

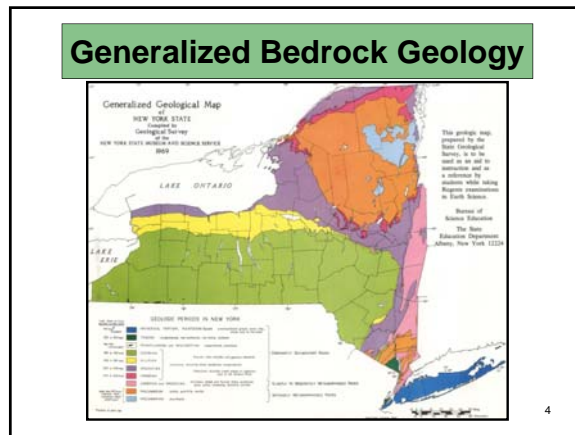
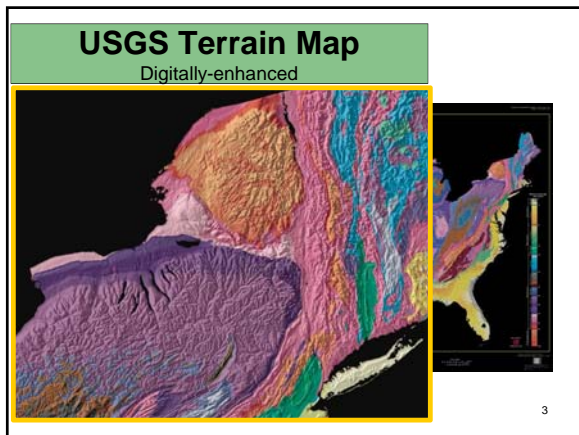
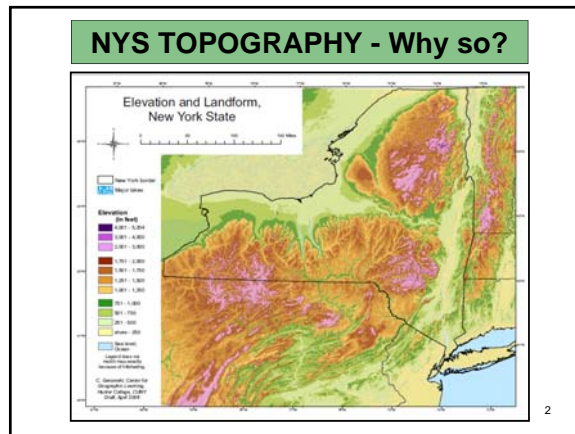
**4**  
**GEOLOGIC BASE and**  
**PALEOGEOGRAPHY**

**Landform Creation**

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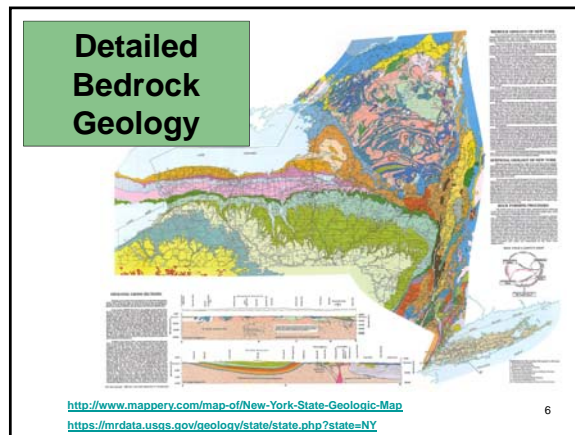
**Complex Geology of NYS**

