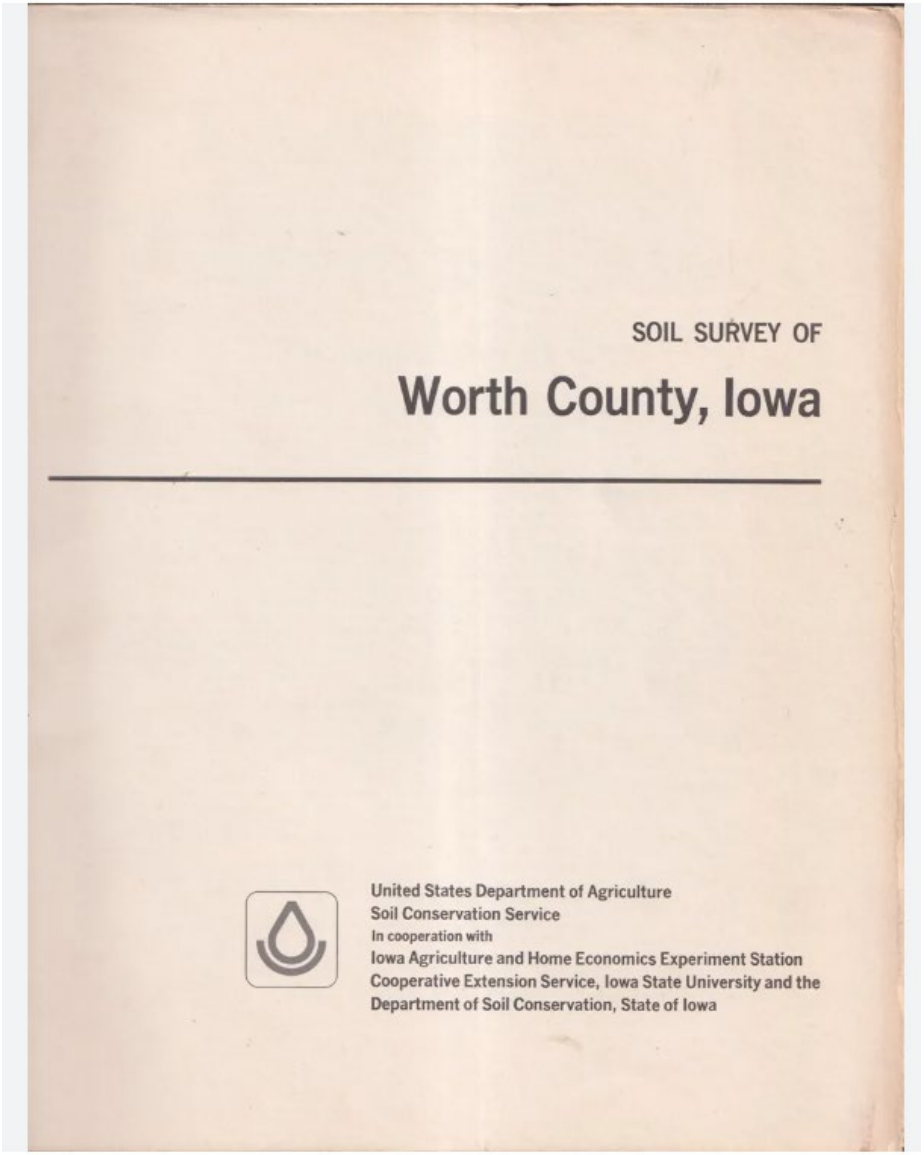
Soil Mapping & Landscapes



Soil Survey

- A soil survey is a detailed report on the soils of an area.
- The soil survey has maps with soil boundaries and photos, descriptions, and tables of soil properties and features

Major parts of a soil survey

- Table of Contents
- Detailed soil map units
- Use and management and interpretive tables
- Classification of soils
- References
- Glossary
- Index to map sheets
- Soil maps

Geomorphology – Energy > Processes > Products

Concept 1. The same physical processes and laws that operate today have operated throughout geologic time, although not necessarily always with the same intensity as now. (Uniformitarianism) Soil #1

Concept 2. Geologic structures are a dominant controlling factor/variable in the evolution of landforms and they are reflected in them.

Concept 3. To a large degree the Earth's surface relief is a product of geomorphic processes operating at differential rates.

Concept 4. Geomorphic processes leave their distinctive imprint upon landforms, and each geomorphic process develops its own characteristic landform assemblage. Soil #2

Concept 5. Various erosional agents force their 'will' upon the Earth's surface producing an orderly sequence of landforms.

Concept 6. Complexity in geomorphic evolution is more common than simplicity. Soil #8

Concept 7. Little of the Earth's topography is older than the Tertiary (66 to 2.6 Ma) and most of it is no older than the Pleistocene (past 2.6 Ma). Soil #7

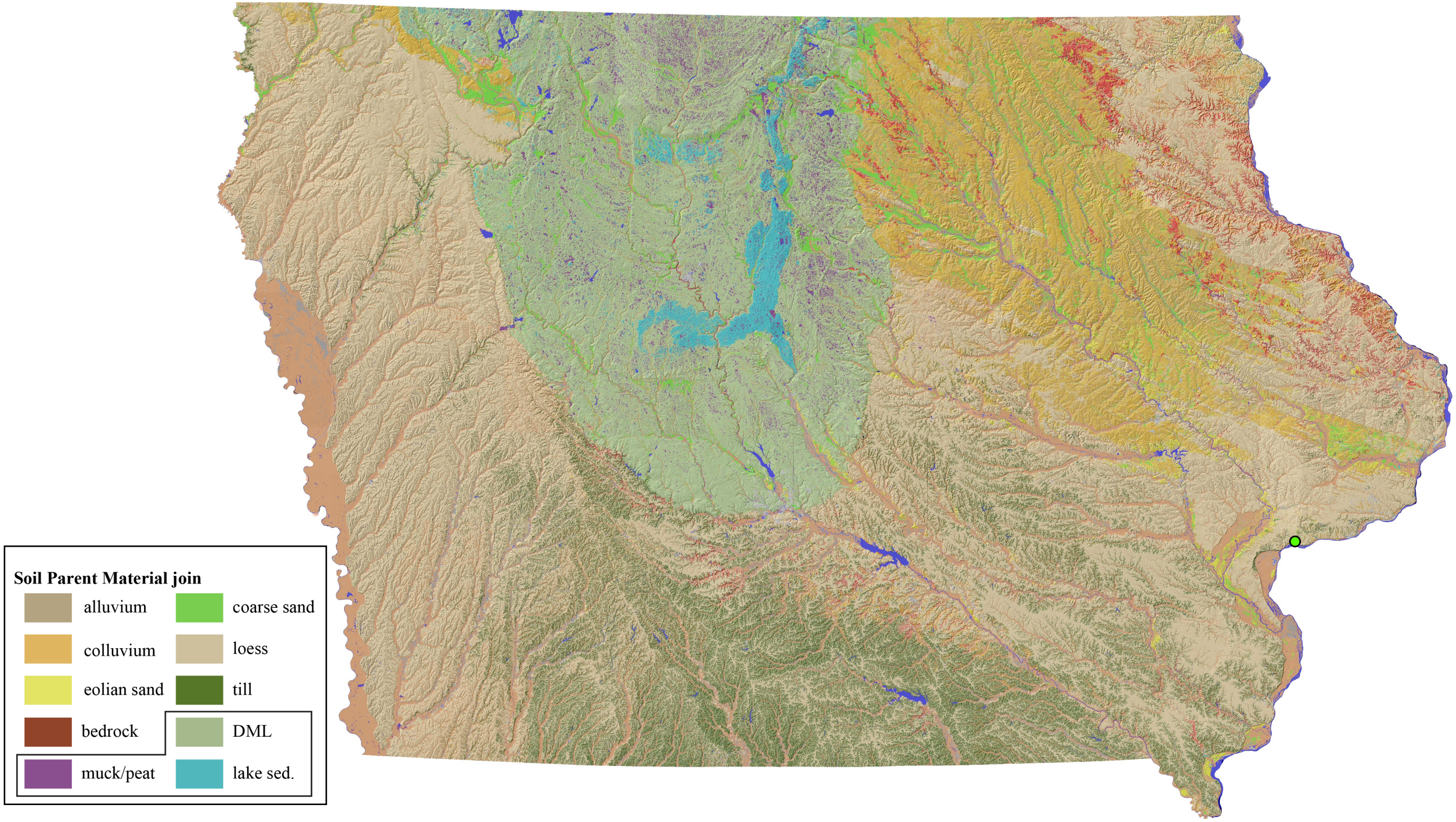
Concept 8. Proper interpretation of present-day landscapes is impossible without a full appreciation of the geologic and climatic manifold of changes that occurred throughout the Pleistocene. Soil #5

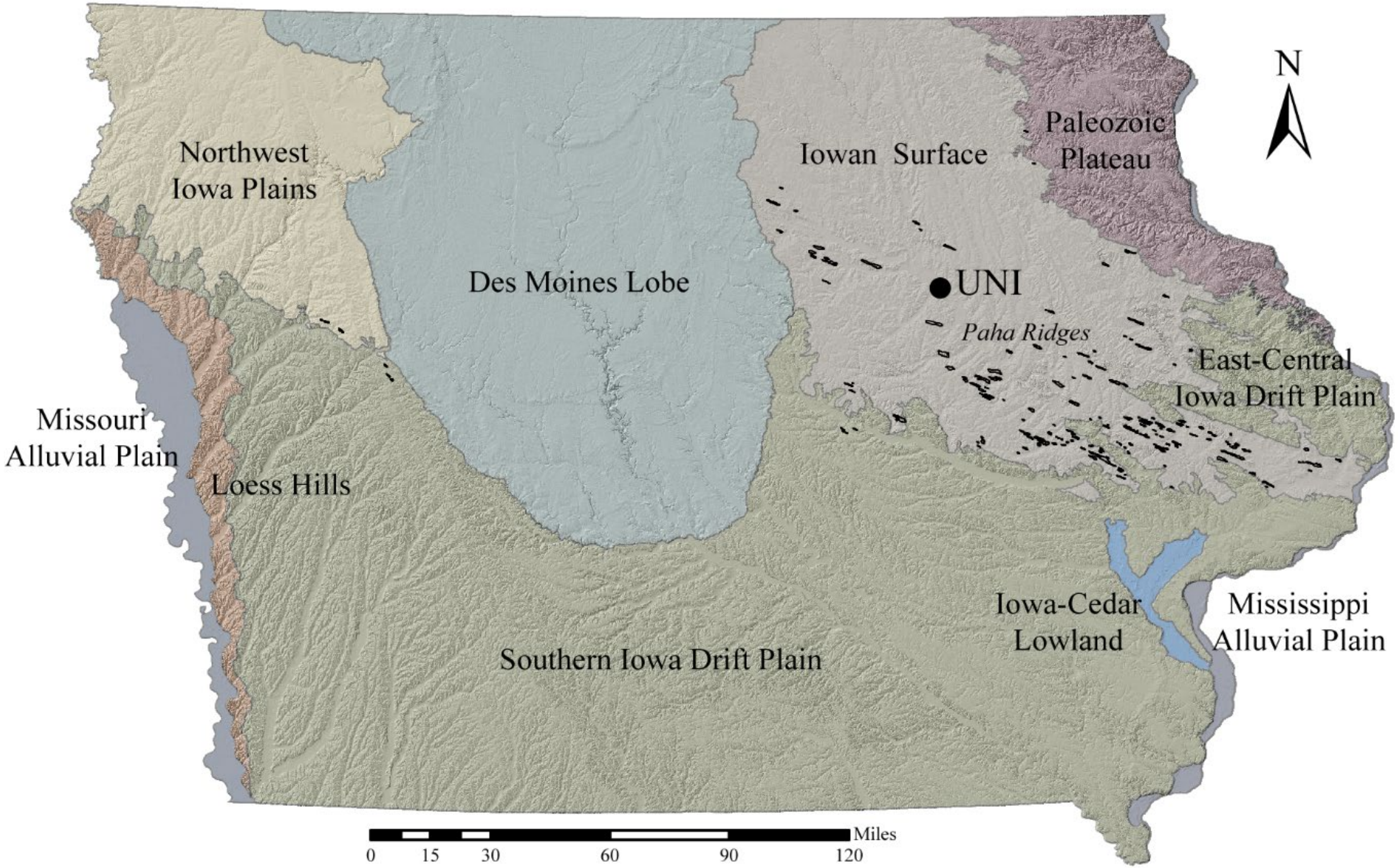
Concept 9. An appreciation of the Earth's climatic variance is necessary to form a proper understanding of the evolving importance of its different geomorphic processes. Soil #6

Concept 10. Geomorphology, although concerned primarily with present-day landscapes, attains its maximum usefulness by historical extension and/or predictive modeling.

