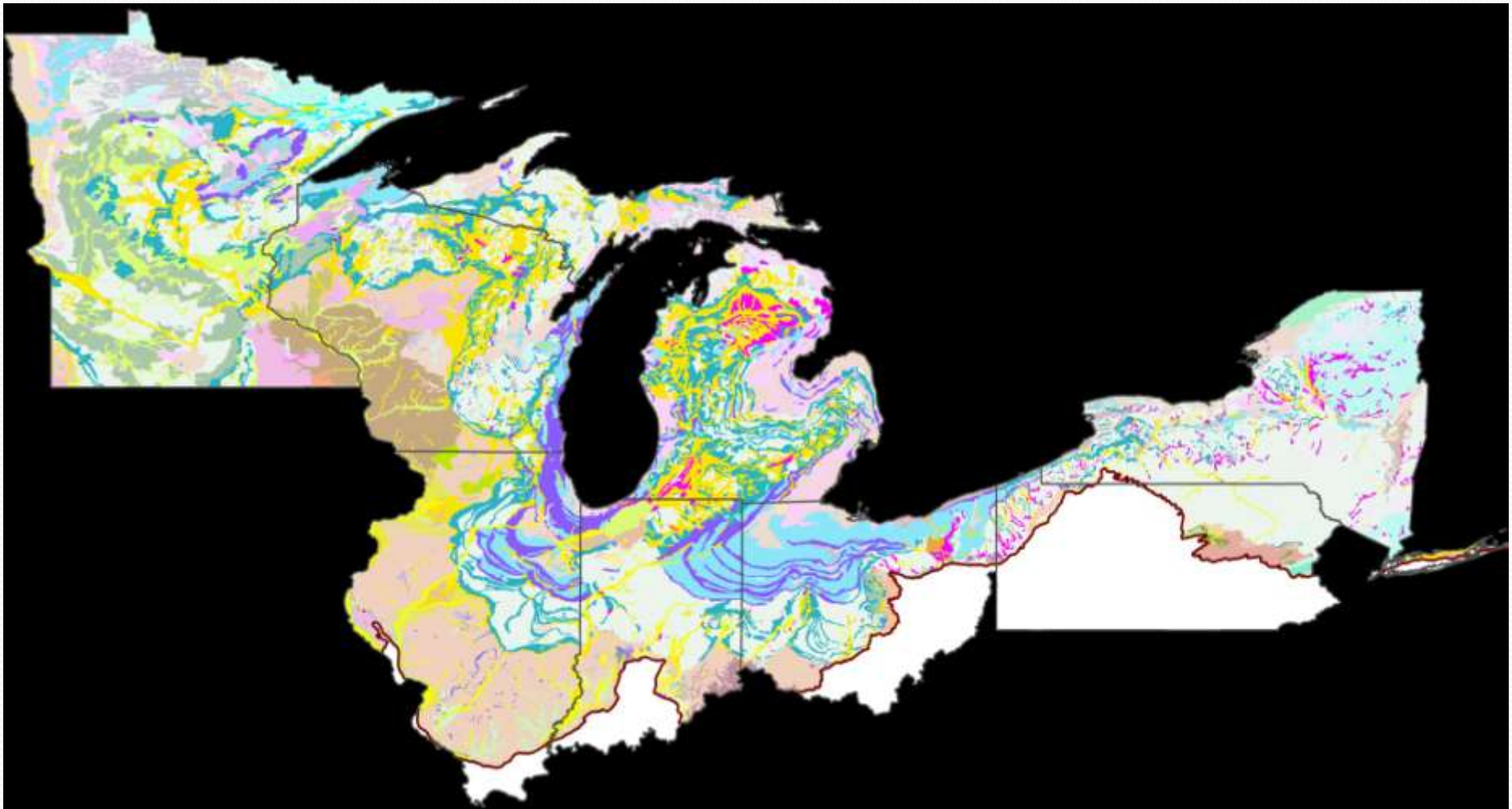
Implications of the Great Lakes Geologic Mapping Coalition for Management of the Illinois River System

Richard C. Berg
Illinois State Geological Survey
Prairie Research Institute
University of Illinois at Urbana-Champaign

ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE

Founded in 1997

GOAL - Map the glacial geology of Great Lakes states in three-dimensions



What are we dealing with in Illinois and the Great Lakes States?

Why did we form the Coalition?

Glaciations several times

Bylot Island, Nunavut, Canada

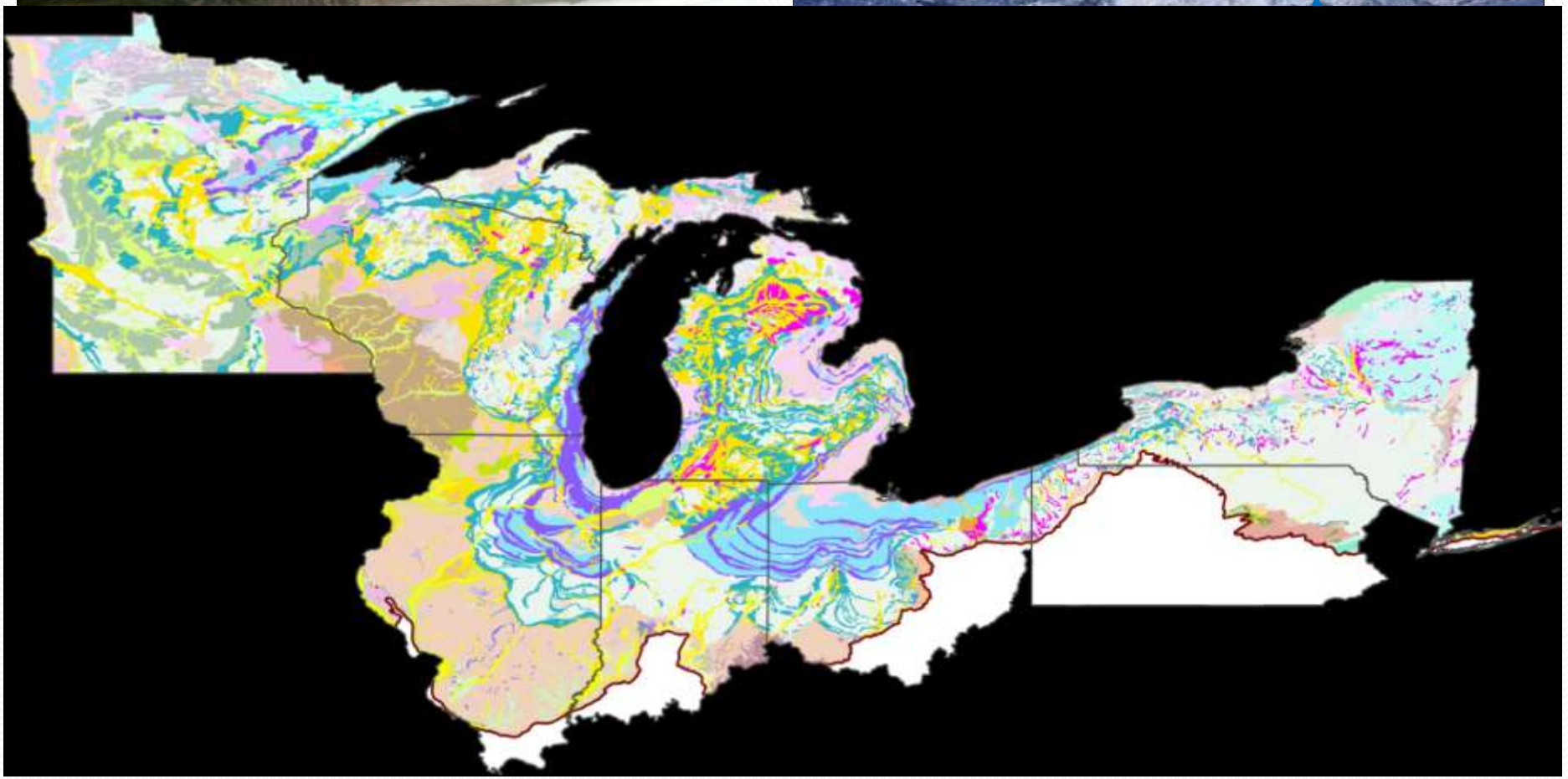
Bylot Island, Nunavut, Canada - Highly sediment-charged water emerging from a conduit at the base of Aktineq Glacier


Glacier
Depositional Landforms
Moraine
Sediment


Debris covered ice, meltout river, terraces
Erosional Landforms

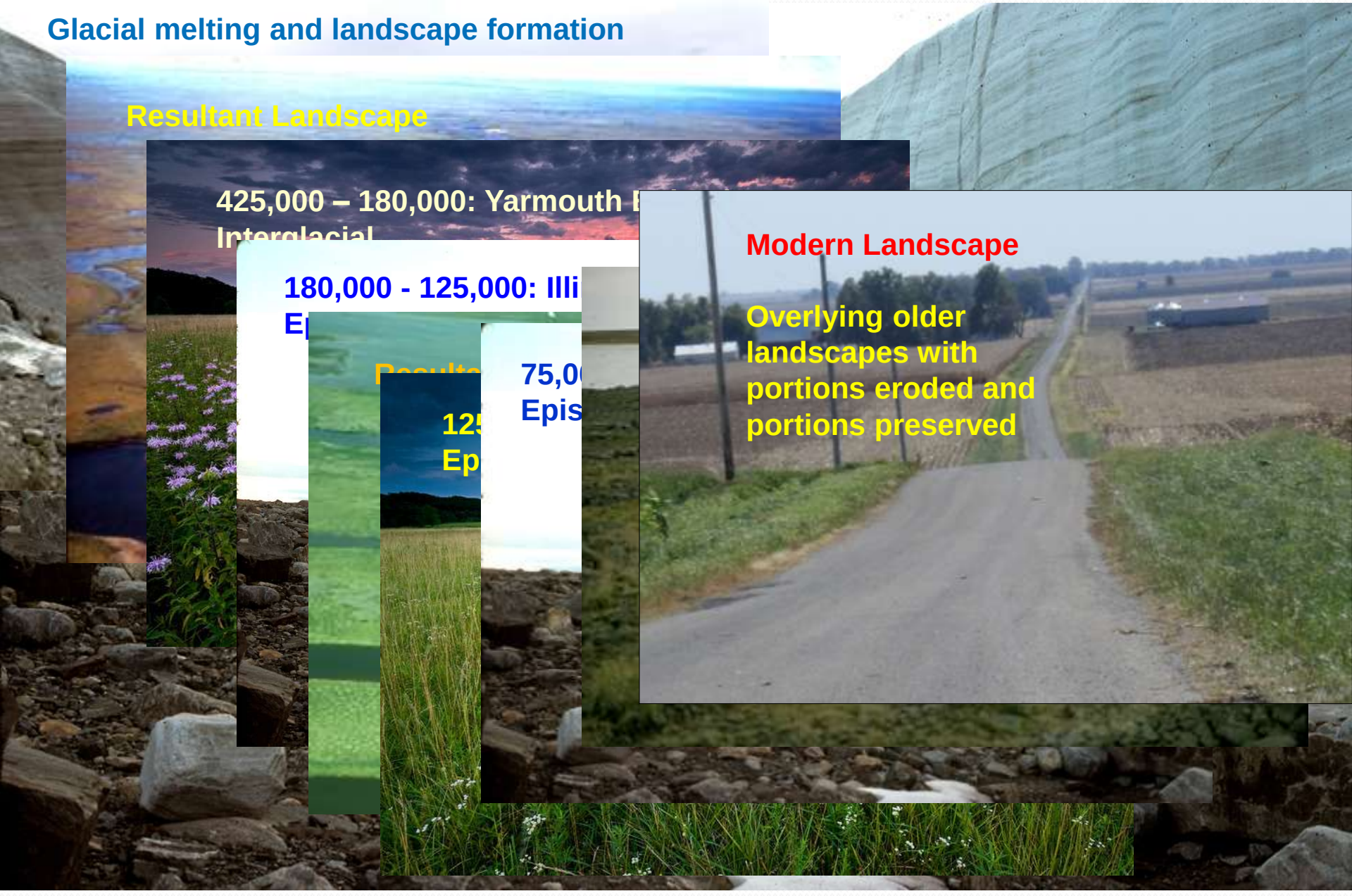
Head of Outwash Deposits

Unique Complex Geology



Our Glacial Legacy

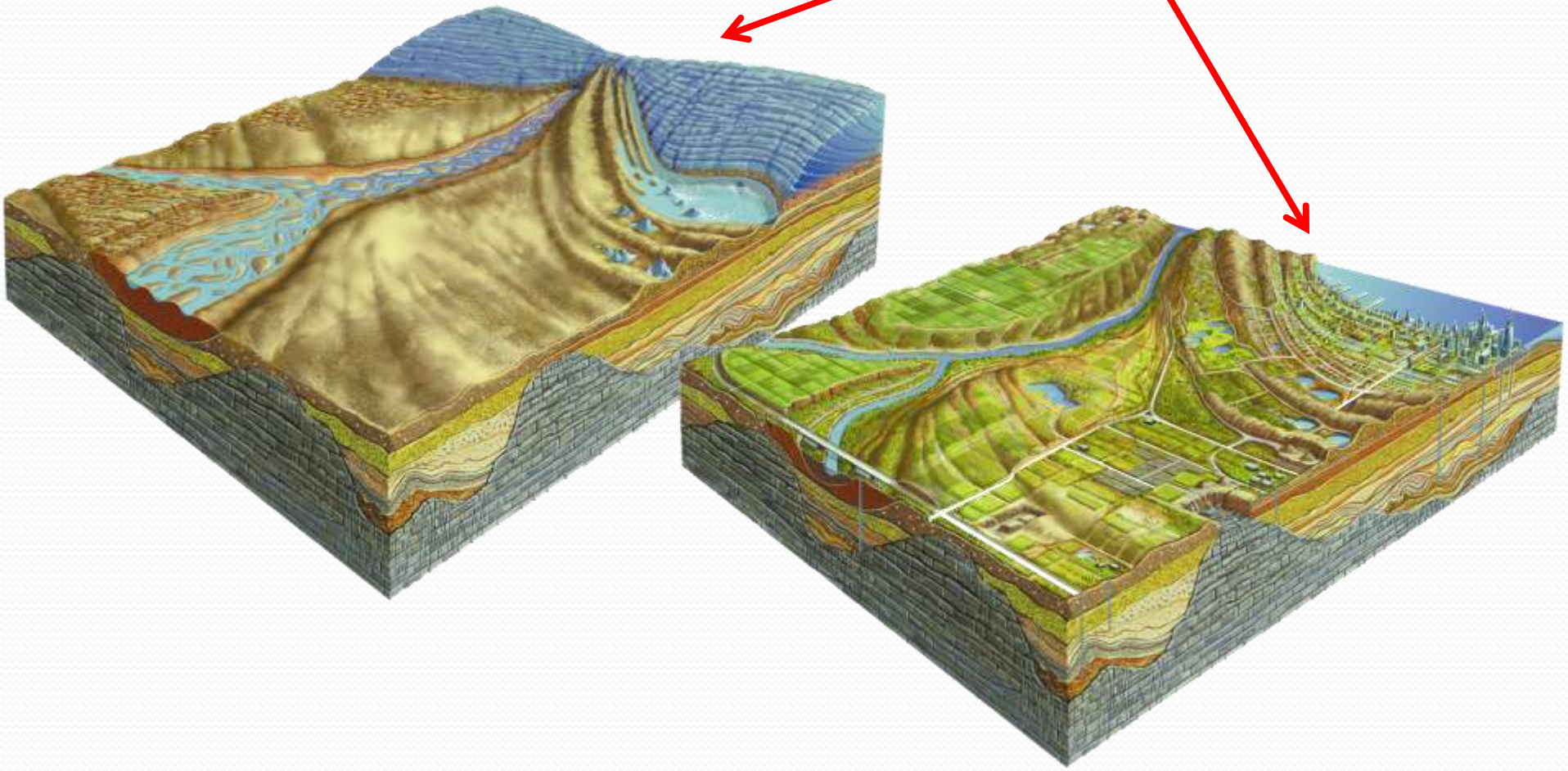
Glacial melting and landscape formation



Why are we doing this?

