INDIANA GEOLOGICAL SURVEY

CENTER FOR GEOSPATIAL DATA ANALYSIS
INDIANA UNIVERSITY

Introduction to the Indiana Water Balance Network – a new NGWMN data provider

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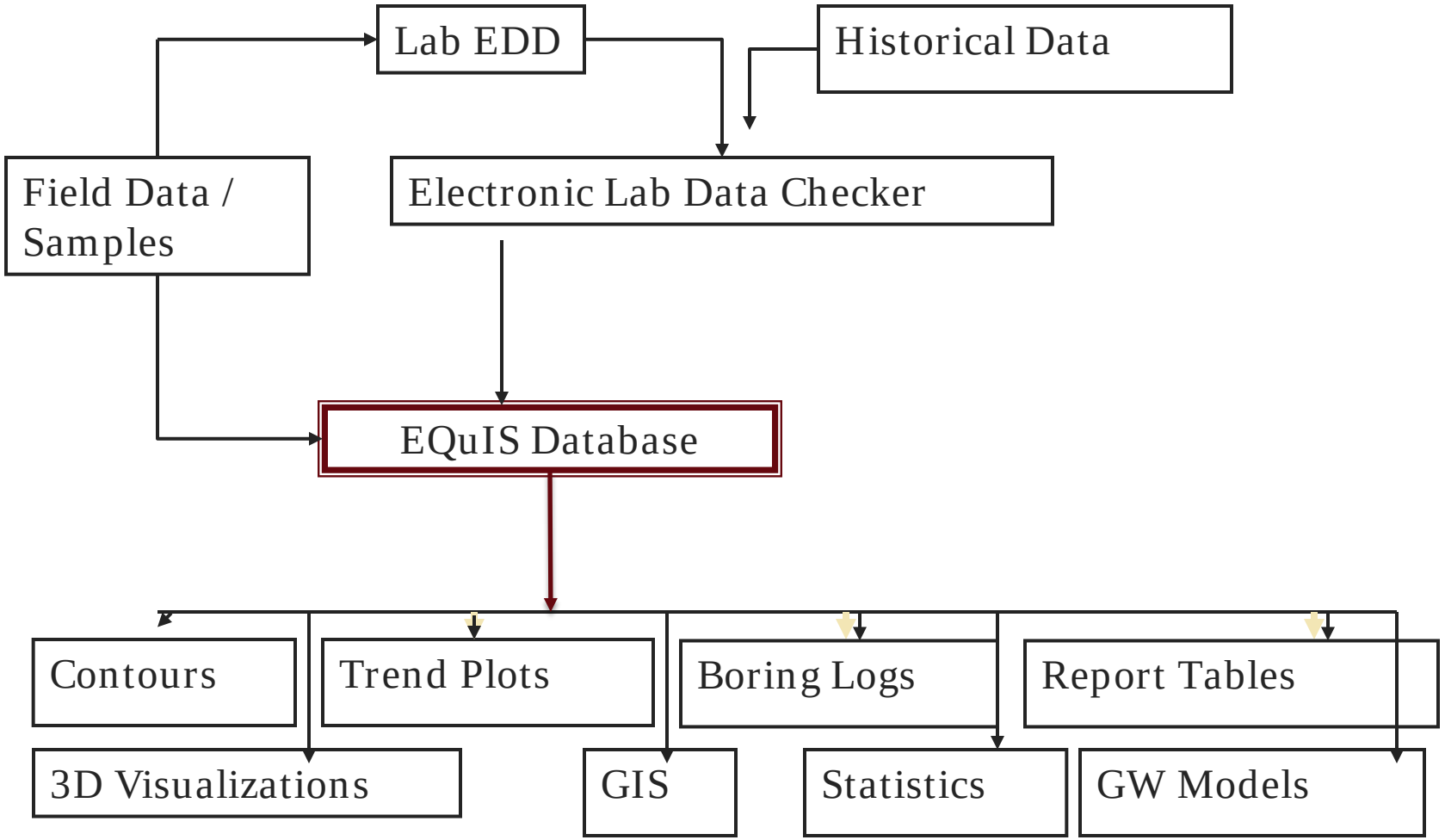
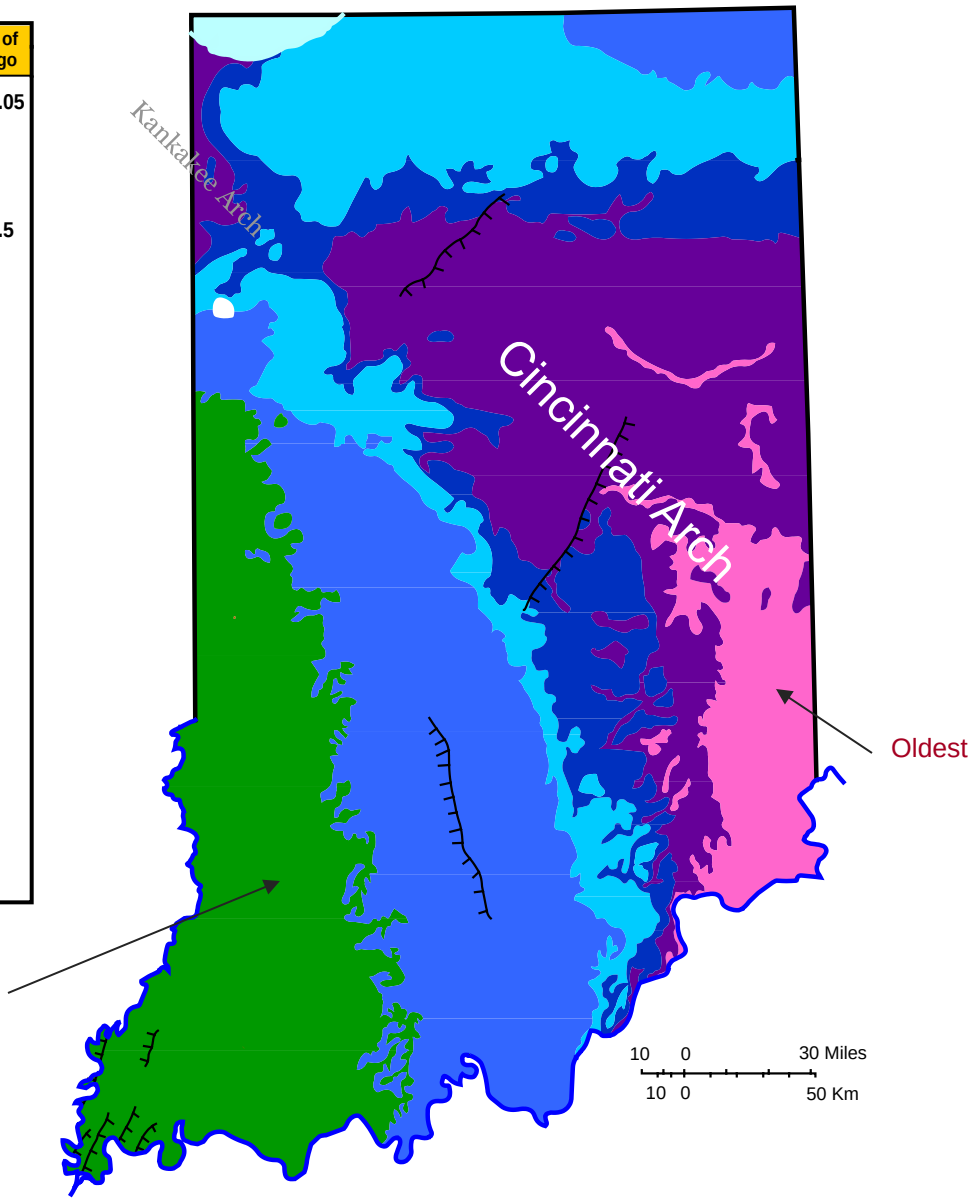
My data management background - EQuIS



