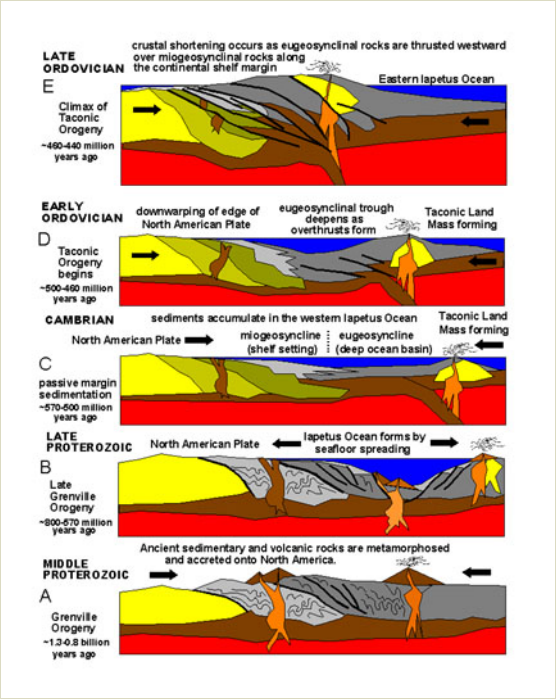
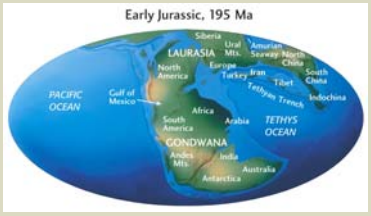
Western New York Geology

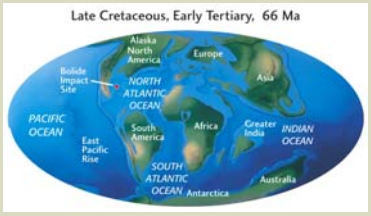
Plate Tectonics

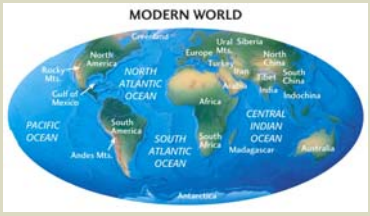
- Alleganian
  - Late Paleozoic
- Acadian
  - Late Devonian
- Taconic
  - Ordovician
- Greenville
  - Late Precambrian



Continent Locations During Episodes of Earth's History



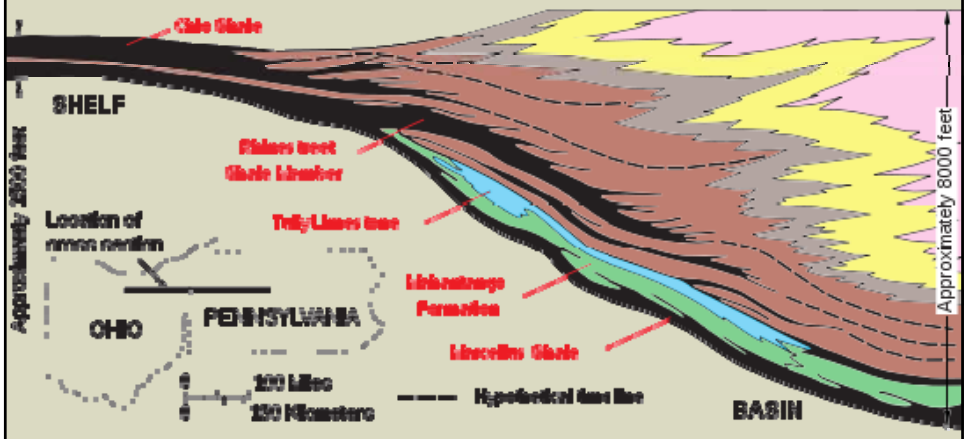




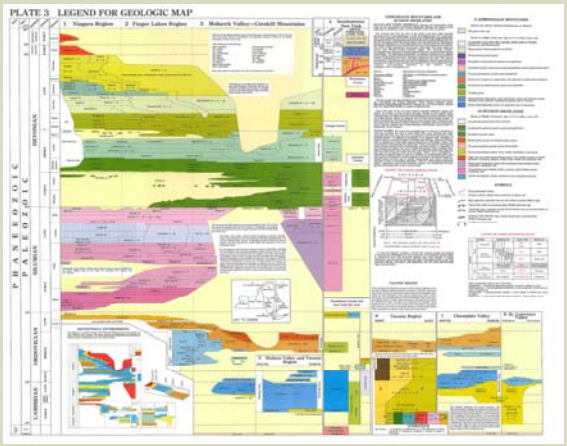
A movie: http://earthguide.ucsd.edu/earthguide/diagrams/plate_reconstruction/platereconstruction.html

