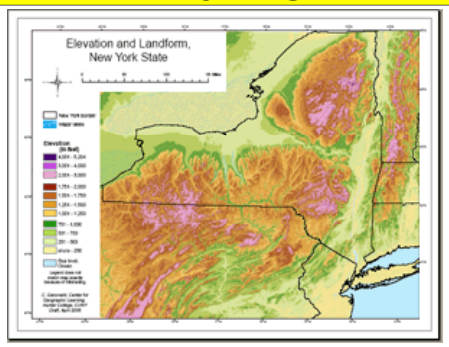
PALEOGEOGRAPHY of NYS

Prof. Anthony Grande

TOPOGRAPHIC RELIEF MAP of NYS



Definitions

Geography: study of people living on the surface of the earth.

Geology: the scientific study of the earth and its processes.

Geomorphology: the study of landforms.

Topography: the study of surface features.

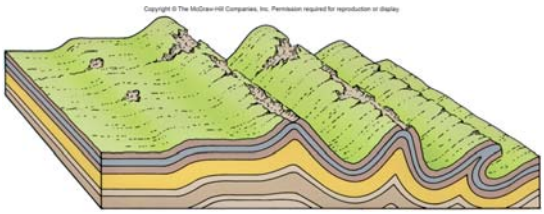
GEOLOGIC PROCESSES

TECTONIC
- **Folding**
- **Faulting**
- **Volcanism**

NATURAL PROCESSES
- **Mass movements**
- **Earthquakes**
- **Volcanic eruptions**
- **Subsidence**

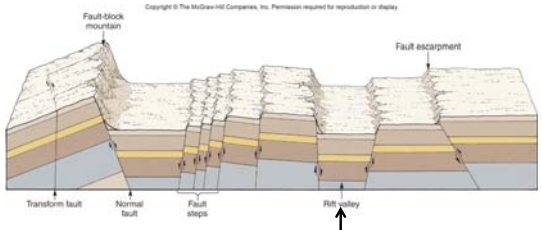
GRADATIONAL
- **Mechanical and chemical weathering**
- **Mass wasting**
- **Agents of Erosion**
  - Running water
  - Moving ice
  - Wind
  - Wave action
  - Long shore currents

Folding



Forces at work: Compression, bending, breaking

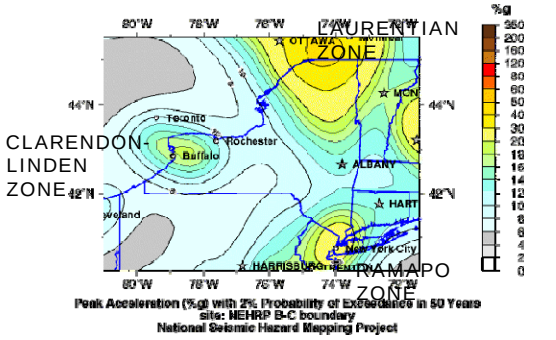
Faulting



Forces at work: movement, tension, breaking

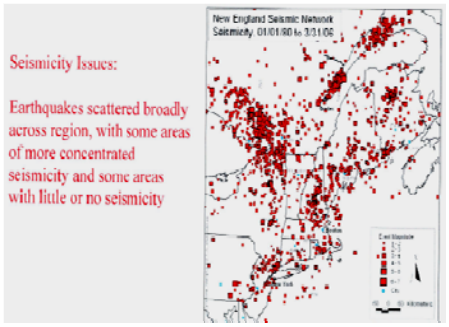
Lake Champlain, Lake George and Sacandaga Lake are in rift valleys (also called grabens).

Seismic Hazard Zones in NYS



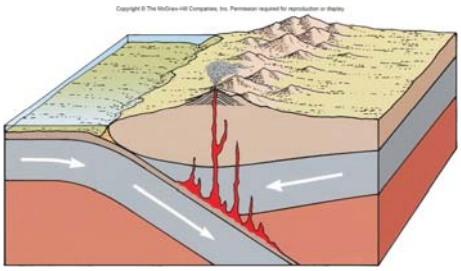
Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
site: NEHRP B-C boundary
National Seismic Hazard Mapping Project

New England Seismic Network including NYS



Earthquake Occurrence Northeast US

Volcanism



Forces at work: melting, movement of molten material, explosive

Palisades Sill

Terrain Units

1. Mountains
2. Plains
3. Hills
4. Plateaus
5. Coastlines

NYS is unique in that <u>all</u> major landform units are found within its borders.

