

Paleogeography of Illinois During the Paleozoic and Mesozoic Eras

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Cover photos taken by Steven D.J. Baumann.

Top photo taken on 2-29-2004 along Rock Creek, looking East at Kankakee River State Park.

Bottom photo taken on 8-30-2008. Photo is of the Platteville Group dipping west into the Vermillion River at Matthiessen State Park in Illinois.

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Abstract

Reconstructing the paleogeography of Illinois is an ongoing challenge. Reconstructing extinct environments is not only the job of geologists but biologists, artists, and chemists. This paper includes eleven different maps showing the landscape and sea floor during five different periods of the Paleozoic and one period of the Mesozoic. Included are ancient streams, shorelines, topography, ocean currents, and the position of Illinois relative to the Equator. The maps included are brief snapshots in time and are approximations. Their purpose is to show the complex environments that have shaped Illinois for hundreds of millions of years.

Introduction

The eleven maps were chosen for this project in order to demonstrate how Illinois has changed through time. There are vast amounts of time missing. There are several reasons for this. The further back we go in time the deeper the rocks are buried, and thus our understanding of them is not very detailed. Many units have been affected by tectonics and have subsequently been folded or faulted even though they were deposited nearly flat. Erosion, both modern and ancient, has erased much of the record. During the Precambrian, Late Paleozoic, and most of the Mesozoic, Illinois was dry land, and any deposits that were laid down are now eroded. Geology or lack thereof, is the reason why the following ten maps were selected.

Description

FIGURE 1: Middle Cambrian Period, 518 Million Years Ago:

This map shows the onset of what would become typical for Illinois during the next 300 million years. The entire state would be near sea level or under the sea. For one billion years prior to this time Illinois was dry land continuously being eroded. The topography of Illinois was much greater than today as a result of more than a billion years of erosion. For the first time the seas are full of life as they encroach on Illinois from what is now the east. Even though the oceans were teeming with life the land was barren. There were no insects, plants, or animals on land during the Cambrian. This led to vast amounts of mineral rich sands (arkose) being deposited into the ever rising sea as the granites on land began to wash in. The sea didn't so much rise as Illinois began to subside. The Illinois basin started to form as a result of North America moving ever closer to Europe, pushing Illinois south and away from the equator.

FIGURE 2: Middle Ordovician Period, 460 Million Years Ago:

Several Ordovician maps were generated for his project. This is the first. It shows the time at which the well sorted *Saint Peter Sandstone* was being deposited. The source of the *Saint Peter* is still somewhat unclear. It is a very pure quartz sandstone that was moving around for at least five million years. There are almost no carbonates interbedded with it. This indicates that the source sand for the Saint Peter was far away and that the sand was recycled many times. During the Ordovician there were still no land plants or animals.

FIGURE 3: Late Ordovician Period, 449 Million Years Ago:

This is when the *Scales Formation* and the later *Fort Atkinson Formation* were being deposited in the area. By this time all of Illinois was under water, and the high points of land were submerged carbonate shoals that were the forerunners of the much larger reefs that would appear during the Silurian and continue to today. During this period the insects had finally moved to the land. Plants and animals were still restricted to the sea.

FIGURE 1:
Illinois Paleogeographic Map
Middle Cambrian Period
Montezuman Age
518 Million Years Ago

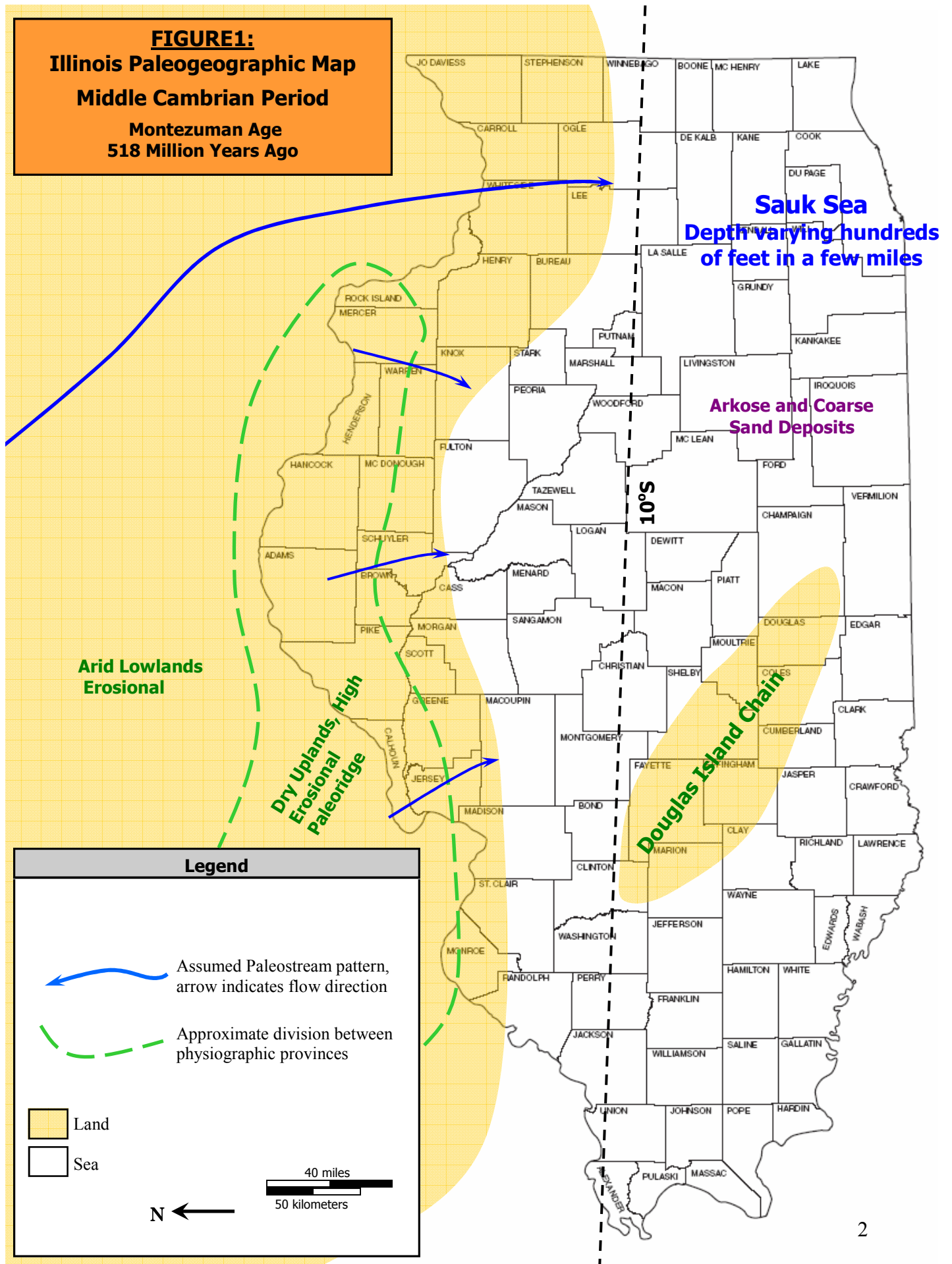


FIGURE 2:
Illinois Paleogeographic Map
Middle Ordovician Period
 Llanvirnian Age
 460 Million Years Ago

