The Driftless Area:

The extent of unglaciated and similar terrains in Wisconsin, Illinois, Iowa, and Minnesota

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Earth's climate has fluctuated between warm and cold conditions on regular cycles; over the past ~2.6 million years the coldest portions of these cycles have been associated with glaciations, which are sometimes called Ice Ages. There have been approximately 50 cycles of warming and cooling over the past 2.6 million years, occurring first on a 40,000-year cycle and later on a 100,000-year cycle. The colder periods allow for the growth of glaciers that have covered large parts of the world's high altitude and high latitude areas, with ice covering much of Canada and flowing southward into the United States on numerous separate occasions.

Glacial cycles through time

Landscapes with past glacial activity are characterized by landforms such as moraines, drumlins, and eskers, as well as sediment that was transported and deposited by ice (i.e. till). The most recent cycle of glaciation, known as the Wisconsin Glaciation, lasted between about 60,000 and 10,000 years ago. The second most recent cycle, known as the Illinoian Glaciation, lasted between about 300,000 and 130,000 years ago. In many places across the Midwest, Illinoian-age glacial deposits are more extensive than Wisconsin-age deposits. In Iowa and Illinois, large Illinoian-age moraines are still found on the landscape. In Wisconsin, however, Illinoian-age glacial landforms have mostly been removed by erosion. Therefore, the Illinoian Glaciation is primarily recognized in Wisconsin by its sediment. All glacial cycles older than the Illinoian Glaciation, collectively referred to as Pre-Illinoian Glaciations, span from 2.6 million years ago to about 500,000 years ago. They are grouped together because erosion has left a patchy distribution of these extremely old deposits, making it difficult to distinguish specific cycles. Pre-Illinoian-age deposits are the most extensive age of glacial sediments in central North America.

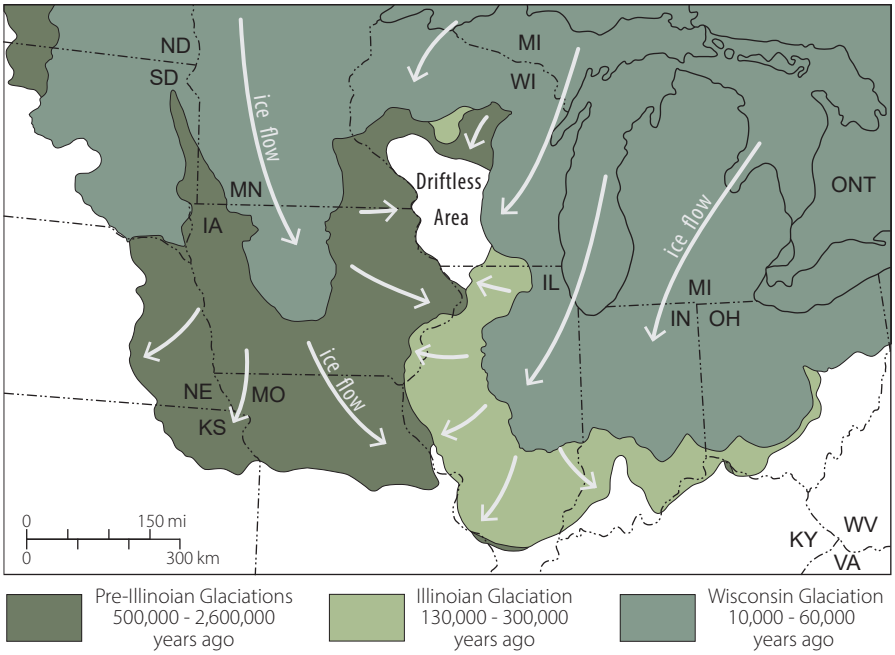

Figure 1. Age and distribution of glacial deposits surrounding the Driftless Area, showing general direction of ice flow for glaciers that bounded the Driftless Area.

The Driftless Area

Dating to the middle 19th Century, geologists have observed a lack of glacial sediment, or 'drift' as it was called then, in an area of southwestern Wisconsin and extreme northwestern Illinois. The lack of glacial deposits and glacial landforms indicated that this portion of the Midwest had apparently never been covered by glaciers. As a result, the landscape has primarily been formed by rivers cutting down into the nearly flat-lying sedimentary bedrock, forming valleys as deep as 400 feet from ridgetop to river level.

In over 150 years of study since the Driftless Area was originally recognized, all evidence supports the interpretation that the region was never covered by an ice sheet. The Driftless Area is bounded by Wisconsin, Illinoian, and Pre-Illinoian glacial deposits. Glaciers bordered the Driftless Area to the west during Pre-Illinoian Glaciation(s), to the southeast during the Illinoian Glaciation, and to the east during the Wisconsin Glaciation. Importantly, this implies that the Driftless Area was never entirely surrounded by ice at any one time.

