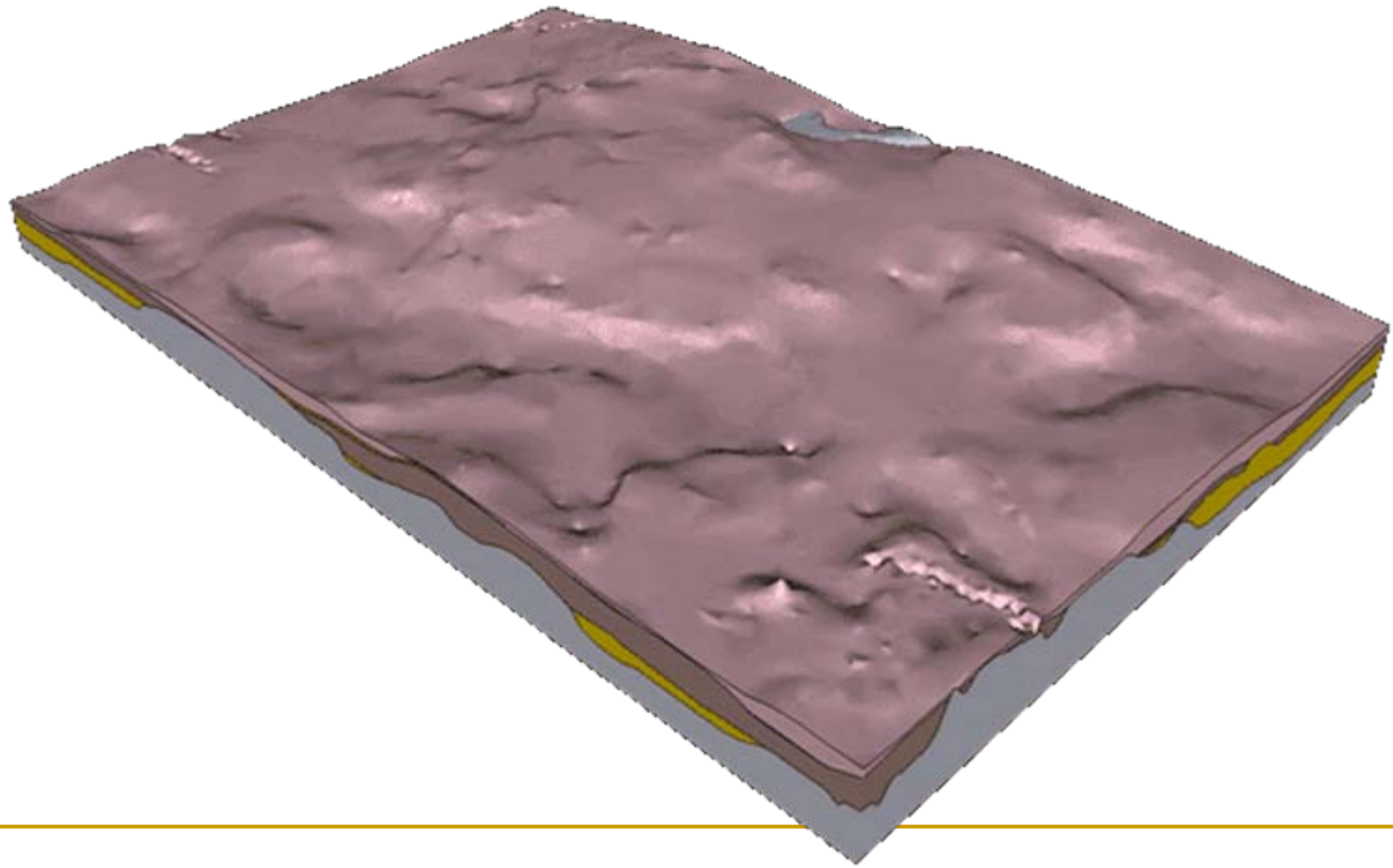

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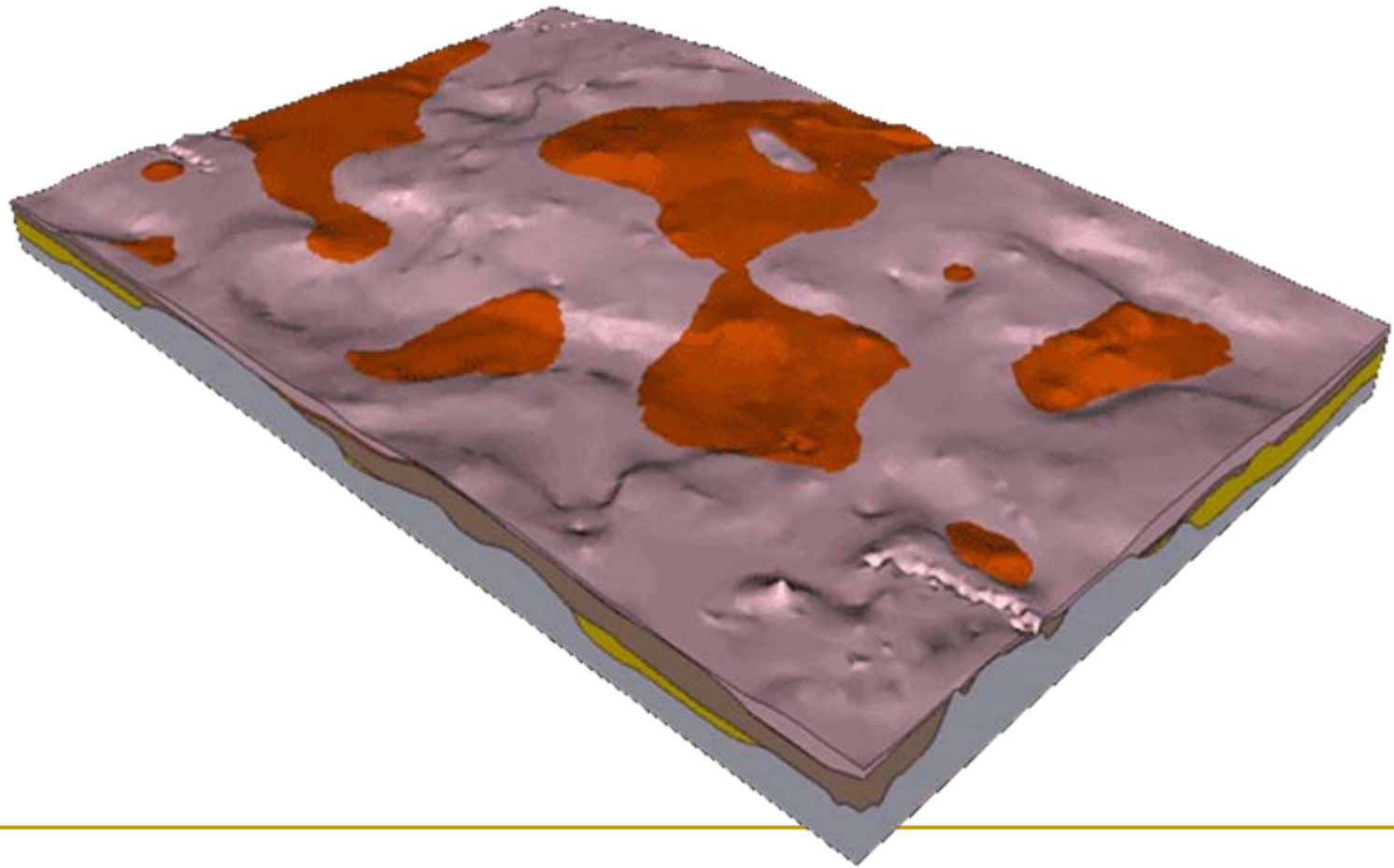

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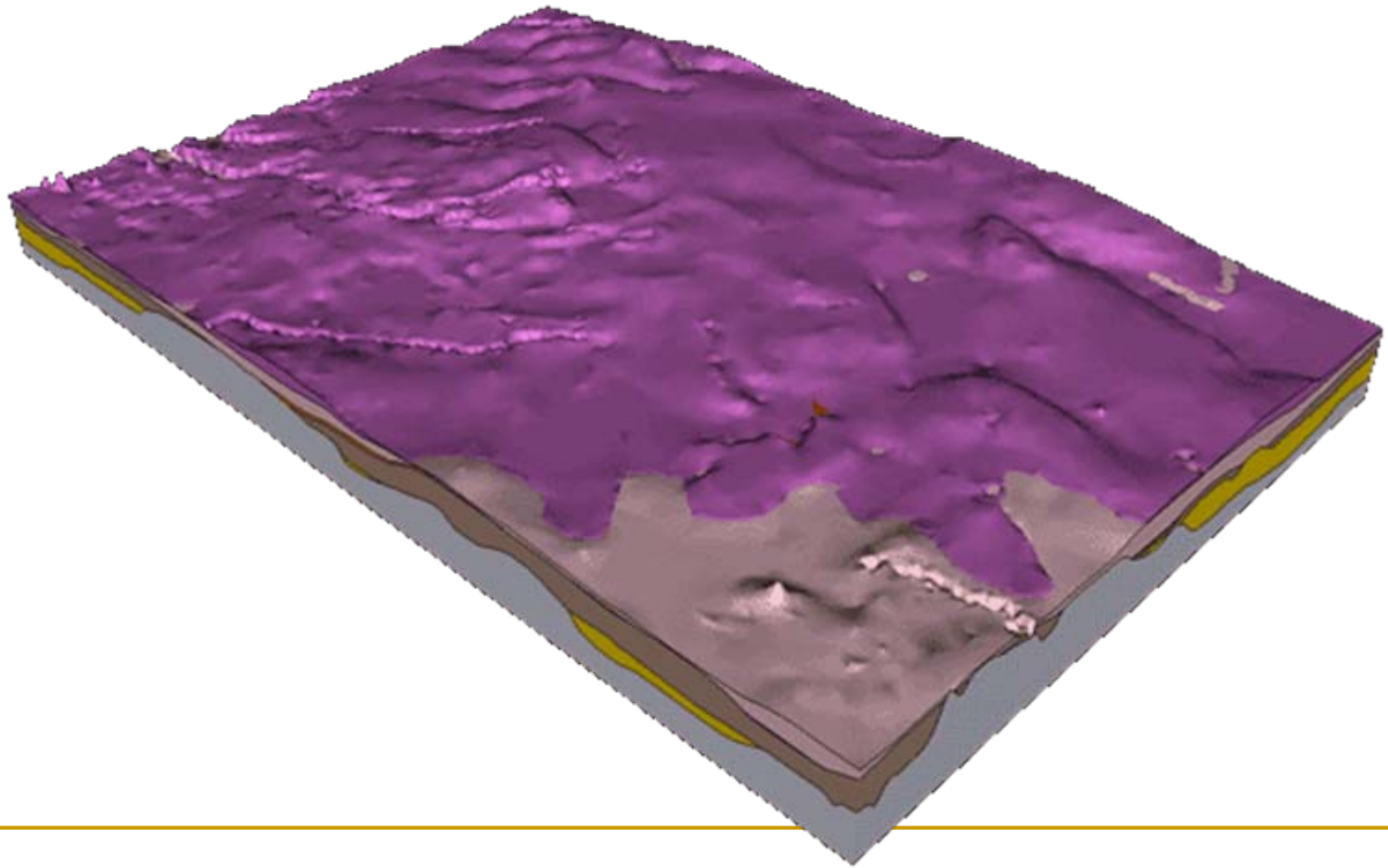

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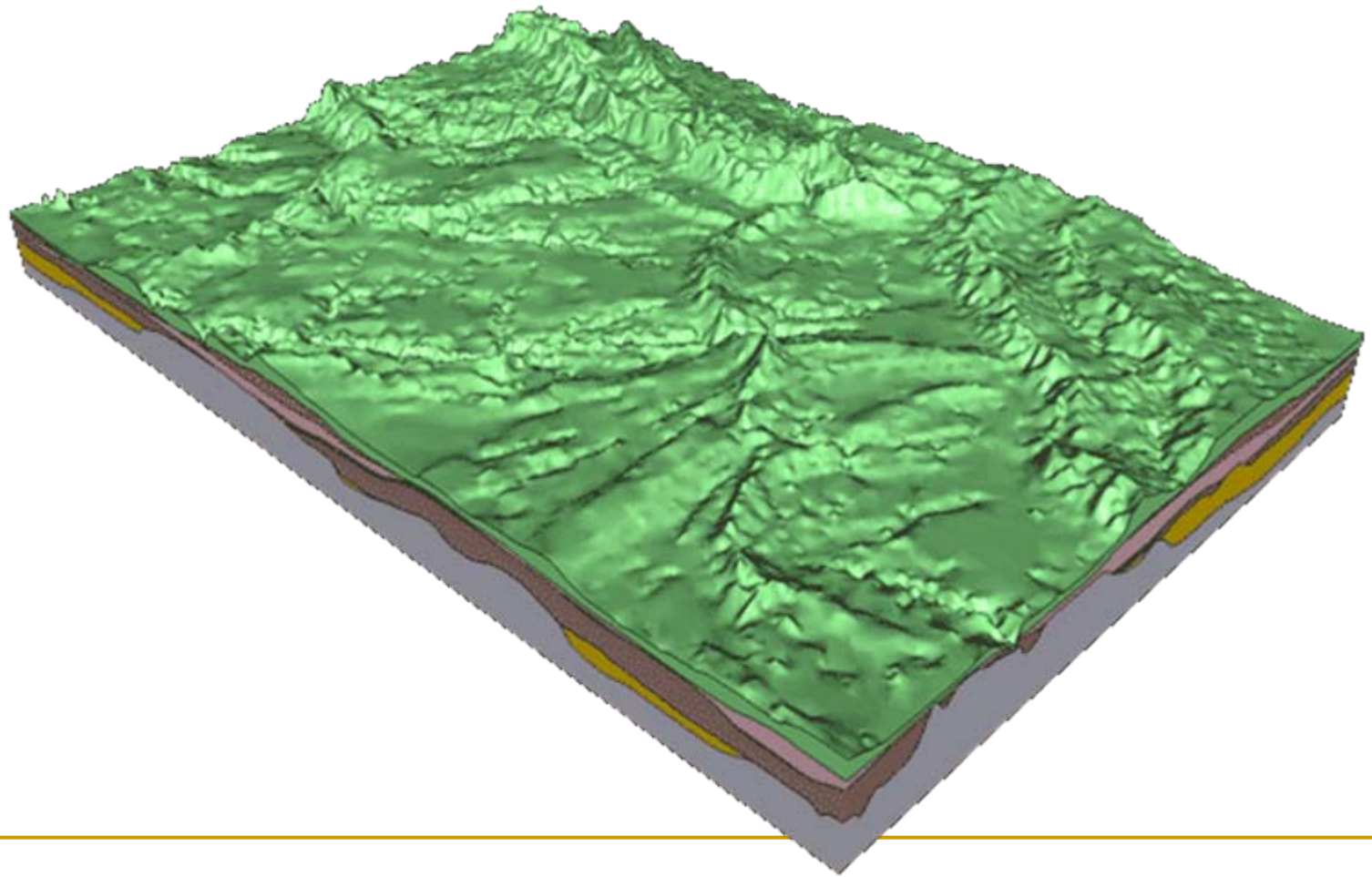
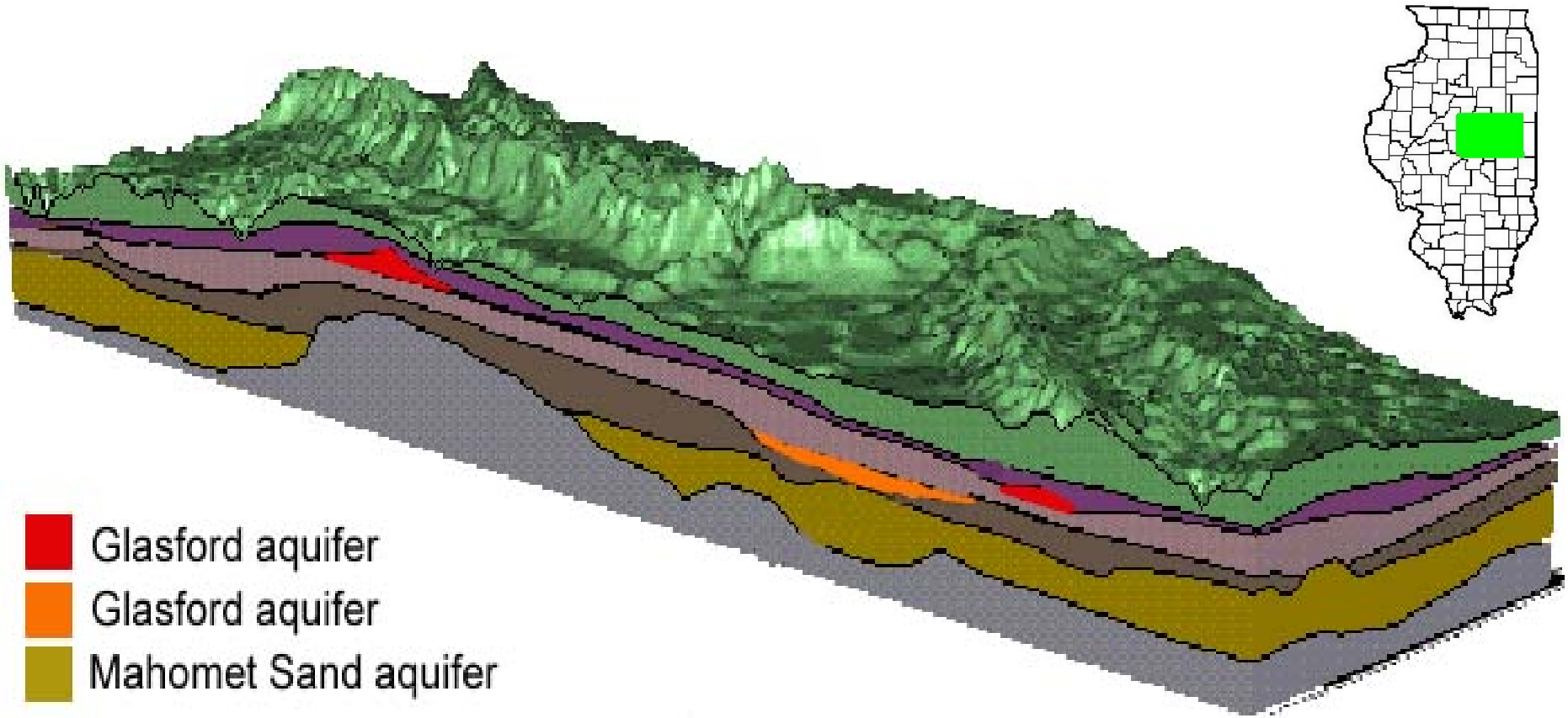
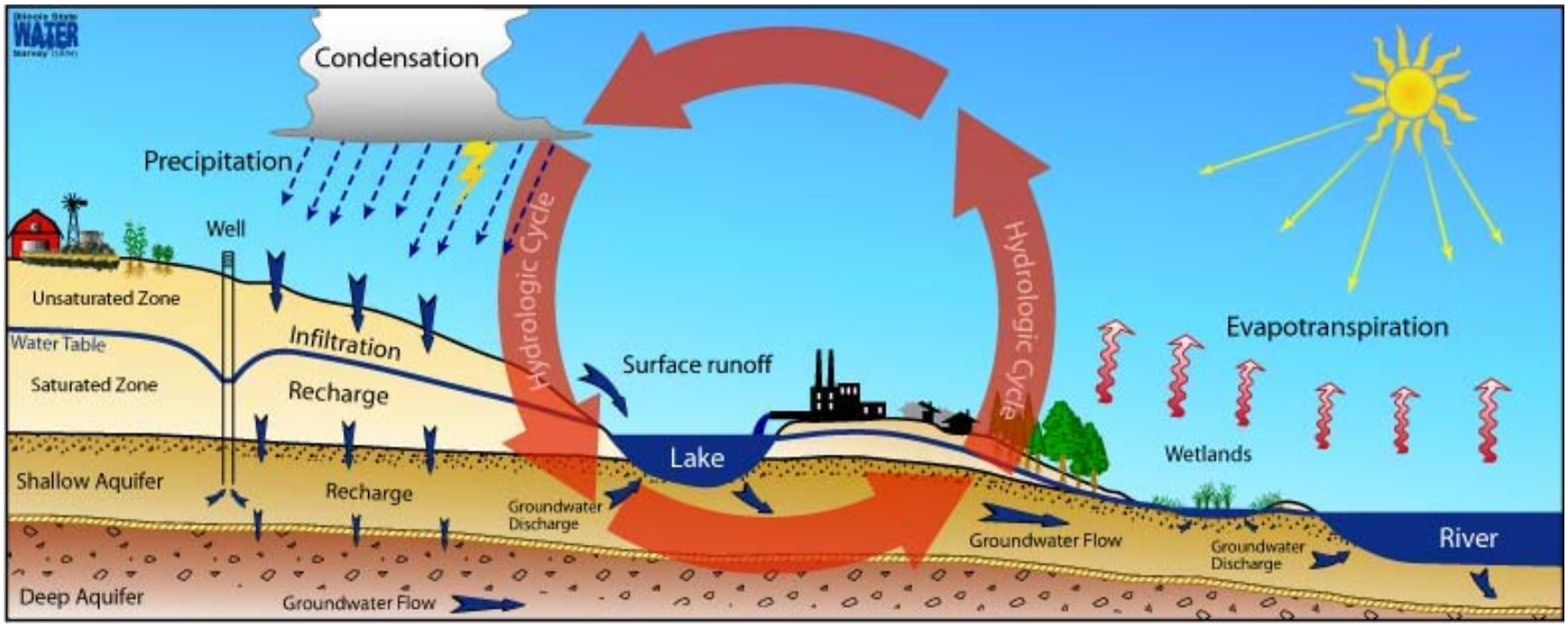


