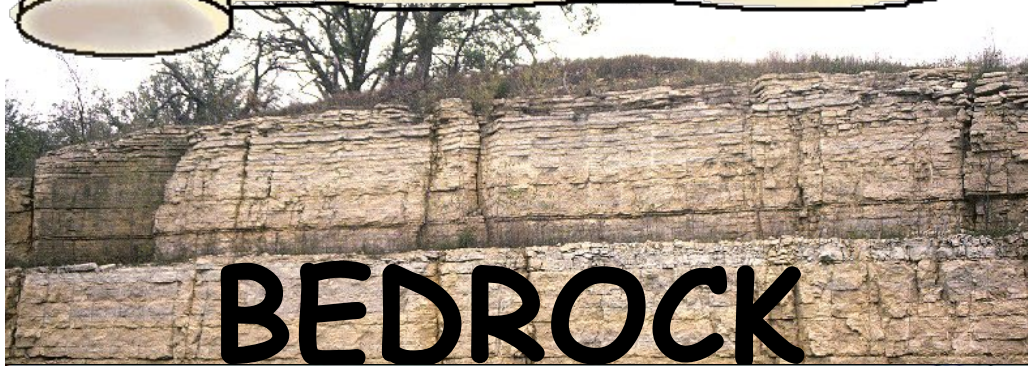
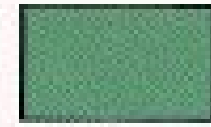


*4 principal factors that
created Iowa's Landscapes*



Explanation



Wisconsinian
(10,500 to 30,000
years ago)



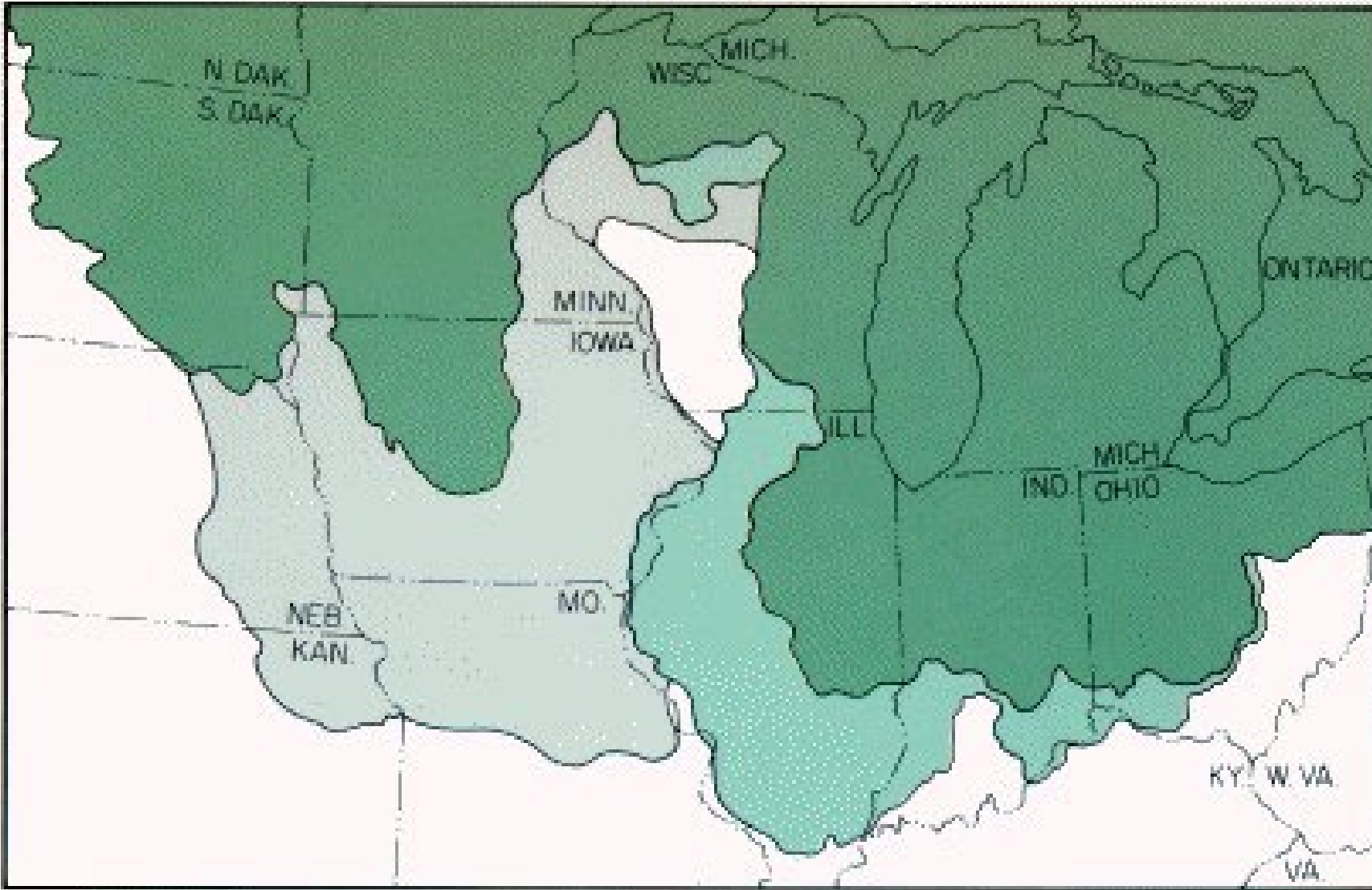
Illinoian
(130,000 to 300,000
years ago)

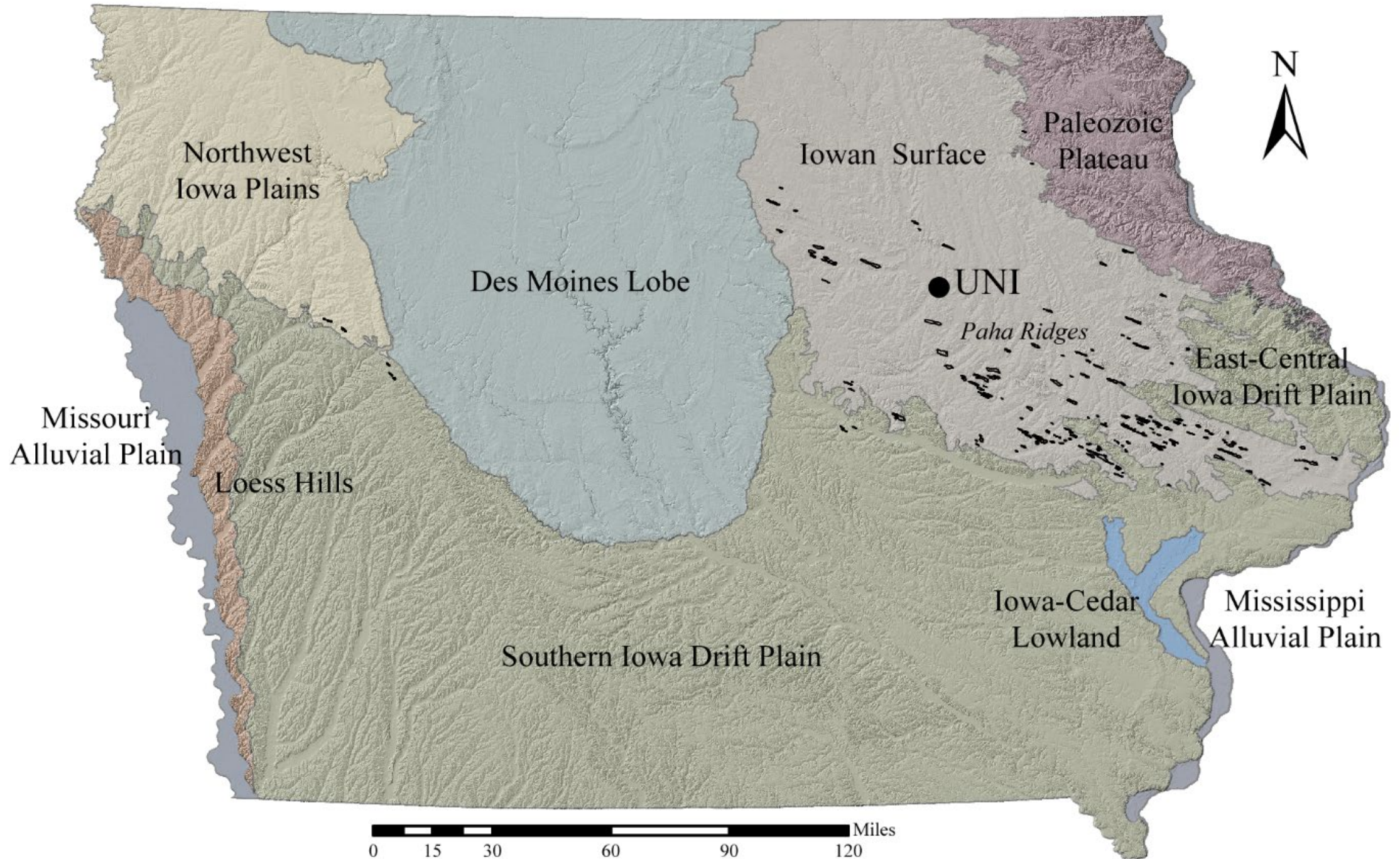


Pre-Illinoian
(500,000 to over
2,500,000 years ago)

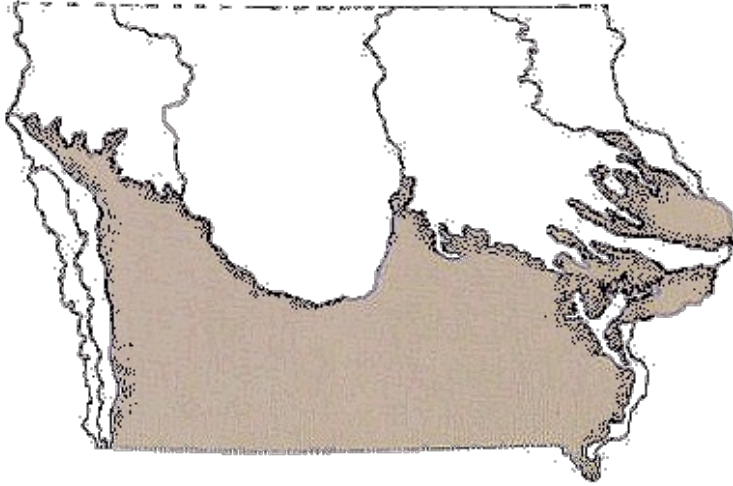
0 100 200 mi.

0 150 300 km.



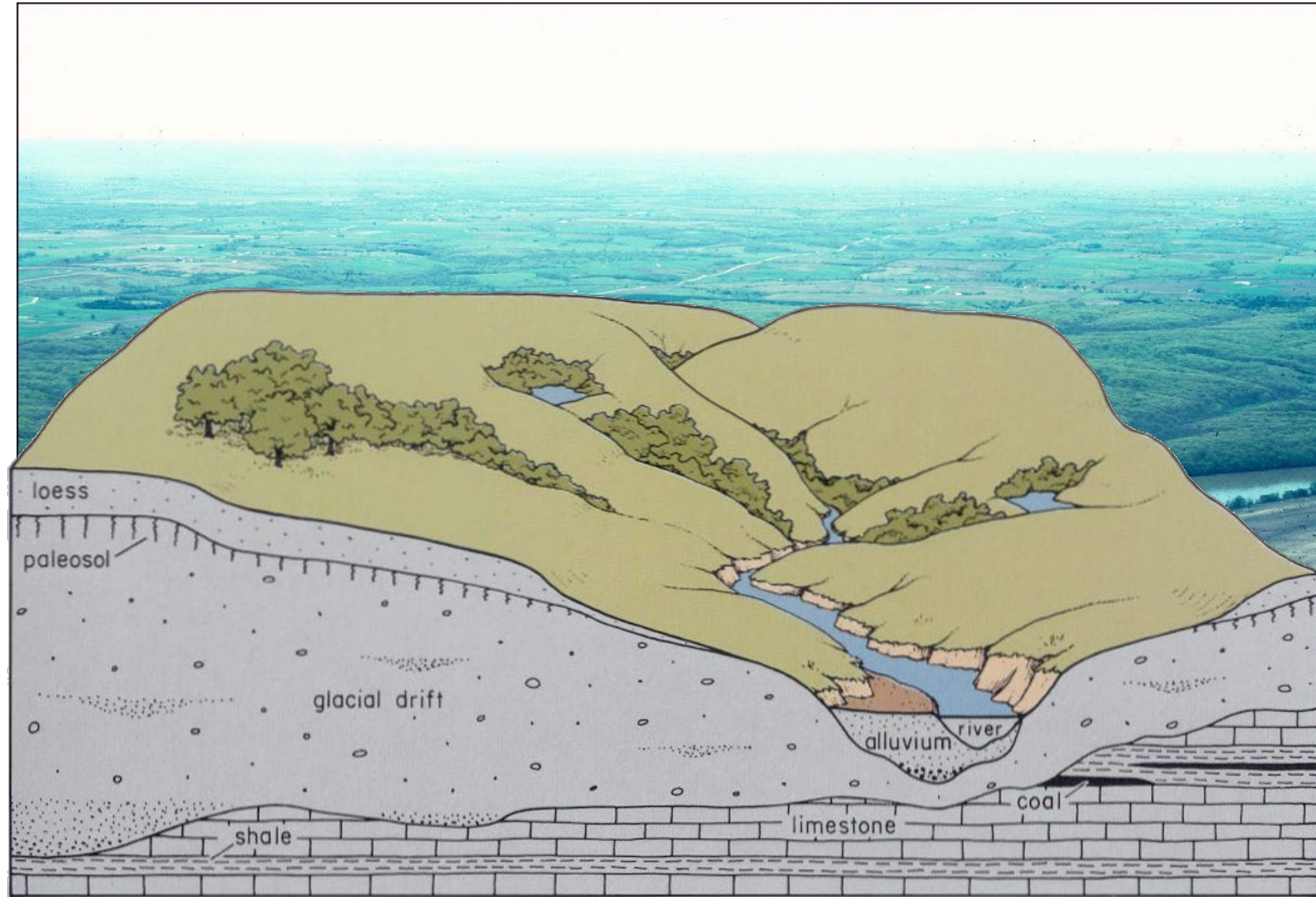


Southern Iowa Drift Plain



Terrain Characteristics

- * moderate loess cover
- * weathered glacial drifts with paleosols
- * integrated drainage network
- * bedrock exposed in deeper valleys