Provide Geologic Information for Economic Development, Water and Mineral Resources, and Public Health

We go from this to this



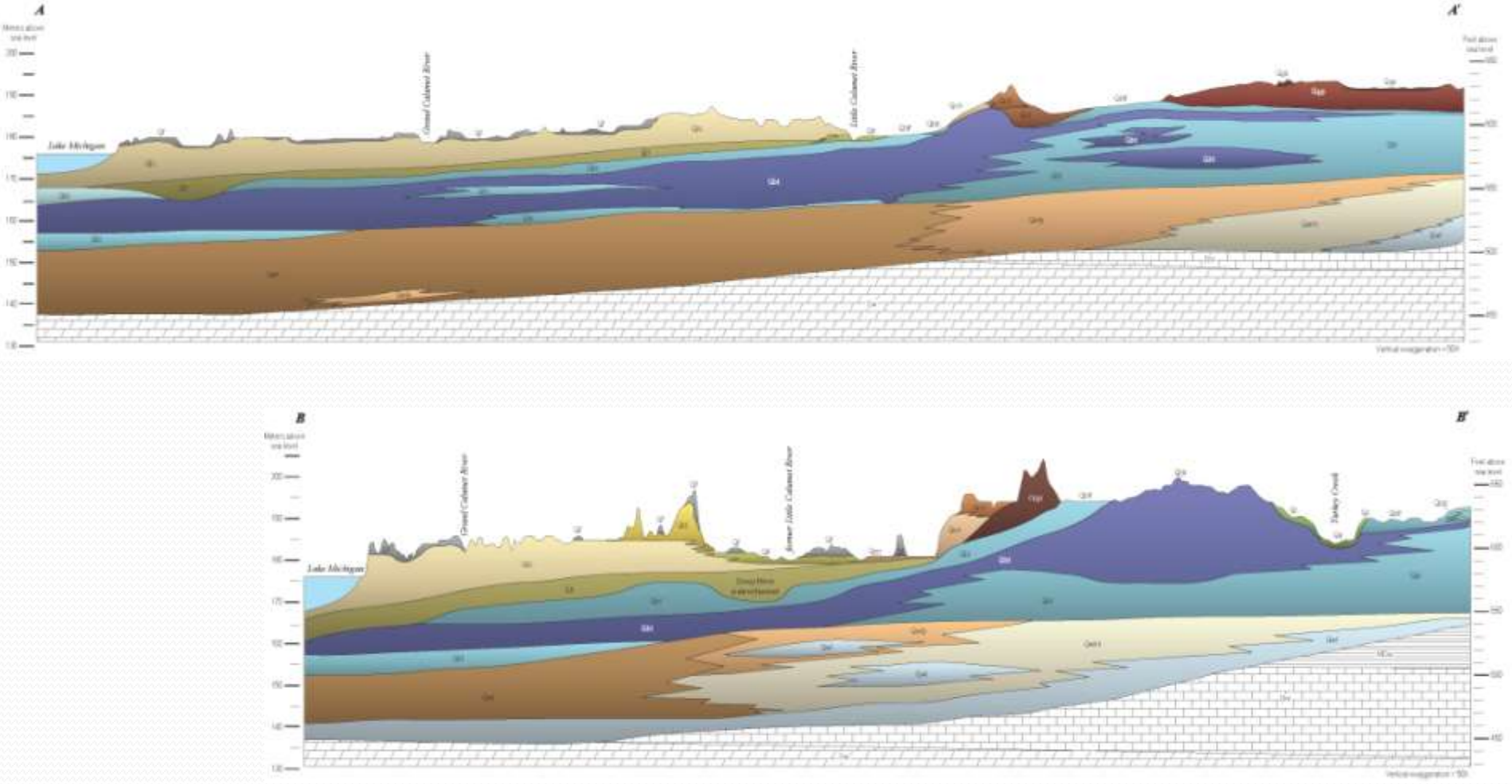
180,000 - 125,000:
Illinois Episode
Glaciation

This is what we see today

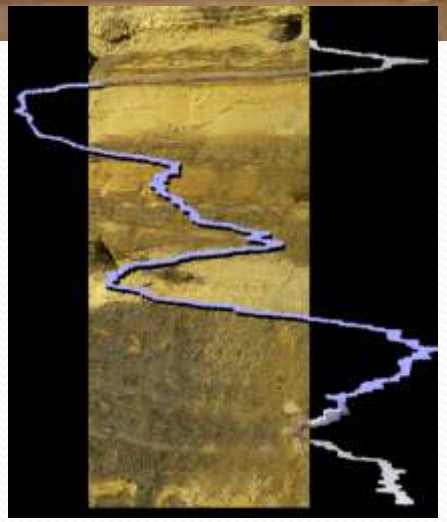
125,000 – 75,000
Sangamon Episode
Interglacial

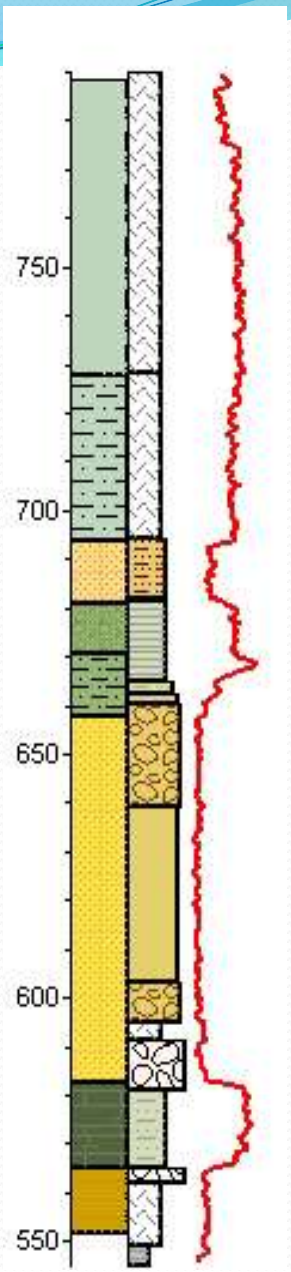
75,000 – 12,000:
Wisconsin Episode
Glaciation

Very Detailed Subsurface Information

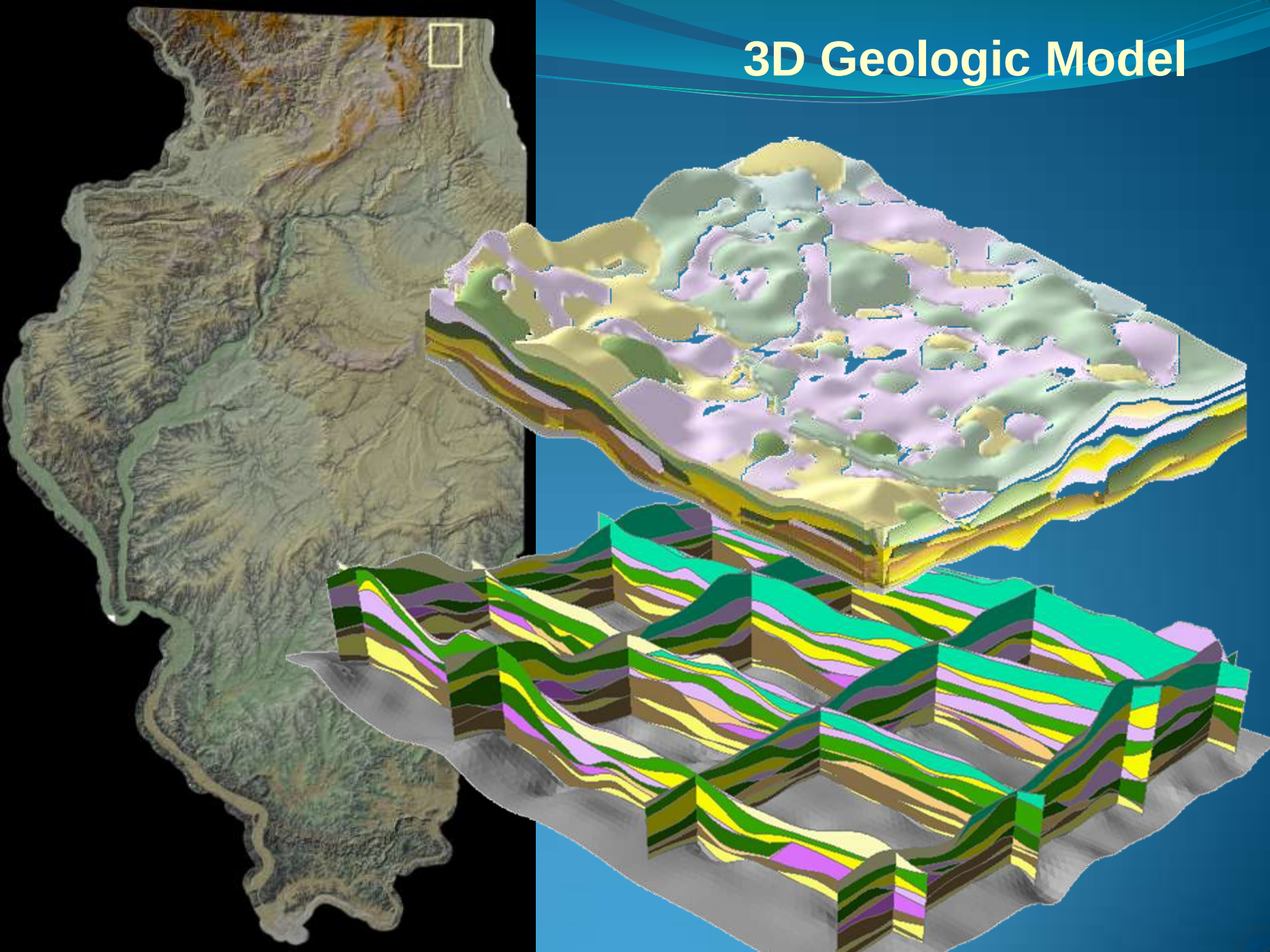


Mapping requires exploration



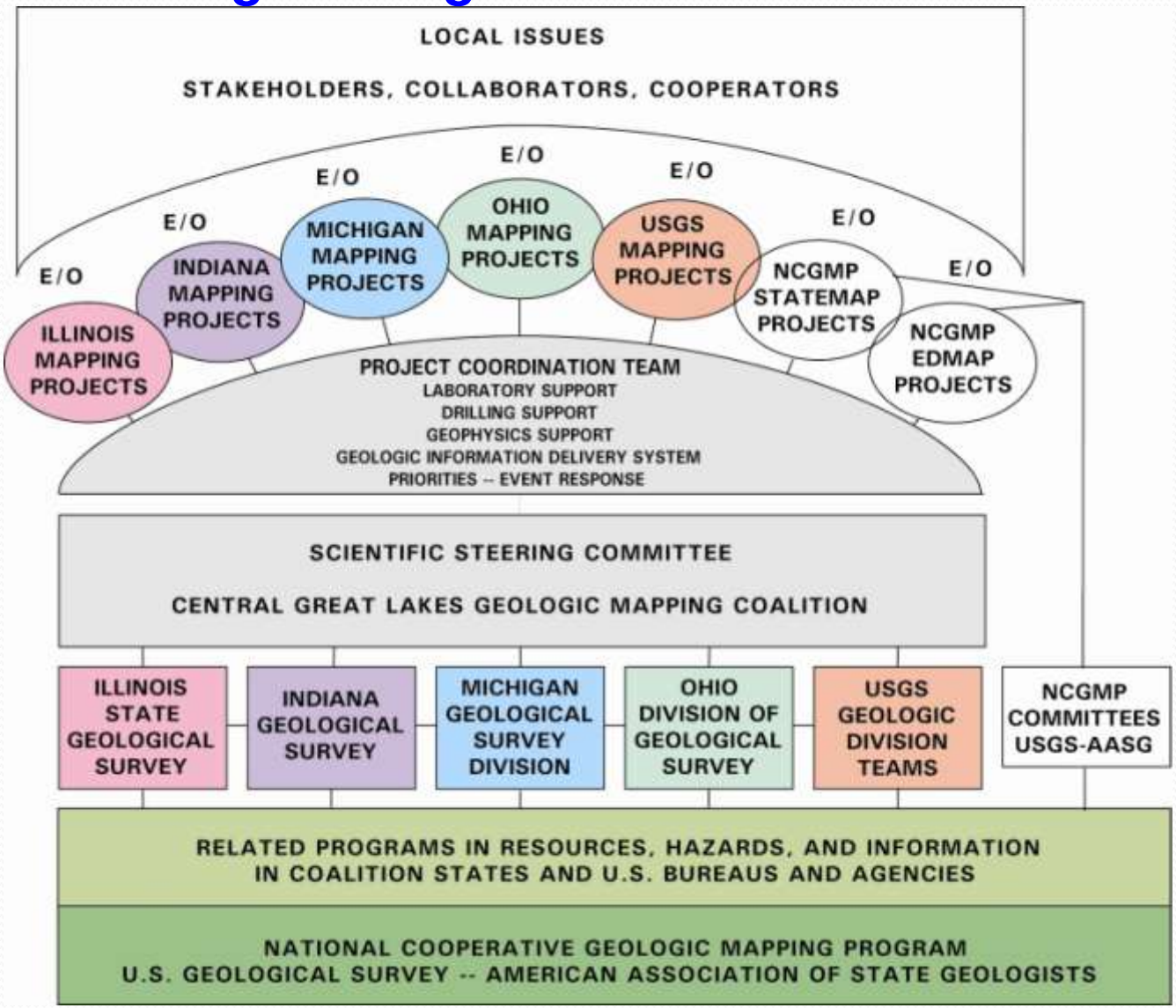


3D Geologic Model



Great Lakes Geologic Mapping Coalition

Original Organizational Chart



1999 Time Line for the 14-Year Long-term Geologic Mapping Program

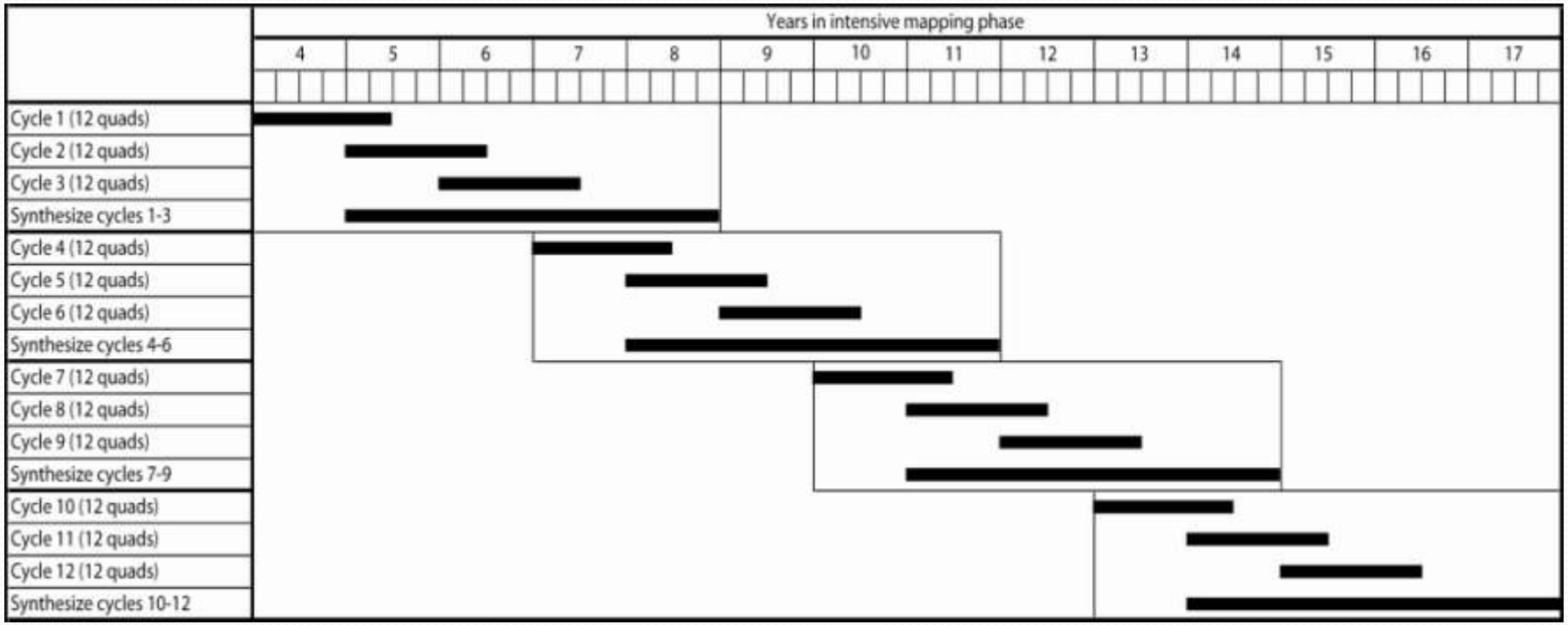
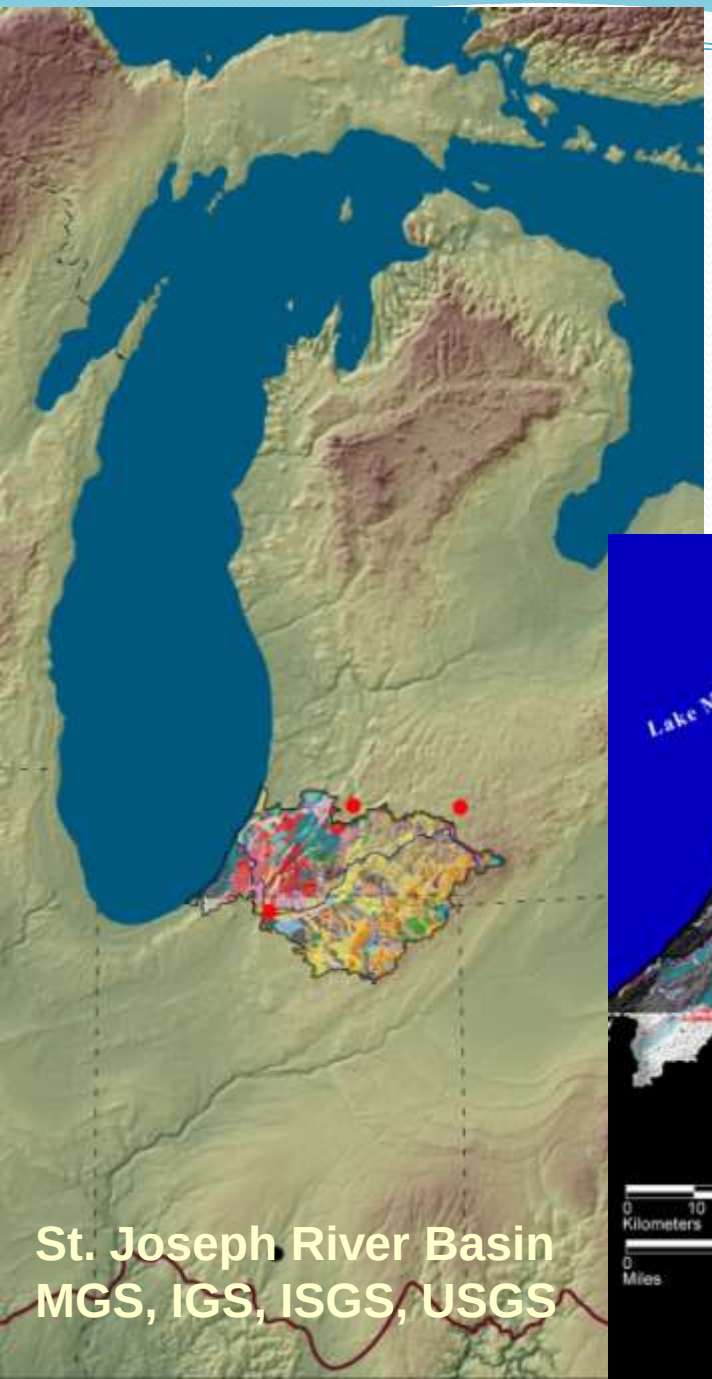