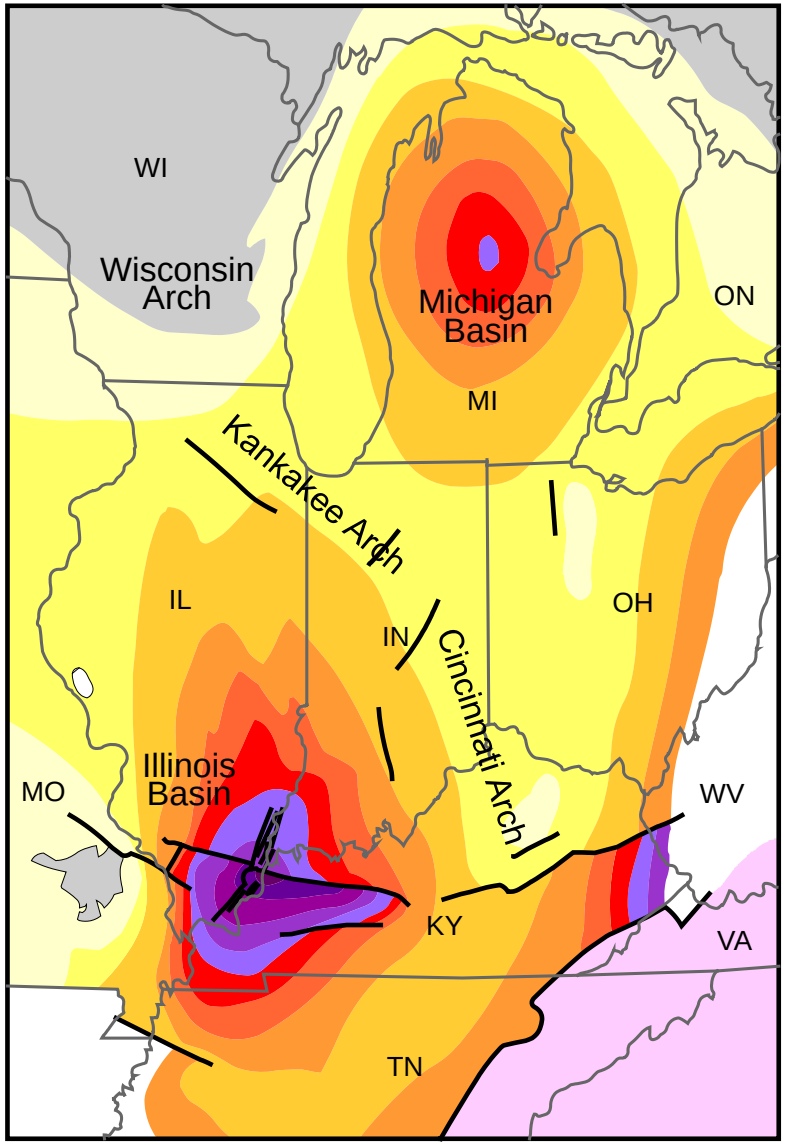
BEDROCK GEOLOGY

EON	ERA	PERIOD	Millions of Years Ago
PHANEROZOIC	CENOZOIC	QUATERNARY	1.75± 0.05
		TERTIARY ***	65 ± 0.5
	MESOZOIC	CRETACEOUS **	135 ± 5
		JURASSIC **	203 ± 3
		TRIASSIC **	250 ± 3
	PALEOZOIC	PERMIAN **	295 ± 5
		PENNSYLVANIAN	325
		MISSISSIPPIAN	355 ± 5
		DEVONIAN	410 ± 8
		SILURIAN	435 ± 6
		ORDOVICIAN	500
		CAMBRIAN *	540 ± 5
PROTEROZOIC	PRECAMBRIAN *		
ARCHEAN			4,600