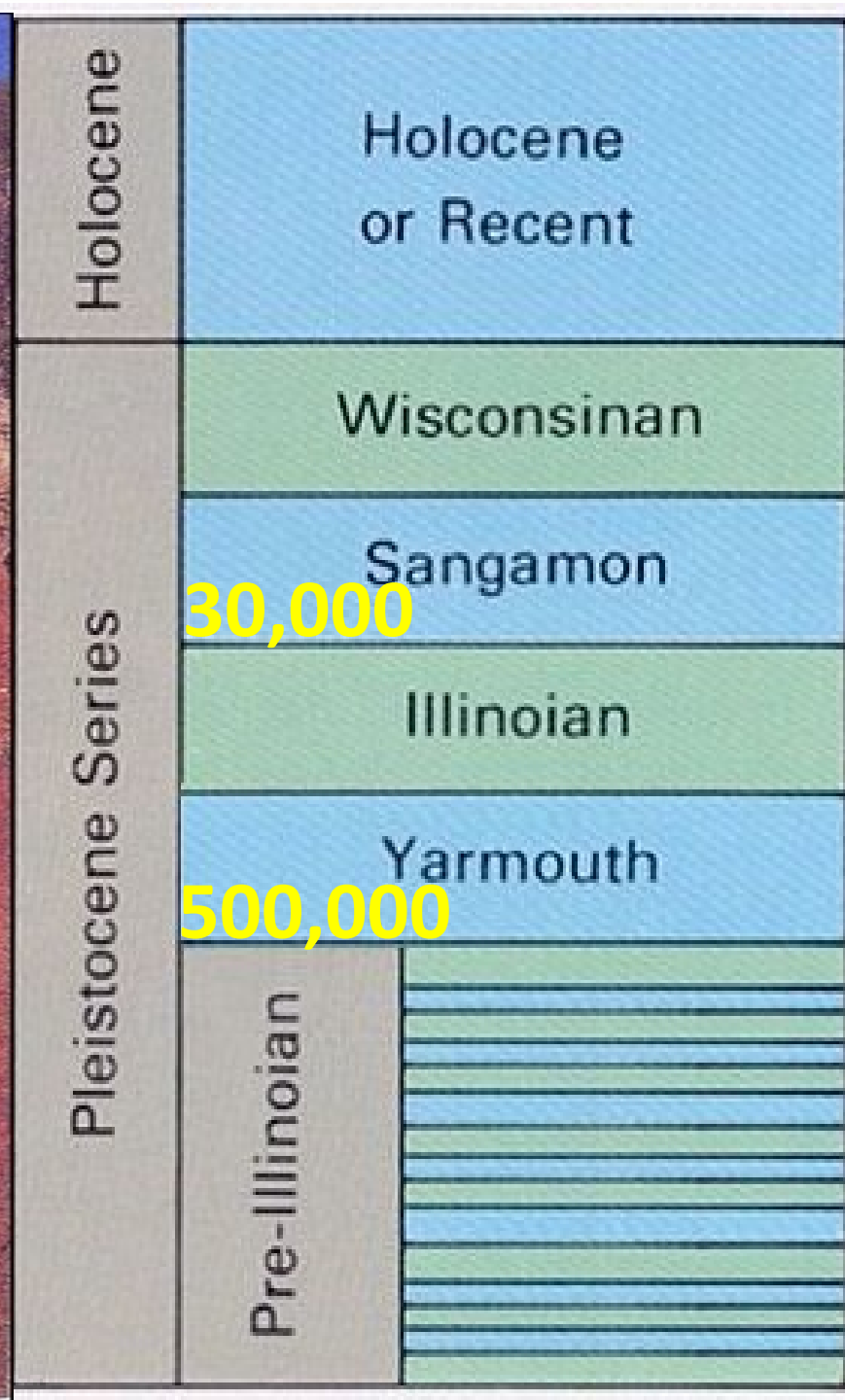
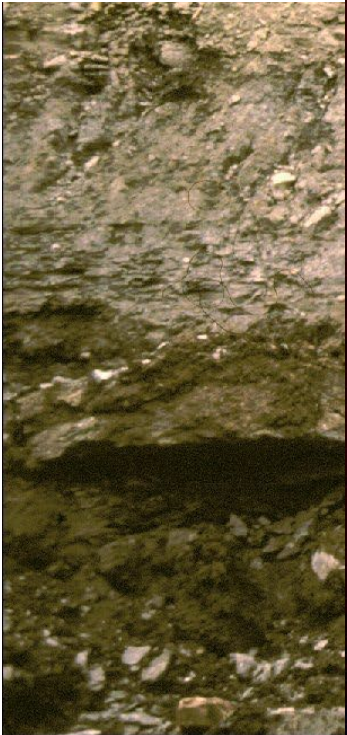


**moderate
loess cover**

loess-capped hills, Iowa County photo by Gary Hightshoe

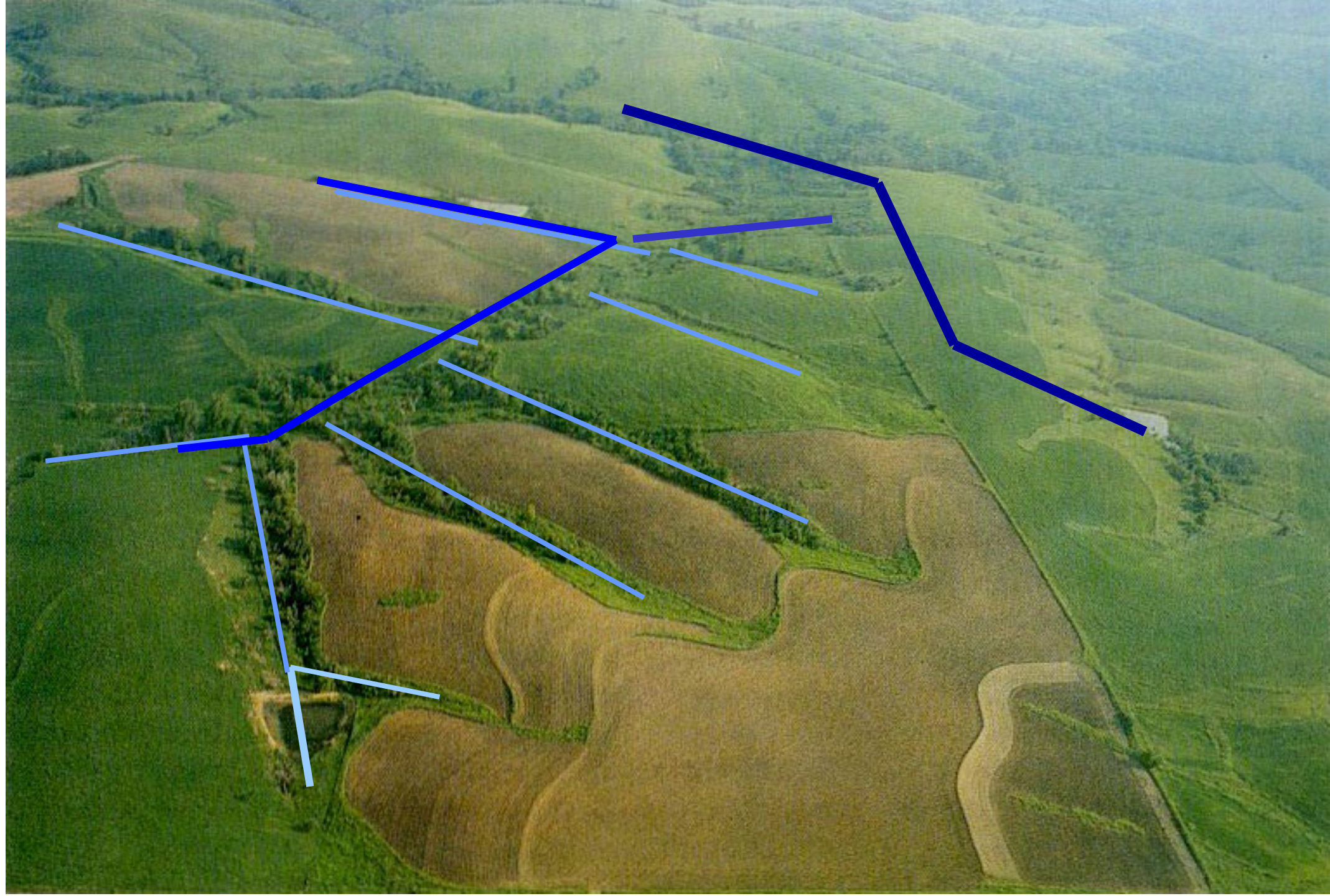


Weathered glacial drift with paleosols



Two Pre-Illinoian tills at the Braddyville Qua
Yarmouth-Sangamon Paleosol "gumbo till",

**integrated
drainage
network**



lowan Surface



Terrain Characteristics

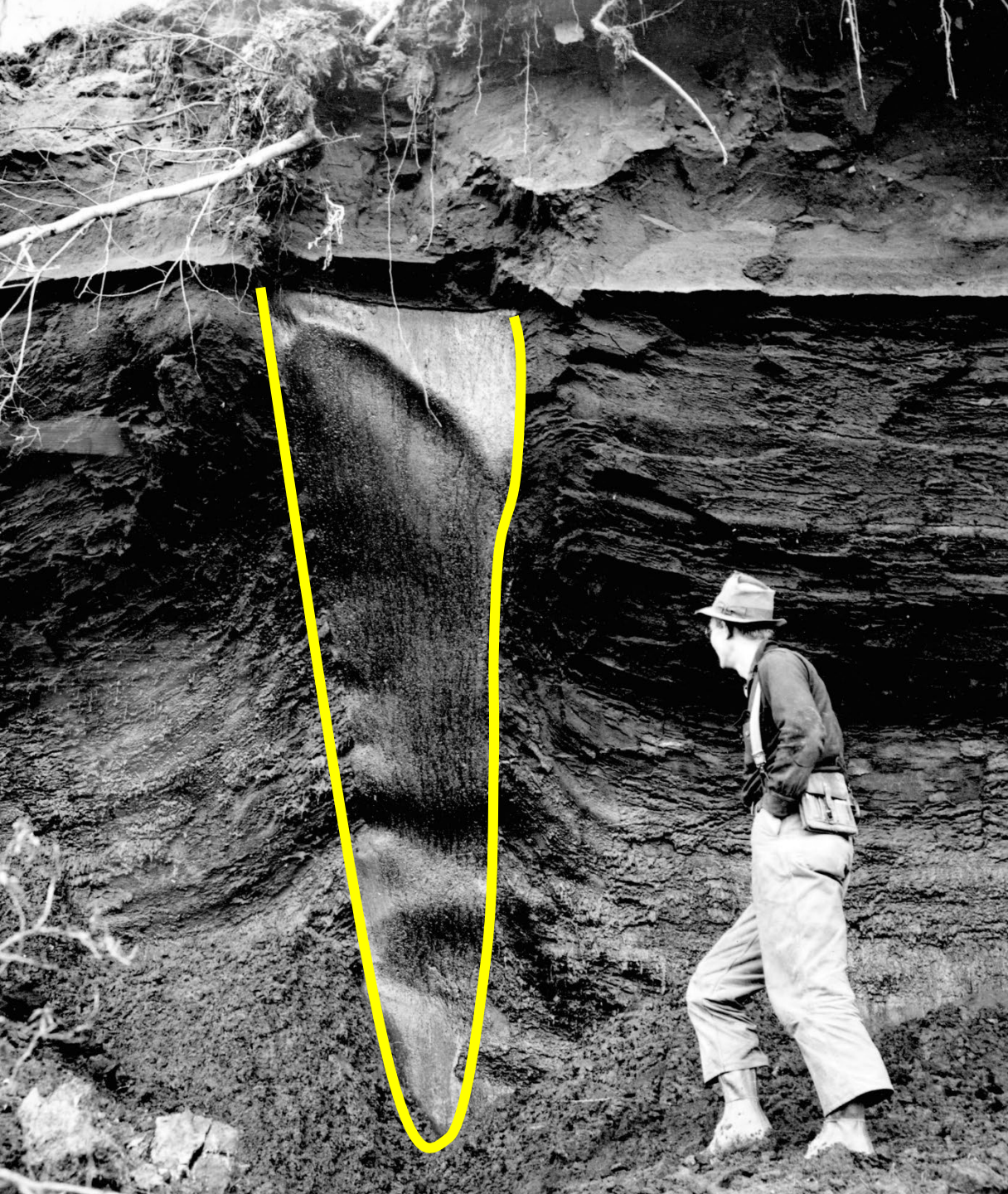
- * gently rolling terrain
- * thin, discontinuous loess or loam over glacial drift
- * bedrock near surface
- * local karst conditions
- * scattered glacial boulders
- * integrated drainage network
- * isolated elongate hills (paha)

photo by Ray Anderson



Iowa Surface - /respect to other Iowa regions?

- Why is the Iowan Surface gently rolling/ flat?
- Why is bedrock closer to the surface?
- Why are there localized karst conditions?

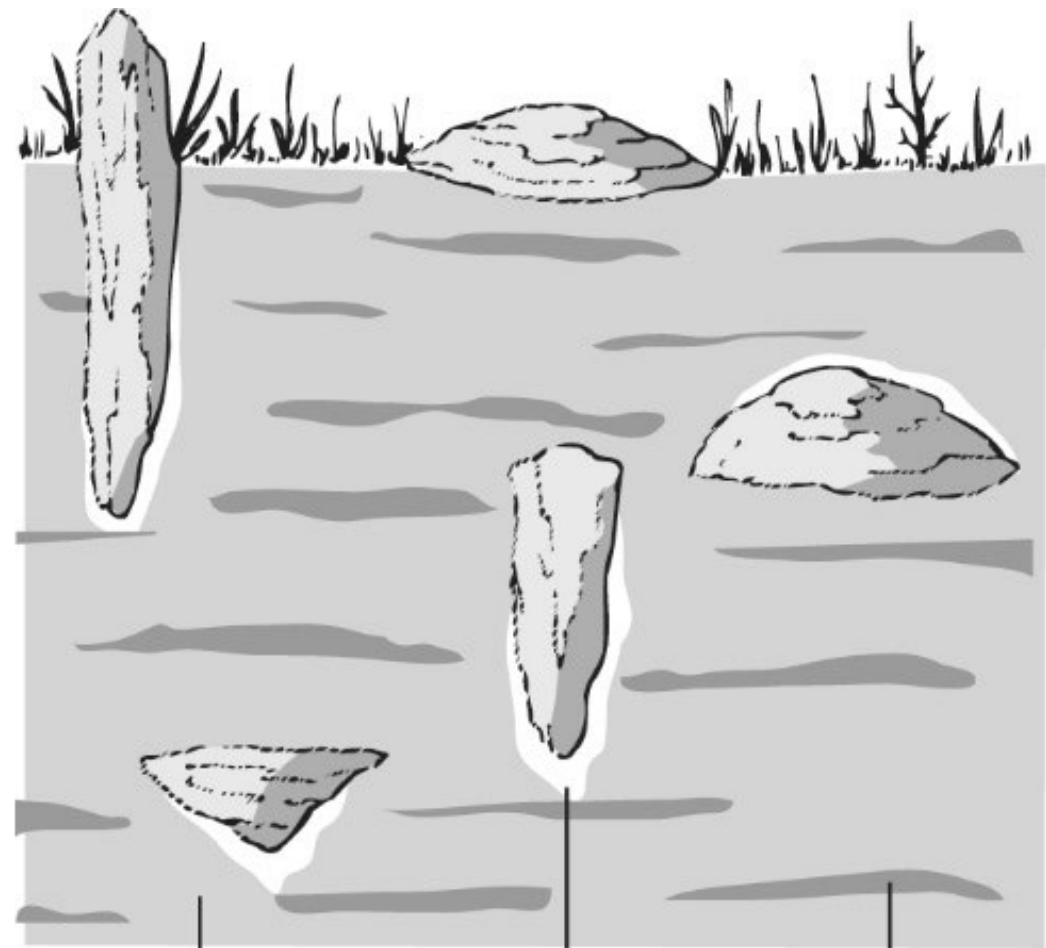


Permafrost

Or **cryotic soil** is at or below the freezing point of water $0\text{ }^{\circ}\text{C}$ ($32\text{ }^{\circ}\text{F}$) for two or more years. Most permafrost is located in high [latitudes](#) (i.e. land close to the North and South poles), but **alpine permafrost** may exist at high [altitudes](#) in much lower latitudes



