Glacial Features of the Inland Basin

Region 1

Excellent examples of glacial scouring are found in the Inland Basin region of the Northeast. Lakes Ontario and Erie were formed by the scouring action of glaciers. The broad, deep basins of Lakes Ontario and Erie, former river valleys, were scooped out by tongues of ice as the glacier advanced over North America. When the glacier began its retreat, meltwater flooded lake basins. Lakes Ontario and Erie were both much larger than today. Glacial meltwater poured into these basins, and the ice blocked drainage that would eventually flow to the northeast via the St. Lawrence River. The Erie and Ontario Lowlands, as well as the once-flooded Mohawk River Valley south of the Adirondacks, are the remains of the much larger lakes. Flat, lowland topography and characteristic lake bottom sediments are found in the areas where the lakes once reached.

The Finger Lakes region of New York was also formed by glacial scouring *(Figure 3.8)*. The Finger Lakes were pre-existing river valleys before the tongues of ice covered the area and widened and deepened the valleys. The stream valleys were dammed at their southern end by glacial till and flooded to form the Finger Lakes when the ice sheet retreated. Whereas streams only erode as far down as sea level, glaciers are able to erode more deeply. The bottoms of two of the Finger Lakes (Lakes Seneca and Cayuga) are actually below sea level.

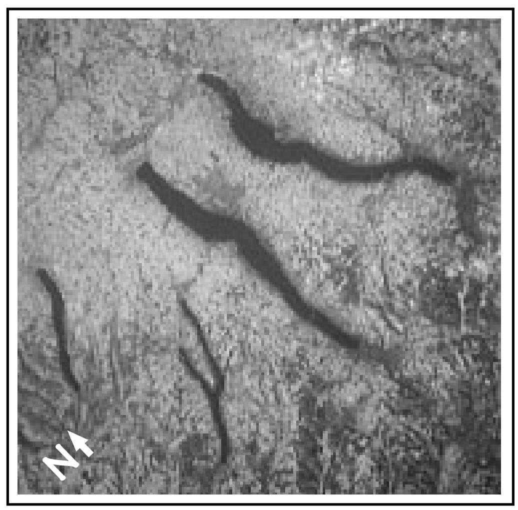
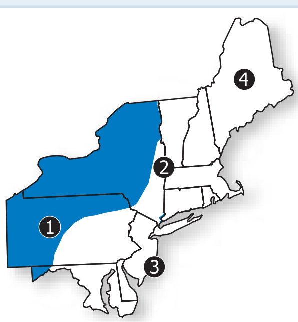


Figure 3.8: A view of the Finger Lakes region glacially carved lakes from the Space Shuttle.
Image courtesy of Alan Spraggins, NASA, JPL, Houston.

The bottoms of Seneca (193 meters deep) and Cayuga (132 meters deep) Lakes are deeper than sea level.



The Finger Lakes region is famous for its numerous gorges, which also resulted indirectly from the glaciers of the Laurentide ice sheet. After the glaciers retreated, or began retreating, tributary streams began running into the Finger Lake Valleys. The erosive force of the glaciers, however, considerably deepened these valleys. Thus, tributary streams were left hanging far above the lake surface, forming a series of waterfalls and cascades all along the Finger Lake Valleys. These stream valleys are called ***hanging valleys*** *(Figure 3.9)*. In a matter of only several thousand years, deep erosion by the tributary streams has moved many of the waterfalls hundreds of meters back away from the edge of the Finger Lake Valleys and created beautiful long, narrow gorges *(Figure 3.10)*. It is possible, though not always easy, to document that some gorges were formed during one or more previous glacial advances and simply re-excavated and further eroded since the last glacial event; some gorges formed during previous glacial advances were buried by sediment (till) in the most recent glacial advance and have not been re-excavated.

The tributary streams rapidly eroded the valley trying to reach the new base level in the Finger Lake Valleys. Resistant rock units have temporarily slowed the stream erosion, and the waterfalls remain.