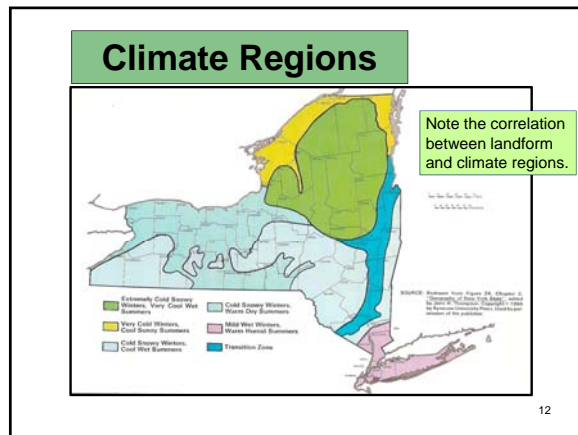
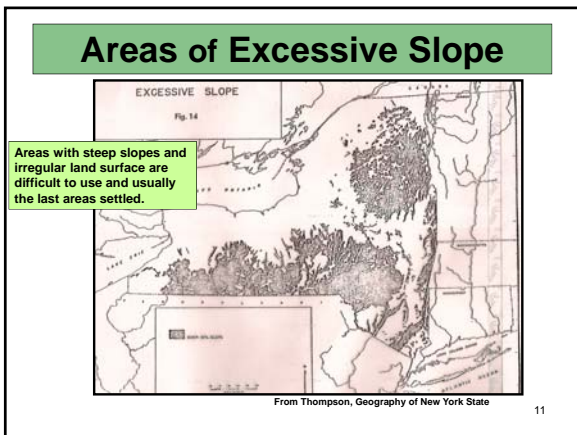
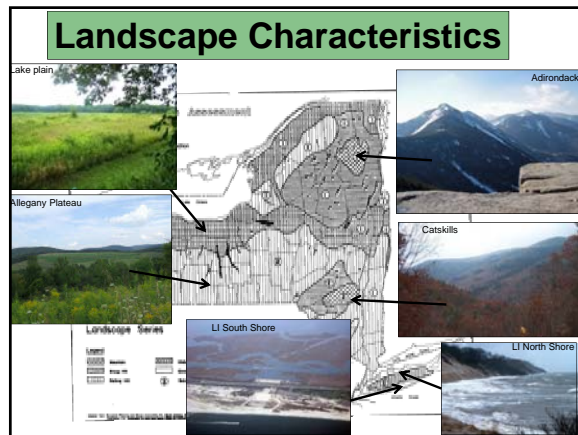
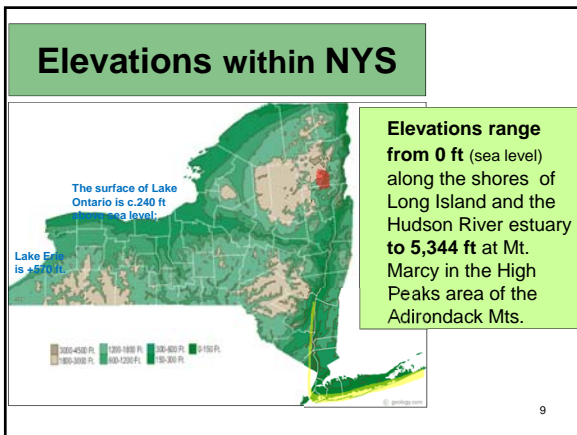
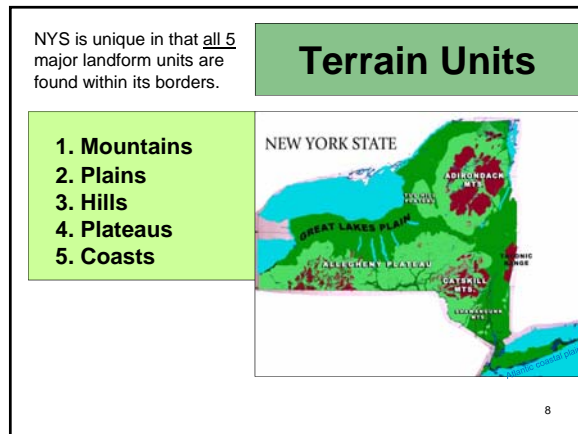
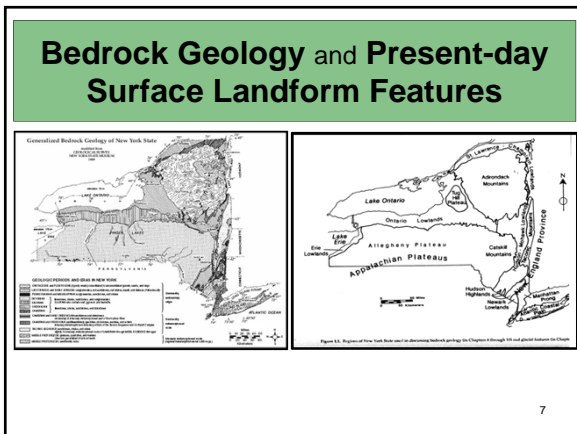
**Generalized Geology**

**Detailed Geology**

<https://www.thoughtco.com/new-york-geological-attractions-4123008/>  
noteworthy geologic formations of NYS