Surrounding areas

Central Sand Plain. Just northeast of the Driftless Area lies Wisconsin's Central Sand Plain. The sand plain was formed by deposition of as much as 400 feet of sand and gravel on the bed of glacial Lake Wisconsin, which formed sometime prior to 24,600

years ago and persisted until it catastrophically drained approximately 17,400 years ago. This area is generally excluded from the Driftless Area because the thick deposits of sand and gravel make it difficult to identify whether any older, buried glacial deposits extend beyond the Wisconsin Glaciation margin.

Driftless-style topography. Large portions of southeastern Minnesota and northeastern Iowa are topographically very similar to the Driftless Area in Wisconsin and Illinois. However, patches of glacial deposits in Minnesota and Iowa demonstrate that they are not "driftless". These areas were covered by Pre-Illinoian ice, evidenced by sparse glacial landforms and sediment. The ice that covered this area would have flowed in a southeasterly direction from the Dakotas and Canadian Prairie Provinces and extended to roughly the position of the modern Mississippi River. A small remnant of a moraine marking the easternmost advance of this ice sheet can be found near Prairie du Chien, Wisconsin, and a small area of till from this glaciation has been mapped in southwestern Wisconsin on the east side of the Mississippi River between Prairie du Chien and Dubuque, Iowa.

The topography in this area is strikingly similar to the true, unglaciated Driftless Area. This is because the layers of sedimentary rock on both sides of the modern Mississippi were deeply cut into by rivers. The Pre-Illinoian glacial deposits in southeastern Minnesota and northeastern Iowa have been eroded to re-expose this network of river valleys carved into bedrock. Because these areas in Minnesota and Iowa were glaciated, it would not be geologically accurate to identify them as part of the Driftless Area. However, it would be accurate to say those areas have "driftless-style topography".

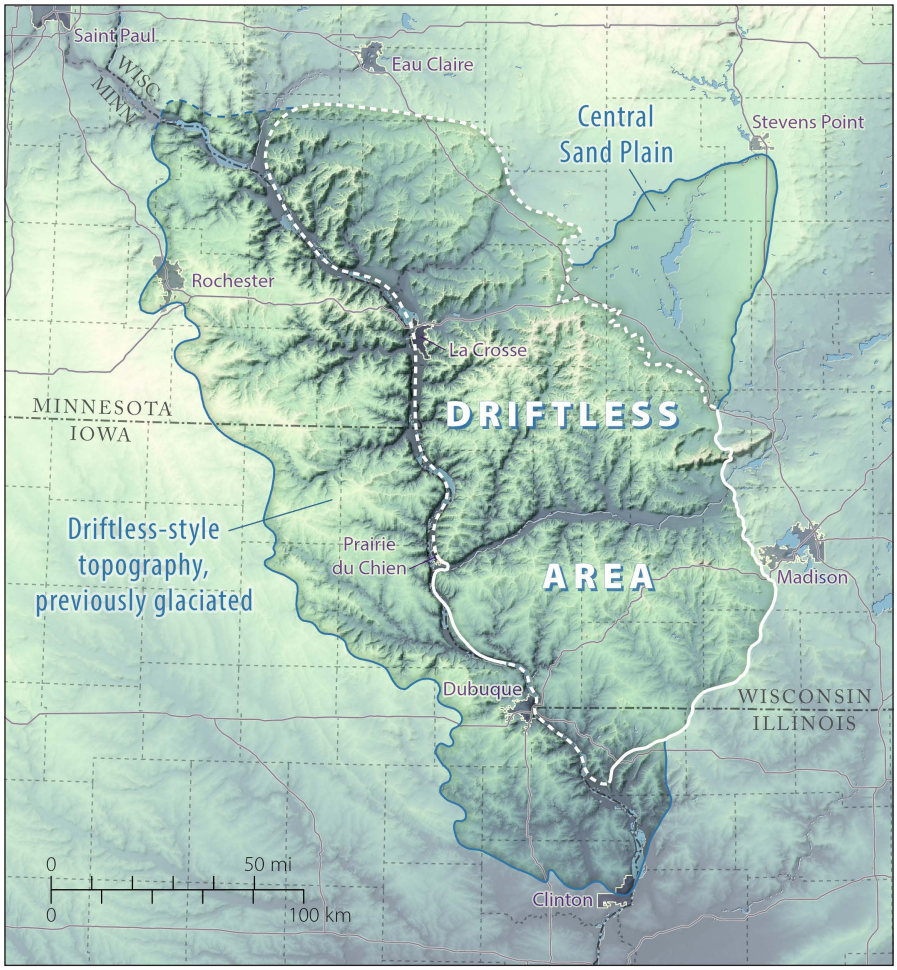

Figure 2. Extent of the Driftless Area in southwestern Wisconsin and northwestern Illinois, and similar landscapes in adjacent areas of Minnesota and Iowa that were glaciated in the relatively distant geologic past. Dashed lines indicate uncertain or inferred boundaries.

Supplemental material

The following material are available for download at https://doi.org/10.54915/qapq2678

- A page-sized and web version of Fig. 2.
- GIS files of the outline of the Driftless Area.

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