

GLACIATION and New York State

Prof. Anthony Grande

Copyright AFG 2012

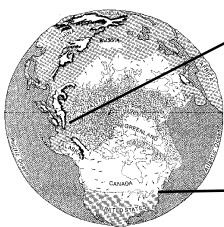
The Last Ice Age

(see Chapter 12)

- The **Pleistocene Epoch** began 1.6 mya.
- During this time, climates grew colder.
- There were numerous ice ages starting 100,000 years ago.
- The **last** advance of ice was during the **Wisconsin Stage of the Laurentide Ice Sheet**, a portion of which covered northern North America.

2

Pleistocene Ice Cap

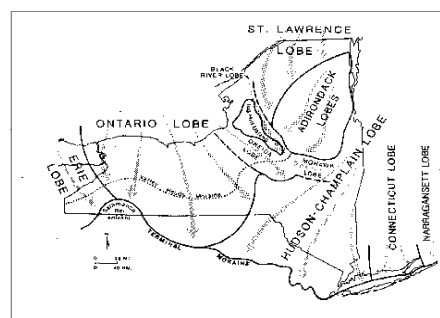


Extent of Ice Sheet over North America about 18,000 years ago.



3

Laurentide Ice Sheet over NYS



4

What did glaciation do for NYS?

1. Major shaper of the present-day landscape.
2. Influenced angle of slope.
3. Etched the drainage system.
4. Influenced the location of farms by creating a new soil layer.

5

Glacial Dynamics

- 1. **Ice sheets** move away from their zones of accumulation and push forward in sections (**lobes**) under the pressure from their weight (called plastic flow).
They also move down slope by slippage (called basal slip) as the weight of the ice melts its lowest levels and acts as a lubricant.
- 2. The forward edge of the ice sheet (**ice front**) acts as a "bulldozer", scouring the land, plucking loose rocks out of the ground and slicing all vegetation in its way.

6

Moraine Deposits in NYS

Terminal Moraine>>

Figure 10.10 The map of New York State is a simplification of the actual moraine patterns of New York State. It follows the same basic principles and uses the same symbols as the map of the Finger Lakes. It is a map by Douglas C. Layman, published by the Finger Lakes State University, New York. The map also includes a profile of the edge of the ice in the pre-glacial period.

13

Drumlins

<http://docs.unh.edu/NY/plmy02sw.jpg>

14

Drumlins

Drumlins: elongated hills of glacial debris created parallel to the flow of ice. They are tapered in the direction of ice flow. Individual drumlins can be 200 ft. high and over a mile long.

15

Creation of a U-Shape Valley

Before glaciation. **After glaciation.**

<http://docs.unh.edu/NY/cort03ne.jpg>

16

Profile of the Finger Lakes

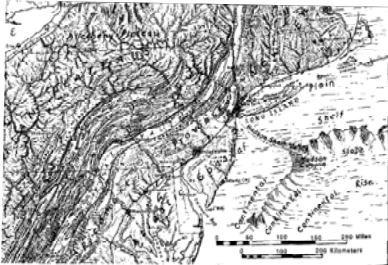
COMPARATIVE DEPTHS AND LEVELS OF THE ELEVEN FINGER LAKES

The **Finger Lakes** existed as V-shaped river valleys on the plateau surface in the pre-glacial period. The valleys were **deepened and widened by moving ice**. Their outlets were **clogged** by glacial deposits to create lake basins.

17

Mohawk River: a U-shaped glacial valley

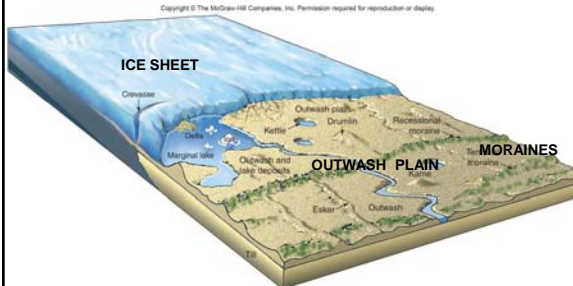
Physiographic Map of Northeast US



Glacial material was deposited on the (dry) continental shelf. Sea level was much lower. The moraines mark the southernmost extent of continental glaciation.



19

Edge of the Ice Sheet



20

Lake Ronkonkoma Suffolk Co.