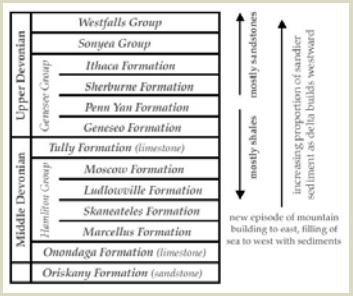
Paleogeography – Devonian Times

Cross Section
Ohio through PA

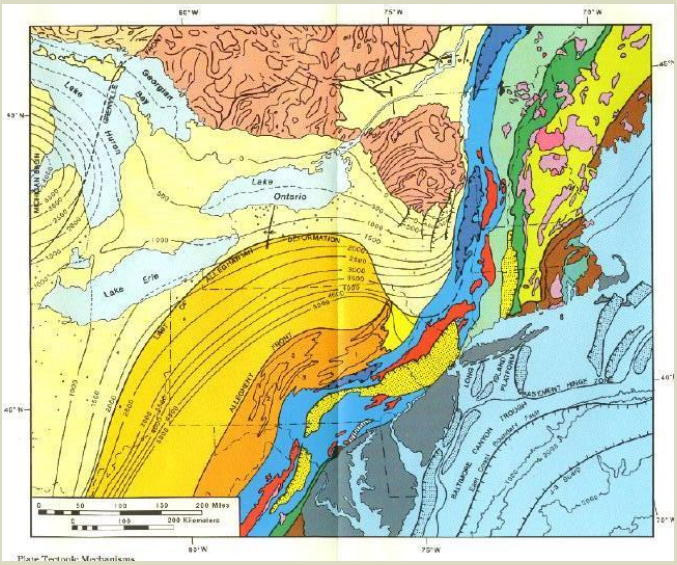


Geologic Stratigraphic Section

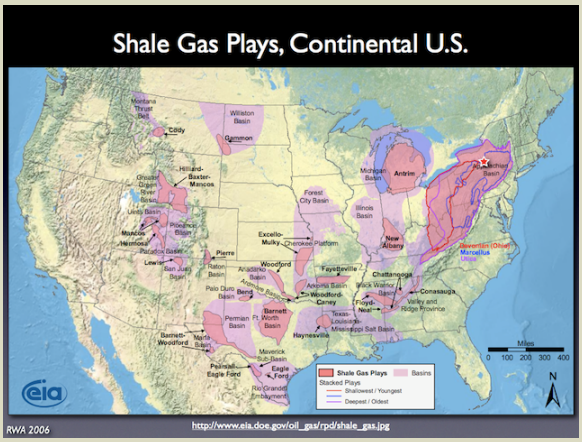




Tectonic Reach

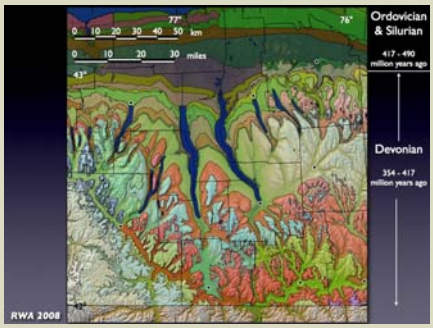


Marcellus and Shale Plays

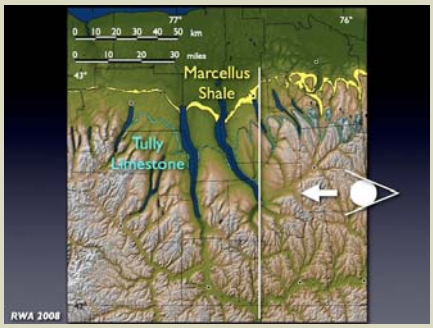


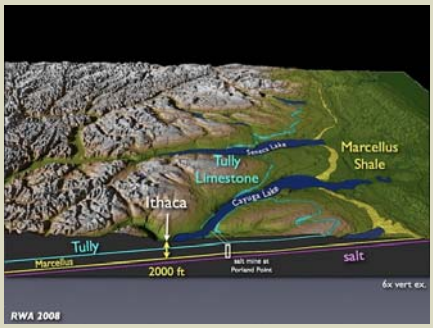
http://www.geo.cornell.edu/geology/faculty/RWA/
Richard W. Allmendinger, Cornell