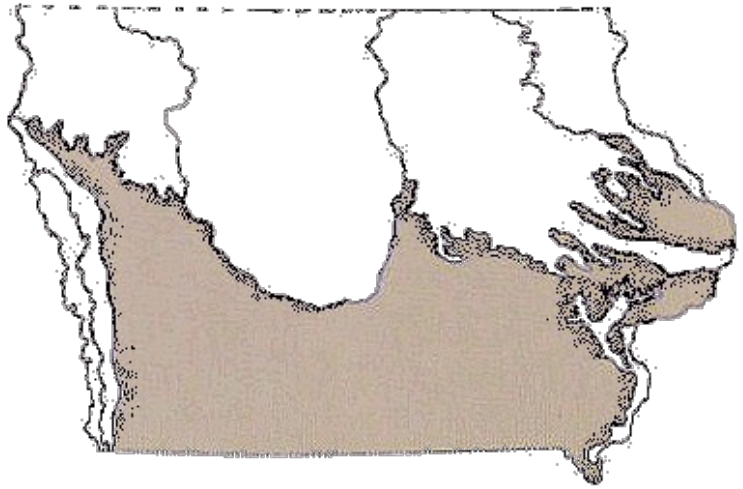
Goal – Find patterns between soils and landforms

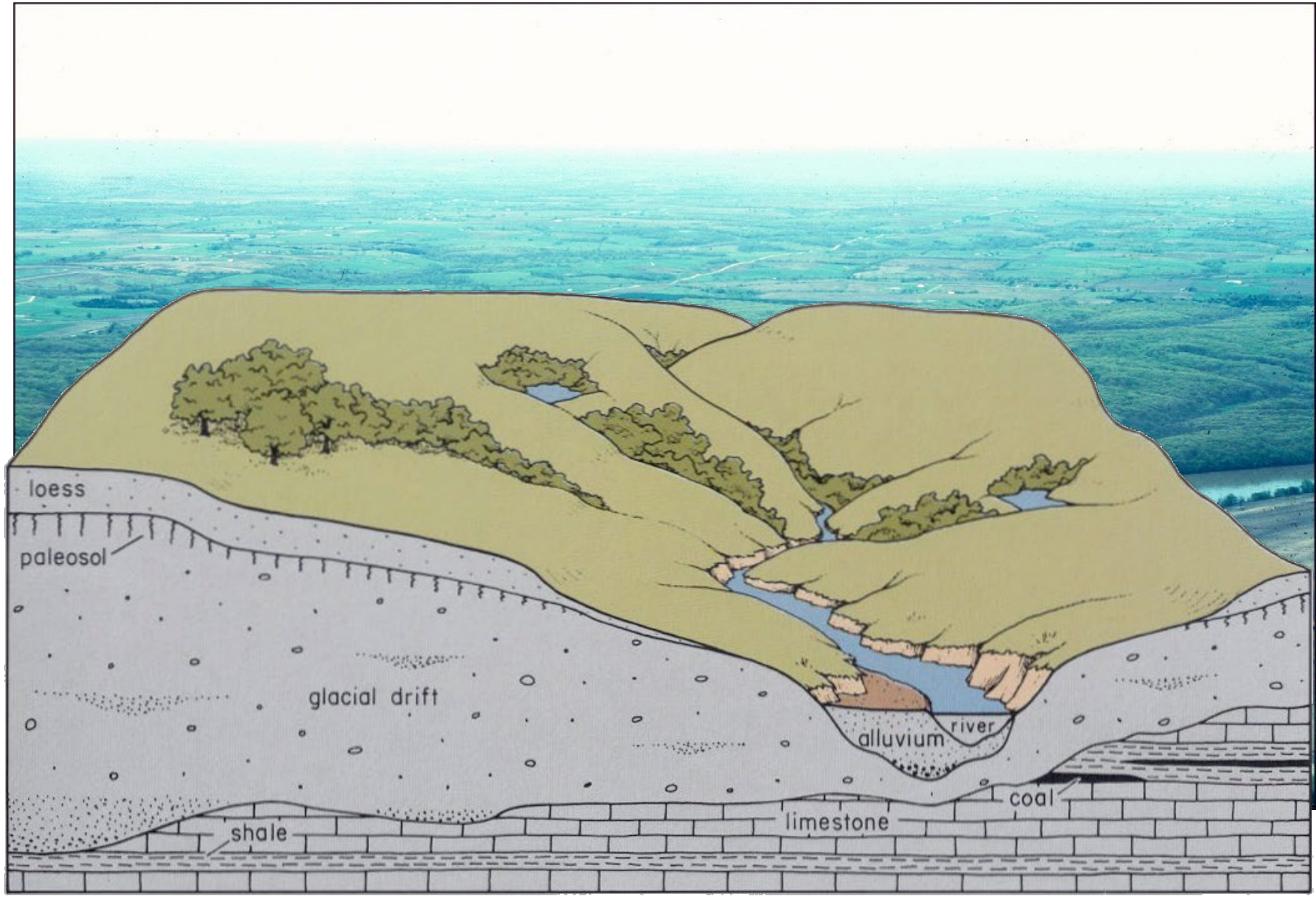
Uses those patterns to interpret the past and model the future.


Soil Parent Material join
alluvium
coarse sand
colluvium
loess
eolian sand
till
bedrock
DML
muck/peat
lake sed.


N
Northwest
Iowa Plains
Iowan Surface
Paleozoic
Plateau
Des Moines Lobe
UNI
Paha Ridges
East-Central
Iowa Drift Plain
Missouri
Alluvial Plain
Loess Hills
Iowa-Cedar
Lowland
Mississippi
Alluvial Plain
Southern Iowa Drift Plain
Miles
0
15
30
60
90
120