Geology of the Mahomet Aquifer

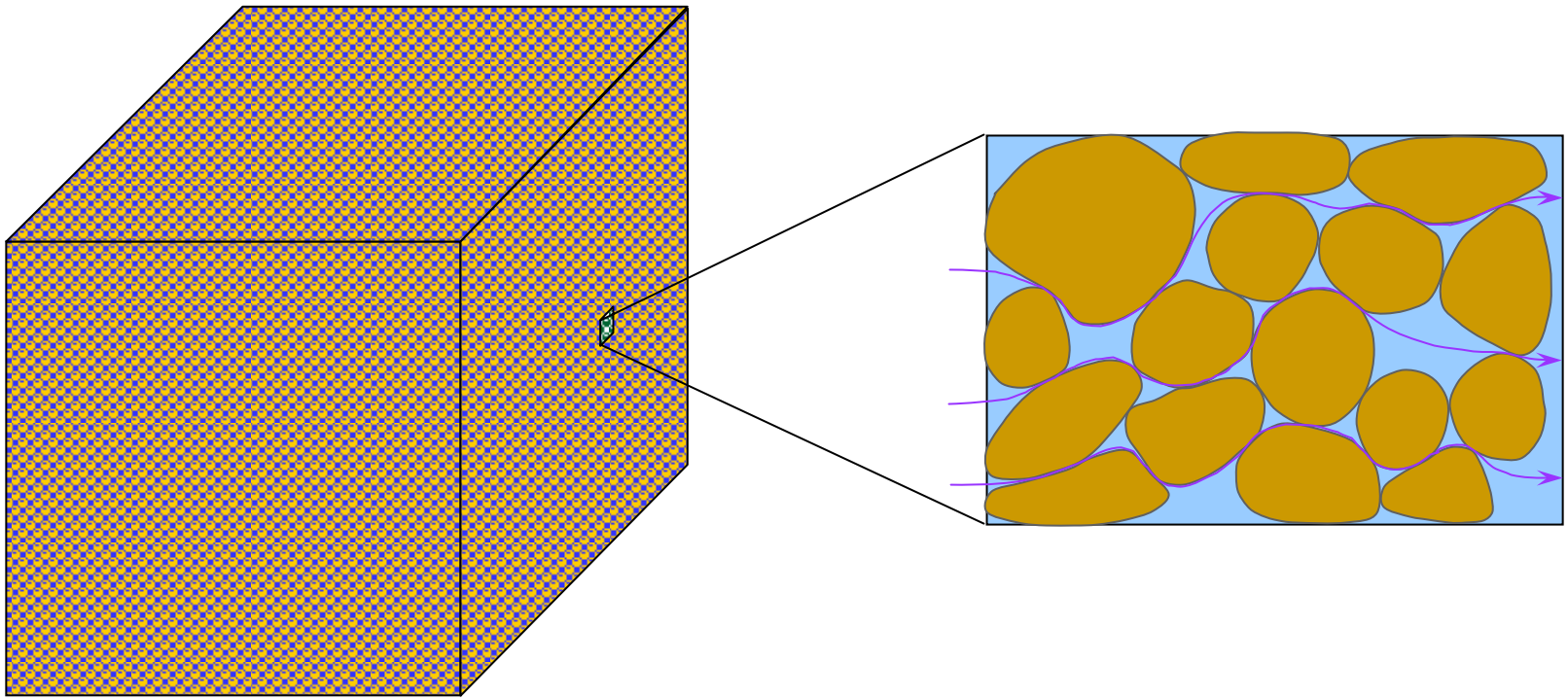


The Hydrologic Cycle

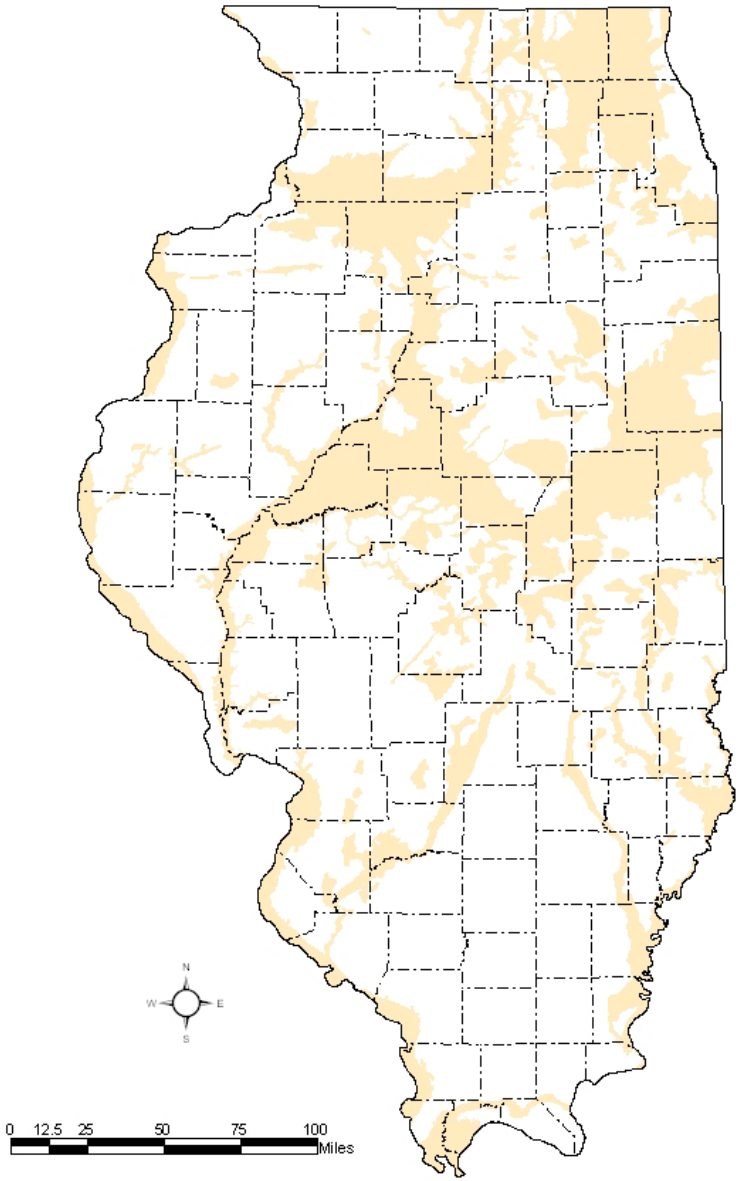


Porous Systems

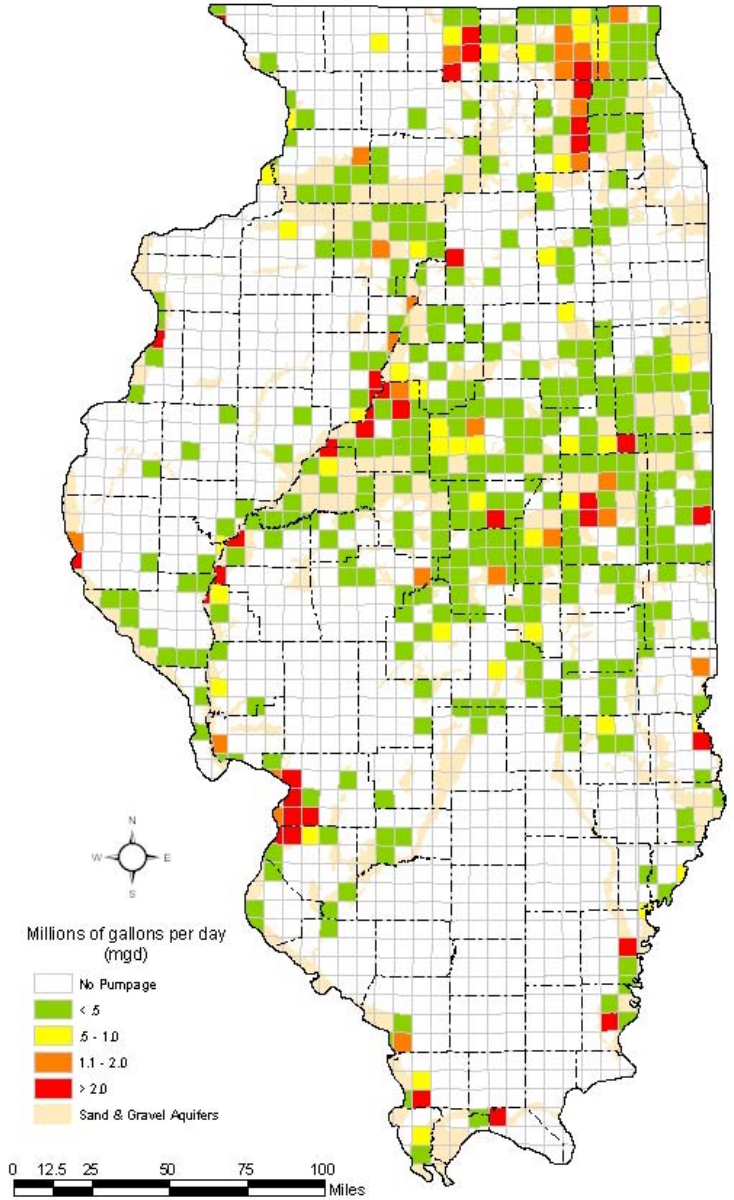
Porosity = volume of pore space / total volume of porous material



