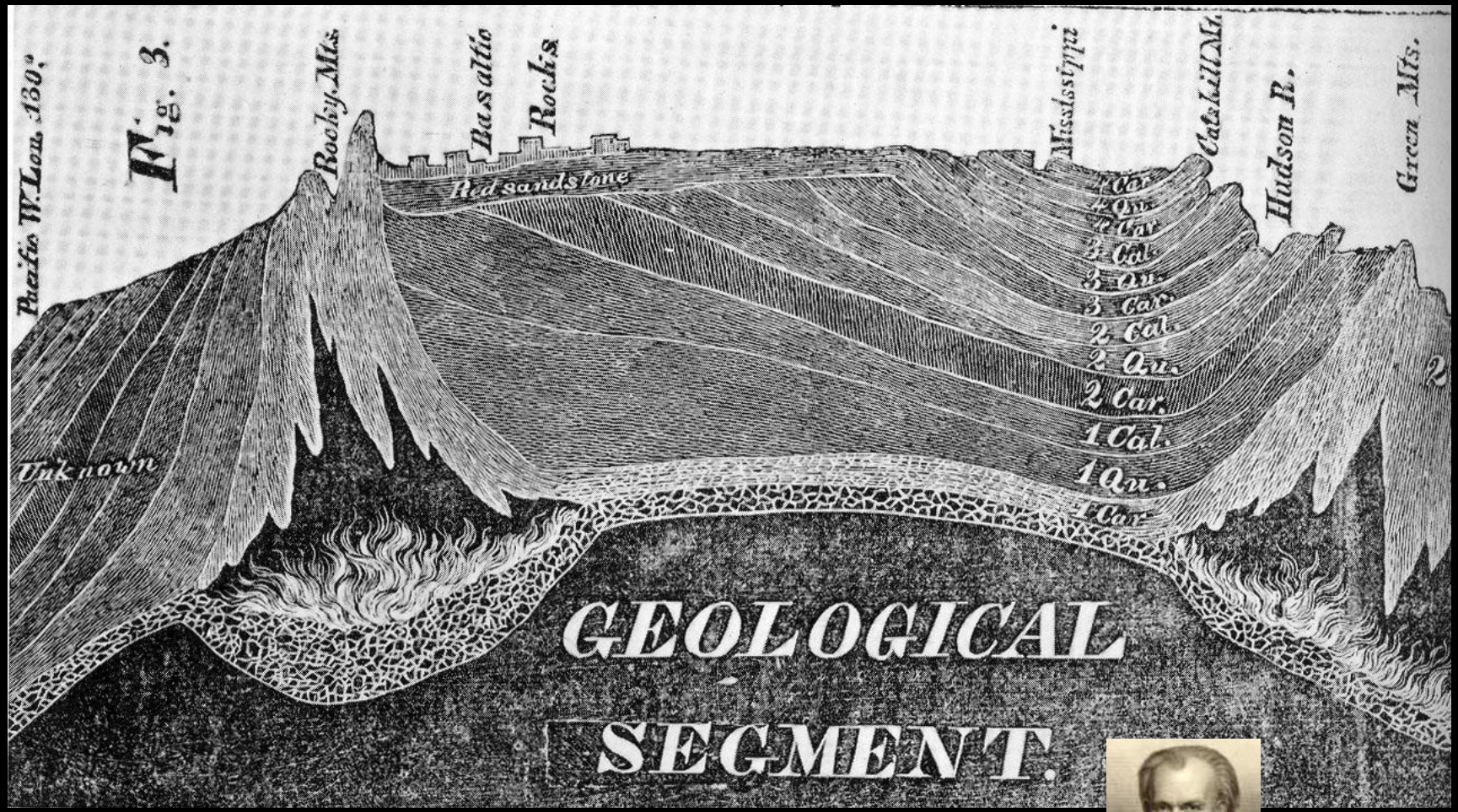
Cameron's Line and the St. Nicholas Thrust in New York City