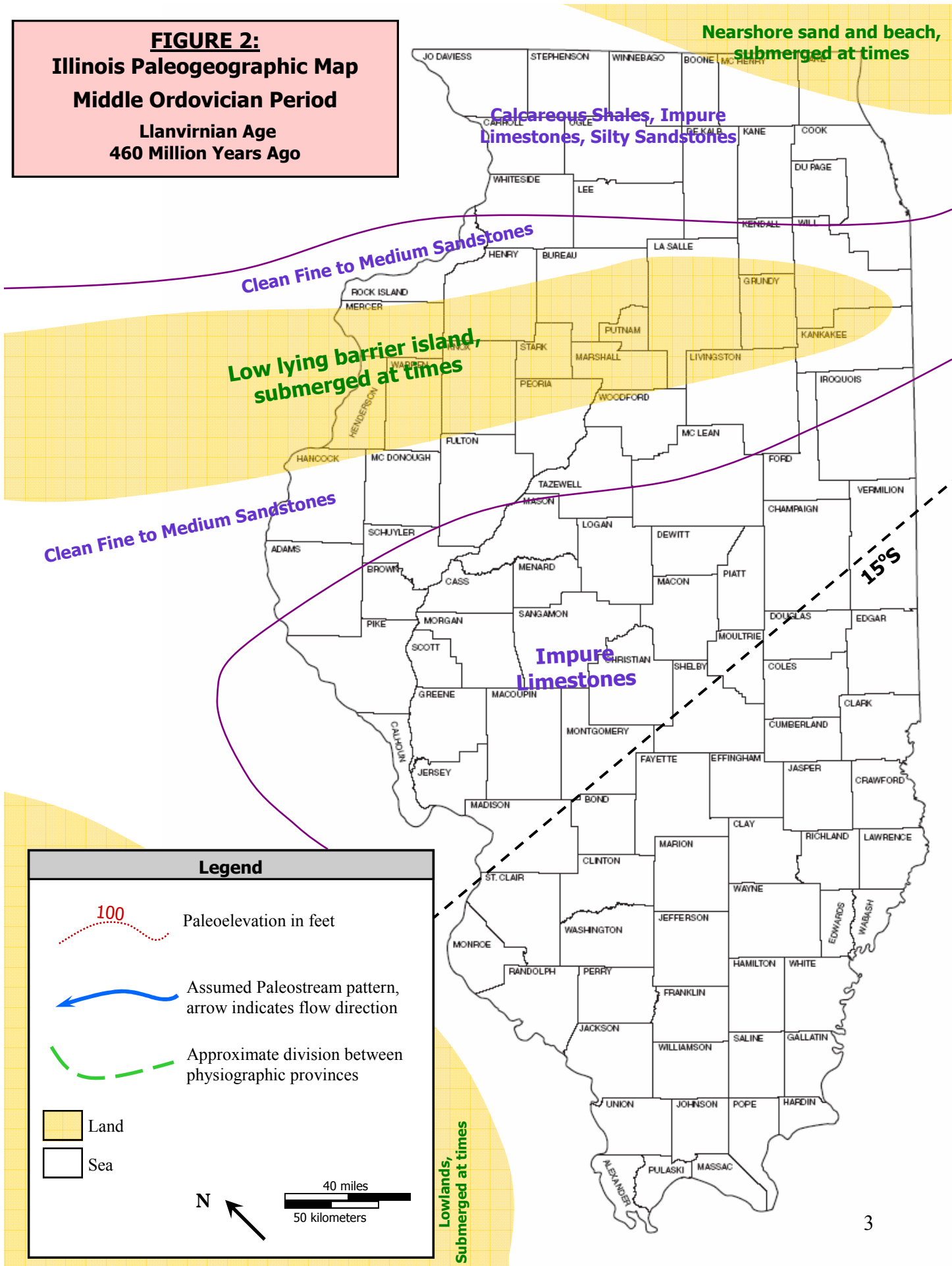
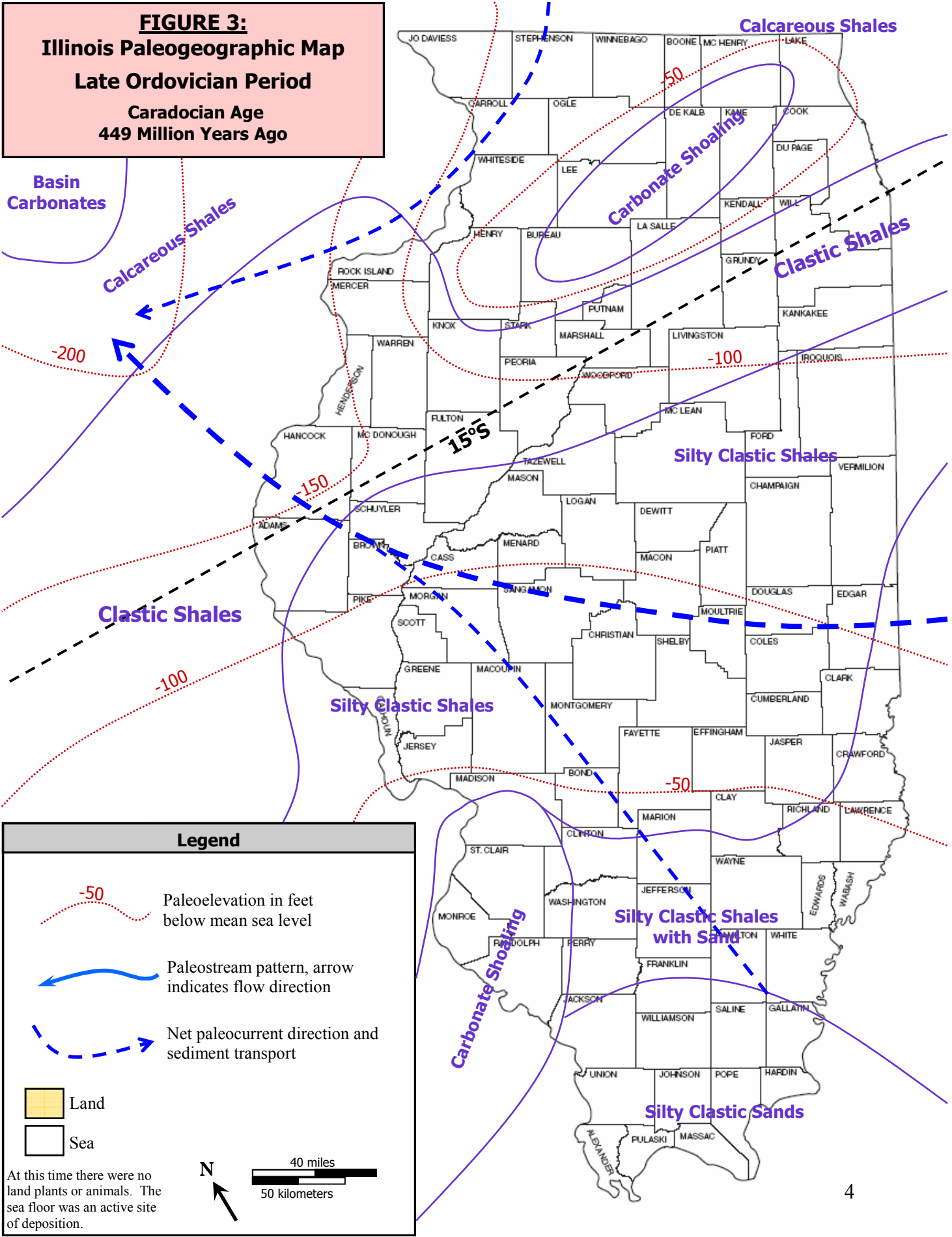