Major Sand & Gravel Aquifers

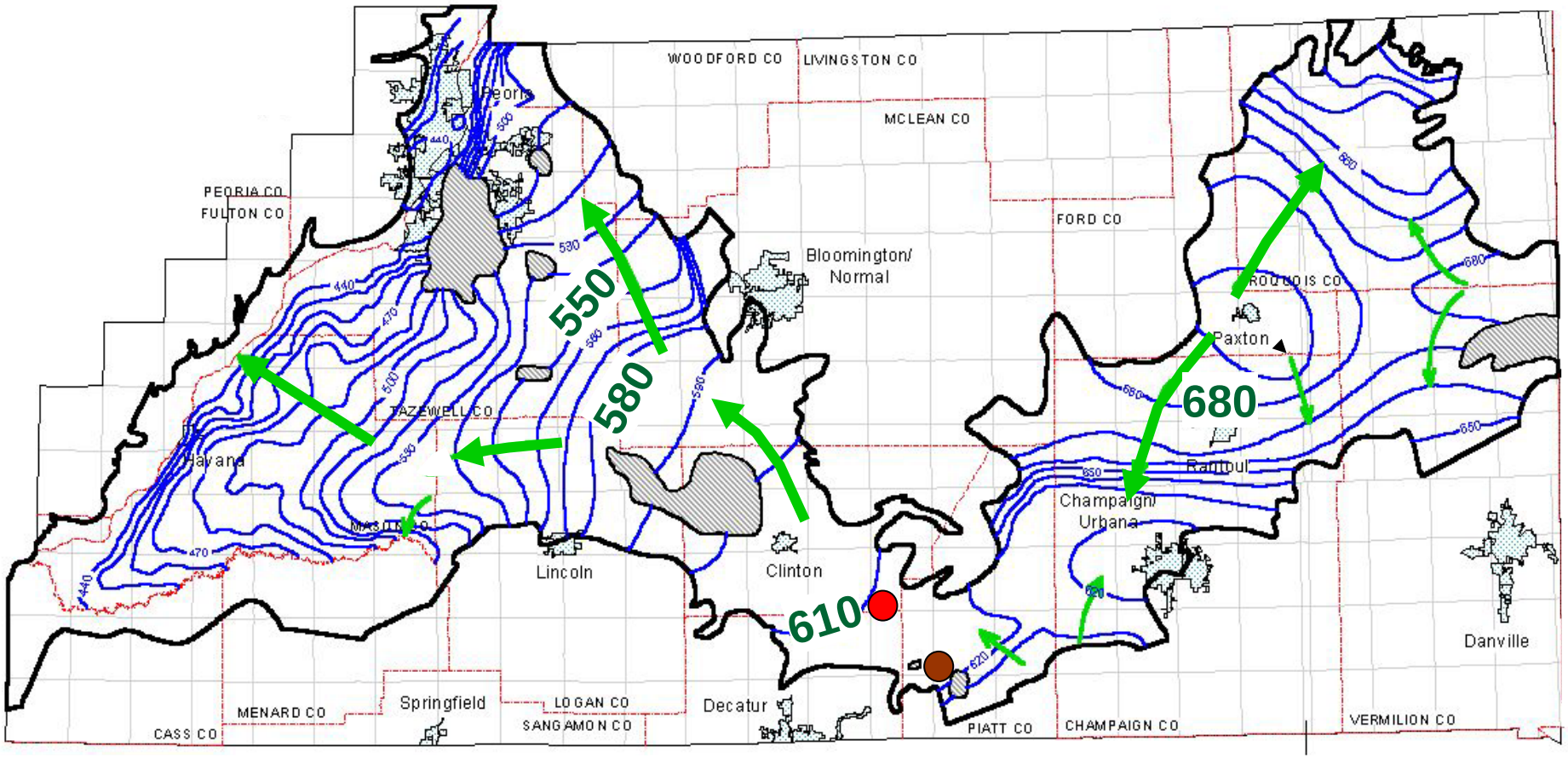


Withdrawals from Sand and Gravel Aquifers

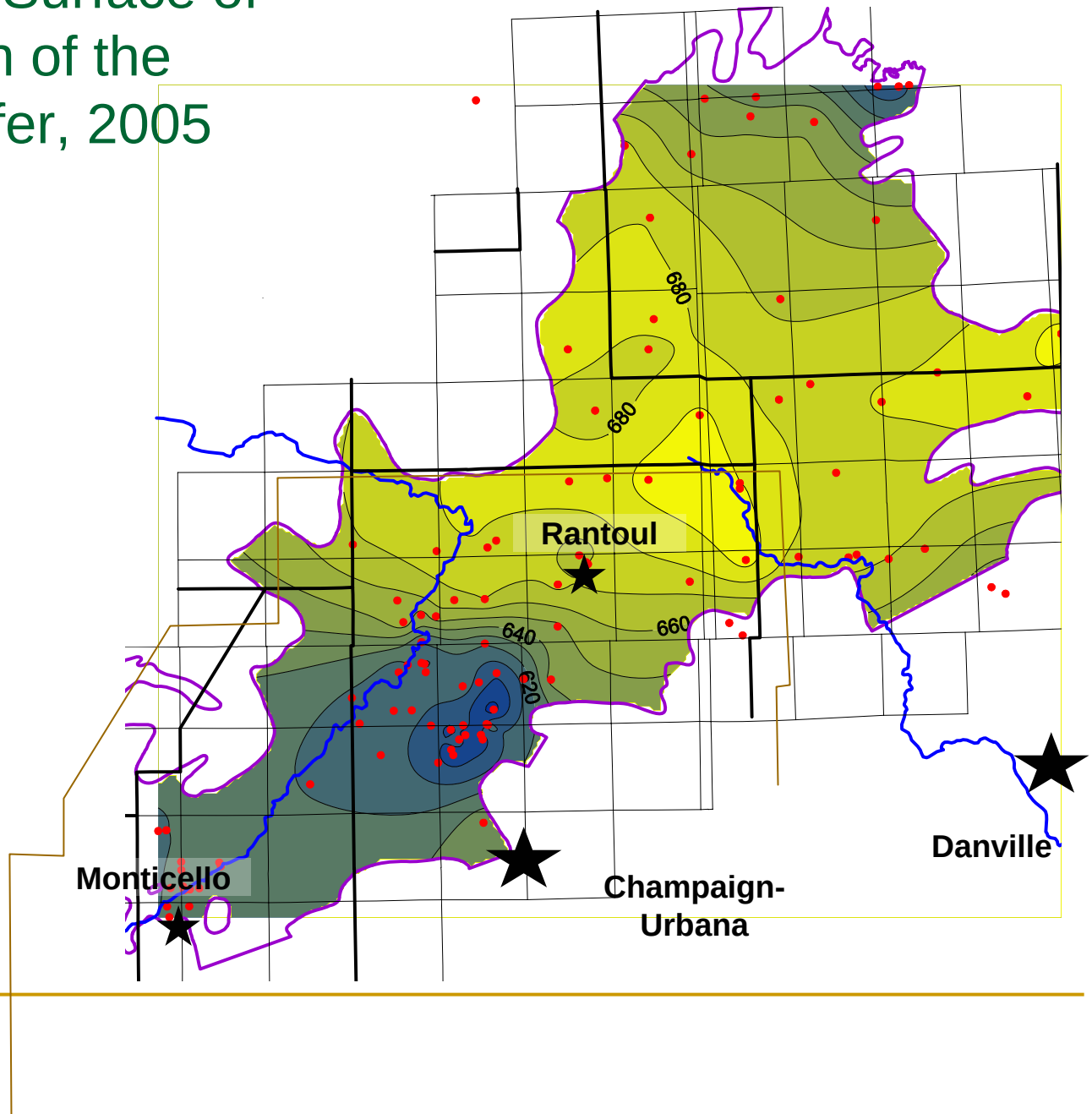


Total use ~ 350 mgd
+ ~200 mgd for irrigation

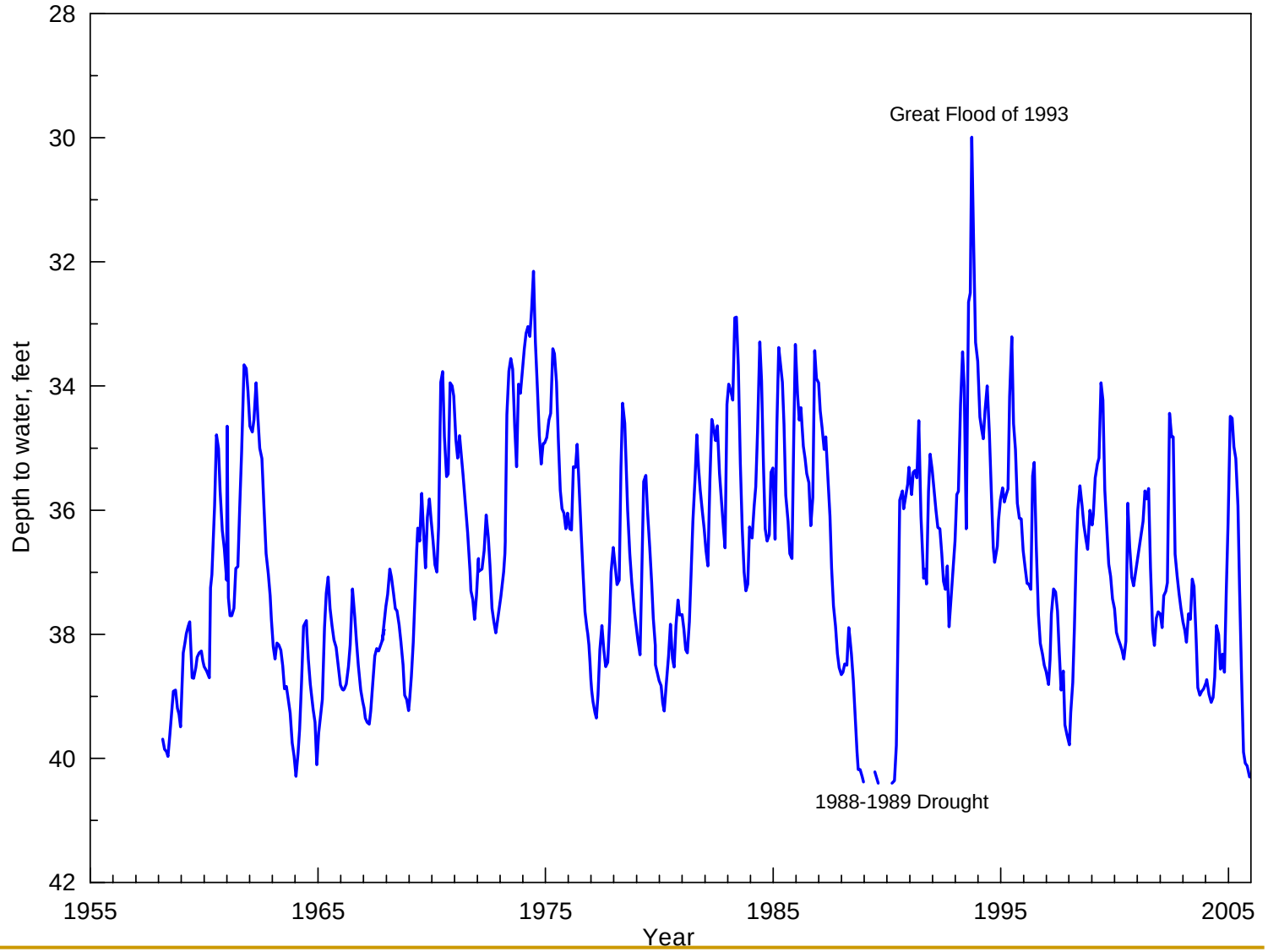
Mahomet Aquifer Groundwater Levels



Potentiometric Surface of Eastern Portion of the Mahomet Aquifer, 2005



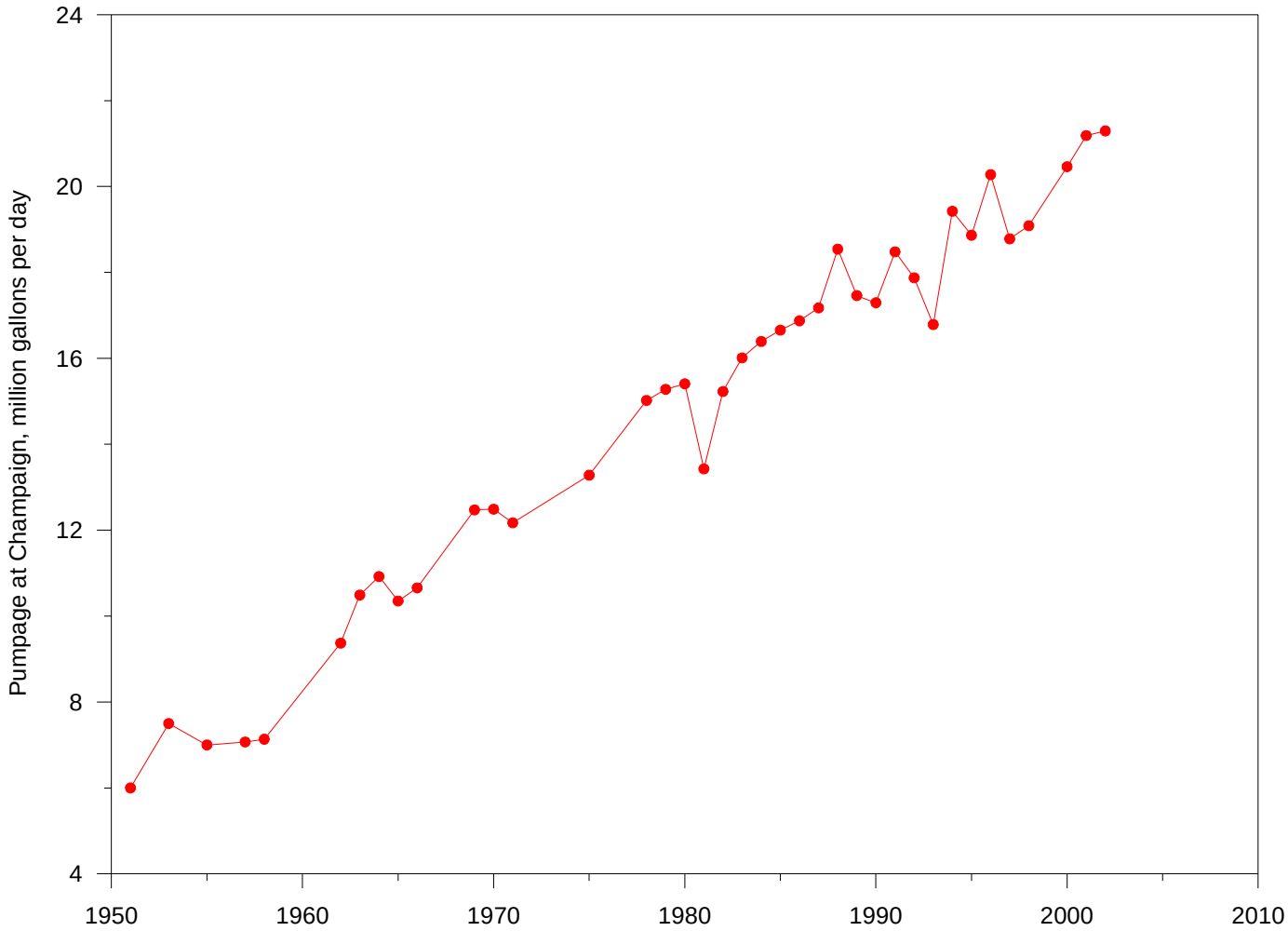
Mahomet Aquifer Water Levels near IL River



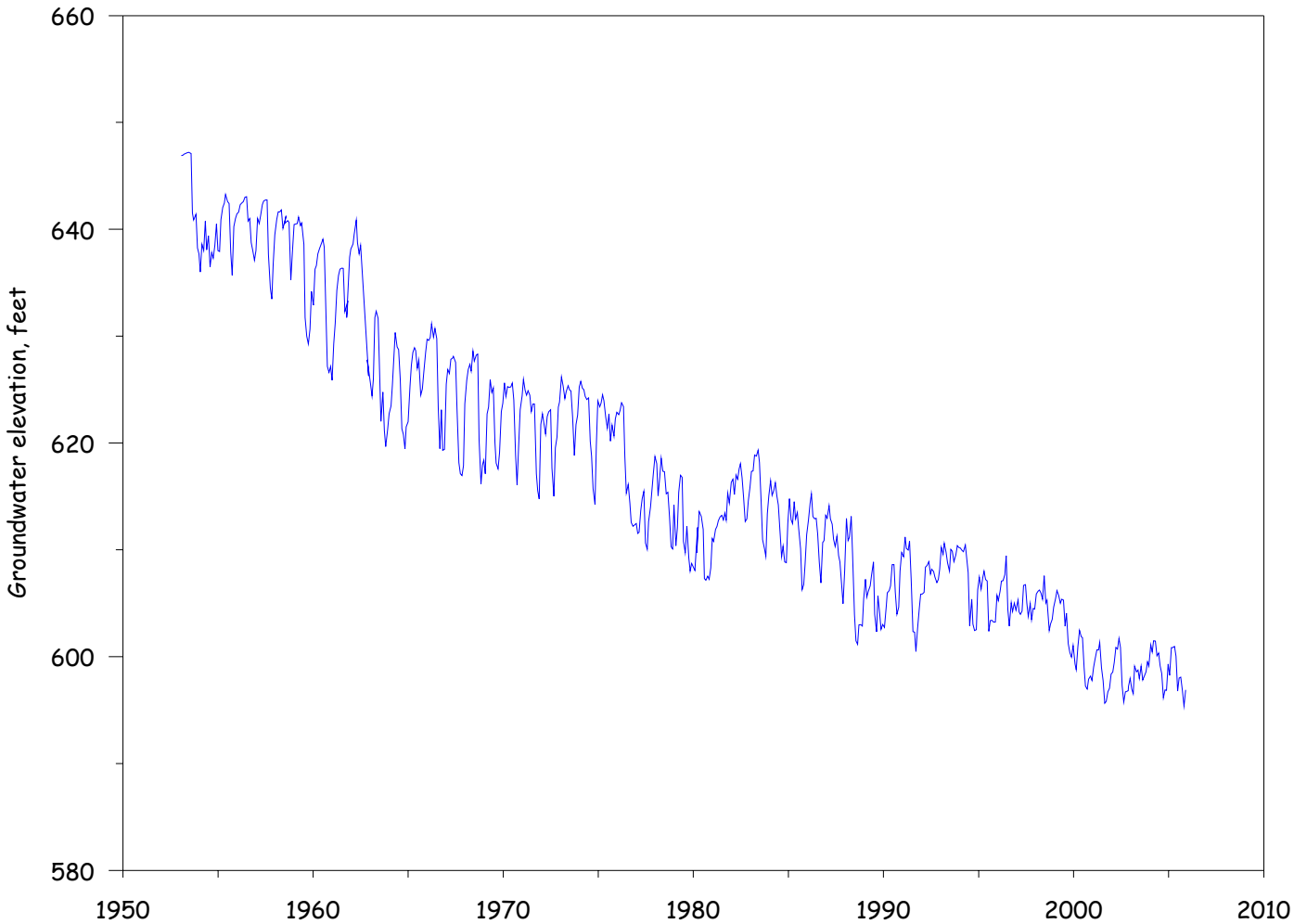
Regional Community Groundwater Use

	2004 Water Use (gpd)
Argenta	57,000
Forsyth	400,000
Illinois-American Water Co.	21,000,000
Mahomet	500,000
Monticello	700,000
Normal	4,100,000
Rantoul	1,600,000
Stone Ridge Dairy (near Bellflower)	~1,200,000
White Heath	50,000