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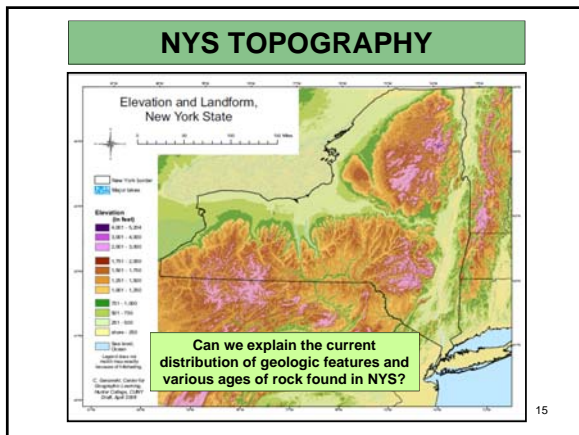




### Nature of NYS's Landscapes

- **Land + 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 supply and access to transportation routes. >>CULTURAL LANDSCAPE

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### Paleogeography

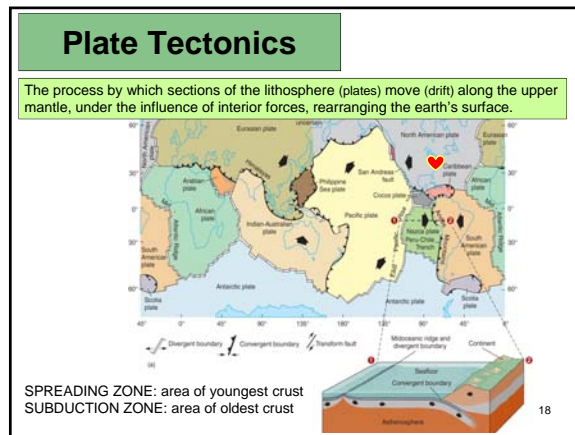
- **The physical nature of NYS has not always looked the way it does today.** Geologic processes and global climate change have combined to create unique combinations of circumstances.
- ✓ We must differentiate between the **bedrock geology** (foundation) and the **surficial geology** (skin).
- ❖ The **subsurface rocks** are **hundreds of millions of years old** but most of the **surface topographic features** are only **thousands of years old!**  
**WHY the difference?**

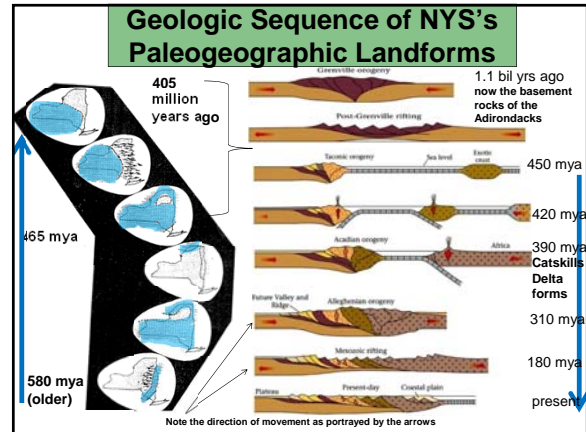
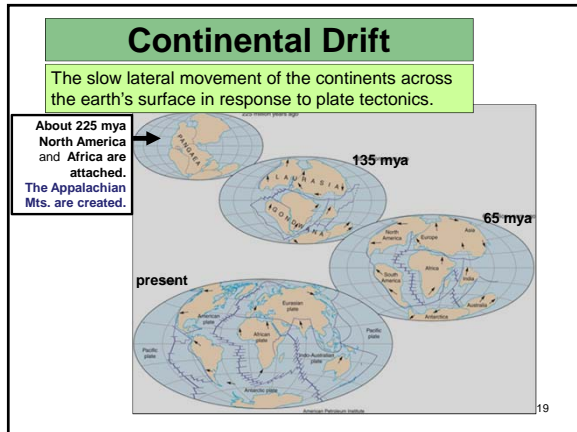
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### Paleogeography

- ❖ The state's **oldest rocks are part of the continental core and are dated at 1.3 billion years old** **BUT** the landform features we see today are only **8,000-12,000 yrs old** because of **the continental ice sheets**.
- About **1.1-1 billion years ago** there was the first of many mountain building periods: **Grenville Orogeny**.
- These mountains were then eroded away only to grow again as a result of subsequent continental collisions.
- During these periods, a **salt water ocean** and an **inland sea** covered areas where there is now land.
- **These changes are explained by geologists through the theories of plate tectonics and continental drift.**