FIGURE 3:
Illinois Paleogeographic Map
Late Ordovician Period
Caradocian Age
449 Million Years Ago



At this time there were no land plants or animals. The sea floor was an active site of deposition.

FIGURE 4:
Illinois Paleogeographic Map
Late Ordovician Period
Ashgillian Age
444 Million Years Ago

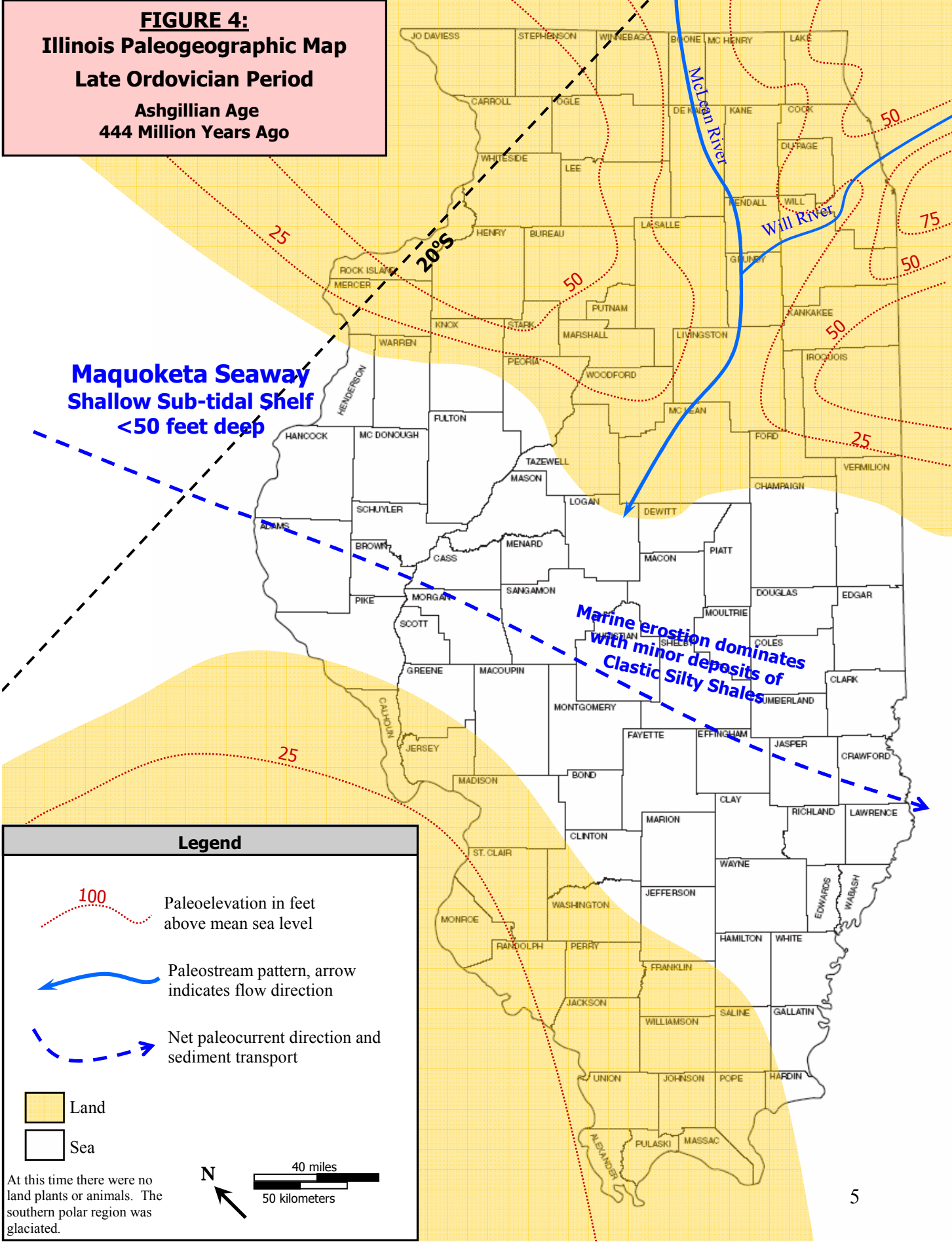


FIGURE 4: Late Ordovician Period, 444 Million Years Ago:

North America at this time had already collided with Europe, and the Appalachian Mountains had formed. This collision of continents was clustered in the southern hemisphere. The land mass that is now Africa was at the south pole. This led to a massive ice sheet forming at the southern polar region. Although Illinois did not have ice and was within the arid belt, the ice did affect Illinois. The Ordovician seas began to retreat, and Illinois was once again exposed land.

FIGURE 5: Late Ordovician Period, 443 Million Years Ago:

This map was included to show how Illinois looked during the height of the Ordovician ice age. The only outlet to the open sea was through Springfield Bay which wrapped around the Ozarks and connected to the open ocean to the north. Illinois would not be this high above sea level for almost another 150 million years! Plants still had not moved to the land during this time and vertebrates were still not common in the oceans. The named paleostreams indicated on the map were inferred from valleys that were formed in the Maquoketa as it eroded. They were named for counties that they pass through.