Table (part) of Surveys In-House Capabilities and Needs

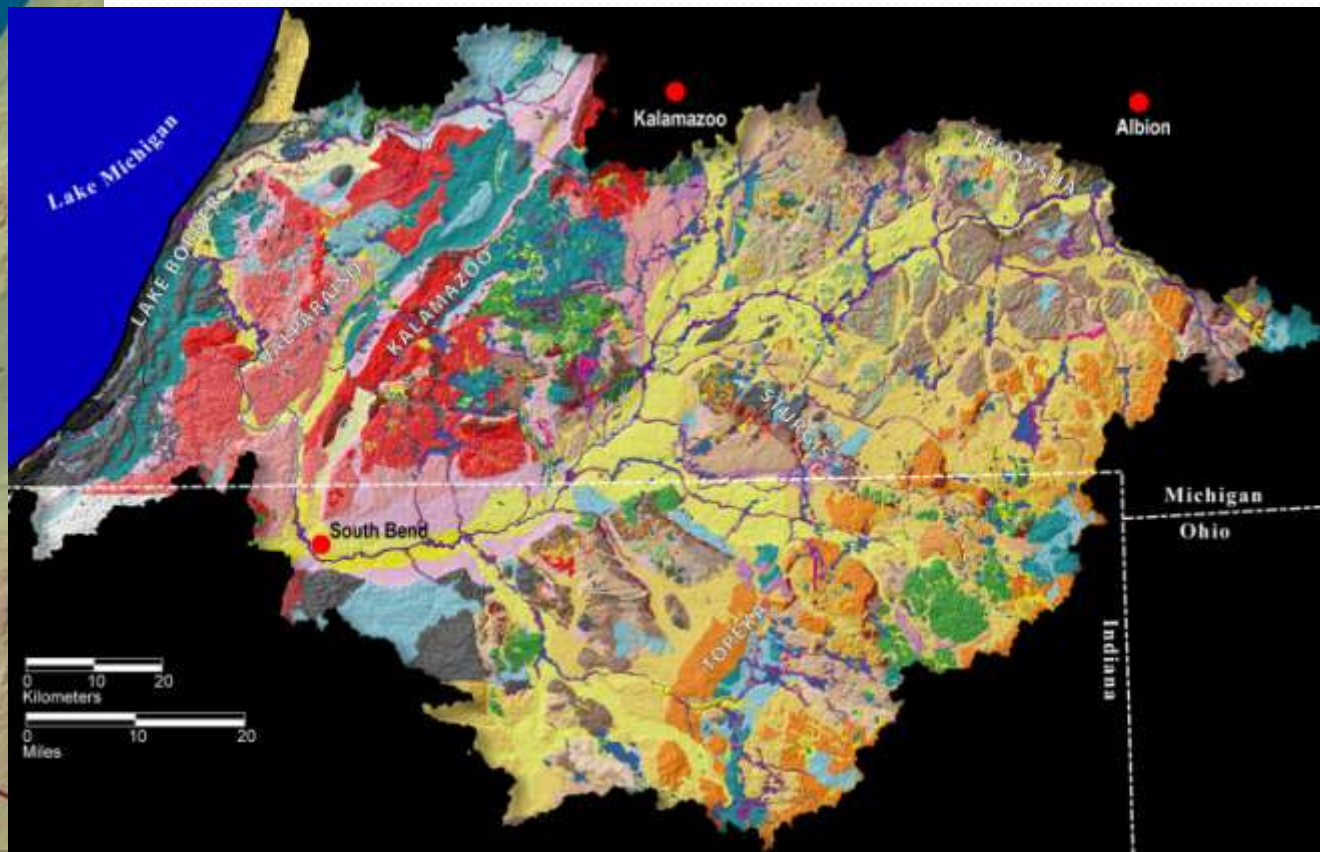
Method/procedure	Type	In-house capabilities/needs*					
		USGS	IGS	ISGS	OGS	MGS	$
Surficial geology field sampling and description							
Sediment coring to 1500 ft depth	Sampling	Y	Y20	Y20	Y20		60
Rotary cuttings to 1000 ft depth	Sampling	Y	Y20	Y20	Y20	Y20	80
Solid stem auger to 125 ft depth	Sampling	Y40	Y				40
Hollow stem auger							
Split spoon, shelby tube, 75–150 ft	Sampling	Y5	Y5	Y5	Y		15
Continuous sampler, 75–180 ft	Sampling	Y5		Y5	Y5	Y5	20
Probing							
Geoprobe, PowerProbe 80 ft	Sampling	Y		Y			
Giddings 45 ft	Sampling	20		Y10			30
Hoverprobe	Sampling	Y					
Vibracore	Sampling				Y		
Penetrometer	Description	Y		Y		Y	
Standard penetration test	Logging	Y			Y		
Downhole Logging							
P-wave velocity	Logging	Y		Y			
Resistivity	Logging	Y		Y			
Gamma	Logging	Y	Y40	Y	40	Y	80
Neutron	Logging	Y		Y		Y	
Caliper	Logging	Y		Y			
Vane shear	Logging	Y		Y			
Acoustic televiewer	Logging	Y	Y	Y			
Magnetic susceptibility	Logging	Y	Y	Y			
Spectral gamma	Logging	Y					
Core splitting and sensitive subsampling (bulk density, moisture content, ...)	Description	Y	Y	Y	Y	Y	
Photography	Description	Y	Y	Y	Y	Y	
Visual descriptions (Munsell color, lithology, bedding, texture, fractures, contacts, horizon, structure, cutans/silans, reaction, depth, thickness, %recovery...)	Description	Y	Y	Y	Y	Y	

GLGMC provides:

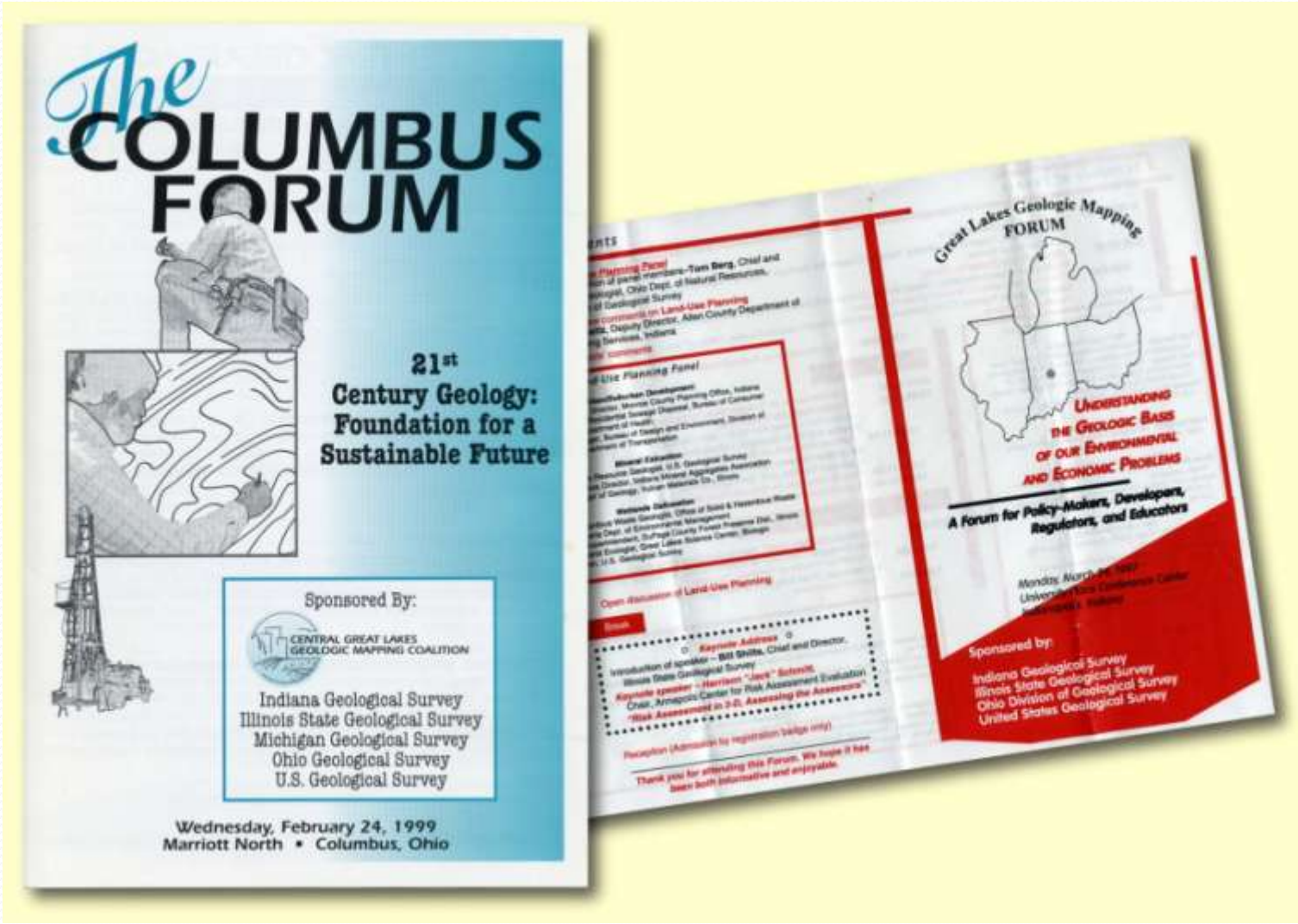
- Shared expertise
- Shared funding
- Shared methodologies
- Shared infrastructure



St. Joseph River Basin
MGS, IGS, ISGS, USGS



GLGMC receives direct input from map users—identifies societal issues



Informational Products

The Central Great Lakes Geologic Mapping Coalition
ISGS, 2000, pamphlet.

The Central Great Lakes Geologic Mapping Coalition
USGS, 1999, Fact Sheet FS-153-99

Mapping the glacial geology of the Central Great Lakes region in three dimensions—a model for state-federal cooperation,
USGS, 2000, Open-File Report 99-349

Sustainable growth in America's heartland—3-D geologic maps as the foundation
Central Great Lakes Geologic Mapping Coalition, USGS, 1999, Circular 1190

Congressional Interactions/Support 1997-2011

Great Lakes Geologic Mapping Coalition

Great Lakes
GEOLOGIC MAPPING COALITION

Summary of Activities – 655 Congressional Visits

- ~30 District office visits
- 2001-6 Appropriations Request Letters
- 2001 Delegation Letter
- 2003 Multi-state Delegation Letter
- 2001 and 2003 "Dear Conferee" Letters
- 2004 Request Letters
- 2005 Multi-state Delegation Letter
- 2006 Multi-state Delegation Letter
- 2007 Multi-state Delegation Letters
- 2008 Multi-state Delegation letters
- 2009 Multi-state Delegation Letter and Great Lakes Task Force Letter
- 2010 Great Lakes Task Force Letters
- 2011 Personal Program Requests

Coalition Meeting Schedule

8:30		OH Gillmor-Andrew Beck, 1203 LHOB			
8:45	IL Durbin-Catherine Potter, SH-309			IN Hill-Lisa Shelton, 1024 LHOB v. int.	
9			IN Lugar-Aaron Whitesel, SH-306	IL Gutierrez-Tom Kotarac, 2367 **RHOB**	IL Hastert-Anthony Reed, 235 CHOB
9:15			Brian Bowker, 2305		
9:30				IN Souder-Mark Pfundstein, 1227 LHOB	
9:45			Bruce Cuthbertson,		
10			Chuck Yessaian, 2161	IL Rush-Yardly Pollas, 2416 RHOB	IL Shimkus-Ray Fitzgerald, 513 CHOB
10:15				IN Pence-Leanne Holdman, 1605 LHOB	
10:30	MI Stabenow-Kristen Knepper, SH-702	OH Turner-Mike Wiehe, 1740 LHOB MI Ehlers-Ellen Burns, 1714 LHOB	OH Strickland-Michelle Dallafior, 336 CHOB		
10:45					IL Schakowski, Amy Fuller, 515 CHOB
11		IL Kirk-Cholly Smith, 1531 LHOB	MI Levin-Dan Jourdan, 2300 RHOB v. int.	IL Manzullo-Steve Johnson, 2228 RHOB	
11:15	IL Governor's Office-Sol Ross, 440 N. Capitol St., Suite 240	OH Jones-Tannaz Haddadi, 1009 LHOB MI Kilpatrick-Jake Bennett, 1610 LHOB	OH Pryce-Peter Freeman, 221 CHOB	IN Hostettler-Adam Howard, 1214 LHOB	
11:30	OH/MI DeWine/Levin-Joy				

Multi-State DC “Hill” Visits

United States Senate

WASHINGTON, DC 20510

April 23, 2008

The Honorable Dianne Feinstein
Chairman
Senate Subcommittee on Interior,
Environment, and Related Agencies
131 Dirksen Senate Office Building
Washington, DC 20510

The Honorable Wayne Allard
Ranking Member
Senate Subcommittee on Interior,
Environment, and Related Agencies
131 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Feinstein and Ranking Member Allard:

As you are considering the FY 2009 Senate Interior, Environment, and Related Agencies Appropriations bill, we ask that you provide $5,000,000 in funding for the Central Great Lakes Geological Mapping Coalition. We also ask that this program be placed in the newly formed U.S. Geological Survey Global Change activity.

The Central Great Lakes Geologic Mapping Coalition includes the U.S. Geological Survey and the state geological surveys of the eight Great Lakes states – Illinois, Indiana, Michigan, Minnesota, New York, Pennsylvania, Ohio, and Wisconsin. The Coalition prepares three-dimensional geophysical maps that are important for utilizing water and mineral resources, siting new facilities, protecting the environment, and mitigating geologic hazards. Municipalities and counties, in particular, have relied on Coalition mapping as part of their economic development planning and decision making.

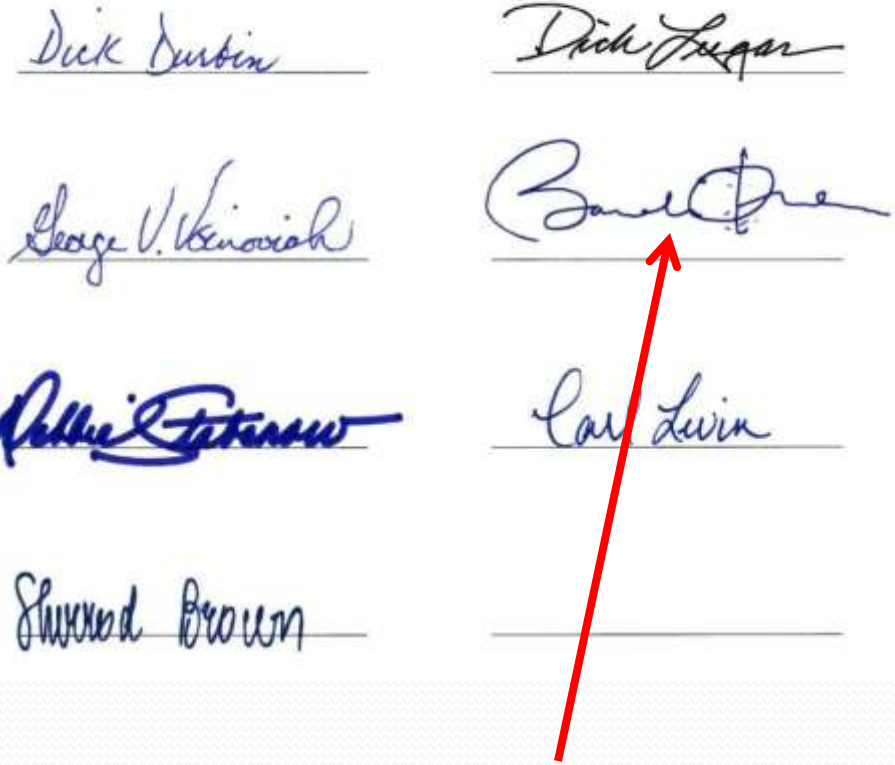
Detailed 3-D geologic maps provided by the Coalition identify the location of groundwater supplies and whether they could be impacted by the siting of energy plants, landfills, or industry. Water and land-use planners use these maps to promote economic development without jeopardizing future drinking water supplies. Coalition maps put local communities in a better position to take preventative measures and avoid expensive mistakes through informed decision-making.

This program has been a line item in the federal budget since FY2000, having received $500,000 each year. From FY 2004 to FY2008 the $500,000 funding level was included in the President's budget request. The President's FY 2009 budget request, however, would terminate this important program.

FY 2009 appropriations of $5,000,000 would allow the Coalition to accelerate its mapping activities, including the start of important projects that Great Lakes communities have been waiting for. At the current funding rate of $500,000 per year, it would take well over 150 years to complete mapping of the states' most critical regions. The cost effectiveness of detailed geologic mapping was shown by a recent cost/benefit study conducted for the Commonwealth of Kentucky, whose residents have had access to geologic maps for over 35 years. The study found that every federal and state dollar spent generated $25 to $39 in economic benefits.

We appreciate your past support and your consideration of this request for continued support in FY2009.

Sincerely,



Personal letter to a constituent

BARACK OBAMA
ILLINOIS

United States Senate
WASHINGTON DC 20510-1306

COMMITTEES:
HEALTH, EDUCATION, LABOR AND PENSIONS
HOMELAND SECURITY AND GOVERNMENTAL AFFAIRS
FOREIGN RELATIONS
VETERANS' AFFAIRS

April 21, 2008

Mr. Bob Campbell
Regional Economic Development Corp
2305 West Main Street
Marion, Illinois 62959

Dear Bob:

Thank you for contacting me to express your support for increased funding for the Central Great Lakes Geologic Mapping Coalition (CGLGMC) in the FY 2009 Interior Appropriations bill. I appreciate hearing from you and am glad that we both view this as an important priority.

Greater federal support for CGLGMC is crucial to improving our geologic knowledge of the central Great Lakes region through studies ranging from groundwater hydrology to carbon sequestration capabilities. That is why I recently joined my colleagues in sending a letter to Senator Dianne Feinstein, who serves as Chair of the Interior Appropriations Subcommittee, urging her to fund the CGLGMC at $5 million in Fiscal Year (FY) 2009. Enlcosed is a copy of that letter.

You may be assured that I will continue to push for this important funding with my colleagues in the Senate. Again, thank you for writing.