Frost Sorting

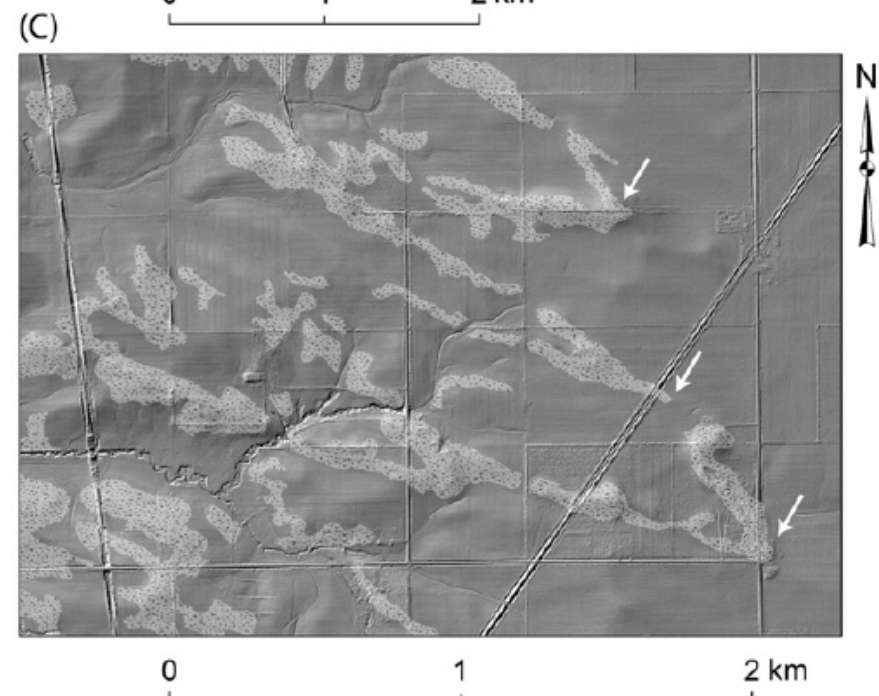
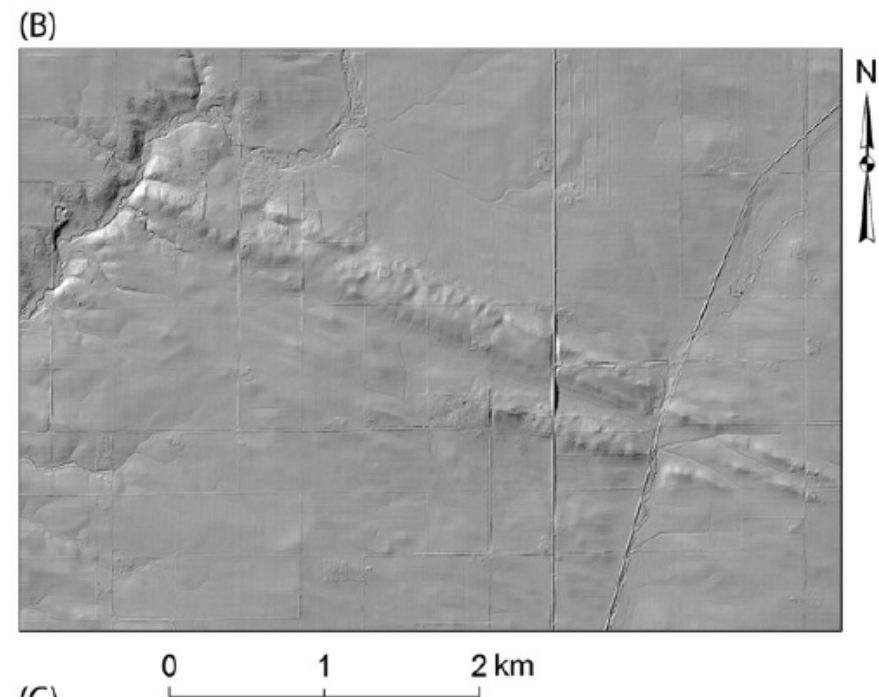
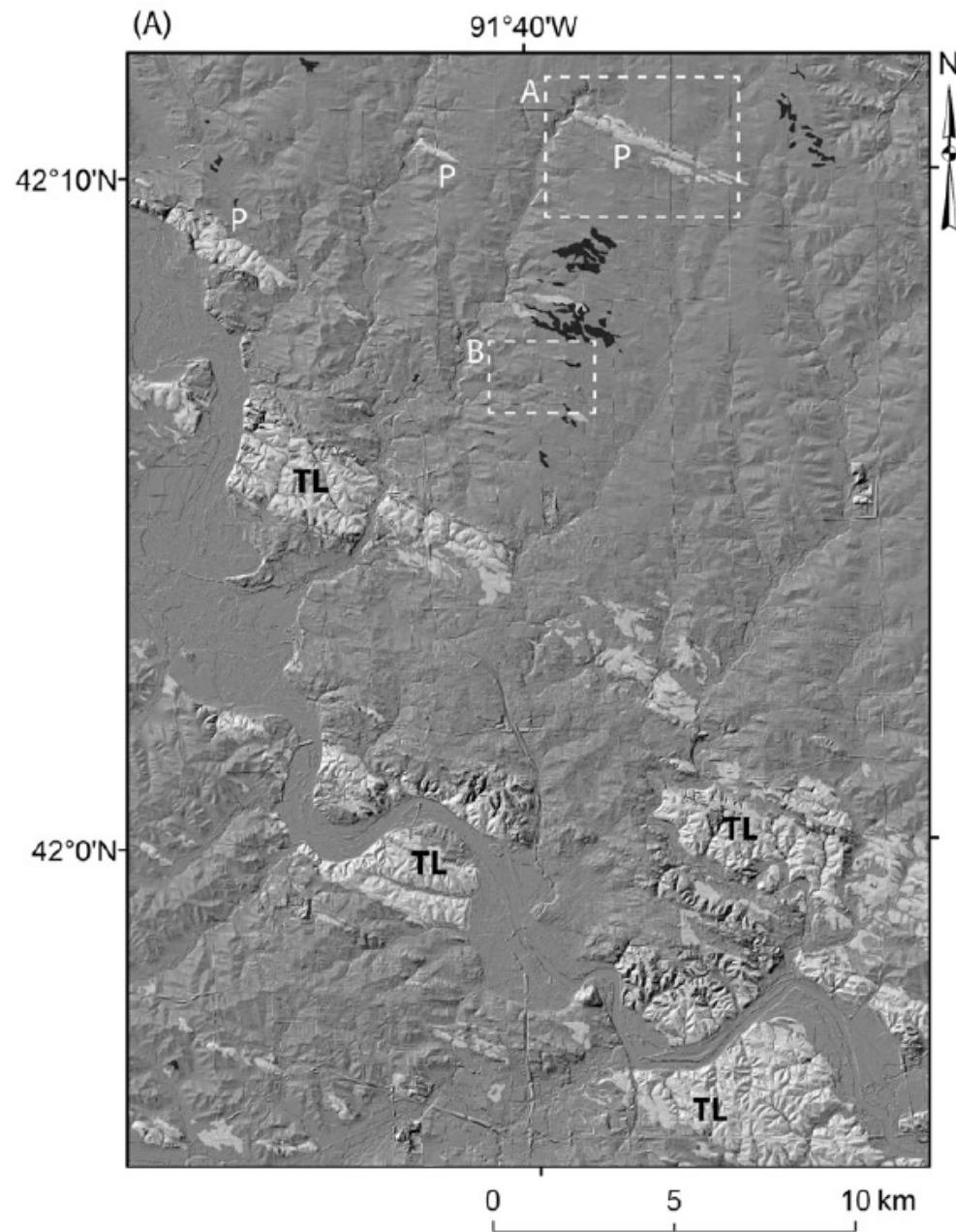


S = frozen silt

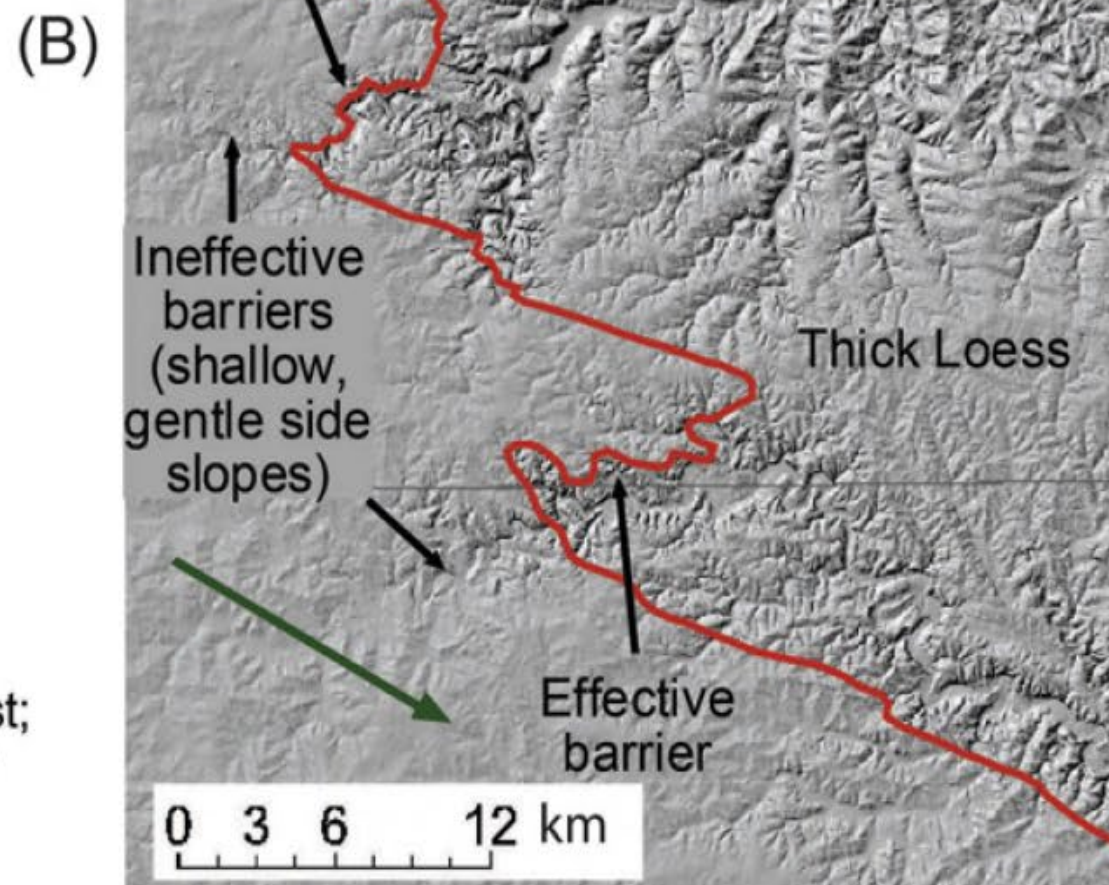
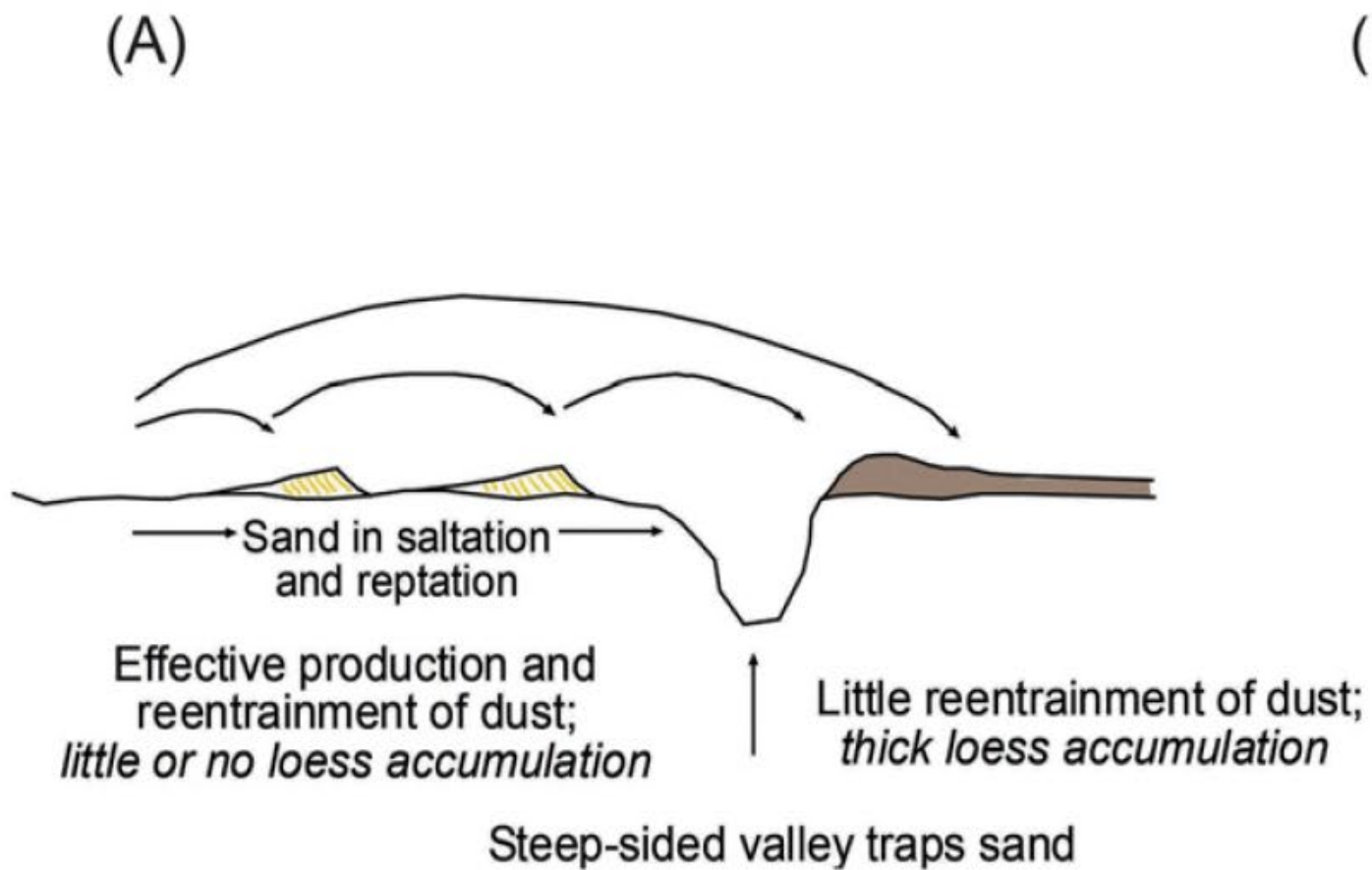
V = voids