FIGURE 6: Silurian Period, 422 Million Years Ago:

Finally the first land plants started to appear. However, Illinois would not see them yet. During this time, the southern ice cap had long melted away and the entire State of Illinois was once again underwater. Now Illinois was south of the arid belt and massive reefs began to form on the flanks of the Wisconsin and Kankakee Arches. The massive reefs are mined today at places like Thornton's Quarry in Cook County. The nearest land mass at this time was a couple of hundred miles to modern north and east.

FIGURE 7: Devonian Period, 385 Million Years Ago:

Most of Illinois was dry land at this time. Devonian deposits weren't even known to exist in Illinois until the early 1990's when they were discovered in Cook County. Now they are known to exist (although they are thin) in Cook, Will, and Kankakee Counties. At this time small plants existed, and the first organically altered soils begin to form, although none are preserved in Illinois. The paleostream indicated on the map is a rough estimate of the drainage at the time. During this time fish and sharks dominated the oceans.

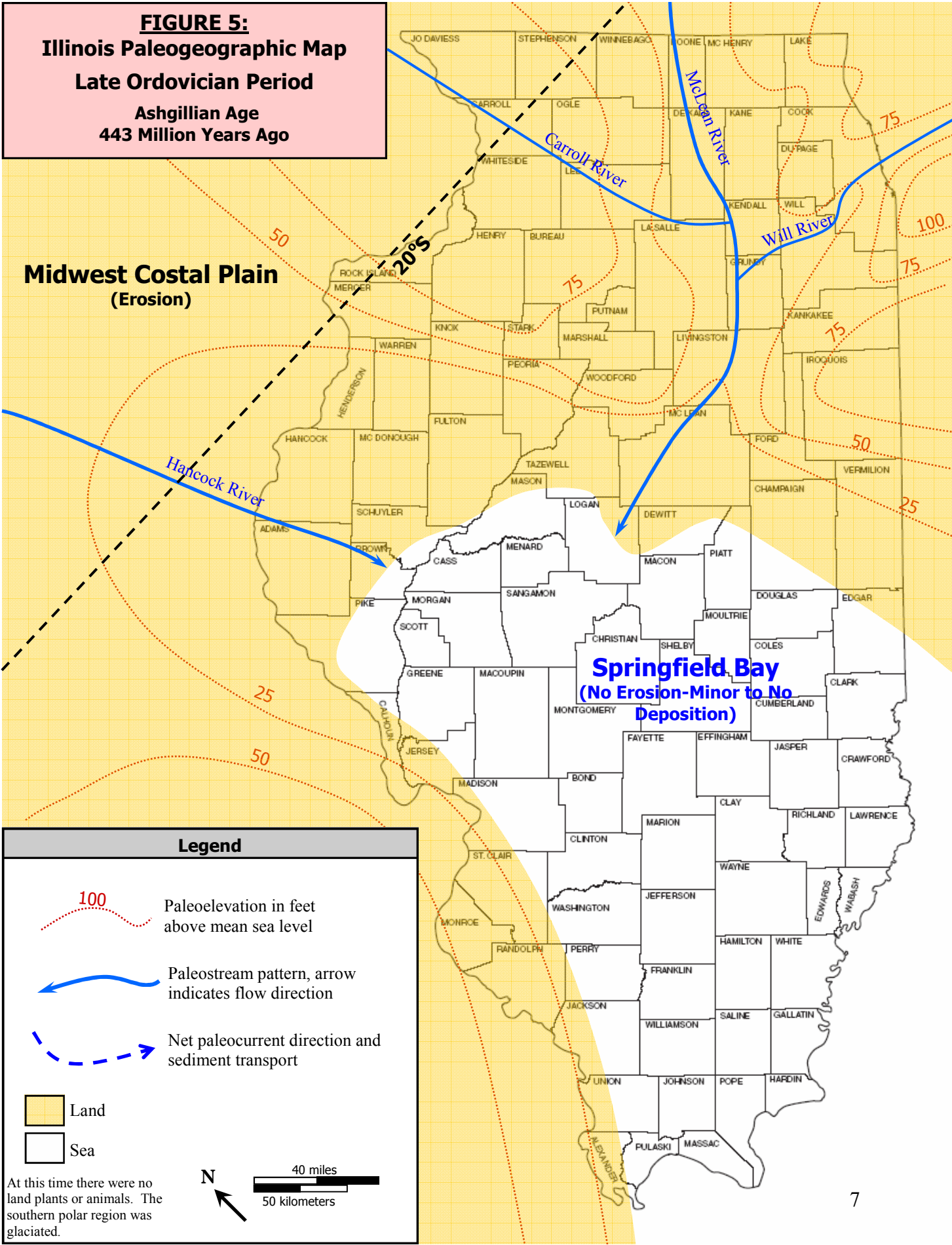
FIGURE 8: Mississippian Period, 325 Million Years Ago:

After the Devonian the seas retreated only to advance again from modern west and southwest. This was a time of large silt delta deposition as plants began to significantly alter the land and sources of clastic sediments carried from the paleostreams were nearby. This would eventually lead to the massive coal deposits that cover more than half the State of Illinois today. This situation would prevail for the next twenty-five million years, until the formation of Pangea. Once Pangea began to assemble about 300 million years ago, Illinois would never be covered by the sea again. We are not really sure of what the landscape looked like for the next 200 million years. We do know that several local fault systems formed, volcanism in Southern Illinois took place as the dinosaurs began to rule the land, plants flourished, and animals took to the air. Alas other than the faults and several dykes, none of it is preserved in Illinois because erosion dominated until the Cretaceous.

FIGURE 9: Late Cretaceous Period, 98.5 Million Years Ago:

We can get a certain feel for the landscape in Illinois during this time because Cretaceous stream deposits exist in North-central and western Illinois known as the *Hadley Gravel* and *Baylius Formation*. The Ancient Mahomet River, which would exist until buried by glaciers ninety-six million years later, began to flow from Ohio, across Indiana, and through Missouri. A now extinct river (referred to herein as the Kane River) flowed from Michigan and met up with the Mahomet near Cass County.

FIGURE 5:
Illinois Paleogeographic Map
Late Ordovician Period
Ashgillian Age
443 Million Years Ago



Midwest Costal Plain
(Erosion)

Springfield Bay
(No Erosion-Minor to No
Deposition)

Legend

- Paleoelevation in feet above mean sea level
- Paleostream pattern, arrow indicates flow direction
- Net paleocurrent direction and sediment transport

- Land
- Sea

At this time there were no land plants or animals. The southern polar region was glaciated.