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### Creation of NYS Landforms

❖ **Taconic Orogeny**  
450 mya

- Erosion of mountains
- Filling in of shallow ancient sea (deposits of salt and gypsum)

❖ **Acadian Orogeny**  
390 mya

- Erosion of mountains
- Catskill Delta** created

❖ **Collision with Africa**  
310 mya

- Catskill Delta** rises above sea level 300 mya

❖ **Alleghanian Orogeny** creates the Appalachian Mts 250 mya

- Erosion of mountains

❖ **Champlain rift** created 180 mya as Pangaea splits up

❖ **Doming of the Adirondacks** begins 20 mya as a hot spot of volcanic activity began to push upward.

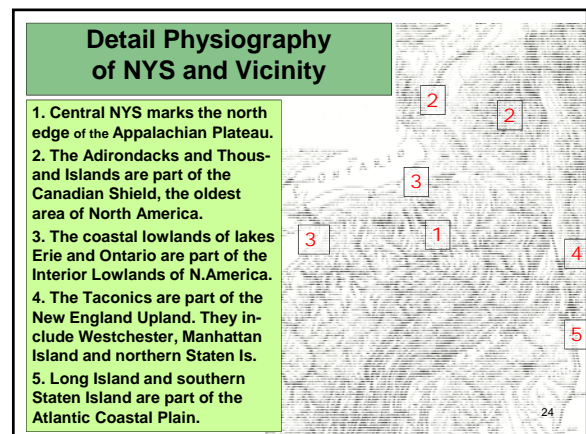
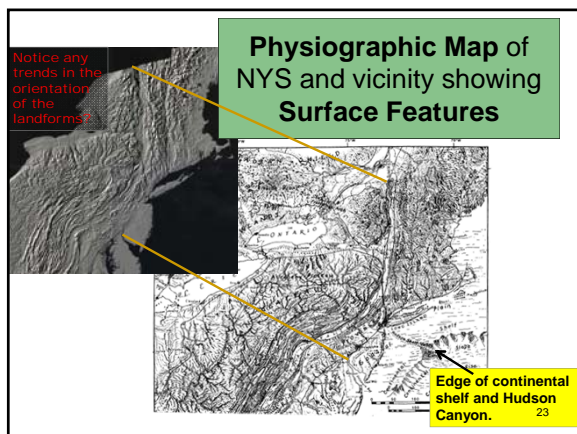
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### Summary

➤ **NYS's landforms were created mainly by forces of folding and faulting during continental collisions and mountain building periods over hundreds of millions of years.**

- ✓ Volcanic activity was present and led to unique features in the eastern part of NYS.
- ✓ The processes are also responsible for the creation of the great variety of rocks and minerals found in NYS.

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### 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 Adirondack Mountains are shown to the north.

**HOW?**

- > Erosion of the Adirondack Mts. 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.

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### Champlain Lowlands

Lake Champlain now occupies a rift zone created as Pangaea split (180 mya).

As Africa moved away from North America and pressure lessened, the crust "dropped" down in relation to bordering areas, creating a lowland.

Eventually the lowland flooded creating the lake.

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### Creation of Adirondack Mts.

**ADIRONDACK UPLIFT**

- Adirondack area before doming began. Sedimentary rock layers on very old rock topped by young rock.
- Adirondack doming, erosion. Early radial drainage. Uplift to remove the sedimentary layers. Folded, contorted, metamorphosed, lower crustal rocks.
- The present breached dome, exposing the old, lower crustal rocks. Eroded, slightly tilted sedimentary rocks.

Uplift - a very recent process pushed old rock through younger layers.

Tug Hill Plateau, High Peaks, Champlain Lowland

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### Adirondack Mts.

Radial drainage patterns indicate a dome structure.

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### Tectonic Provinces of Eastern North America

Hundreds of millions of years of geologic activity have created the present-day distribution of tectonic regions of North America.

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### Elevation of Landforms in Northeast US

The Hudson-Mohawk corridor is 1 of 3 routes across the Appalachian Mts. and the **only lowland route** north of Alabama. Elevation is c.450 ft. at Rome, NY.

It connects the Atlantic coast to the Interior Lowlands via the Great Lakes.

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## Physiographic Regions of NYS

NYSGS identifies 12 physiographic regions.

- Each has physical characteristics that are unique to it.
- Their characteristics have influenced human perception and subsequent land use.