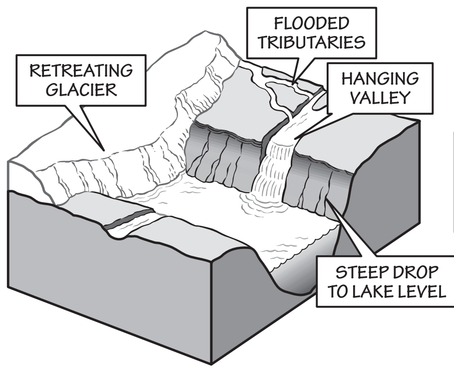


Figure 3.9: Development of a hanging valley following glacial retreat. Figure by J. Houghton.

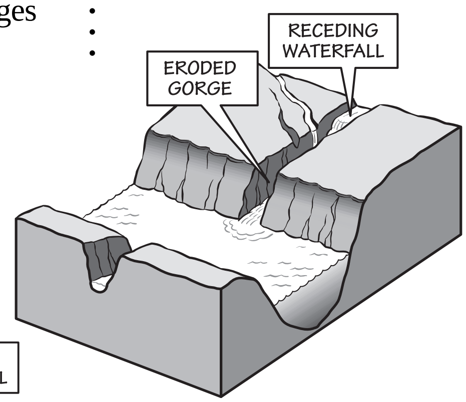


Figure 3.10: Development of a post-glacial gorge as in the Finger Lakes of central New York. Figure by J. Houghton.

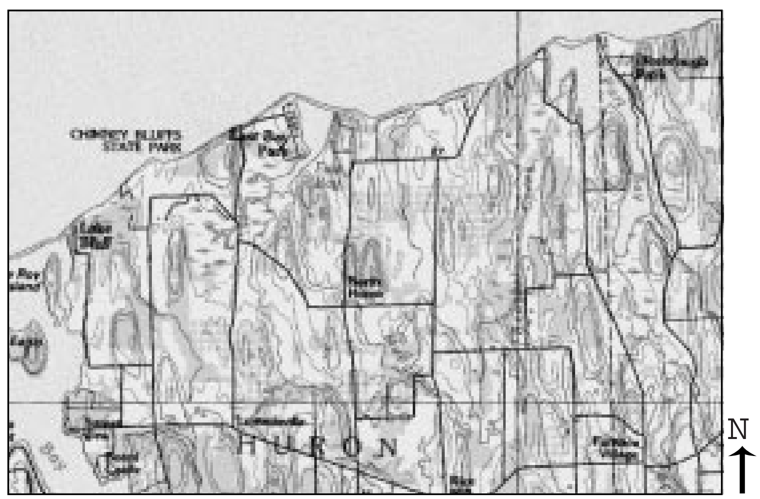
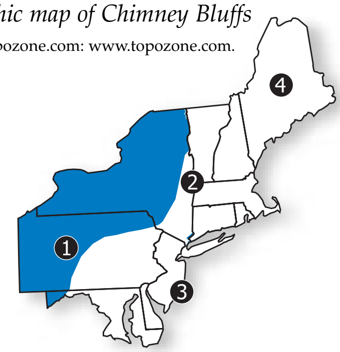


Figure 3.11: Drumlins on the topographic map of Chimney Bluffs State Park, New York. Image provided by Topozone.com: www.topozone.com.

Glacial Deposits

In addition to a blanket of till over the region, glacial deposits in the Inland Basin Region include abundant drumlins and moraines south of the Finger Lakes *(Figure 3.11)*. Between Rochester and Syracuse in the Ontario Lowlands are more than 10,000 drumlins. The drumlins are an important clue in determining the direction of flow of the most recent advance of the ice sheet. The Ontario Lowland drumlins are all generally oriented north to south, providing solid evidence that the glaciers flowed south over the landscape.

The terminal moraines in the Inland Basin include the Kent and Olean Moraines in Pennsylvania and the Valley Heads Moraine in New York *(Figure 3.12)*. The Valley Heads Moraine is significant because it divides the St.