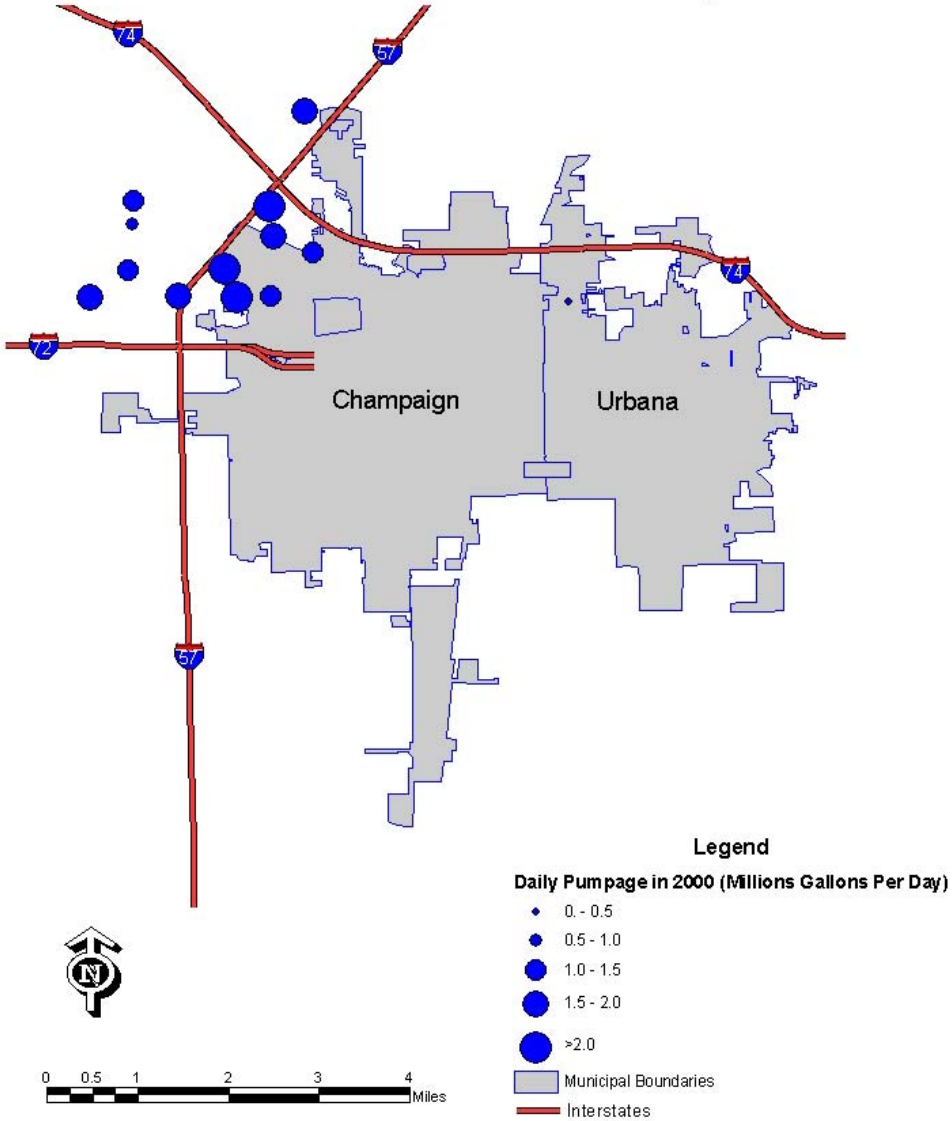
Water Use - *Long-term trend at Champaign*



Mahomet Aquifer Water Levels near Champaign



Top Producing Wells Owned by Illinois American Water Comany



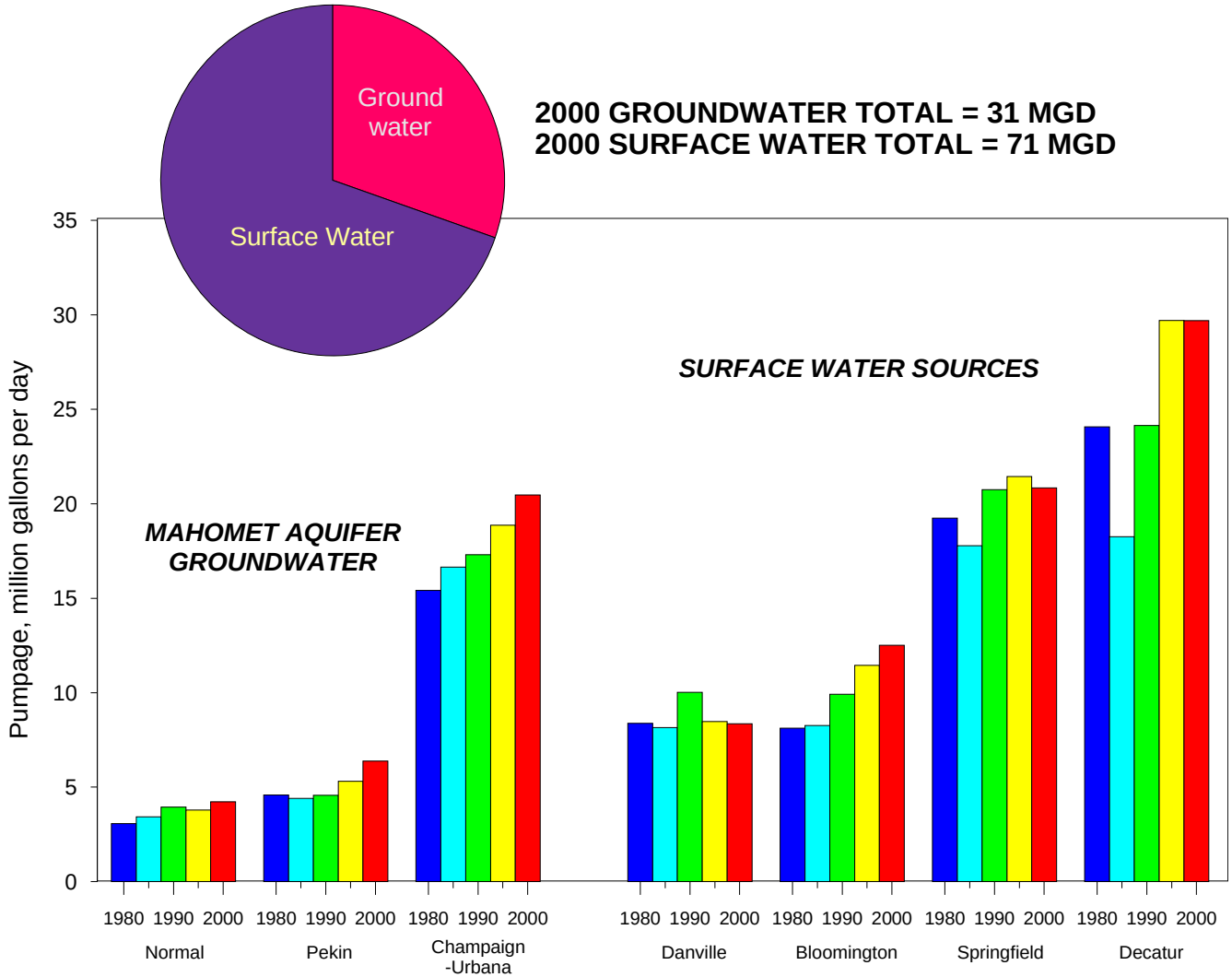
Potential for Conflict

"Whiskey is for drinking; water is for fighting over."

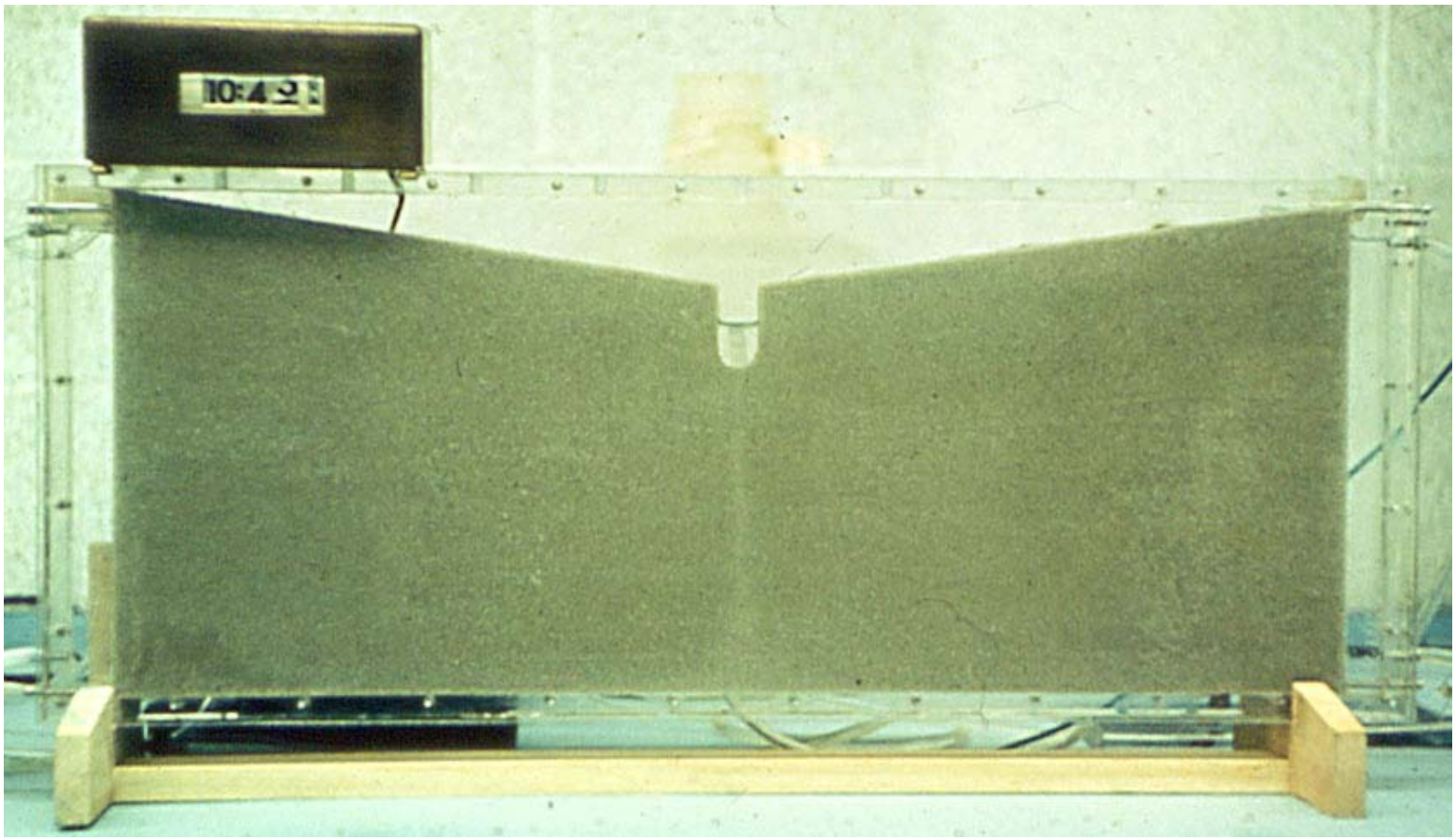
attributed to Mark Twain

- New major users
  - Peaker power plants
  - Dairy
  - Ethanol plants
  - Municipal water users
- Well interference

Water Use - *Selected communities in the Mahomet Aquifer region*



Groundwater – Stream Interaction



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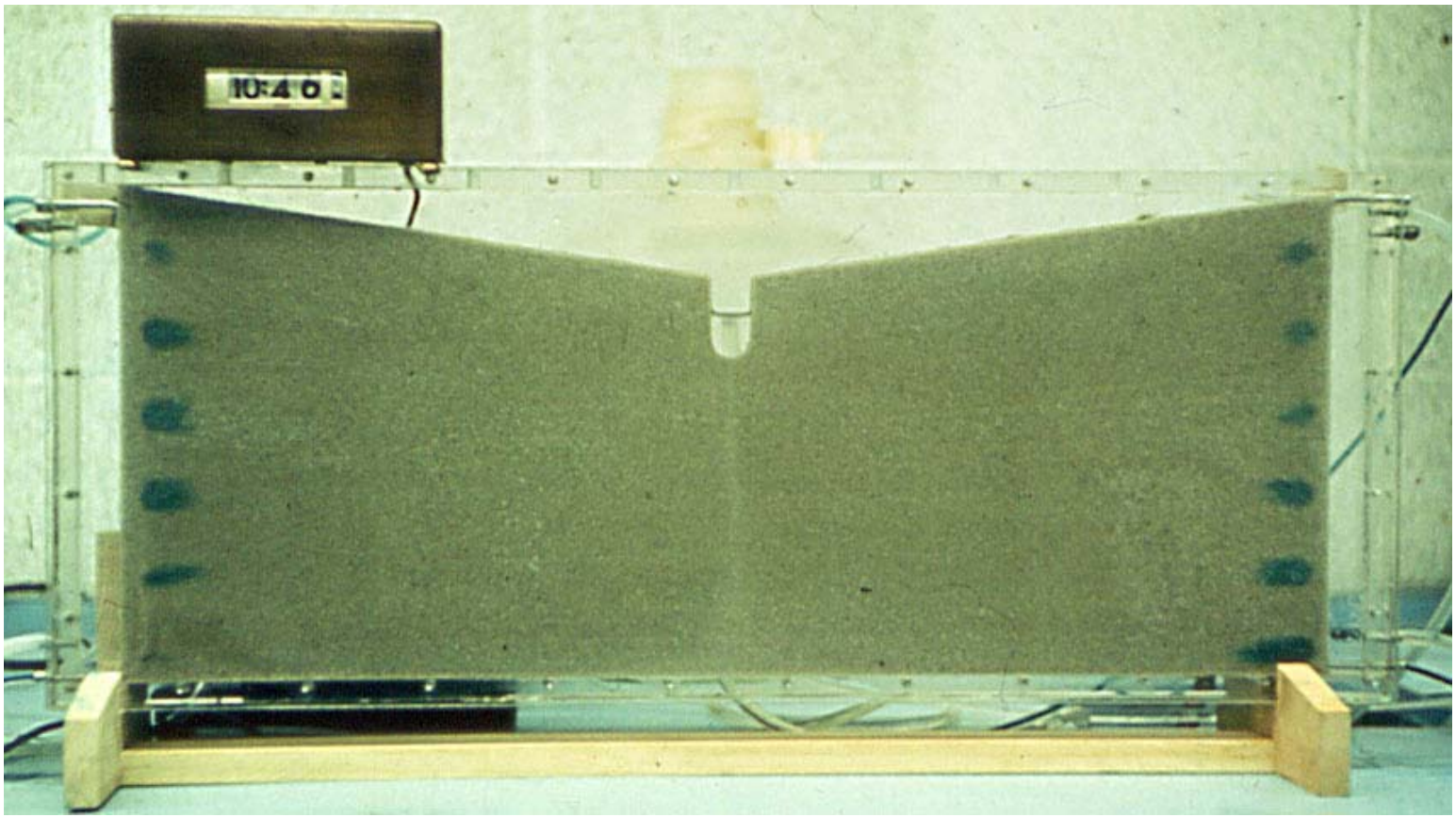

