Regional Stratigraphy of the Trenton-Black River Interval

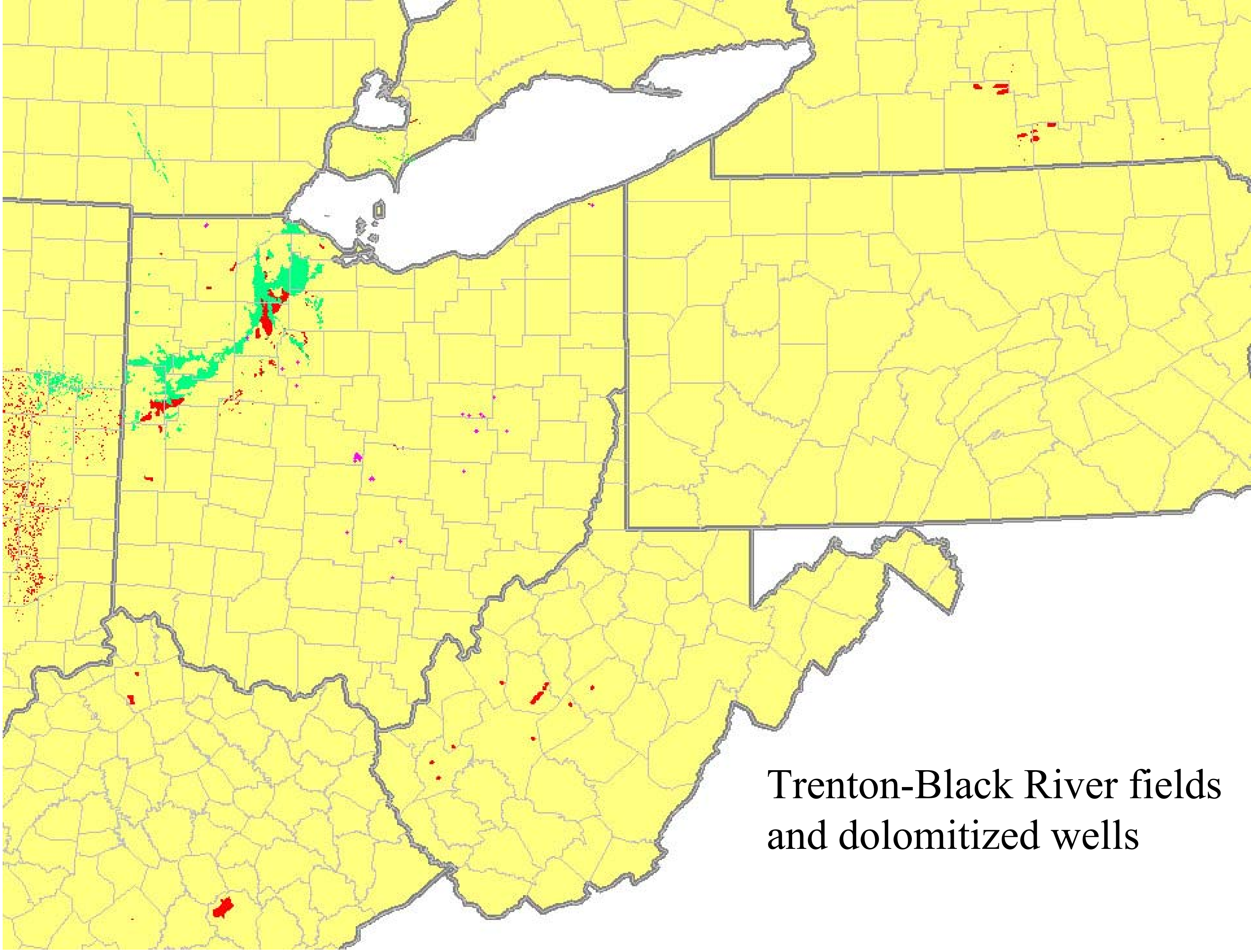
3/29/05

Columbus, Ohio

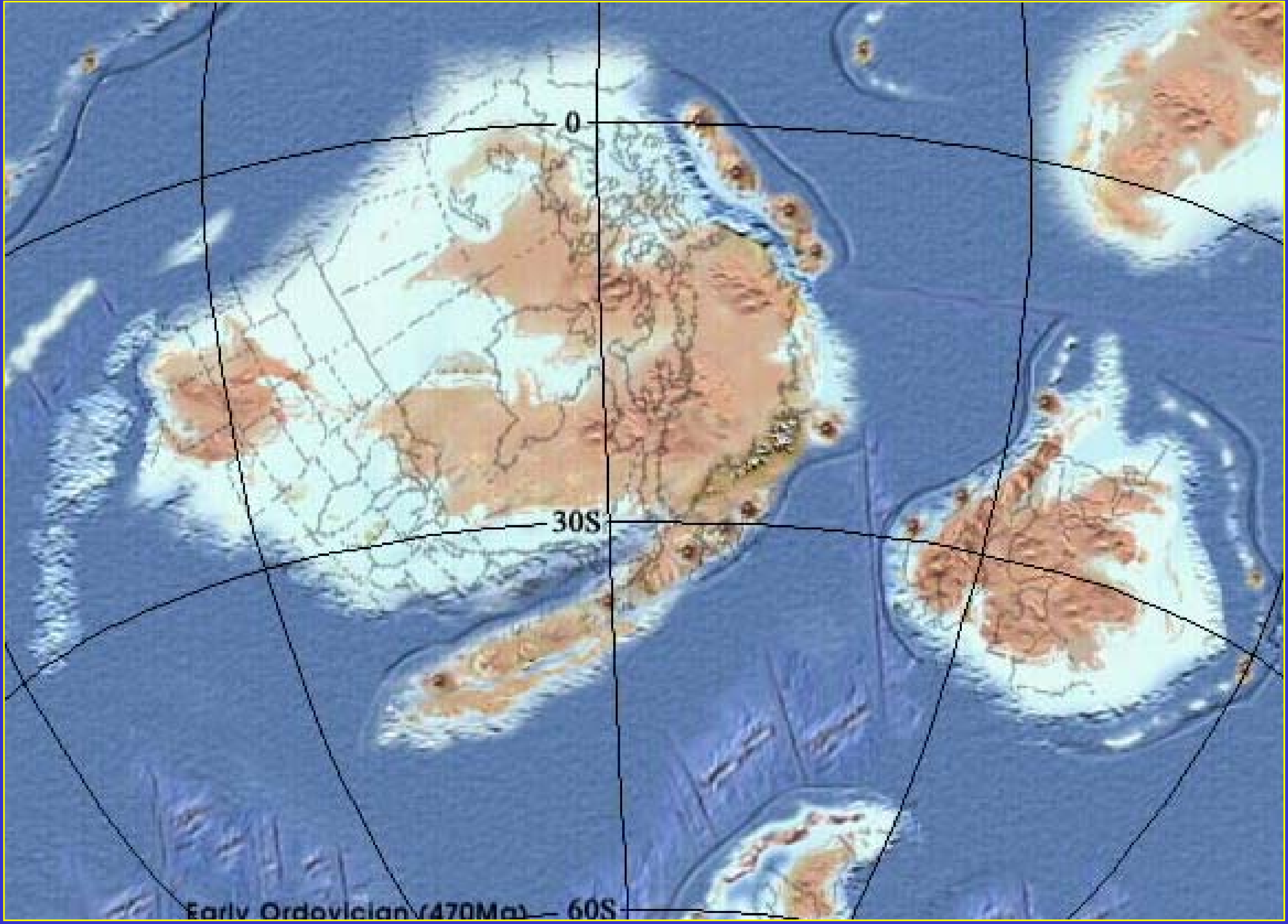
Ron Riley and Mark Baranoski

Stratigraphy Outline

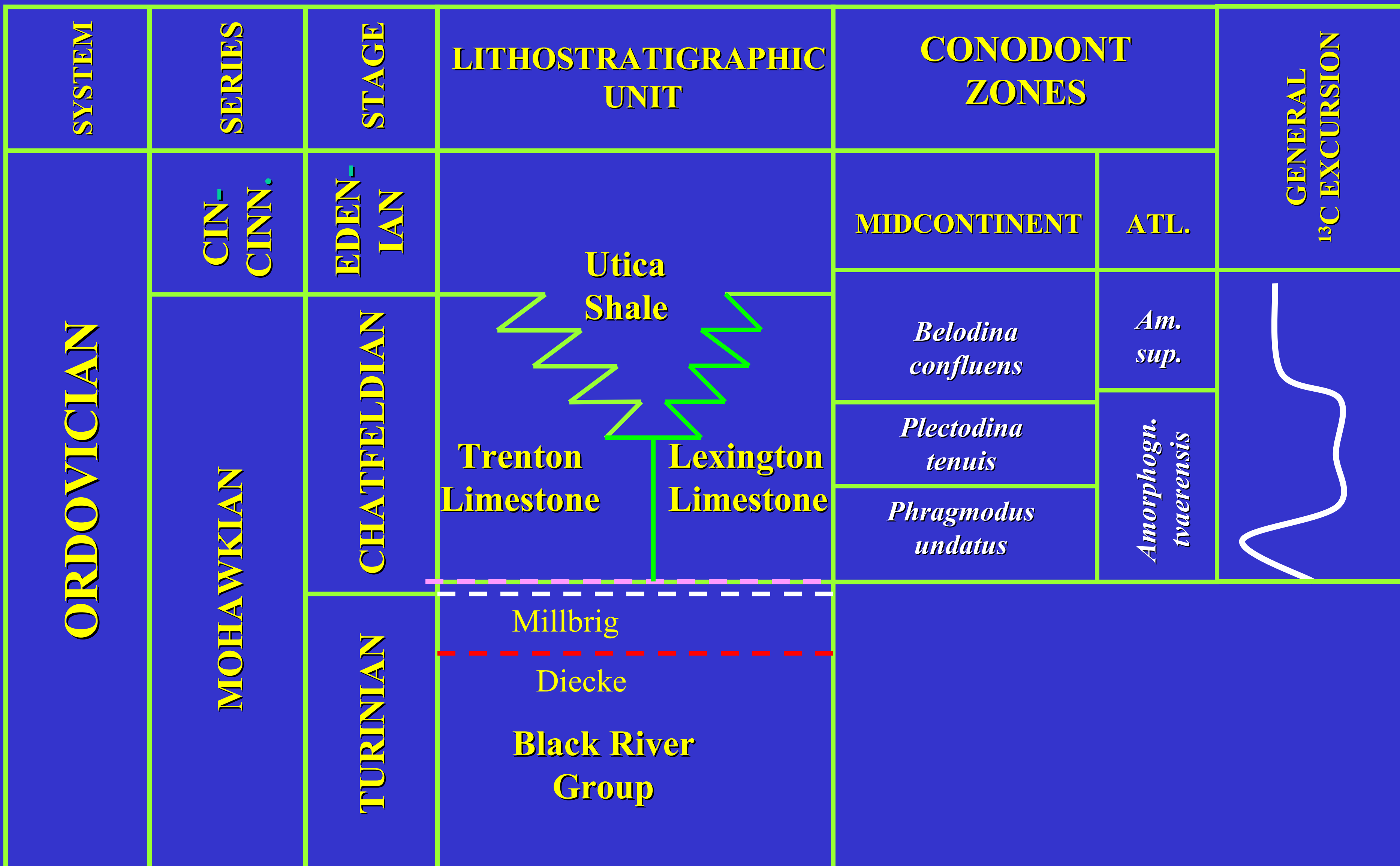
- Regional stratigraphy and its importance to other tasks
- Regional Setting
- Idealized depositional profile and major facies.
- Stratigraphic framework and major lithostratigraphic units being mapped.
- Isopach maps and basin geometry
- Overview of “Sebree Trough”
- Relation of basin geometry to producing trends and other potential exploration areas.



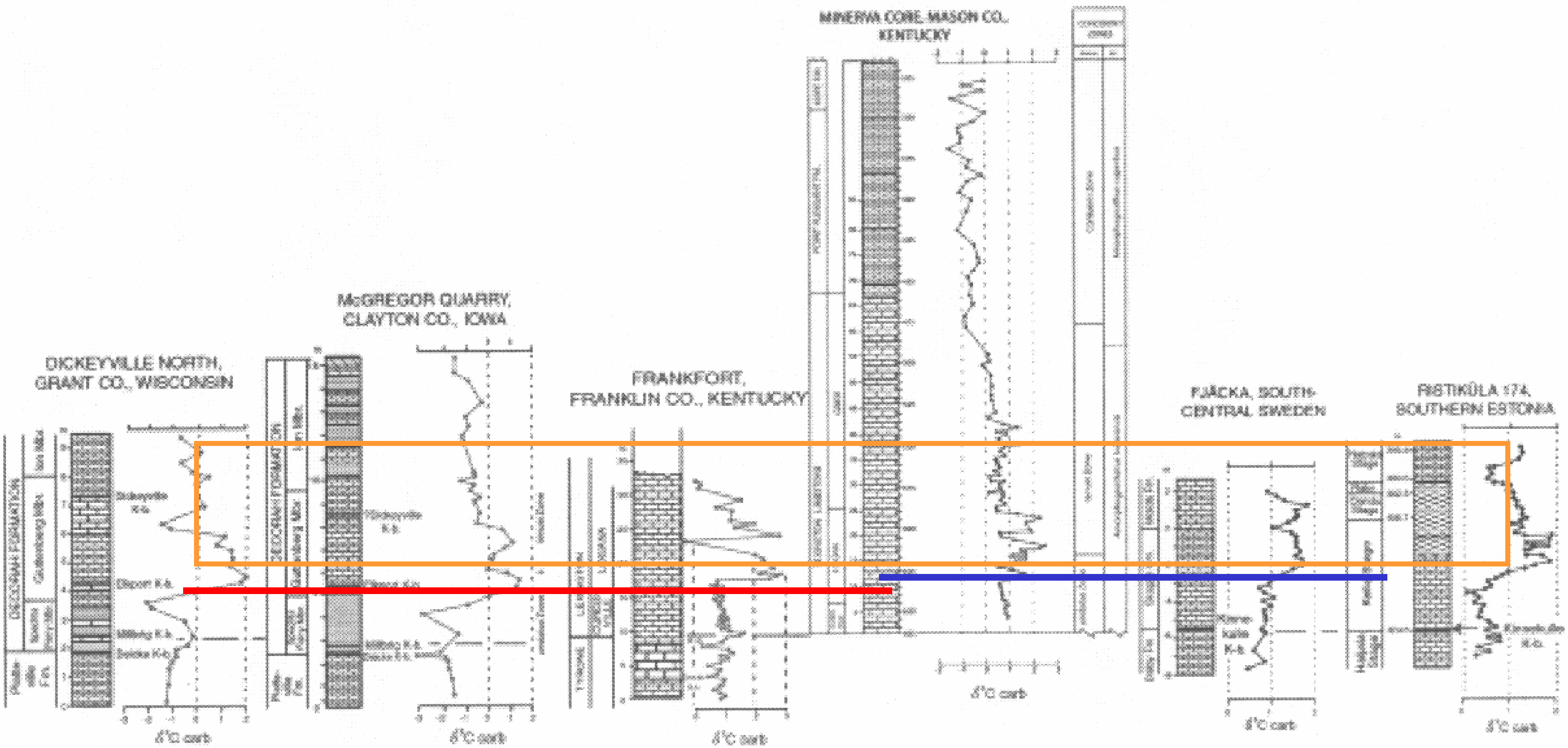
Trenton-Black River fields and dolomitized wells



Modified from Blakey, 2002



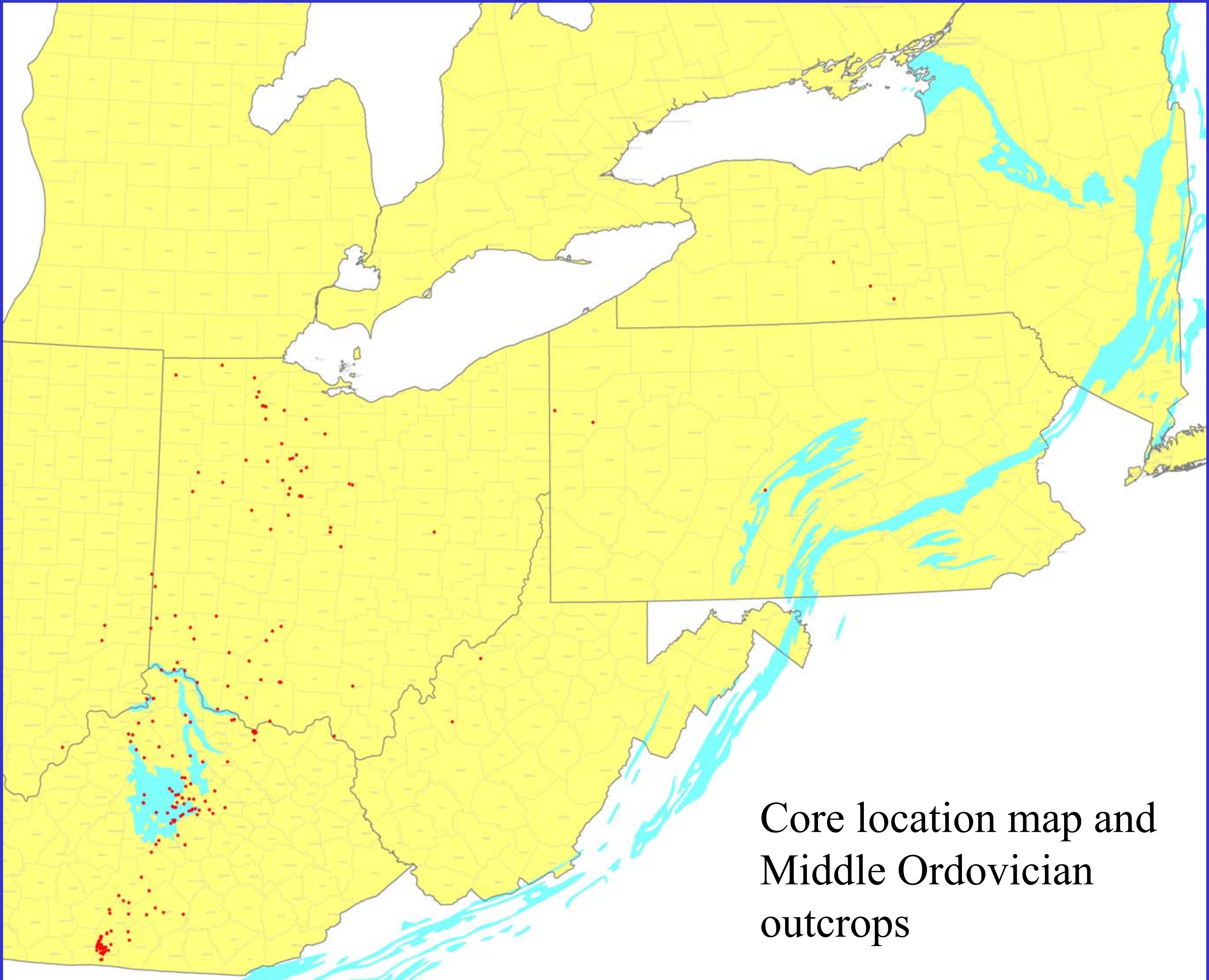
SYSTEM
SERIES
STAGE
LITHOSTRATIGRAPHIC UNIT
CONODONT ZONES
GENERAL ^{13}C EXCURSION
ORDOVICIAN
CIN-CINN.
MOHAWKIAN
EDEN-IAN
CHATFELDIAN
TURINIAN
Utica Shale
Trenton Limestone
Lexington Limestone
Millbrig
Diecke
Black River Group
MIDCONTINENT
ATL.
Belodina confluens
Plectodina tenuis
Phragmodus undatus
Am. sup.
Amorphogn. tvaerensis