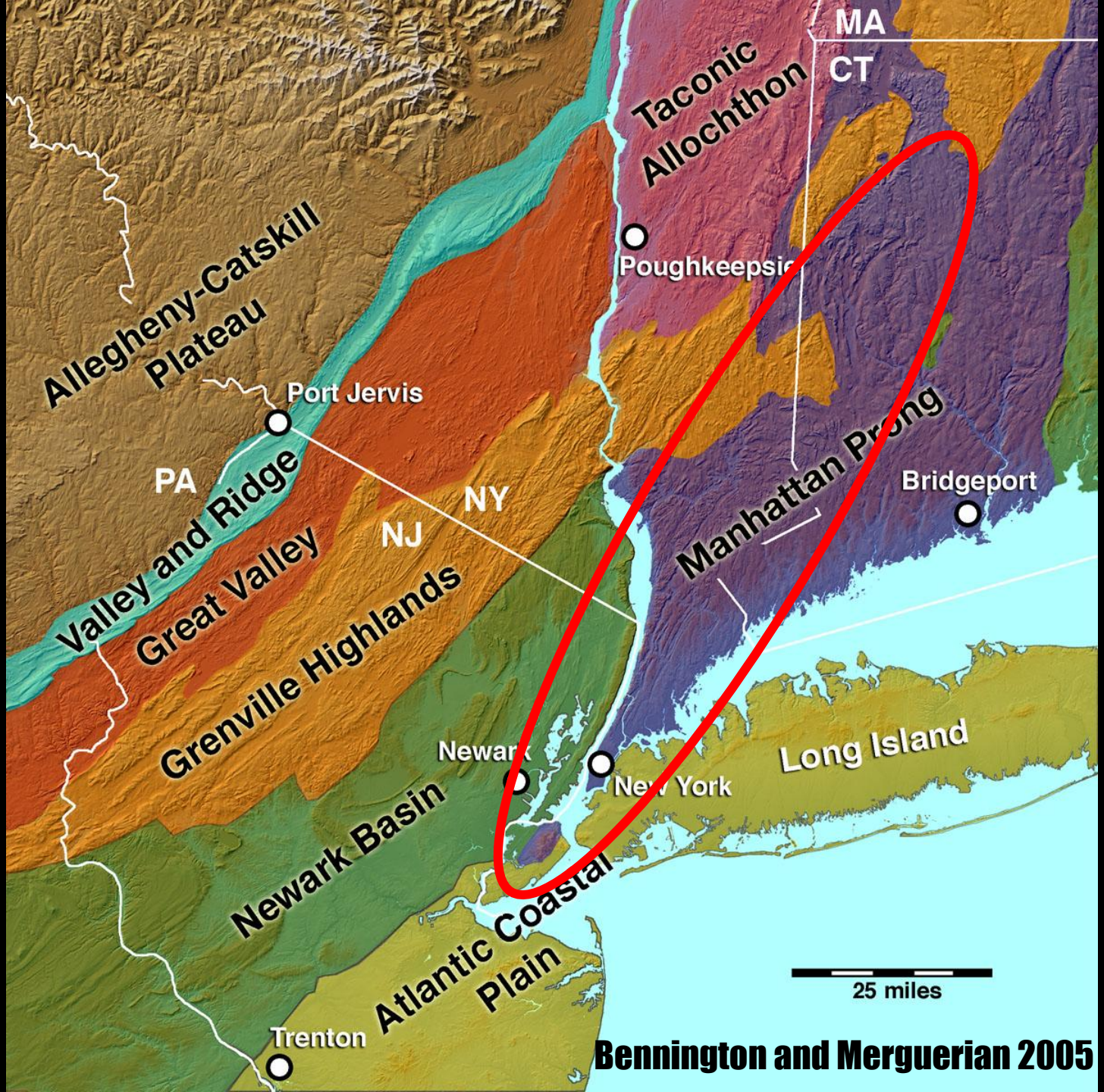
Charles Merguerian

DUKE