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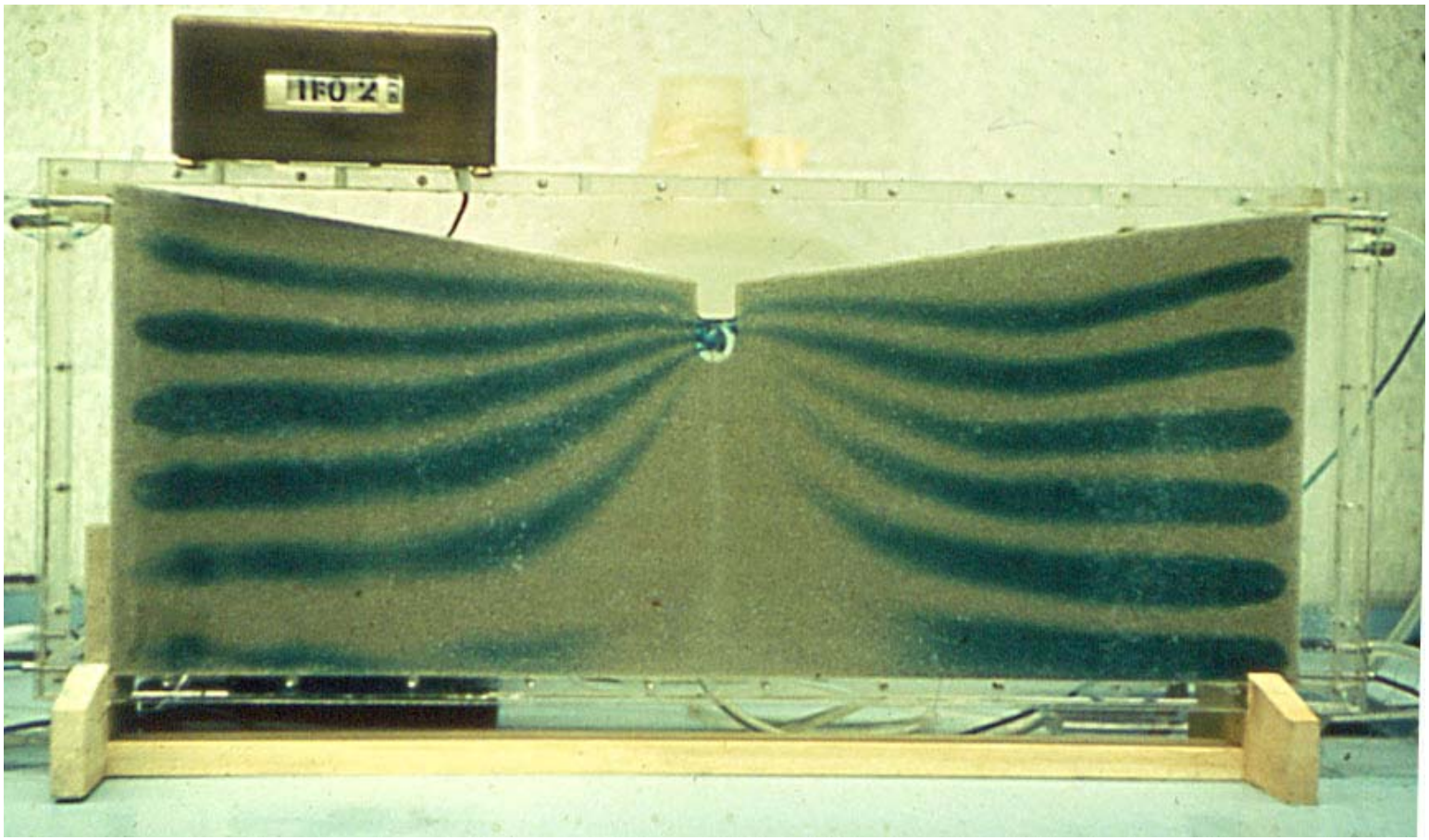

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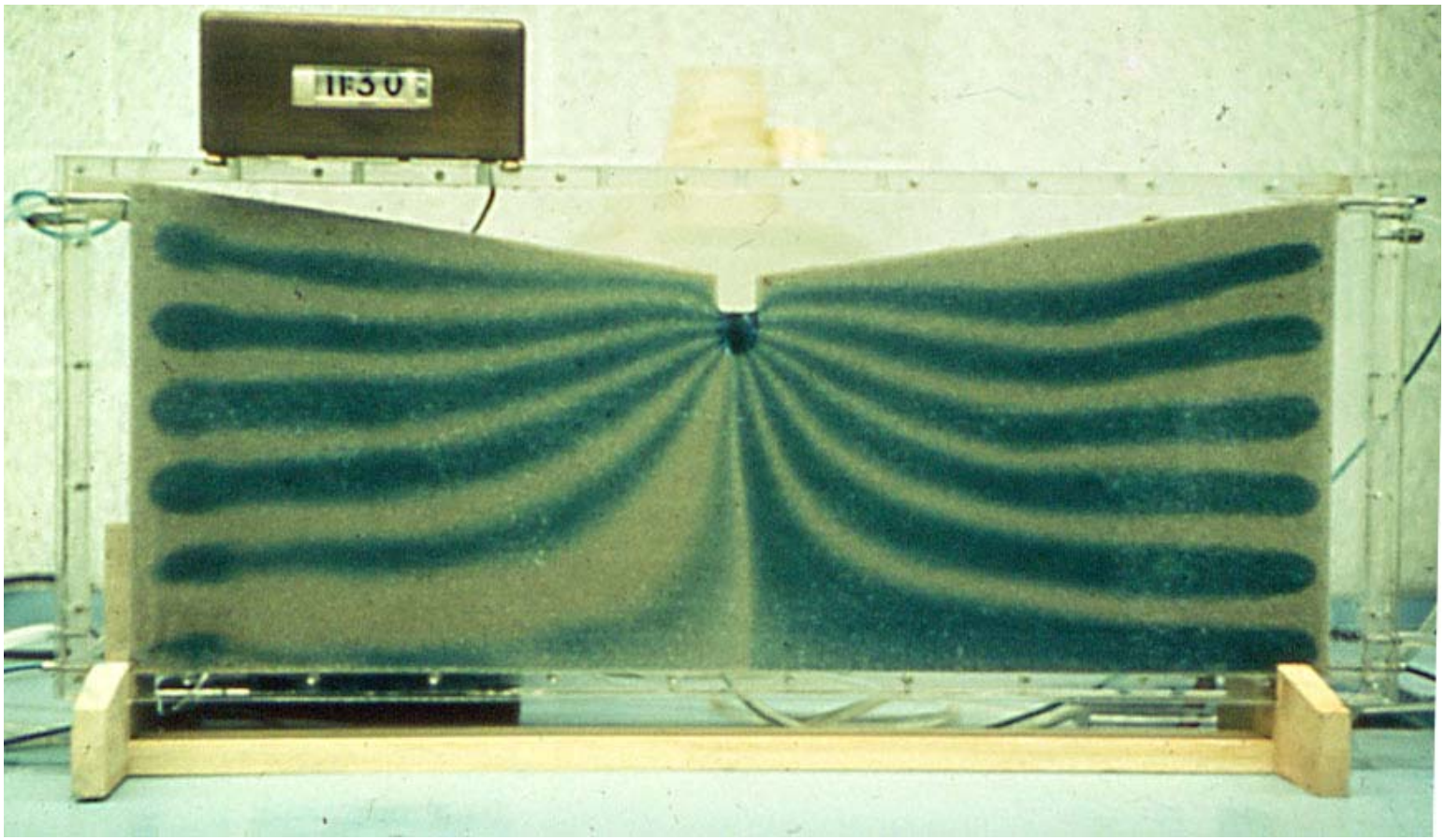
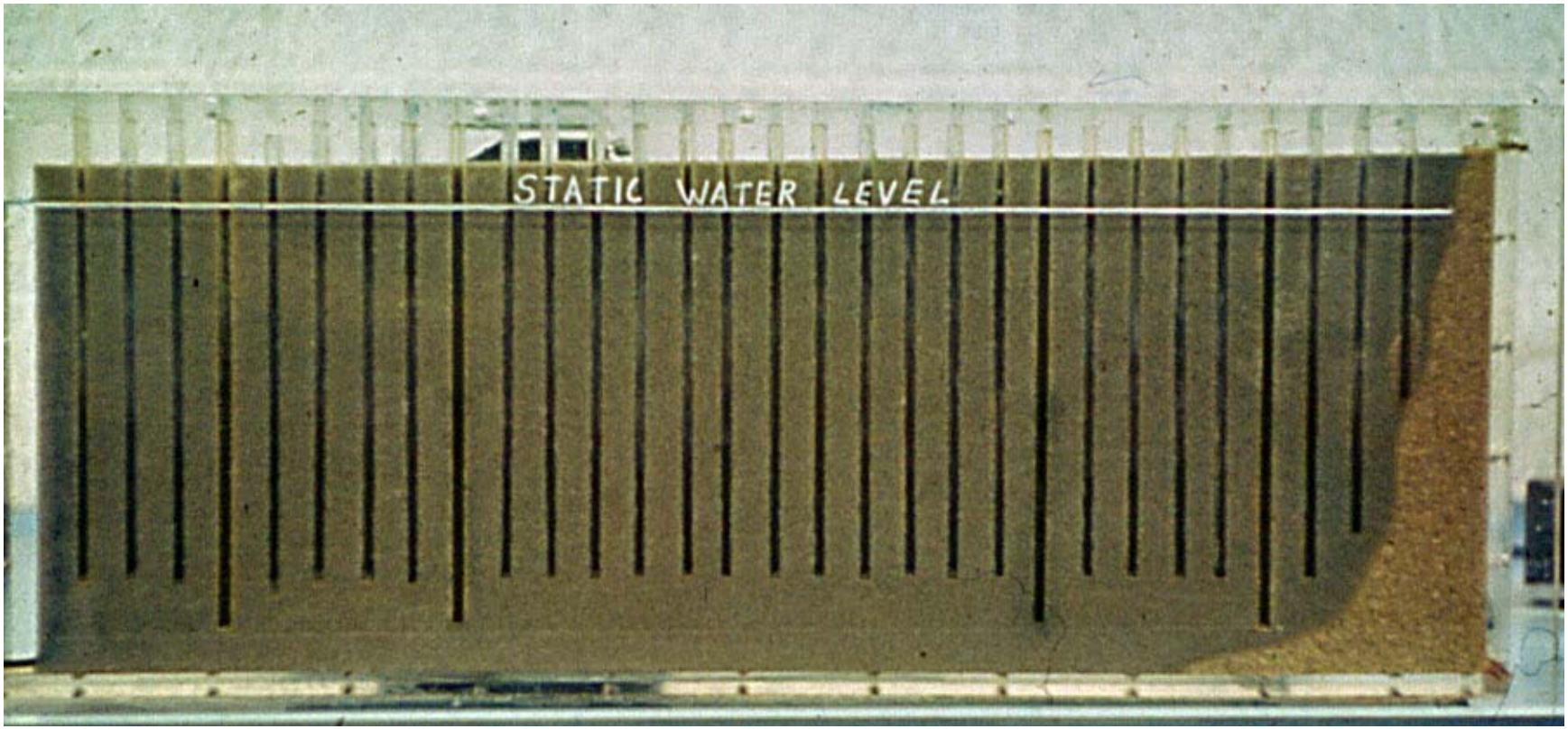


Overlapping Cones of Depression – Well Interference



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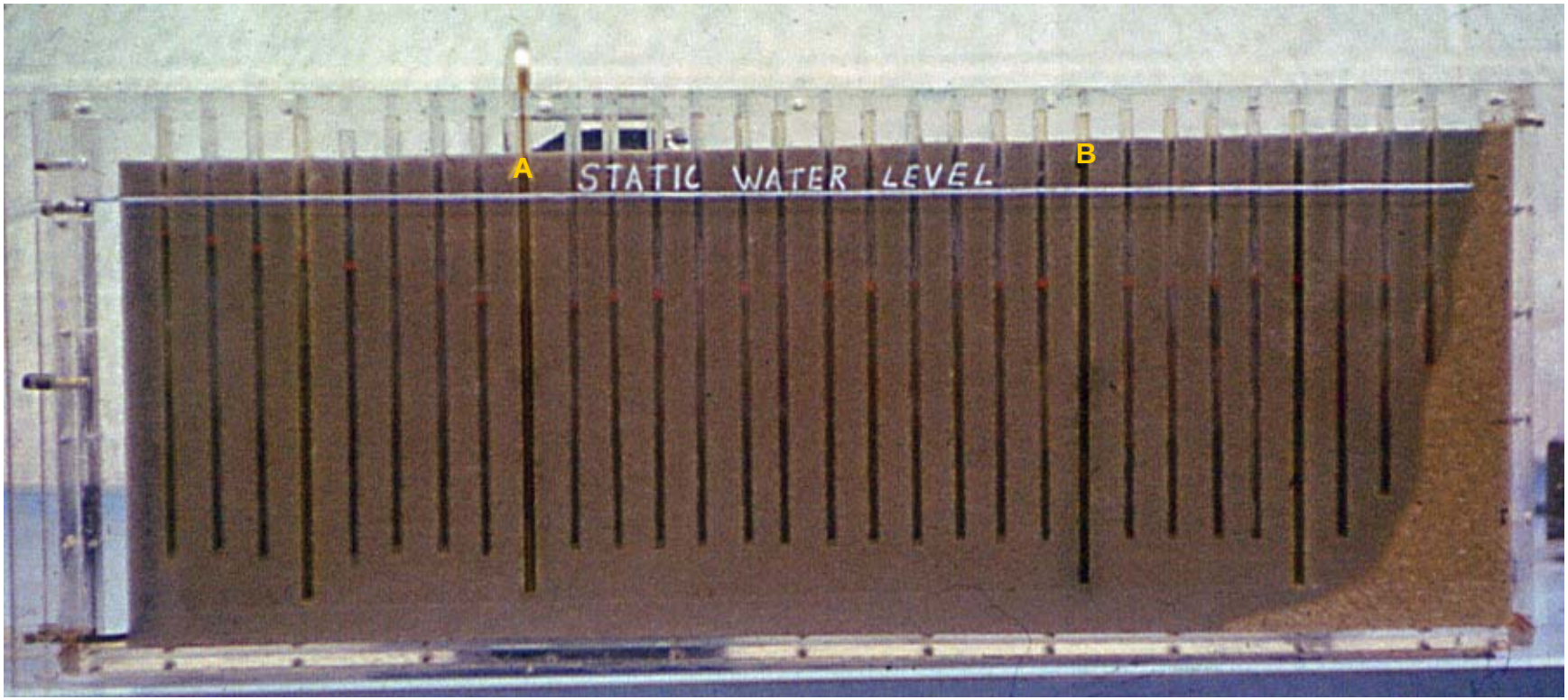

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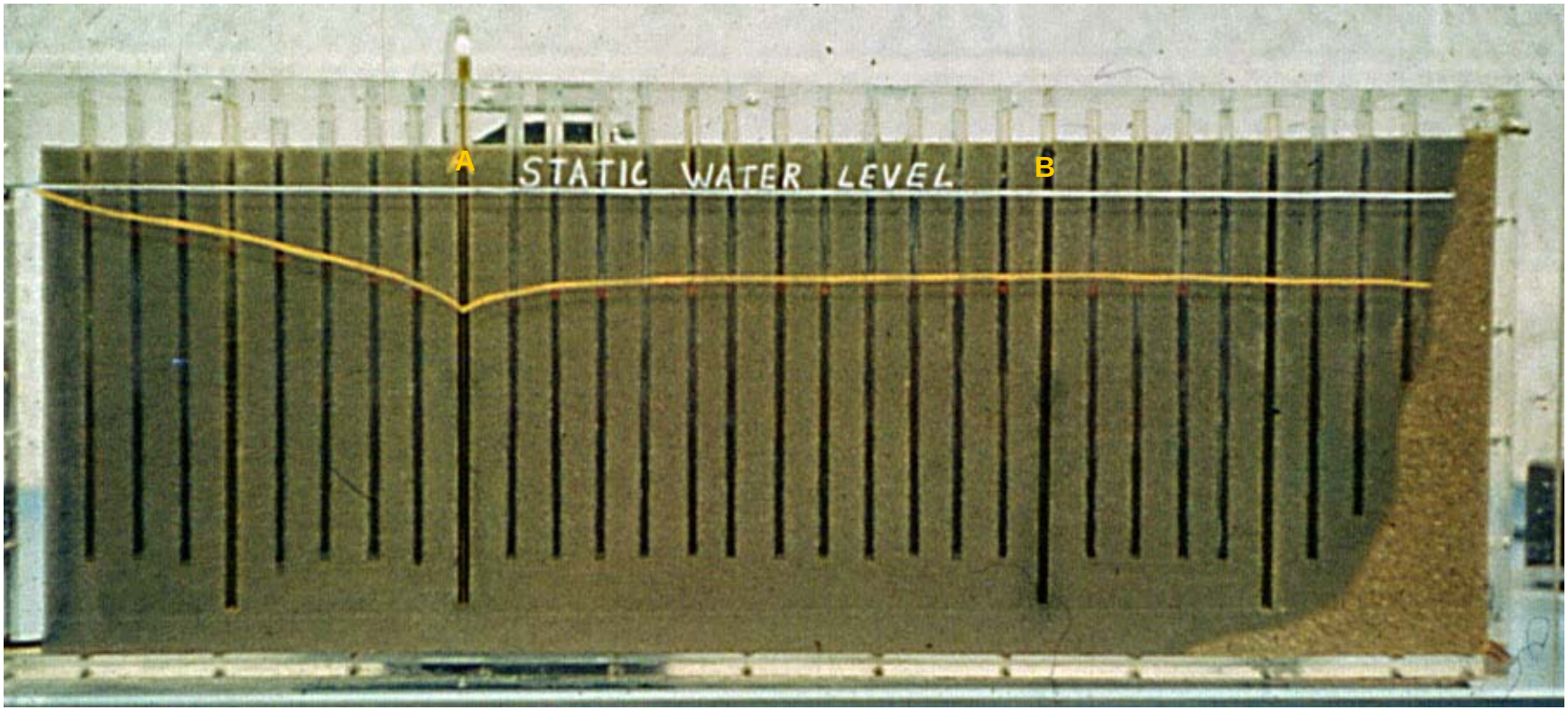