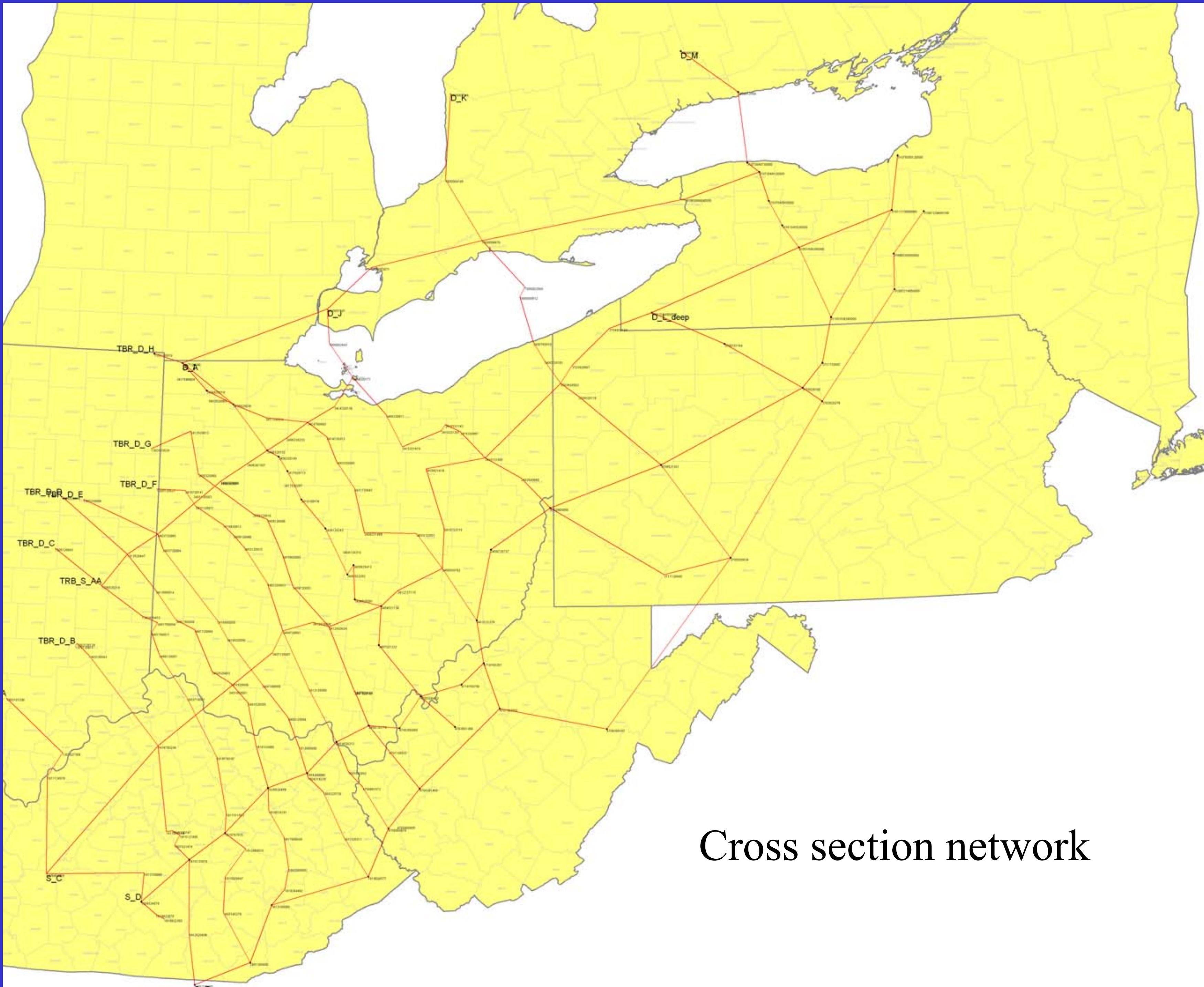
Location of positive ^{13}C excursion within the Late middle Ordovician Successions from various locations globally (from Saltzman et al., 2003)

Millbrig K-bentonite

Kinnekulle K-bentonite

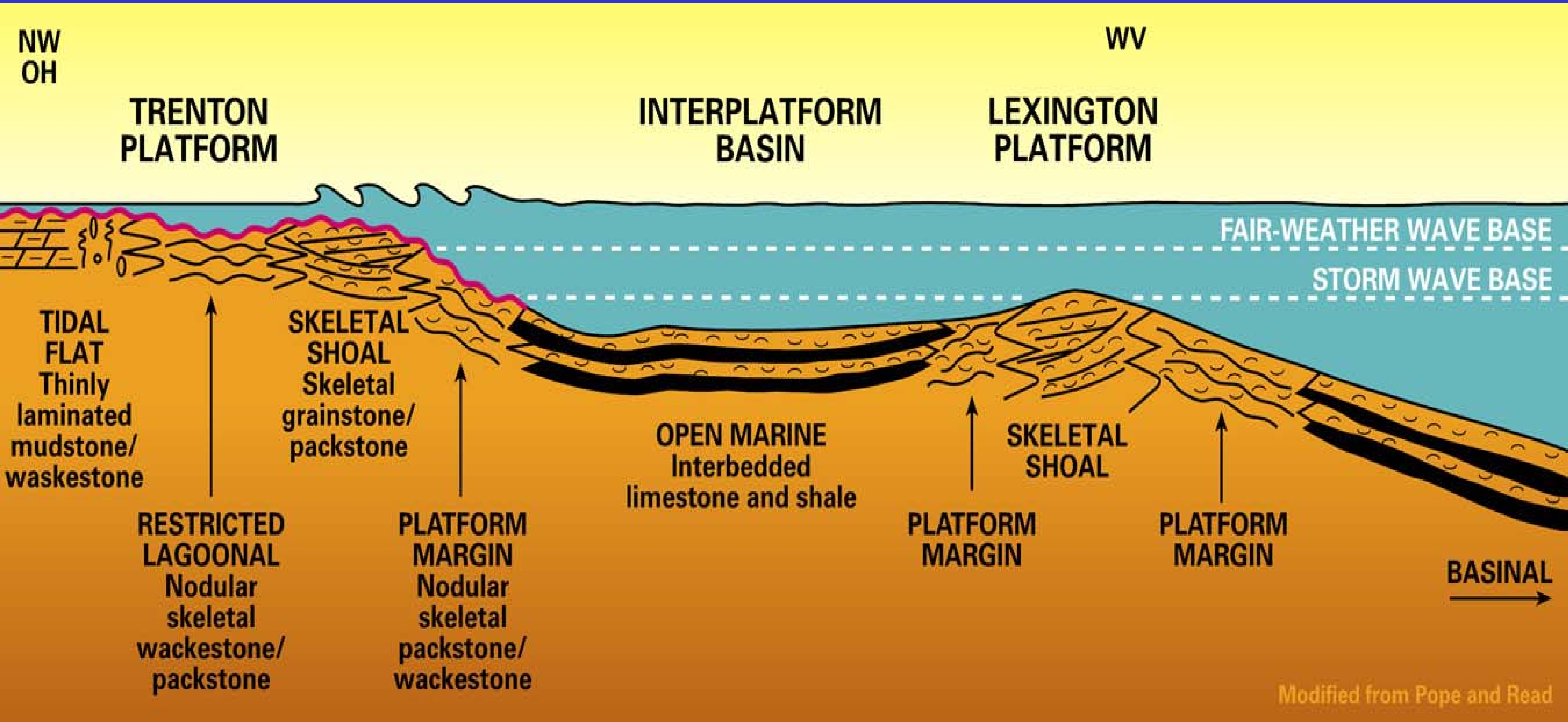


Core location map and Middle Ordovician outcrops



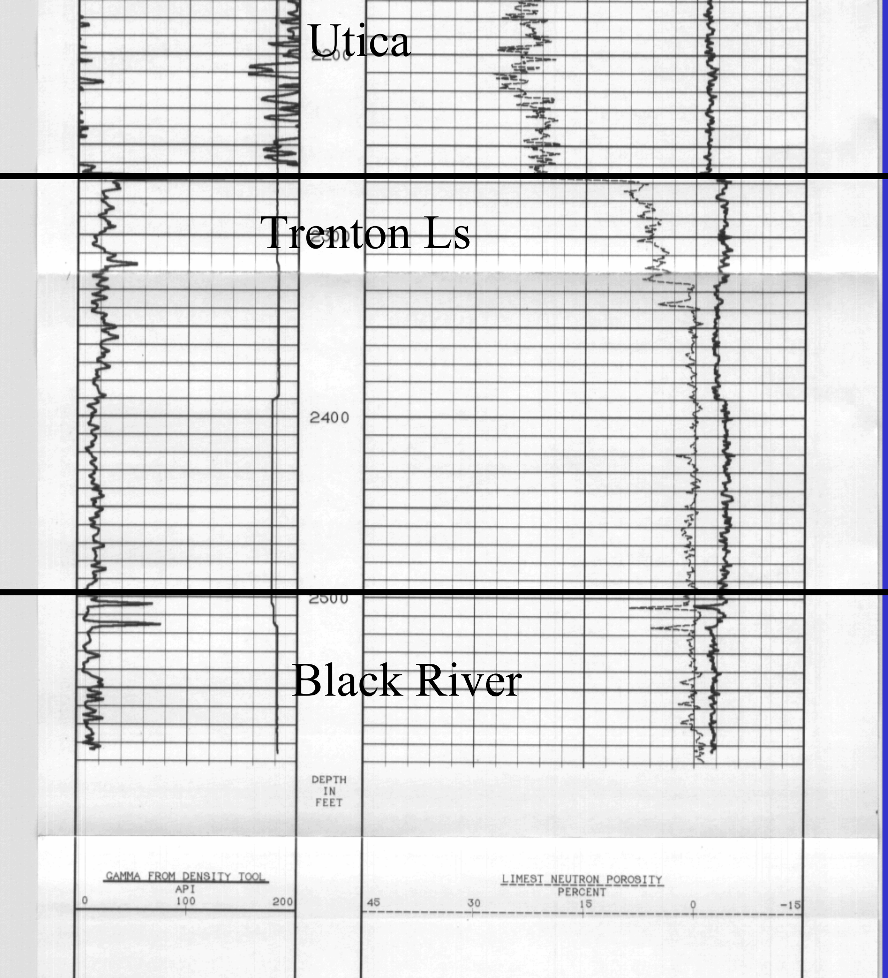
Cross section network

Idealized platform to basin model and major facies



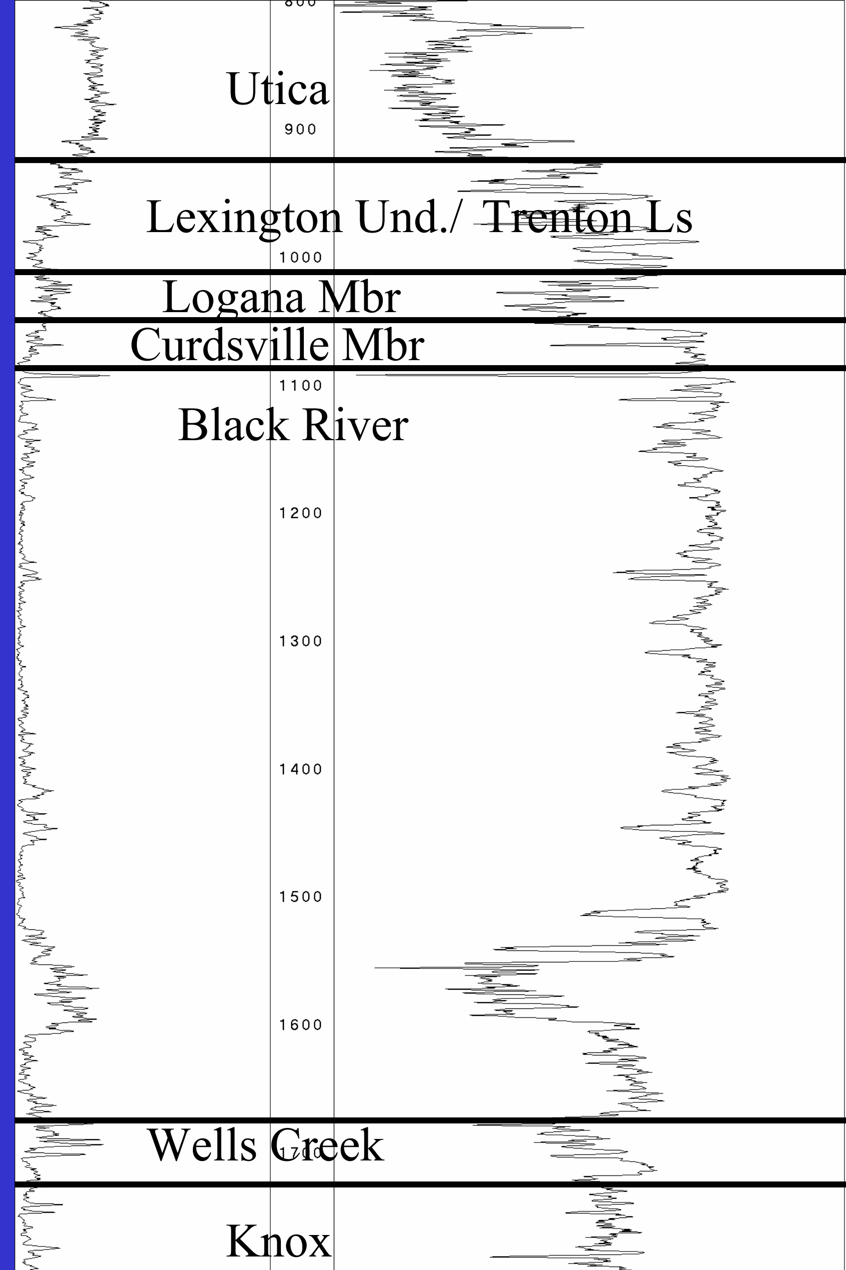
Importance of Depositional Setting and Basin Geometry

- Reservoir rocks, i.e. grainstones.
- Seismic signature on Trenton varies depending on depositional setting.
- Relationship to producing trends and potential exploration areas.
- Basin geometry may be influenced by deep-seated faulting and related to HTD.