Marcellus Geology

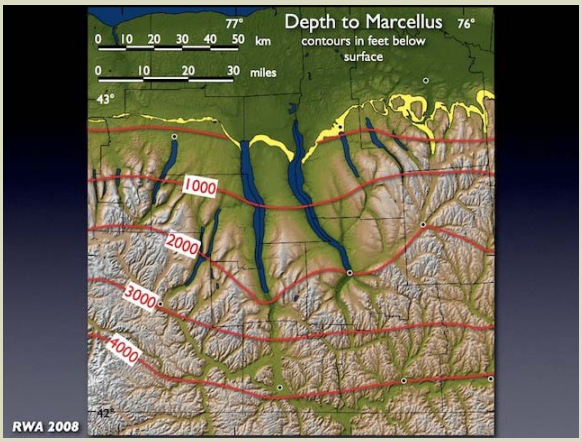


Subsuface

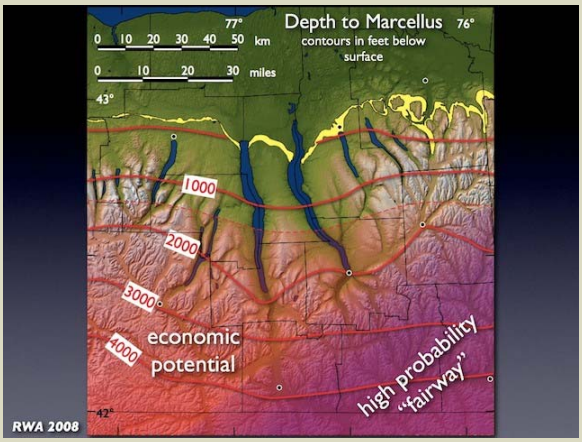




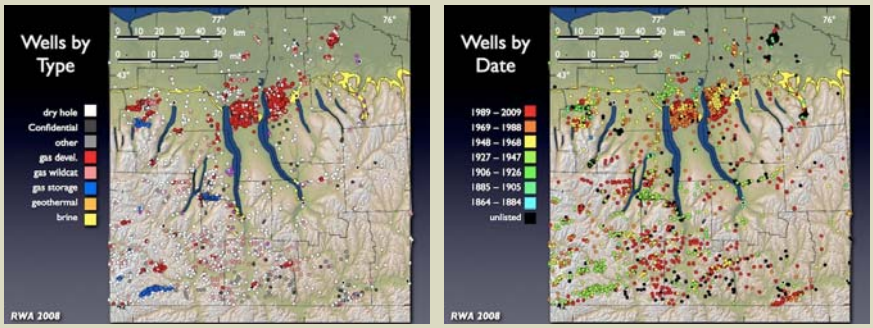
Depth to Marcellus

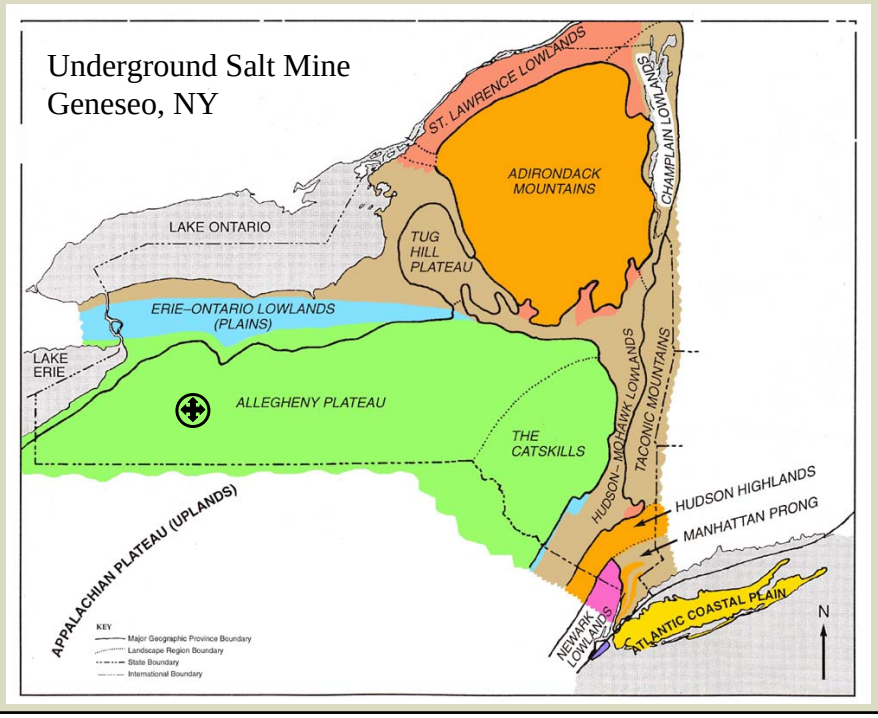


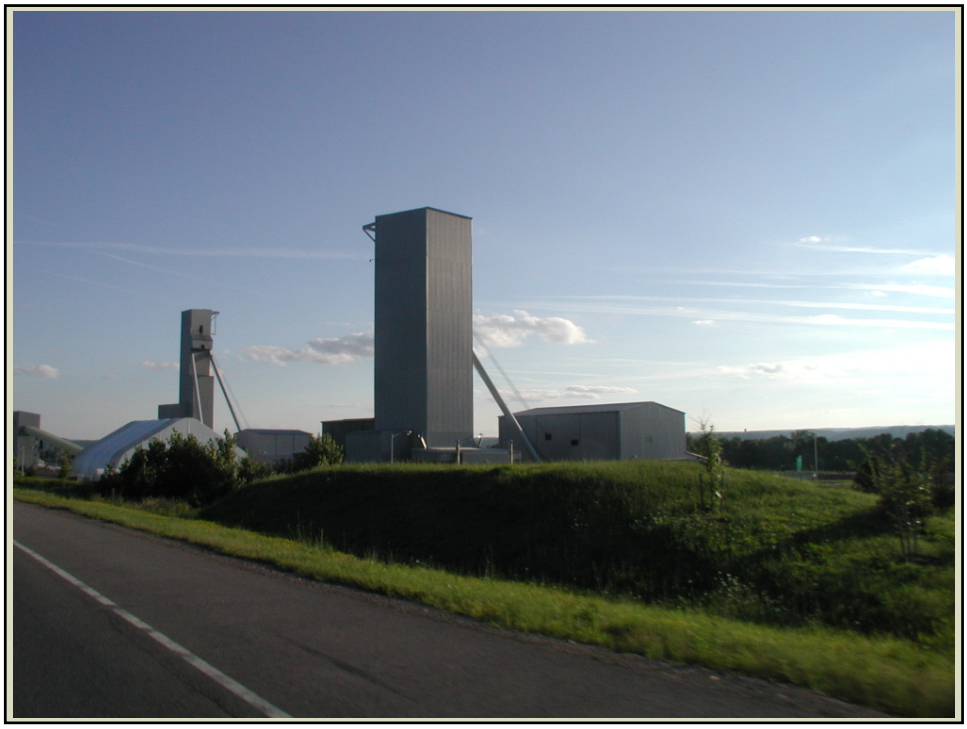
Marcellus Economics

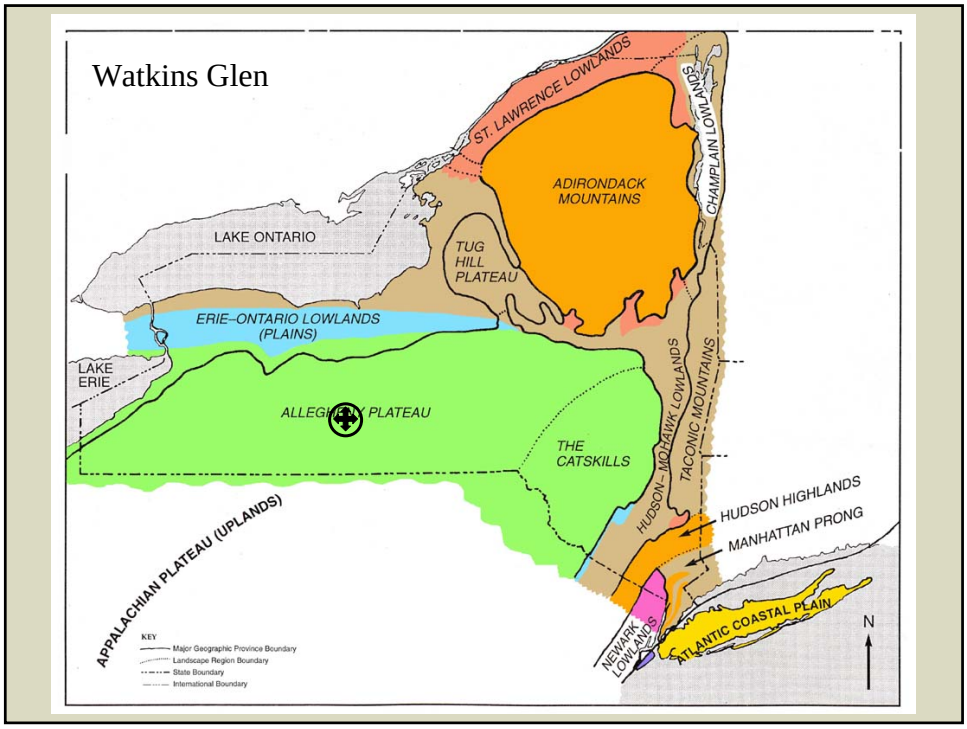


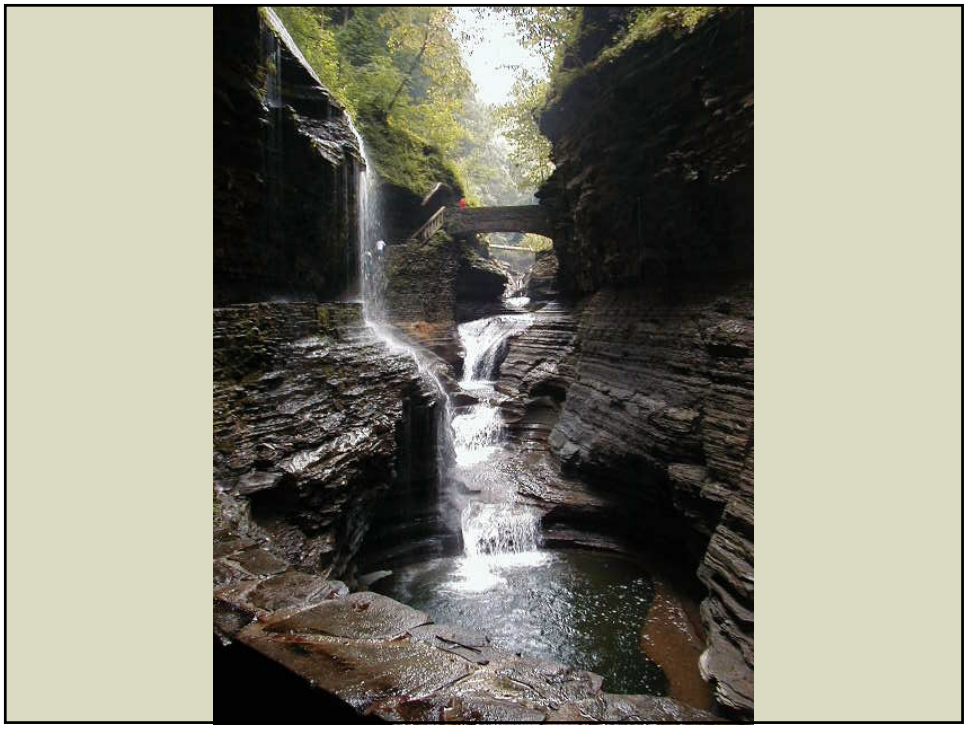
Gas Wells

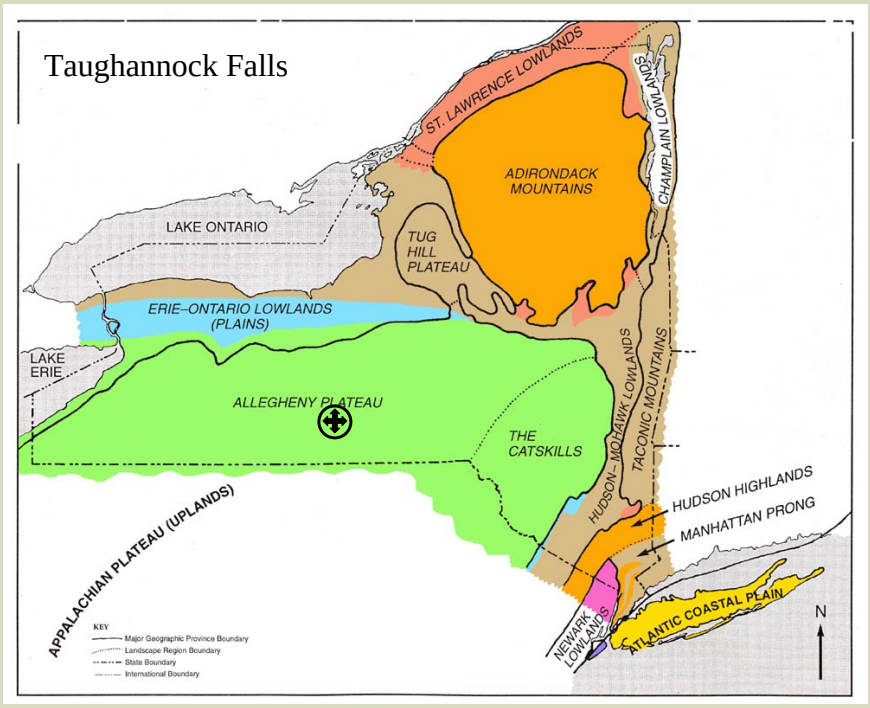

Wells by Type
dry hole
Confidential
other
gas devel.
gas wildcat
gas storage
geothermal
brine
RWA 2008
Wells by Date
1989 – 2009
1969 – 1988
1948 – 1968
1927 – 1947
1906 – 1926
1885 – 1905
1864 – 1884
unlisted
RWA 2008


Underground Salt Mine
Geneseo, NY