I = ice layers

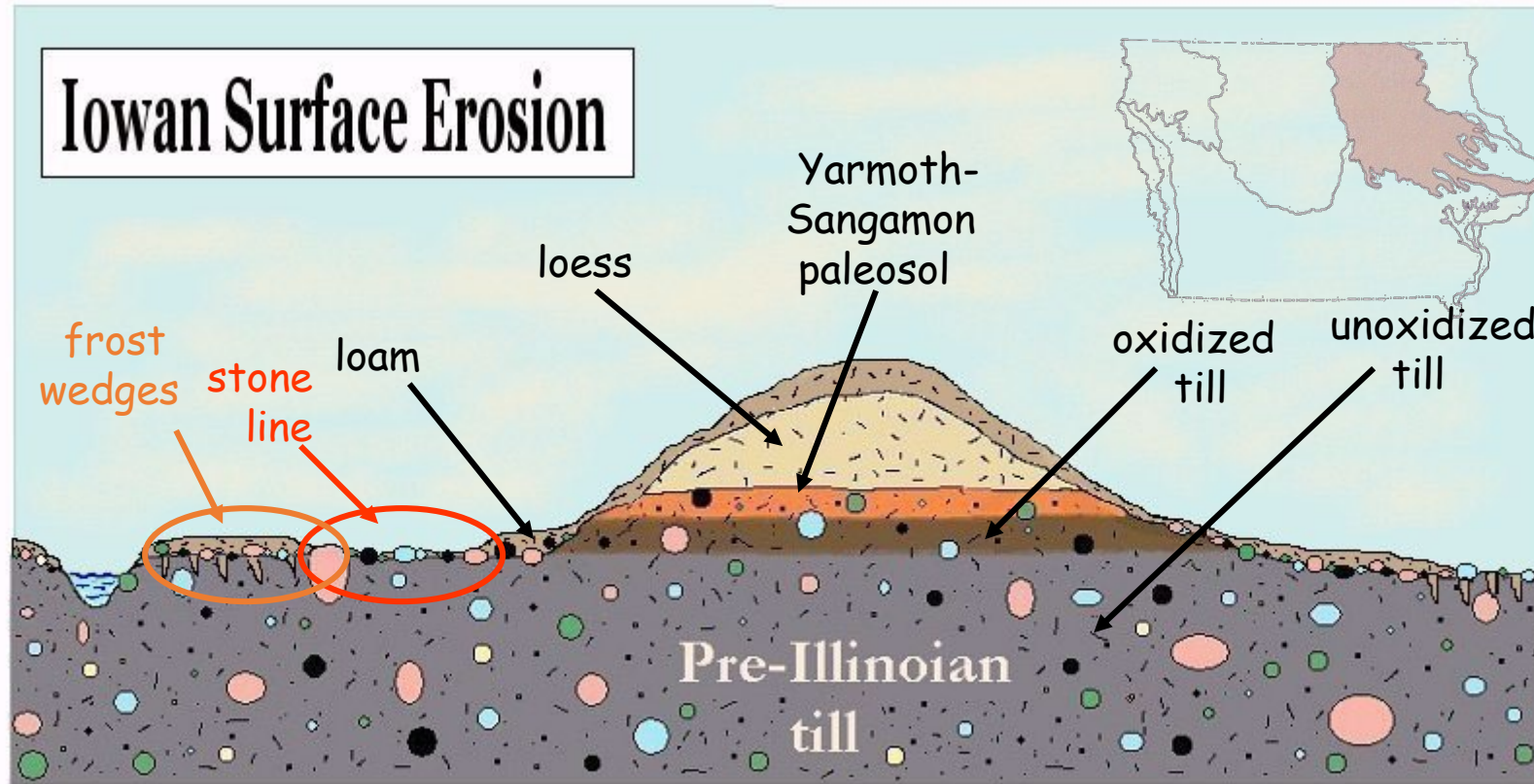
Joe Mason Paper







Formation of the Iowan Surface 16,500 – 21,000 ybp



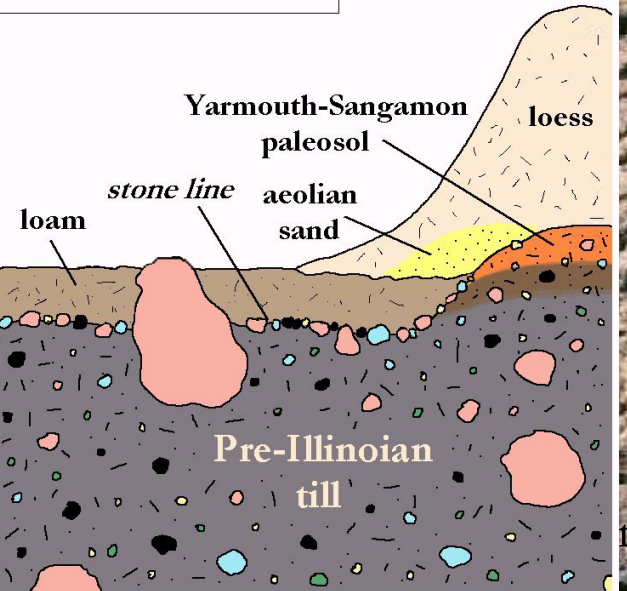
thin, discontinuous loess or loam over glacial drift

loam →

stone line →

PreIllinoian
till

Iowan Surface



Iowan Surface soil profile in south Cedar Falls photo by Jim Walters

bedrock near surface

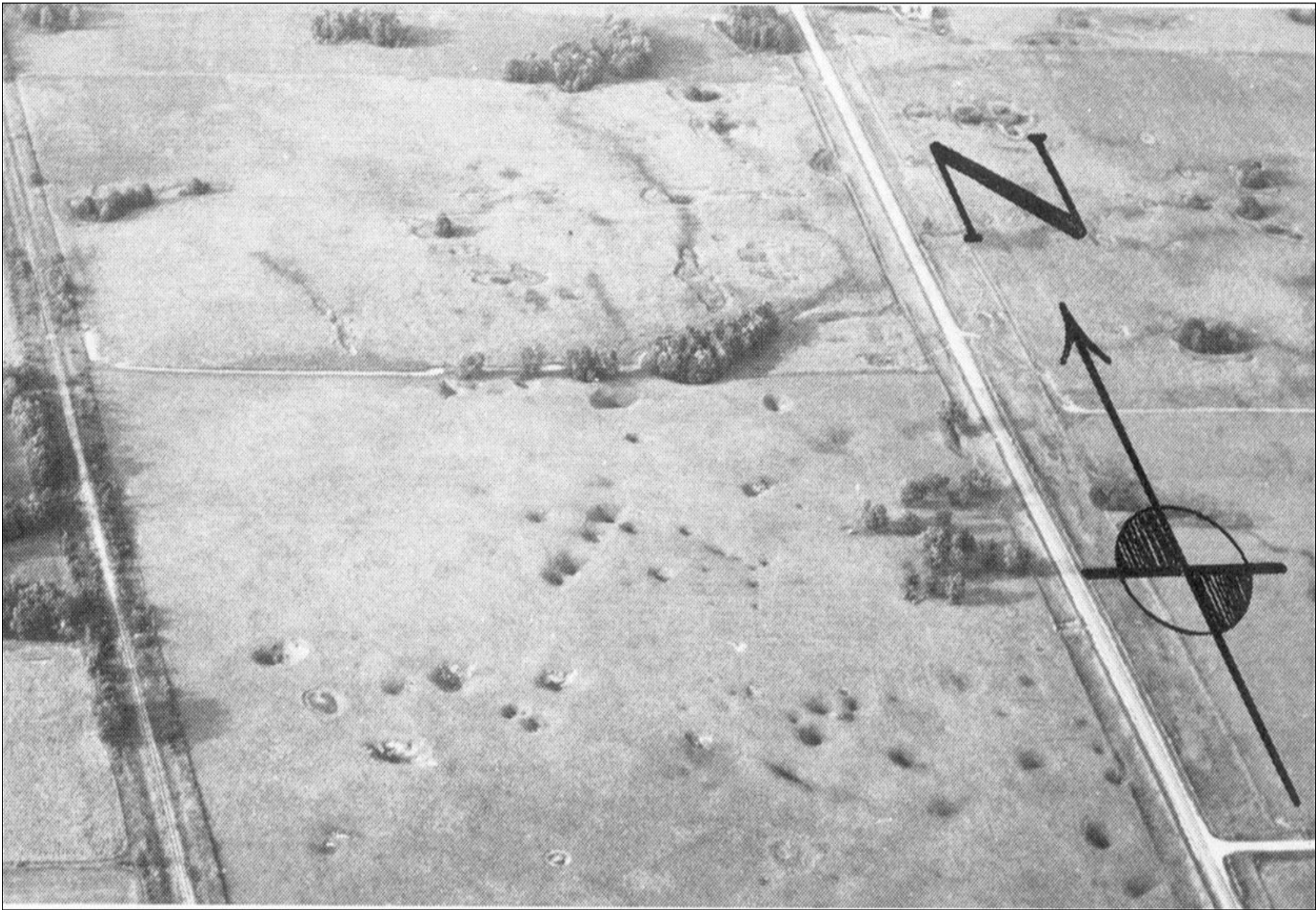
Natural bridge at Maquoketa Caves State Park, Jackson County

photo by Ray Anderson



local karst

Sink holes in pasture, Floyd
County *photo by Stan Grant*



**scattered
glacial boulders**

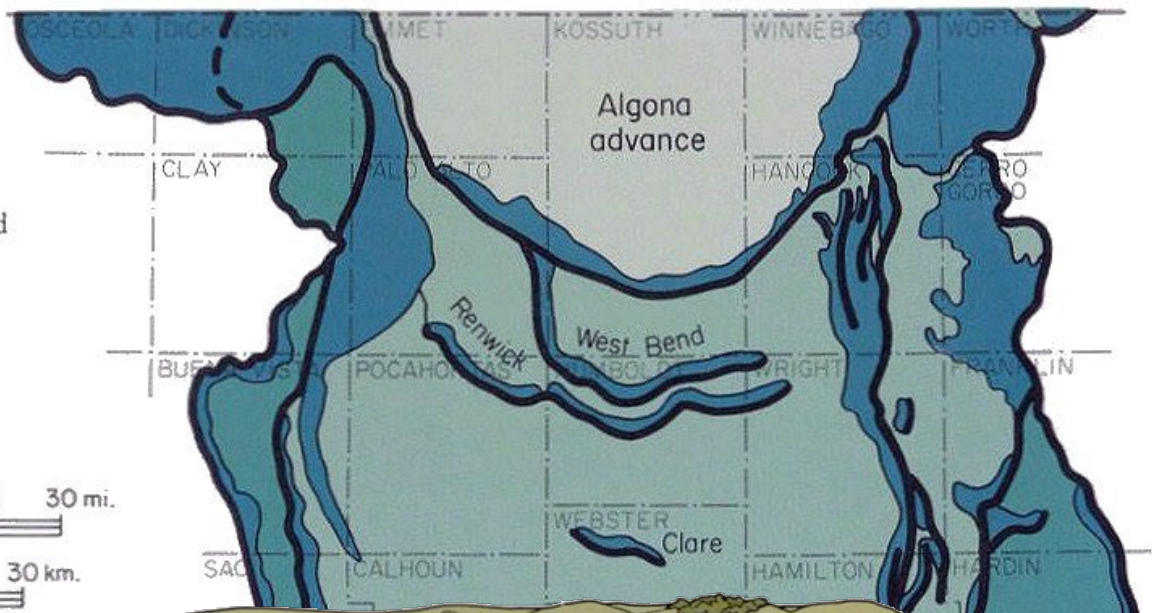
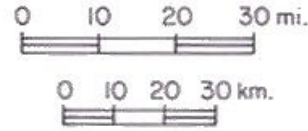
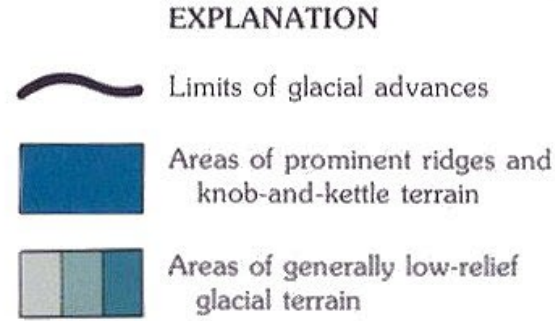
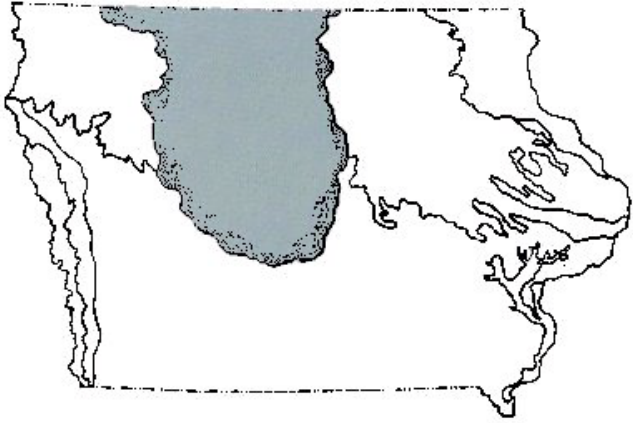