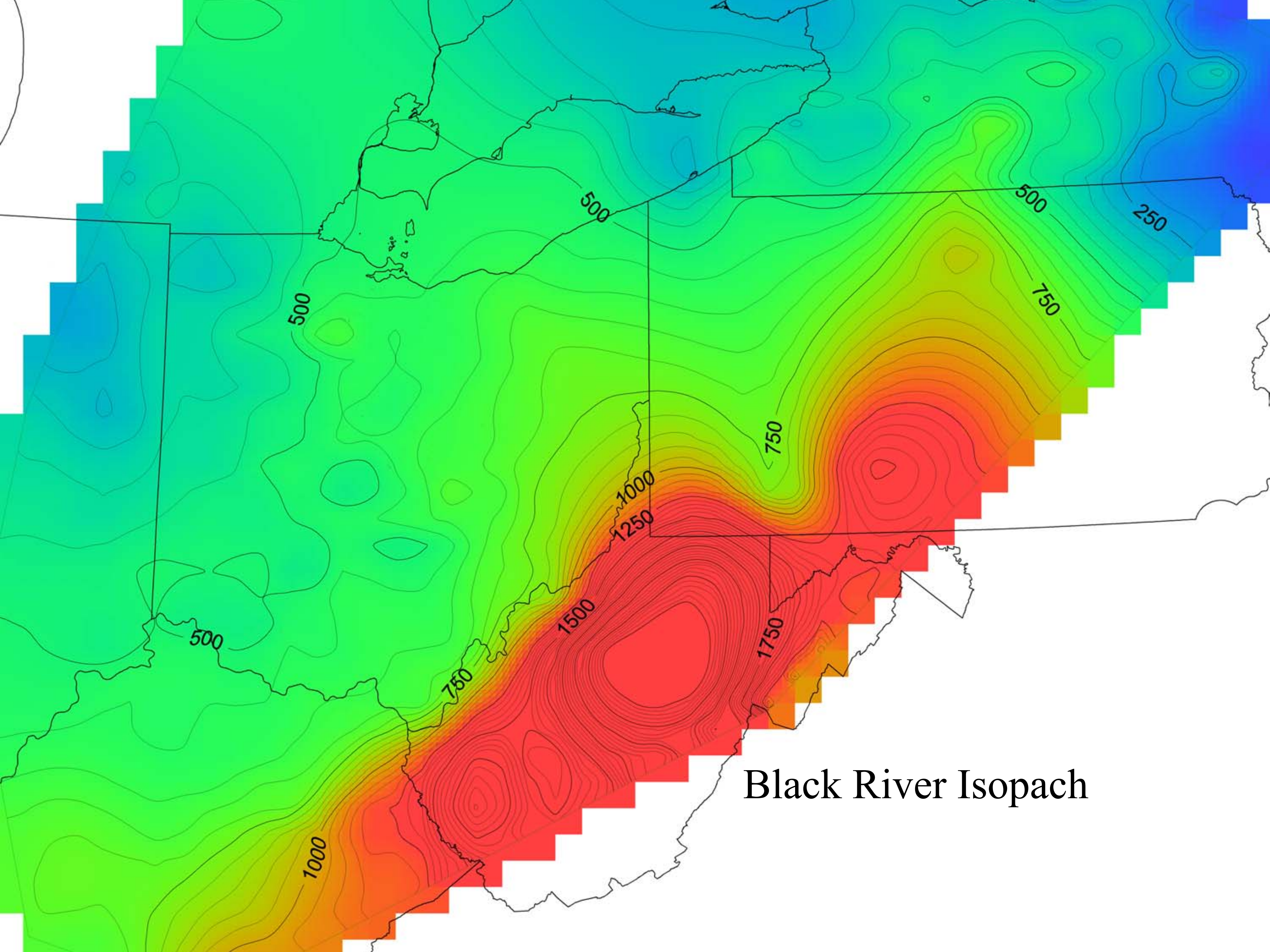
Platform facies

Williams Co. Core 3256

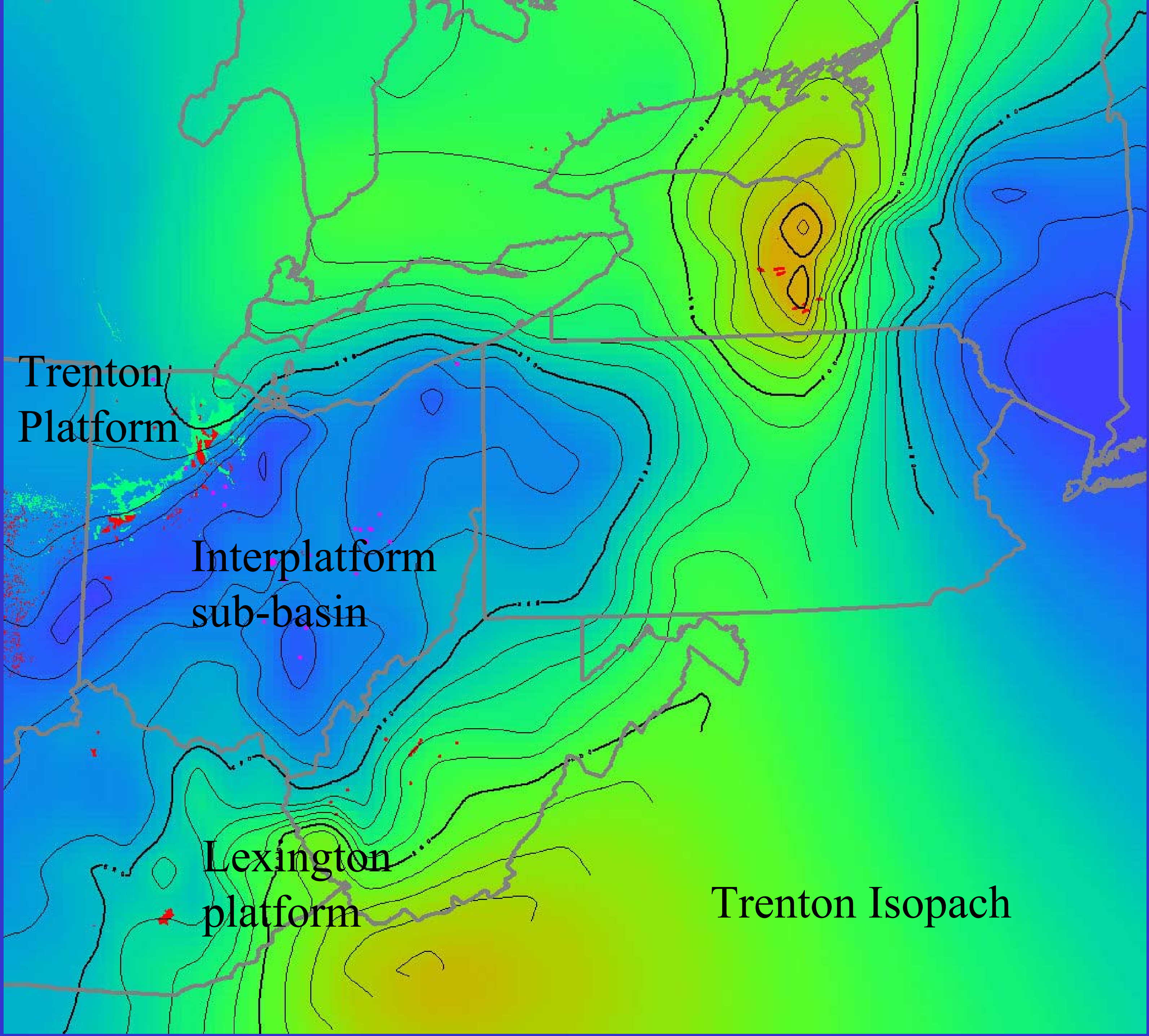


InterPlatform sub basin facies

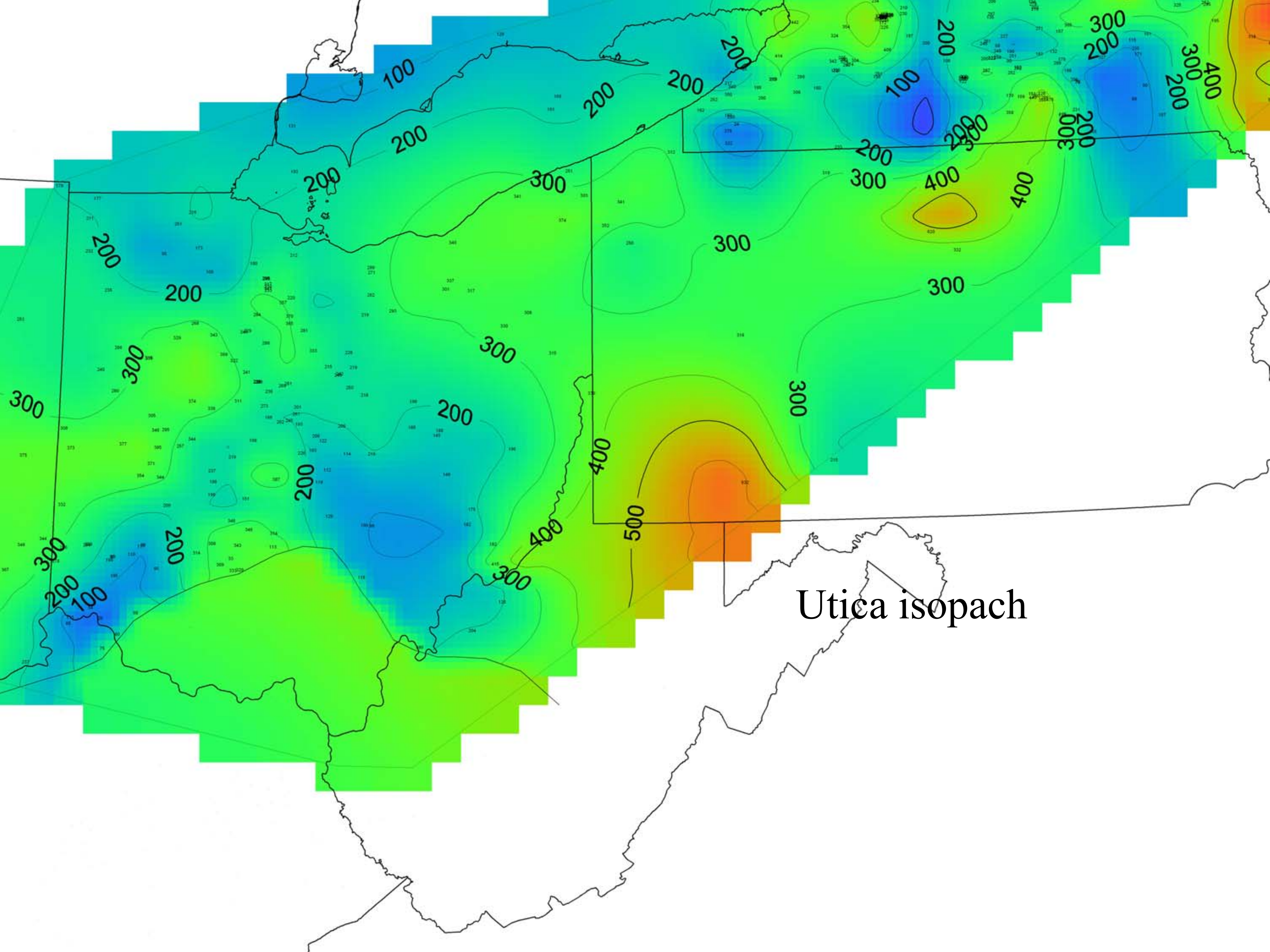
Warren Co. Core 2627



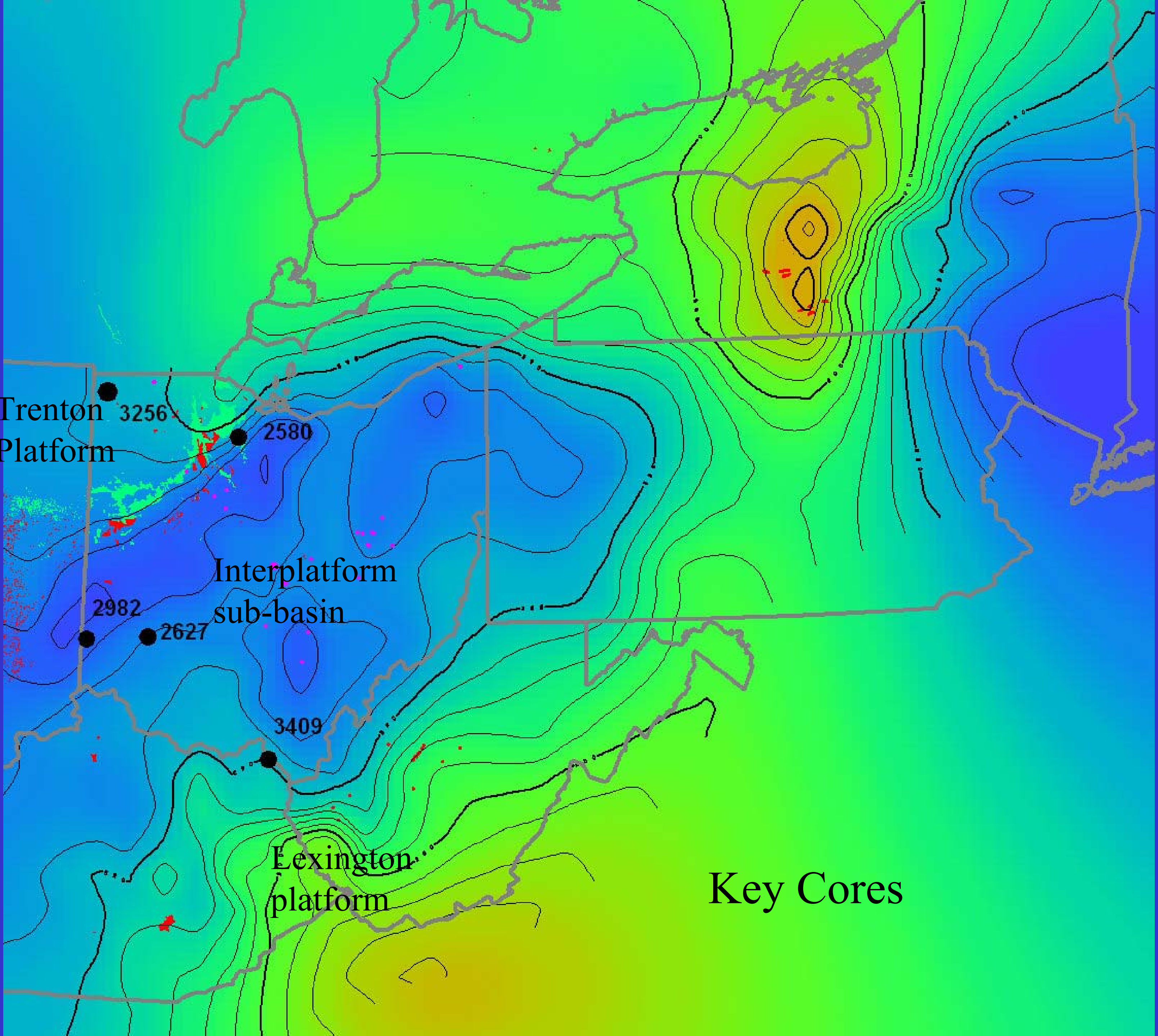
Black River Isopach



Trenton
Platform
Interplatform
sub-basin
Lexington
platform
Trenton Isopach



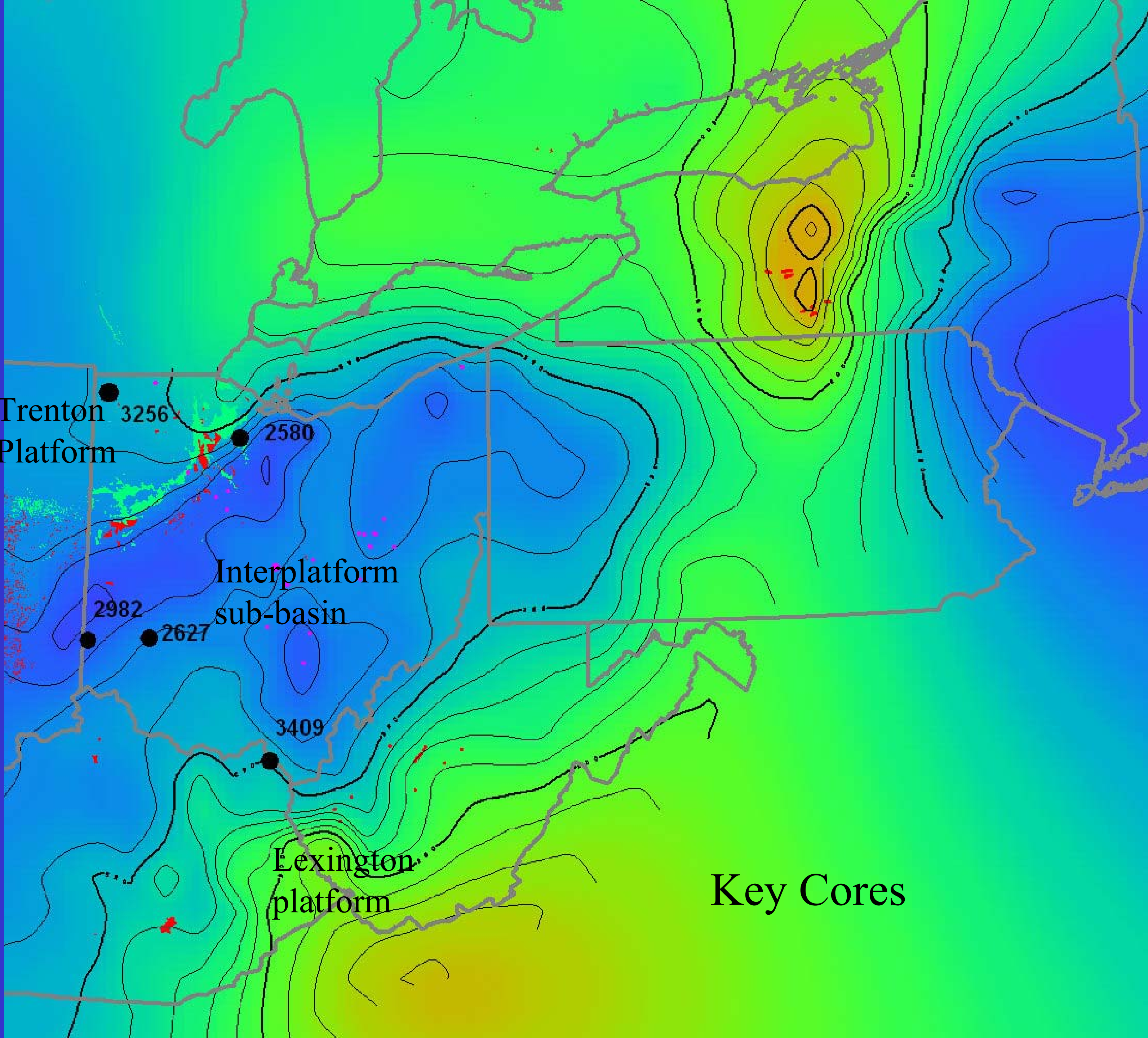
Utica isopach


Trenton
Platform
3256
2580
Interplatform
sub-basin
2982
2627
3409
Lexington
platform
Key Cores

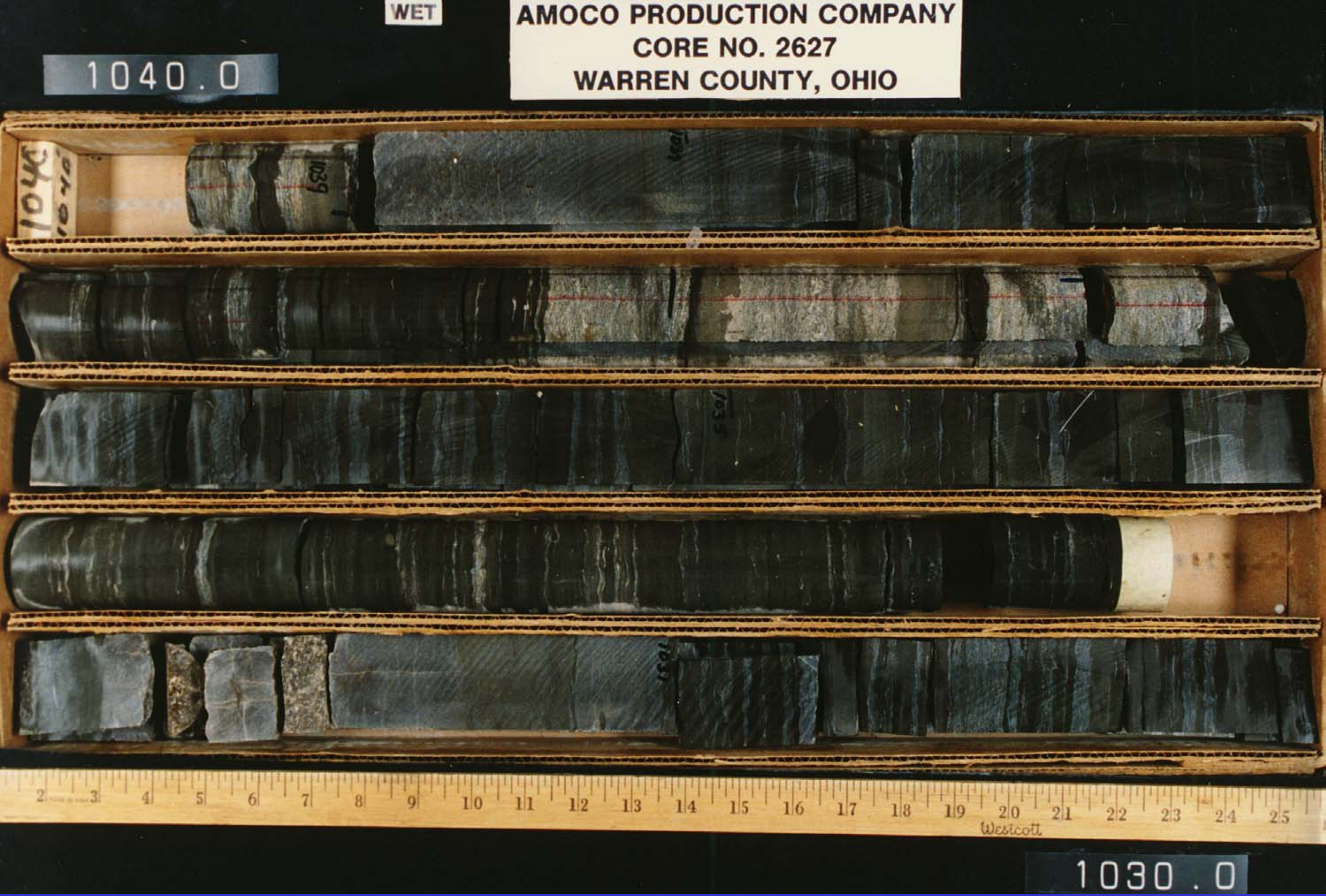
Trenton Platform

Trenton

Williams County , Core 3256


Trenton
Platform
3256
2580
Interplatform
sub-basin
2982
2627
3409
Lexington
platform
Key Cores