ST. LAWRENCE LOWLANDS
ADIRONDACK MOUNTAINS
CHAMPLAIN LOWLANDS
LAKE ONTARIO
TUG HILL PLATEAU
ERIE–ONTARIO LOWLANDS (PLAINS)
LAKE ERIE
ALLEGHENY PLATEAU
THE CATSKILLS
HUDSON–MOHAWK LOWLANDS
TACONIC MOUNTAINS
HUDSON HIGHLANDS
MANHATTAN PRONG
APPALACHIAN PLATEAU (UPLANDS)
NEWARK LOWLANDS
ATLANTIC COASTAL PLAIN
N
KEY
Major Geographic Province Boundary
Landscape Region Boundary
State Boundary
International Boundary




Watkins Glen
ST. LAWRENCE LOWLANDS
CHAMPLAIN LOWLANDS
ADIRONDACK MOUNTAINS
LAKE ONTARIO
TUG HILL PLATEAU
ERIE–ONTARIO LOWLANDS (PLAINS)
LAKE ERIE
ALLEGHENY PLATEAU
THE CATSKILLS
HUDSON–MOHAWK LOWLANDS
TACONIC MOUNTAINS
HUDSON HIGHLANDS
MANHATTAN PRONG
APPALACHIAN PLATEAU (UPLANDS)