Integrated drainage networks

Edge of North Liberty Lobe,
Iowan Surface, Johnson County
photo by Ray Anderson

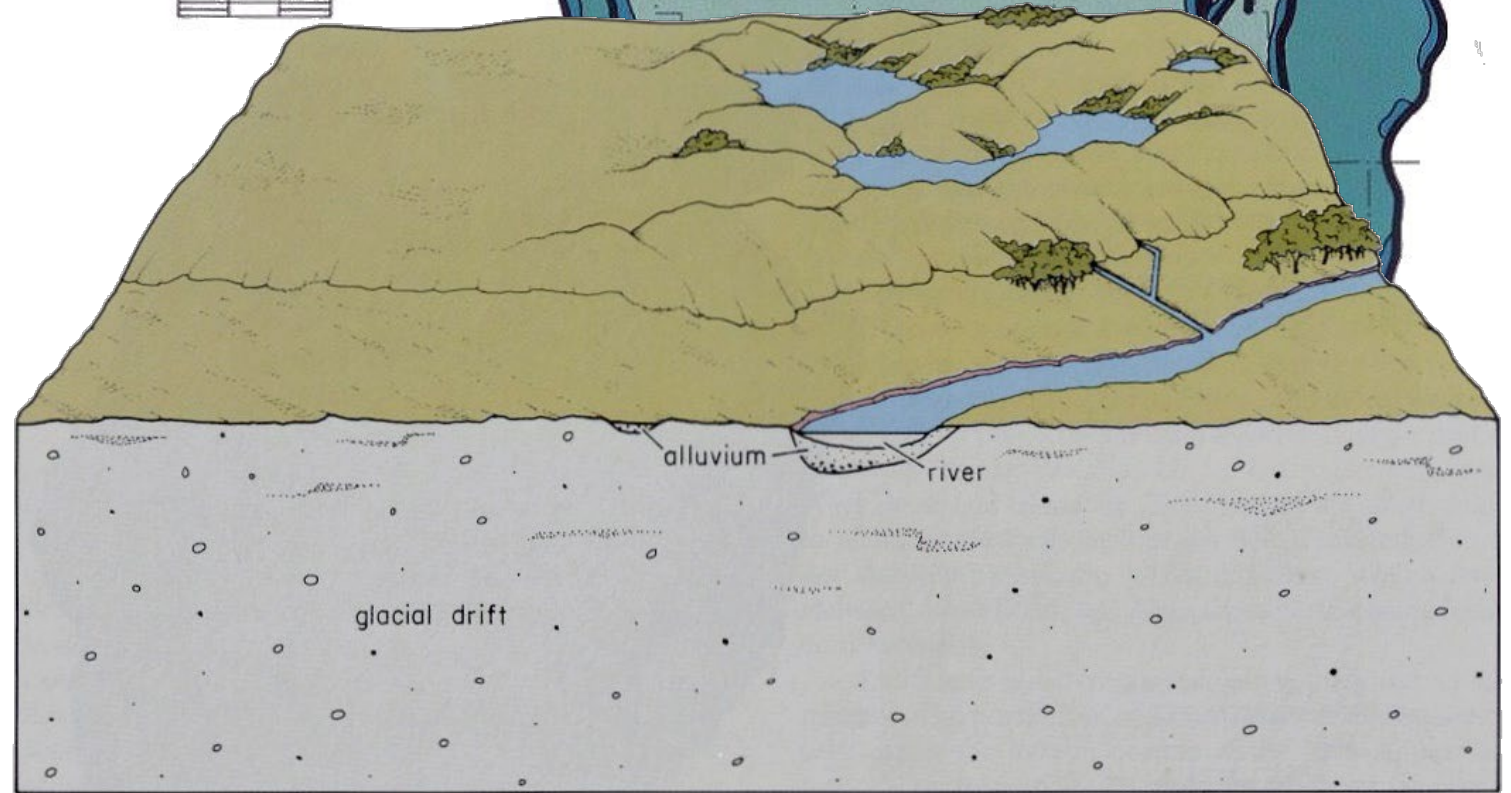


Des Moines Lobe



Terrain Characteristics

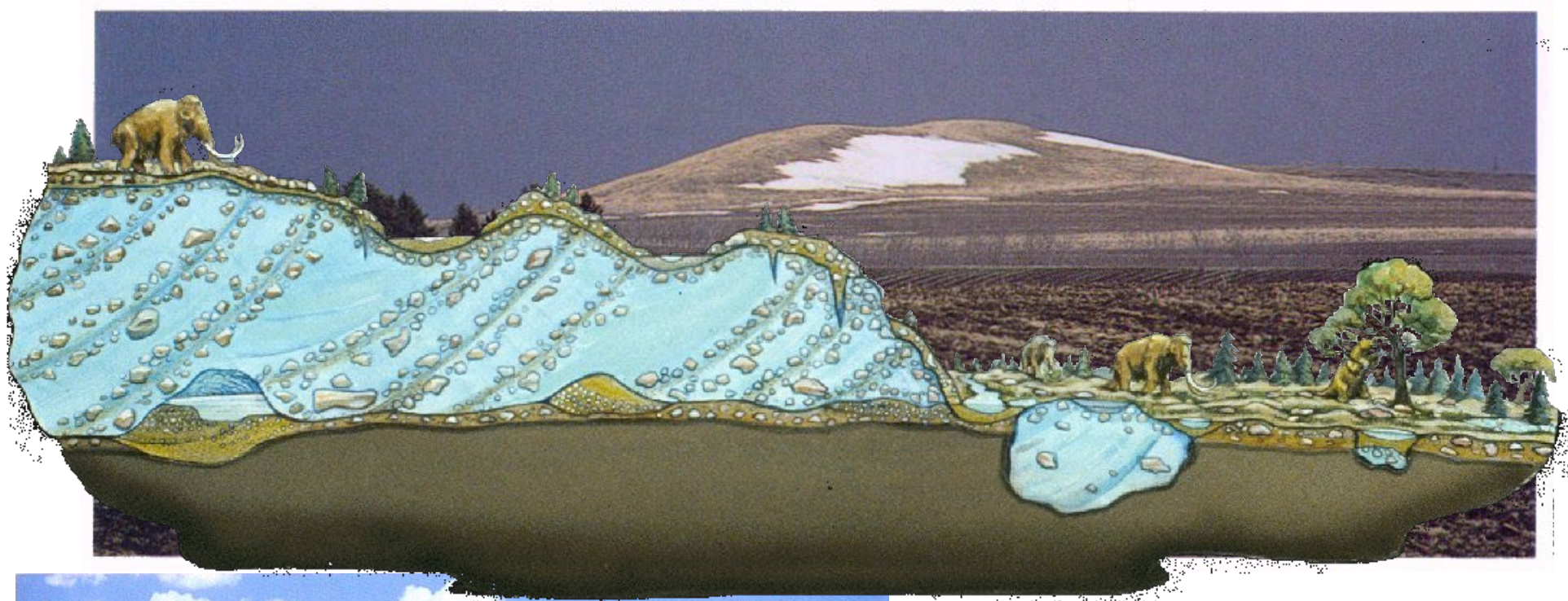
- * fresh glacial till
- * no loess cover
- * bands of knob and kettle terrain
- * areas of level terrain
- * poor surface drainage
- * natural lakes, wetlands



**fresh
glacial till**

exposures of Des Moines Lobe till
photos by Tim Kemmis





Ocheyeden Mound a large
Kame in Osceola Co.

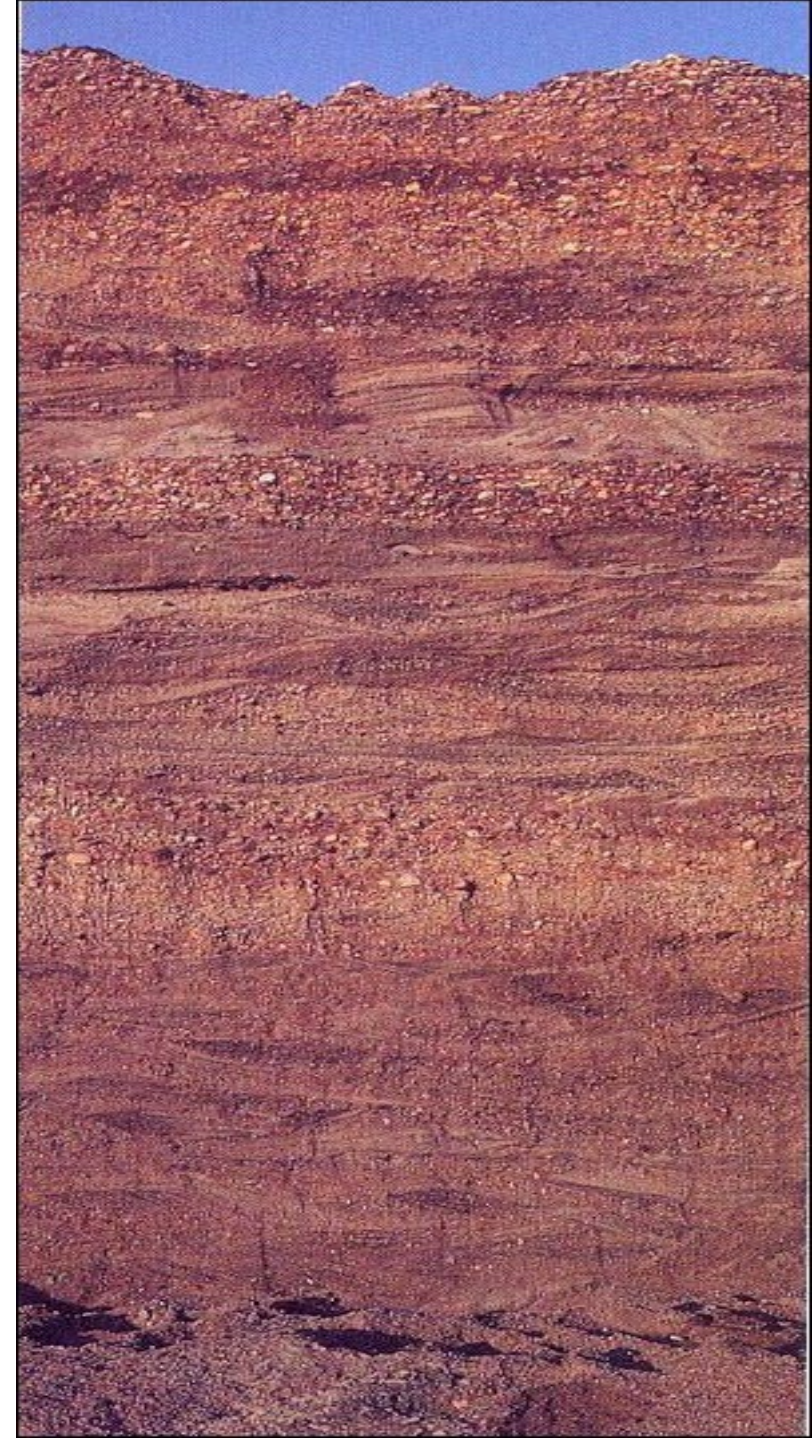


Freda Haffner Kettlehole
State Preserve
a large kettle in Dickinson Co.

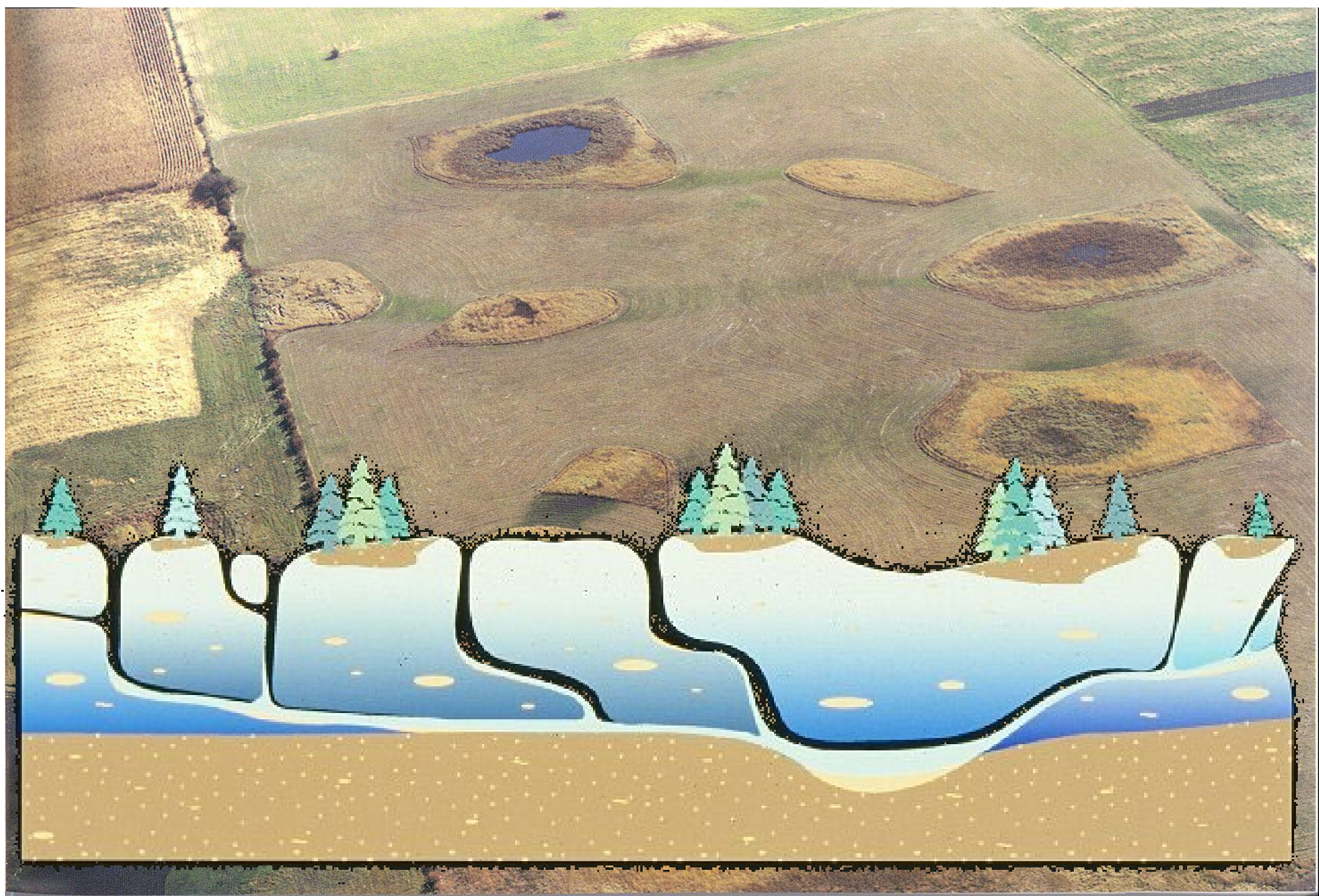
Upland sand and gravel deposits



Upland Sand and Gravel Deposit, Emmet County
photo by Tim Kemmis



linked depression systems



Doolittle Prairie, Story County
photo by Gary Hightshoe

Spring Run State Wildlife
Management Area, Dickinson
County photo by Douglas C. Harr