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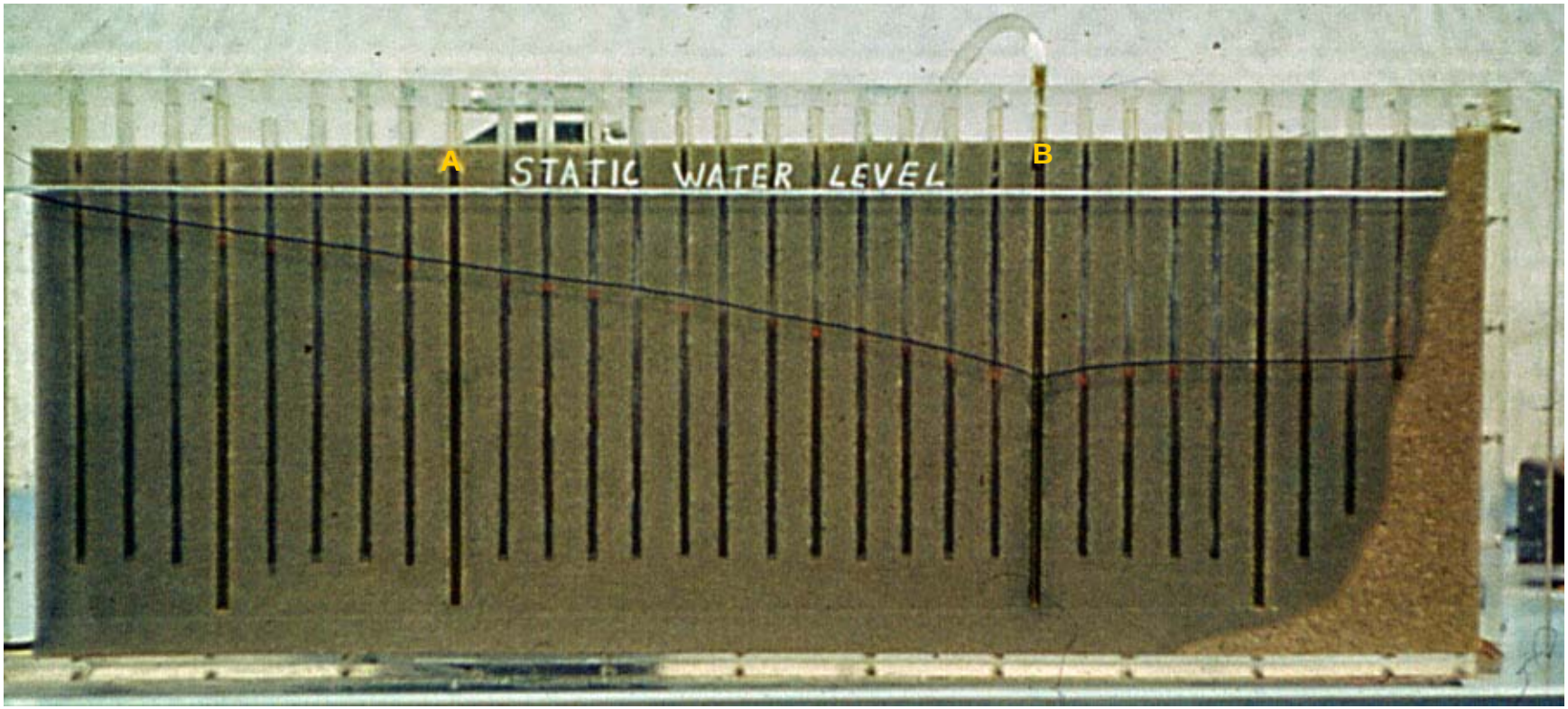
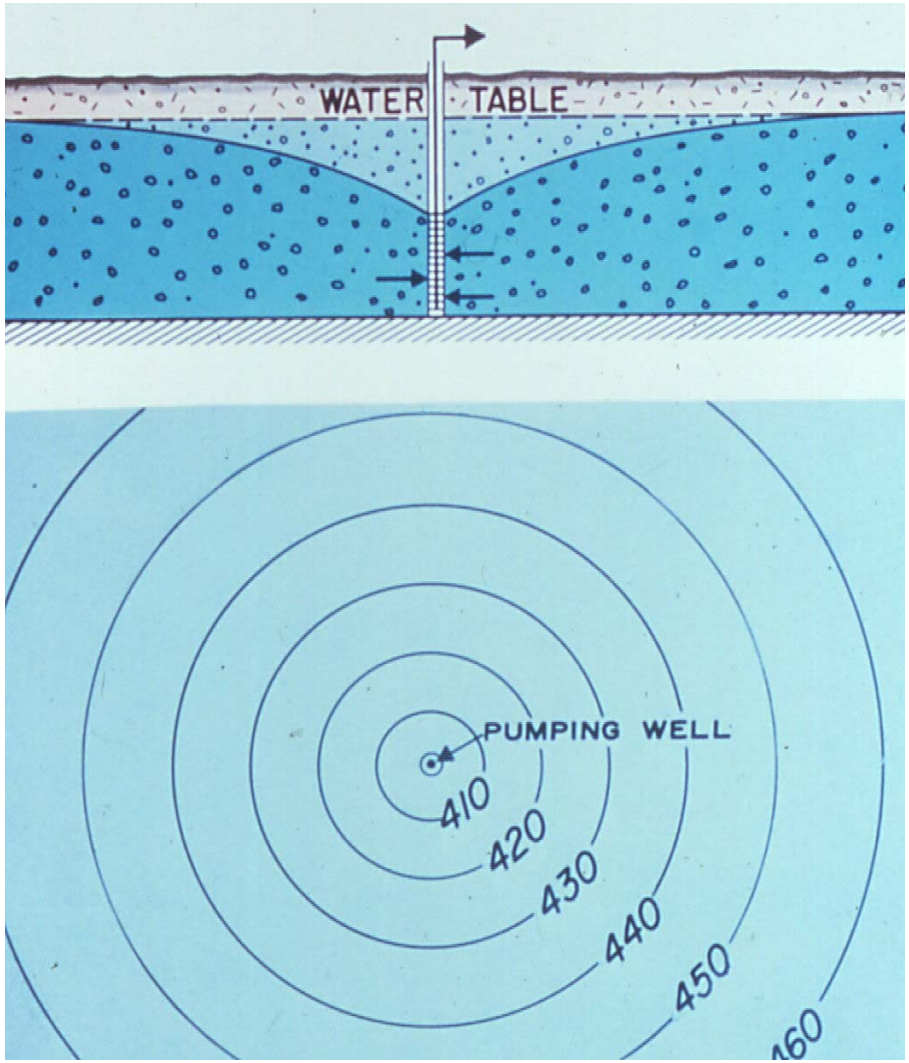
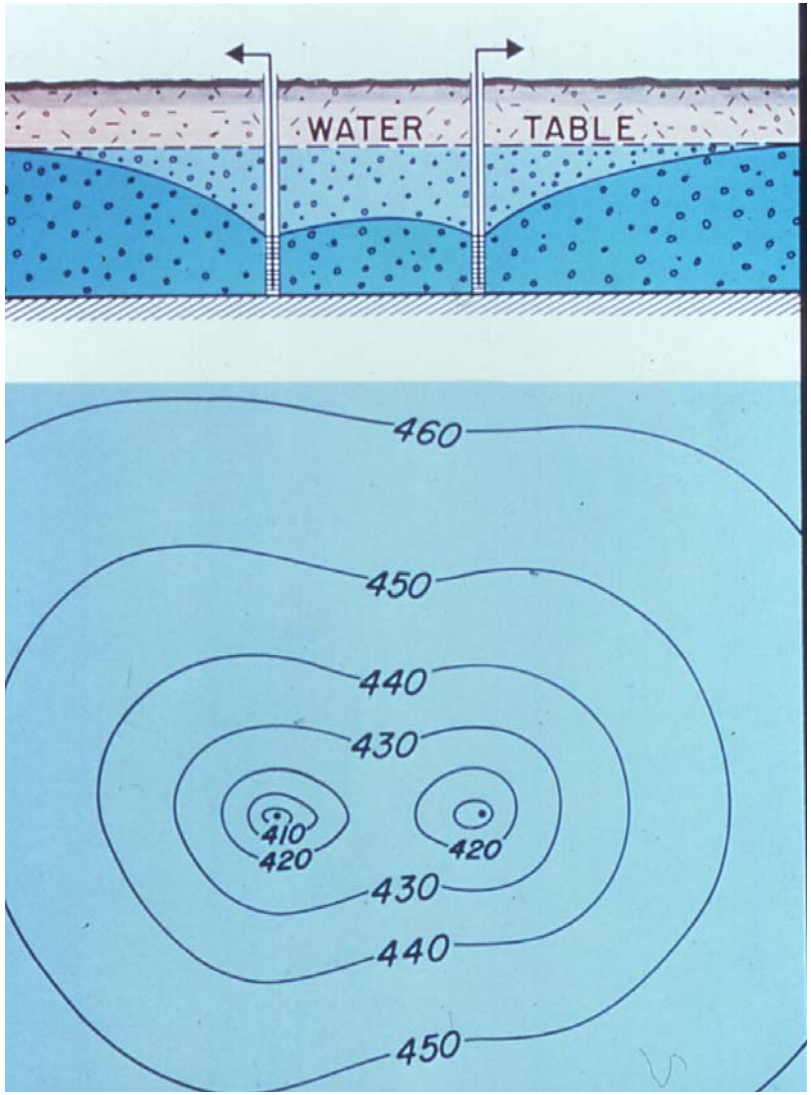