* Not exposed at the surface ** Not present *** Scattered deposits



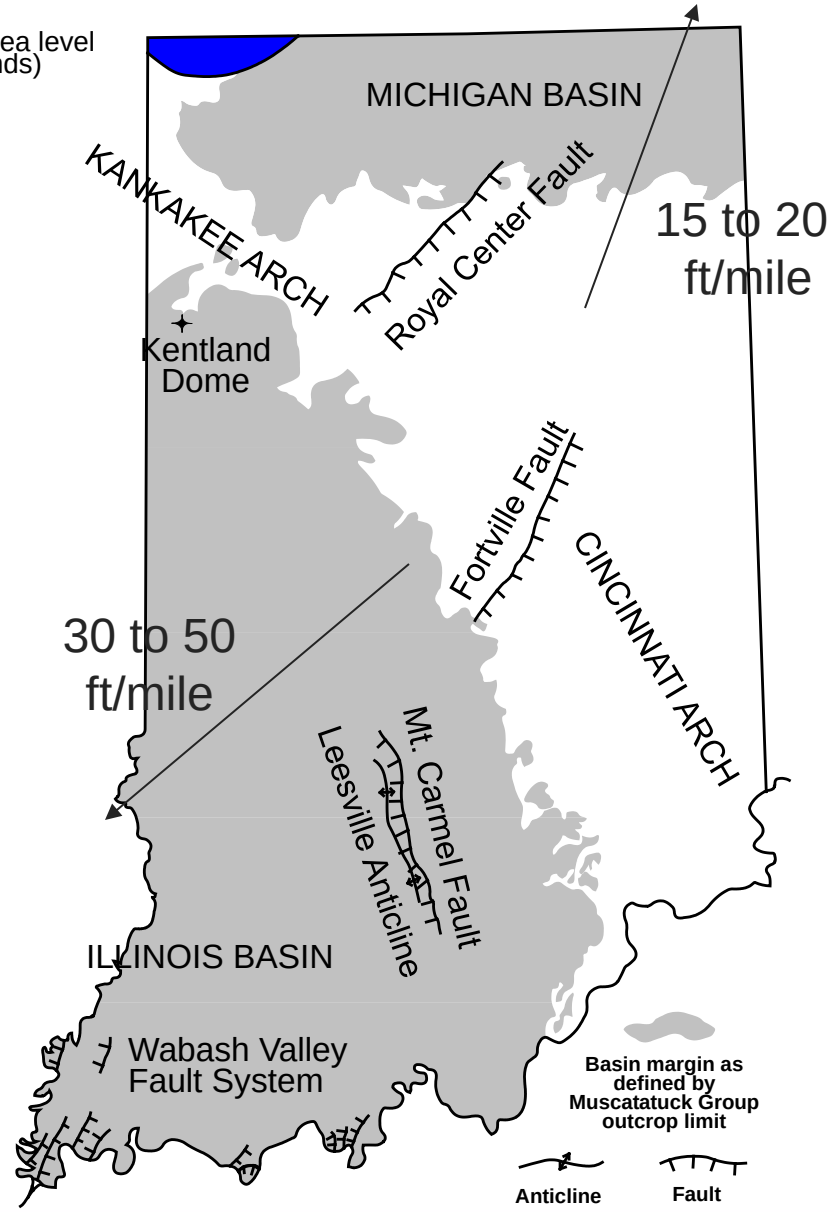
Arches and Basins

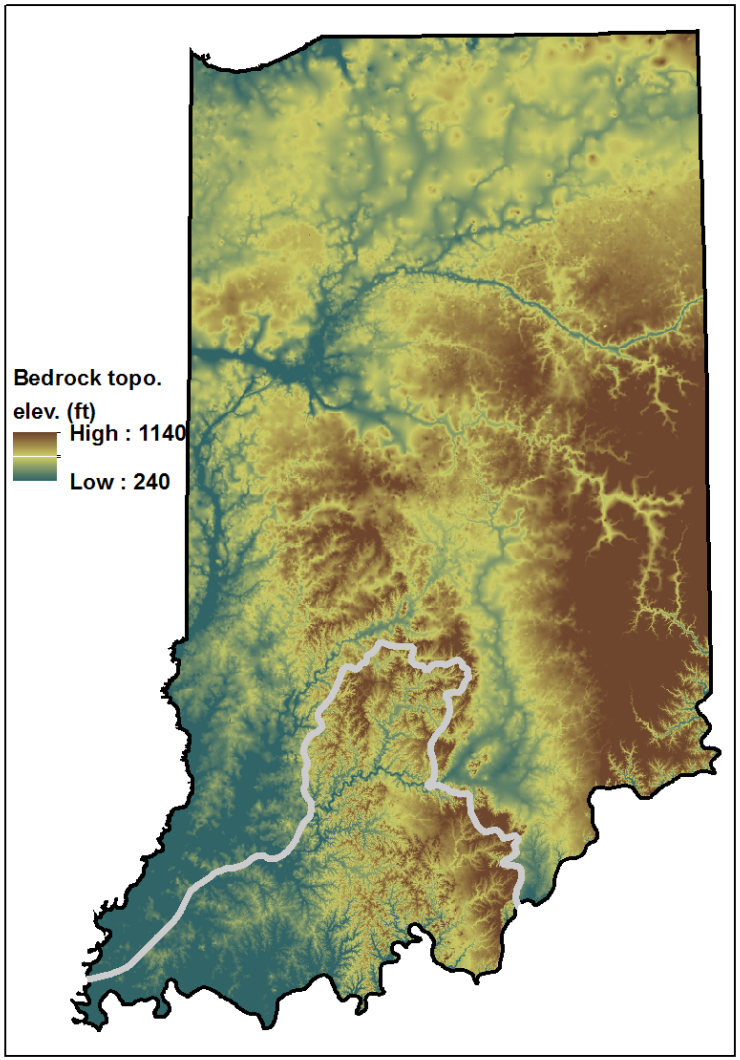


EXPLANATION

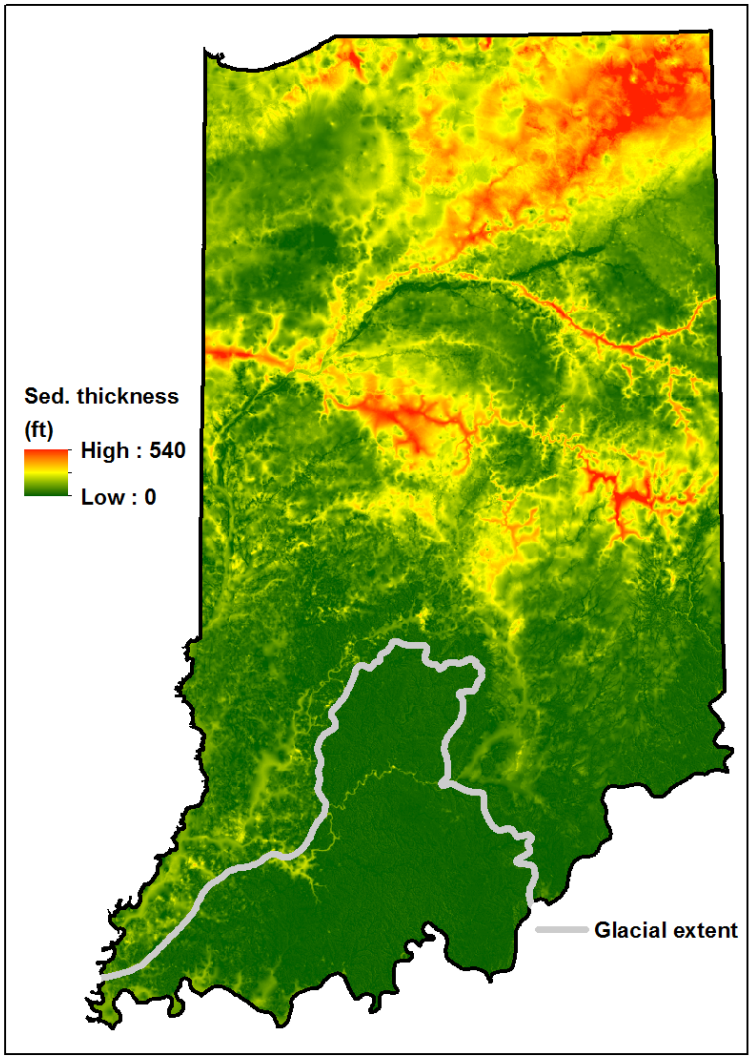
Feet below sea level (thousands)