NEWARK LOWLANDS
ATLANTIC COASTAL PLAIN
N
KEY
Major Geographic Province Boundary
Landscape Region Boundary
State Boundary
International Boundary




Taughannock Falls
ST. LAWRENCE LOWLANDS
ADIRONDACK MOUNTAINS
CHAMPLAIN LOWLANDS
LAKE ONTARIO
TUG HILL PLATEAU
ERIE–ONTARIO LOWLANDS (PLAINS)
LAKE ERIE
ALLEGHENY PLATEAU
THE CATSKILLS
HUDSON–MOHAWK LOWLANDS
TACONIC MOUNTAINS
HUDSON HIGHLANDS
MANHATTAN PRONG
APPALACHIAN PLATEAU (UPLANDS)
NEWARK LOWLANDS
ATLANTIC COASTAL PLAIN
N
KEY
Major Geographic Province Boundary
Landscape Region Boundary
State Boundary
International Boundary

Lakes

Lake Ontario, January Ice Fields

Owasco Lake

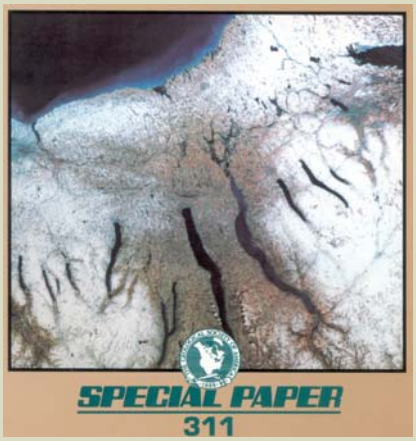
Origin?