Human Interaction

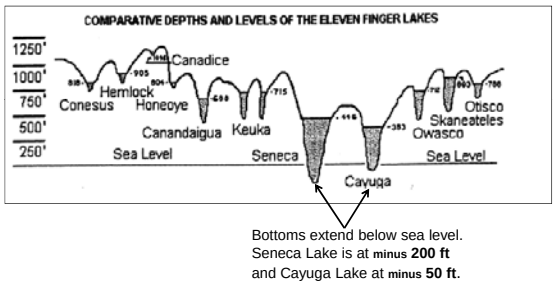
- Each major topographic region represents certain advantages and disadvantages to human land use and settlement.
- Human use of topographic regions varies with climate and technology**.**
- ADVANTAGE: Since European settlers came from areas with similar conditions they were able to adapt to NYS conditions easily.

Introduction to the Physical Geography of NYS

LANDFORMS

- NYS has a variety of terrain features: from the sandy coastal plains of Long Island to the granite peaks of the Adirondacks.
- NYS's topography ranges in elevation from **0 ft** (sea level) along the shores of Long Island and the Hudson estuary to **5344 ft** at Mt. Marcy in the Adirondacks.
- Two of the Finger Lakes on the Appalachian Plateau have depths that are **below sea level.**

Depths of the Finger Lakes



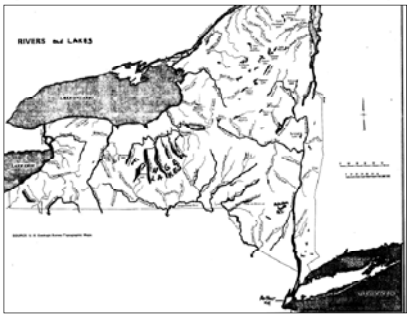
Bottoms extend below sea level.
Seneca Lake is at **minus 200 ft**
and Cayuga Lake at **minus 50 ft.**

Introduction to the Physical Geography of NYS

LANDSCAPES

- Land along with climate provides the basis of lakes, rivers, soil and scenery. It is a finite resource, one that cannot be manufactured by people. PHYSICAL LANDSCAPE
- People manage it and reap its harvest: crops, forest products, wildlife and minerals.
- People tend to concentrate their settlement on the best lands: flat with fertile soil, ease of construction, fresh water and access to transportation routes. CULTURAL LANDSCAPE

Rivers and Lakes
as part of the Physical Landscape



Paleogeography

- **NYS did not always look the way it does today.** Throughout earth history geologic and atmospheric forces have combined to change the landscape.
- **Global climate change and continental drift** have combined to create unique combinations of circum-stances that have affected the land surface.
- **While the subsurface rocks are hundreds of millions of years old, most of the surface topographic features that we see today are only thousands of years old and are a result of the last glacial period.**

Paleogeography

- During the hundreds of millions of years there have been **mountain ranges taller than the Rockies** and both **an ocean and an inland sea** covering the area where there is now land.
- Through a variety of geological processes, including **plate tectonics and continental drift,** aspects of the **rock cycle**, and the **tectonic and gradational forces** (especially glaciation), our present landscape has evolved. And it continues to change.
- **Both bedrock and surficial geology are important.**

Paleogeographic Sequence of Landforms in NYS

The paleogeographic sequence maps give us a sense how the state appeared 580 to 405 million years ago.

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Note the prehistoric areas of oceans and mountains.

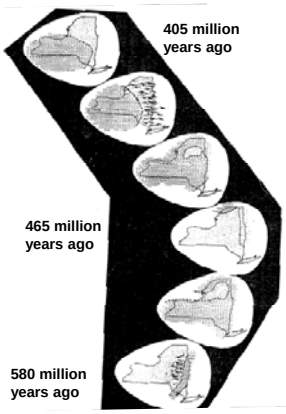
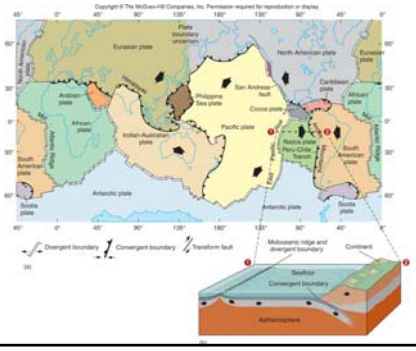
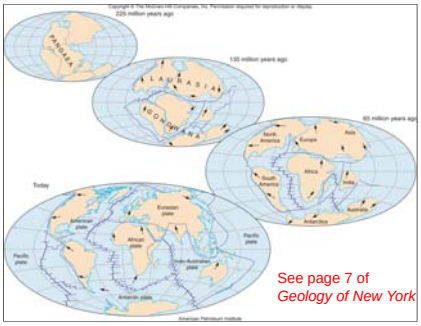