- < 0
- 0-2
- 2-4
- 4-6
- 6-8
- 8-10
- 10-12
- 12-14
- 14-16
- 16-18
- 18-20
- 20 >
- Fault

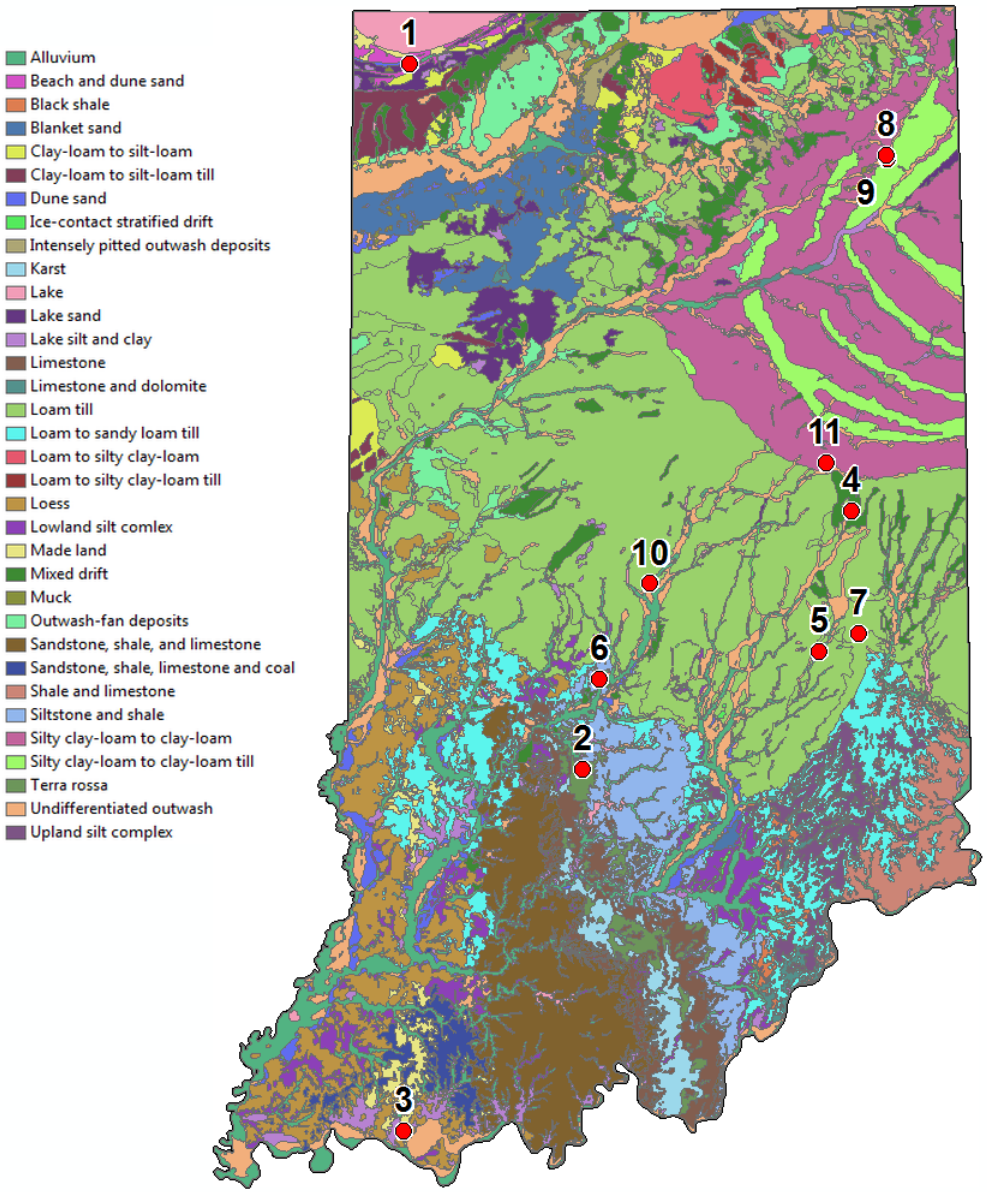




Bedrock topography



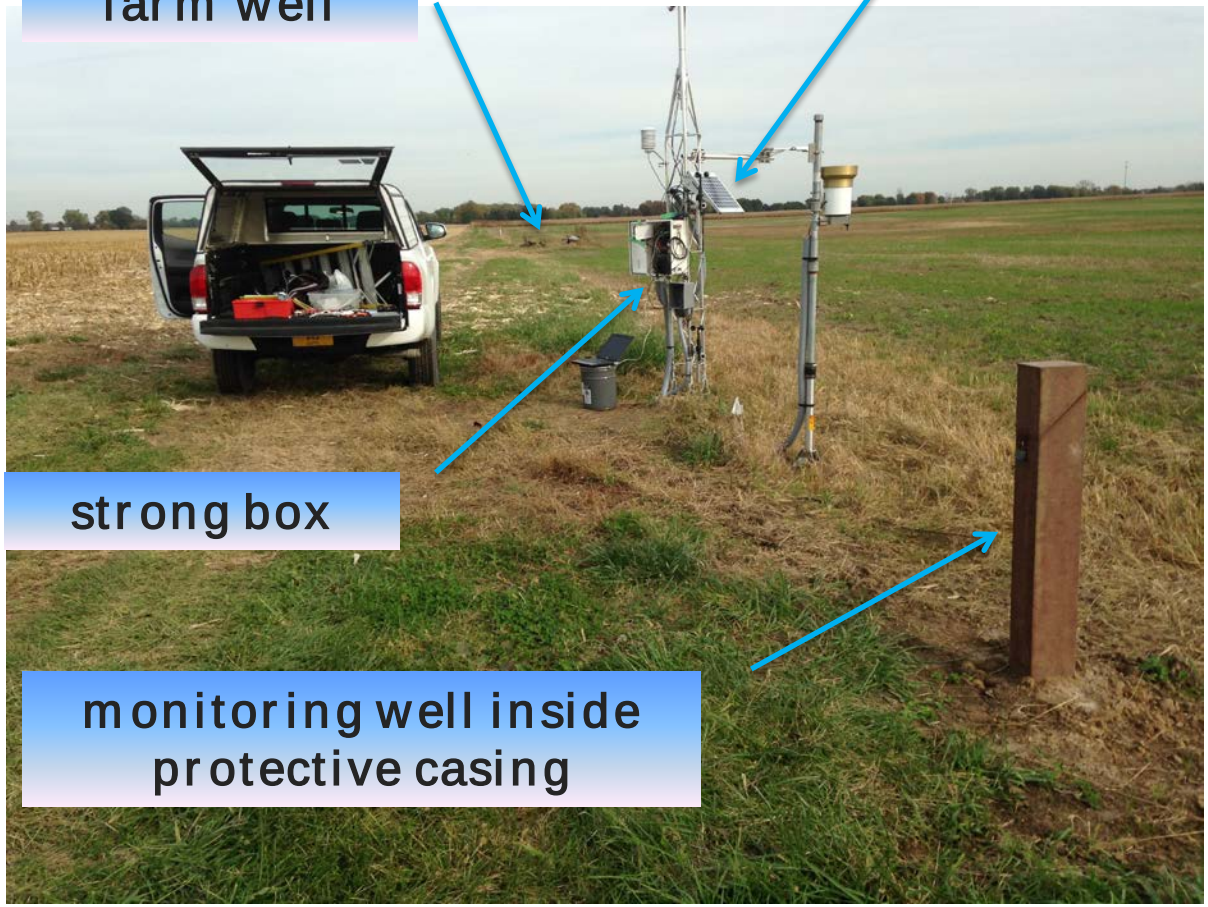
Sediment thickness