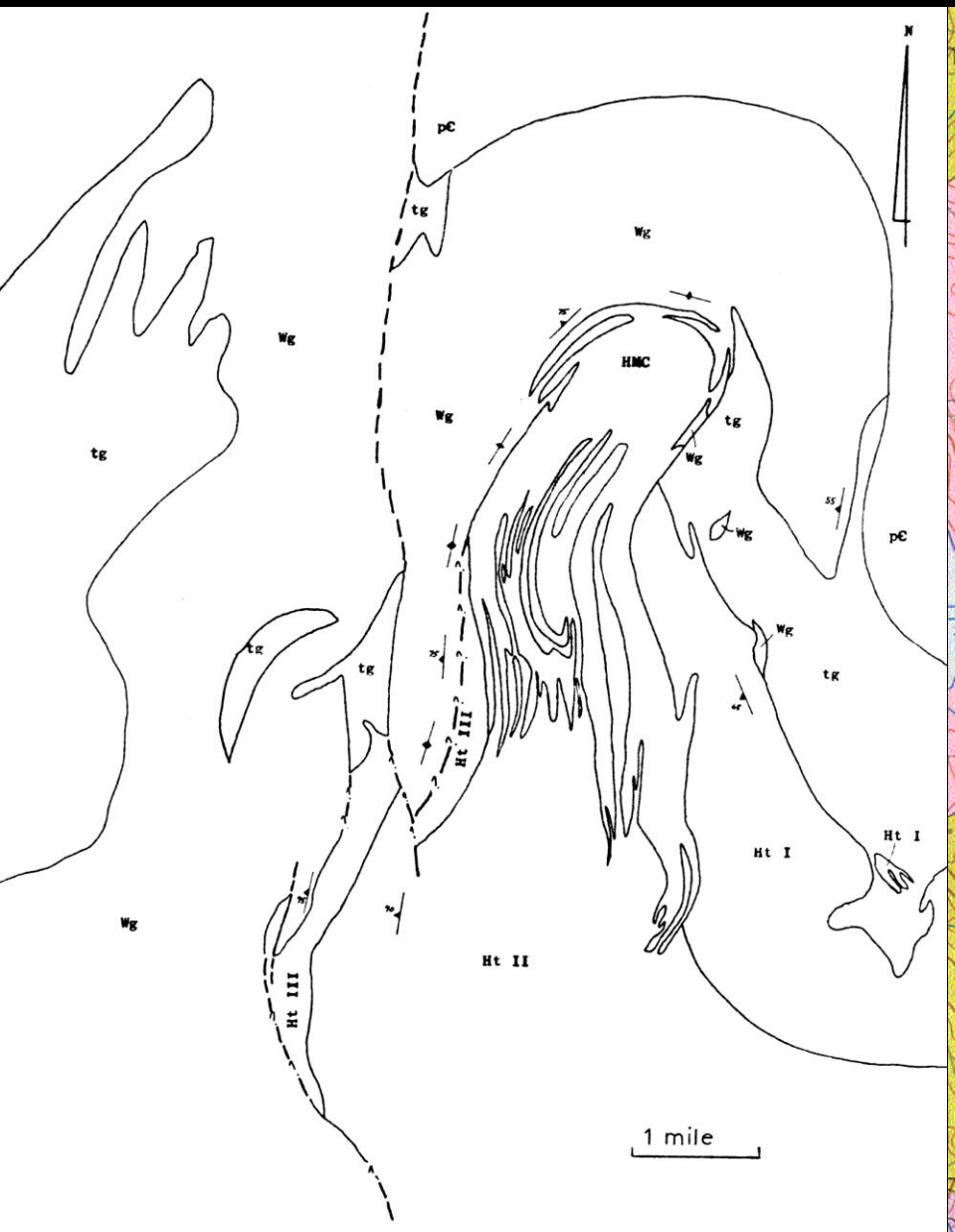


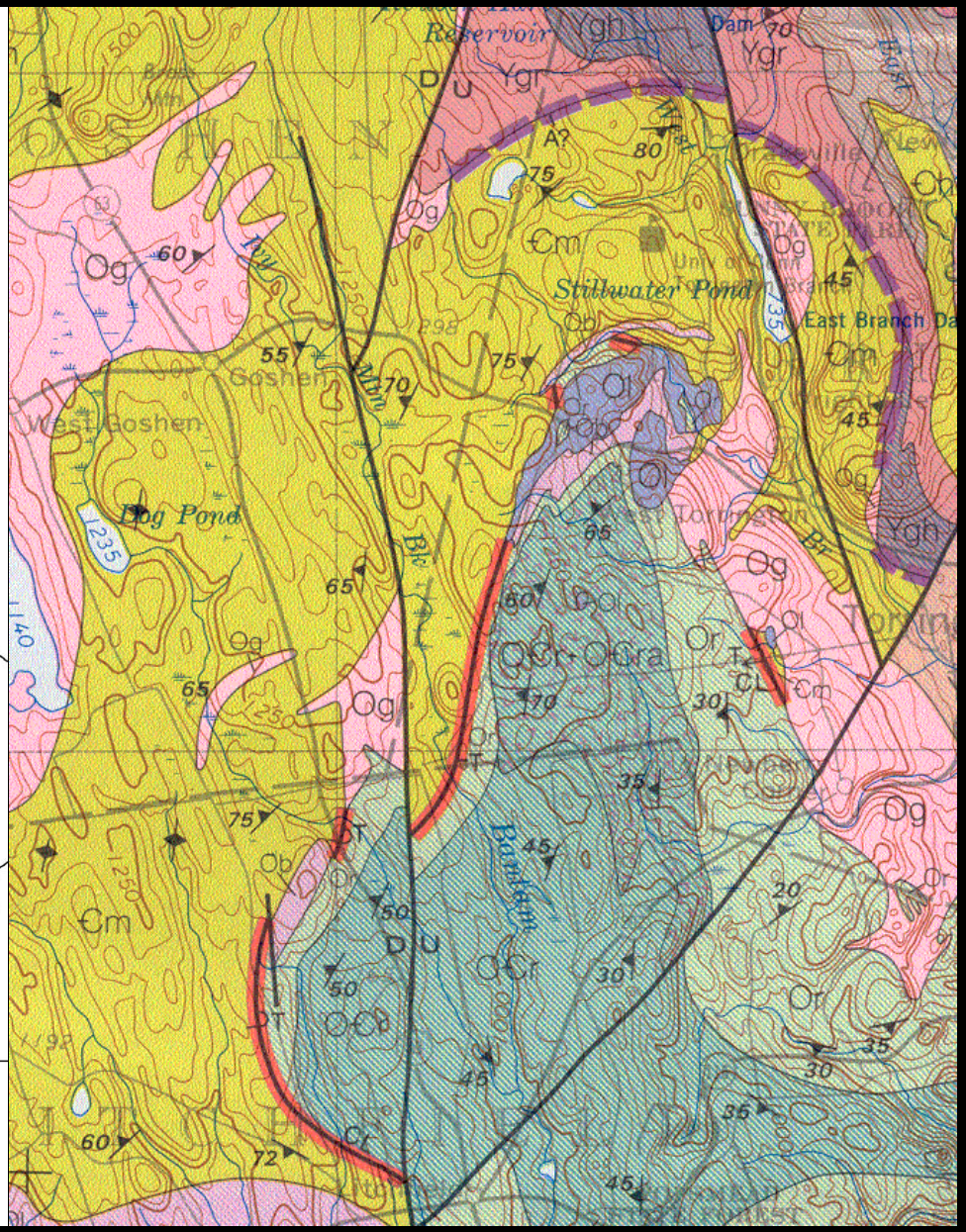
Eaton 1820

Geological Society of America (22 Mar 2026)