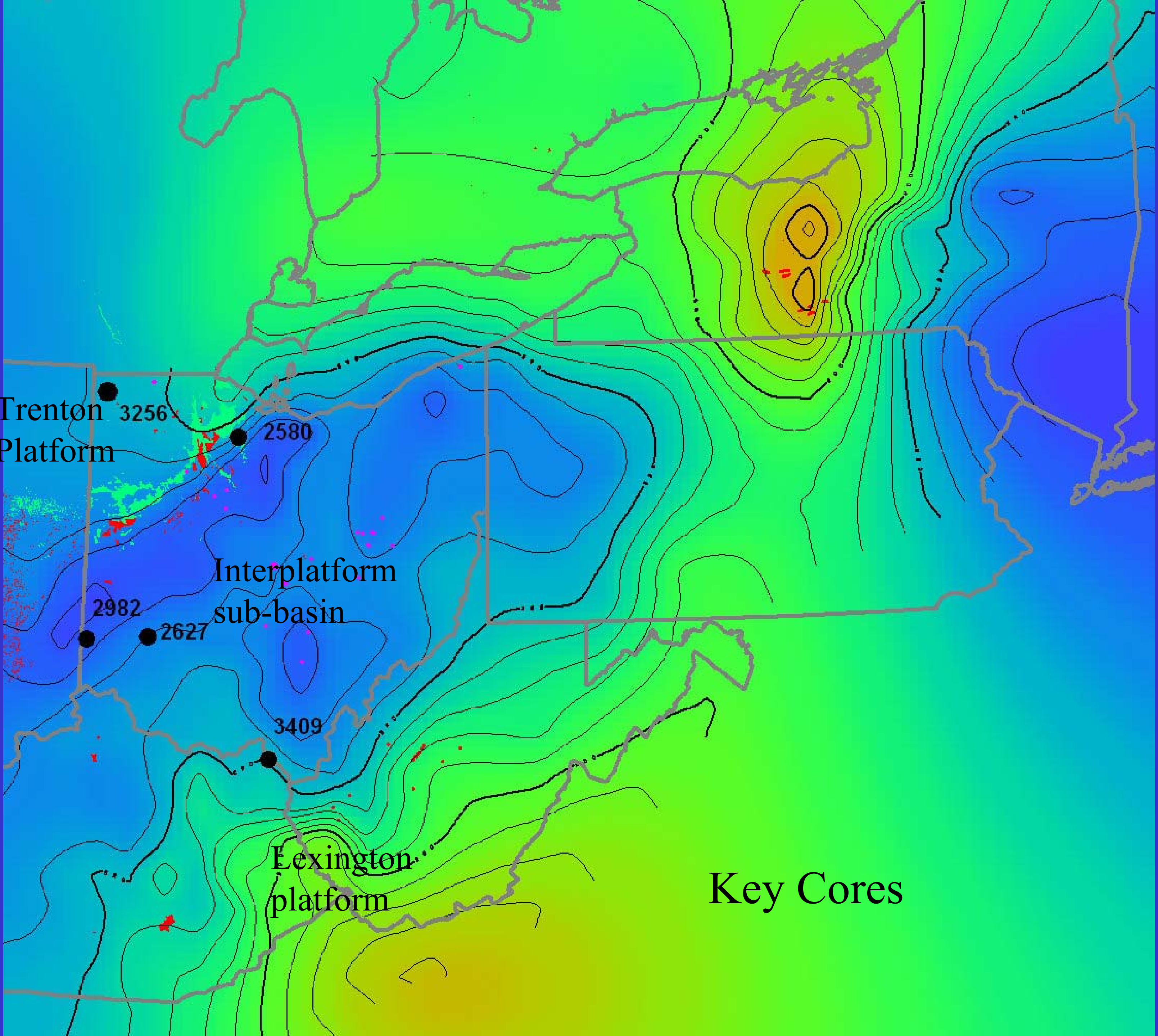
Lexington Ls., Sub-basin



Logana Mbr., Sub-basin

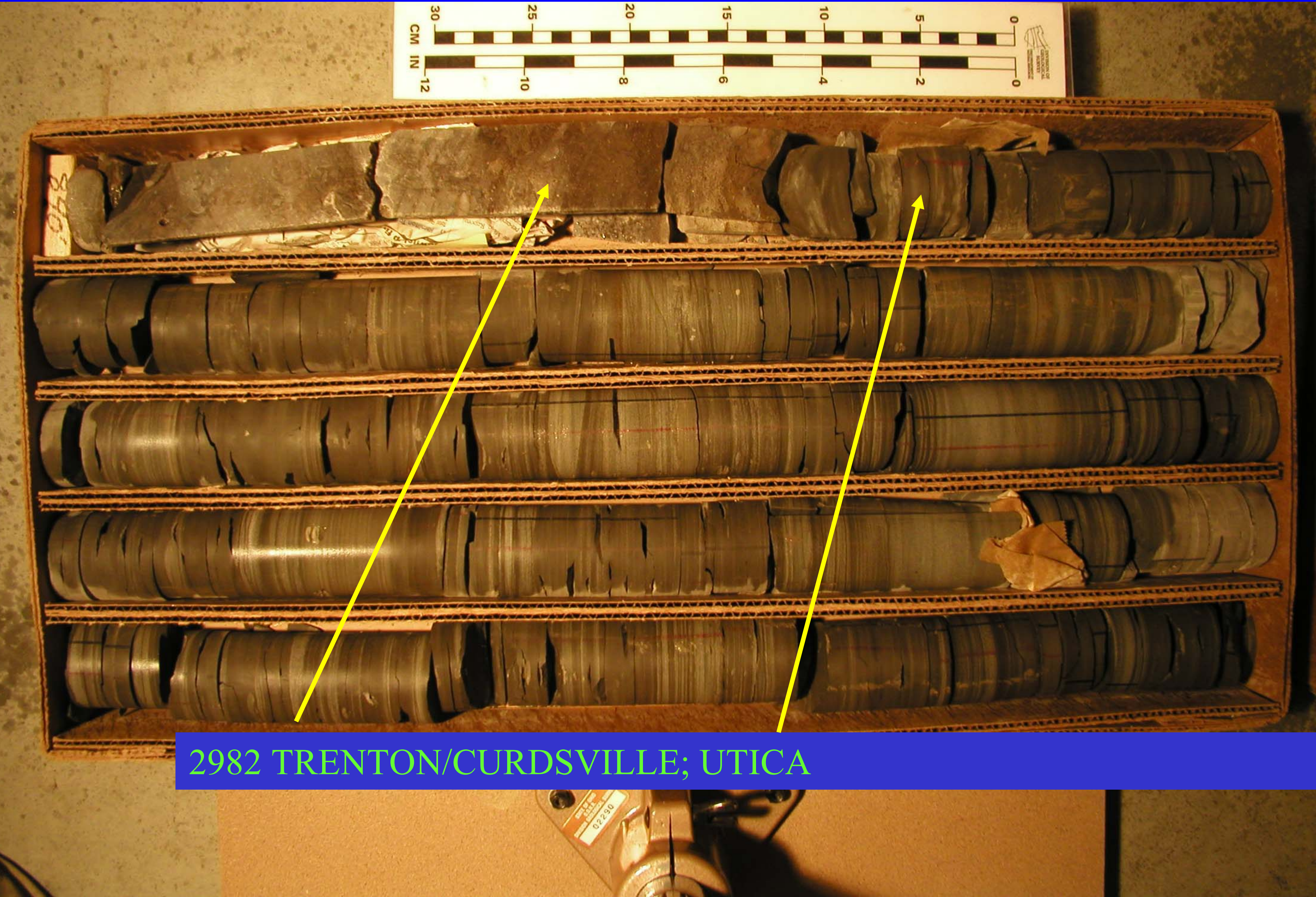
Curdsville Mbr, sub-basin

Black River Gp., Sub-basin



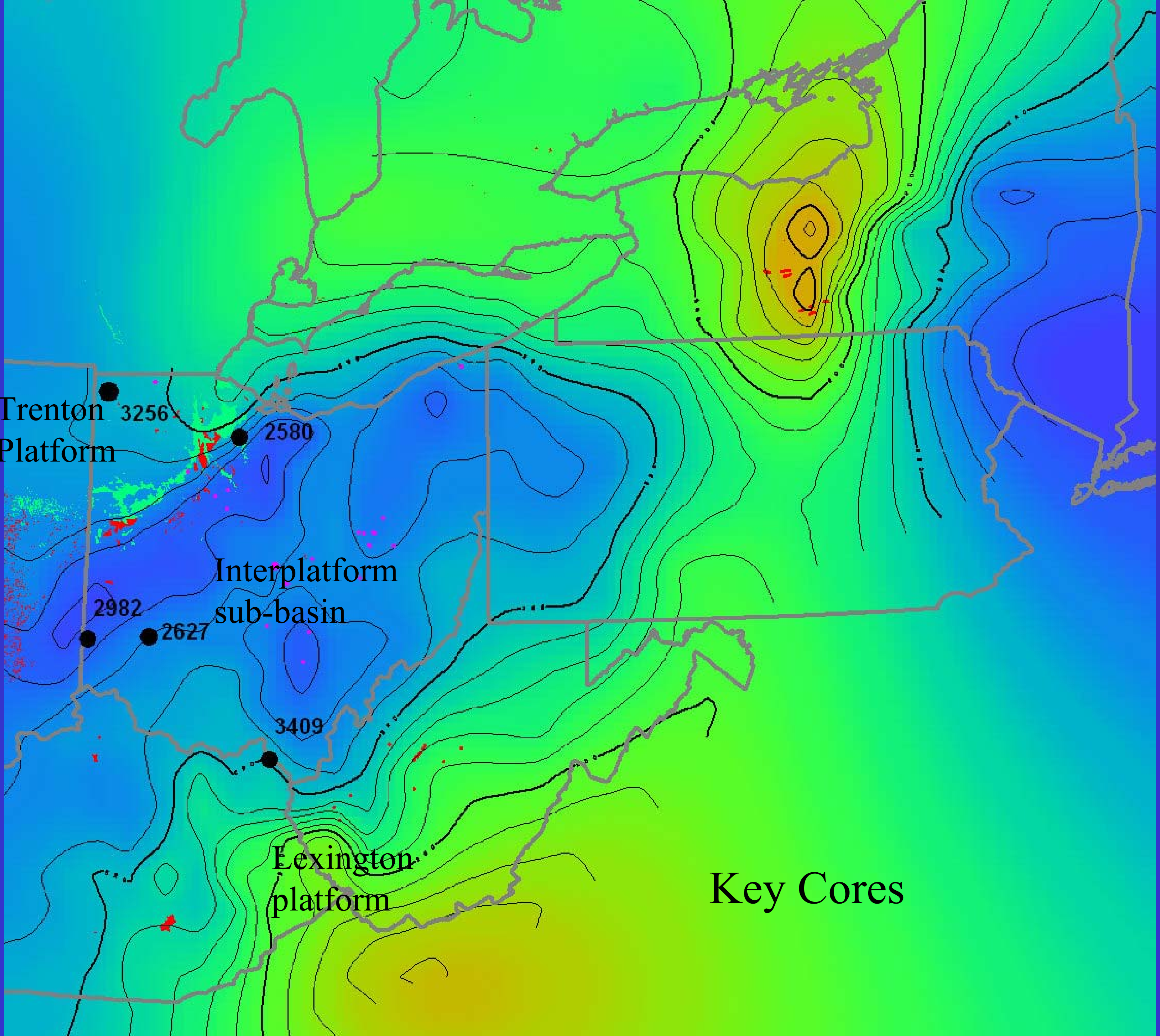
Trenton Platform
3256
2580
Interplatform sub-basin
2982
2627
3409
Lexington platform
Key Cores

Sub-Basin



2982 TRENTON/CURDSVILLE; UTICA

Sub-basin



Trenton Platform
3256
2580
Interplatform sub-basin
2982
2627
3409
Lexington platform
Key Cores