Sincerely,

Barack Obama
United States Senator

Enclosure

WASHINGTON OFFICE
713 HART SENATE OFFICE BUILDING
WASHINGTON DC 20510
OFFICE (202) 224-2854

CHICAGO OFFICE
230 S. DEARBORN
SUITE 3900
CHICAGO, IL 60604
OFFICE (312) 886-3506

SPRINGFIELD OFFICE
607 EAST ADAMS
SUITE 1202
SPRINGFIELD, IL 62701
OFFICE (217) 492-5580

MARION OFFICE
700 NORTH COURT STREET
MARION, IL 62959
OFFICE (618) 997-3600
FAX (618) 997-3650

MOLINE OFFICE
1211 52ND AVENUE
MOLINE, IL 61265
OFFICE (309) 793-1217
FAX (309) 793-1223

Congress of the United States
House of Representatives
Washington, DC 20515

May 18, 2001

The Honorable Joe Skeen, Chairman
Subcommittee on Interior Appropriations
B-308 Rayburn House Office Building
Washington D.C. 20515

Dear Mr. Chairman:

We would like to take this opportunity to express our support for a funding request filed recently by two of our Illinois colleagues, Phil Crane and John Shimkus. In their letter to you, dated April 5, 2001, they asked you and your subcommittee colleagues to allocate $20 million in the Fiscal Year (FY) 2002 Interior Appropriations bill for some very important three-dimensional (3-D) geologic mapping work to be conducted by the Central Great Lakes Geologic Mapping Coalition (CGLGMC) in Illinois and three other previously glaciated states in the Midwest. For us, and for many other public officials, business leaders and concerned citizens, the significance of this work is that it will produce invaluable geologic information, in this case 3-D geologic maps, that can and should lead to better informed decision-making about the future of our state and our communities.

For the record, Mr. Chairman, this is not a brand new endeavor. Not only did the CGLGMC receive funding in the FY 2001 Interior Appropriations bill (money was provided for it within the U.S. Geological Survey's Earth Surface Dynamics Line Item/Program Element), but it currently has a pilot project underway (one of three) in the vicinity of Antioch, Illinois -- a rapidly growing area in northern Illinois that is confronted with a number of the problems and concerns that 3-D geologic maps can help resolve. The results of this initial mapping will serve as a template for a larger-scale program that covers 1,200 high priority areas in Illinois, Indiana, Ohio and Michigan and will delineate earth materials and underground aquifers from the surface of the earth down to a depth of several hundred feet. Since what is well under the earth's surface may be as important, or even more important, than what is at ground level when it comes to determining the uses to which certain lands should be put, it is essential that funding for the CGLGMC be increased to the level recommended in the Crane-Shimkus letter (a copy of which is enclosed). At that level, more 3-D geologic maps can be made available more quickly to those who can put them to good use.

To be more specific, the $20 million appropriations request we are supporting will produce three dimensional images that will assist all levels of government with projects (such as the siting of municipal landfills) in which they have an interest. Also, these maps will help developers and planners by outlining possible dangers that may exist below the surface, such as aquifers that could become contaminated and soils that may be susceptible to erosion, flooding, subsidence and/or earthquake tremors. Not only could insights of that nature save construction firms, municipalities, counties, states and the federal government millions of dollars, but these geologic maps will also help identify ground and drinking water resources, sand and gravel resources, wetlands capable of being preserved or restored, and abandoned industrial areas that may lend themselves to successful redevelopment.

Speaking of potential cost savings, millions of tax dollars are spent each year to correct mistakes that could have been avoided if private sector investigations and/or local and county governments had more geological information. For example, 3-D geologic maps could reveal where industrial development might be situated or where a major highway could best be located to avoid problems with underground aquifers. All of which brings to mind the old adage about "an ounce of prevention being worth a pound of cure." $20 million this year and in succeeding years for 3-D geologic maps may seem like a lot of money, but given their cost saving potential and their value to everyone who might be adversely affected by uninformed land use decisions, these maps represent to us a very sound investment that are likely to pay very large dividends in the future.

When you and your subcommittee colleagues meet to consider the FY 2002 Interior Appropriations bill, please include $20 million for the Central Great Lakes Geologic Mapping Coalition when you get to that portion of the bill which deals with the U.S. Geological Survey. When all is said and done, we firmly believe you will be glad you did.

Sincerely,

J. Dennis Hastert M.C.
Richard A. Gephardt M.C.
Henry J. Hyde M.C.
Donald A. Manzullo M.C.
Jerry Costello M.C.
Lane Evans M.C.
David Phelps M.C.

Congress of the United States
Washington, DC 20515

March 18, 2008

Chairman Norman D. Dicks
Subcommittee on Interior, Environment,
and Related Agencies
B-308 Rayburn House Office Bldg
Washington, DC 20515

Ranking Member Todd Tiahrt
Subcommittee on Interior, Environment,
and Related Agencies
B-308 Rayburn House Office Bldg
Washington, DC 20515

Dear Chairman Dicks and Ranking Member Tiahrt:

As you are considering the FY2009 House Interior and Environmental Appropriations Bill, we respectfully urge you and your colleagues to, first, request that $500,000 be restored for the Central Great Lakes Geological Mapping Coalition, and also that this program be placed in the newly formed U.S. Geological Survey Global Change Activity. This program has been a line item in the Federal Budget since FY2000, having received funding of $500,000 each year, and from FY2004 - FY2008, the $500,000 funding level was included in the President's Budget. The FY2009 Presidential Budget Request proposed the termination of the program. We also request that the Coalition receive an additional $4,500,000 in the House Interior and Environment Appropriations Bill. Specifically, we are requesting a total of $5.0 million. This funding is for three-dimensional (3-D) geological mapping that addresses issues of natural resources, water availability and protection, sustainability needs, and economic development.

Eight Coalition states - Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota, Pennsylvania, and New York - are unique within the U.S. because they have a combination of (1) thick and complex layers of glacial deposits containing groundwater for a large percentage of their residents, (2) rapidly increasing water demands for energy facilities, (3) high population, (4) heavy industry, (5) serious Brownfield redevelopment issues, (6) high agricultural productivity, and (7) Great Lakes shoreline and groundwater-lake water exchange issues. The valuable earth-science information that results from detailed mapping of these states can be used to promote economic development by identifying and protecting groundwater supplies for municipalities, industry, and agriculture and by providing other important information needed for sustainable growth, while directing development away from environmentally sensitive areas or hazardous settings. Mapping information is particularly needed in rapidly developing urban areas and along transportation corridors, as well as for domestic energy development, which all states have designated as high-priority for mapping.

When new detailed 3-D geologic maps are provided to municipal, county, and state agency officials they are immediately able to inform developers, energy companies, regulators, commercial and industrial interests, the agricultural community, and citizens about areas in which underground water supplies are abundant, or could be impacted by the siting of energy plants, landfills, and manufacturing facilities. Additionally, when water and land-use planners have access to these maps, they are able to promote economic development without jeopardizing future drinking water supplies. At the same time, this information allow planners to address environmental problems, hazards, and water-use issues that often accompany residential, commercial, and industrial development. Furthermore, officials and other interested parties are in a better position to take preventative measures and avoid expensive mistakes rather than being forced to live with the costly consequences of uninformed decision-making.

At the current rate of funding- $500,000 per year – it will take well over 150 years to complete mapping of the states' most critical regions. By that time, countless decisions will have been made in ignorance of critically important geological facts that will have affected the quality of life for the region's residents. The cost effectiveness of detailed geologic mapping is shown by a recent cost/benefit study conducted for the Commonwealth of Kentucky, whose residents have had access to geologic maps for over 35 years. The study found that every federal and state dollar generated $35-39 of economic benefits.

We appreciate your past support and your consideration of this request for continued support in FY2009.

Sincerely,

Rep. Bobby L. Rush
Rep. Timothy V. Johnson
Rep. John D. Dingell
Rep. John Shimkus
Rep. Luis V. Gutierrez
Rep. Melissa L. Bean
Rep. Betty Sutton
Rep. Dale E. Kildee
Rep. Ron Kind
Rep. Christopher P. Carney
Rep. Sander M. Levin
Rep. Ralph Regula
Rep. Janice D. Schakowsky
Rep. Peter J. Roskam
Rep. Bart Stupak
Rep. Mike Rogers
Rep. Candice S. Miller
Rep. Charles A. Wilson
Rep. Judy Biggert
Rep. Tim Holden
Rep. John Conyers, Jr.

THE NORTHEAST-MIDWEST COALITION

GREAT LAKES TASK FORCE

October 29, 2009

Secretary Ken Salazar
U.S. Department of the Interior
1849 C Street, N.W.
Washington DC 20240

Dear Secretary Salazar,

We are writing in support of the U.S. Geological Survey's Great Lakes Geologic Mapping Coalition which is part of the National Cooperative Geologic Mapping Program (NCGMP) and urge you to provide a base increase. Established in 1997, it now includes all eight Great Lakes states.

The industrial, commercial, and residential activities in the Great Lakes states directly and indirectly affect the Lakes as well as the quality of life for approximately 80 million people. The Coalition's program operates with county and municipal decision makers and provides custom-made detailed information on earth materials at land surface and beneath the ground. This information allows local decision makers to balance their decisions on water and earth resources with wise economic development.

The Great Lakes states are unique because glaciers crossed the region many times, depositing mud, clay, sand, and gravel. These water deposits provide about half of the drinking water for its residents as well as all of the sand and gravel resources for concrete and subsequent infrastructure development. Large urban subdivisions and high water-use industries are dependent on adequate and sustainable water supplies. Demand for Great Lakes water is increasing; however, our current knowledge of aquifers containing adequate supplies to offset and augment Great Lakes water use is lacking.

Additionally, Great Lakes cities, parks, brown fields, and transportation corridors are being built in the region, and without knowing what lies beneath the surface, millions of dollars may be wasted because of poor planning. For example, project planners spent $85 million on site characterization while planning for a low-level radioactive waste repository in Illinois. A three-dimensional (3D) geological map showing that the site was unsuitable because of buried aquifers would have saved millions.

Currently, funding for state and federal mapping has been minimal. The NCGMP provides some funds, but only enough to initiate the process of addressing critical natural resource issues. Therefore, we encourage you to increase the Coalition's funding to $5 million as well as an increase to the overall NCGMP by $5 million. Additional funds for the Coalition *will* ensure timely delivery of information. It is also important that the overall NCGMP be increased because strategies developed by the Coalition in the Great Lakes region to map thick glacial deposits in rapidly developing urban areas are applicable to many other states having metropolitan areas on coastlines or along the flood plains of rivers (which includes most U.S. major cities).

Thank you for your consideration.