Lawrence and Susquehanna drainage basins. Before the most recent ice age, many streams of the Inland Basin region (especially in New York and Pennsylvania) flowed south into the Susquehanna River. However, the Valley Heads Moraine, blocked the flow of water to the south, damming the Finger Lakes and forcing streams to drain north into the St. Lawrence River Valley *(Figure 3.12)*.

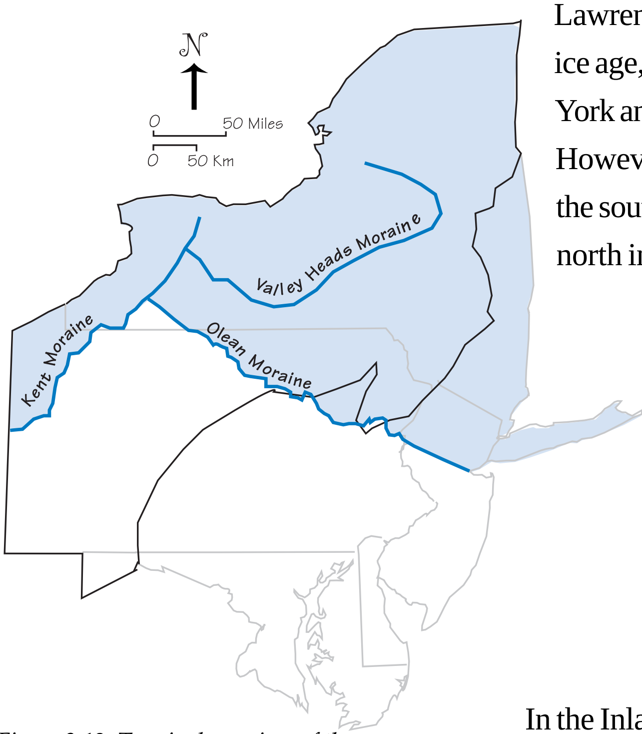


Figure 3.12: Terminal moraines of the Inland Basin. Light blue represents the maximum extent of the most recent ice sheet.

> **Varves:**
> ***glacial lake deposits***
> *Thinly bedded, very fine-grained sediments or clay characterize the deposits of glacial lakes that have shrunken considerably or disappeared. Coupled laminations of light and dark sediments, called varve deposits, are common lake-bottom features. The light bands represent summer deposits in the lake, whereas the dark layers represent winter deposits. The dark color in varved layers is attributed to an abundance of organic material.*

Periglacial Features

In the Inland Basin, a small area of southern New York, most of Pennsylvania and all of Maryland were left ice-free. Much of this region not covered by the ice sheet was periglacial, showing characteristic features of permafrost *(Figure 3.13)*. Throughout Pennsylvania and parts of Maryland are evidence of solifluction (permafrost-area mudslides), patterned ground and boulder fields.

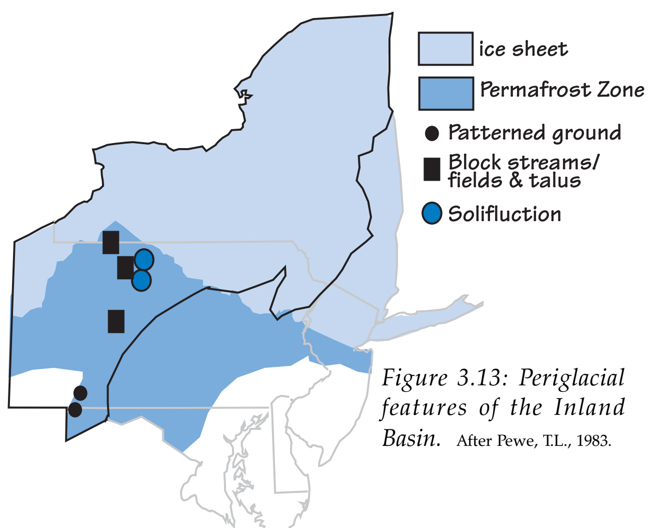


Figure 3.13: Periglacial features of the Inland Basin. After Pewe, T.L., 1983.