LEXINGTON PLATFORM

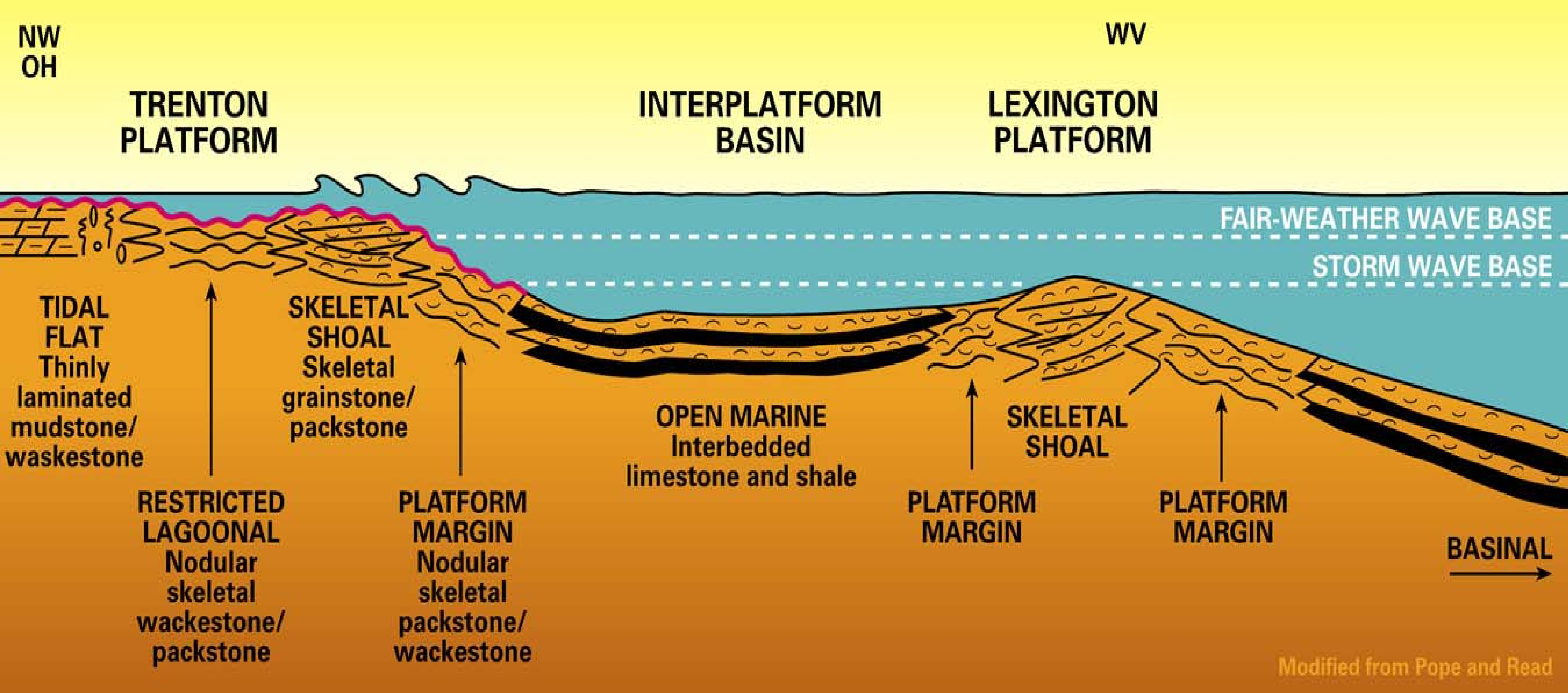
3409 LEXINGTON UNDIFFERENTIATED

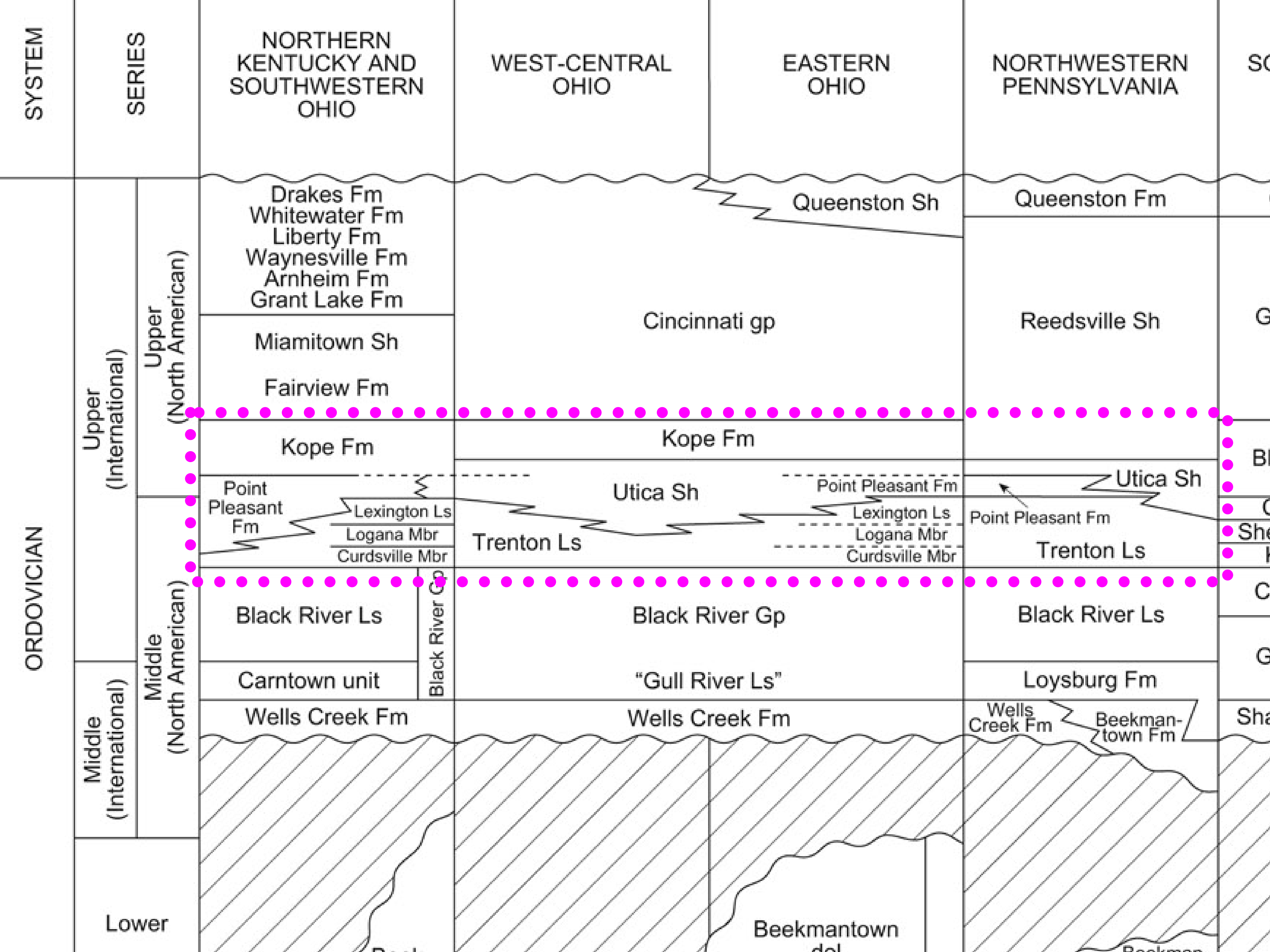
LEXINGTON PLATFORM

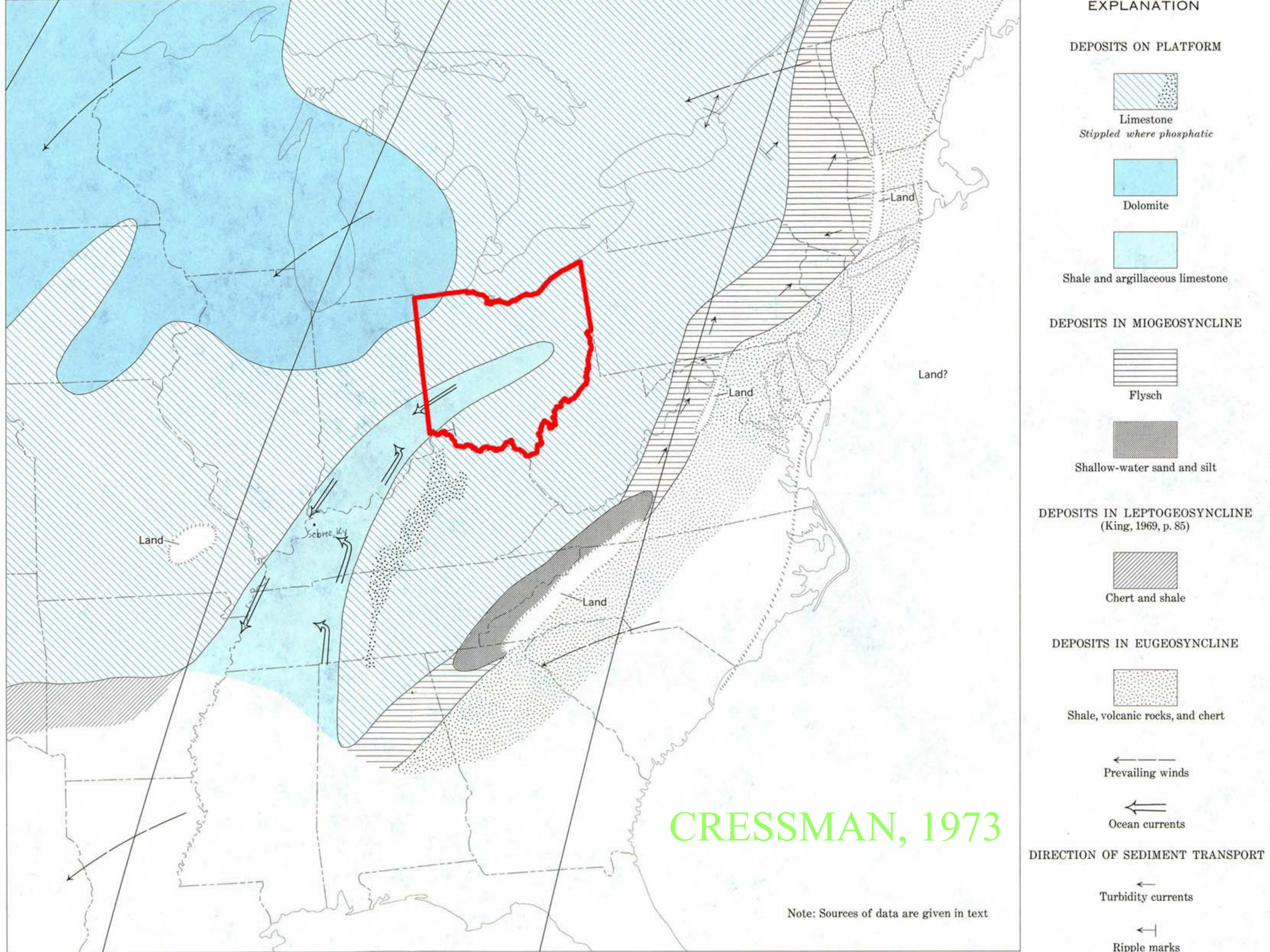
LITHOSTRATIGRAPHY IN, OH, KY REGION

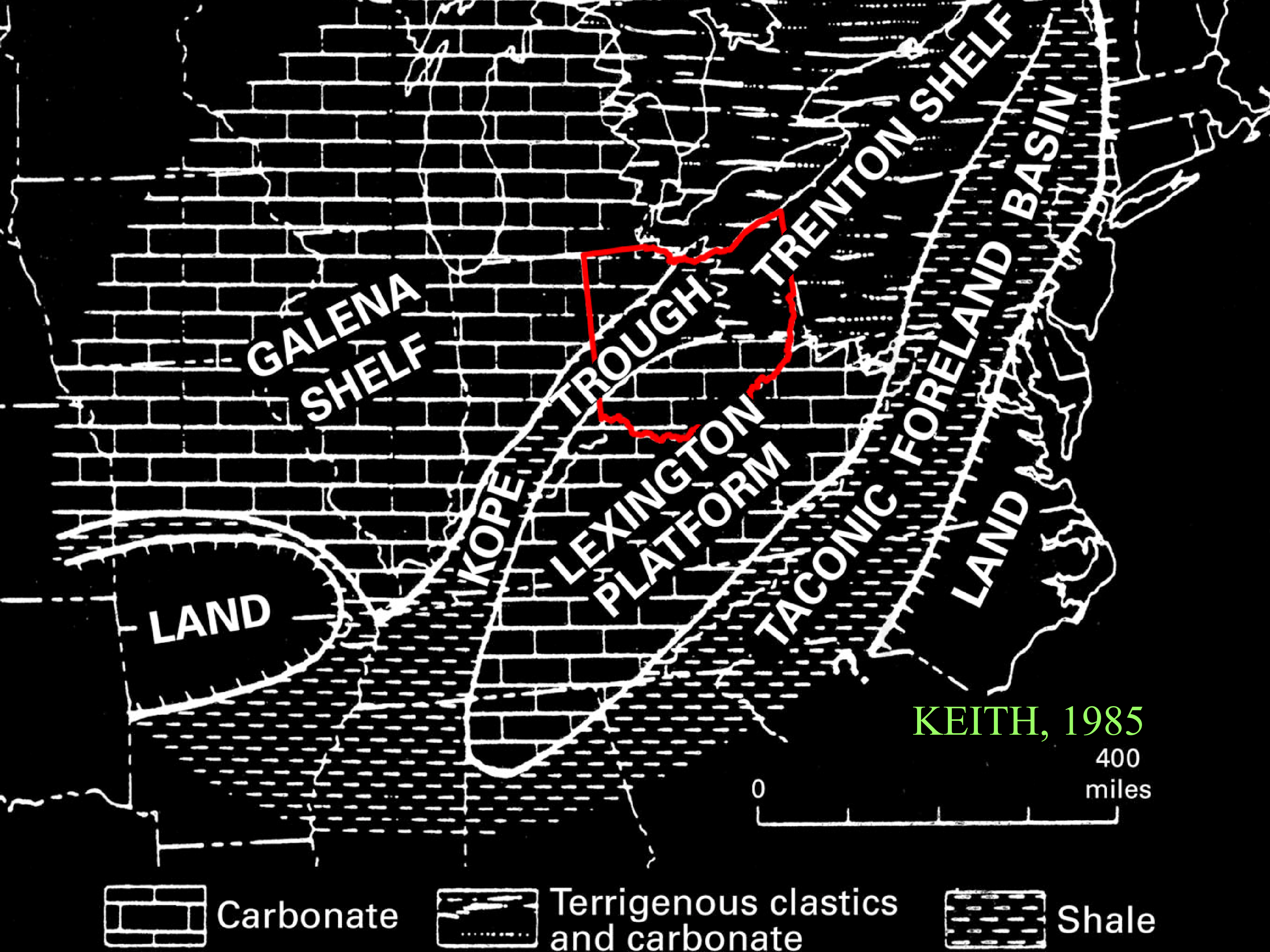
OVERVIEW OF THE "SEBREE TROUGH ??"

Idealized platform to basin model and major facies



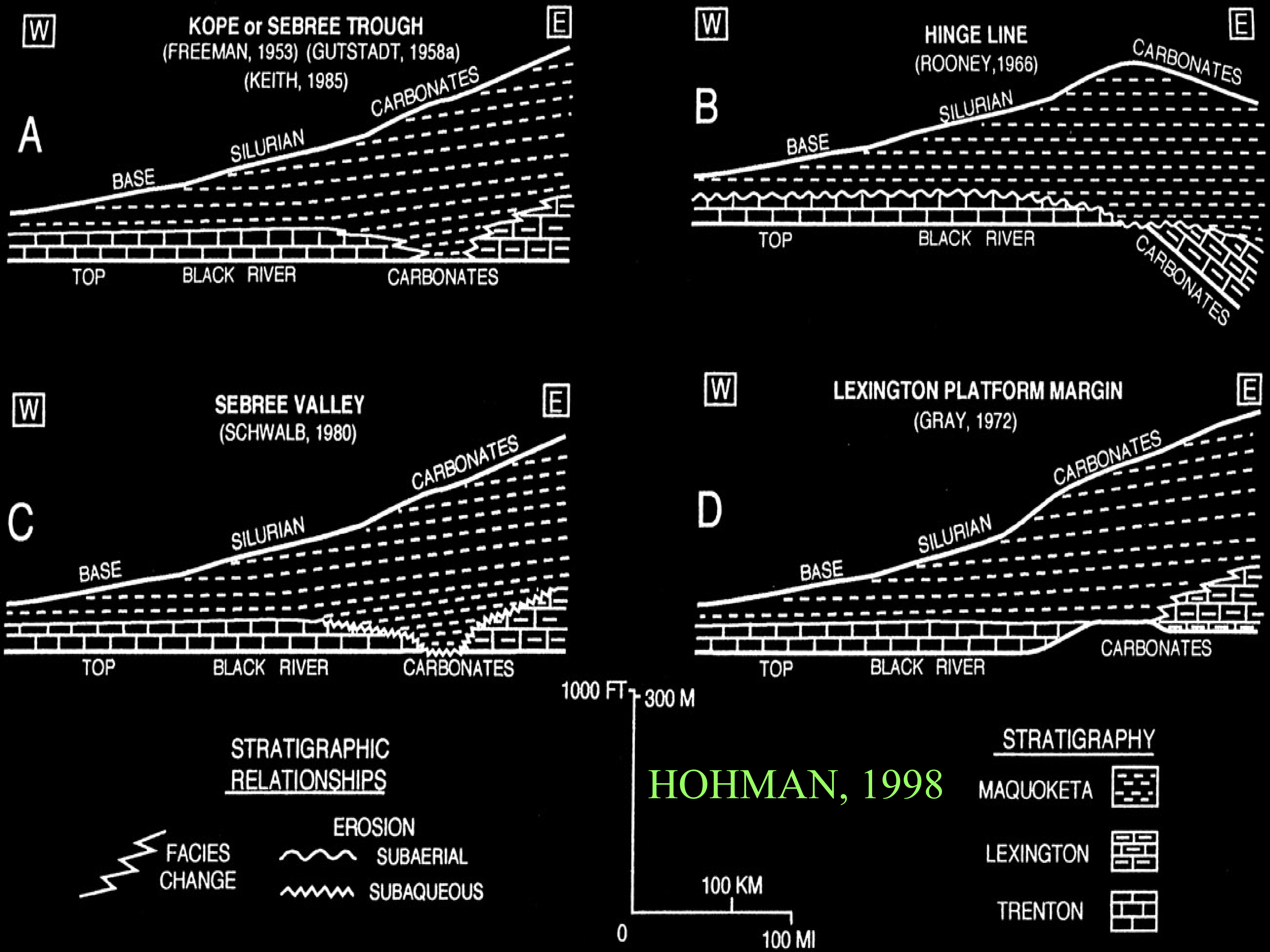

SYSTEM
SERIES
NORTHERN KENTUCKY AND SOUTHWESTERN OHIO
WEST-CENTRAL OHIO
EASTERN OHIO
NORTHWESTERN PENNSYLVANIA
ORDOVICIAN
Upper (International)
Middle (International)
Lower
Upper (North American)
Middle (North American)
Drakes Fm
Whitewater Fm
Liberty Fm
Waynesville Fm
Arnheim Fm
Grant Lake Fm
Miamitown Sh
Fairview Fm
Queenston Sh
Queenston Fm
Cincinnati gp
Reedsville Sh
Kope Fm
Kope Fm
Utica Sh
Utica Sh
Point Pleasant Fm
Point Pleasant Fm
Point Pleasant Fm
Lexington Ls
Lexington Ls
Logana Mbr
Logana Mbr
Curdsville Mbr
Curdsville Mbr
Trenton Ls
Trenton Ls
Black River Ls
Black River Gp
Black River Gp
Black River Ls
Carntown unit
"Gull River Ls"
Loysburg Fm
Wells Creek Fm
Wells Creek Fm
Wells Creek Fm
Beekman-town Fm
Beekmantown dol

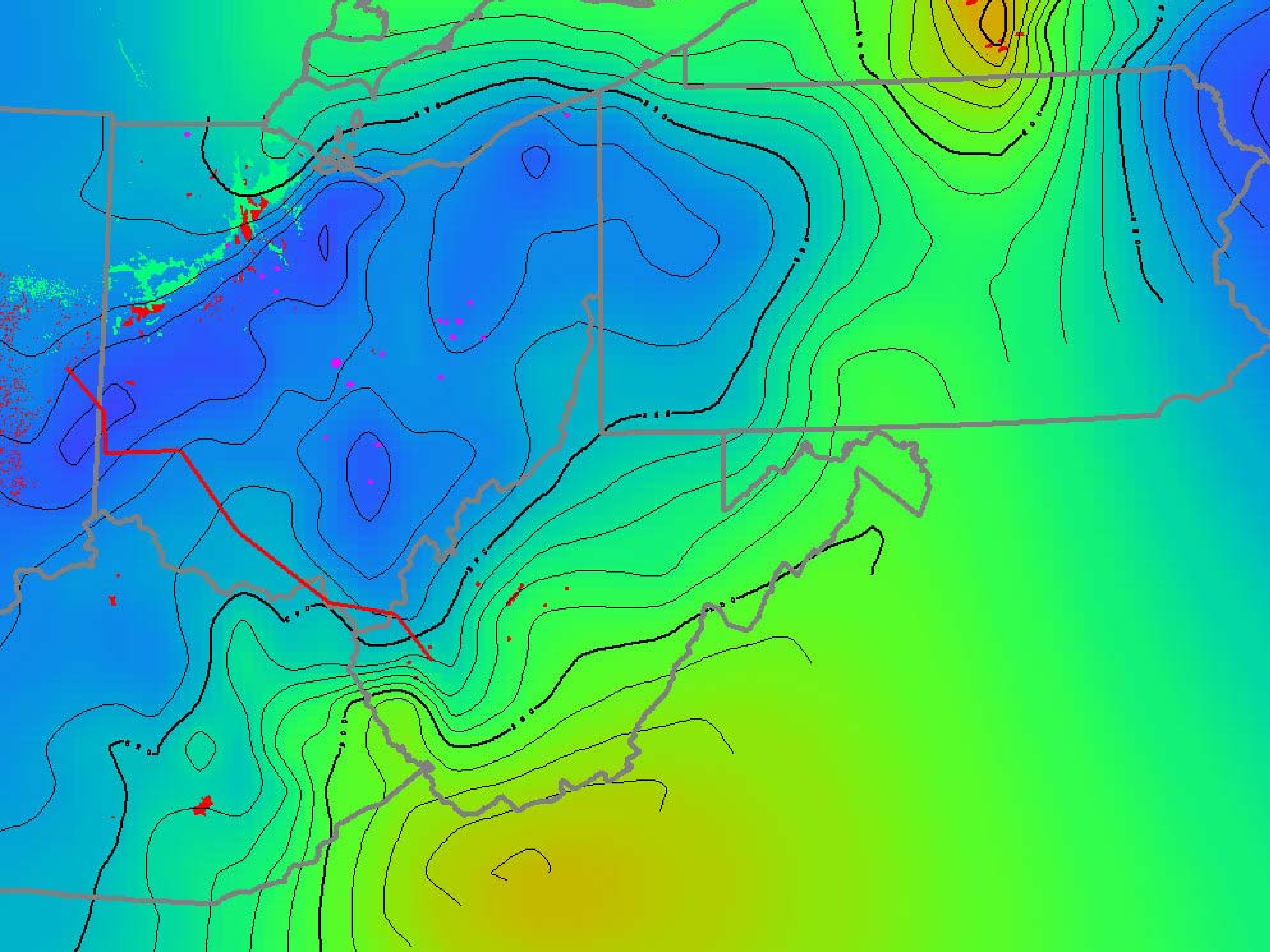

EXPLANATION
DEPOSITS ON PLATFORM
Limestone
Stippled where phosphatic
Dolomite
Shale and argillaceous limestone
DEPOSITS IN MIOGEOSYNCLINE
Flysch
Shallow-water sand and silt
DEPOSITS IN LEPTOGEOSYNCLINE
(King, 1969, p. 85)
Chert and shale
DEPOSITS IN EUGEOSYNCLINE
Shale, volcanic rocks, and chert
Prevailing winds
Ocean currents
DIRECTION OF SEDIMENT TRANSPORT
Turbidity currents
Ripple marks
Land
Land?
Land
Land
Land
Sebree, Ky
Note: Sources of data are given in text
CRESSMAN, 1973

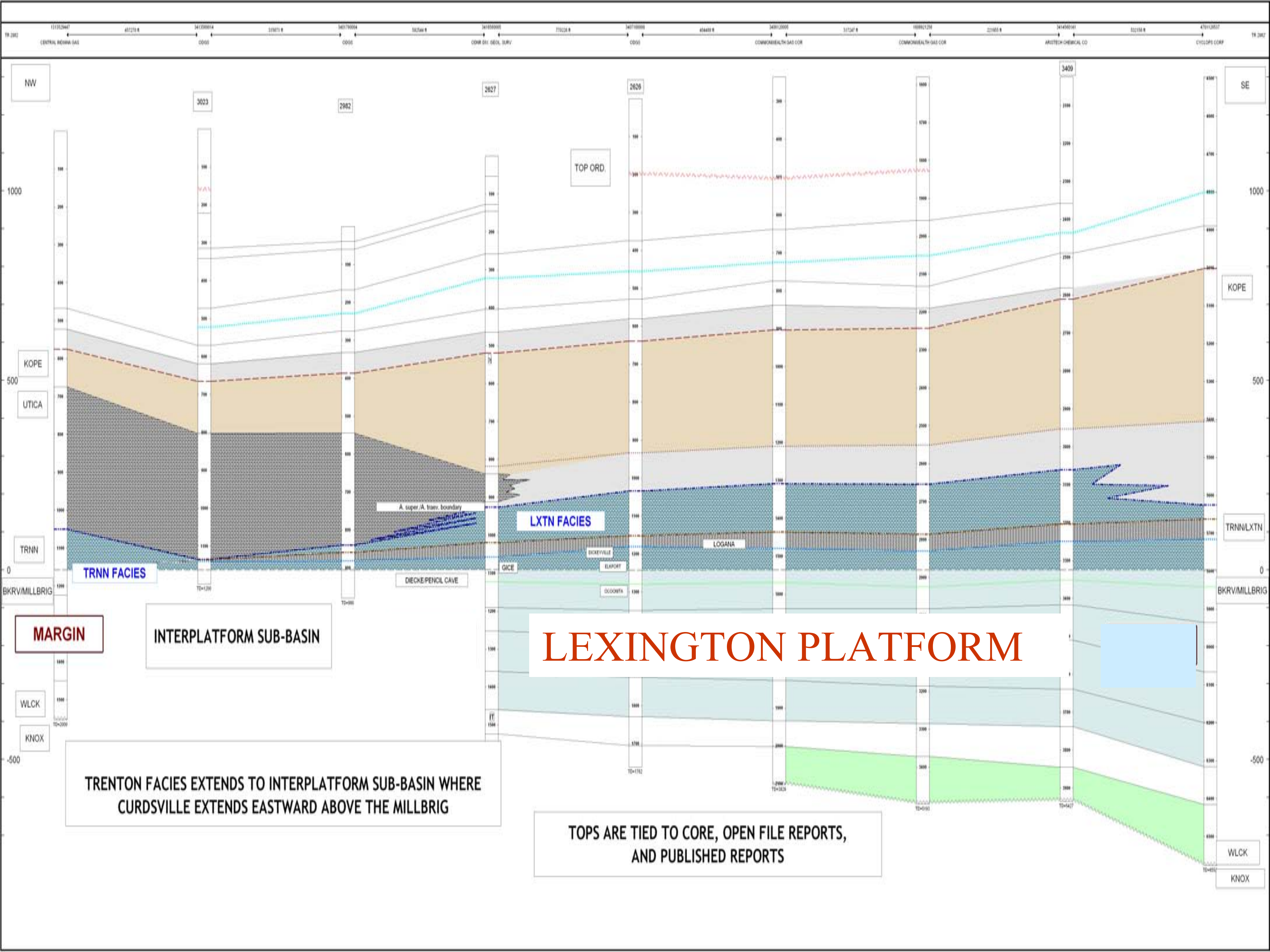


GALENA SHELF
KOPE TROUGH
TRENTON SHELF
LEXINGTON PLATFORM
TACONIC FORELAND BASIN
LAND
LAND
KEITH, 1985
0
400
miles
Carbonate
Terrigenous clastics and carbonate
Shale