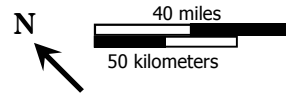
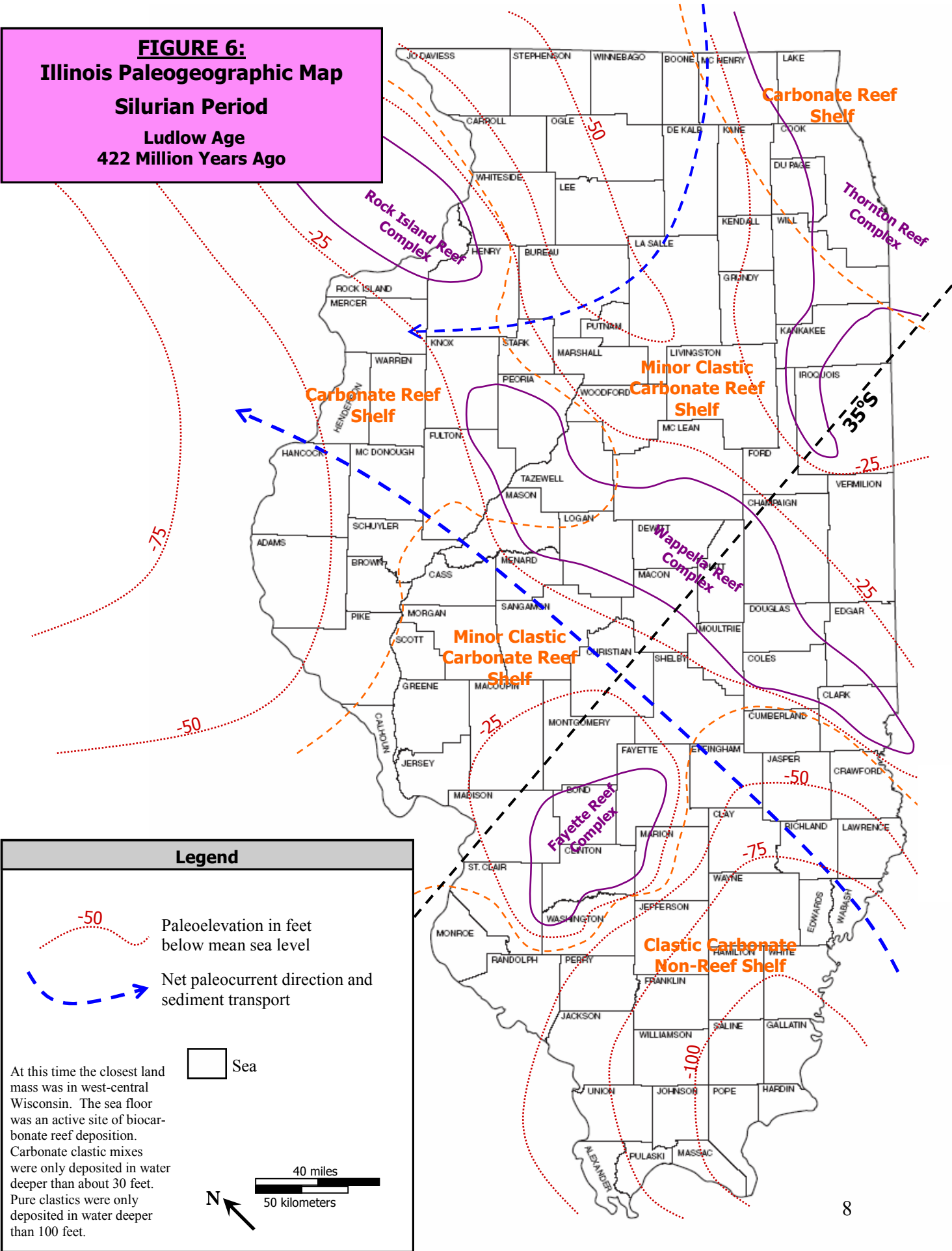


FIGURE 6:
Illinois Paleogeographic Map
Silurian Period
Ludlow Age
422 Million Years Ago



Legend

Paleoelevation in feet below mean sea level

Net paleocurrent direction and sediment transport

Sea

At this time the closest land mass was in west-central Wisconsin. The sea floor was an active site of biocarbonate reef deposition. Carbonate clastic mixes were only deposited in water deeper than about 30 feet. Pure clastics were only deposited in water deeper than 100 feet.

N

40 miles / 50 kilometers

FIGURE 7:
Illinois Paleogeographic Map
Devonian Period
Eifelian Age
385 Million Years Ago