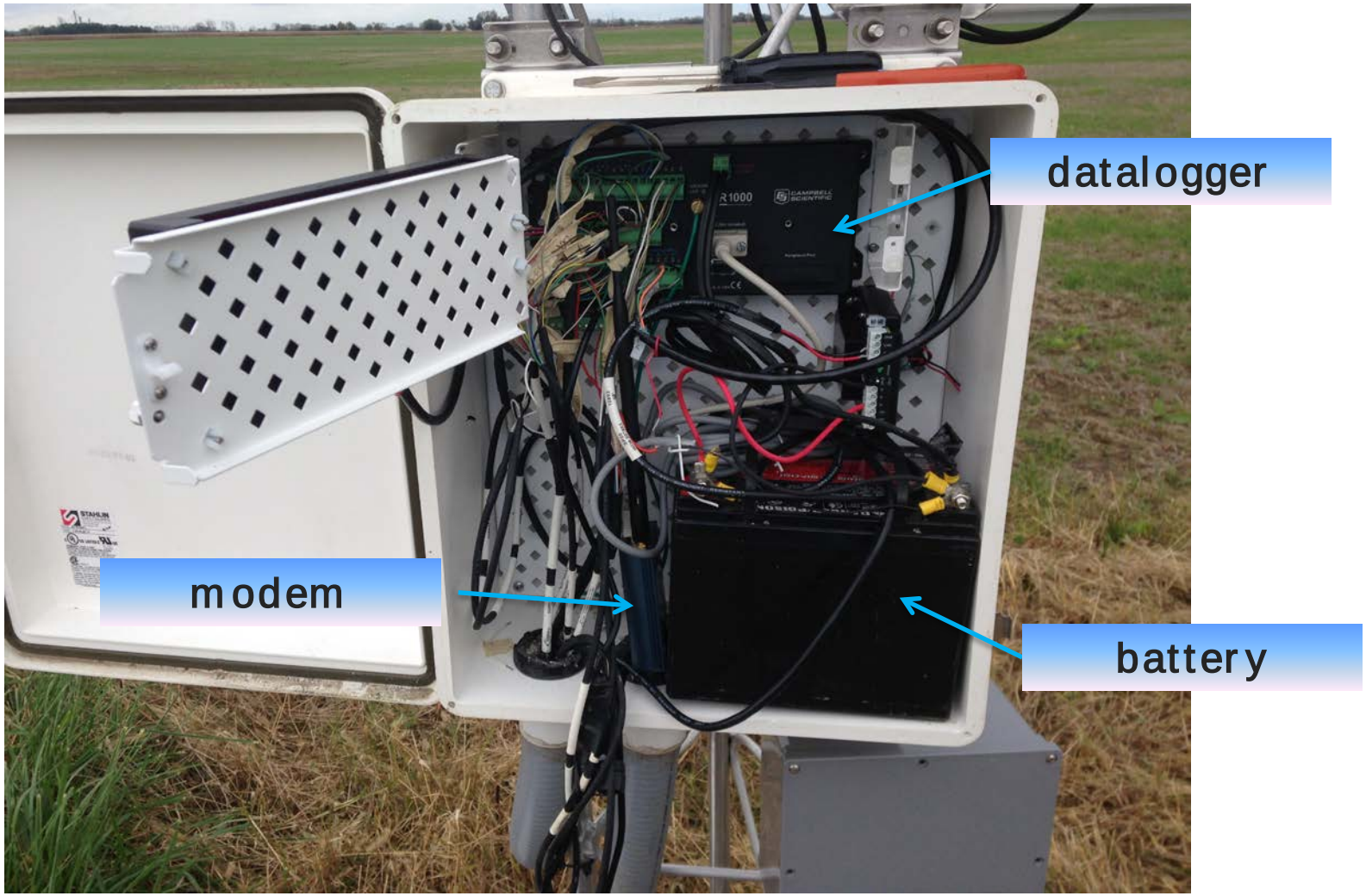
Site locations and diversity of hydrogeologic settings in Indiana …we're not capturing everything but you've gotta start somewhere

Surficial geology of Indiana
by Gray (1989)