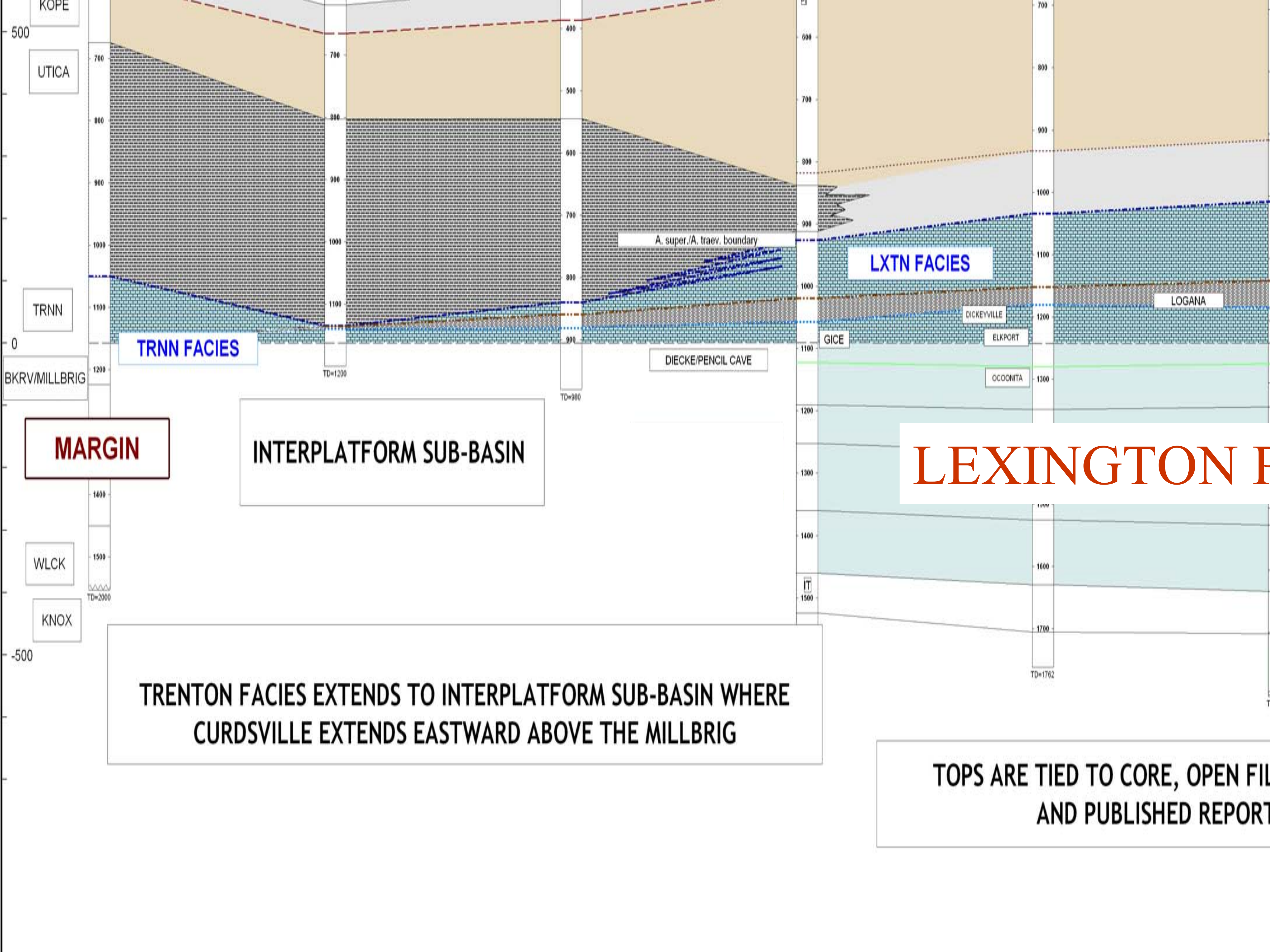
WICKSTROM, ET AL., 1992


W
KOPE or SEBREE TROUGH
(FREEMAN, 1953) (GUTSTADT, 1958a)
(KEITH, 1985)
E
A
BASE
SILURIAN
CARBONATES
TOP
BLACK RIVER
CARBONATES
W
HINGE LINE
(ROONEY, 1966)
E
B
BASE
SILURIAN
CARBONATES
TOP
BLACK RIVER
CARBONATES
W
SEBREE VALLEY
(SCHWALB, 1980)
E
C
BASE
SILURIAN
CARBONATES
TOP
BLACK RIVER
CARBONATES
W
LEXINGTON PLATFORM MARGIN
(GRAY, 1972)
E
D
BASE
SILURIAN
CARBONATES
TOP
BLACK RIVER
CARBONATES
STRATIGRAPHIC
RELATIONSHIPS
FACIES
CHANGE
EROSION
SUBAERIAL
SUBAQUEOUS
1000 FT
300 M
0
100 KM
100 MI
HOHMAN, 1998
STRATIGRAPHY
MAQUOKETA
LEXINGTON
TRENTON

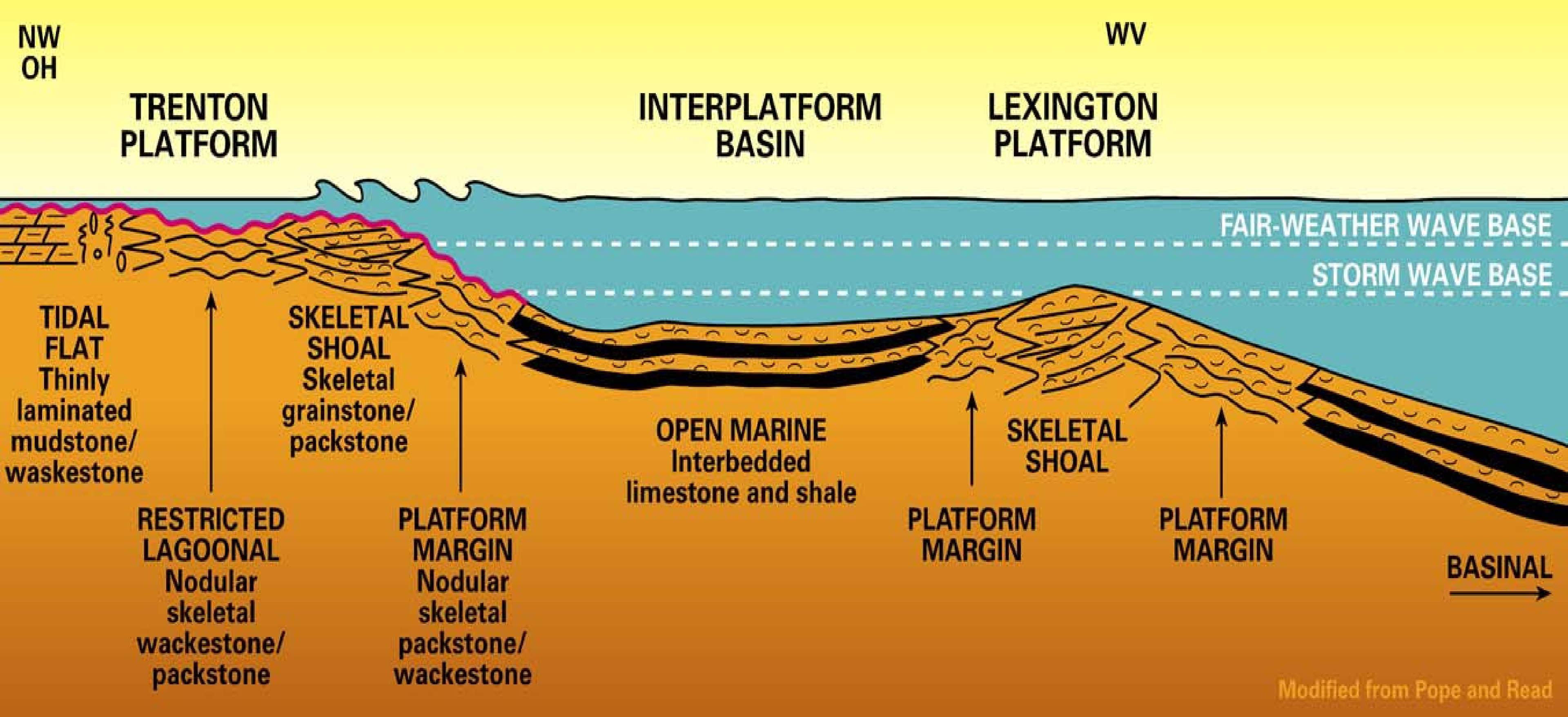


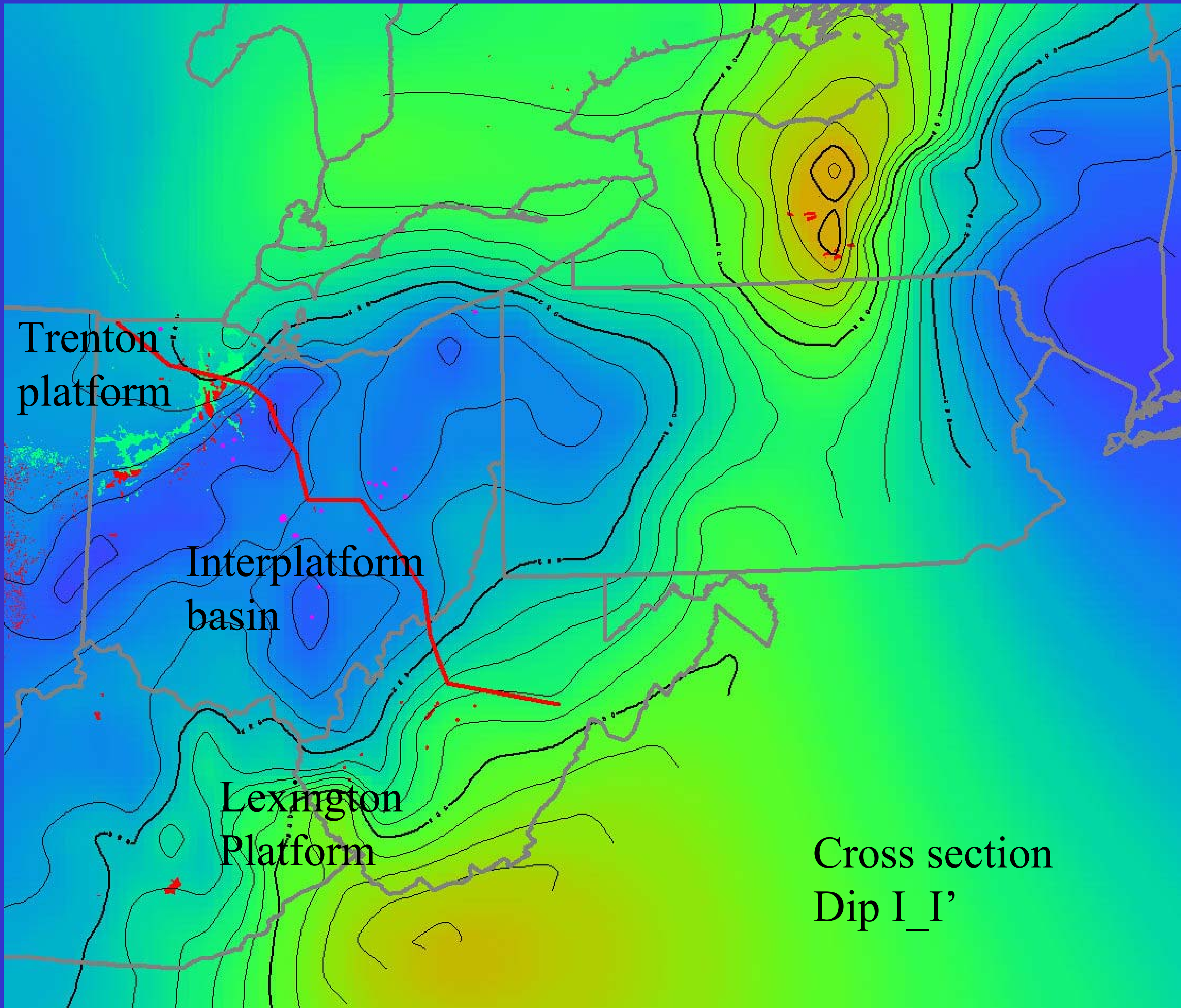


NW
SE
TOP ORD.
KOPE
UTICA
TRNN
BKRV/MILLBRIG
WLCK
KNOX
TRNN/LXTN
1000
500
0
-500
3023
2982
2627
2626
3409
A. super./A. traev. boundary
LXTN FACIES
TRNN FACIES
LOGANA
DIECKE/PENCIL CAVE
GICE
MARGIN
INTERPLATFORM SUB-BASIN
LEXINGTON PLATFORM
TRENTON FACIES EXTENDS TO INTERPLATFORM SUB-BASIN WHERE CURDSVILLE EXTENDS EASTWARD ABOVE THE MILLBRIG
TOPS ARE TIED TO CORE, OPEN FILE REPORTS, AND PUBLISHED REPORTS

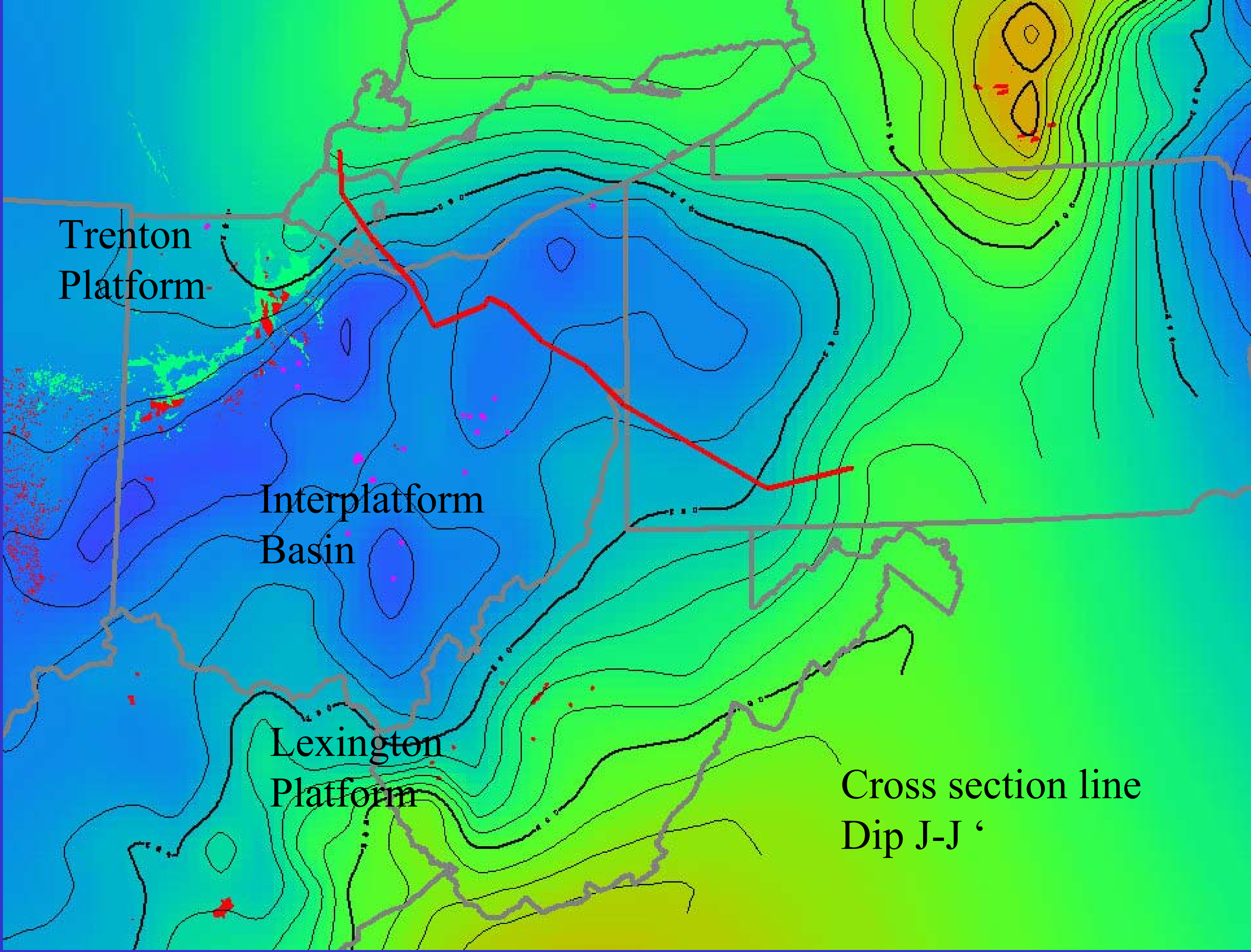

KOPE
500
UTICA
TRNN
0
BKRV/MILLBRIG
MARGIN
WLCK
KNOX
-500
TRNN FACIES
INTERPLATFORM SUB-BASIN
A. super./A. traev. boundary
DIECKE/PENCIL CAVE
GICE
LXTN FACIES
LOGANA
DICKEYVILLE
ELKPORT
OCOONITA
TD=1200
TD=980
TD=2000
TD=1762
LEXINGTON P
TRENTON FACIES EXTENDS TO INTERPLATFORM SUB-BASIN WHERE
CURDSVILLE EXTENDS EASTWARD ABOVE THE MILLBRIG
TOPS ARE TIED TO CORE, OPEN FIL
AND PUBLISHED REPORT