Southern Iowa Drift Plain

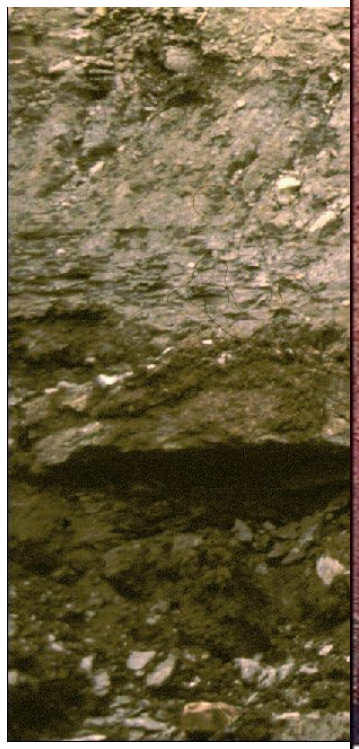




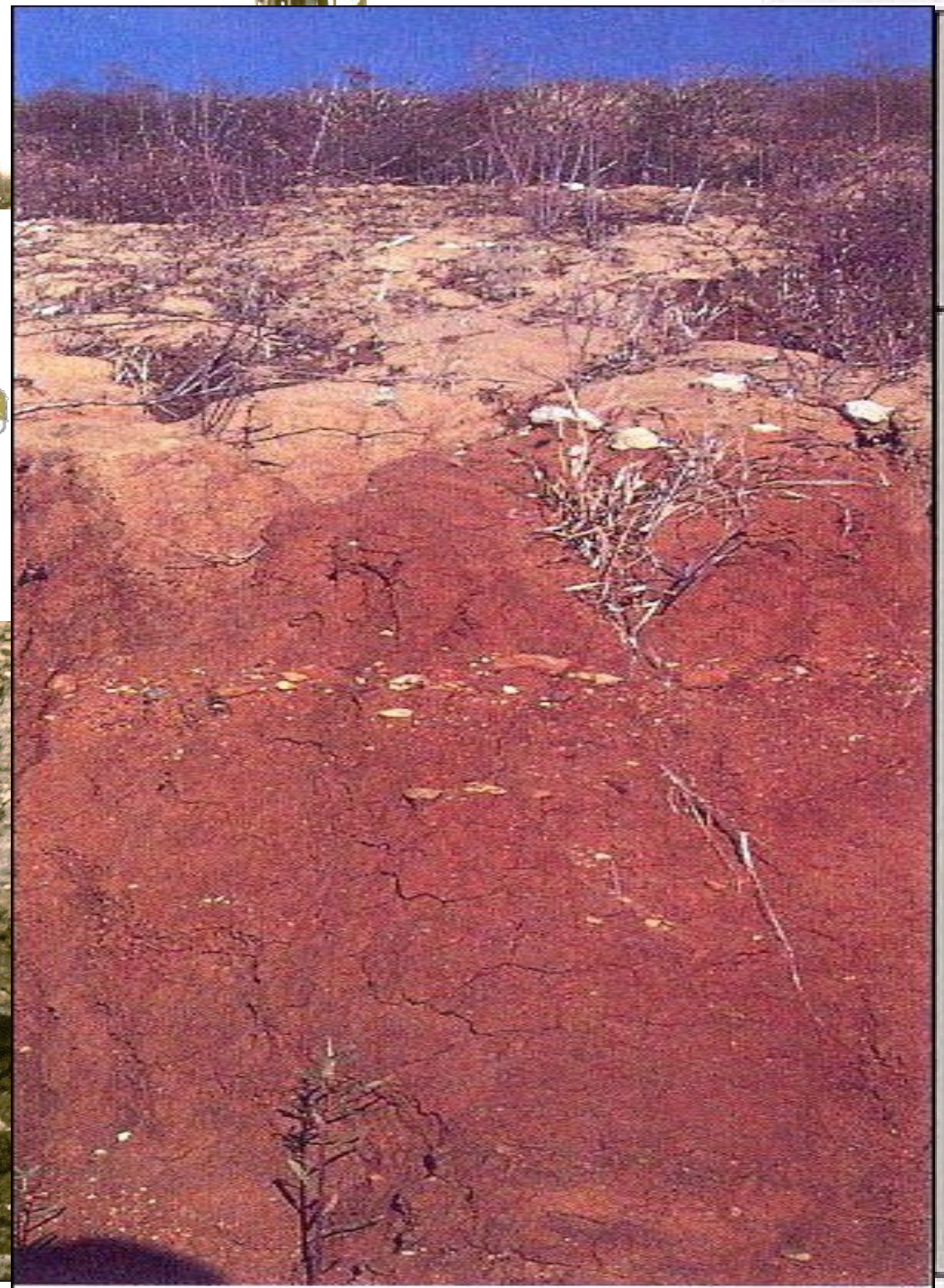
Terrain Characteristics

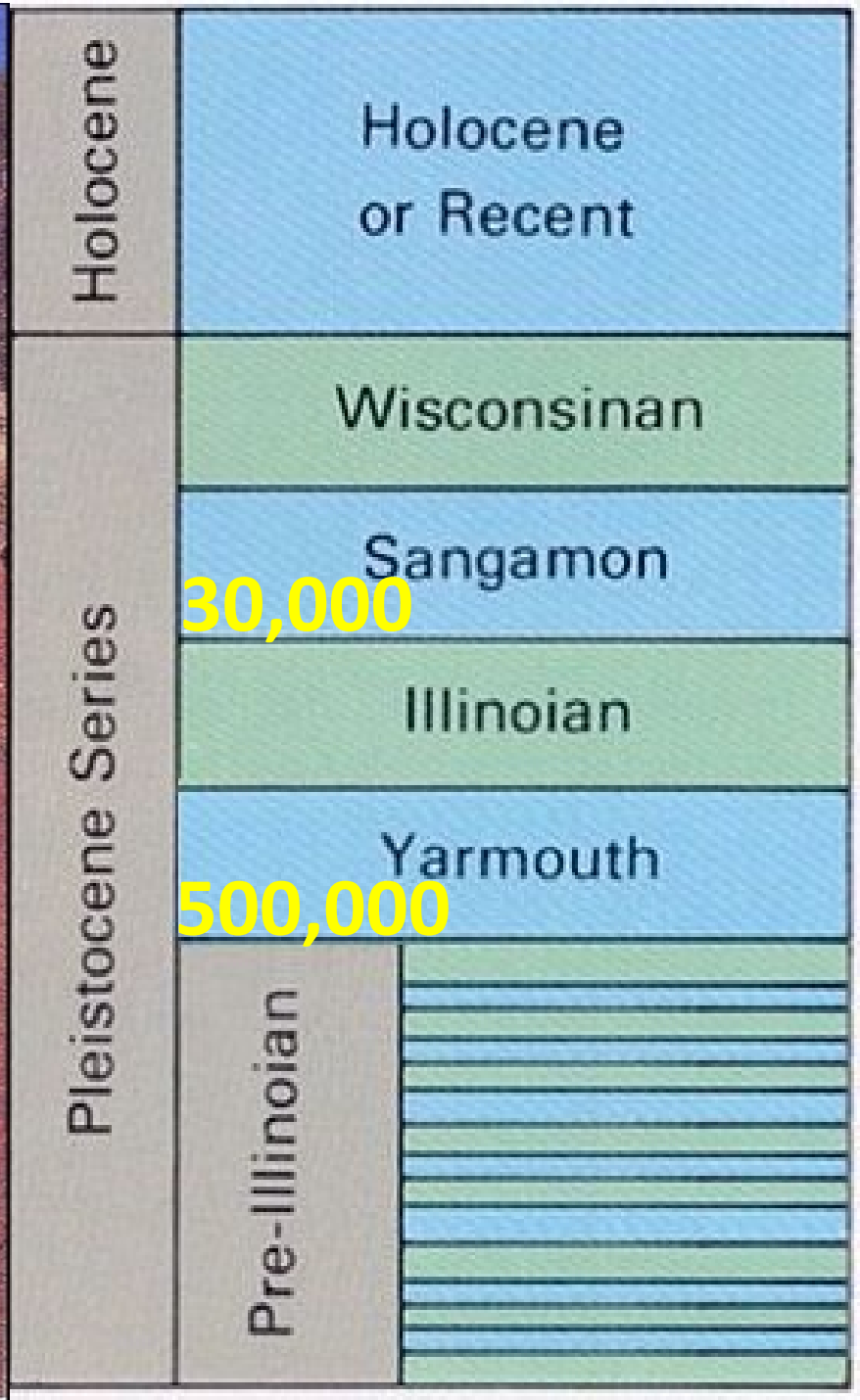
* moderate loess cover
* weathered glacial drifts with paleosols
* integrated drainage network
* bedrock exposed in deeper valleys

Weathered glacial drift with paleosols

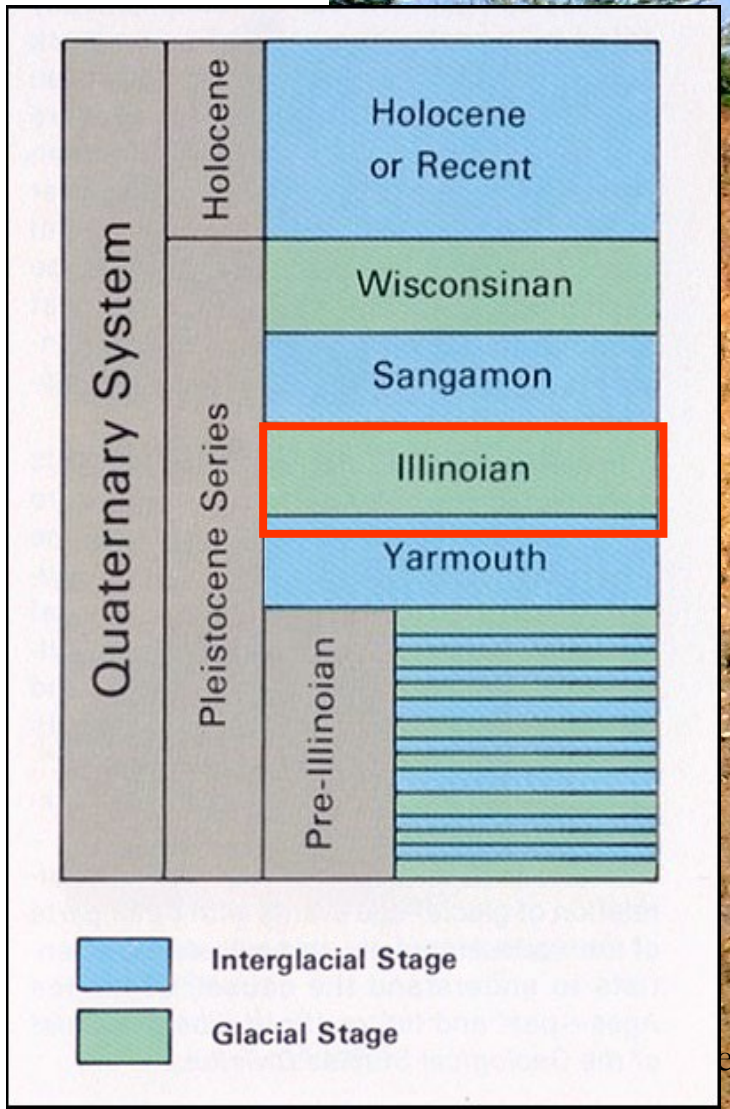


Two Pre-Illinoian tills at the Braddyville Qua
Yarmouth-Sangamon Paleosol "gumbo till",





weathered glacial drift & paleosol



limits of Illinoian till in Iowa

ybp

- - -30,000

-- 130,000

Peoria Loess

Sangamon Geosol

oxidized till

Illinoian Till

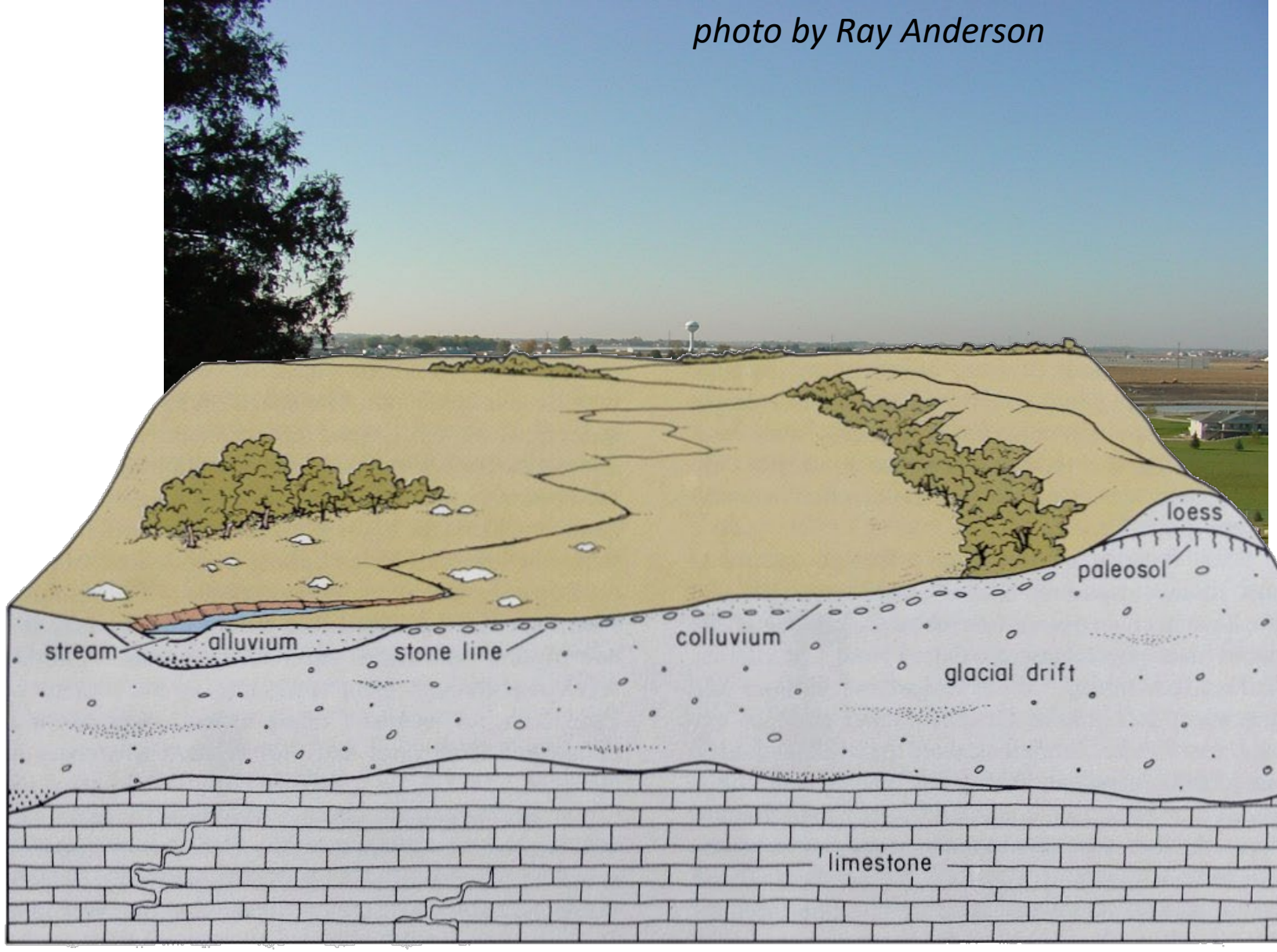
unoxidized till

es Moines County *by Ray Anderson*

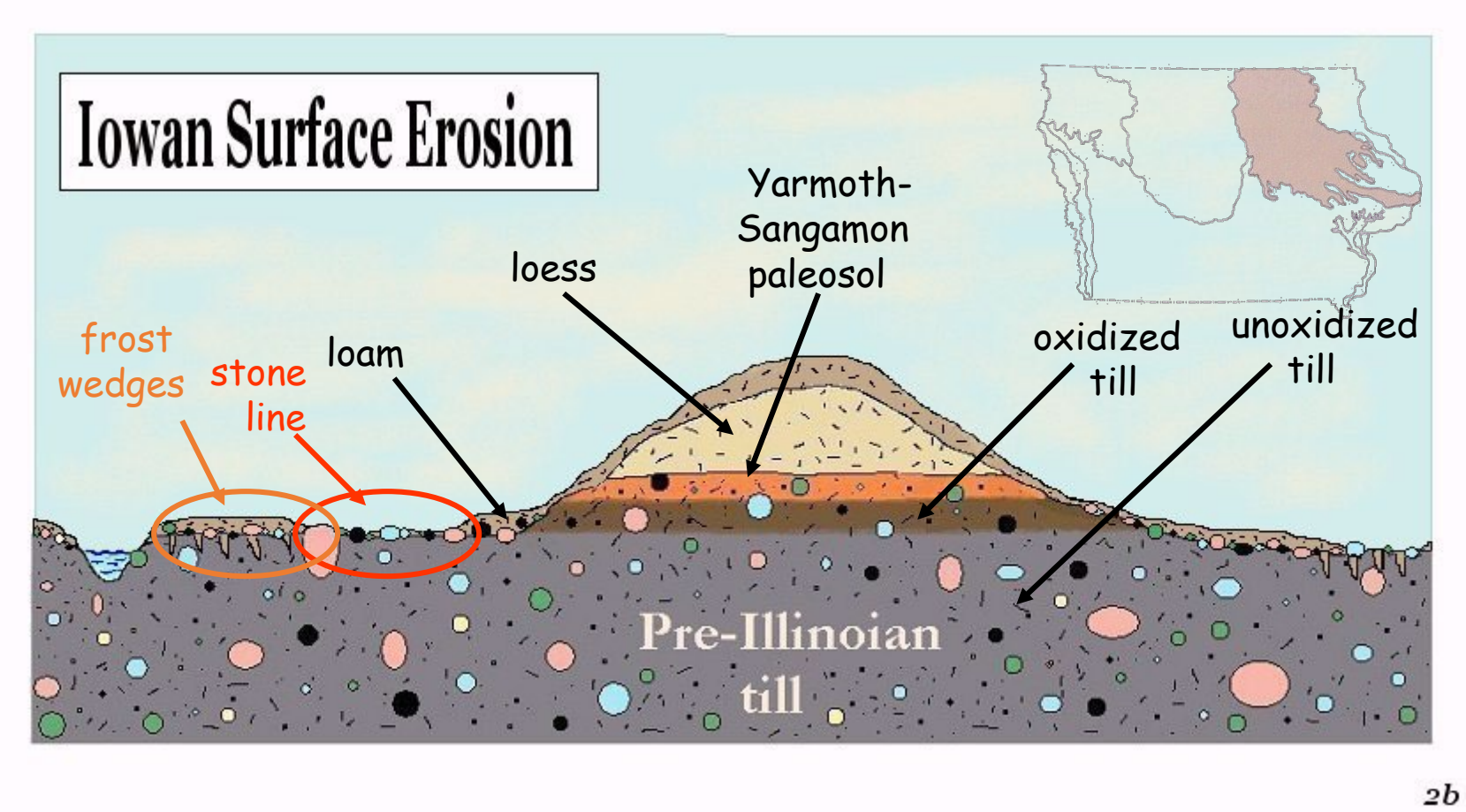
Iowan Surface

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)