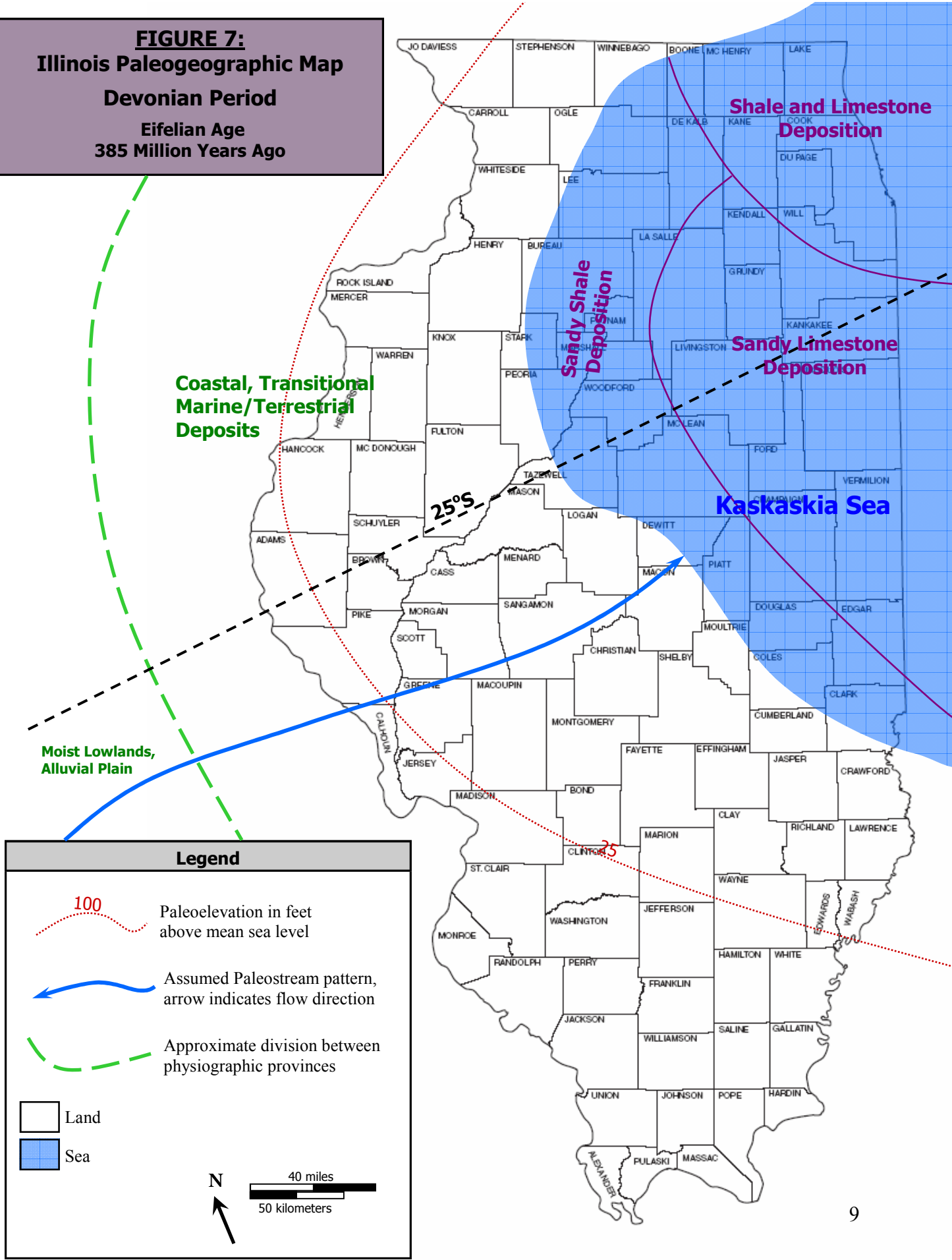


FIGURE 8:
Illinois Paleogeographic Map
Mississippian Period
Serpukhoian Age
325 Million Years Ago

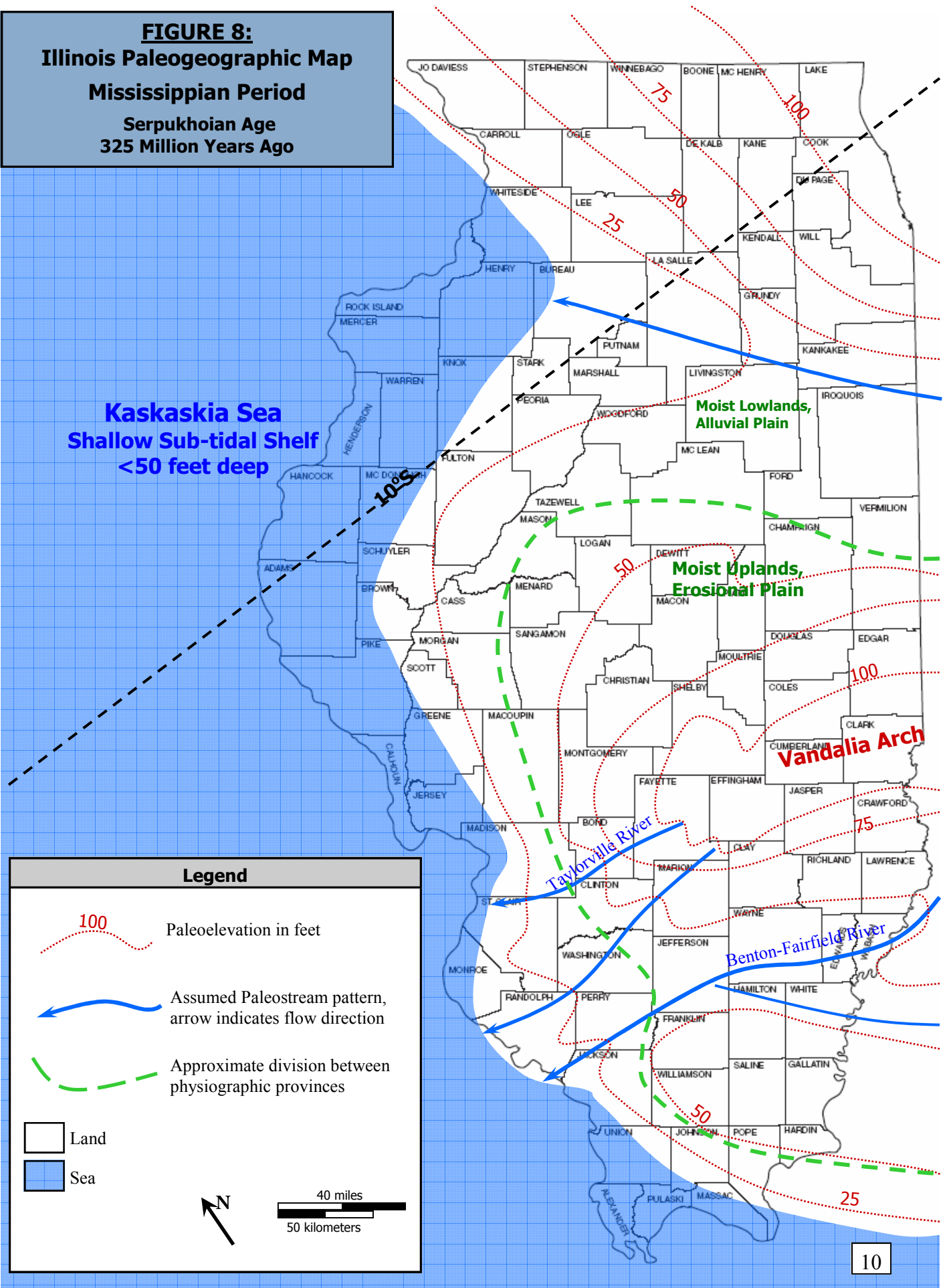


FIGURE 9:
Illinois Paleogeographic Map
Late Cretaceous Period
Albanian Age
98.5 Million Years Ago