IWBN site


solar panel
farm well
strong box
monitoring well inside protective casing

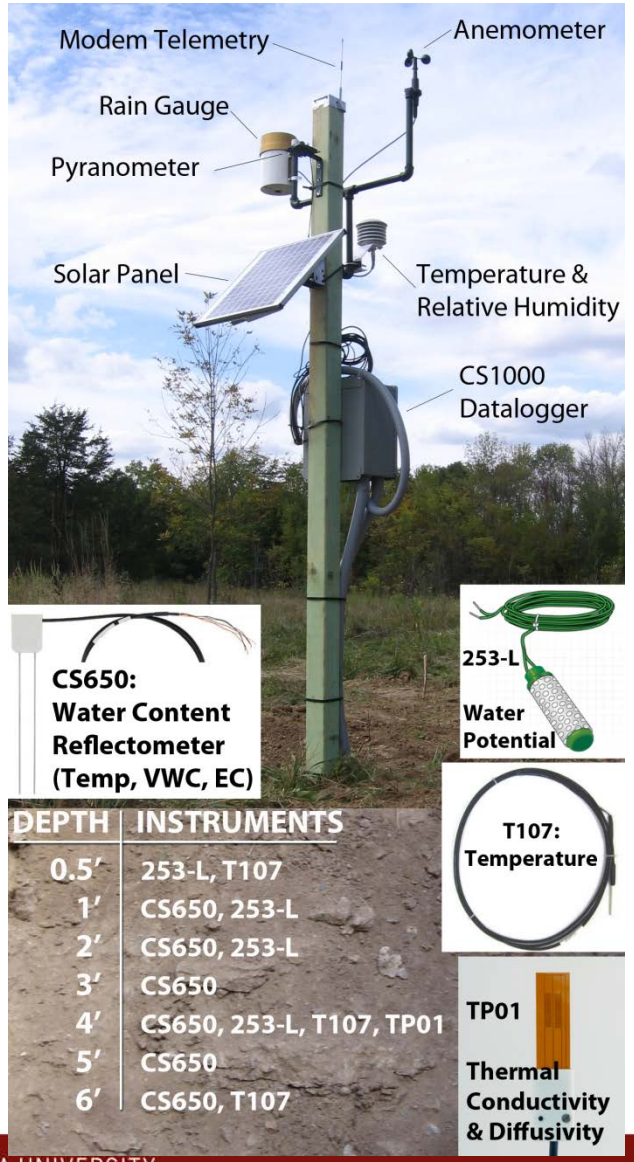
Campbell Scientific dataloggers and sensors



Monitoring approach

Potential evapotranspiration

Soil moisture , matric potential, thermal properties, and temperature



Vented pressure transducer installation

Drill&Drop soil moisture probe installation

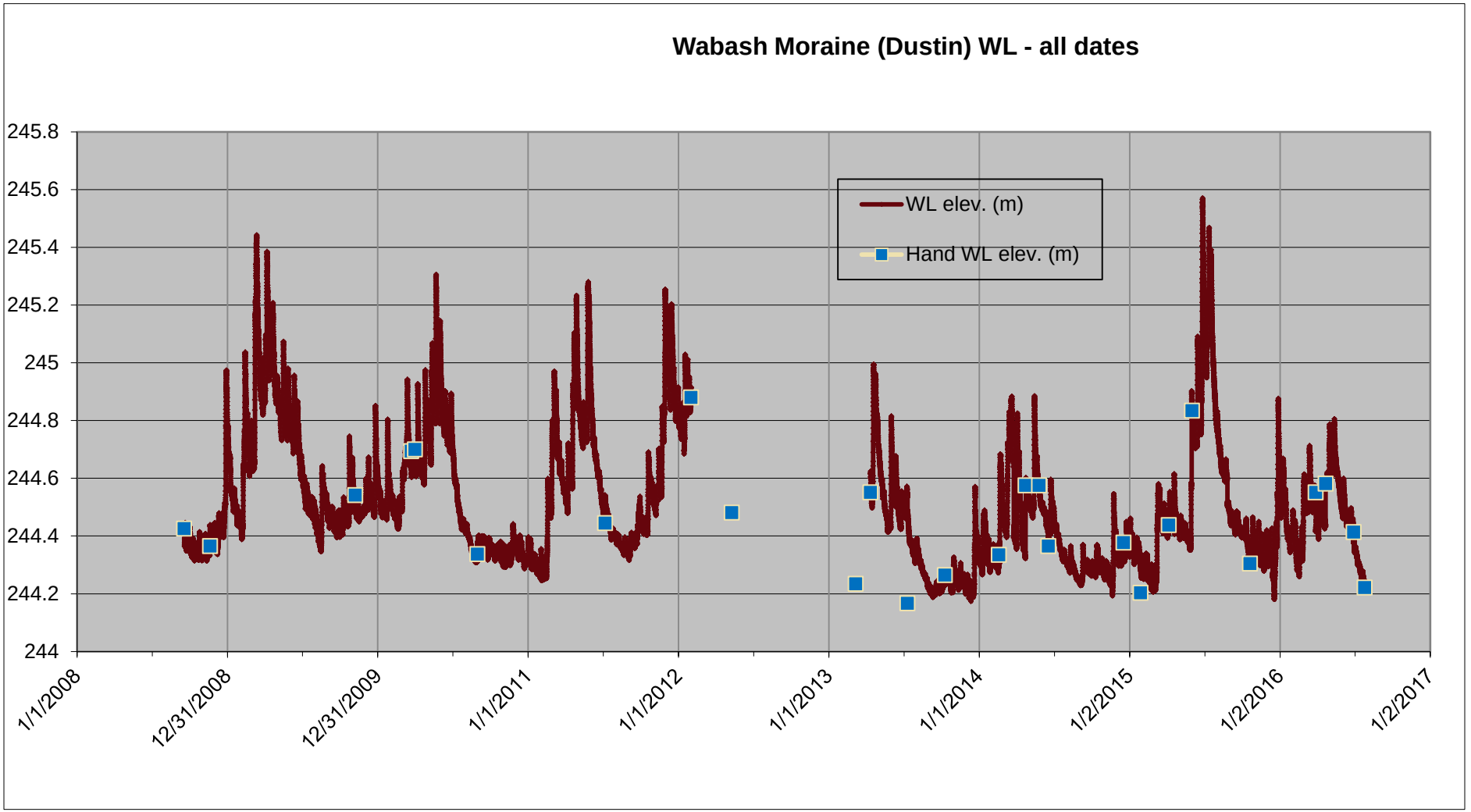
Instrumentation (groundwater monitoring)

$$P = Q + E + \Delta S_S + \Delta S_G$$

	Site name	Aquifer type	DTW (ft)	Record start	Temp.
north	Eel River Valley	Unconfined	34-36’	11/2009	Y
	Wabash Moraine	Confined	70-75’	9/2008	Y
	Lake Station	Unconfined / wetland	0-3’	8/2007	N
central	Flat Rock River	Unconfined	7-8’	8/2012	Y
	Summit Lake	Unconfined / wetland	0-3’	3/2010	N
	EcoLab	Unconfined	1-3’	9/2012	Y
	Ball State	Semiconfined	10-15’	4/2013	Y
south	Ohio River	Unconfined	30-40’	12/2007	N