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

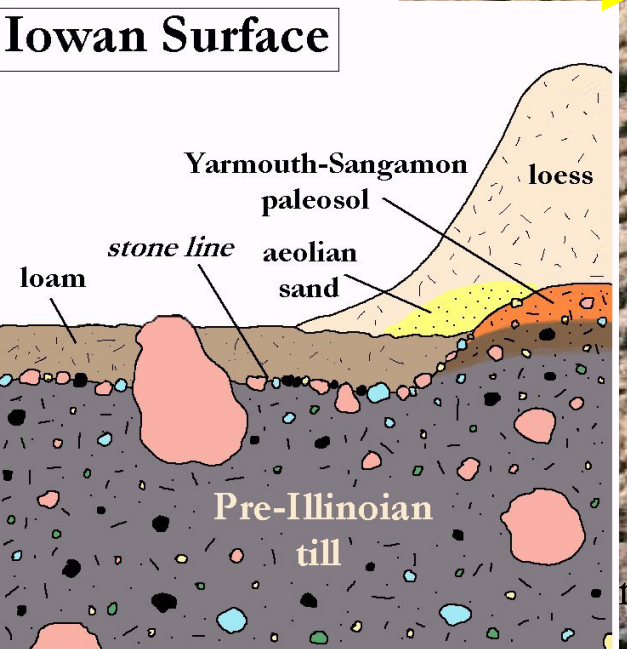


thin, discontinuous loess or loam over glacial drift

loam

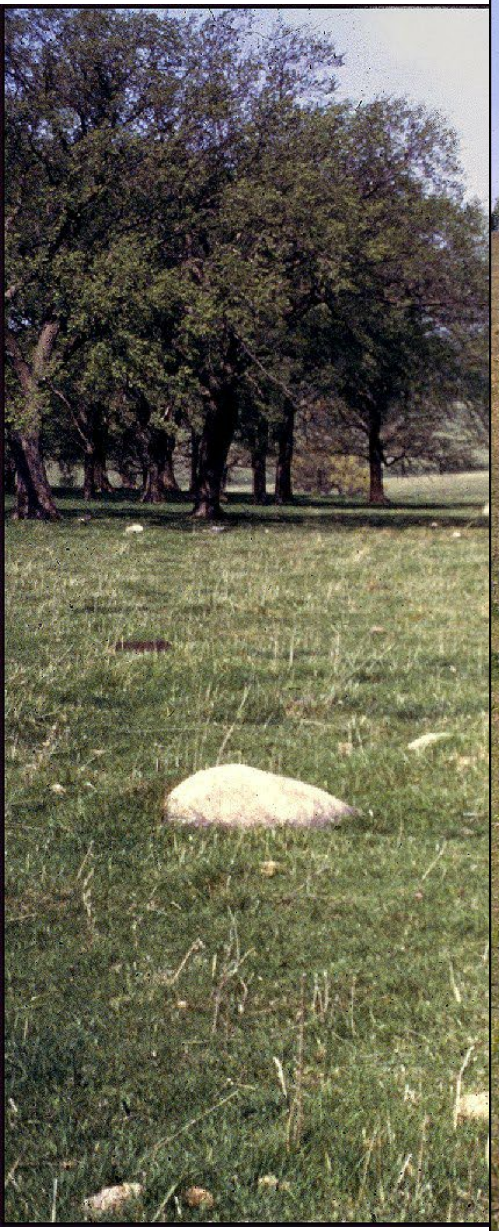
stone line

PreIllinoian till



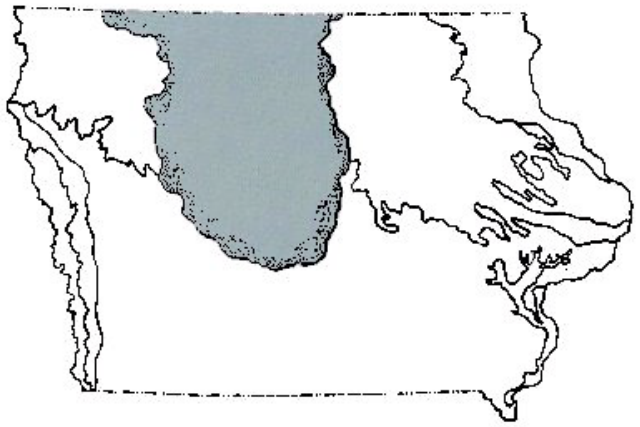
n Surface soil profile in south Cedar Falls *photo by Jim Walters*

scattered glacial boulders



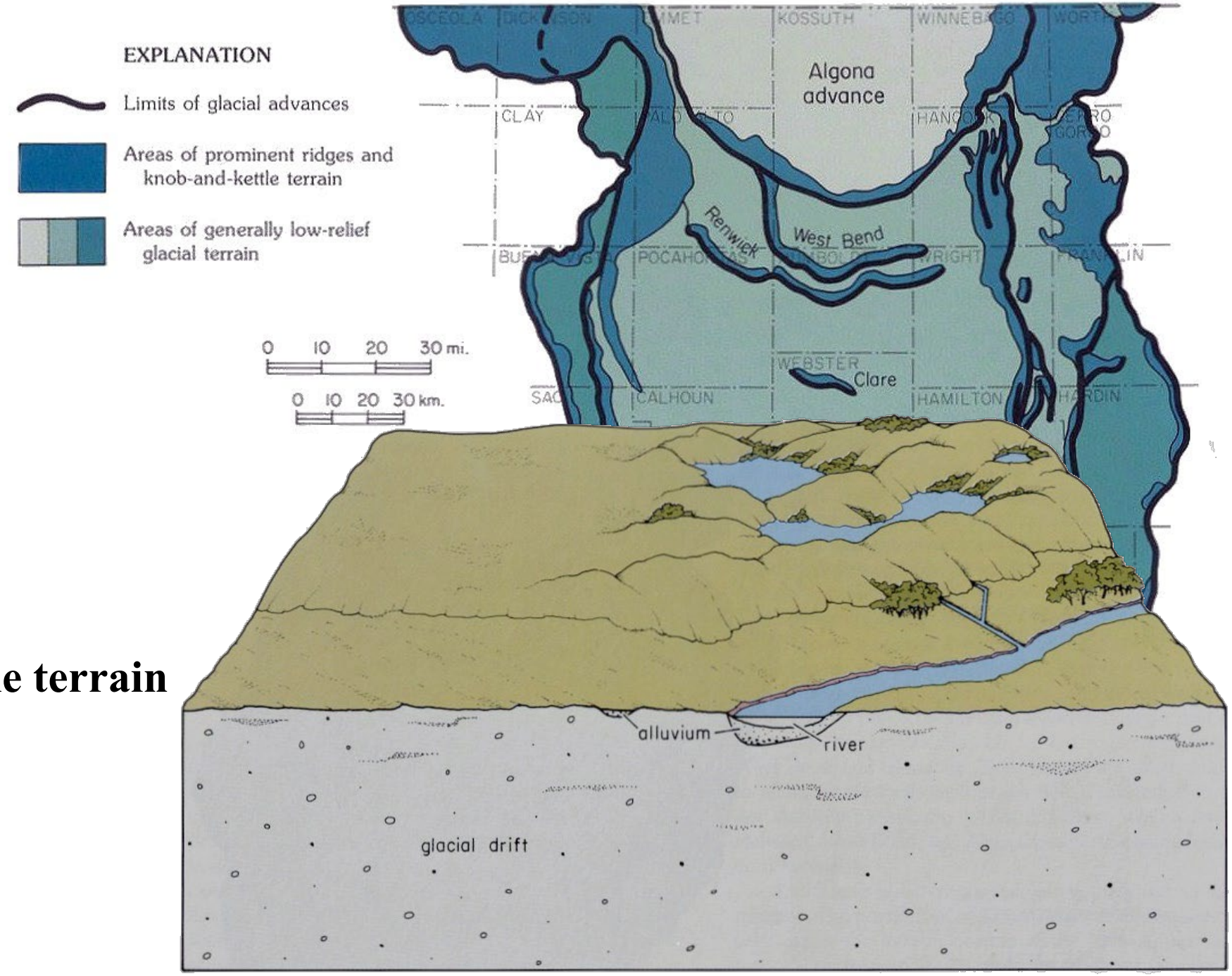

1050
1060
1050
1053
1066
1054
1034
1050
1076
1065
1050
1053
1050
1030
1066
1050
1030
1000
1055
1052
1070