Overlapping Cones of Depression – Well Interference

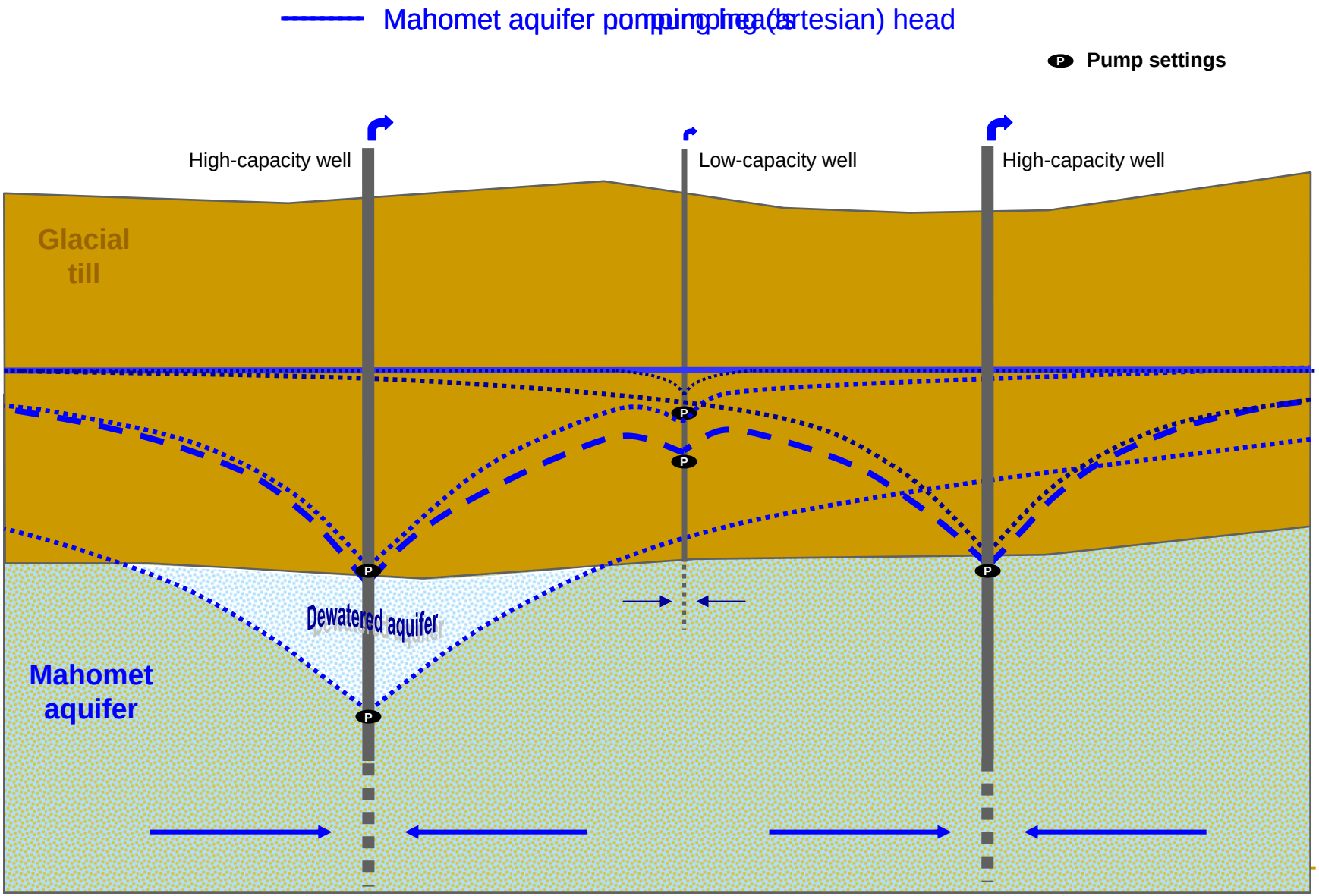
Cone of Depression



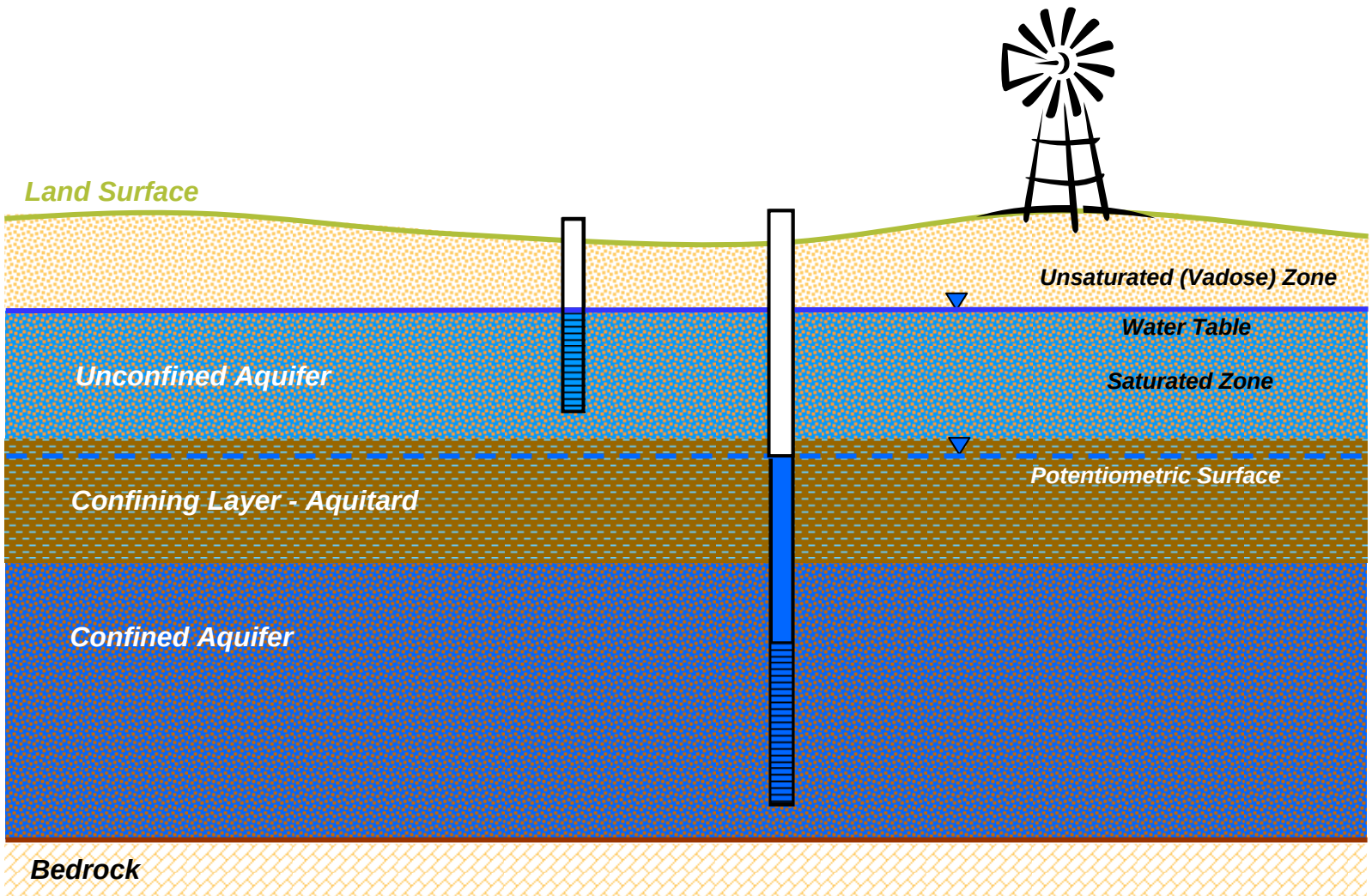
Overlapping Cones of Depression



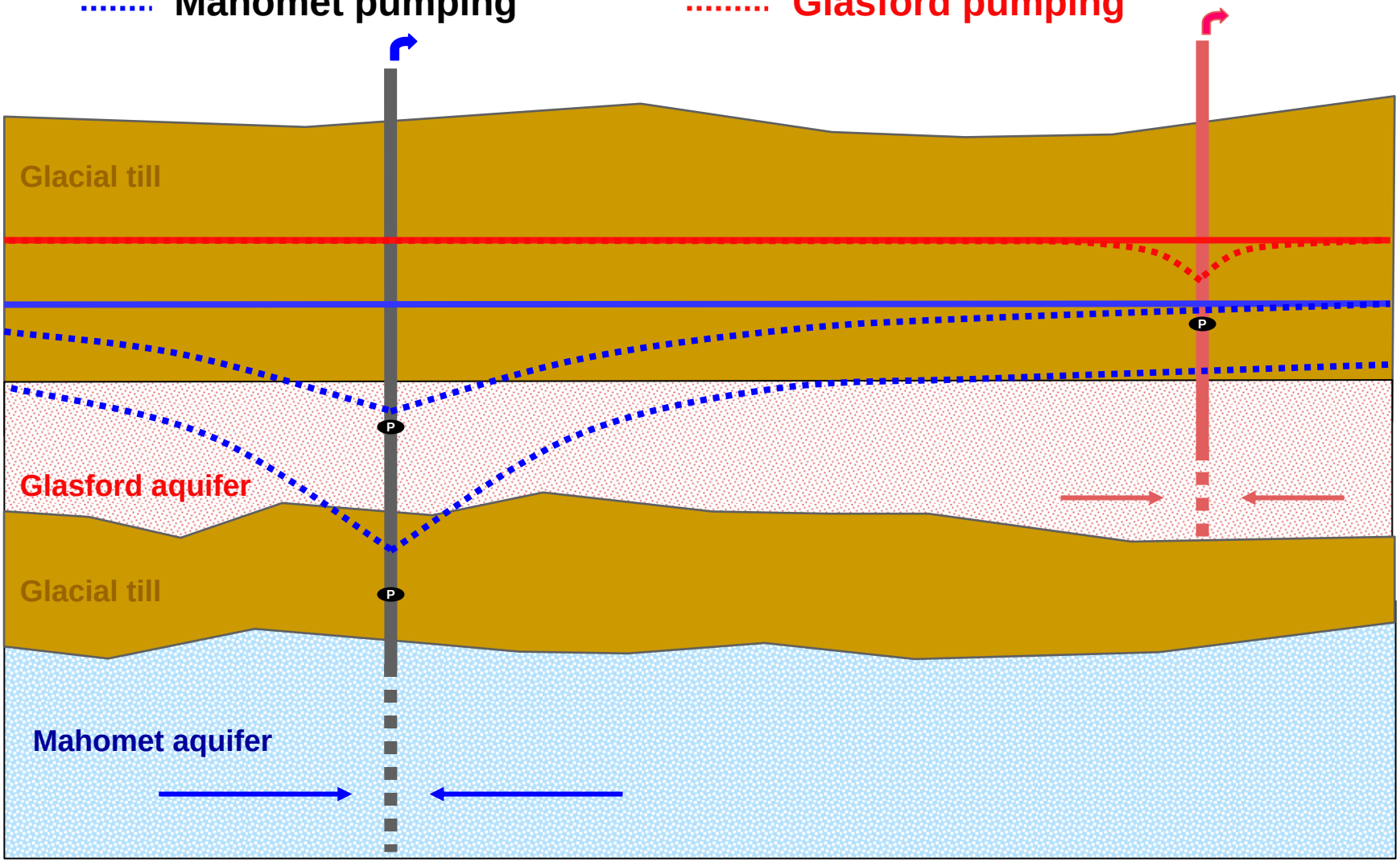
Impacts of pumping on water levels (artesian head)



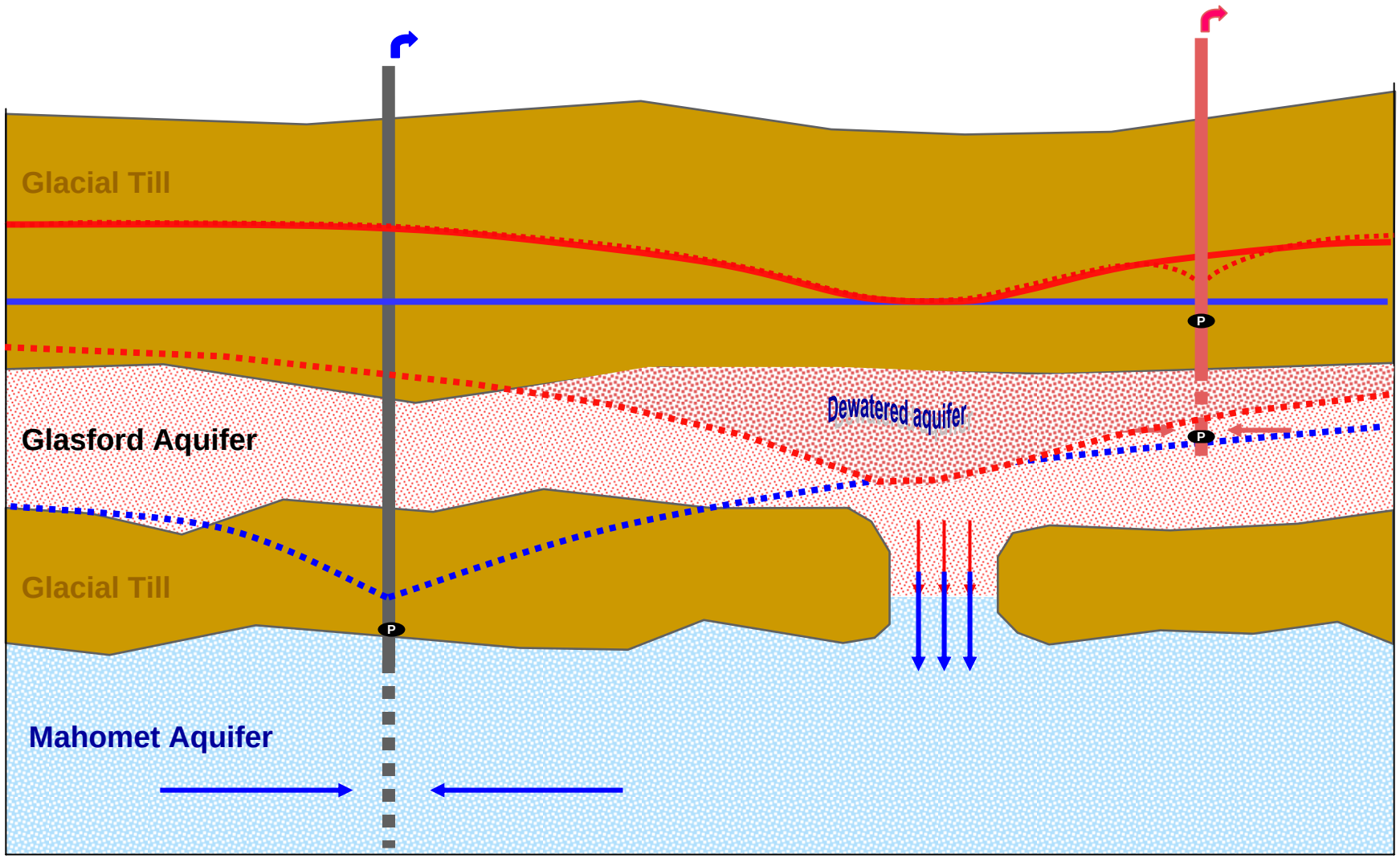
Confined Aquifers



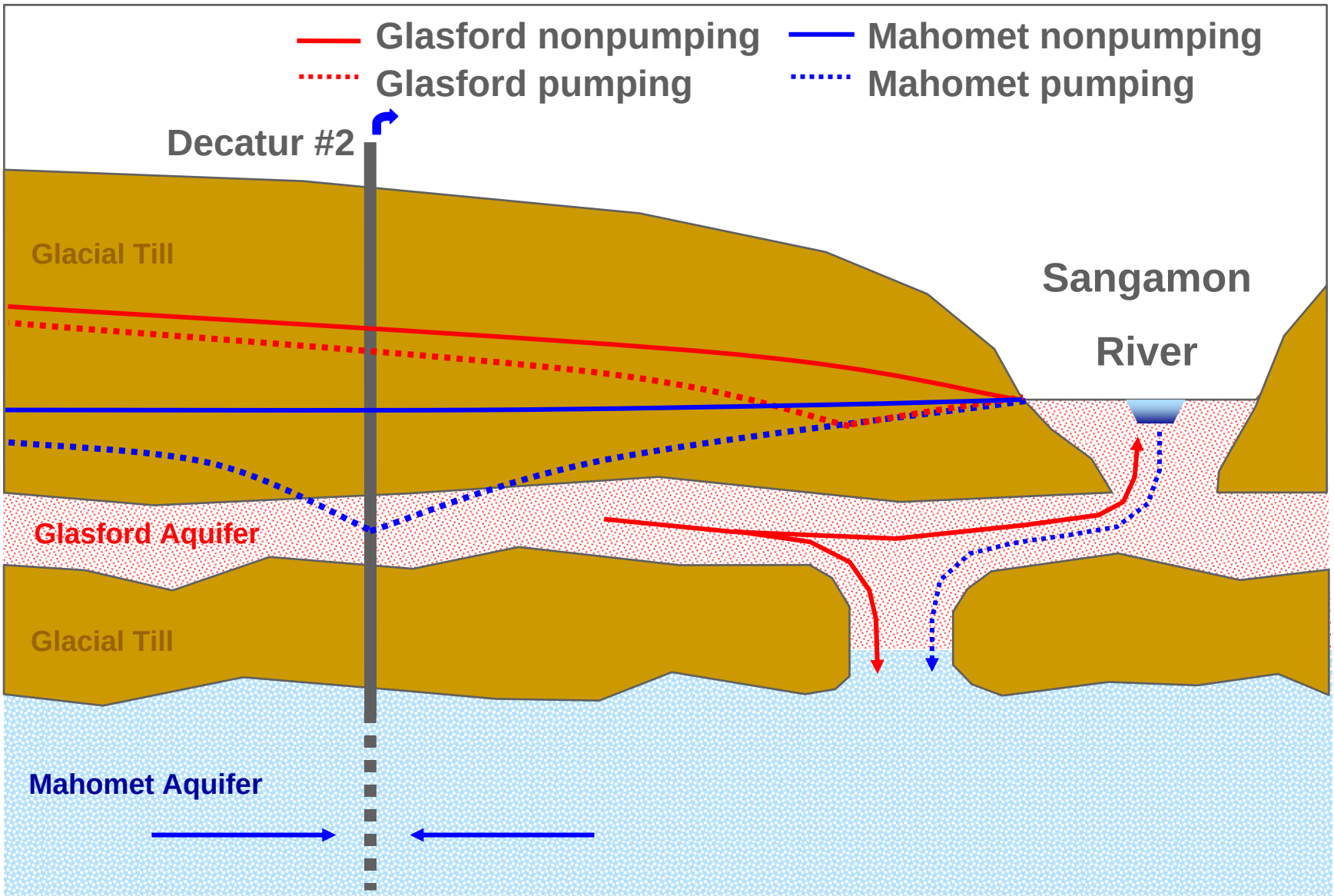
Impact of pumping when aquifers are hydraulically separate



Impact of pumping when aquifers are hydraulically linked



Interaquifer Connections to the Sangamon below Allerton Park



Mahomet Aquifer Consortium

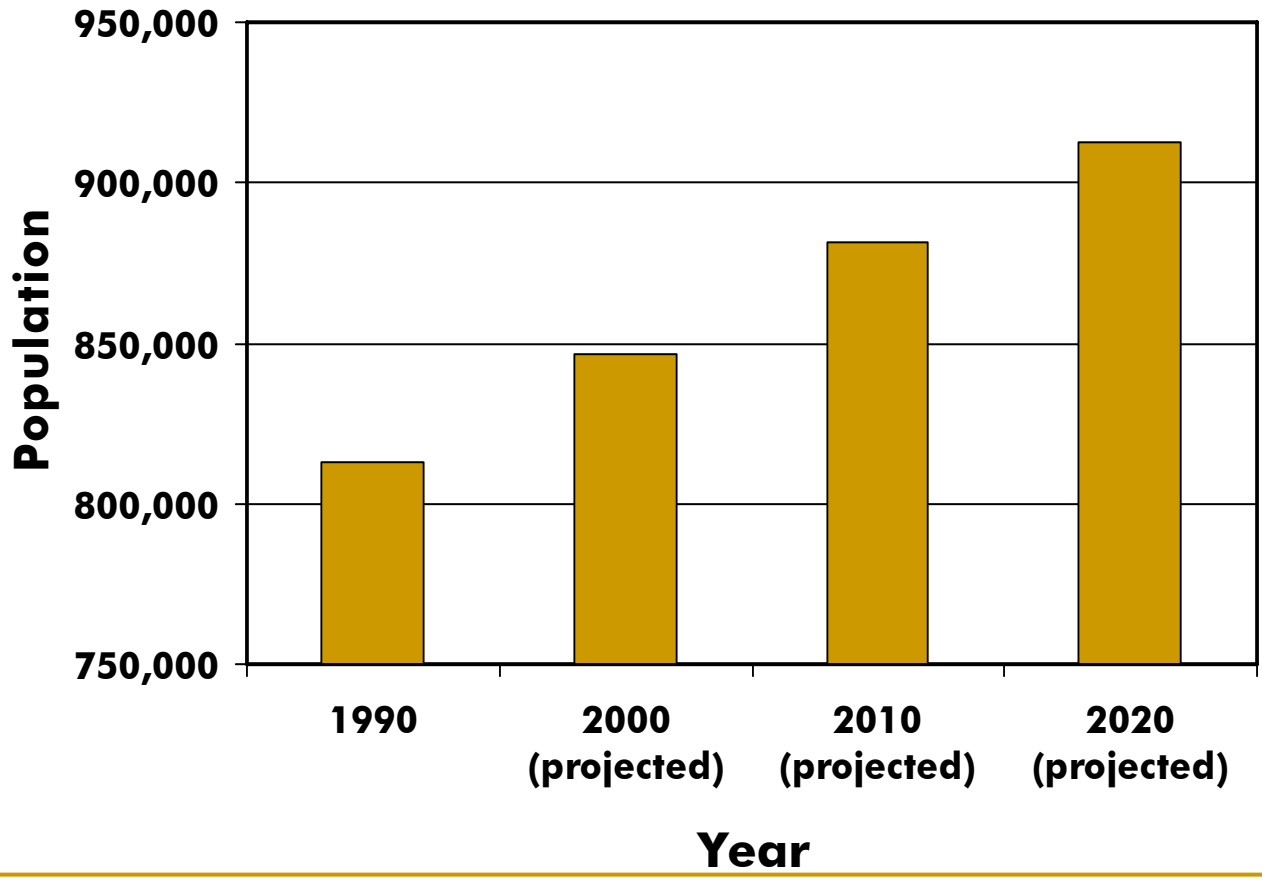
Mission Statement--

... to further study the Mahomet Aquifer on a regional basis and to develop options for the management of this valuable resource.