- Hole
- Water

Seneca Lake

Lakes: Hole – 76 Mechanisms

- Tectonic Processes
- Glacial Processes
- Others
  - Volcanic (Caldera)
  - Landslide (Dams)
  - Solution (Karst Topography)
  - Fluvial (Oxbow)
  - Aeolian
  - Shoreline
  - Organic (Beavers)
  - Anthropogenic (Reservoirs)
  - Meteorite (Crater)
- Hanley Field Area

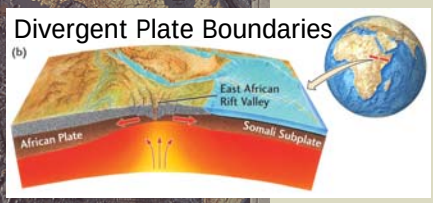


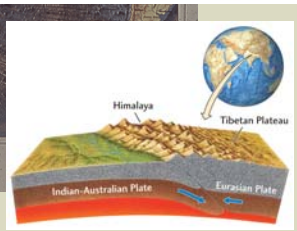
Tectonic Processes

Caspian & Aral Seas

Lake Baikal

East African Rift Lakes



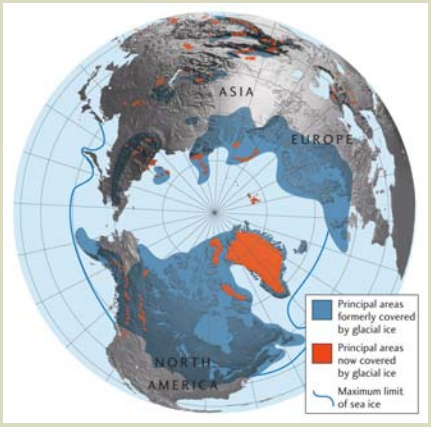


Convergent Plate Boundaries
Transform Boundaries?

Glacial Processes
Ice Scour

Ice Age – Pleistocene
1.8 million to 10,000 years ago

- Major Ice Sheets
  - Canada, Scandinavia
  - Extends Temperate Climatic Zone
  - Last Retreat 15ka
- Continental Record
  - 4 Major Advances
  - Wisconsin – Würm
    - Homo sapiens
  - Late Wisc – Riss
  - Illinoian – Mindel
  - Kansan – Gunz
  - Nebraskan - Danube



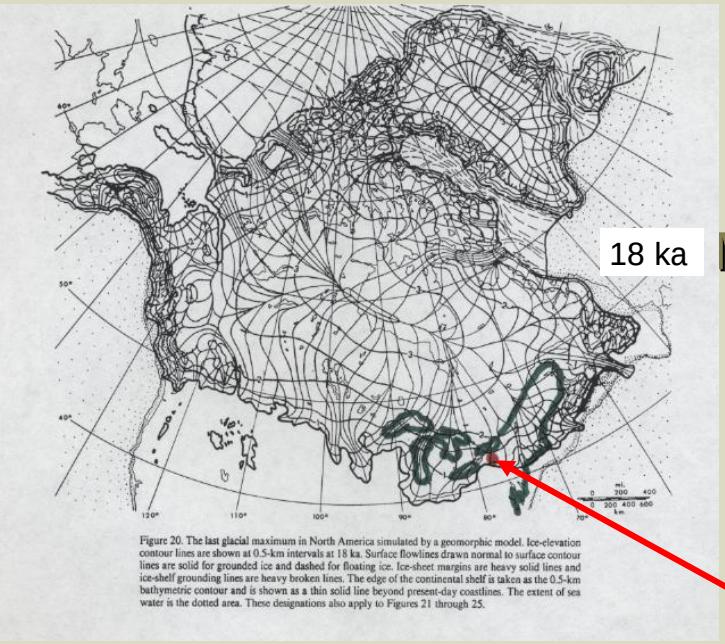


Figure 20. The last glacial maximum in North America simulated by a geomorphic model. Ice-elevation contour lines are shown at 0.5-km intervals at 18 ka. Surface flowlines drawn normal to surface contour lines are solid for grounded ice and dashed for floating ice. Ice-sheet margins are heavy solid lines and ice-shelf grounding lines are heavy broken lines. The edge of the continental shelf is taken as the 0.5-km bathymetric contour and is shown as a thin solid line beyond present-day coastlines. The extent of sea water is the dotted area. These designations also apply to Figures 21 through 25.