Plate Tectonics



Continental Drift

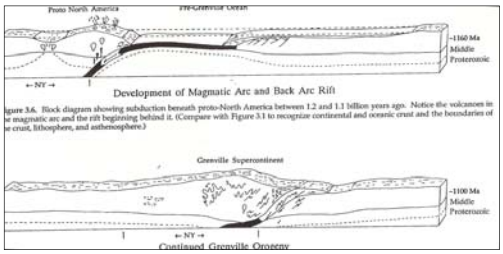


See page 7 of *Geology of New York*

Paleogeography

- The state's oldest rocks were deposited 1.3 billion years ago, BUT the landform features we see today are only 8,000-10,000 years old. **See chart on p. 7 *Geology of NYS*.**
- From **Chapter 3, Plate Tectonic History**, you see that the rocks were deformed and metamorphosed during the Grenville mountain building period 1.1-1 billion years ago as North America and Africa collided.
- These mountains were then eroded away only to grow as a result of subsequent continental collisions**. Figs 3.6-3.14** show a generalized sequence of geologic events through block diagrams. Also **p. 251 Appendix.** Note the sections marked "NY" on the diagrams.

Grenville Orogeny



Collision of tectonic plates

Paleogeography

- One of the major geologic features of the state is the CATSKILL DELTA. This is in **Chapter 8**.
- This huge delta complex of the middle/late Devonian Period is composed of sedimentary rocks that underlay the Allegheny Plateau of NYS.
- Erosion of the Acadian Mts. to the east deposited sediment into the shallow sea in the interior of proto-North American continent. As the mountains grew, erosion increased, filling the sea with sediment. It is thickest on the east and thins toward the west. **See Fig. 8.14, 8.15, 8.16.**
- *The **chart on page 7** lists the important geologic events in NYS. It also shows important marker fossils.*

Catskill Delta

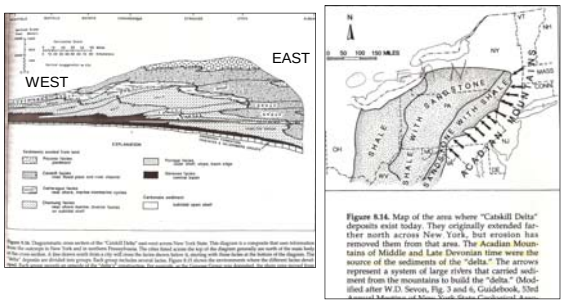


Figure 8.14. Map of the area where "Catskill Delta" deposits exist today. They originally extended farther north across New York, but erosion has removed them from that area. The Acadian Mountains of Middle and Late Devonian time were the source of the sediments of the "delta." The arrows represent a system of large rivers that carried sediment from the mountains to build the "delta." (Modified after W.D. Sevon, Fig. 3 and 4, Guidebook, 53rd

Tectonic Provinces of North America

The present-day distribution of tectonic regions of North America is a result of hundreds of millions of years of geologic activity.

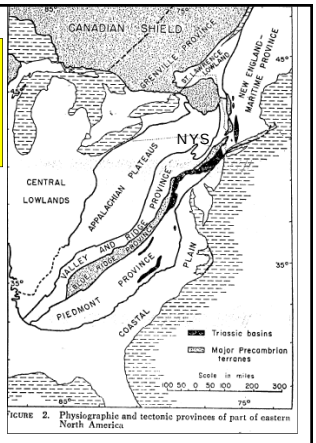
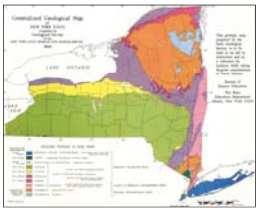


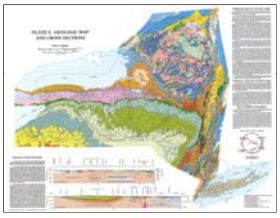
FIGURE 2. Physiographic and tectonic provinces of part of eastern North America

Present Geology of NYS

Generalized Geology



Detailed Geology



THE GEOLOGY OF NYS IS VERY COMPLEX