Des Moines Lobe



Terrain Characteristics

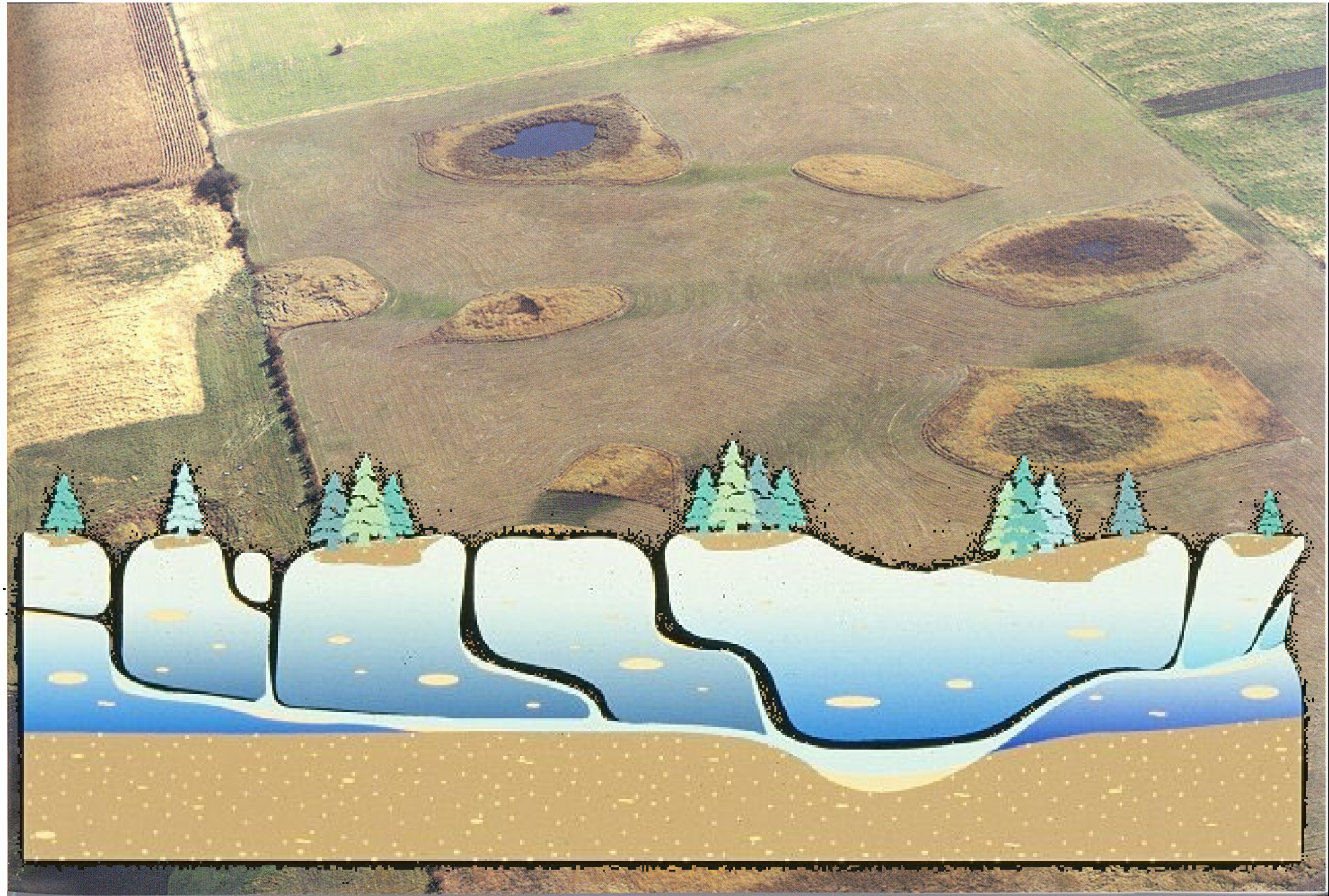
* fresh glacial till
* no loess cover
* bands of knob and kettle terrain
* areas of level terrain
* poor surface drainage
* natural lakes, wetlands



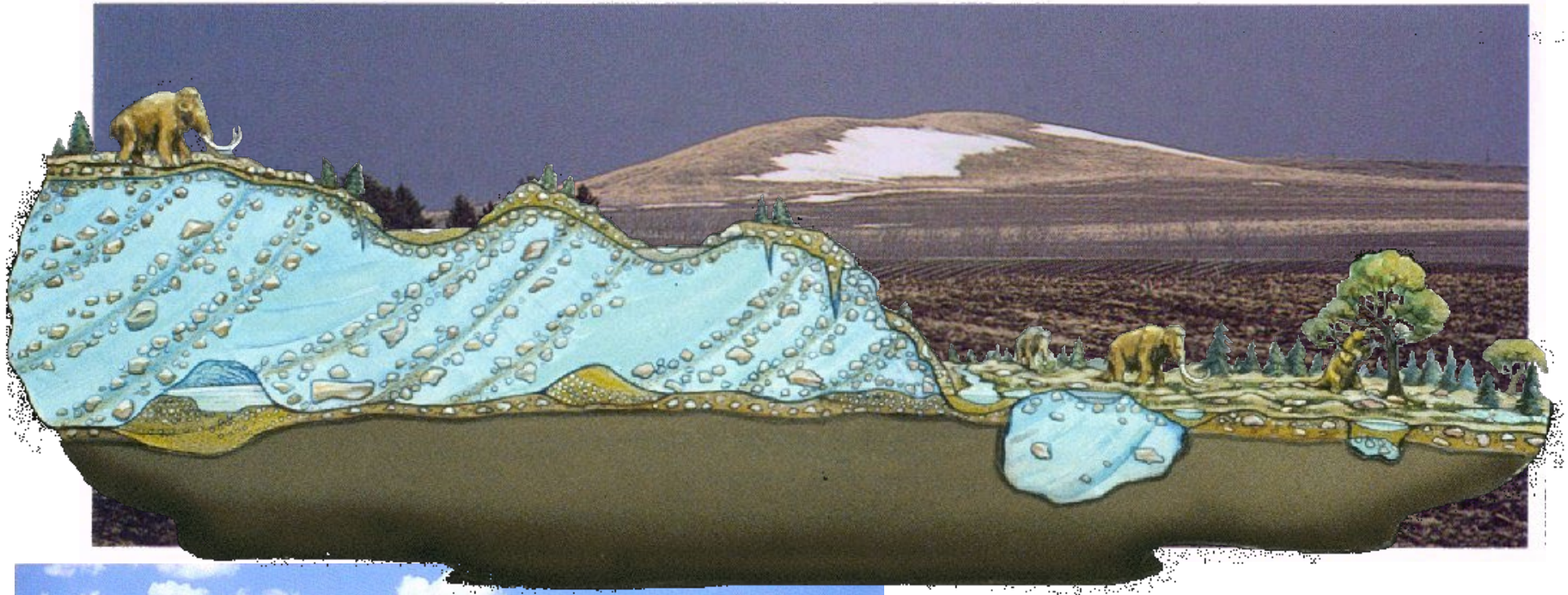
fresh
glacial till

exposures of Des Moines Lobe till
photos by Tim Kemmis

linked depression systems



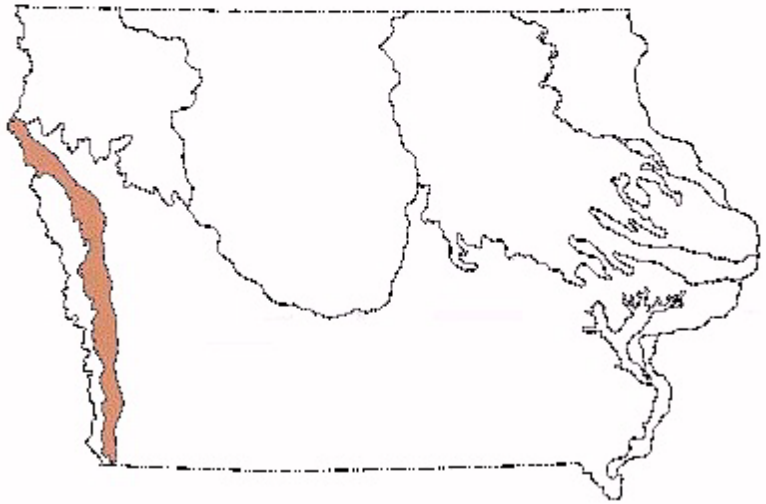
Doolittle Prairie, Story County
photo by Gary Hightshoe



Ocheyeden Mound a large Kame in Osceola Co.

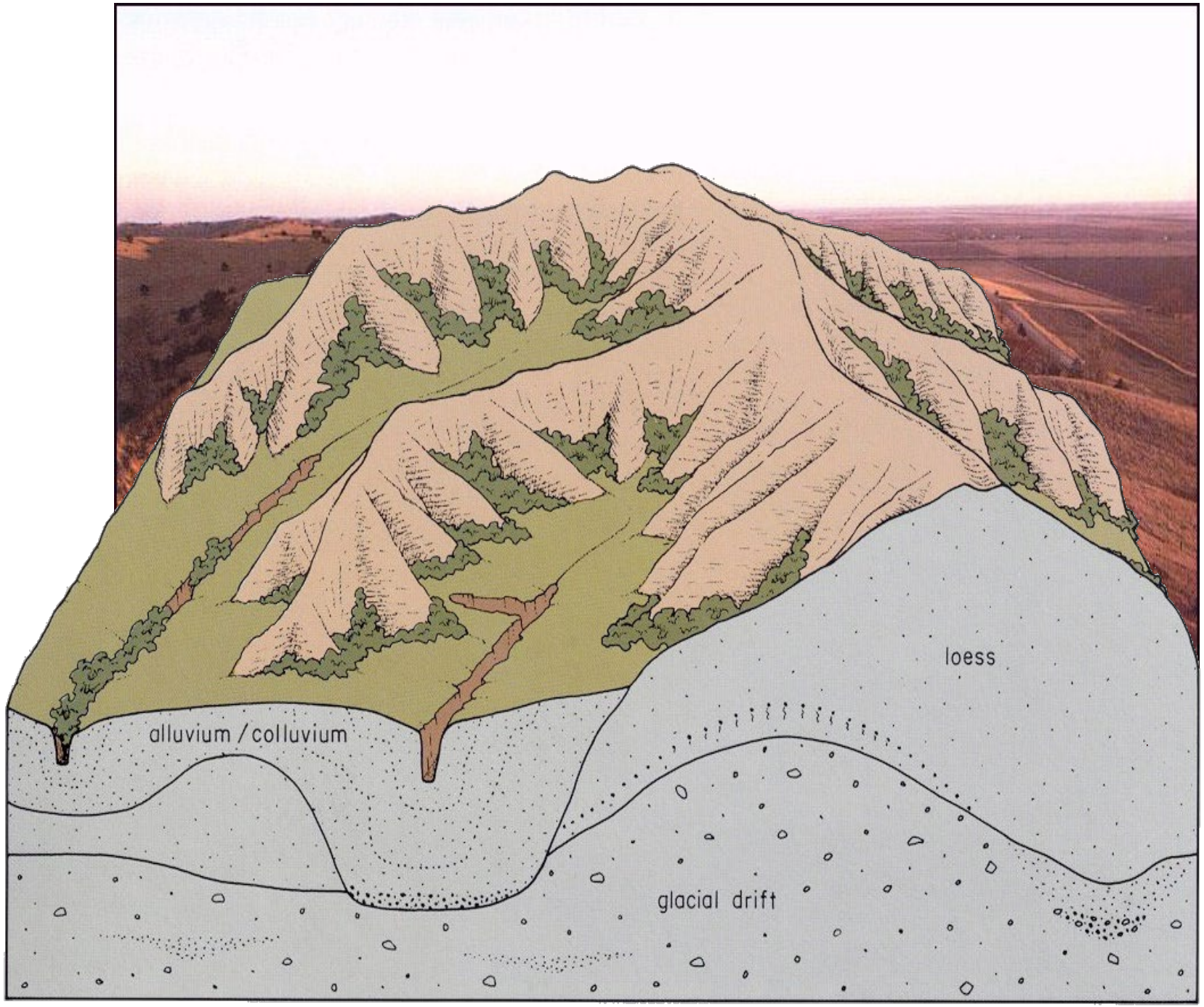
Freda Haffner Kettlehole State Preserve
a large kettle in Dickinson Co.