Idealized platform to basin model and major facies

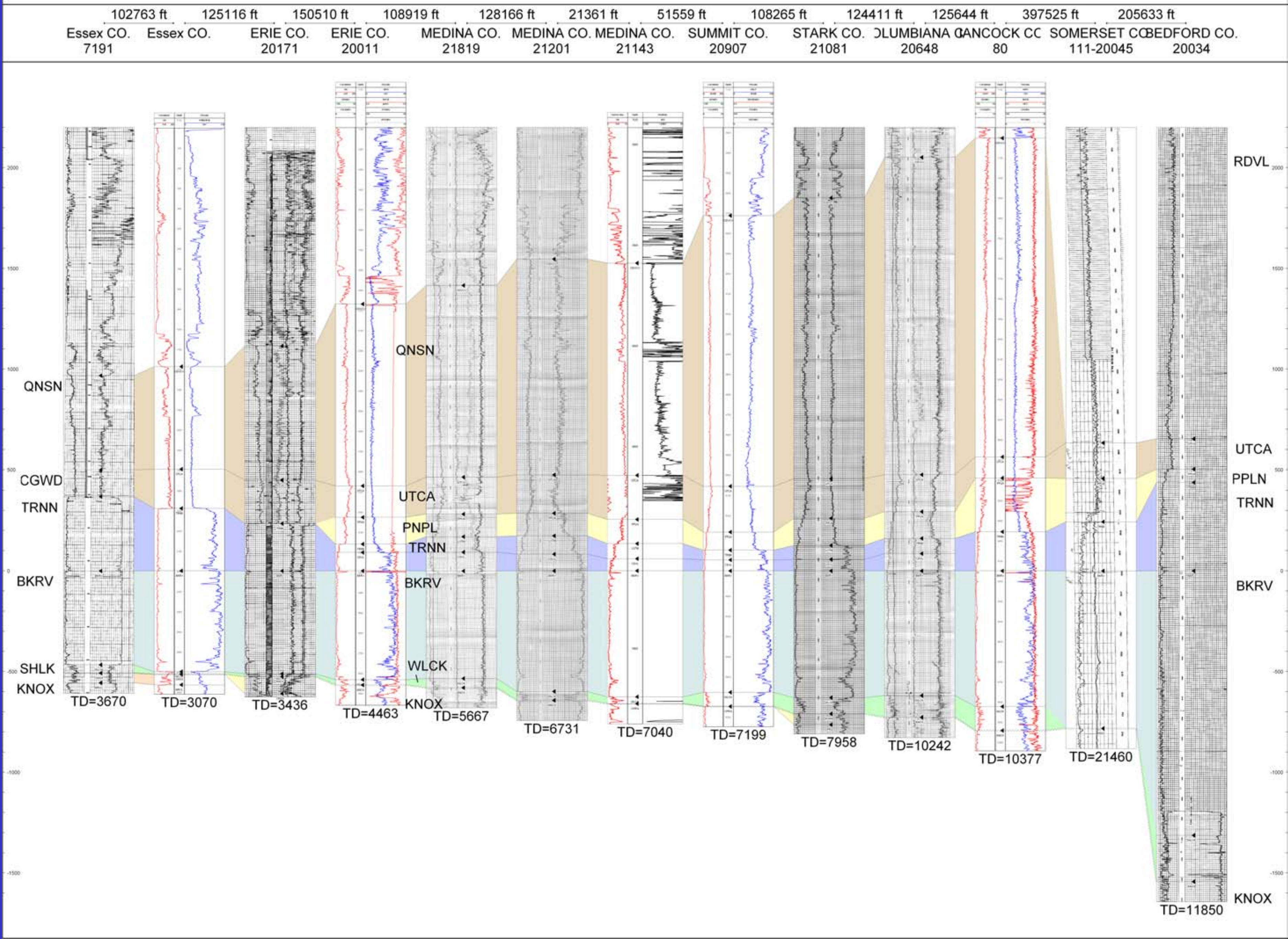


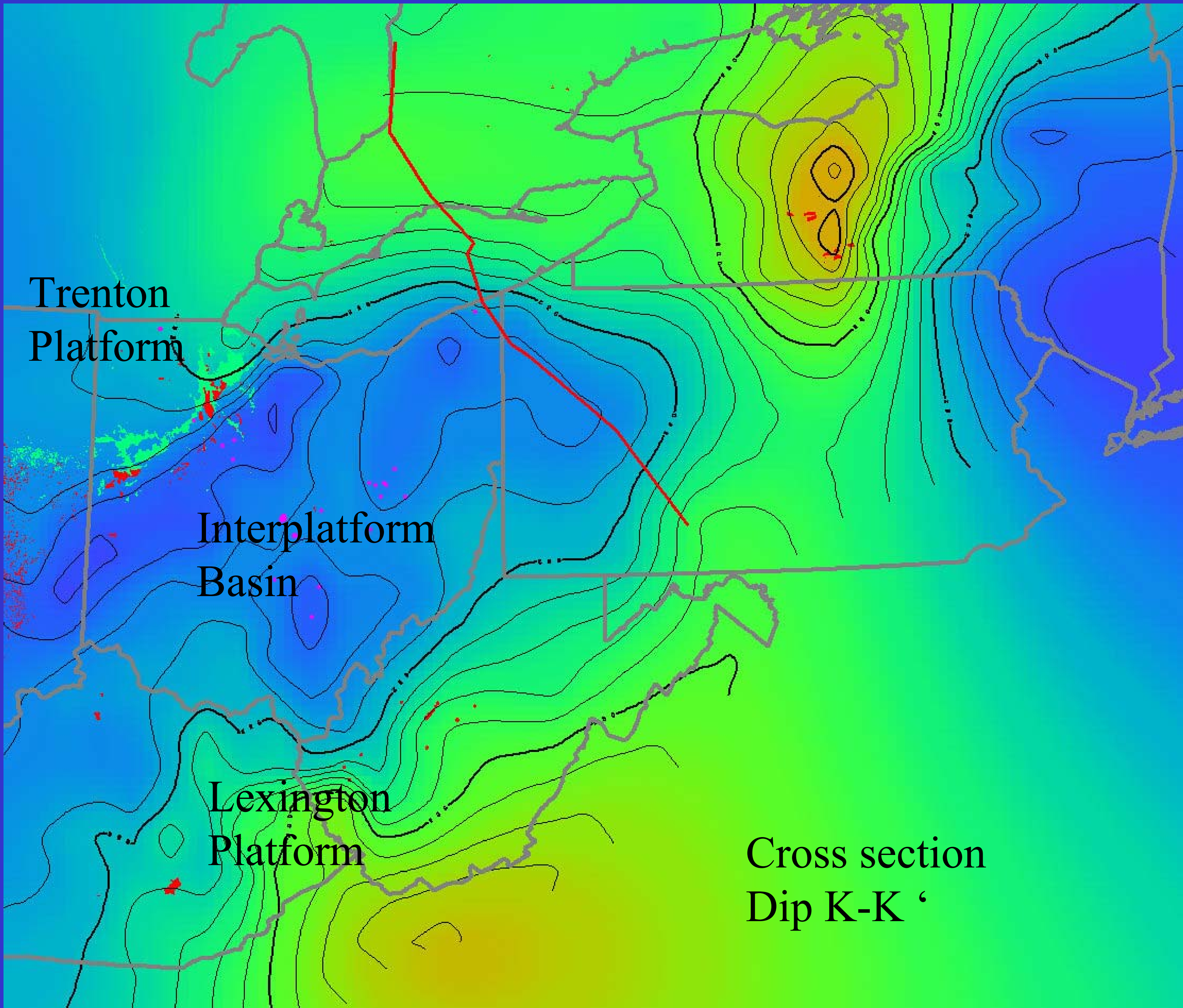

Trenton
platform
Interplatform
basin
Lexington
Platform
Cross section
Dip I_I'

Stratigraphic cross section Dip I-I ‘ from NW OH to WV

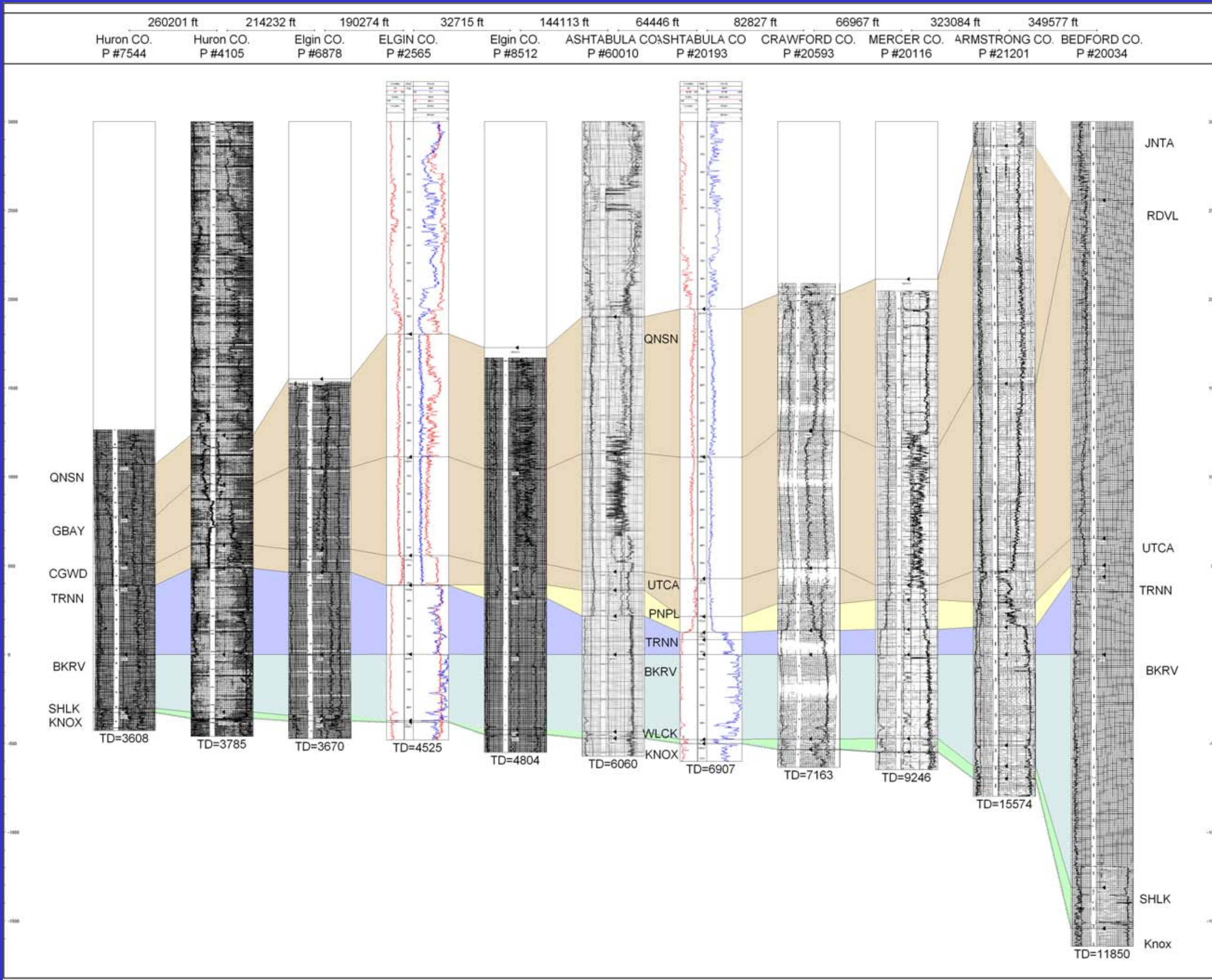

Trenton
Platform
Interplatform
Basin
Lexington
Platform
Cross section line
Dip J-J '

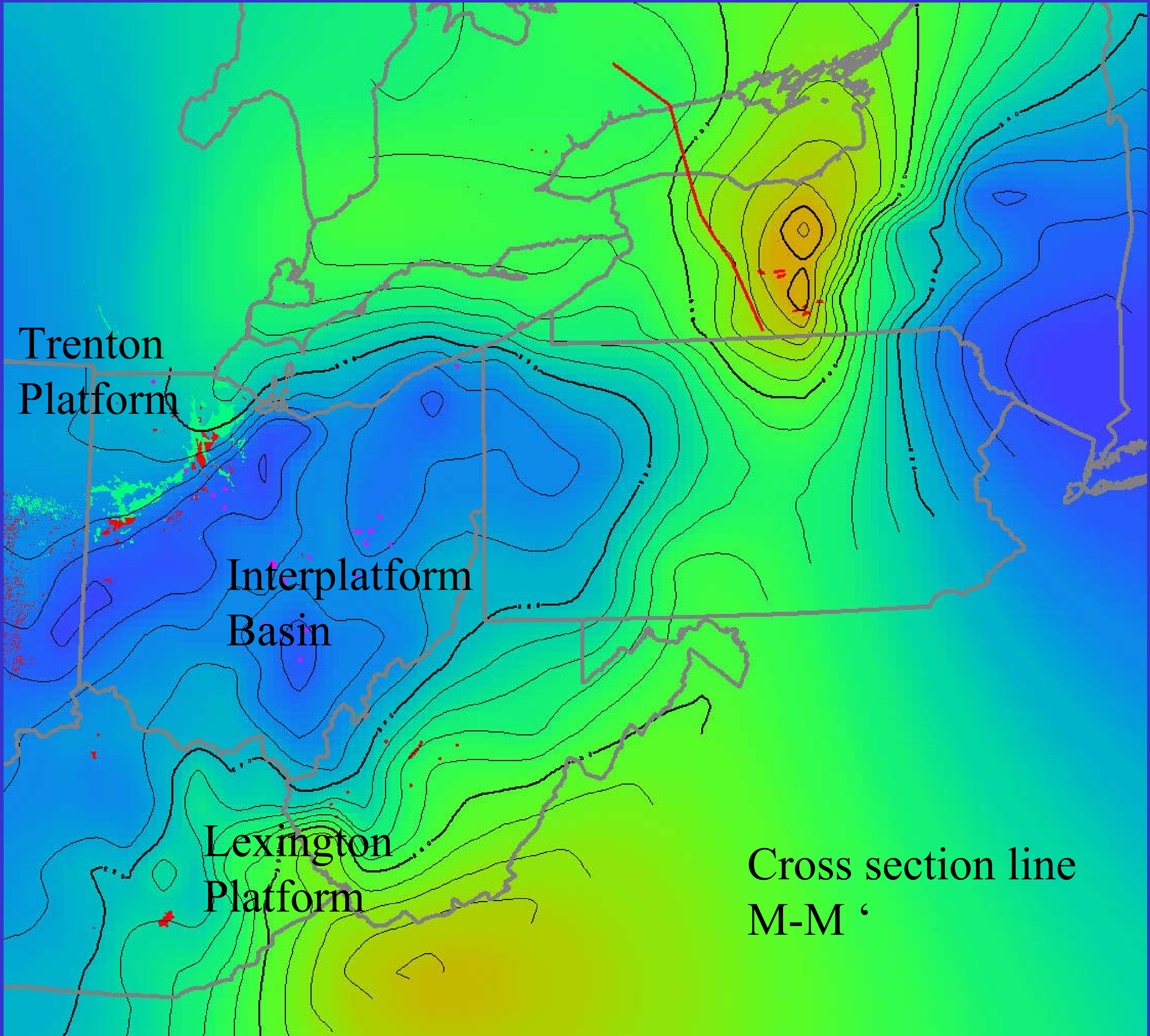
Stratigraphic cross section Dip J-J ‘ from ON to PA



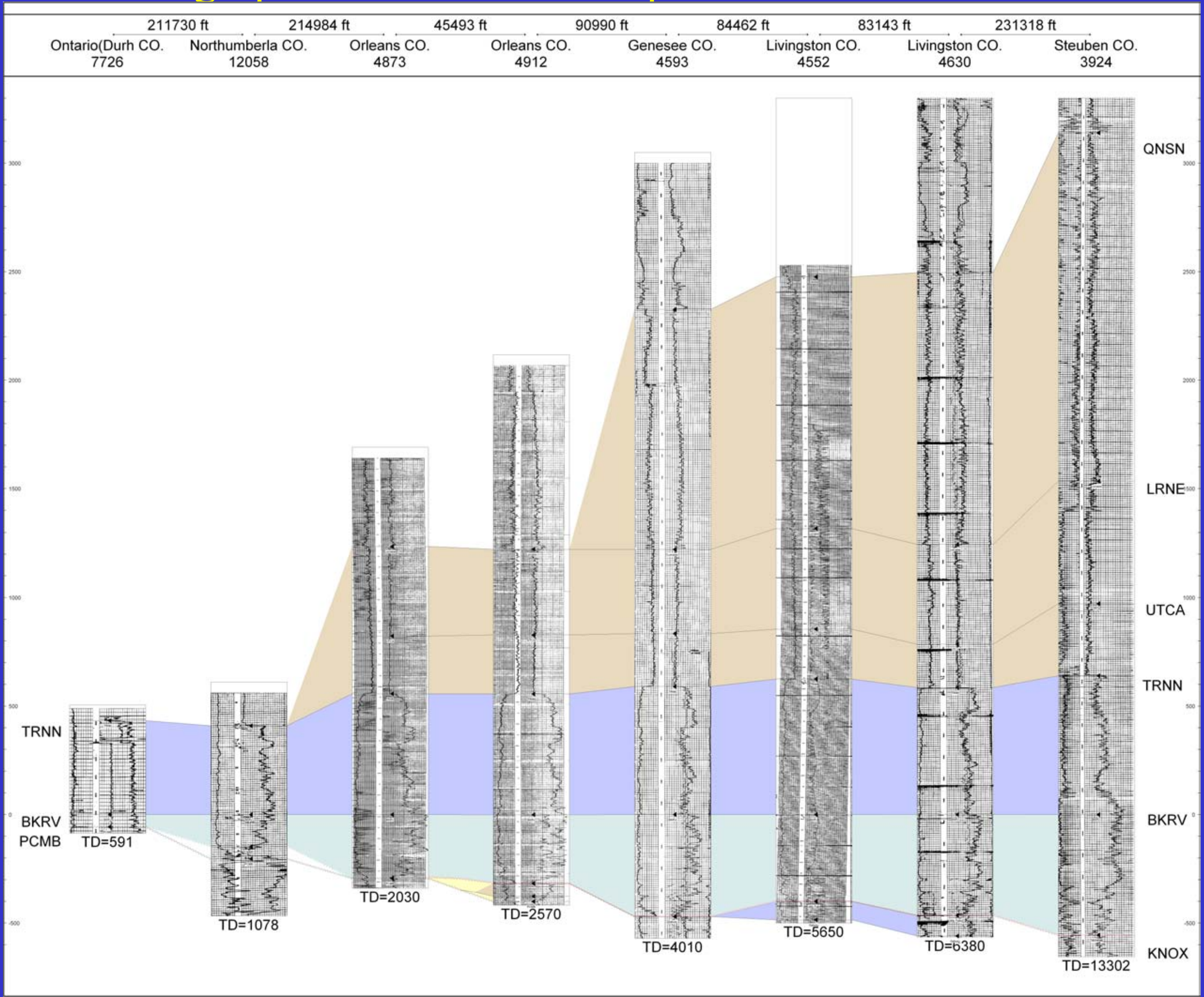

Trenton
Platform
Interplatform
Basin
Lexington
Platform
Cross section
Dip K-K '

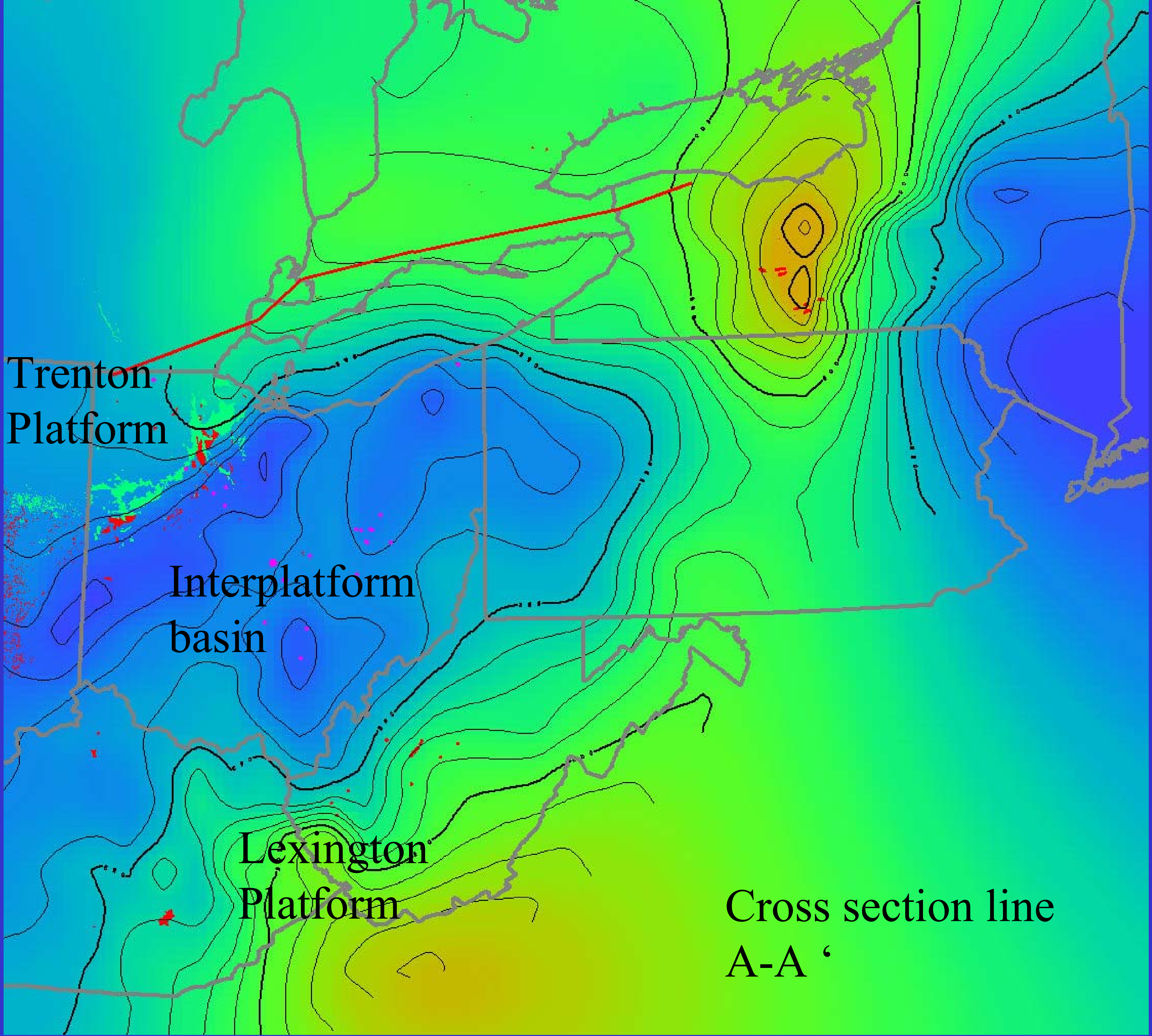
Stratigraphic cross section Dip K-K ‘ from ON to PA