Last Ice Age

Maximum Ice Extent

Deglaciation

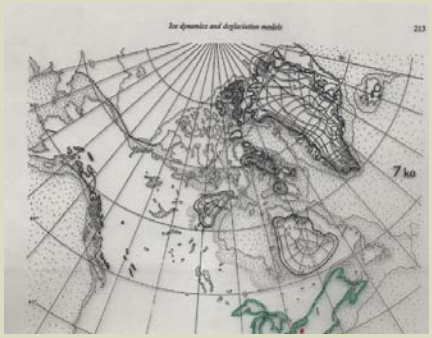
14 ka

12 ka

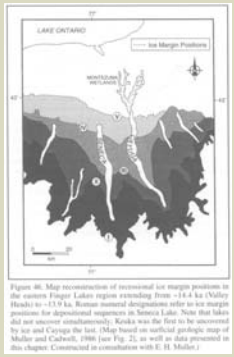
Deglaciation

9.5 ka

7 ka



Local Impact Finger Lakes



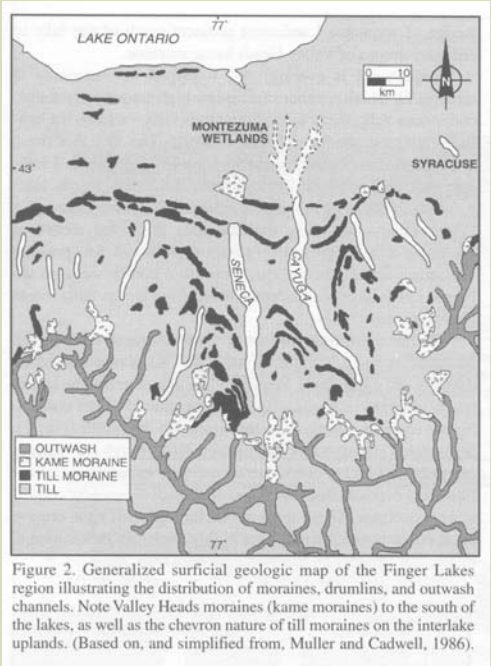
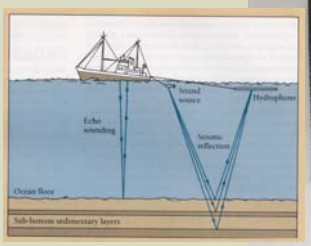


Figure 2. Generalized surficial geologic map of the Finger Lakes region illustrating the distribution of moraines, drumlins, and outwash channels. Note Valley Heads moraines (kame moraines) to the south of the lakes, as well as the chevron nature of till moraines on the interlake uplands. (Based on, and simplified from, Muller and Cadwell, 1986).

Seismic Profiles



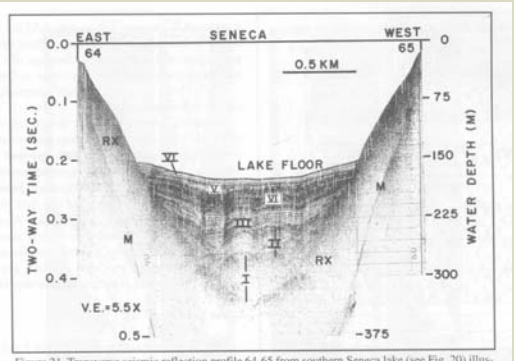
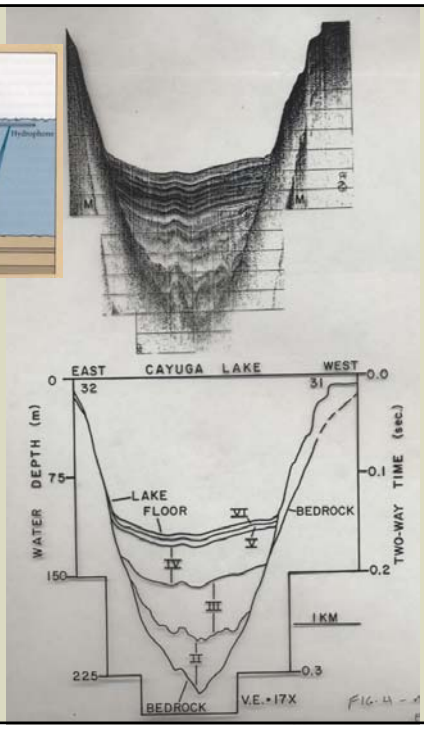
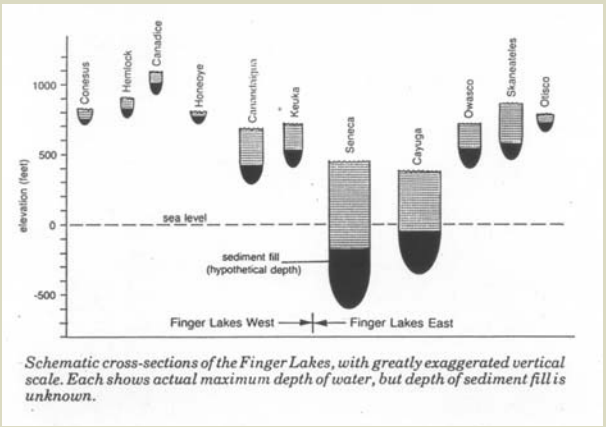


Figure 21. Transverse seismic reflection profile 64-65 from southern Seneca lake (see Fig. 20) illustrating seismic stratigraphic divisions of sediment-fill as well as bedrock reflection (RX), which can be traced continuously across the lake.