Sincerely,

George V. Voinovich
United States Senator

Carl Levin
United States Senator

Mark Kirk
Member of Congress

John Dingell
Member of Congress

Louise M. Slaughter
Member of Congress

Vernon J. Ehlers
Member of Congress

Russell D. Feingold
United States Senator

Sherrod Brown
United States Senator

Debbie Stabenow
United States Senator

Richard Durbin
United States Senator

Sander Levin
Member of Congress

Eric Fana
Member of Congress

Brian Higgins
Member of Congress

Bart Stupak
Member of Congress

Mike Quigley
Member of Congress

John Conyers
Member of Congress

James Oberstar
Member of Congress

Bobby Rush
Member of Congress

Jesse Jackson, Jr.
Member of Congress

Janice Schakowsky
Member of Congress

Timothy Johnson
Member of Congress

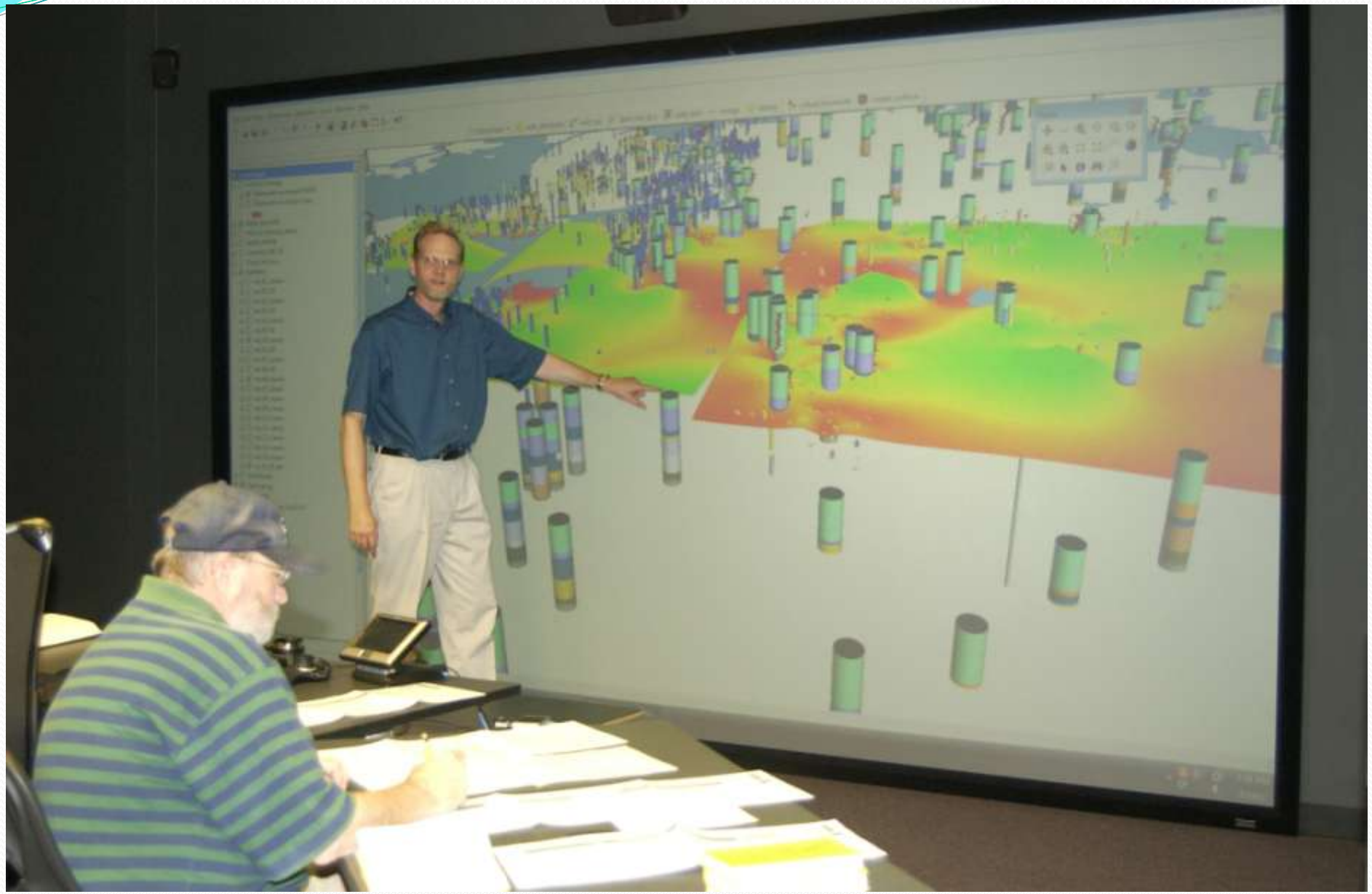
John M. Shimkus
Member of Congress

Current GLGMC 3D Mapping and Modeling Program

Lake County, Illinois

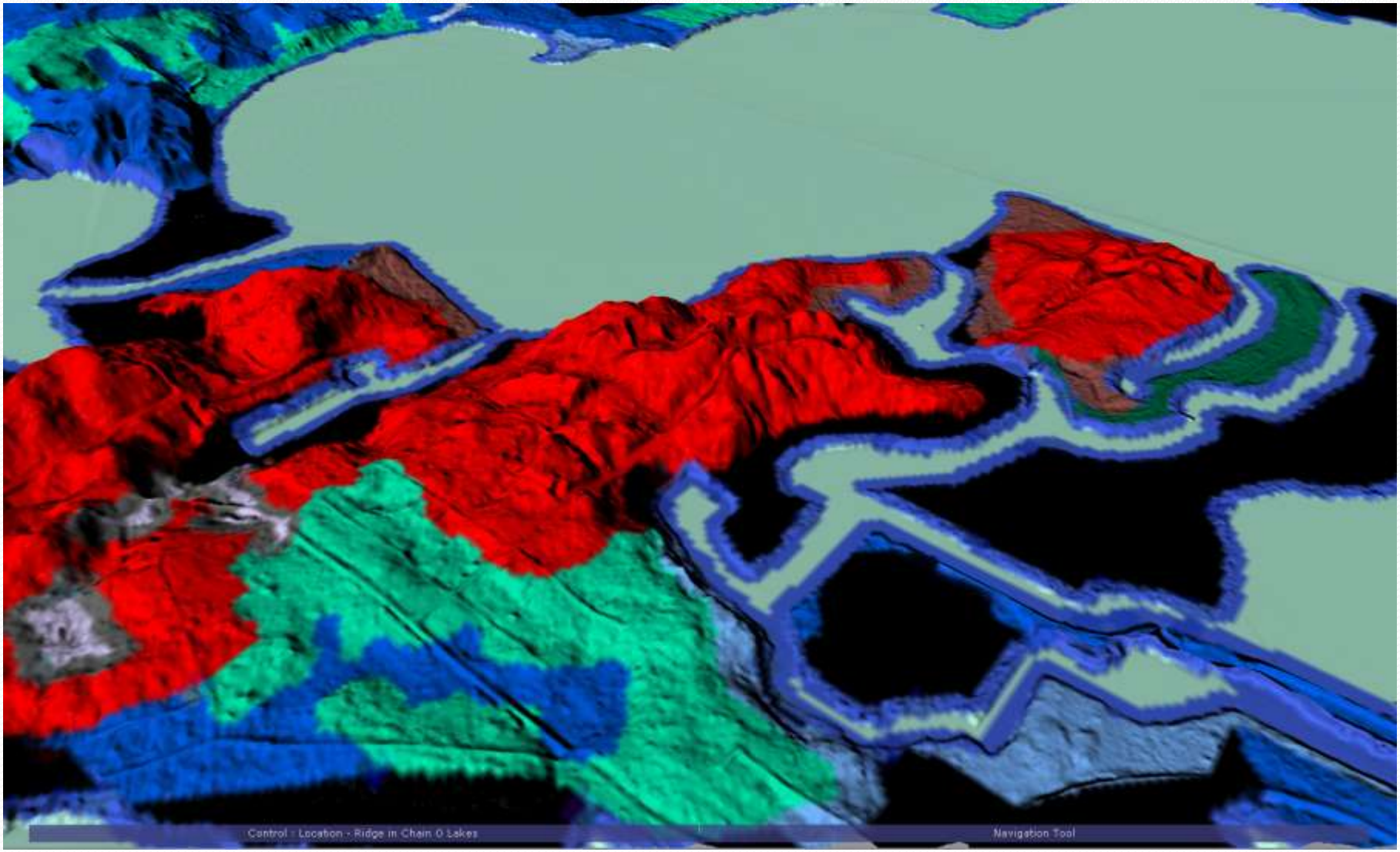
Illinois' GLGMC Priority Mapping Areas

ISGS Visualization Laboratory

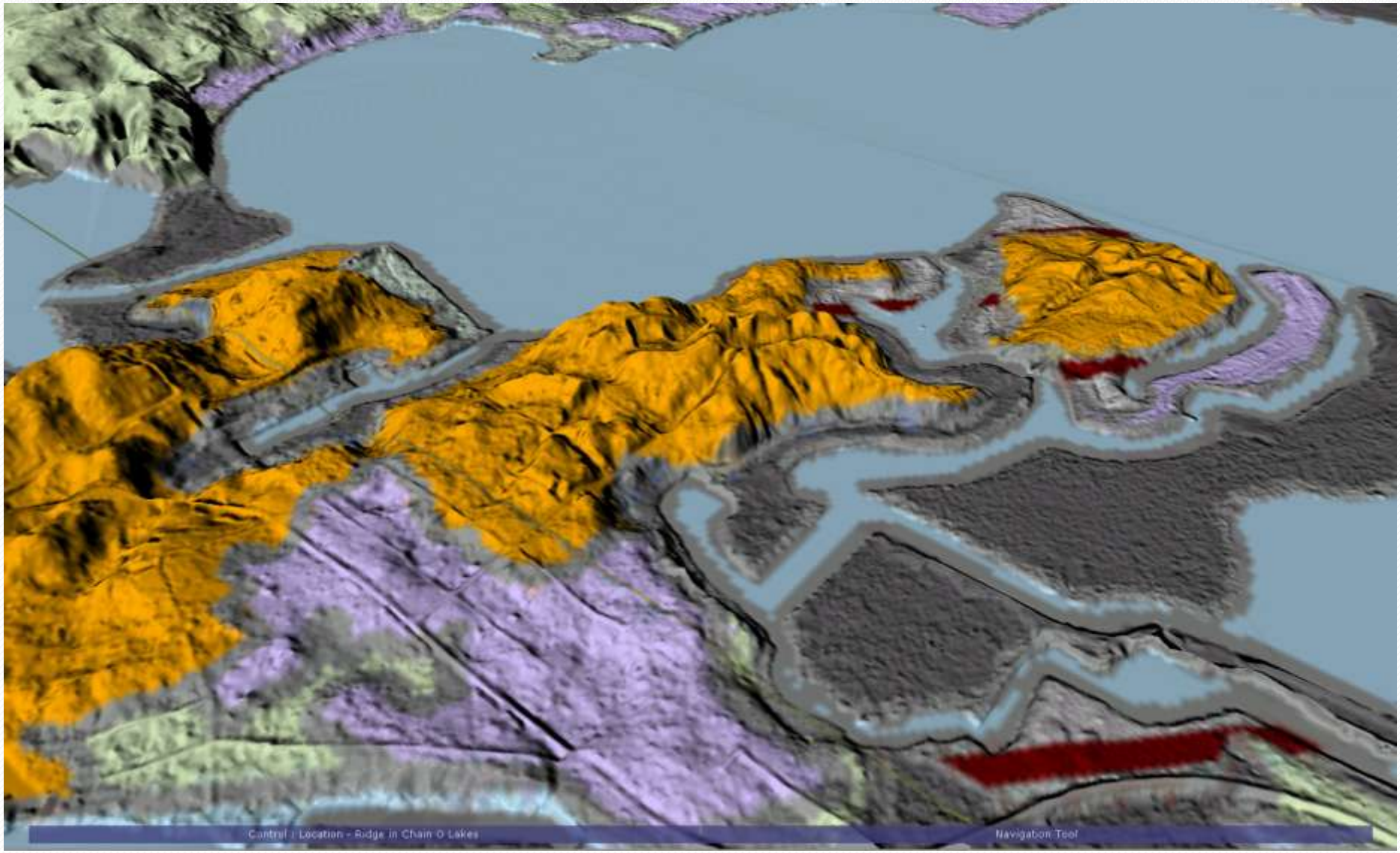


Historical Aerial Photography

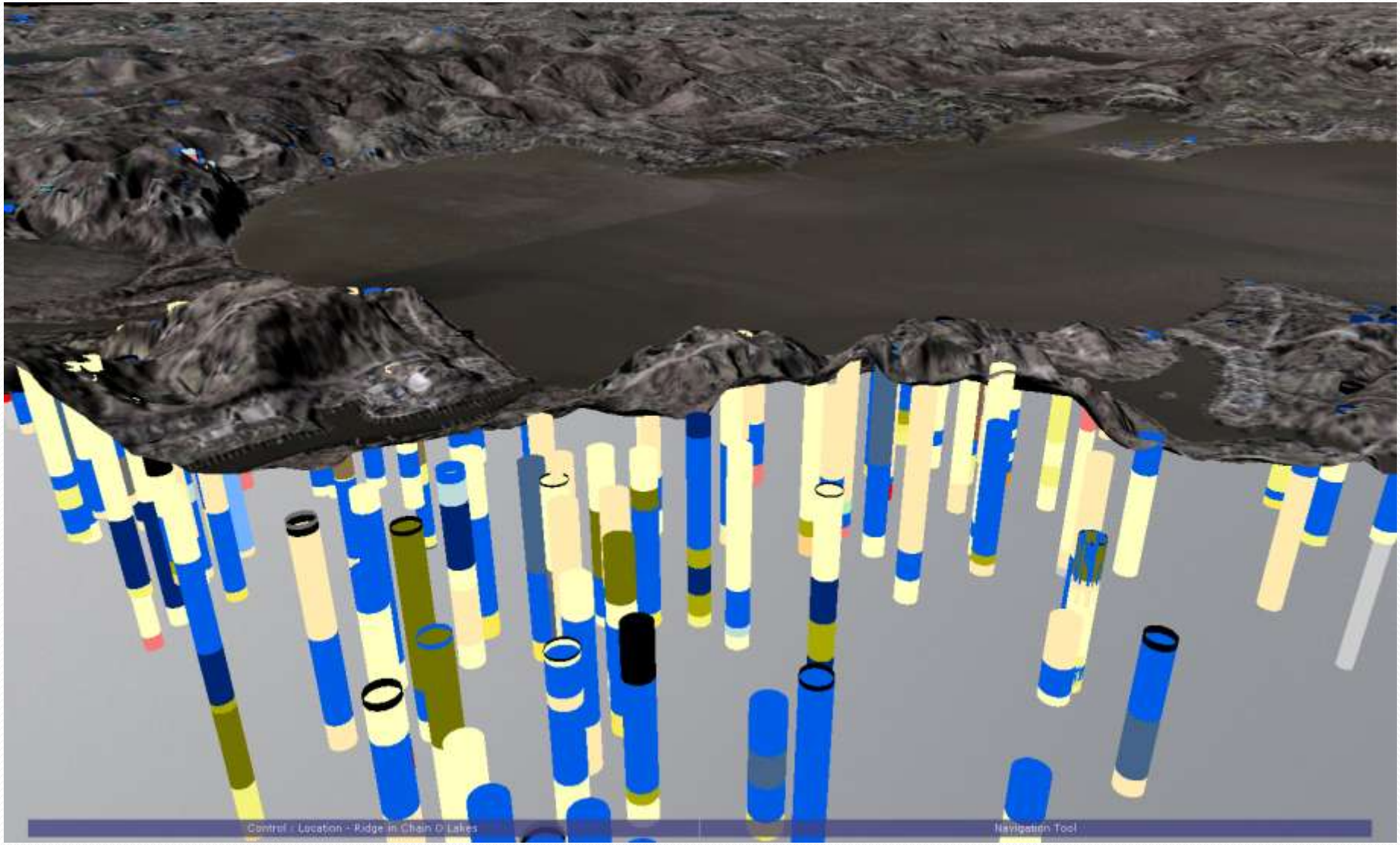
Fit Soil C-Horizons to Photography



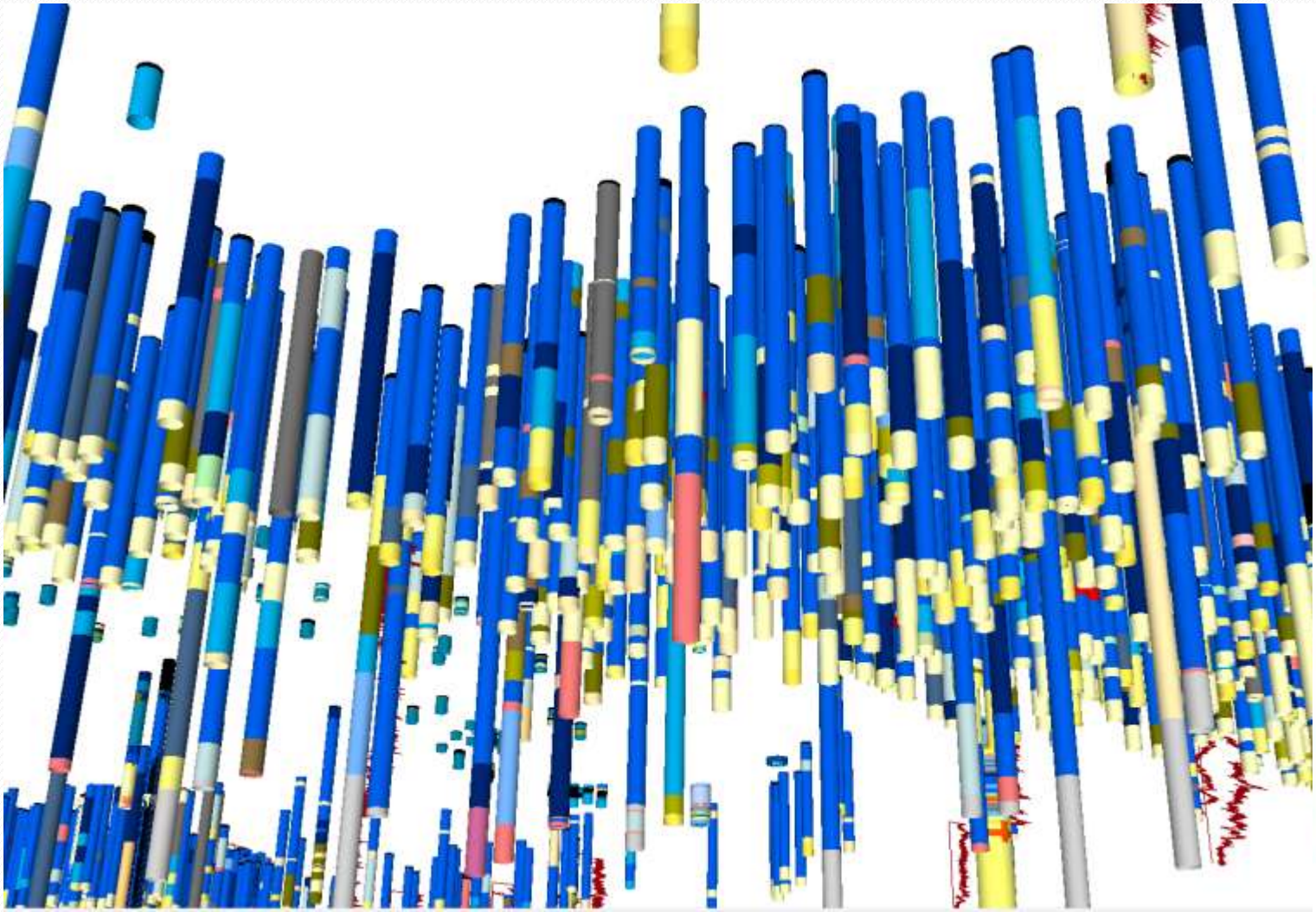
Fit Quaternary Geology to Photography



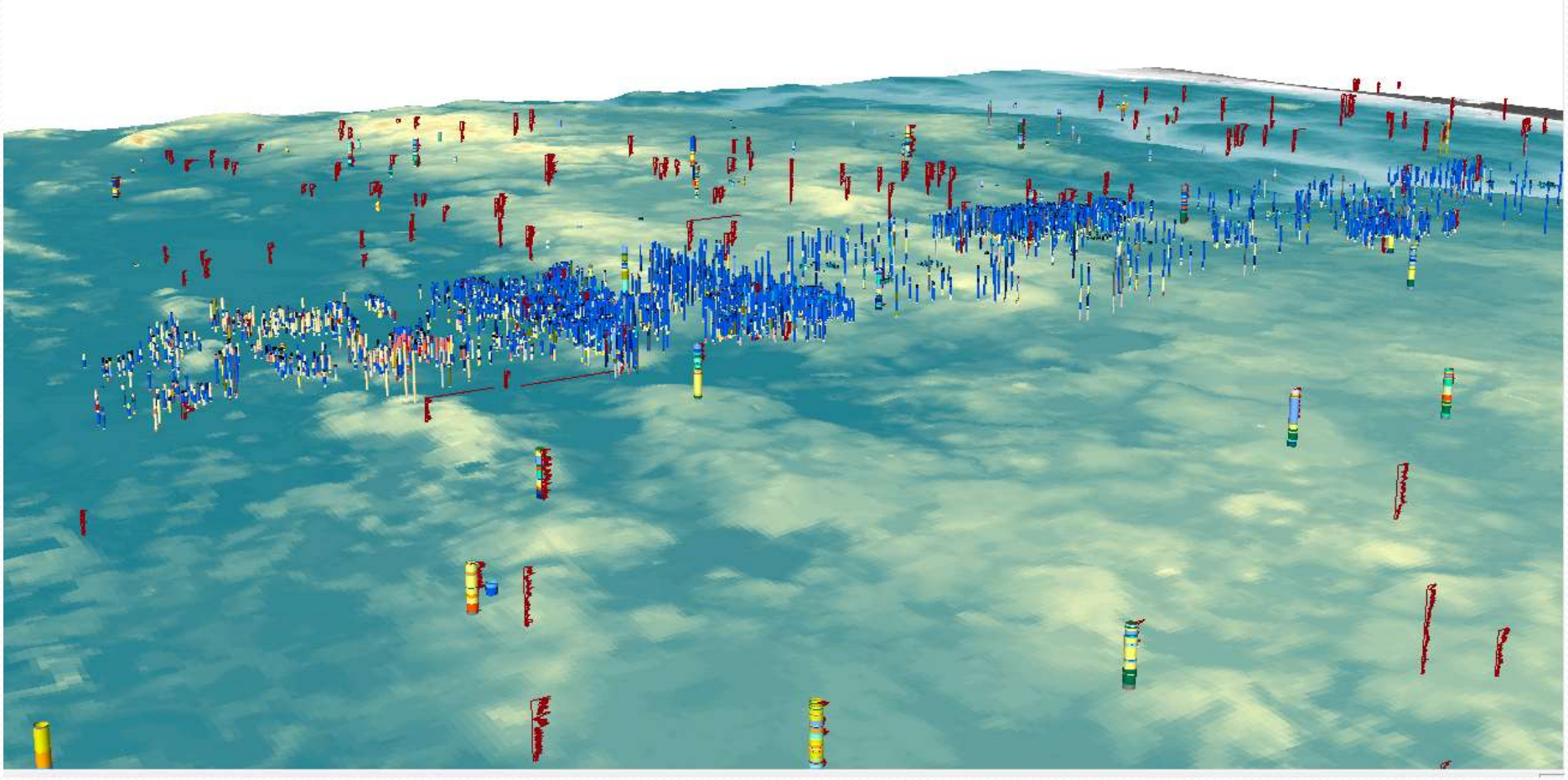
Add Subsurface Well Data



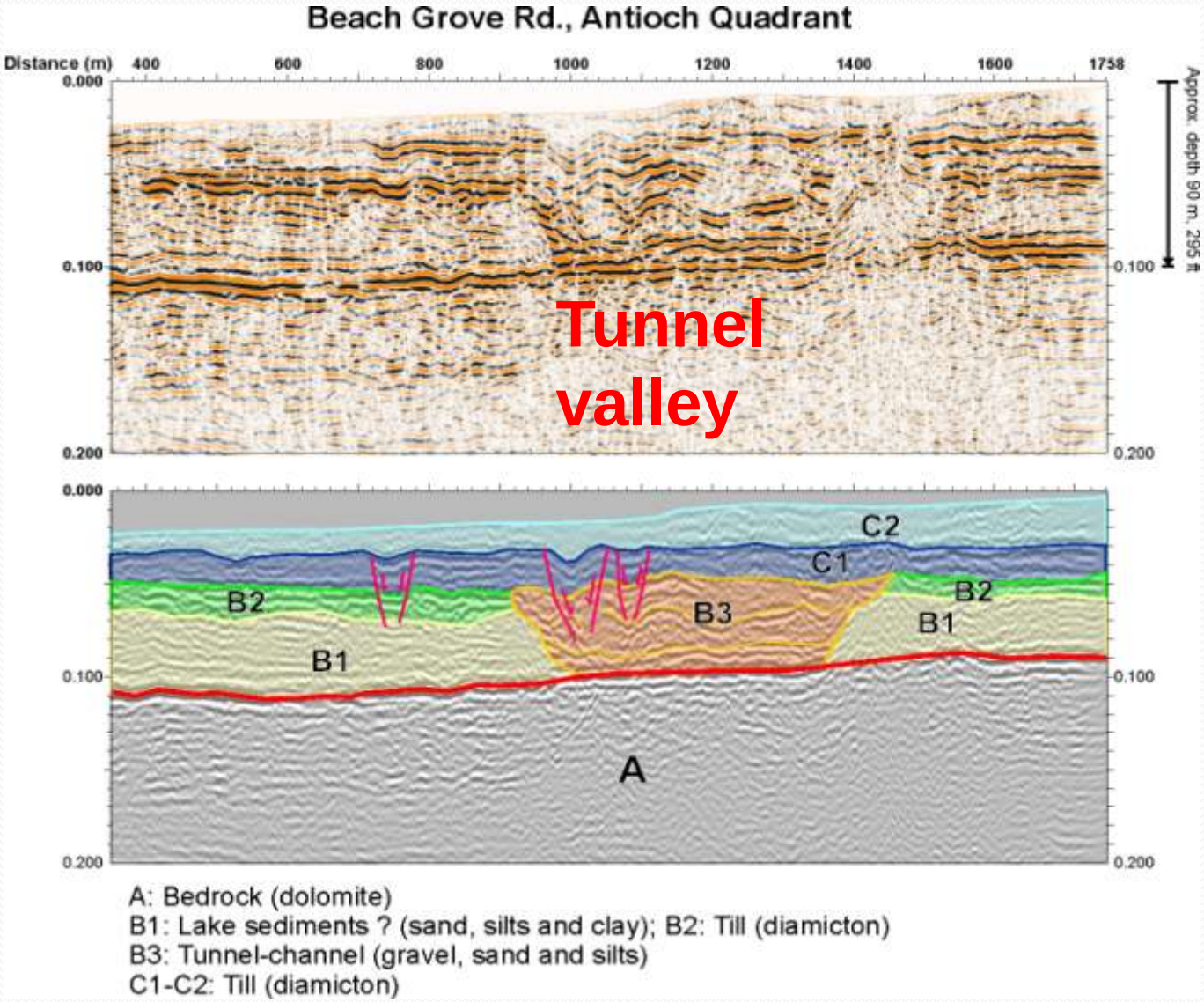
Classify Well Data According to Materials and Stratigraphy