**poorly developed
drainage**

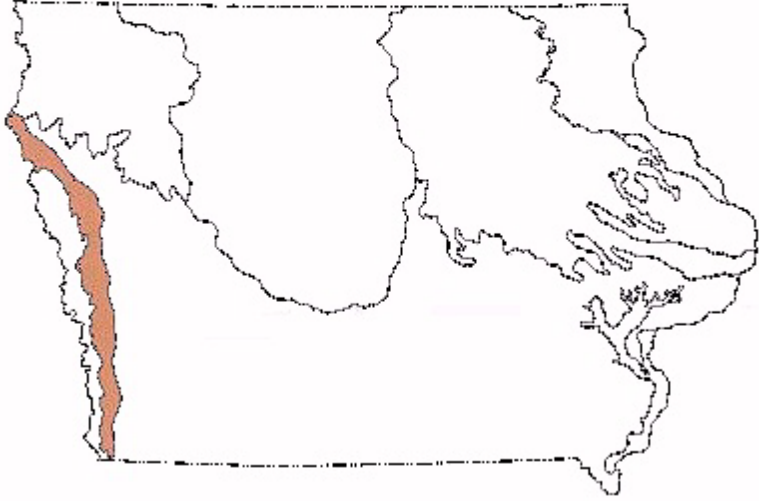


natural lakes and wetlands

Three Corner Pond, Dickinson
County *photo by Jean Prior*

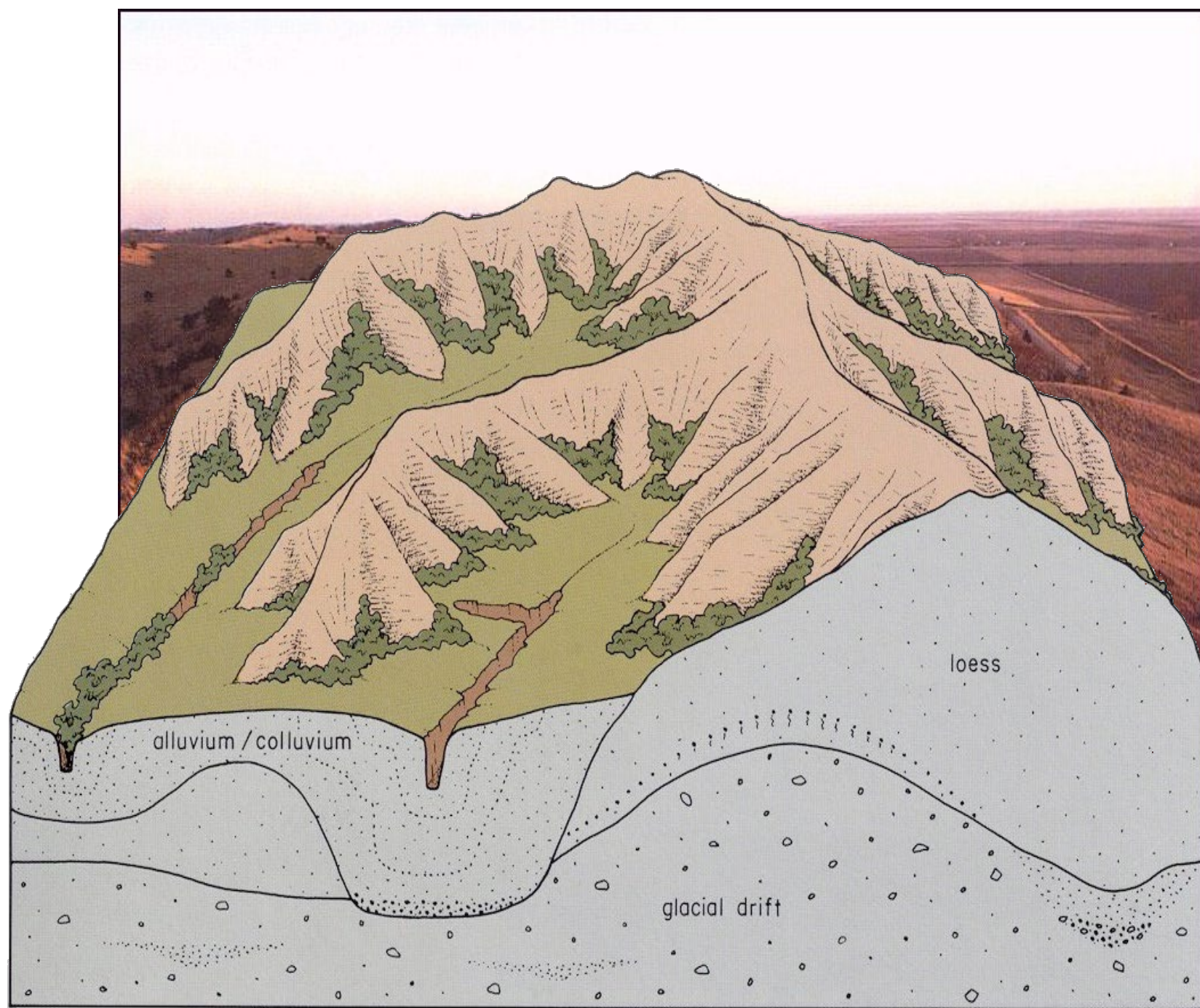


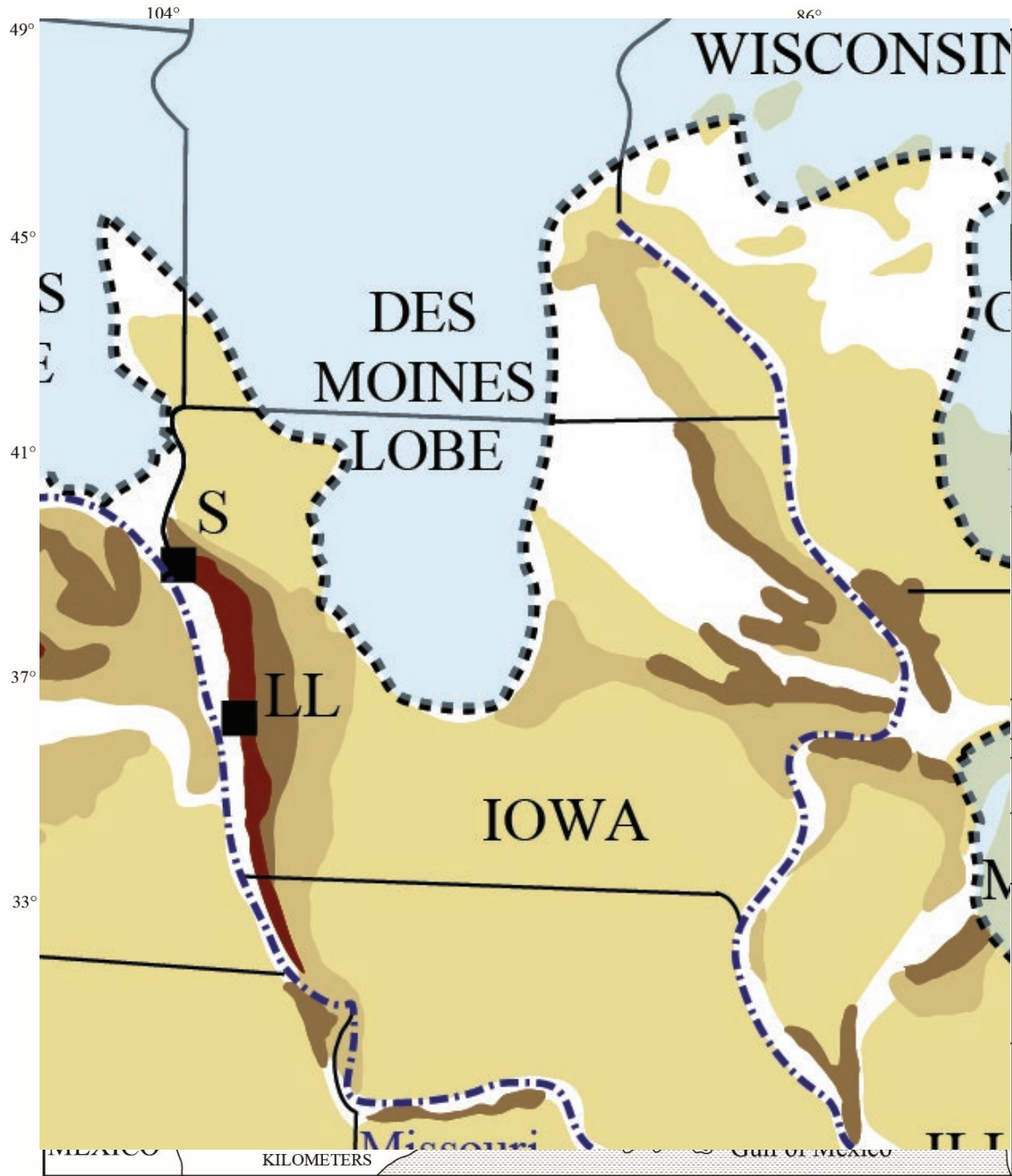
Loess Hills



Terrain Characteristics

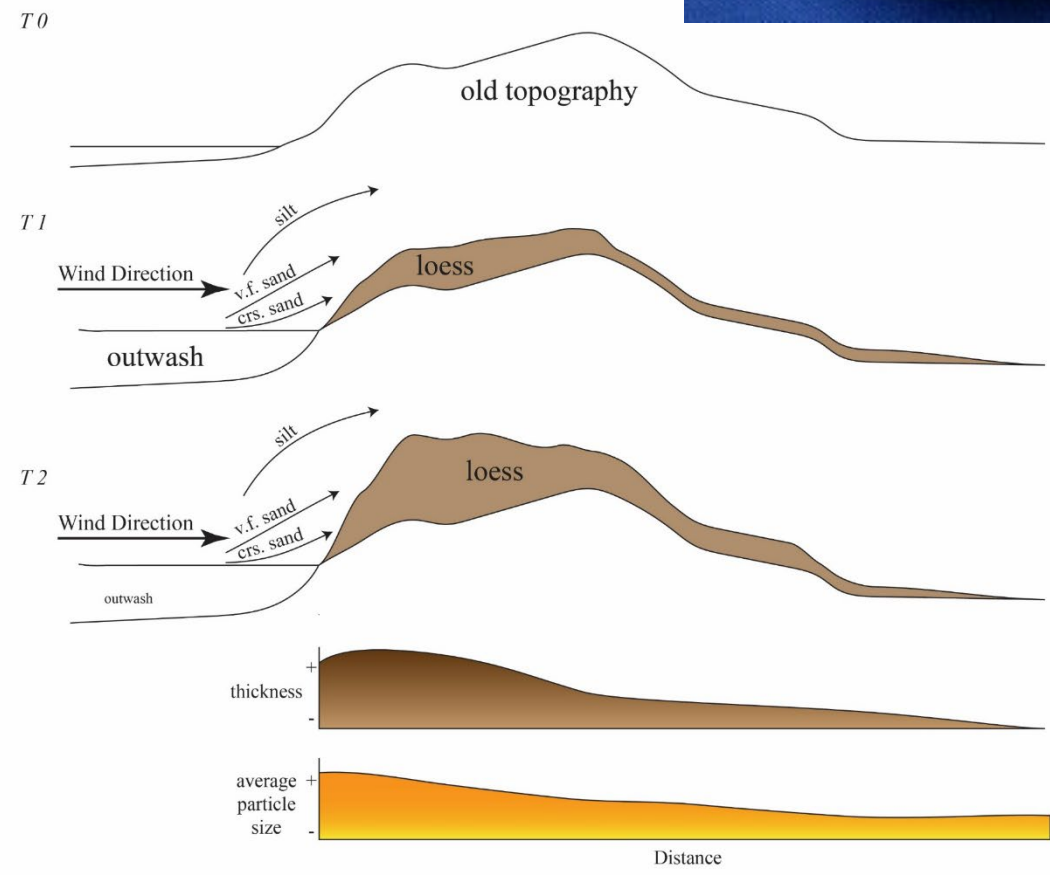
- * thick loess cover
- * sharply ridged terrain
- * high drainage density
- * rapid surface runoff
- * gully development
- * vertical road cuts



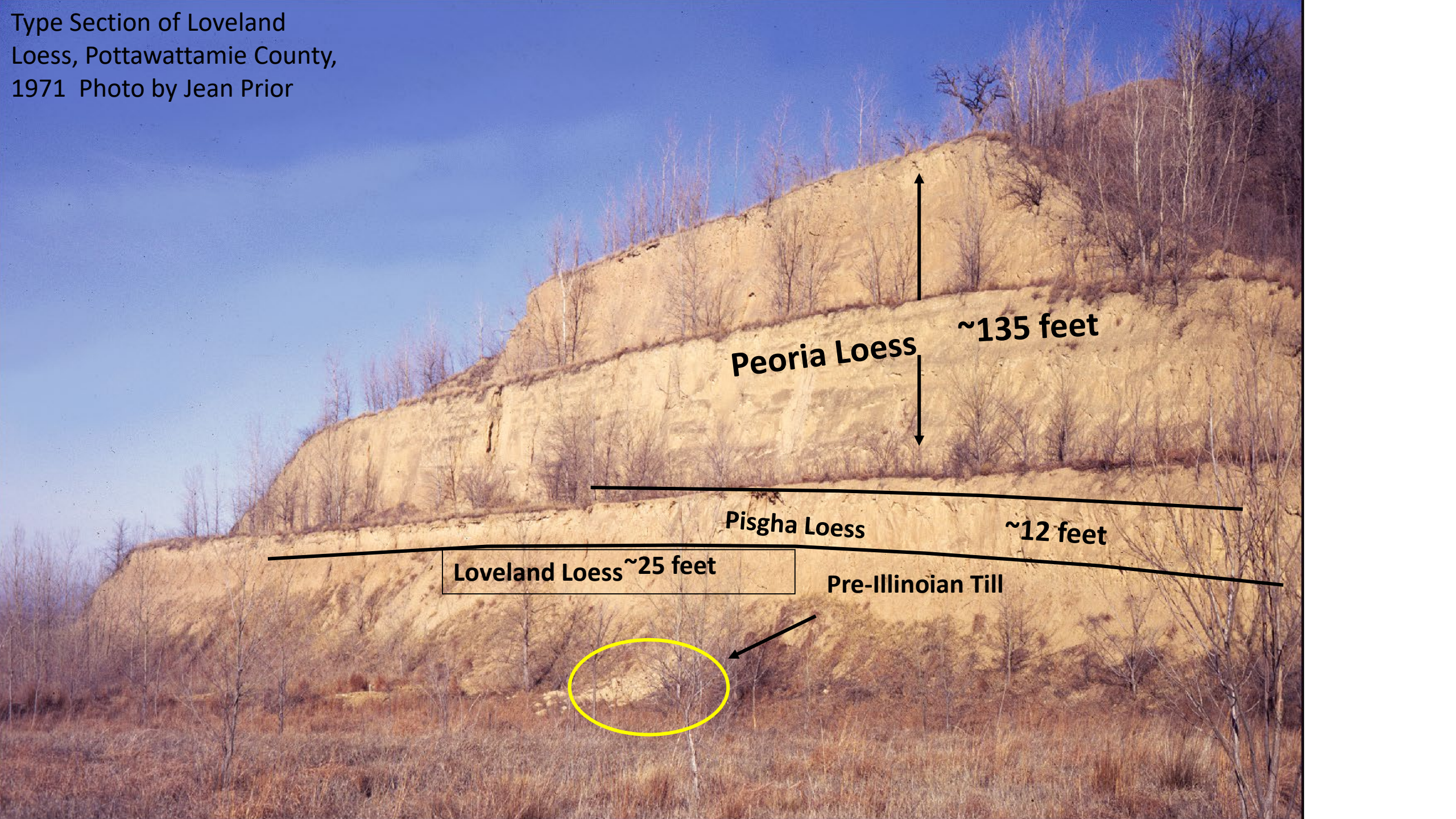


(Muhs et al., 2013)

Loess?