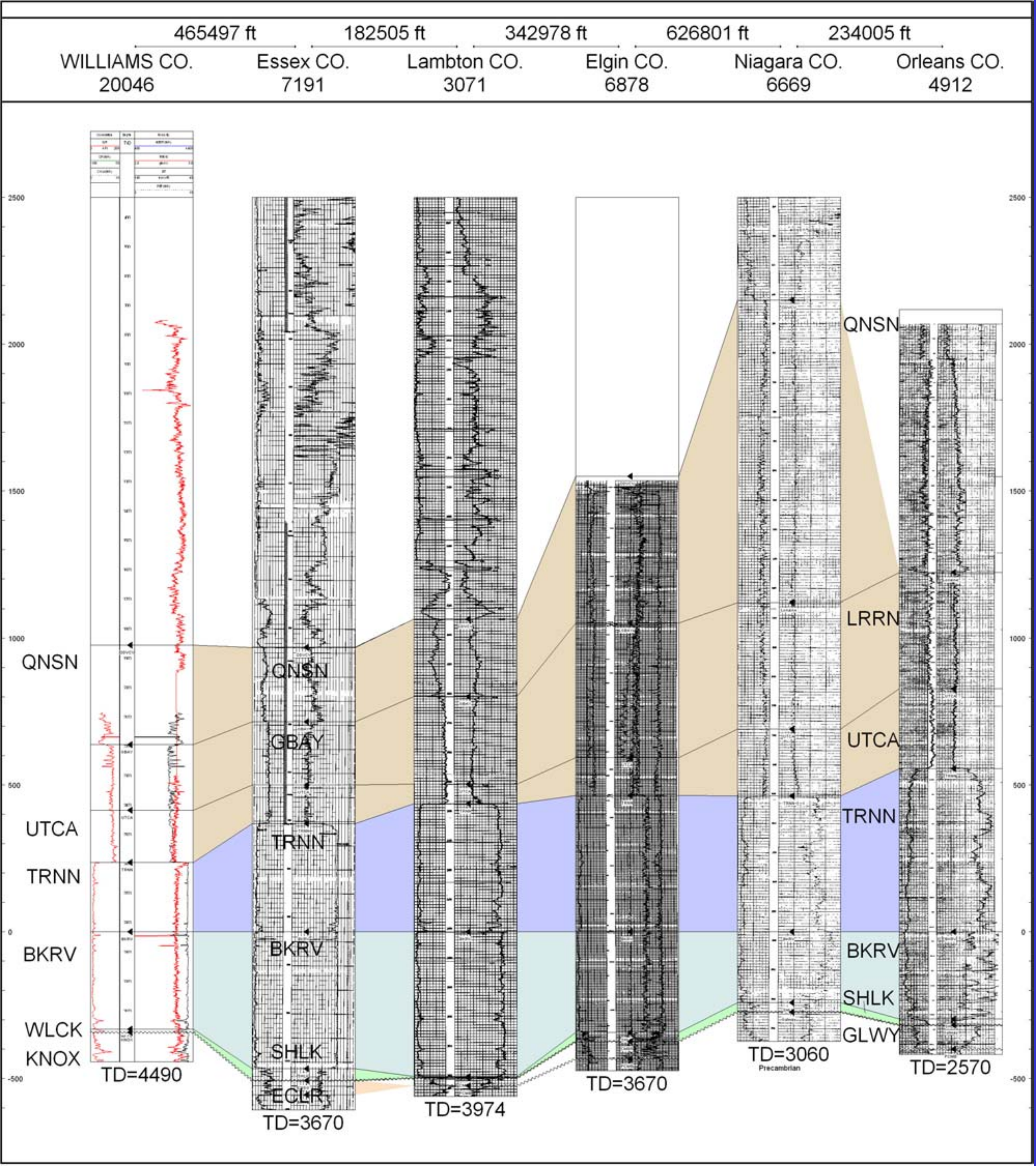

Trenton
Platform
Interplatform
Basin
Lexington
Platform
Cross section line
M-M ‘

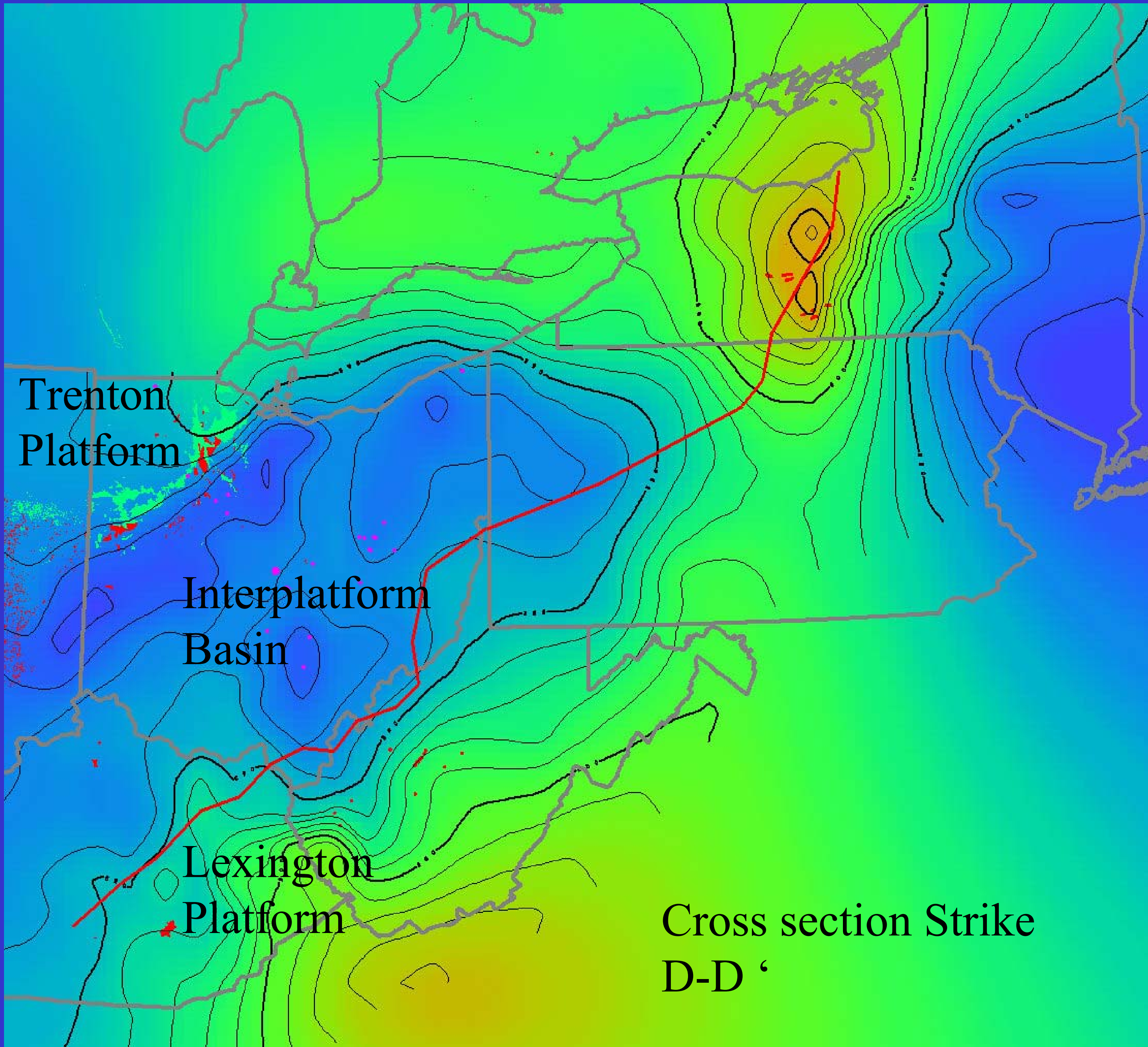
Stratigraphic cross section Dip M-M ‘ from ON to PA



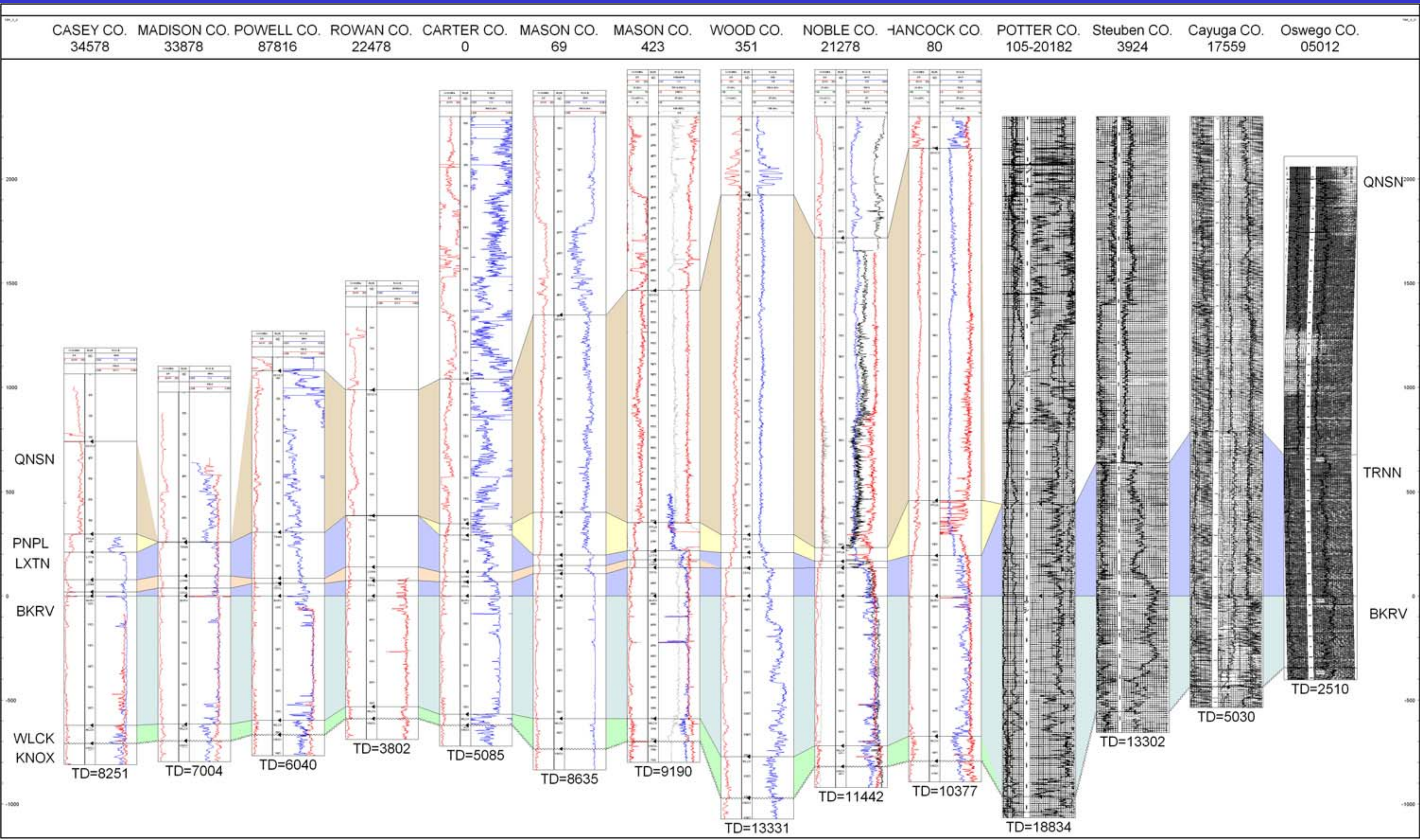

Trenton
Platform
Interplatform
basin
Lexington
Platform
Cross section line
A-A '

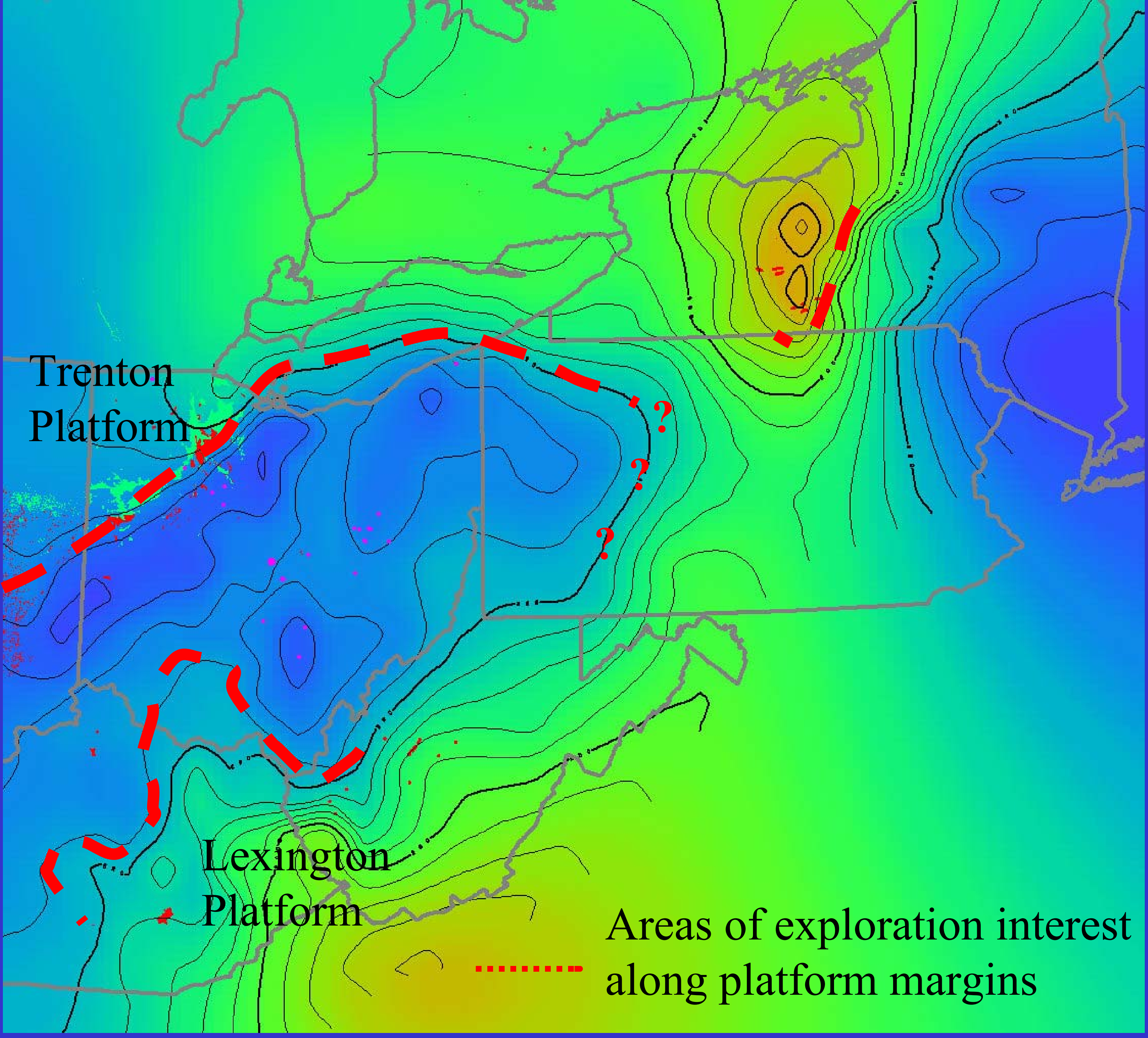
Stratigraphic cross section Strike A-A' from NW Ohio to NY




Trenton
Platform
Interplatform
Basin
Lexington
Platform
Cross section Strike
D-D '

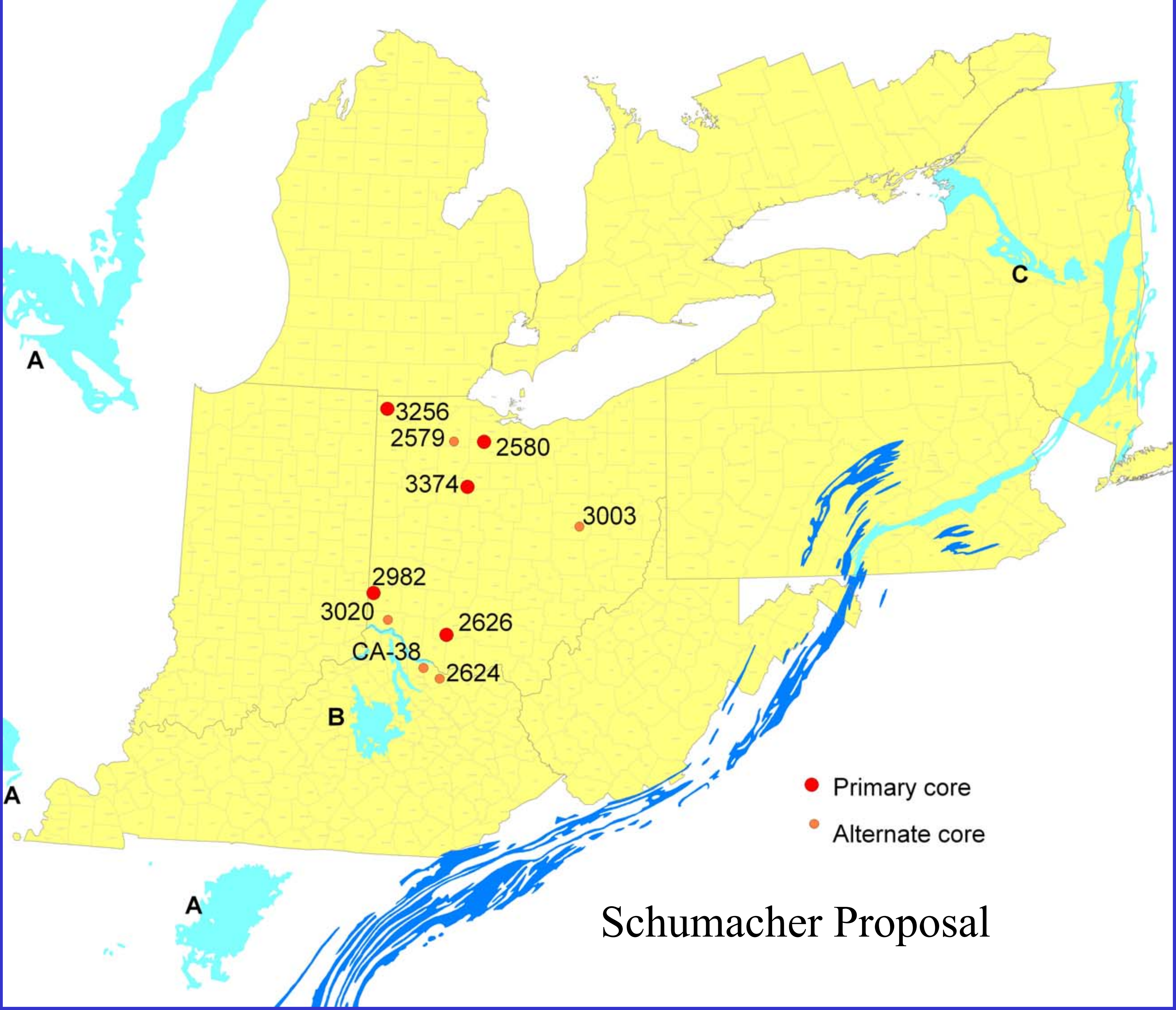
Stratigraphic cross section Strike D-D ‘ from KY to NY




Trenton
Platform
Lexington
Platform
Areas of exploration interest
along platform margins

Stratigraphy tasks and importance to other tasks

- Integrate major stratigraphic facies and sequences with thin section petrography to define reservoir facies.
- Integrate regional stratigraphy with C13 markers and chemically fingerprinted bentonites.
- Integrate regional facies and sequences with production maps to define producing trends.
- Integrate regional stratigraphy with regional structural features to define potential HTD trends.
- Integrate all tasks to better understand the entire petroleum system.



Schumacher Proposal