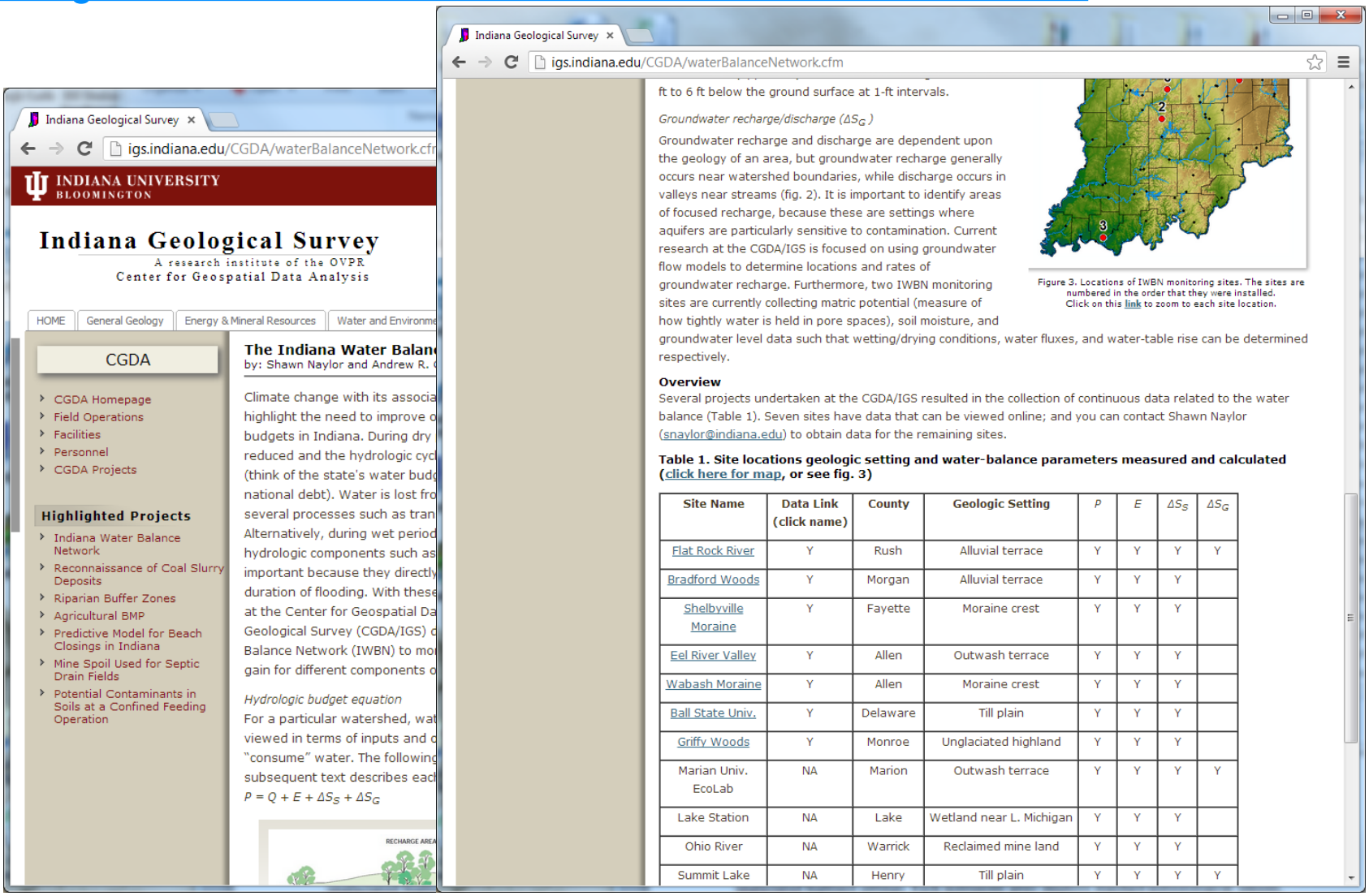
Data are collected at hourly intervals with pressure transducers connected to a datalogge