Type Section of Loveland
Loess, Pottawattamie County,
1971 Photo by Jean Prior



Peoria Loess ~135 feet

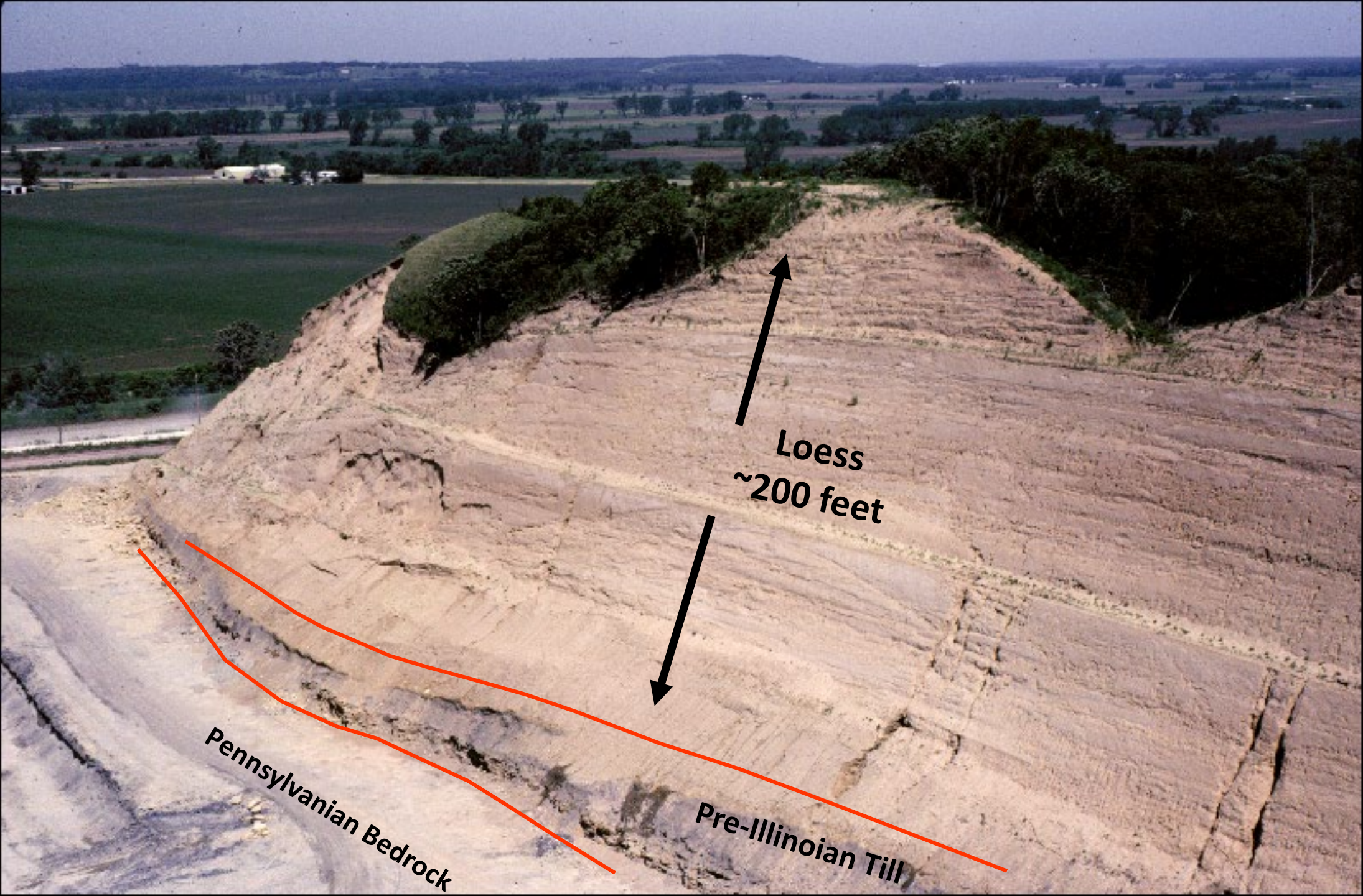
Pisgha Loess ~12 feet

Loveland Loess ~25 feet

Pre-Illinoian Till



thick loess co



Crescent Quarry, Pottawattamie County
photo by Ray Anderson

Loess
~200 feet

Pennsylvanian Bedrock

Pre-Illinoian Till

**sharply ridged
terrain**

Sharp ridge crests, Plymouth County
photo by Gary Hightshoe



Drainage development in thick loess,
Monona County *photo by Gary Hightshoe*

**high drainage
density**



gully development

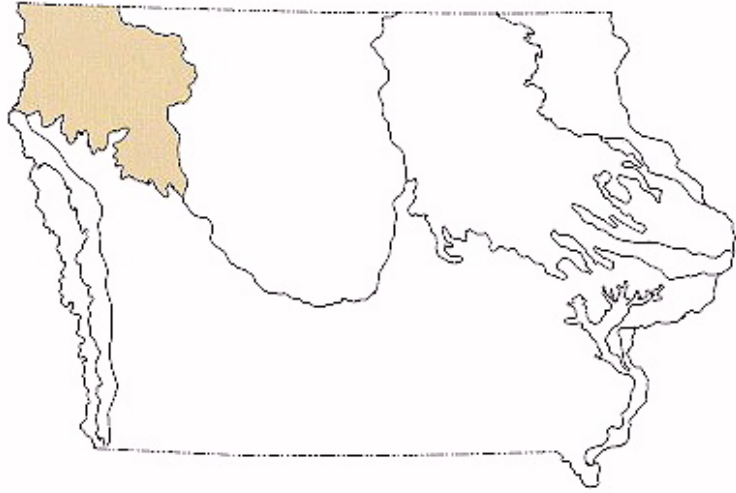


near Treynor, Pottawattamie County
photo by Tim Kemmis

Vertical loess cut, Durr Hill, Monona County
photo by Jean Prior



Northwest Iowa Plains

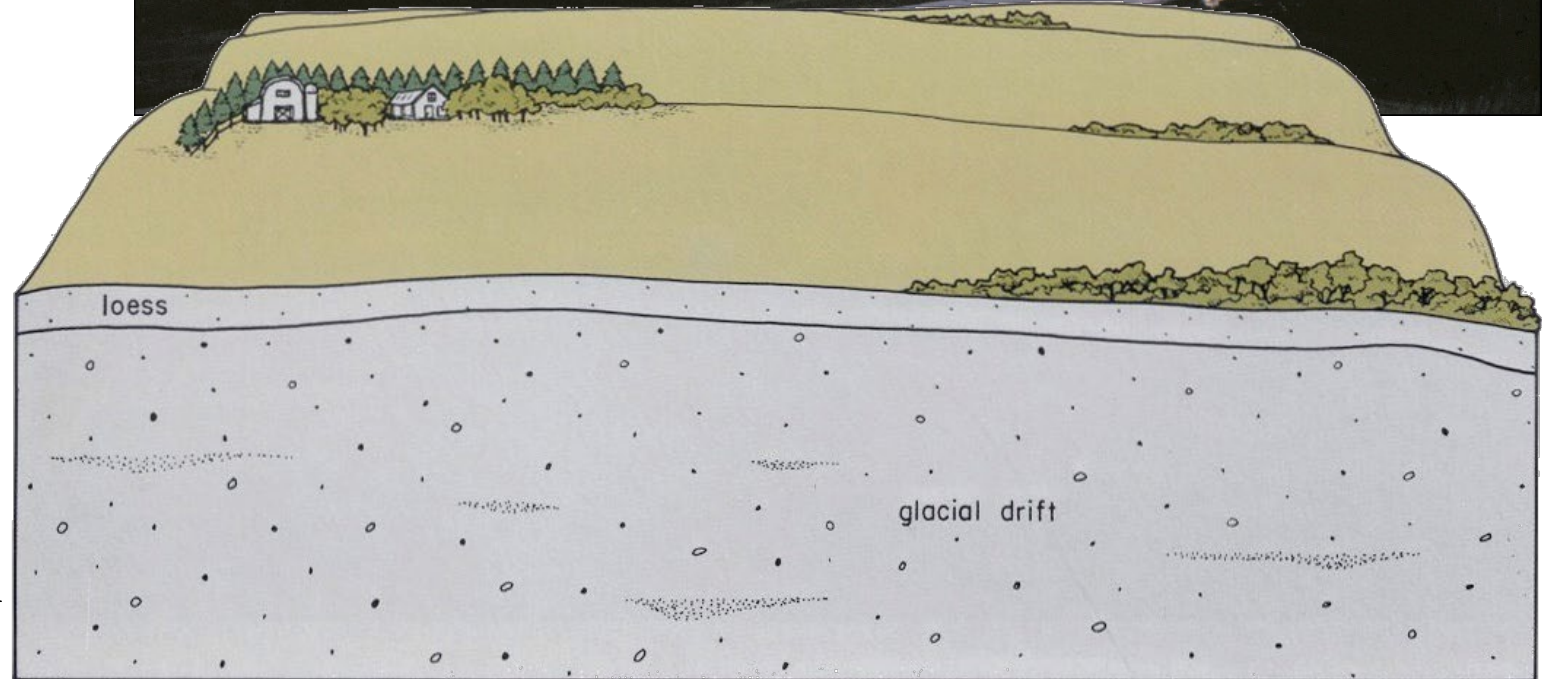


Northern Iowa Plains, Cherokee County *photo by Jean Prior*



Terrain Characteristics

- * moderate to thick loess over glacial till
- * gently rolling terrain
- * integrated drainage network



**moderate to thick
loess over glacial till**

Loess-capped hills in Northern Iowa Plains, O'Brien County

photo by Andy Assell



**gently rolling
terrain**

Rolling hills of the Northwest Iowa Plains *photo by Jean C. Prior*

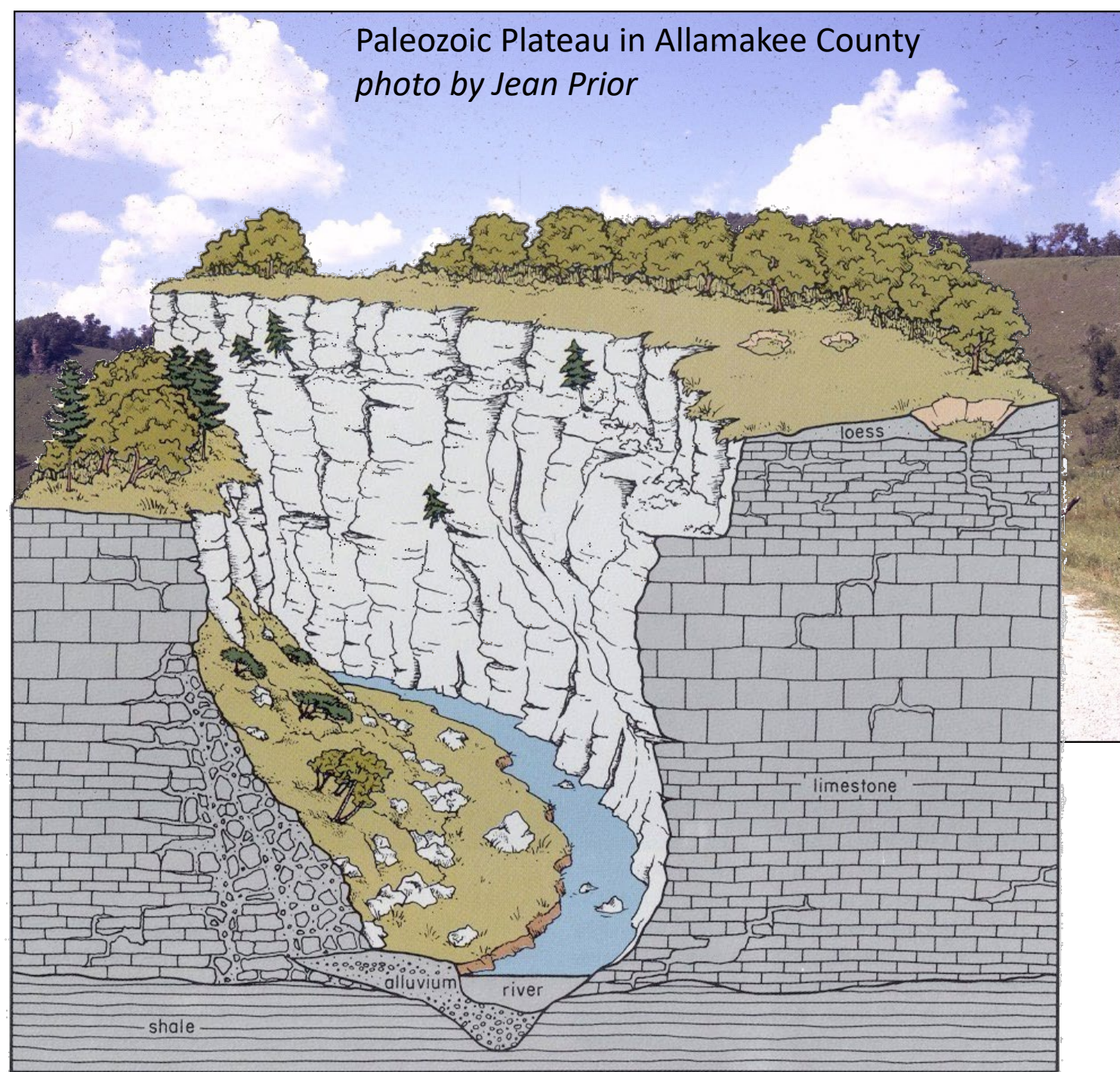


Paleozoic Plateau



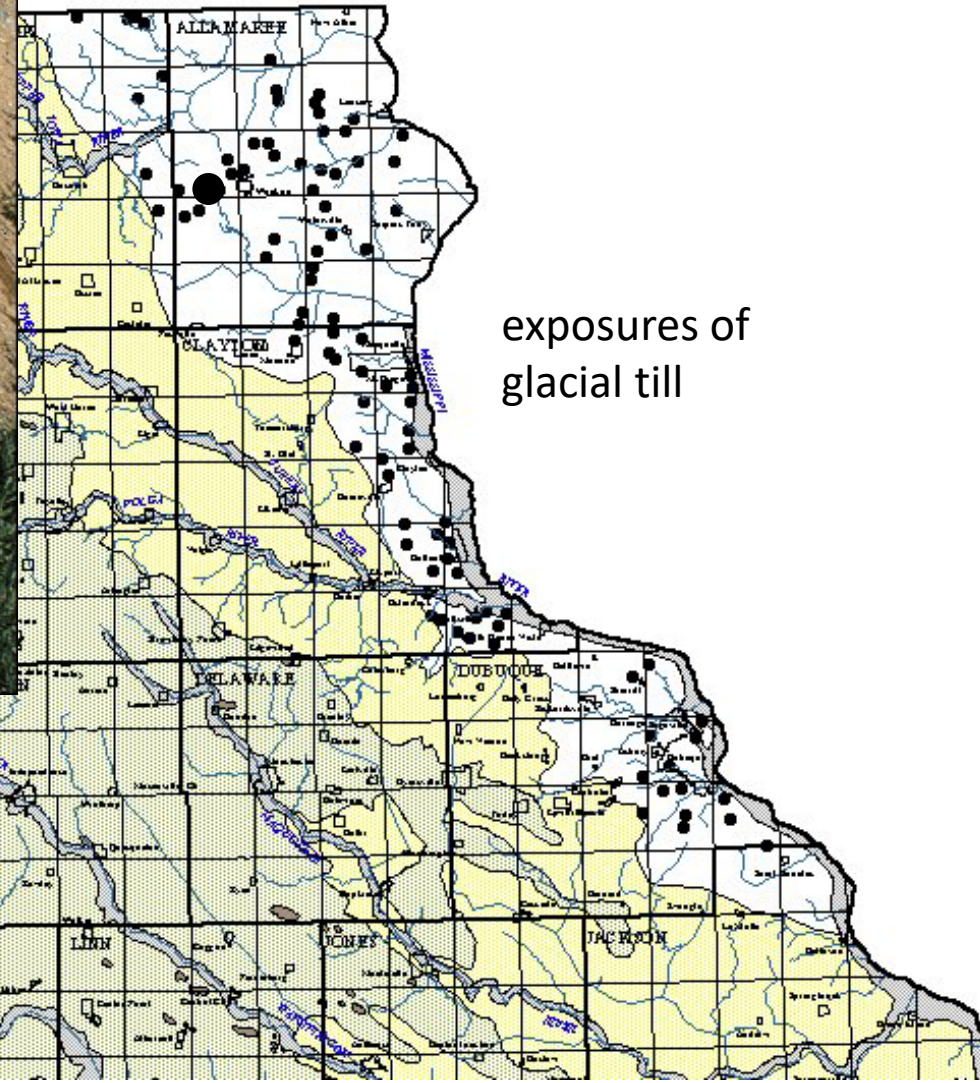
Terrain Characteristics

- * thin loess cover
- * Isolated patches of glacial drift
- * bedrock-dominated terrain
- * plateau-like uplands
- * integrated drainage network
- * deeply-entrenched valleys
- * karst topography
(sinkholes, caves, springs)





thin loess cover
isolated patches of glacial drift



exposures of
glacial till

Glacial Geology of Iowa
unpublished map by Jean Prior

Ordovician Galena Group Limestone Cliffs,
Upper Iowa River, Allamakee County *photo by Ray Anderson*