www.MahometAquiferConsortium.org

Water Use-- Potential future demand

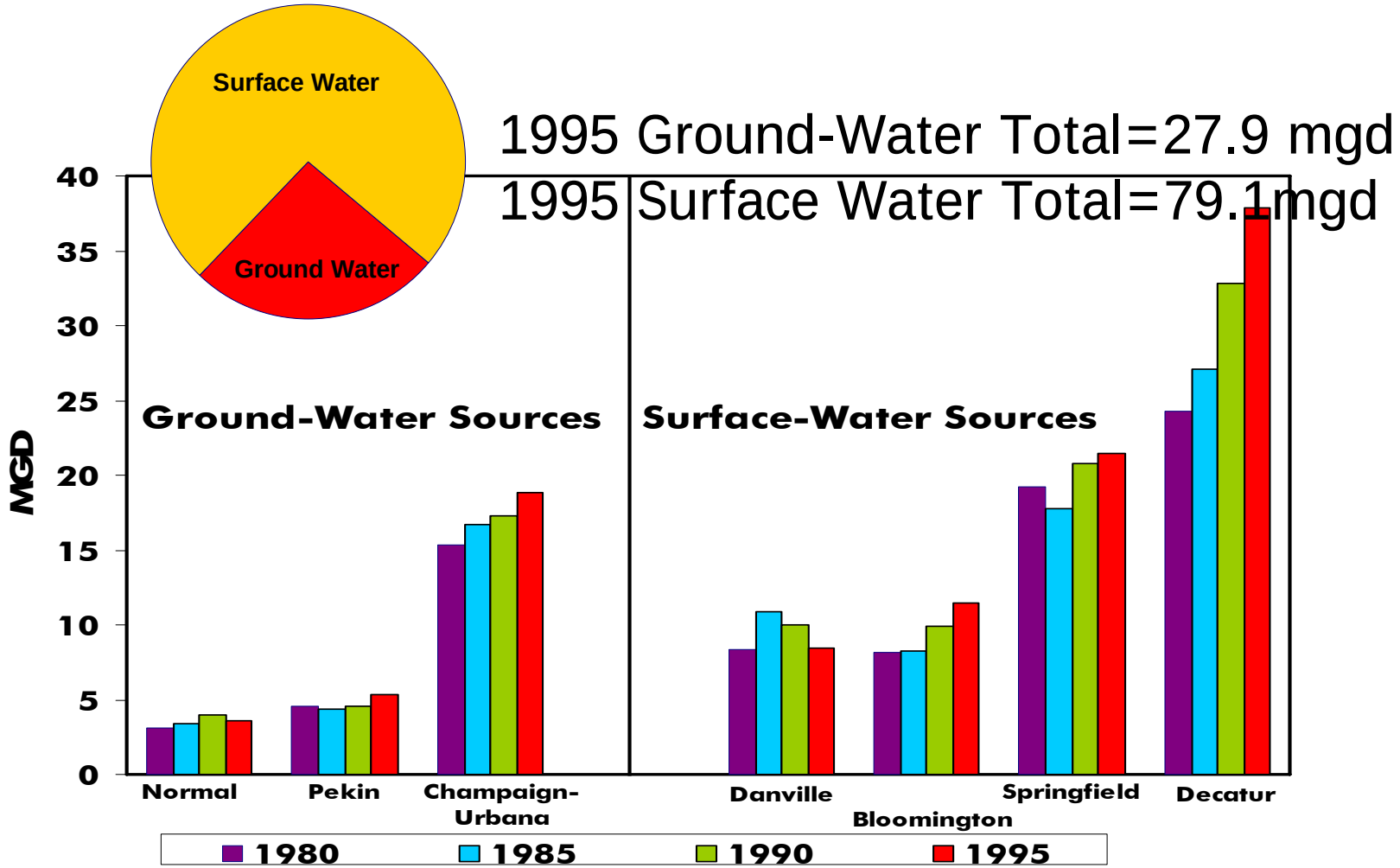
Population change in the Mahomet Aquifer Region



Source: State of Illinois, Bureau of the Budget (1997)

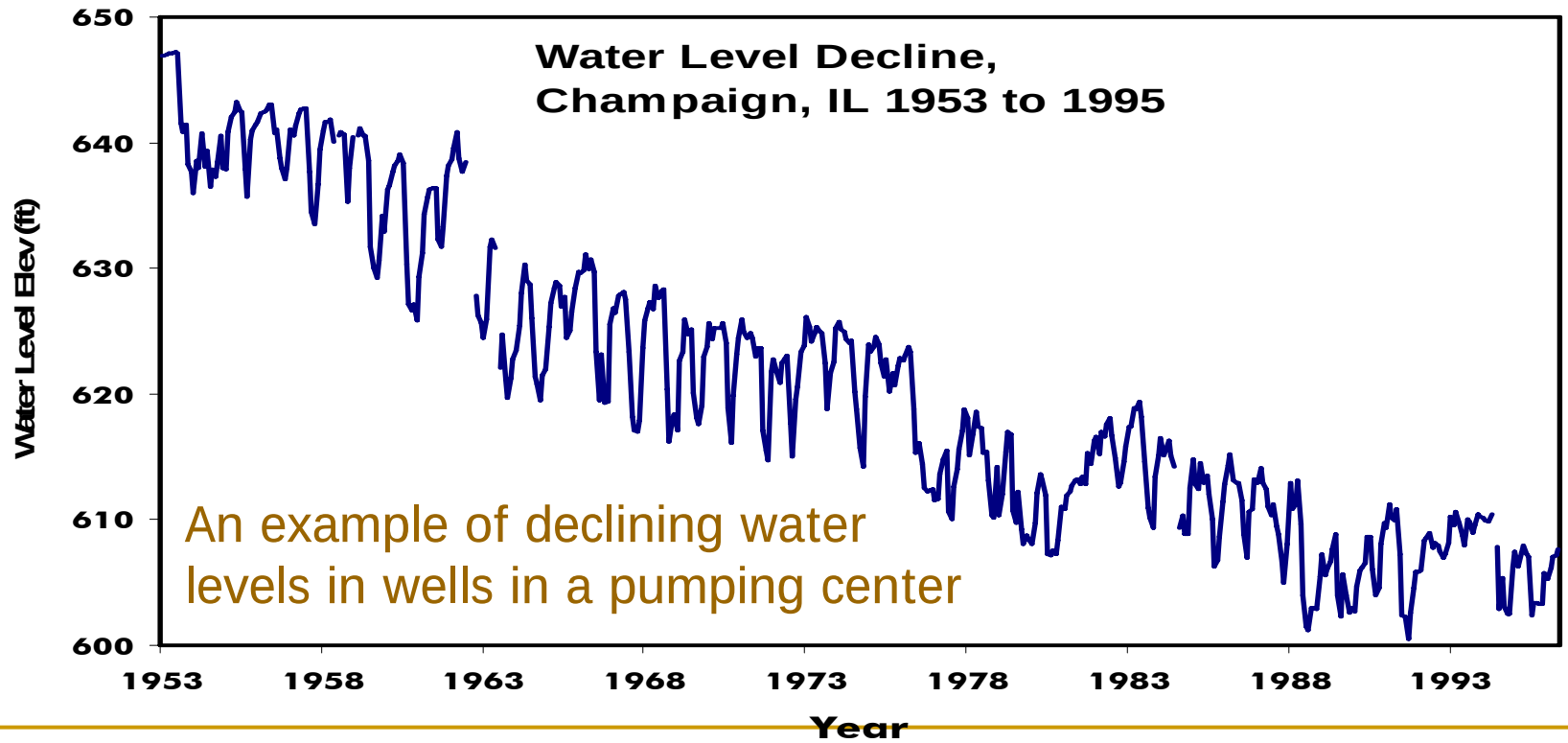
Water Use--

Selected communities in the Mahomet Aquifer region



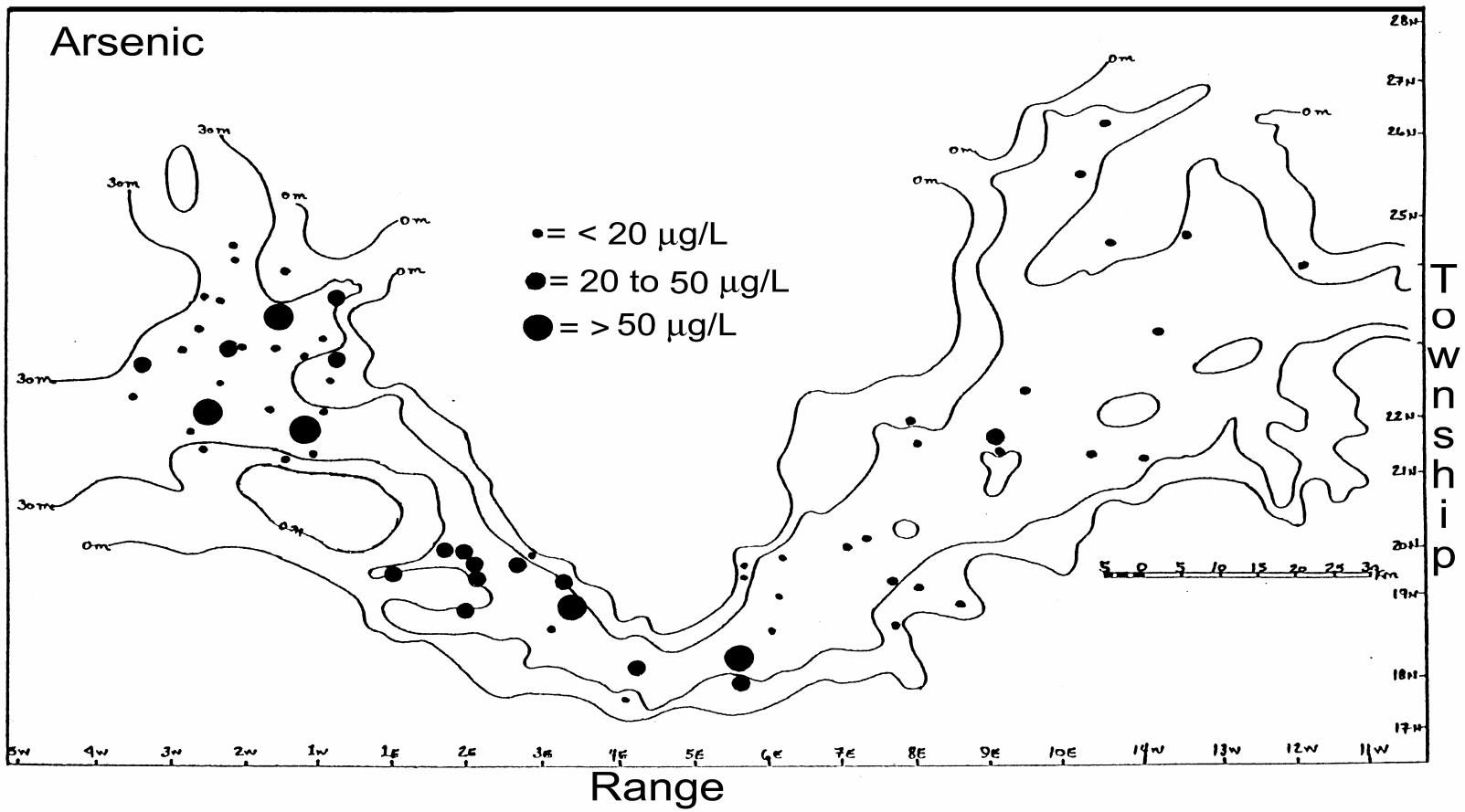
Why is this effort needed?

- Make informed decisions about meeting future water demand-- effect of projected growth and possible weather extremes



Why is this effort needed?

- Identify and resolve water quality issues



Why is this effort needed?

- Help ensure your water supply for the future
- Optimize your future water supply costs
- Promote planned economic development/ smart growth for your community

How can you help?

- Provide data– well locations, volume of water pumped, …
- Provide funding
- Provide audiences for educational presentations (schools & businesses!)

MAC Board of Directors

Contact information

- Mel Pleines, Mackinaw Valley Water Authority, Minier, 309-392-2719
- Dorland Smith, Illinois Water Authority Assoc., Havana, 309-543-3147
- Barry Suits, Illinois-American Water Co., Champaign, 217-373-3247
- Craig Cummings, City of Bloomington, 309-434-2225
- Nancy Erickson, Illinois Farm Bureau, 309-557-3153
- Sharon Martin, Monticello, 217-687-2628
- Ellis Sanderson, Urbana, 217-328-4488

Water Supply Planning in Illinois

- Gov. Blagojevich issues Exec Order 2006-01
- The Development of State and Regional Water-Supply Plans
- Plans should be
  - Consistent with existing laws, regs & rights
  - Based on science
  - Regional and not statewide

STATE OF ILLINOIS
EXECUTIVE DEPARTMENT
SPRINGFIELD, ILLINOIS

2006-01

EXECUTIVE ORDER FOR THE DEVELOPMENT OF STATE AND REGIONAL WATER-SUPPLY PLANS

WHEREAS, the citizens of Illinois rely on surface water and groundwater for personal consumption, and industries of the State use a significant amount of that water for economic development; and

WHEREAS, the increasing demands on Illinois' water resources and the impacts of drought may lead to conflicts between the multiple water supply users and may adversely affect the health of the State's citizens as well as adversely impacting the environment and the economy; and

WHEREAS, the quantity of surface water and groundwater in Illinois must be properly assessed through a sound planning process as an essential part of any responsible, economically viable and secure water supply development for the citizens of the State; and

WHEREAS, the Illinois Interagency Coordinating Committee on Groundwater, the Illinois State Water Survey, and the Illinois State Water Plan Task Force have identified the Priority Water Quantity Planning Areas that are most at risk for water shortages and conflicts; and

WHEREAS, the Illinois Integrated Water Quantity Planning and Management Committee recommends the development of regional aquifer and watershed plans for managing water supplies;

THEREFORE, BE IT ORDERED that the following actions shall be executed:

Consistent with the authority granted to the Department of Natural Resources under the Rivers, Lakes, and Streams Act, 615 ILCS 5/5 *et seq.* and the Level of Lake Michigan Act, 615 ILCS 50/1 *et seq.*, the authority of the Department of Natural Resources' Office of Water Resources under 20 ILCS 801/5-5, the Office of Water Resources, in coordination with the State Water Survey, shall:

1. Define a comprehensive program for state and regional water supply planning and management and develop a strategic plan for its implementation consistent with existing laws, regulations and property rights,

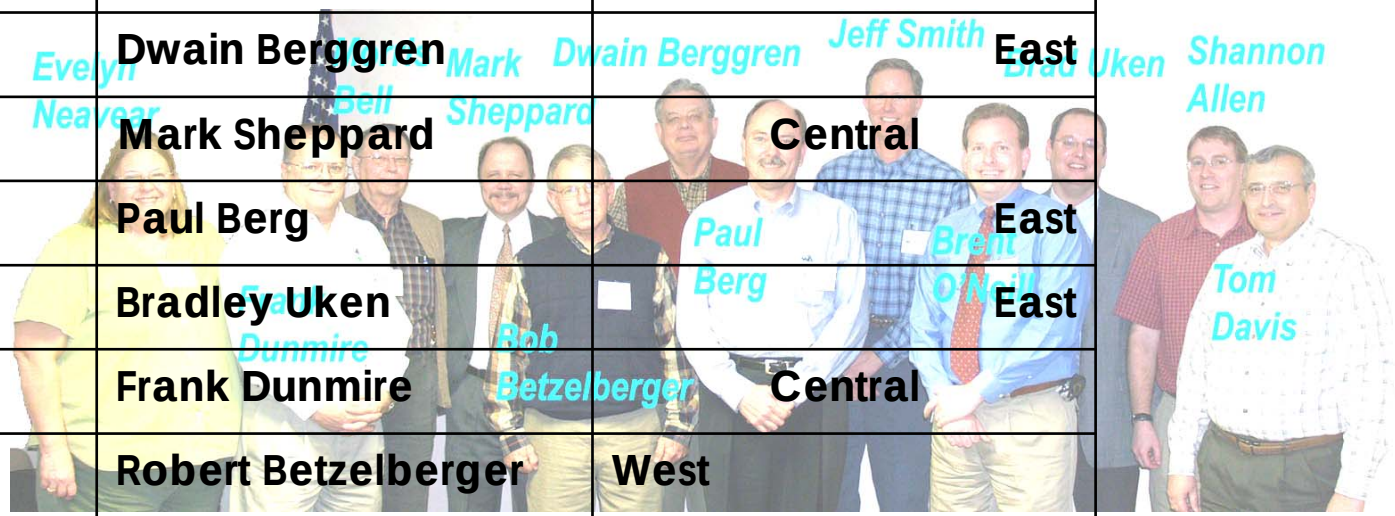
2. Provide for public review of the draft strategic plan for a water supply planning and management program;

Water Supply Planning in Illinois

- Two pilot committees
- Formed and working
- Develop demand projections and assess supply

Water Supply Planning in Illinois
East-Central Illinois Committee

Interest Group	Representative	Geographic Region
Agriculture	Jeff Smith	West
Counties	Evelyn Neavear	West
Electric Generating Utilities	Thomas L. Davis	Central
Environment	Dwain Berggren	East
Industries	Mark Sheppard	Central
Municipalities	Paul Berg	East
Public	Bradley Uken	East
Rural Water Districts	Frank Dunmire	Central
Small Business	Robert Betzelberger	West
Soil and Water Conservation	Shannon Allen	Central
Water Authorities	Morris Bell	West
Water Utilities	Brent O'Neill	East



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