Loess Hills

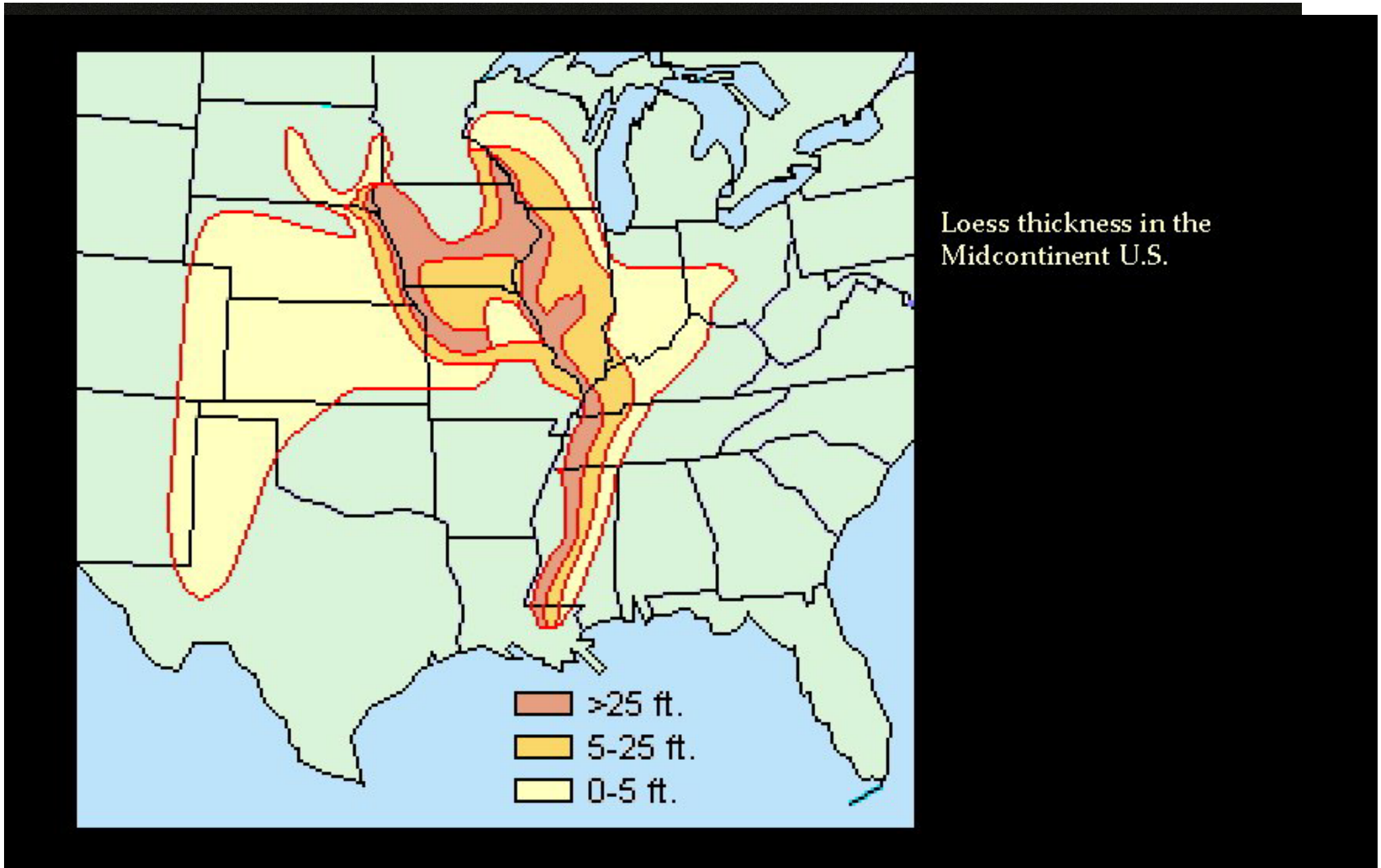


Terrain Characteristics

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

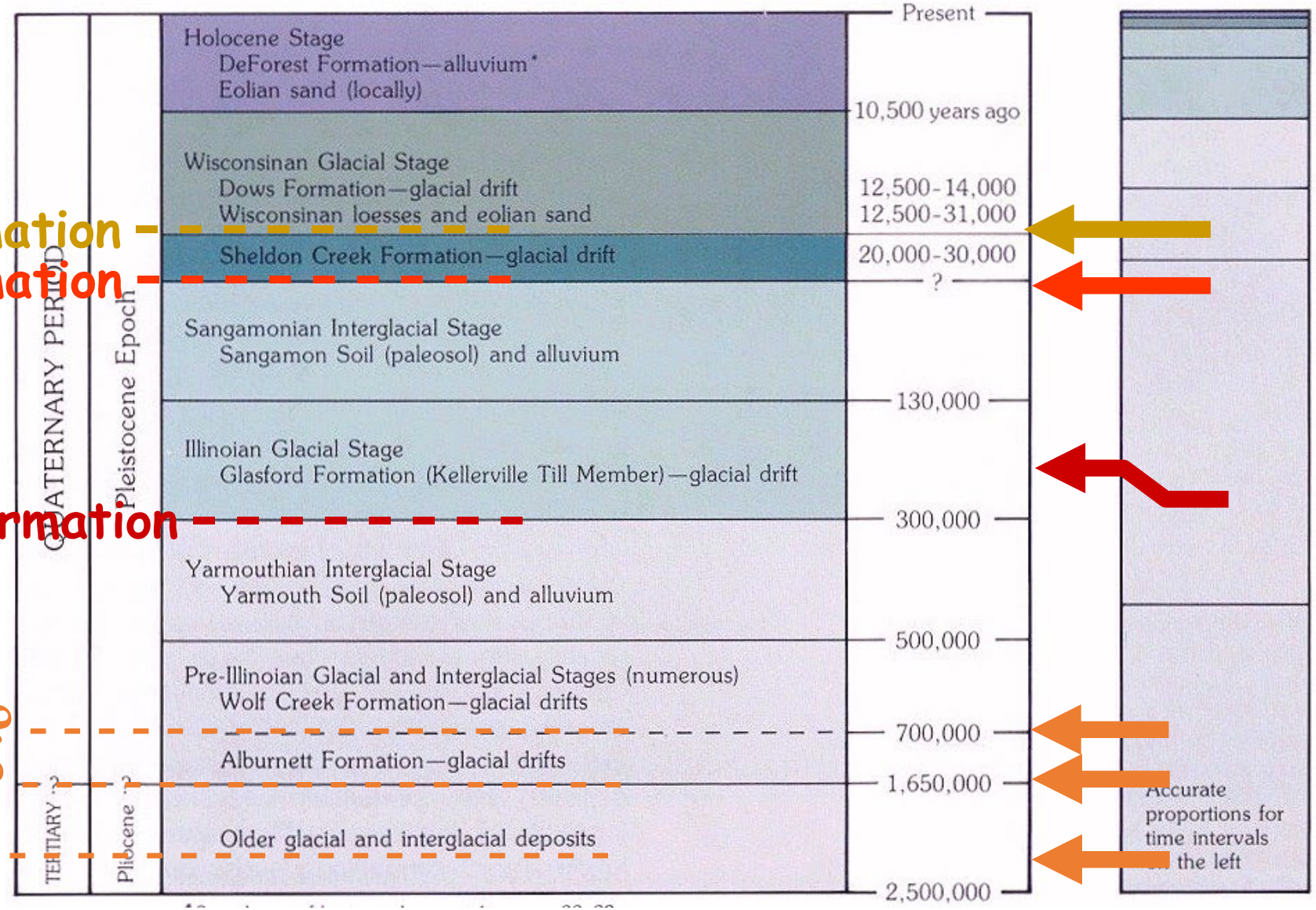


What is Loess???



Loess thickness in the Midcontinent U.S.

Age of loess deposition in Iowa



Peoria Formation

Pisgah Formation

Loveland Formation

???

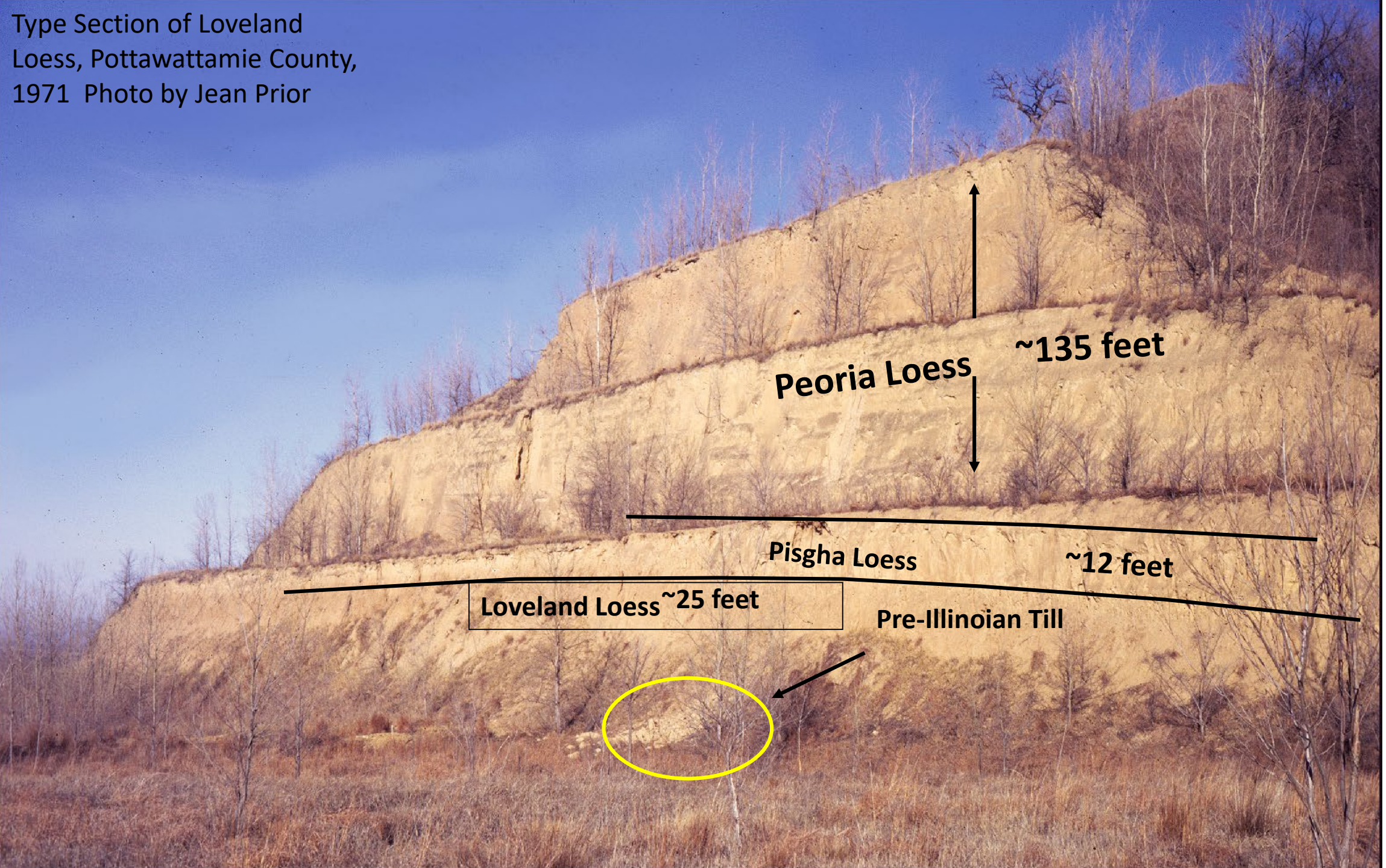
???

???