Lake Ronkonkoma is a kettle lake. It was created when a huge chunk of the ice sheet got anchored on the outwash plain and was covered by glacial debris. As the ice melted, a circular depression was created.

Because of the high clay content of the sediment, the depression was able to retain the glacial melt water that filled the hollow.

21

Mendon Ponds Park, Monroe Co.

22

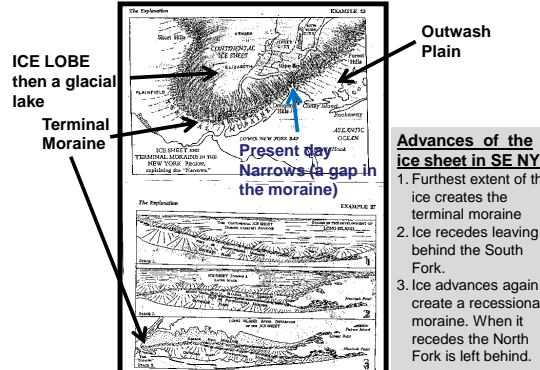
Mendon Ponds Park




Kettle lakes south of Rochester, NY.
Also see Fig. 12.20 in geology book.

23

Glacial Topography of SE NYS



Advances of the ice sheet in SE NYS

1. Furthest extent of the ice creates the terminal moraine
2. Ice recedes leaving behind the South Fork.
3. Ice advances again to create a recessional moraine. When it recedes the North Fork is left behind.

24

Long Island is part of the “drowned” Atlantic Coastal Plain

ATLANTIC COASTAL PLAIN
SHOWING DROWNED INNER LOWLAND

25

Creation of Long Island

The Ronkonkoma and Harbor Hill moraines run from Staten Island to southern New England creating the base of Long Island and Cape Cod. Long Island Sound was a **glacial lake** (a valley filled with fresh water from melting glaciers) with an overflow outlet near Fishers Island. Over time the glacial lake drained, leaving a river that flowed to the sea. As climate warmed, sea level rose. Salt water flooded the valley creating an **estuary**. The highest points of the moraines became islands. Sea level continued to rise, eventually linking LIS with NY Bay creating Long Island.

North-South Topographic Profiles across Long Island

1. The twin forks and Shelter Island
2. Central Suffolk County
3. Western Suffolk County
4. Central Nassau County

27

Recessional Moraines of the Southern Tier

28

Glacial Dam at Ithaca, NY

Southern outlet of Cayuga Lake is blocked by deposits of the **recessional moraine**.

<http://docs.unh.edu/NY/ithc95ne.jpg>

29

Ithaca Topographic Map

Dry valleys and valleys with small streams indicate features that once contained great amounts of water. Deposits of glacial debris blocked the flow of water draining to the south.

30

Ice in Retreat - 1

A. MAX EXTENT
21,750 yrs BP

B. GLACIAL RETREAT

DRAINAGE FLOW

C.

13,000 years
Valley Heads
Mohawk

Flow or Drainage
Hudson

31

Ice in Retreat - 2

-11,000 - 13,000 yrs

D.

E.

F.

Split drainage

G.

all drainage
down the Hudson

32

Retreat of the Glaciers in NYS: Stages of Wisconsin Deglaciation

A

Ice melts along its southern front. Catskills, Lower Hudson Valley, LI and SW NYS are ice free.

Dashed line marks the maximum extent of glaciation.

B

Adirondacks are no longer covered by the ice sheet but mountain glaciers exist.

Ice flows around the Adirondacks meeting in the Mohawk valley.

All meltwater drains to the Susquehanna River.

C

Meltwater fills the deepened valleys of the Allegheny Plateau creating the Finger Lakes.

Meltwater drains to the Allegheny and Ohio rivers.

Finger of ice blocks the Hudson river valley.

D

Most of the ice sheet has disappeared from NYS.

All meltwater drains through the Mohawk-Hudson lowland to the Atlantic Ocean.

33

Rivers and Lakes of NYS: a result of glaciation

The location of the rivers and lakes of NYS are a result of the physiography created by glacial processes.

Extra Credit for Midterm Exam

Glaciation in Your County. (max of +5 pts.)

1. Describe the glacial features found in one of your assigned counties (other than the ones used in class).
2. Find and print a portion of a topographic map from that county.
3. Circle and identify the glacial features evident on the map.
4. Tell how you know the feature is of glacial origin.

35