Things to Consider



Schematic cross-sections of the Finger Lakes, with greatly exaggerated vertical scale. Each shows actual maximum depth of water, but depth of sediment fill is unknown.

Glacial Ice & Meltwater Erosion

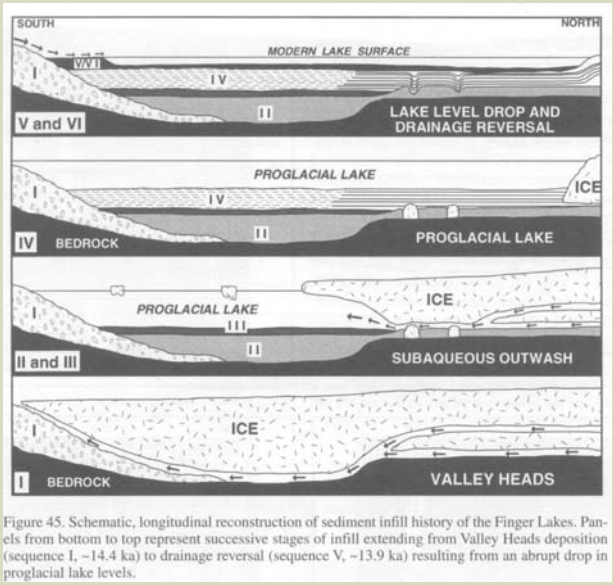
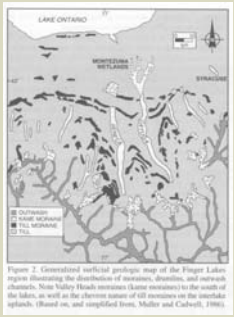
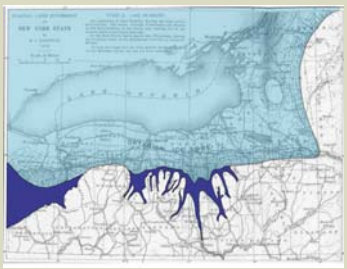
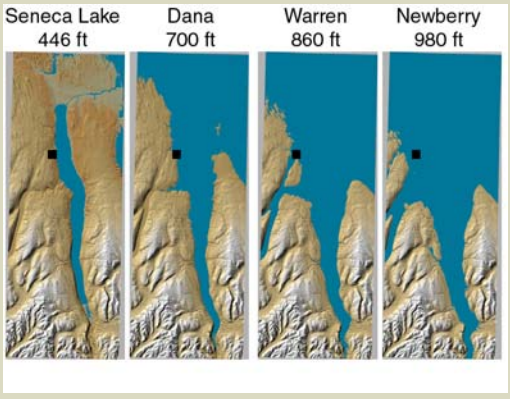


Figure 45. Schematic, longitudinal reconstruction of sediment infill history of the Finger Lakes. Panels from bottom to top represent successive stages of infill extending from Valley Heads deposition (sequence I, ~14.4 ka) to drainage reversal (sequence V, ~13.9 ka) resulting from an abrupt drop in proglacial lake levels.

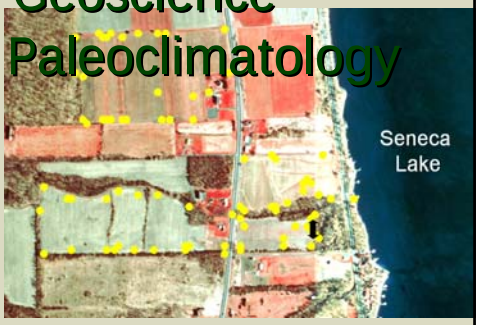


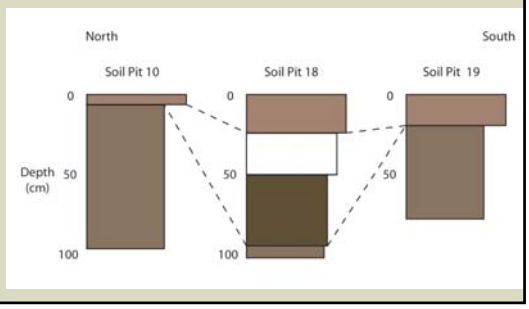
Deglaciation & Proglacial Lakes





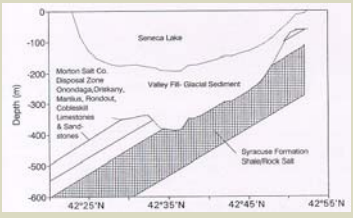
Tara Curtin, Geoscience
Sedimentology & Paleoclimatology



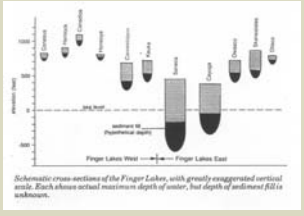


Western New York
Salina Fm (Halite) and Other Evaporites
400 my ago

South to North X-Section



Bedrock Geology



Only Seneca Lake deep enough to intersect Salt Formation