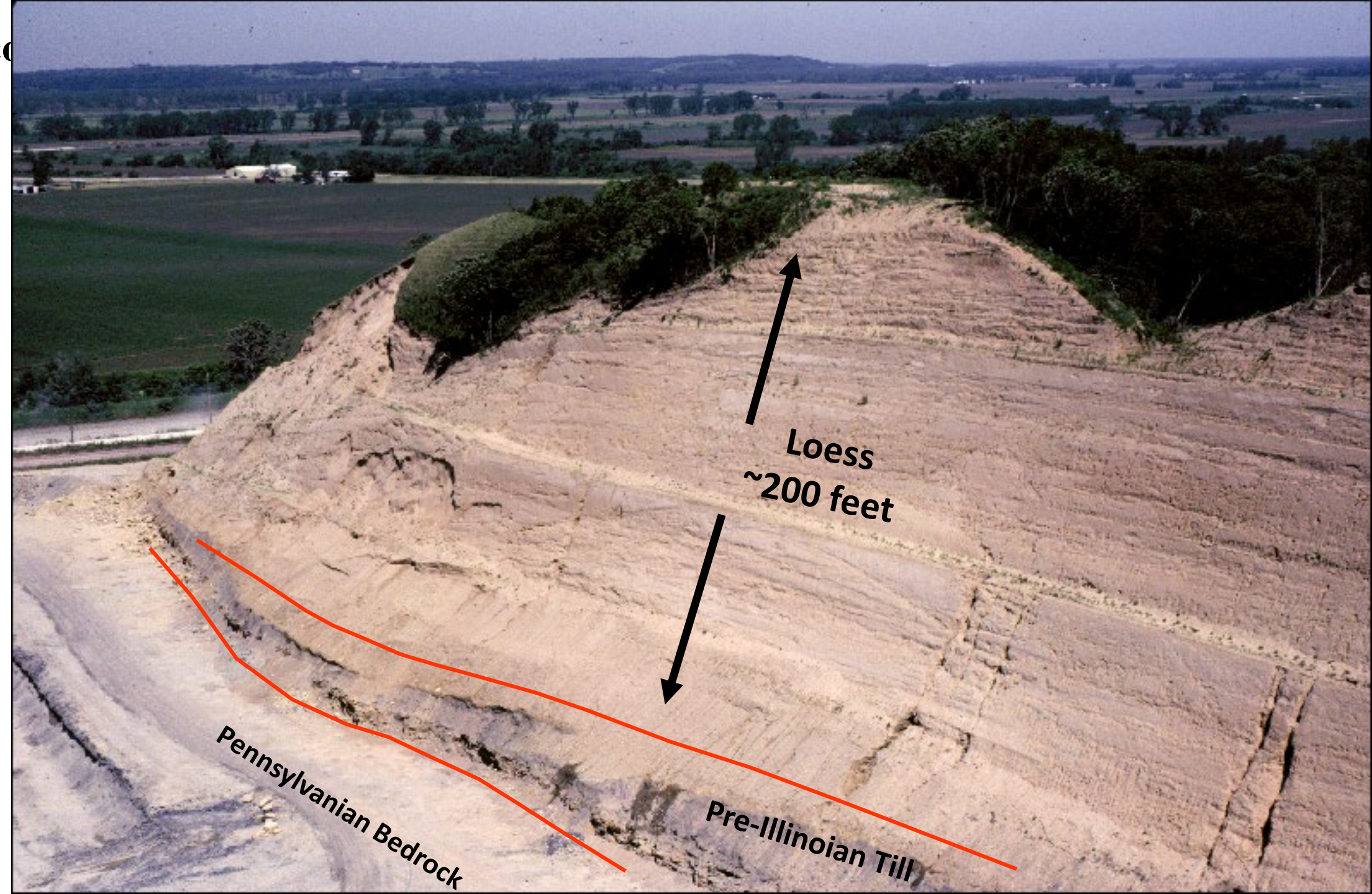
12,000 ybp to 25,000

25,000 ybp to 53,000

130,000 ybp to 180,000


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

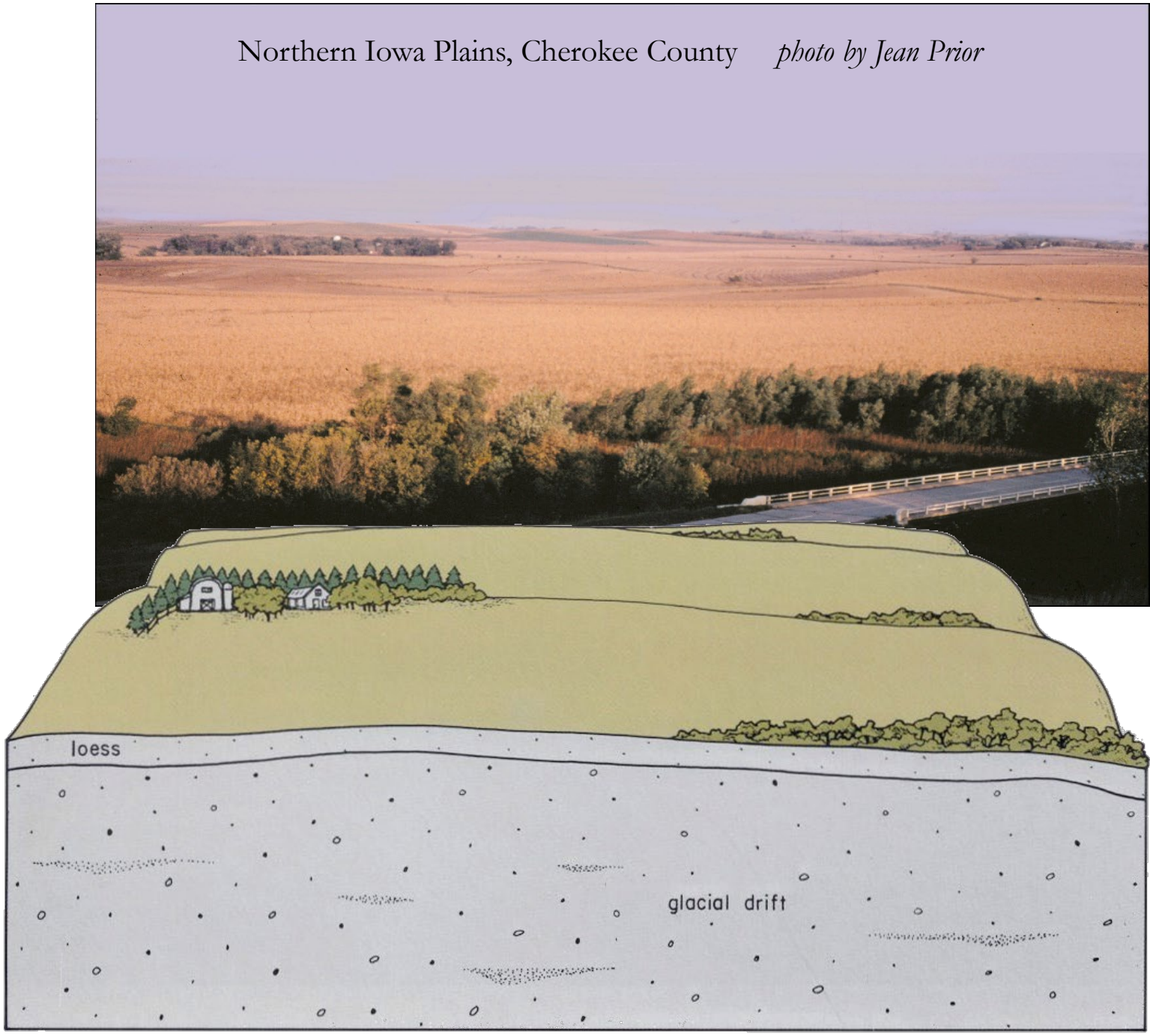


Crescent Quarry, Pottawattamie County
photo by Ray Anderson

Northwest Iowa Plains

Terrain Characteristics

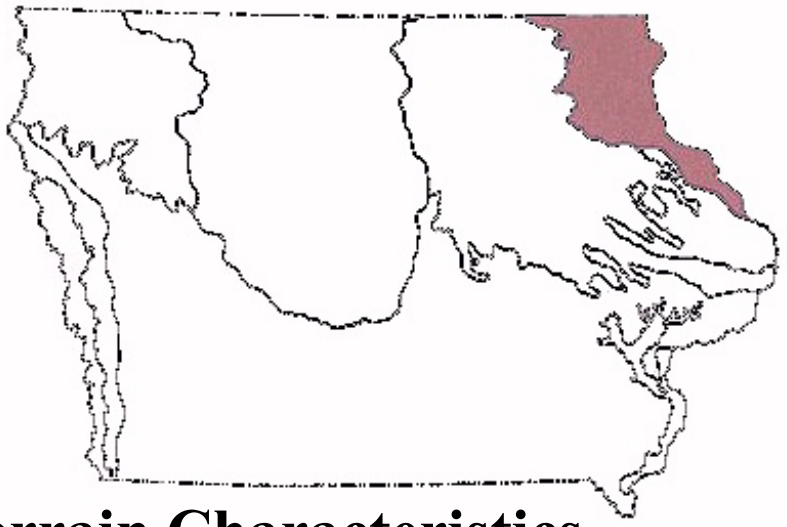
* moderate to thick loess over glacial till
* gentle rolling terrain
* integrated drainage network



moderate to thick loess over glacial till

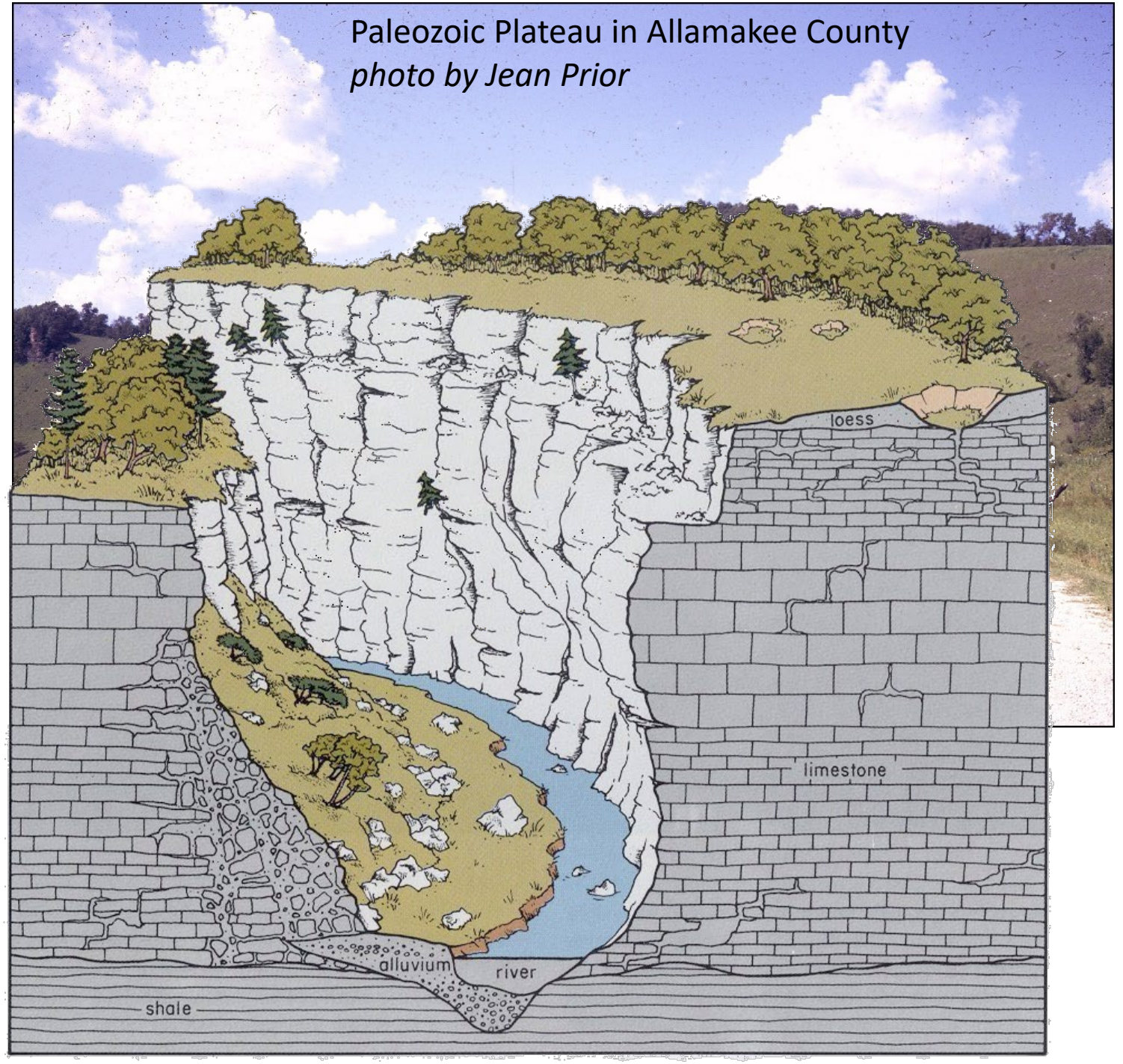
Loess-capped hills in Northern Iowa Plains, O'Brien County
photo by Andy Assell