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## Physiographic Regions of NYS

NAME	LOCATION	PRINCIPAL ROCK TYPE	SLOPE	SPECIAL CHARACTERISTICS
St. Lawrence Lowland	North, between the Adirondacks and Laurentian highlands of Canada	Sedimentary (sandstone and siltstone)	Level to gentle	Part of the vastest corridor from the Great Lakes to the Atlantic Ocean. The St. Lawrence River empties in The Thousand Islands area, a remnant of the Isthmus of Archa between the Adirondacks and the Laurentians.
Adirondack Highlands	Northwest	Igneous and metamorphic (gneiss)	Moderate to very steep	A core structure of ancient mountains. Highest peaks in NYS. Highest elevations related to the Canadian Shield, the core area of North America.
Champlain Lowland	Northeast, between the Adirondacks and the New England Upland (Green Mt. section)	Sedimentary (sandstone)	Level	Occupied mostly by Lake Champlain. Links the Hudson Lowland to the St. Lawrence Lowland.
New England Upland	East	Igneous and metamorphic (granite)	Steep	Partly extends into eastern NYS as the Taconic Mts. The Reading Prong cuts across 20% NYS as the Hudson Highlands, forms the gorge of Hudson at West Point. Southern Prong forms Massachusetts.
Black River Valley Lowland	North central, between the Adirondacks and Tug Hill	Sedimentary (sandstone)	Level to gentle	This area was at one time occupied by a glacial lake.
Tug Hill Upland	North central, between the Black River Valley and the Ontario Lake plain	Sedimentary (sandstone)	Moderate	Clipped by resistant sandstone, forms a cuesta that is sloped from east to west. Area of poor drainage.
Erie Ontario Plain Lowland	Northeast, covering Lake Erie and Lake Ontario	Sedimentary (sandstone, shale and siltstone)	Level to gentle	Part of the Interior Plain of North America. Characterized by weak rock formations with some resistant outcrops, (as the Niagara escarpment). Covered by thin glacial soils, some poor drainage. Divided between Rochester and Syracuse.
Mohawk Valley Lowland	East central, between the Adirondacks and the Appalachian Highlands	Sedimentary (shale)	Level to moderate	Scraped by the Mohawk River. Wasteful at Oneida Falls is where the glacial melt water broke through the pre-glacial drainage divide.
Appalachian Upland (Albany Plateau and the Catskill Mountains)	South central	Sedimentary (sandstone, shale and limestone)	Gentle to moderate on the Allegheny Plateau. Moderate to steep in the Catskills.	Largest physiographic region of NYS. Northern end of the Great Appalachian Passage that extends north from Alabama. Resistant beds on north and east form escarpments in the Allegheny. The high Catskills, deeply dissected by glaciers, are the lowest parts of the plateau. The Catskills are not mountains but a weathered eroded (dissected) older portion of the plateau. The Allegheny Plateau region in the southwest is the only part of the upland that was not glaciated.
Hudson Valley Lowland	East, between the Appalachian and New England Uplands	Sedimentary (limestone and shale)	Level to moderate	Part of the Ridge and Valley Province of North America (called Appalachian) that extends north from Alabama. The Hudson River is a sea level until Troy. Southern section is drained by the Wallkill River.
Finger Lakes Lowland or Newark Basin	Southeast, between the Catskills and the Reading Prong of New England Uplands	Sedimentary (sandstone)	Gentle	Smallest region of NYS; was once occupied by a glacial lake.
Long Island Coastal Upland	Southeast	Unconsolidated (sand)	Level to gentle	Northern portion of the Atlantic Coastal Plain that extends from Cape Cod to Florida. Terraced ridges and outwash plain. Hudsons are present.

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## Landform Analysis

How geographers assess the landscape.

### Physical Characteristics

- **Elevation** – height above sea level
- **Relief** – vertical difference between a high and low point
- **Slope** – horizontal distance between a high and low point
- **Valley Shape** and **Stream Flow** – work of water and gravity.  
*(Slope angle + volume of water + geologic setting = Rate of erosion)*
- **Vertical Zonation of Climate** – 3.5°F/1,000 ft. of change in elevation (related to #1 above)

### Influence on People

- **Barrier or Unifier** – fosters isolation or interaction
- **Distinction or Assimilation** – separation or mixing
- **Transportation/Communication** – ease and cost
- **Population Density**
- **Economic Activities**
- **Hazards** – natural and man-made

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Now on to  
Glaciers!



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