Integrate Well Data with Downhole Geophysical Profiles

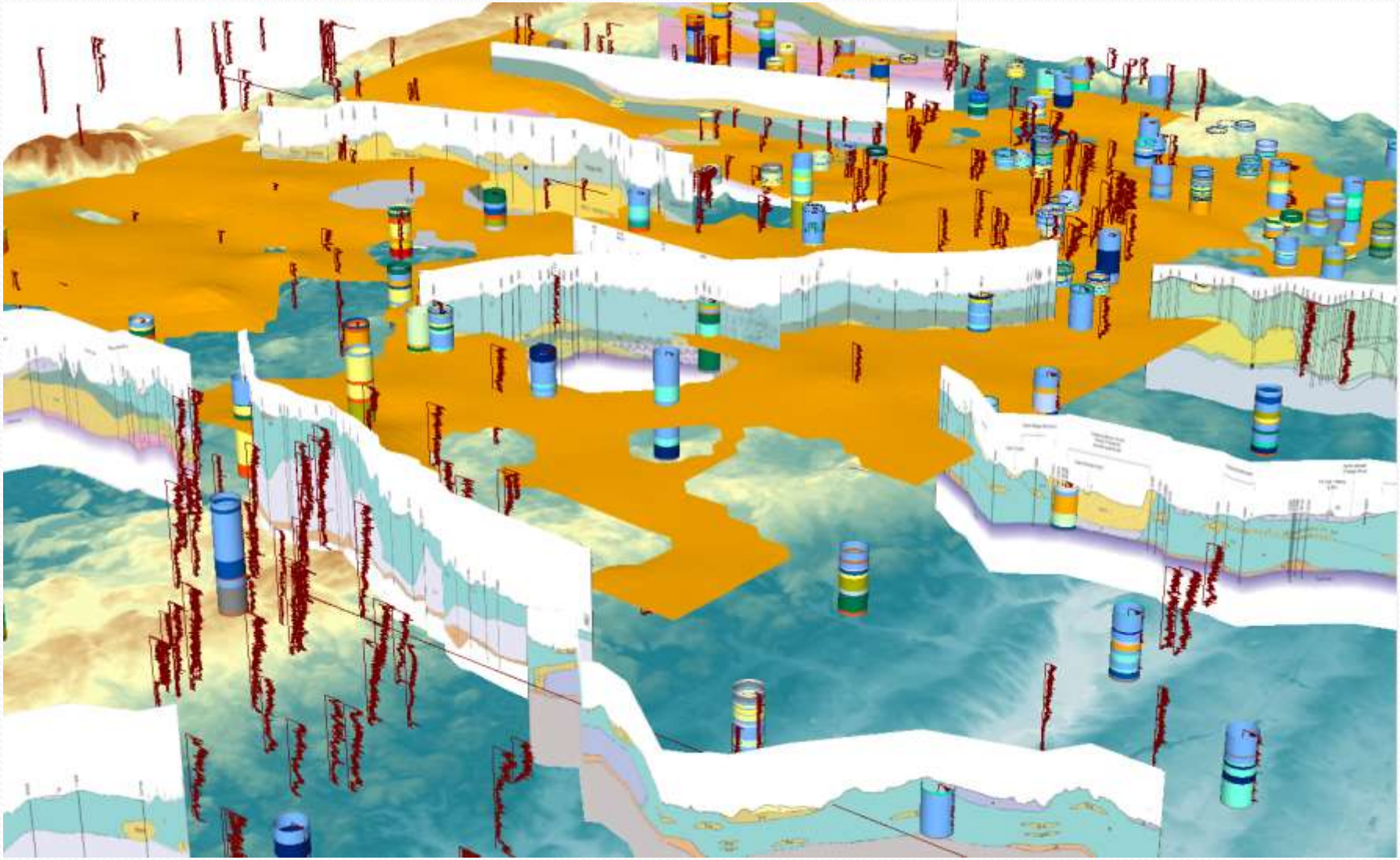


Integrate Seismic Profiles with Water Well Data and 3D Geologic Model

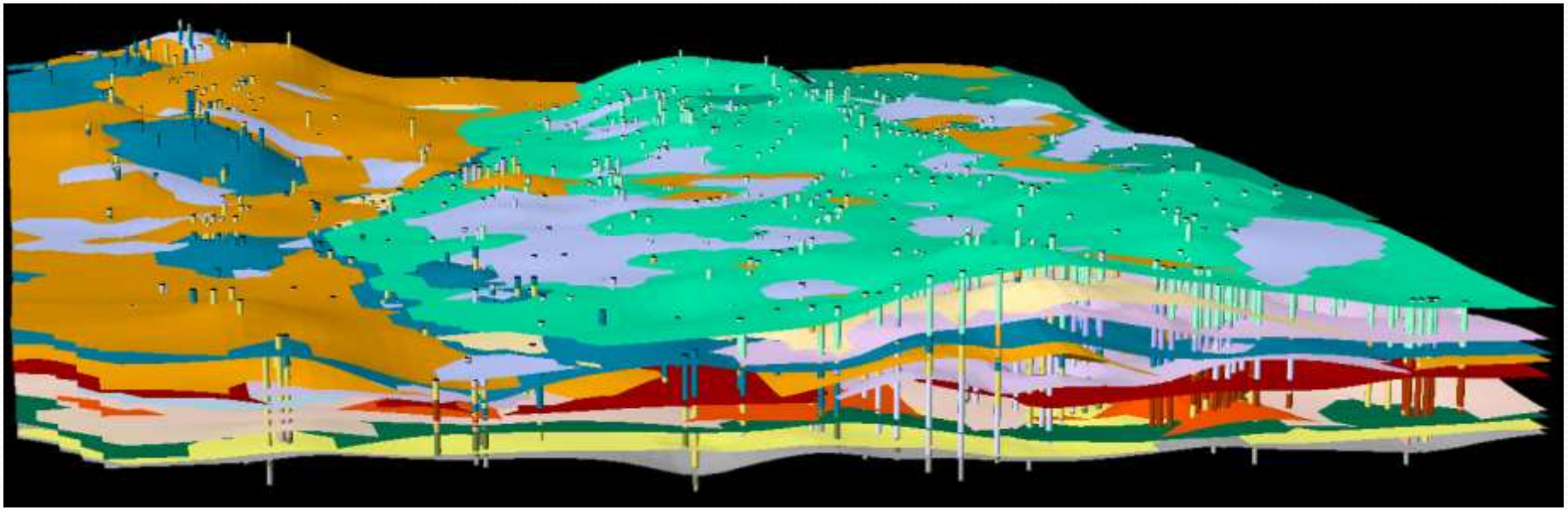


Contributed by A. Pugin

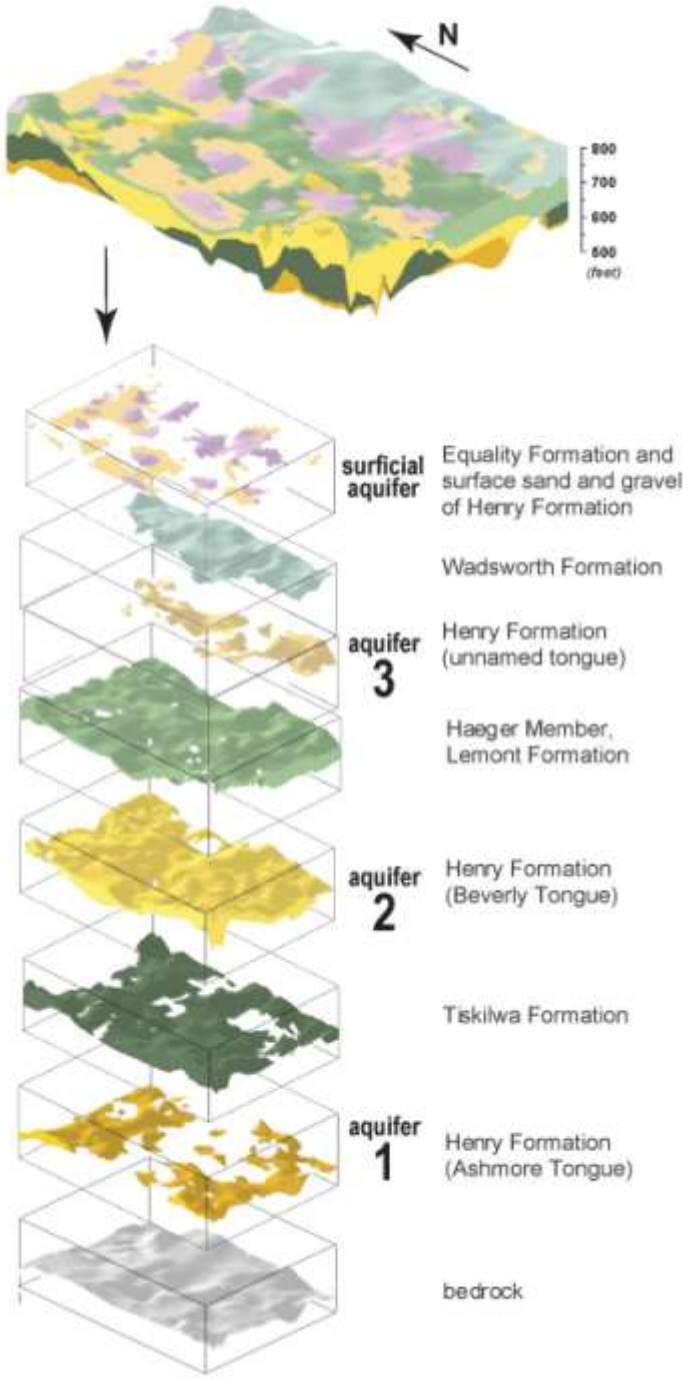
Create Layered Surfaces Using Cross-sections as Guides



Create Layered Surfaces of Quaternary Sediments and eventually a Solids Model



Solids & Pull-apart Model



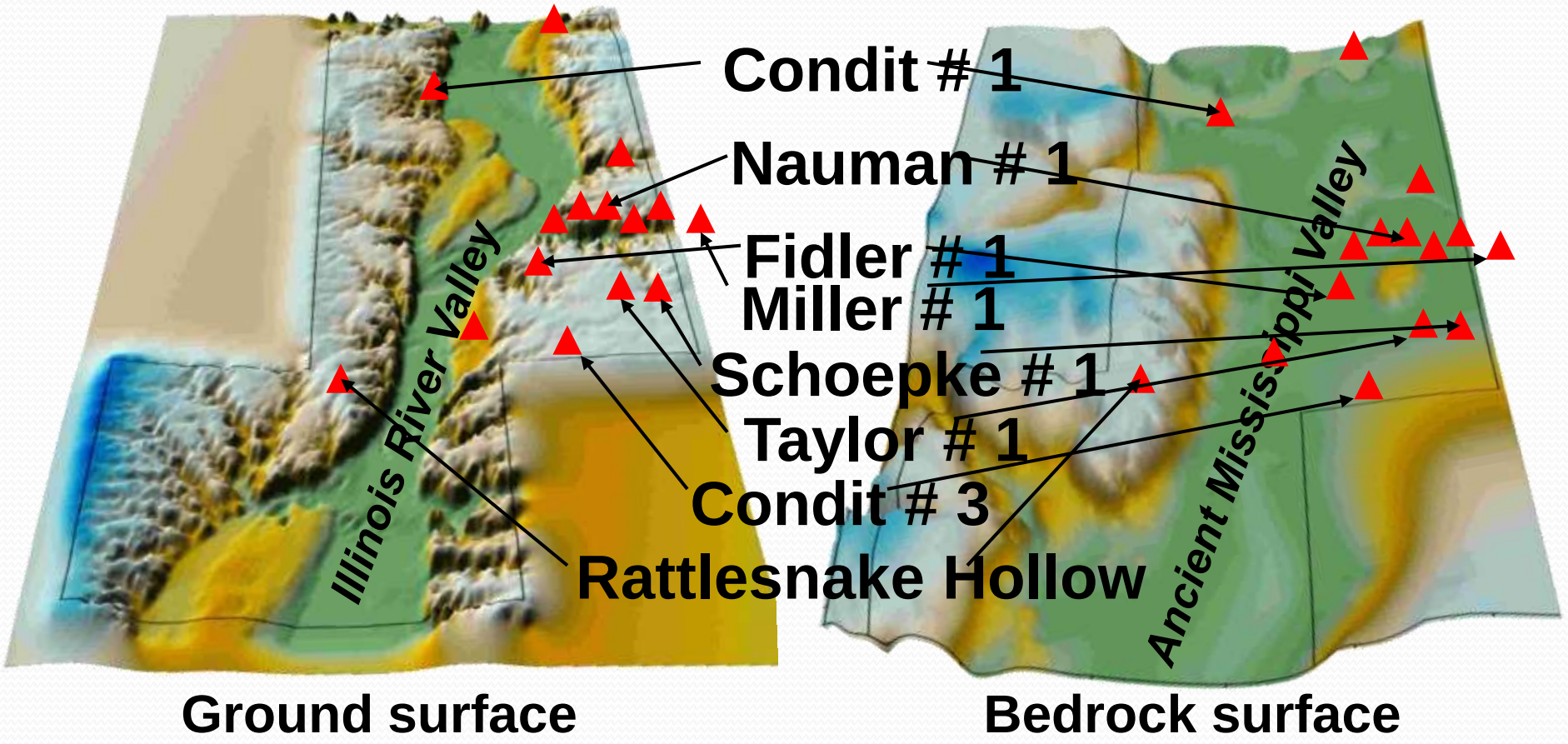
Coalition Priority Mapping Area: Middle Illinois River Valley

- Scientific Discoveries:
  - Sediments are not as old as we thought.
  - Ancient Mississippi River migrated over a 15-mile wide channel, and seemed to be located first on the eastern side of the bedrock valley and then migrated westward.
  - Residence time of Illinois Episode glacial ice in region was just over the last 20,000 years of the 55,000-year period.
  - Mississippi River diverted 24.8 ka.
  - There is a deep and very thick sand and gravel aquifer underlying a large portion of the region east of the present day valley.