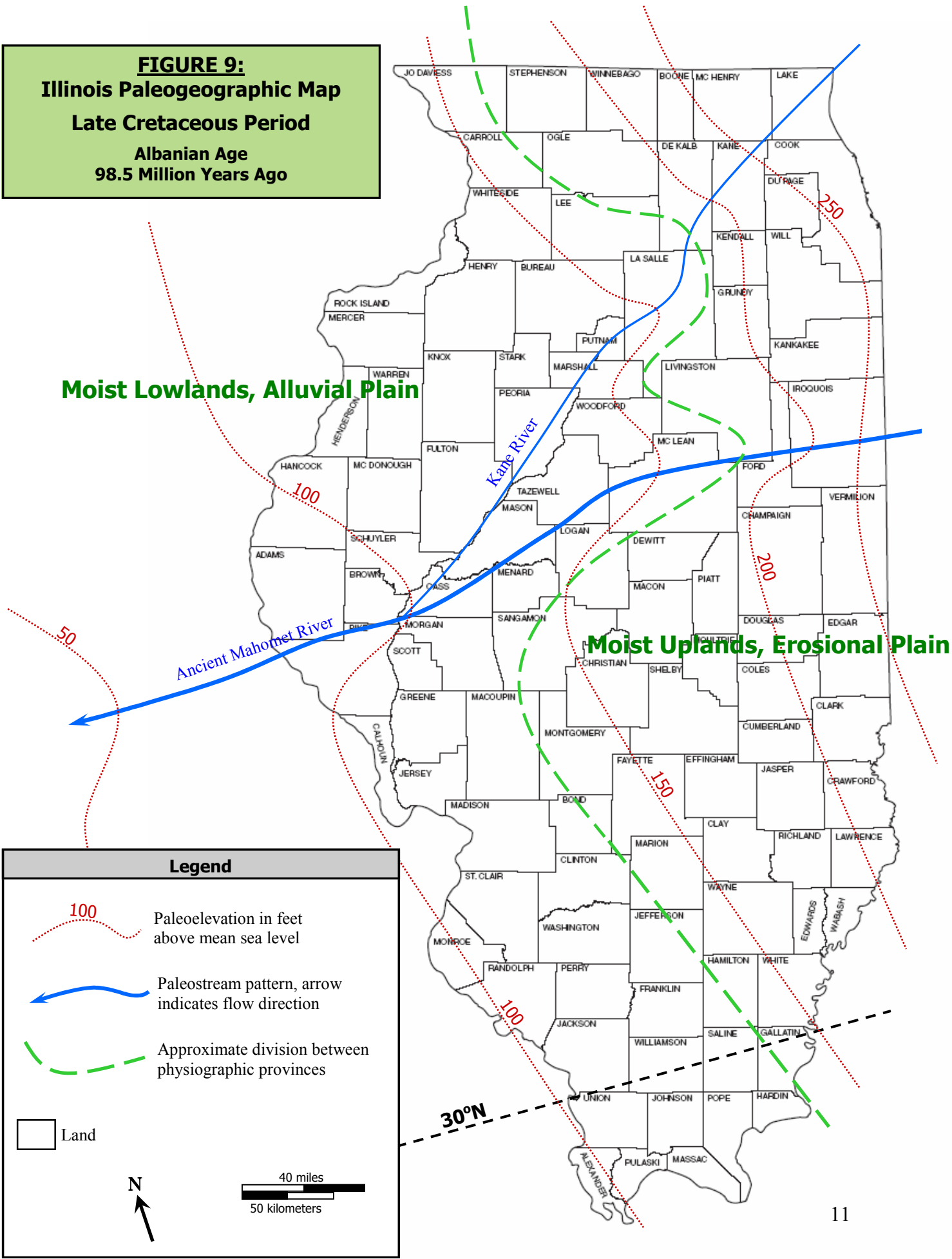


FIGURE 10: Late Cretaceous Period, 93.1 Million Years Ago:

The Mahomet River was well established with two tributaries entering it; the Kane River from the north and the Greene River (both named after counties they pass through) from the south. The Greenhorn Seaway covered most of Iowa at this time but never reached Illinois. It existed for millions of years prior and slowly moved east as the Rockies formed. However, the Ozark Mountains and the Wisconsin Arch prevented the Greenhorn Sea from entering Illinois. During this time dinosaurs used Illinois as a migration route around the seaway. Unfortunately none of them were ever preserved due to the fact that Illinois was in an active state of erosion as it is today.

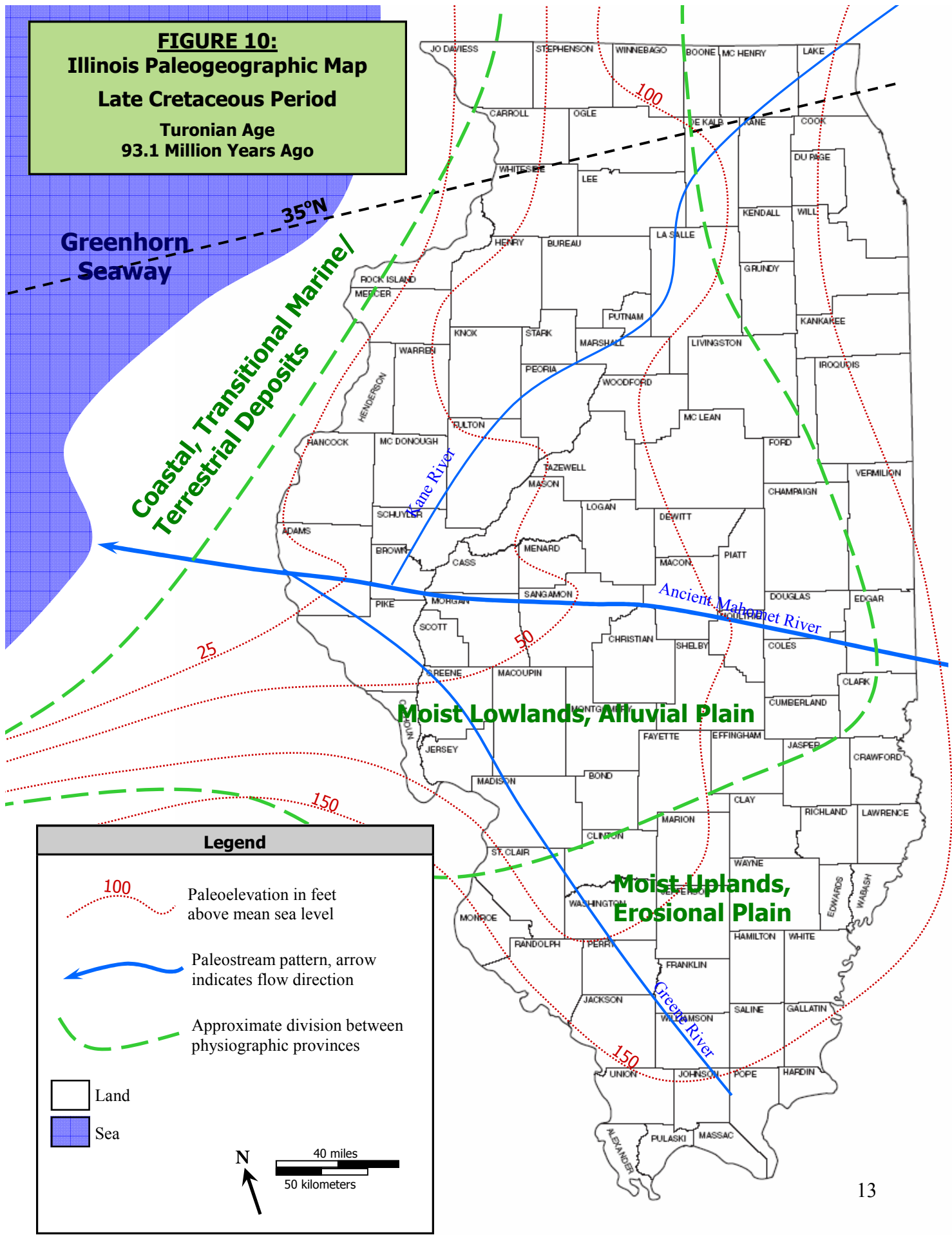
FIGURE 11: Late Cretaceous Period, 72.5 Million Years Ago:

Just prior to this time the landscape changed dramatically. The Rockies were almost completely formed, squeezing off the Greenhorn Seaway. The Caribbean began to form as did Florida. This led to an area of subsidence known as the Mississippi Embayment which stretched all the way from the Gulf of Mexico to Southern Illinois and continues to subside to this day. This permanently altered the flow of rivers in the state. The Mississippi River and tributary pattern that we would recognize today began to take shape. The beach sands of the *McNairy Formation* were the only active deposits at this time in Southern Illinois along the northern tip of the Mississippi Embayment. If Antarctica had not begun to freeze over about twenty-six million years ago the Mississippi Embayment would still reach Southern, Illinois. Illinois had finally moved north out of a subtropical climate zone and into the humid continental zone, and was less than 10°S of its present latitude.

Conclusions

At the end of the Mesozoic (65 million years ago), Illinois would continue to actively erode as the river systems we know today took on a more modern look. Nothing much geologically would happen until about two million years ago when the most recent ice age began. Glaciers would cover almost the entire State of Illinois from time to time. The ice would leave deposits hundreds of feet thick called till. This till would plug the Mahomet River and favor the Ohio River. The Great Lakes would be left by the glaciers as they melted away 10,000 years ago.

FIGURE 10:
Illinois Paleogeographic Map
Late Cretaceous Period
 Turonian Age
 93.1 Million Years Ago



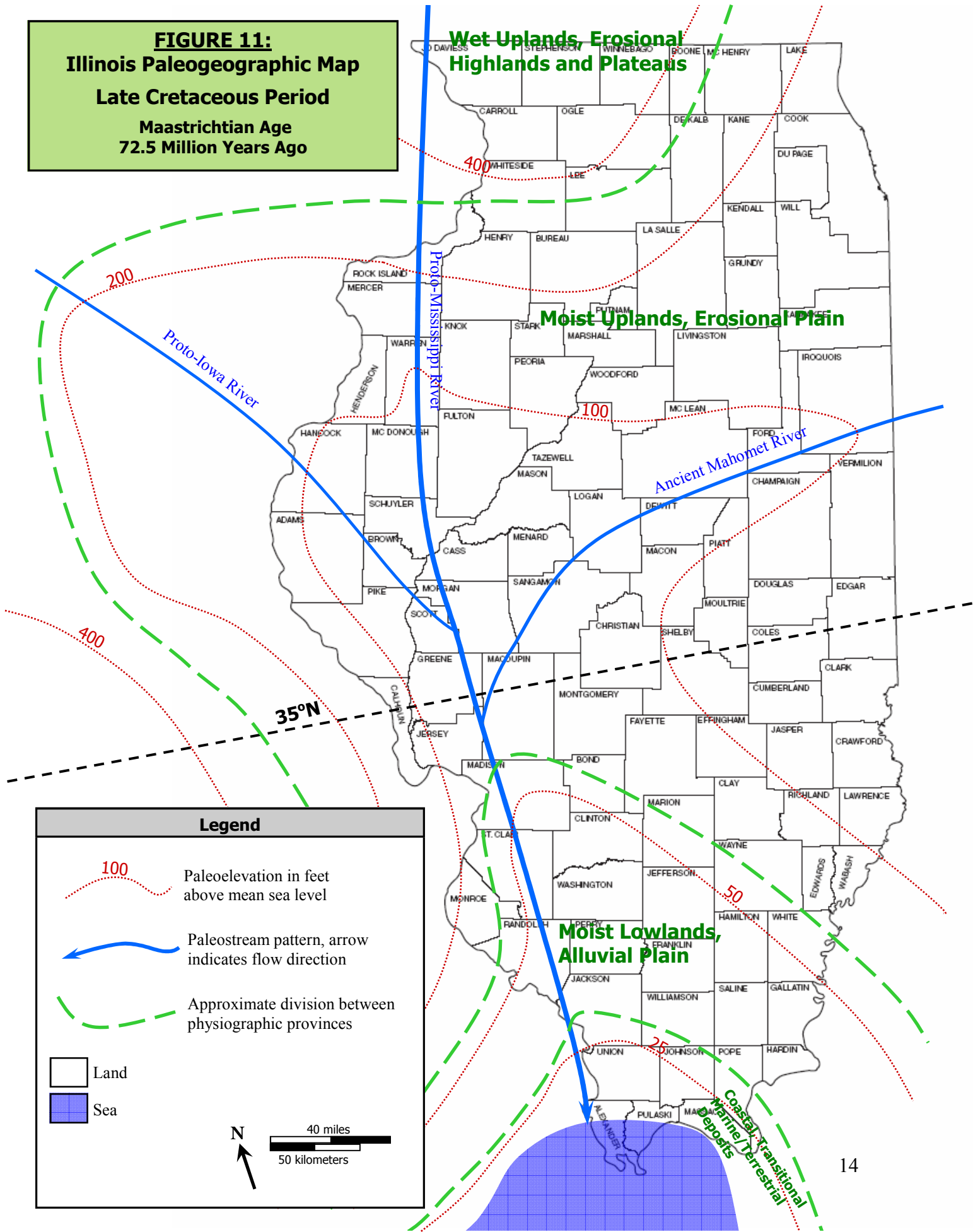
Legend

- Paleoelevation in feet above mean sea level
- Paleostream pattern, arrow indicates flow direction
- Approximate division between physiographic provinces
- Land
- Sea

N

40 miles
50 kilometers

FIGURE 11:
Illinois Paleogeographic Map
Late Cretaceous Period
Maastrichtian Age
72.5 Million Years Ago



Legend

- Paleoelevation in feet above mean sea level
- Paleostream pattern, arrow indicates flow direction
- Approximate division between physiographic provinces
- Land
- Sea

N
 40 miles
 50 kilometers

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Credits

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