Paleozoic Plateau

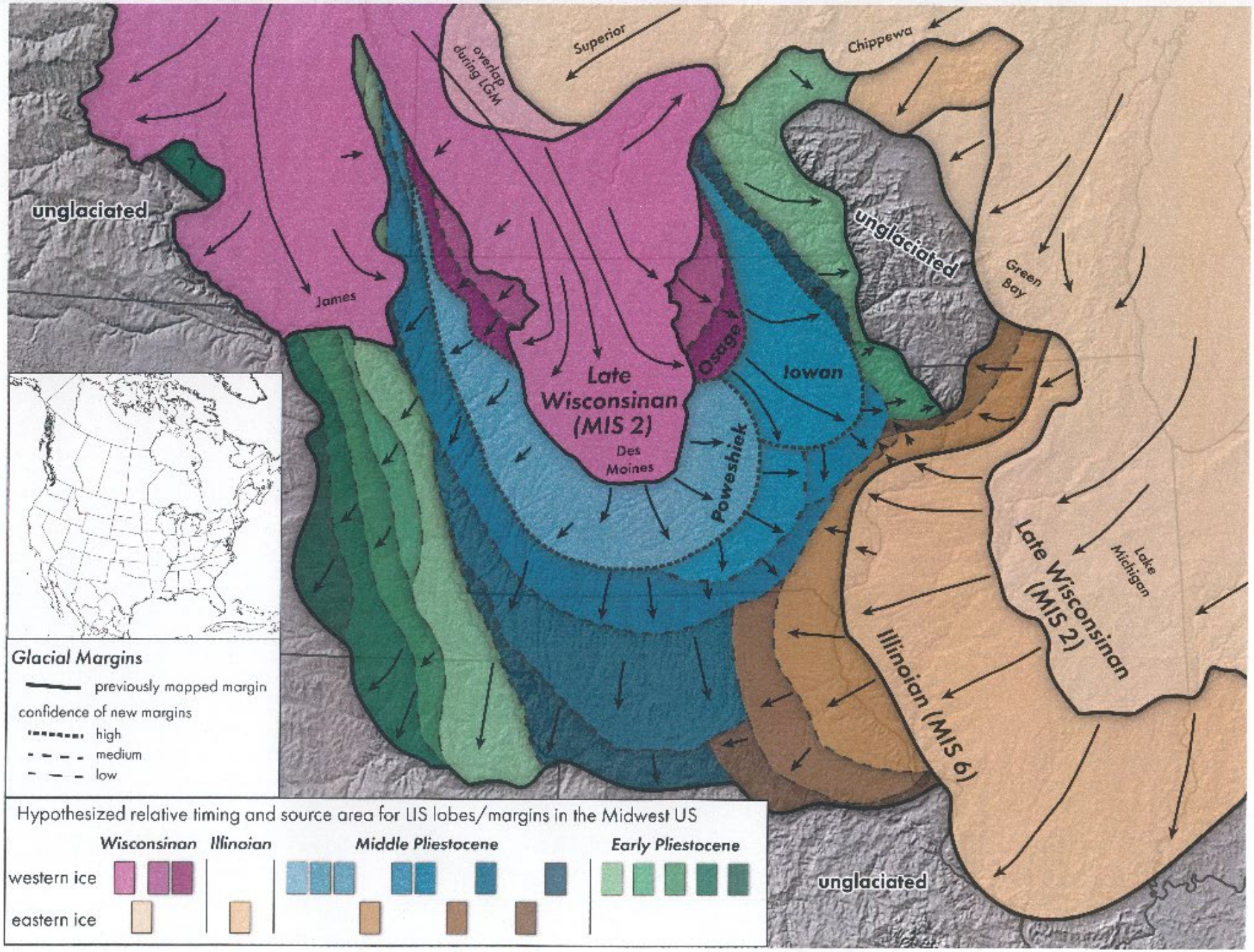


Terrain Characteristics

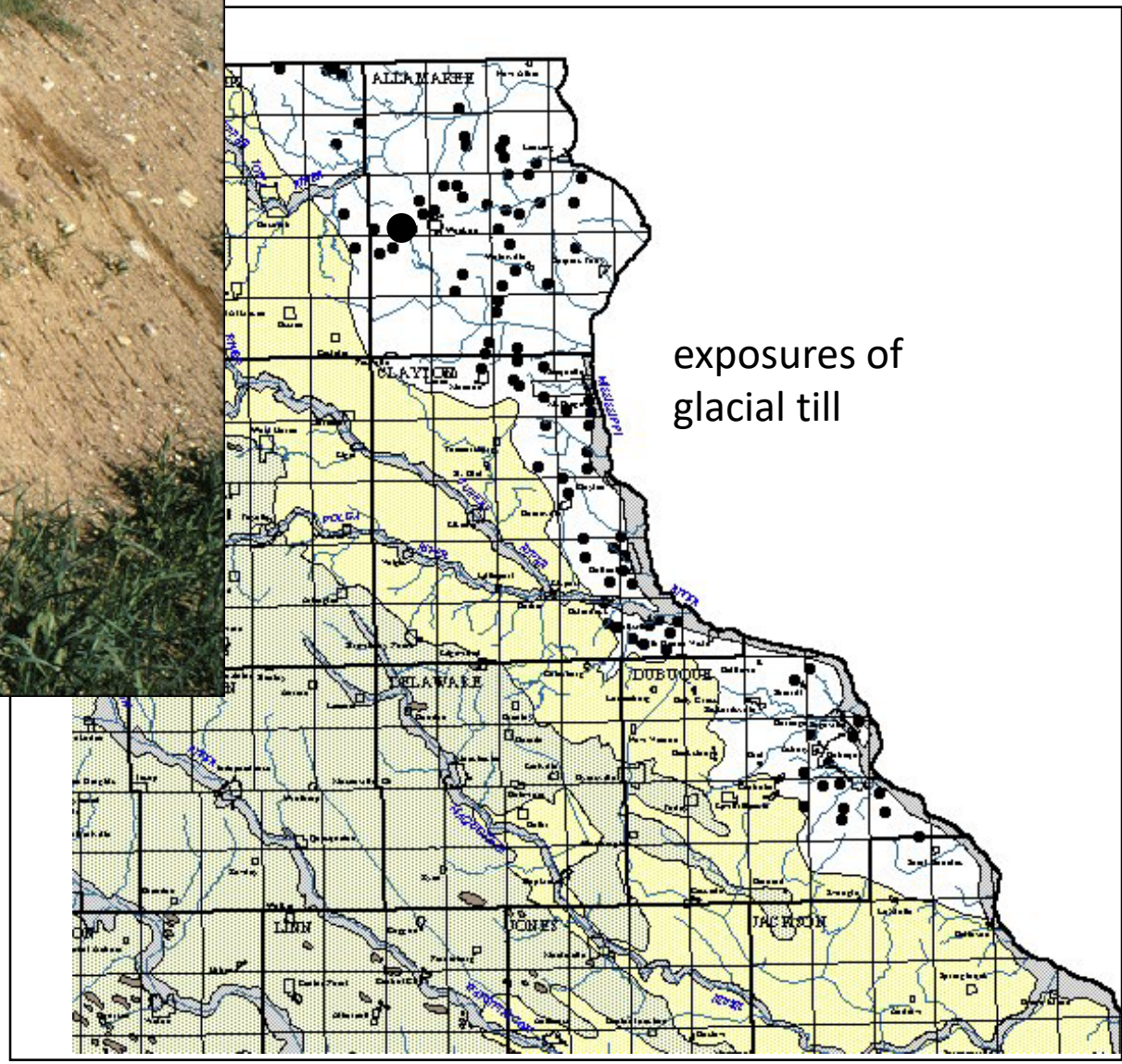
* thin loess cover
* Isolated patches of glacial drift
* bedrock-dominated terrain
* plateau-like uplands
* integrated drainage network
* deeply-entrenched valleys
* karst topography (sinkholes, caves, springs)



Paleozoic Plateau in Allamakee County
photo by Jean Prior


unglaciated
James
overlap during LGM
Superior
Chippewa
unglaciated
Green Bay
Late Wisconsinan (MIS 2)
Des Moines
Osage
Iowan
Poweshiek
Lake Michigan
Late Wisconsinan (MIS 2)
Illinoian (MIS 6)
unglaciated
Glacial Margins
previously mapped margin
confidence of new margins
high
medium
low
Hypothesized relative timing and source area for LIS lobes/margins in the Midwest US
Wisconsinan
Illinoian
Middle Pliestocene
Early Pliestocene
western ice
eastern ice

thin loess cover
isolated patches of glacial drift

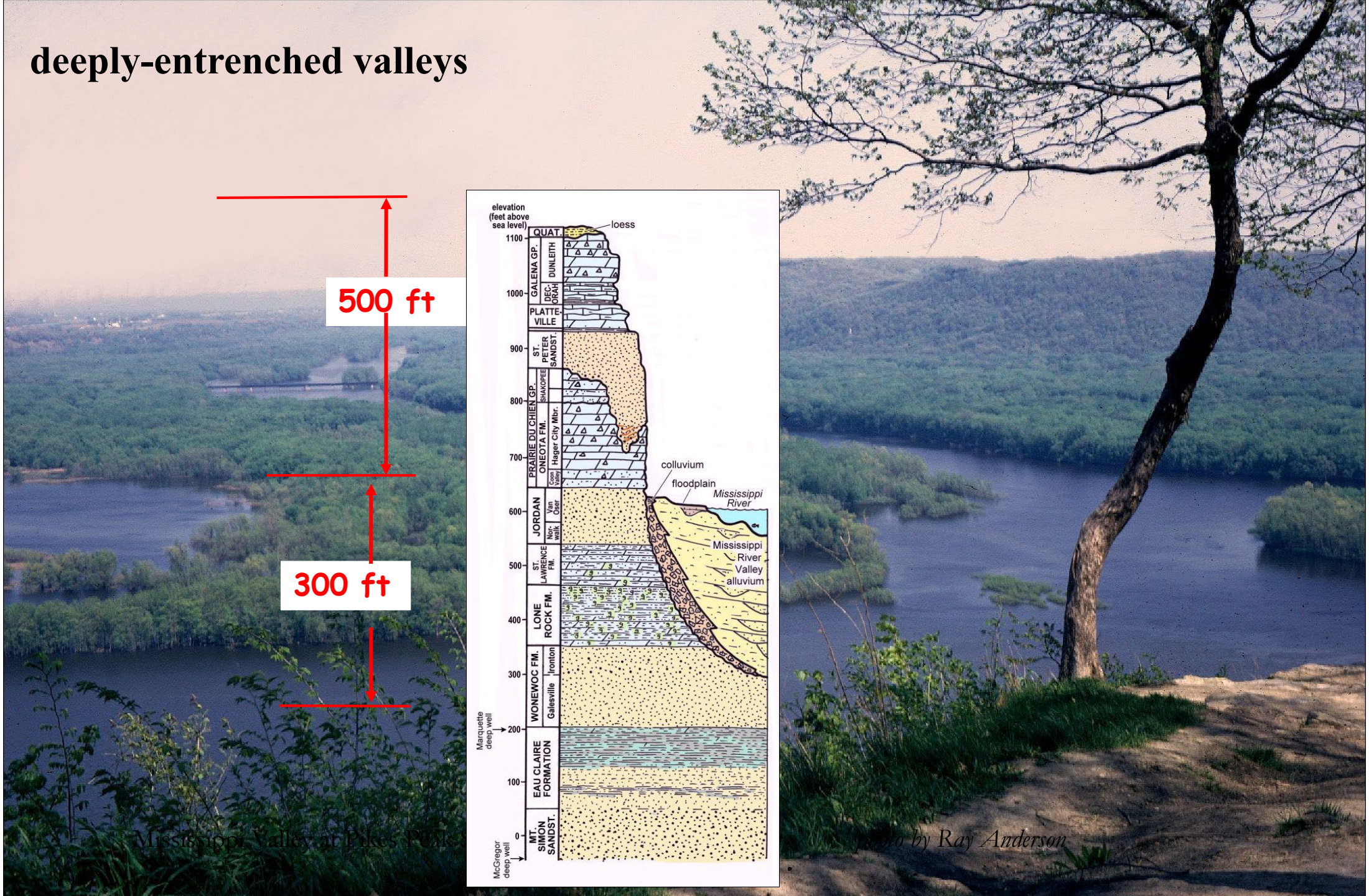


exposures of
glacial till

Glacial Geology of Iowa
unpublished map by Jean Prior

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

deeply-entrenched valleys



Mississippi Valley at Pikes Peak

Photo by Ray Anderson

Alluvial Plains

Terrain Characteristics

*** thick alluvium**

*** level terrain along valleys**

includes stream channels, floodplains, oxbow lakes, terraces, alluvial fans, sand dunes