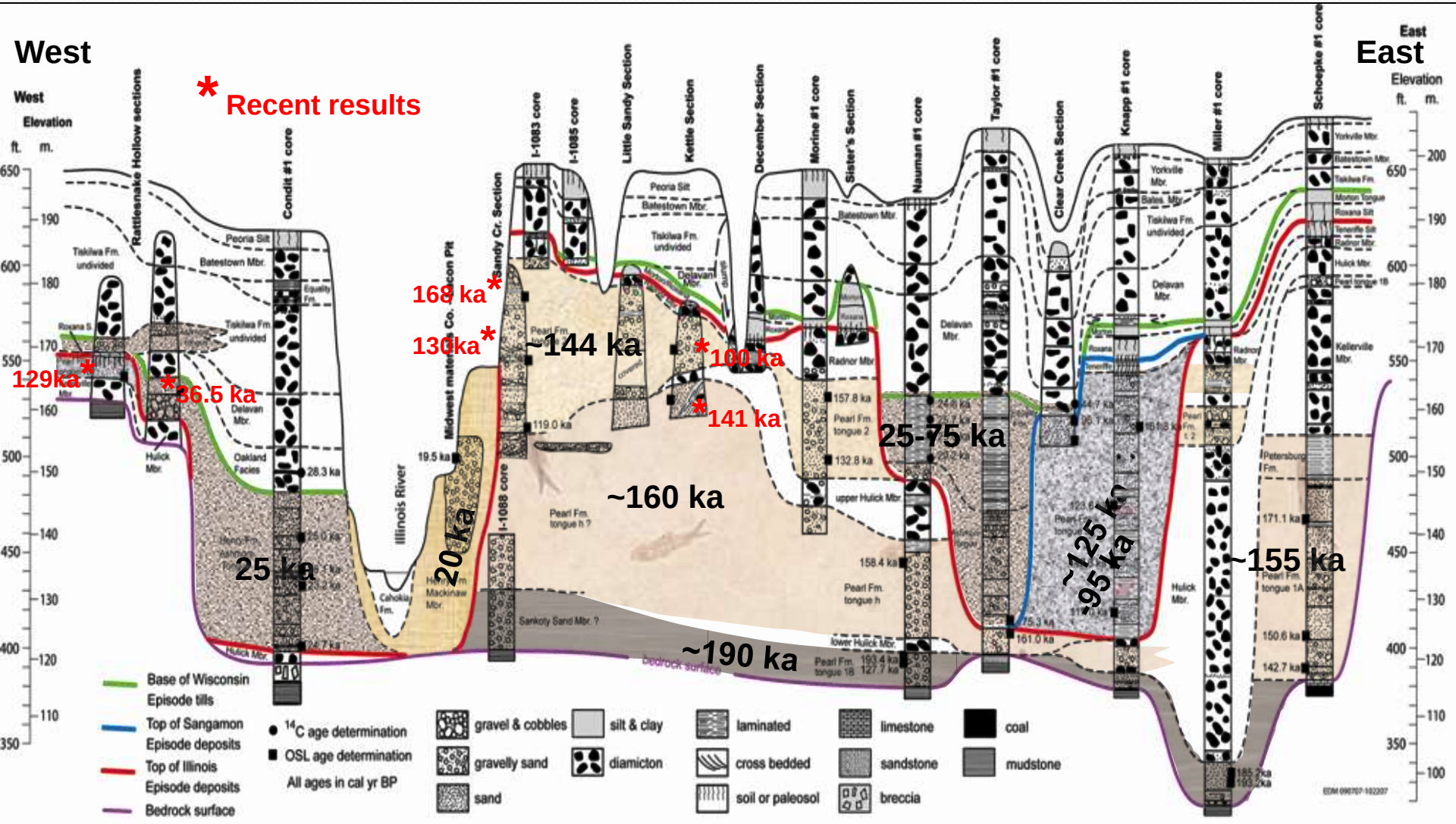
Sampling and Age Determinations

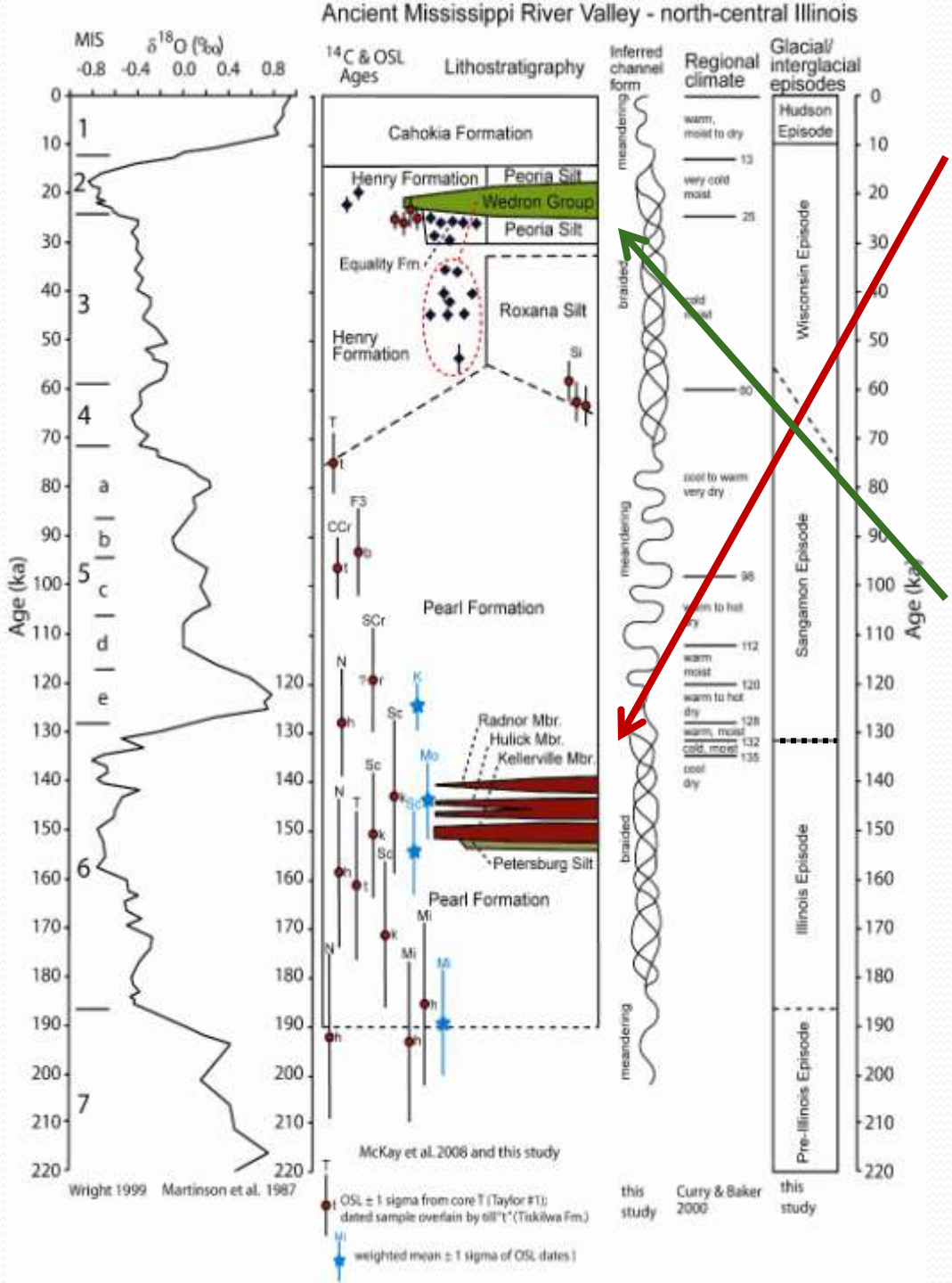
- 16 continuous cores
  - 52 to 330 ft deep (eight >200 ft)
  - 2980 ft of core
- 25 OSL ages (UNL)
  - 20 from 6 cores
  - 5 from 5 outcrops (7 more are planned)
- 20 ^{14}C ages (conventional and AMS; ISGS and other labs)
  - 7 from 2 cores
  - 13 from 4 outcrops

Borehole and Outcrop Locations



Sediment ages younger than expected - Correlations



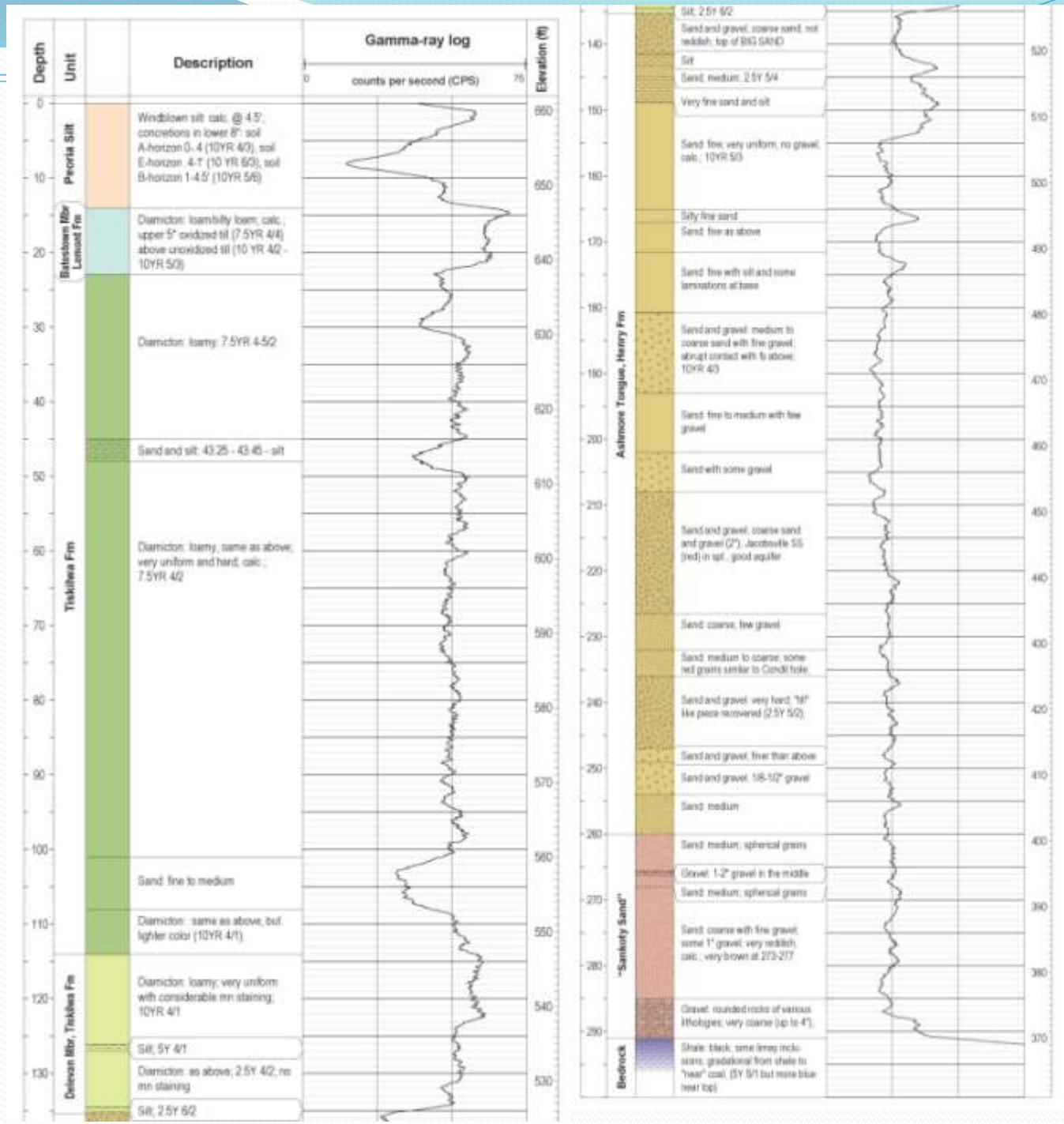


- Illinois Episode (180-125 YBP) ice was in central IL longer (~20 kyr) than Wisconsin Episode (75-12YBP) ice (~14 kyr).
- Glaciers in IL near end of Illinois & Wisconsin Episodes

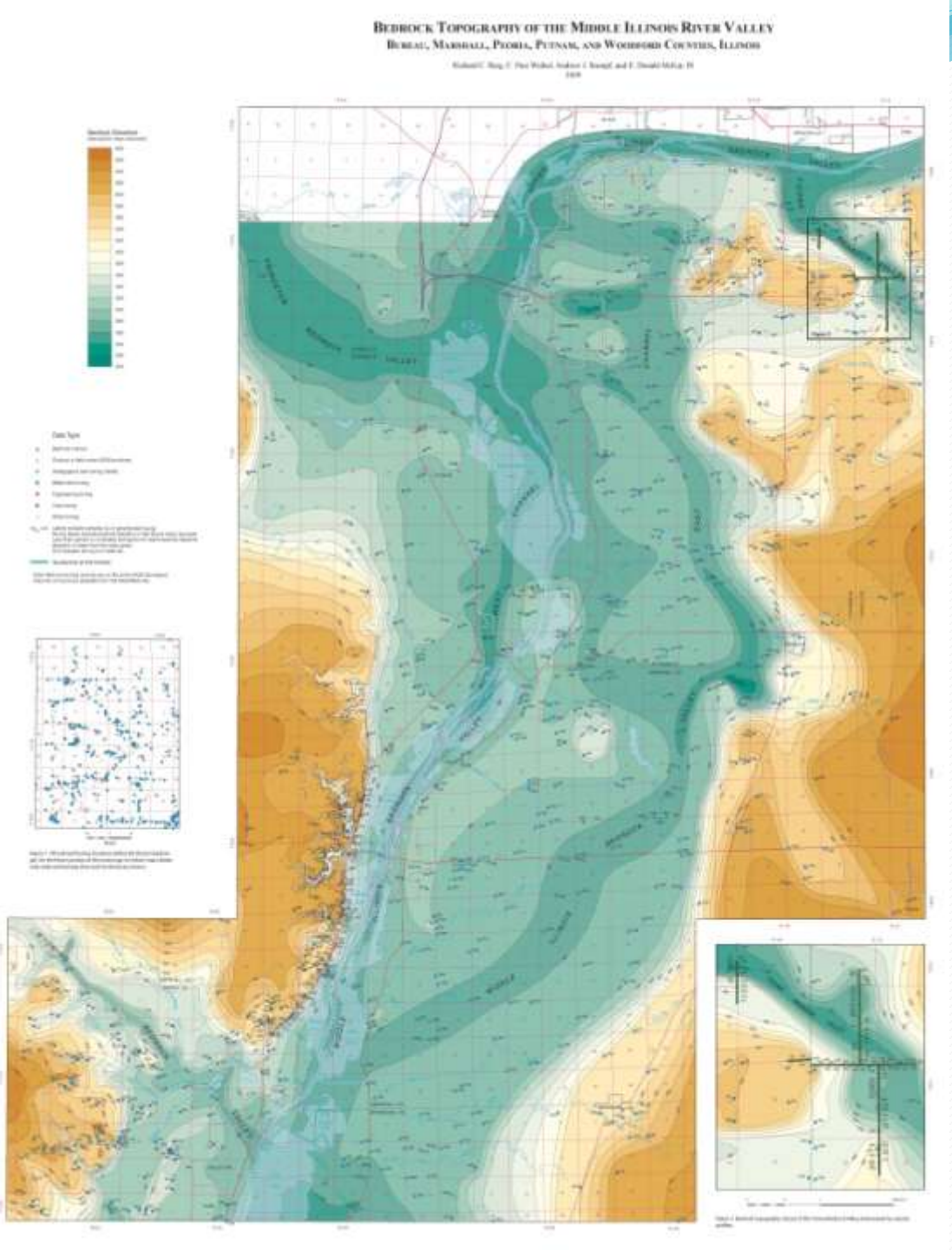
Thick sand & gravel aquifer underlies uplands

July 2011 - Fidler Core

East of Henry

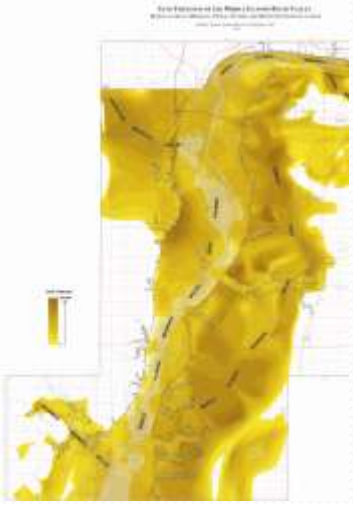


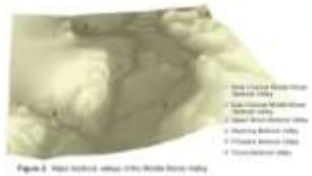
Bedrock Topography

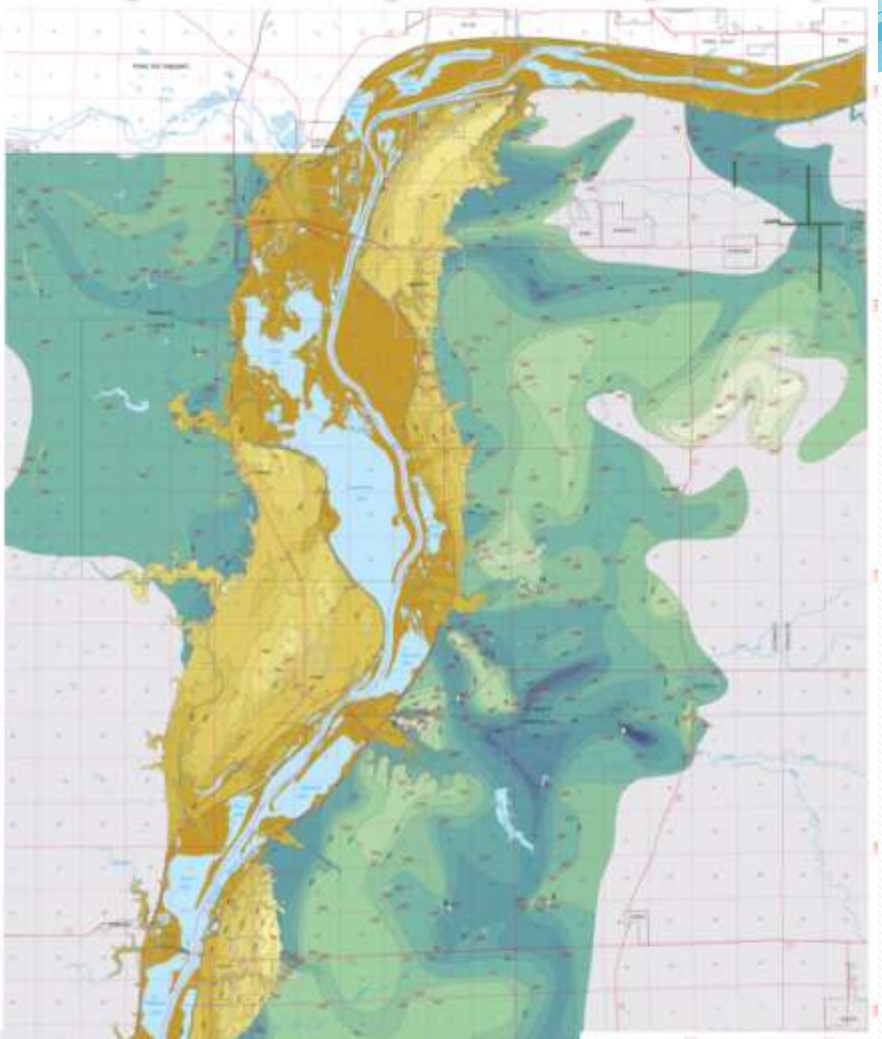


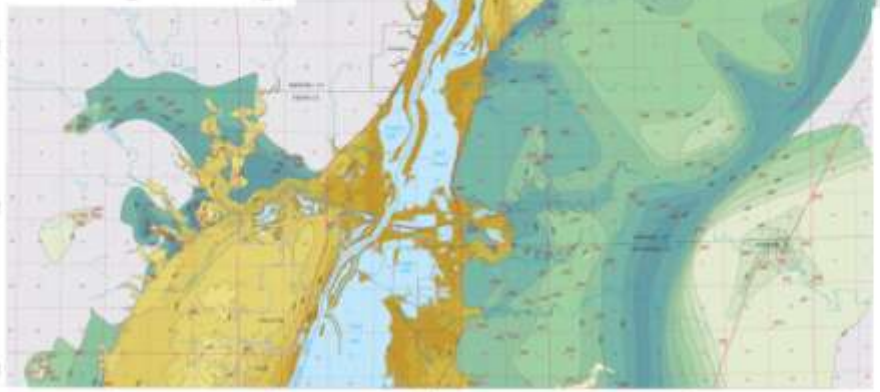
Elevation of the Top of the “Big Sand”