**bedrock-dominated
terrains**

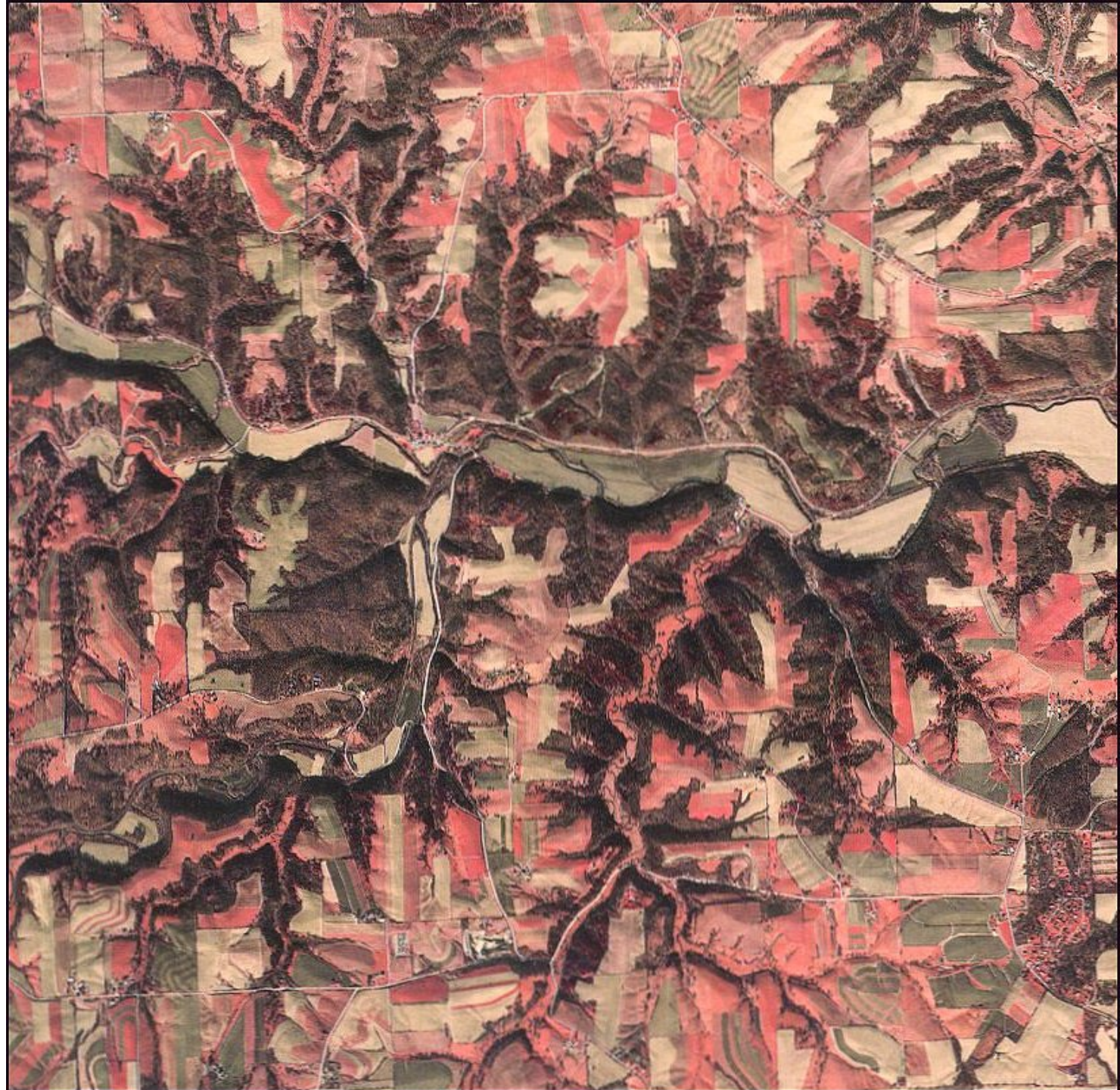
plateau-like uplands

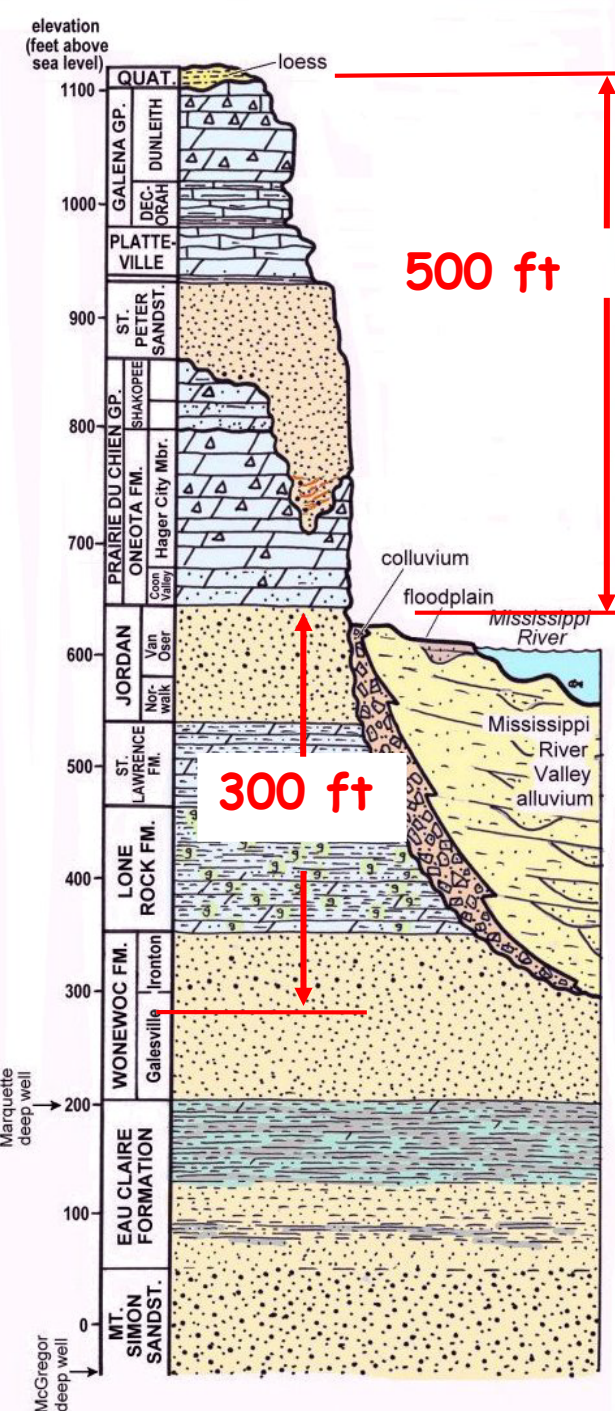


Mississippi River Valley, Allamakee County
photo by Jean Prior

integrated drainage network

Maquoketa River west
of Dubuque





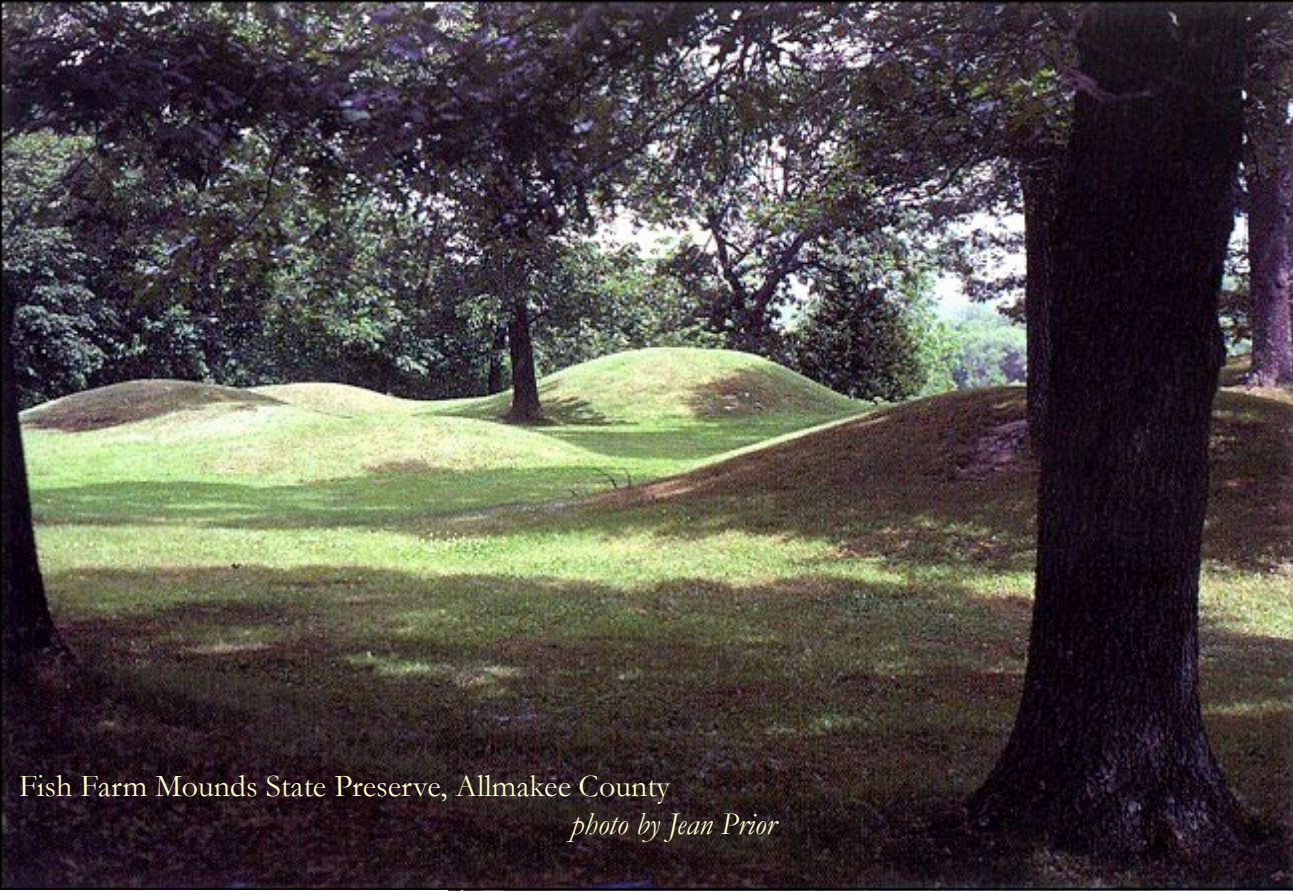
deeply-entrenched valleys



Mississippi Valley at Pikes Peak State Park, Allamakee County, Iowa. Photo by Ray Anderson

**Meandering
river,
crescent-shaped
point-bars**

Terraces



Fish Farm Mounds State Preserve, Allmakee County

photo by Jean Prior

karst topography



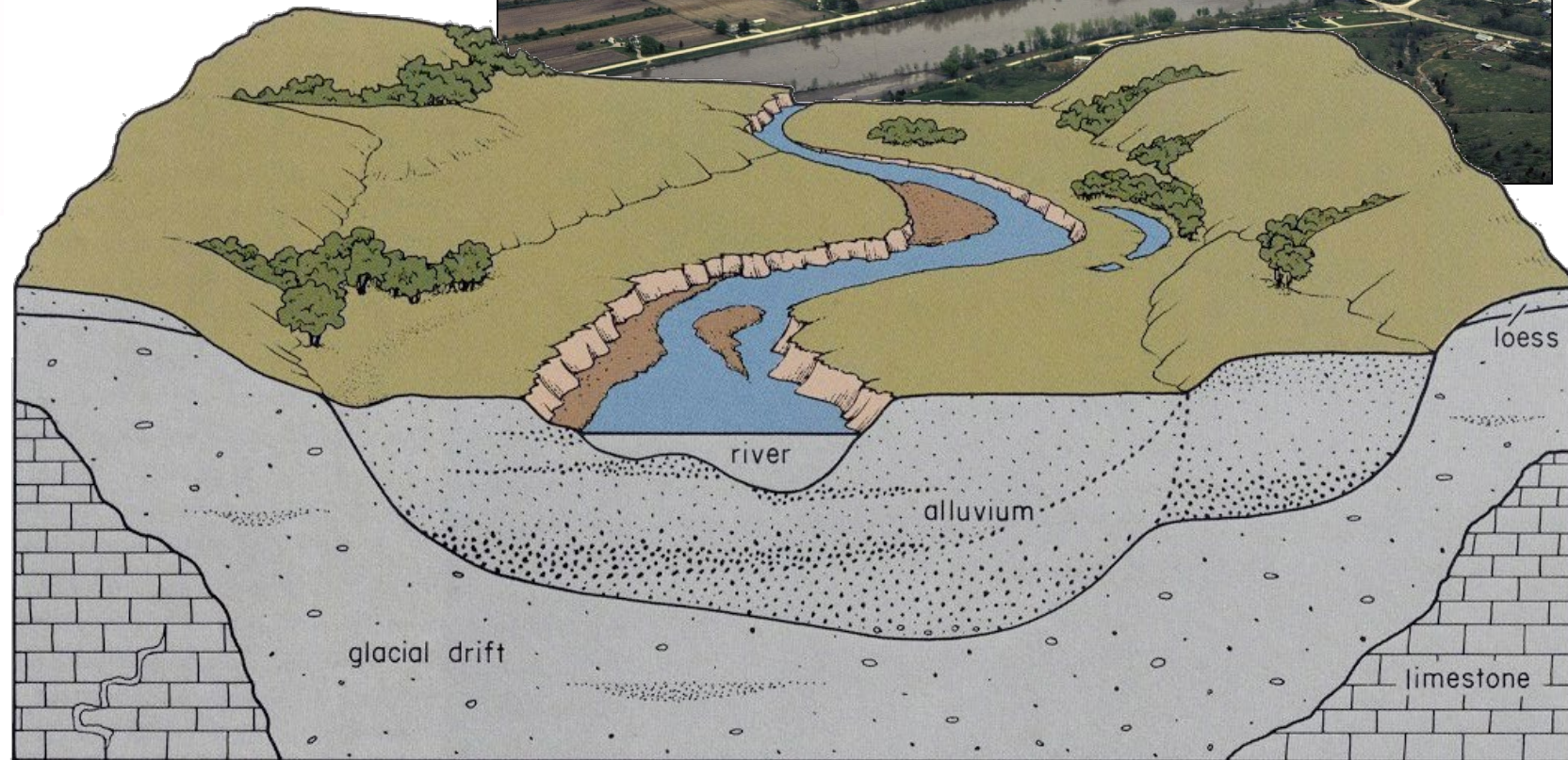
Sinkhole country, Clayton County
photo by Gary Hightshoe

Alluvial Plains



Terrain Characteristics

- * thick alluvium
- * level terrain along valleys includes stream channels, floodplains, oxbow lakes, terraces, alluvial fans, sand dunes





Shell Rock River Alluvium, Worth County

photo by Tim Kemmis