Groundwater elevations versus time

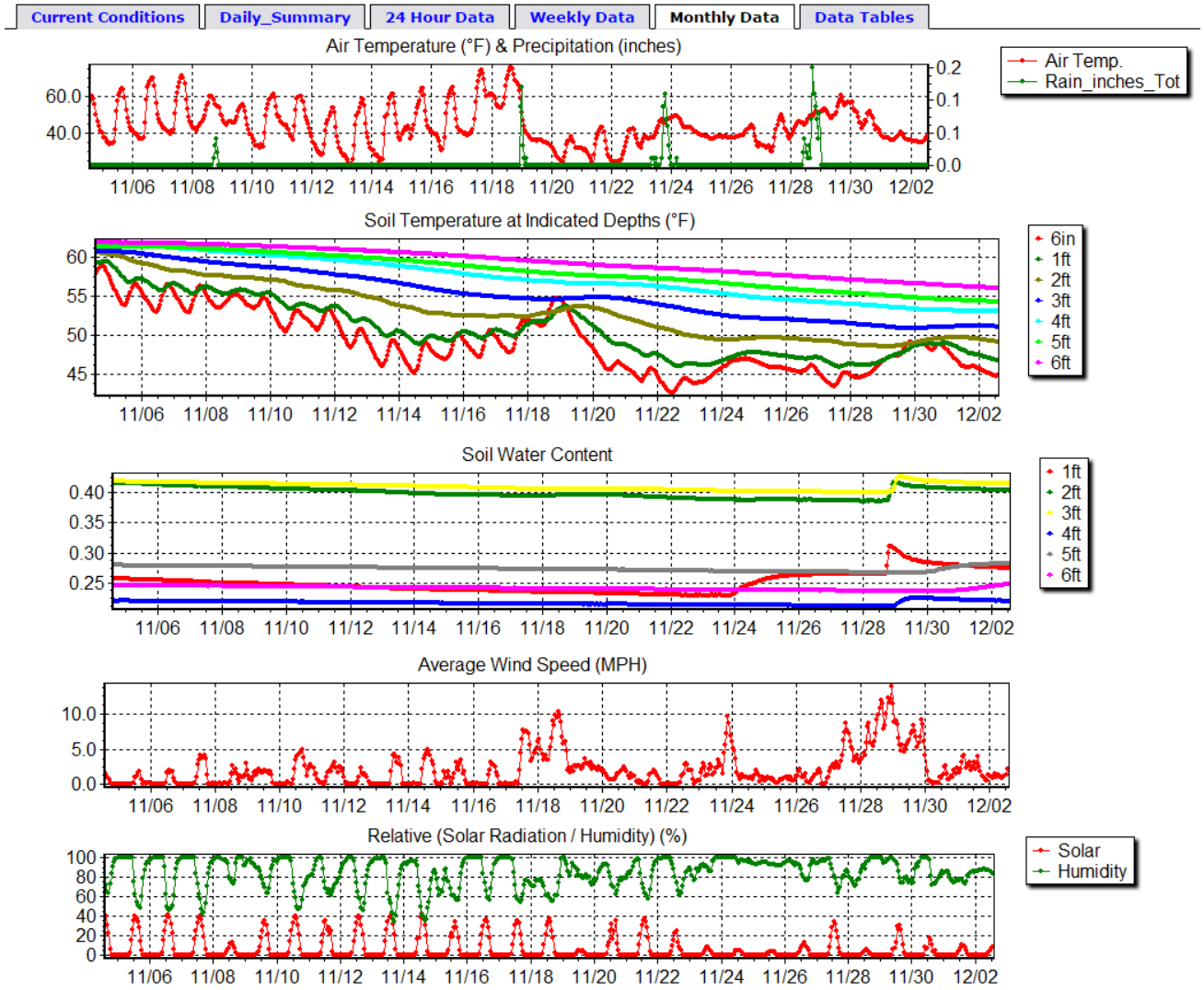


Provisional data on the Web

[Indiana Water Balance Network - http://igs.indiana.edu/CGDA/waterBalanceNetwork.cfm](http://igs.indiana.edu/CGDA/waterBalanceNetwork.cfm)



Meteorological and soil data served to web site



Collaborators

Research cohorts

Sally Letsinger

Kevin Ellett

Darren Ficklin

Greg Olyphant

Property access

The Yoder Farm LLC

ACRES LANDTRUST

Aurora Vista Farms

BALL STATE UNIVERSITY

BRADFORD WOODS

INDIANA GEOLOGICAL SURVEY

Questions

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Field sampling and soil characterization

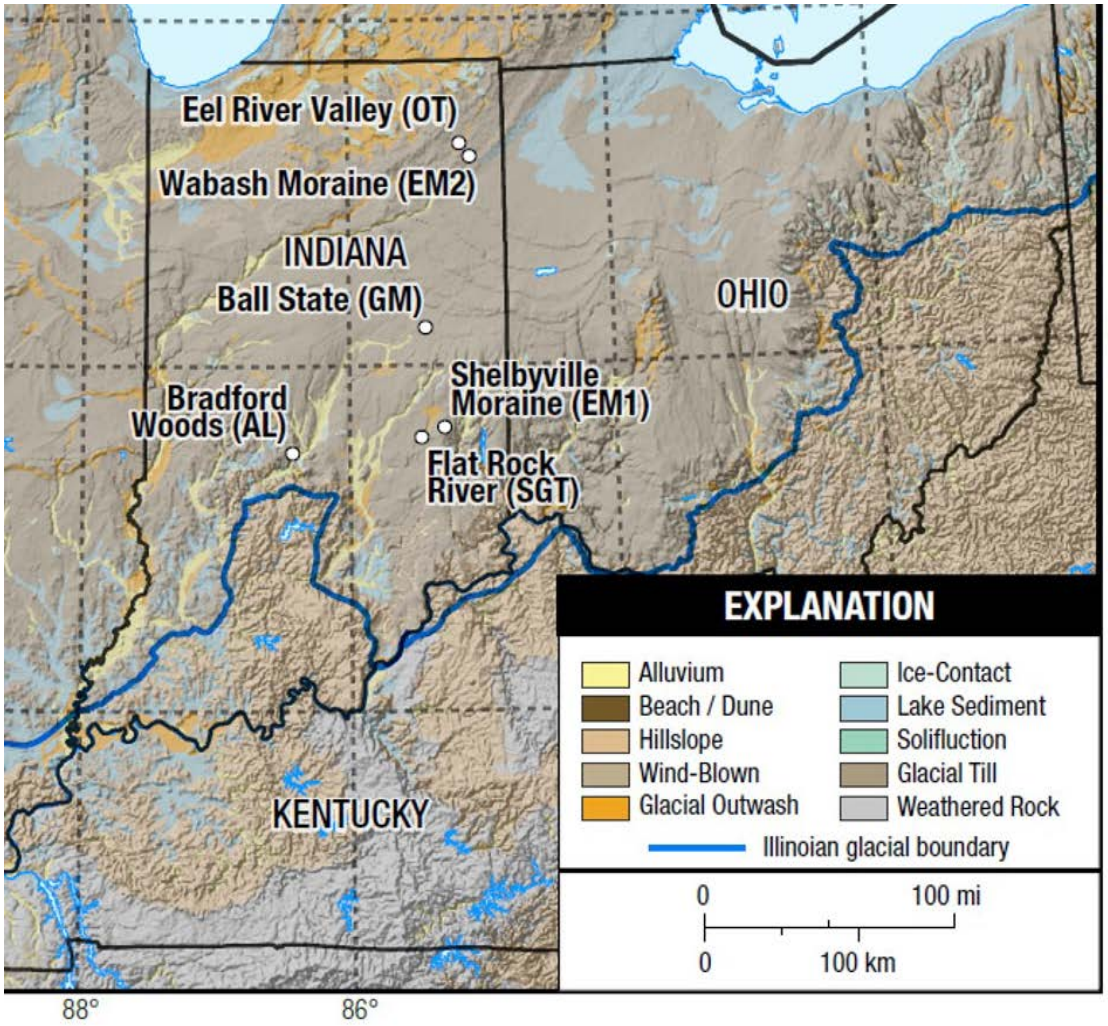
Samples collected at 0.3m intervals (0.3-1.8m below ground surface)

brass core liners used to collect samples for:

- ***bulk density*** determination
- field ***gravimetric water content***
- soil ***moisture retention characteristics***
- ***grain size*** analysis

Bulk density data and grain size distributions are used to estimate hydraulic parameters (e.g., Ksat) used in model development

Monitoring locations



6 sites represent common hydrogeologic settings and soil parent materials in the glaciated GLR