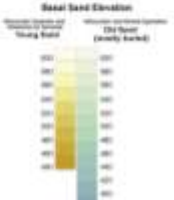
“Big Sand” Thickness



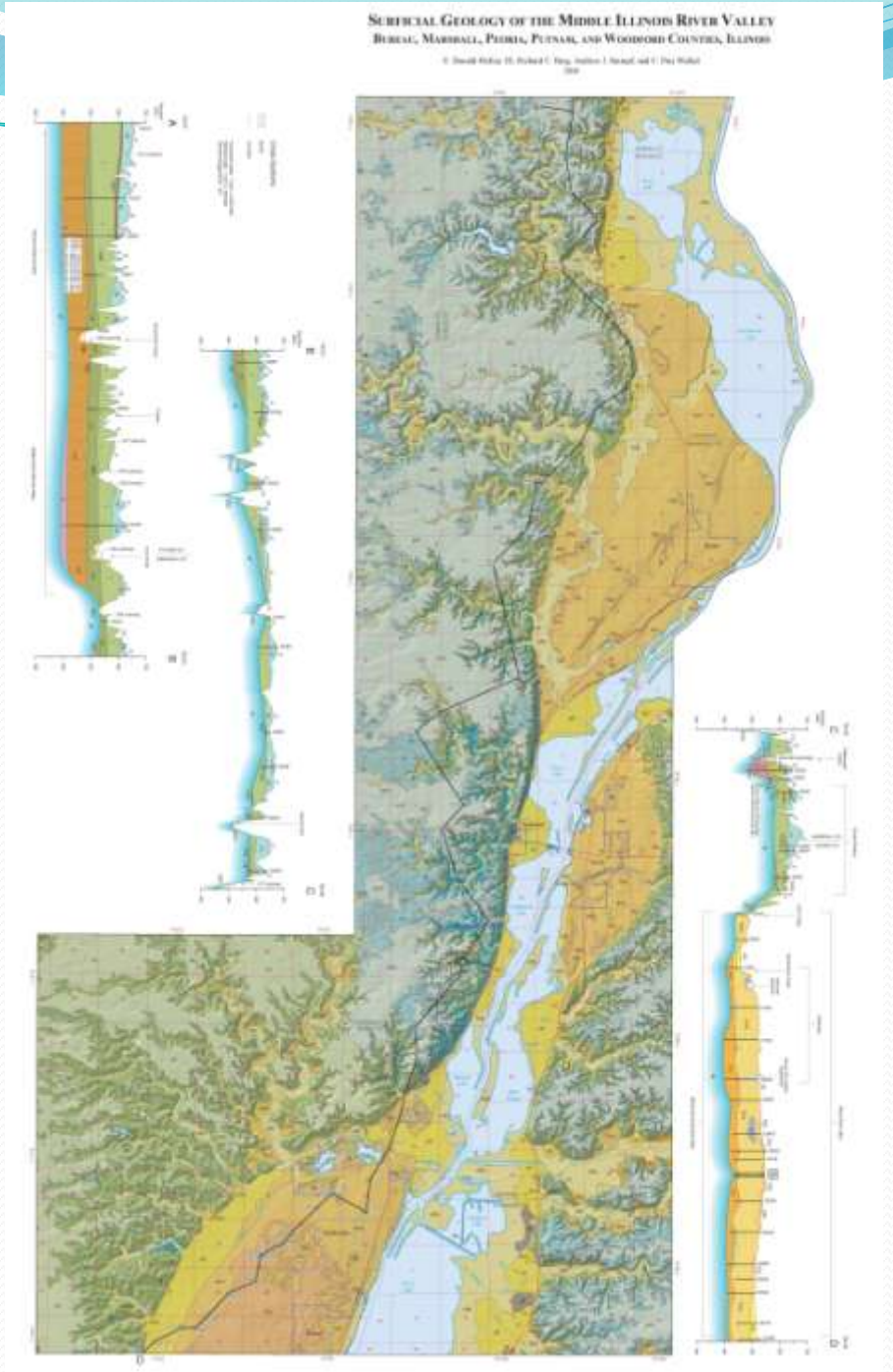








Surficial Geology




Great Lakes Geologic Mapping Coalition
“Rivers Initiative”

Derivative Maps and Applications

From 1999 Coalition 3D Geologic Mapping Implementation Plan

Ground-Water Considerations
- Aquifer Delineation
- Aquifer Sensitivity/Vulnerability
- Depth to Top of Aquifer
- Depth to Top of the Water Table
- Hydraulic Properties
- Potentiometric Surfaces
- Potential Ground-Water Yield
- Ground-Water Quality
- Recharge/Discharge
- Ground-Water/Surface-Water Interactions
- Artesian Conditions
- Sand Lenses and Fractures

Engineering Considerations and Hazard Assessment
- Soil Amplification of Seismic Energy
- Soil Period (Resonance) for Seismic Waves
- Liquefaction Potential
- Landslide Potential
- Subsidence Events and History
- Erosion History and Potential
- Flooding Susceptibility
- Compressible Soils
- Poorly Drained Soils
- Load-Bearing Capacity
- Flood Erosion and Sedimentation
- Flood-Plain Risk Zones
- Karst Features and Collapse Potential

Facility Siting and Planning
- Waste-Disposal Planning
- Industrial, Commercial, Residential, and Infrastructure Siting/Planning

Geochemical Considerations
- Radon Potential
- Baseline Ground-Water Geochemistry
- Baseline Geologic Material Geochemistry

Wetlands
- Wetland Delineation
- Hydric Soils
- Wetland History and Location
- Wetland Hydrogeology

Mineral Resources
- Sand and Gravel
- Shallow Bedrock
- Drift Gas
- Peat
- Overburden Thickness and Character

Habitats
- Habitat Alterations
- Ecosystem Delineation, Reconstruction, and Maintenance
- Biodiversity Potential

Economic Assessments
- Property Values/Insurance Estimates
- Risk Assessments
- Benefit:Cost Studies

NOTE – >15 of 46 map applications directly related to rivers and surface water.

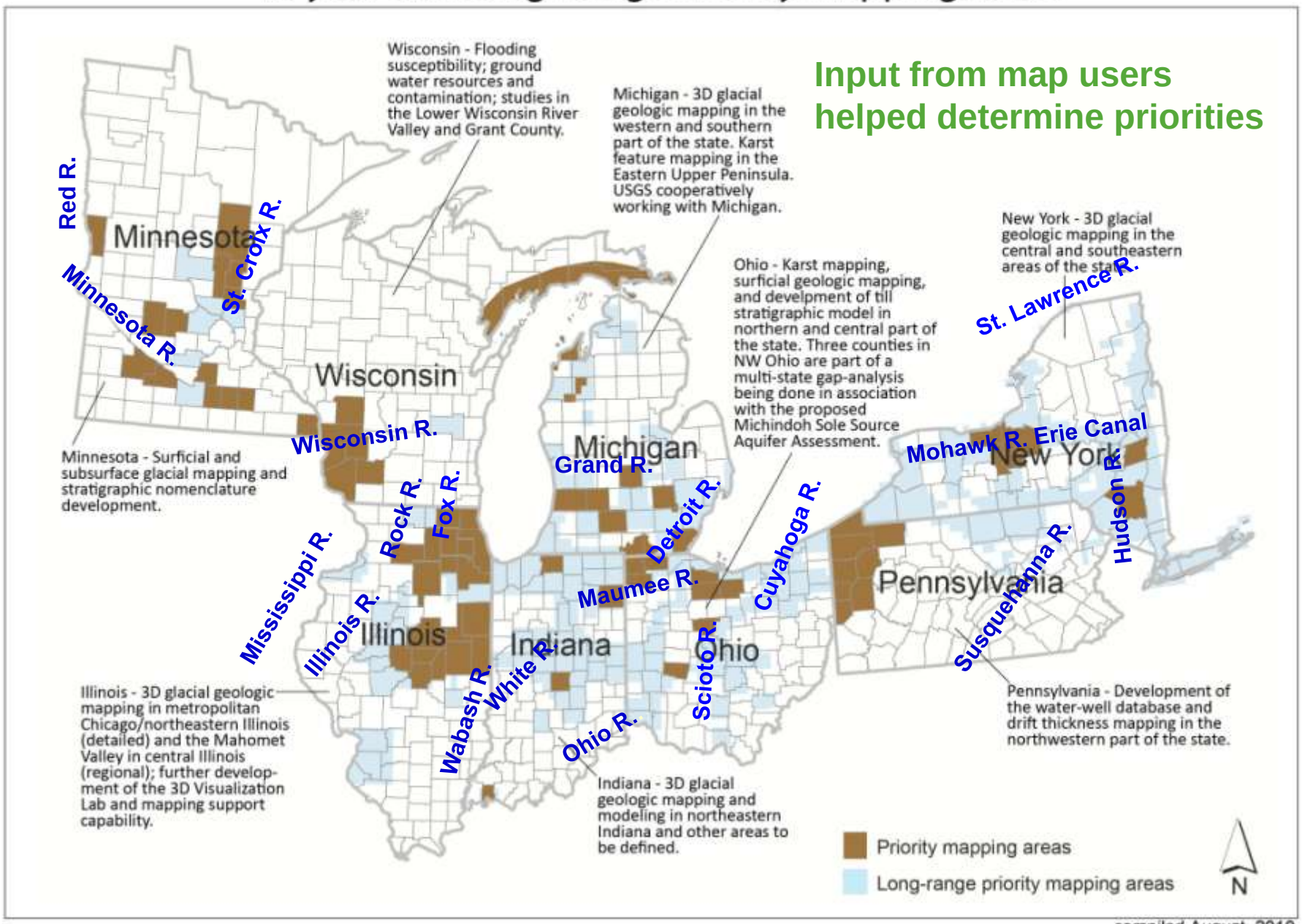
Maps Required for User Applications

● Primary application
❍ Secondary application

Map Products / Applications	Ground-water supply	Aquifer contamination potential	Transport of agricultural chemicals	Aquifer recharge areas	GW-SW interaction	Well-head protection	Ground-water quality	Ground-water flow model	Ground-water transport model	Facilities siting	Construction siting	Industrial minerals sources	Habitat alteration	Flood hazards	Landslide hazards	Coastal erosion hazards	Radon hazards
Basic Map Products:																	
Surface geologic materials	❍	●	●	●	●	●	❍	❍		●	●	●	❍	●	❍	❍	❍
Subcrops and isopachs	●	●	●	❍	❍	❍	❍	●	●	●	❍	●			●	●	❍
3-D geologic maps	●	●	●	●	●	❍	●	●	●	●	●	●		❍	●	●	●
Bedrock topography	●	❍	❍	❍	❍	❍		●	●	❍	●	❍	❍			❍	
Geochemistry of surficial materials	❍	●	●				●		●	❍	❍	❍	❍				●
Hydrogeologic characterization	●	●	●	●	●	●	●	●	●	●	❍		❍		❍	❍	
Ground-water table	❍	●	●	●	●	❍	❍	●	❍	●	●	❍	●		❍	❍	
Ancillary Map Information from Secondary Sources:																	
Topography, digital orthophoto maps	❍	❍	❍	●	●	❍	❍	❍	❍	●	●	❍	❍	●	●	●	❍
Soils		❍	❍	●	●	❍	❍	❍	❍	❍	●		●	●	❍		❍
Drainage basin	❍	❍	❍	❍	❍		❍	❍		❍				●			
Point sources of contamination	●	●	●	●	❍	●	●		●	●	●		❍	❍			
Land use (current and historical)	❍	●		●	❍	●	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	
Infrastructure and demography	●	●		❍	❍	❍	●	❍	●	●	❍	❍	●	●	●	●	●

NOTE – 4 of 17 maps required for user application directly related to rivers and surface water.

Great Lakes Geologic Mapping Coalition
10-year and Long-Range Priority Mapping Areas

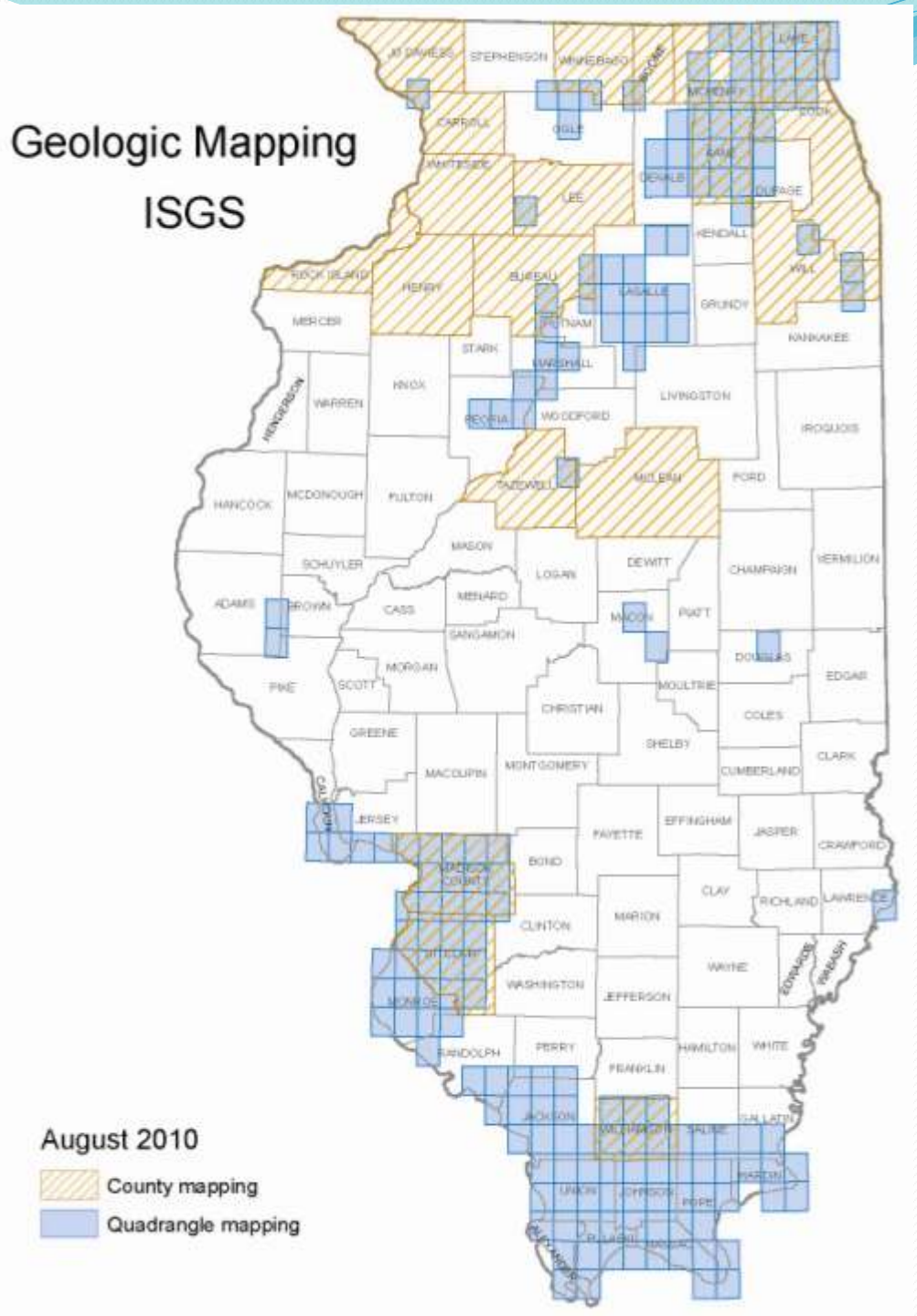


compiled August, 2010

ISGS Status of Geologic Mapping

- **Illinois River only partially completed**

Illinois' GLGMC Priority Mapping Areas



Thoughts on Adding a GLGMC River Component

- **Indiana** - I like the idea for several reasons.
  - Its important for the Coalition to grow scientifically. This represents a very important research direction so why not grow in this direction. Societal applications are huge. Theoretical linkages between glacial geology and fluvial geology are also huge. It would stimulate thinking within our close-knit group.
  - It should help the Coalition politically because we collectively can't help but be involved in a wider cross-section of environmental issues.
  - It should help us logistically because it represents more collective resources.
  - The current Coalition is mature enough to handle such an expansion. Lastly, it represents, potentially, a way to grow the funding and we're desperate for this.

- **Ohio** - I think having a group to promote the geology of rivers (and /or lakes) would be a great idea given how so much of the science is now emphasizing biology/biodiversity/habitat, etc. Granted, these are all important-however, the framework geology and its relative importance are at some point going to be lost on future generations.

- **New York** -This theme of Big rivers works here in NY as well, the Mohawk, Hudson and Susquehanna are all big players. Right now I do not have a dog in this fight but most of our projects have some external connection. Typical inputs for our STATEMAP proposals are Landslides, in Lake Clays, flood hazards etc.

- **Wisconsin** - Being the person in the Coalition who's probably most directly tied to working with river systems, I'm all in favor of the idea. I'm a big advocate of the "glacial and pro-glacial (and periglacial)" aspect of the Coalition's charter, and the work that I do with Coalition funds reflects that. I'm coming more and more to believe that pro-glacial systems will be the emerging field for providing an absolute chronology of glacial events in the Midwest, and I think it would be great to have people involved in fluvial research have a venue for seeing how their research overlaps with the Coalition work.

Past Yields Clues to the Present
Present is the Key to the Past

GLGMC can help with:

- In Illinois - understanding of the AMR
- For everyone - lots of infrastructure

GLGMC needs help with:

- Sedimentological aspects of river deposits
  - Old vs. new
  - Visible vs. buried
  - Identification of bed forms
- Occurrence and age of wetlands
- Fluvial hydraulics
  - Meander formation
  - River changes associated with erosion and deposition
  - Currents, flows, and flooding

What else? DISCUSSION