Bennington and Merguerian 2005

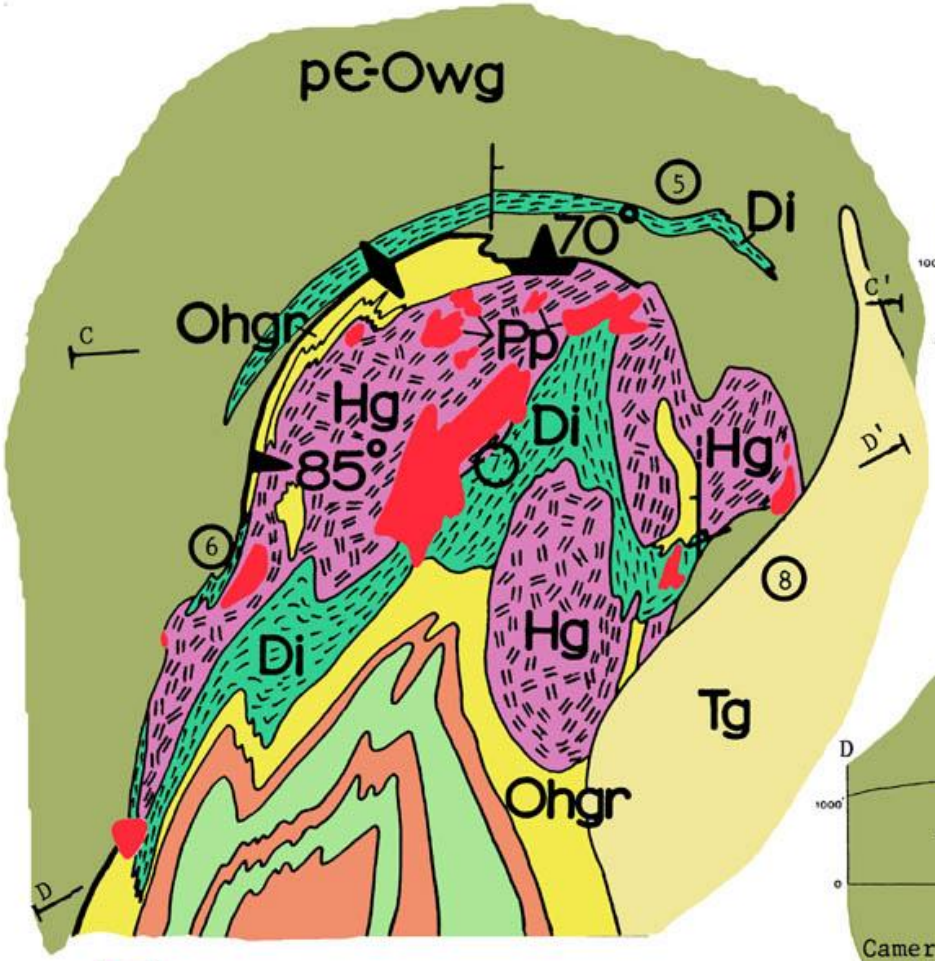


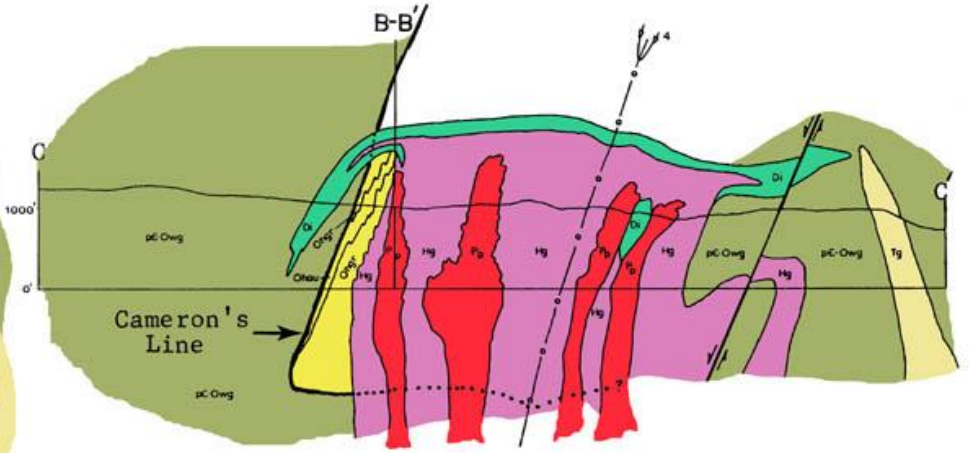


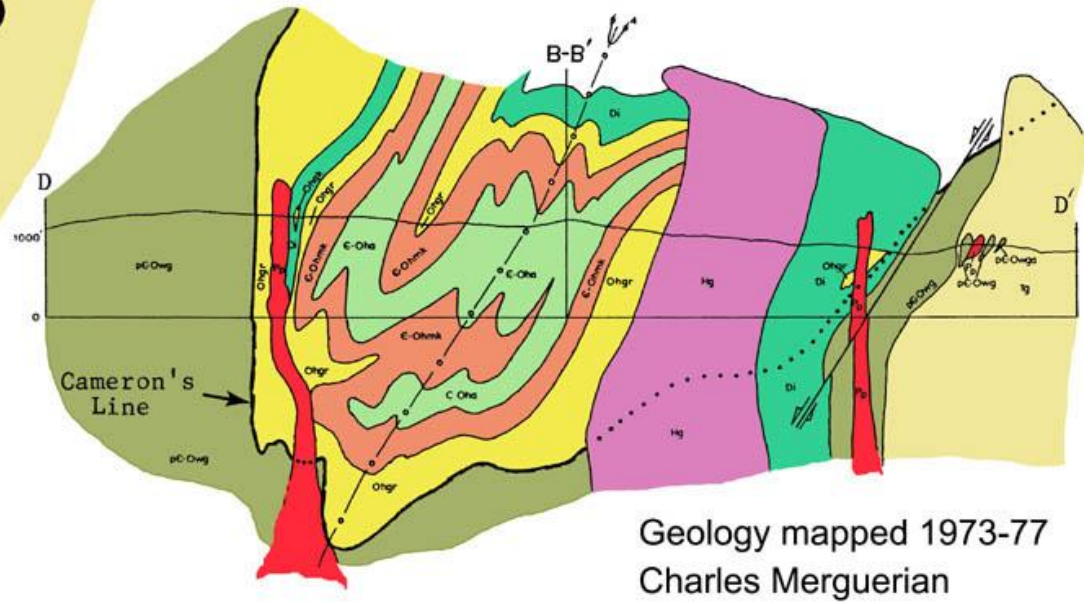
Gates and Christensen 1965

Rodgers et al 1985

Unit Hg 446 +/- 7 Ma in line with Taconian Cortlandt intrusive suite







Pp Meta-pyroxenite, -hornblendite

Di Metadiorite

Hg Metagabbro

Geology mapped 1973-77
Charles Merguerian

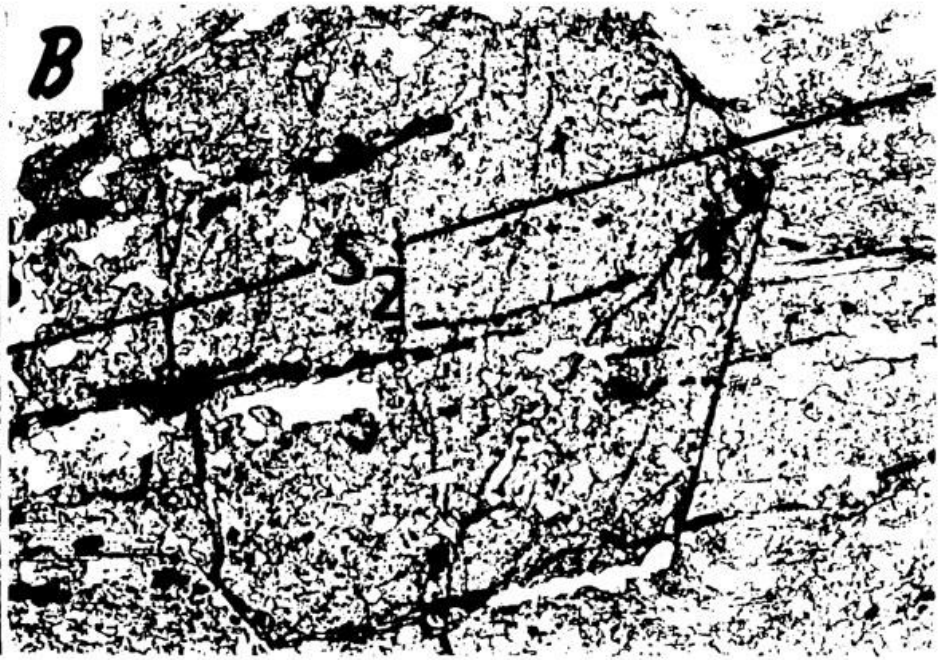


Figure 45 - a) Contact induced garnet enrichment in Hartland granofels xenolith from Stop 7. b) Garnet porphyroblast overprinting and including the penetrative S_2 foliation in Hartland amphibolite (Ohau) from contact aureole of the Hodges Complex at Stop 6. c) Cordierite (Cord) with typical pinnite (Pi) alteration coexisting with kyanite (Ky). Sample from contact of Hodges gabbro with Hartland granofels (Ohgr) on the northeast slope of Klug Hill.

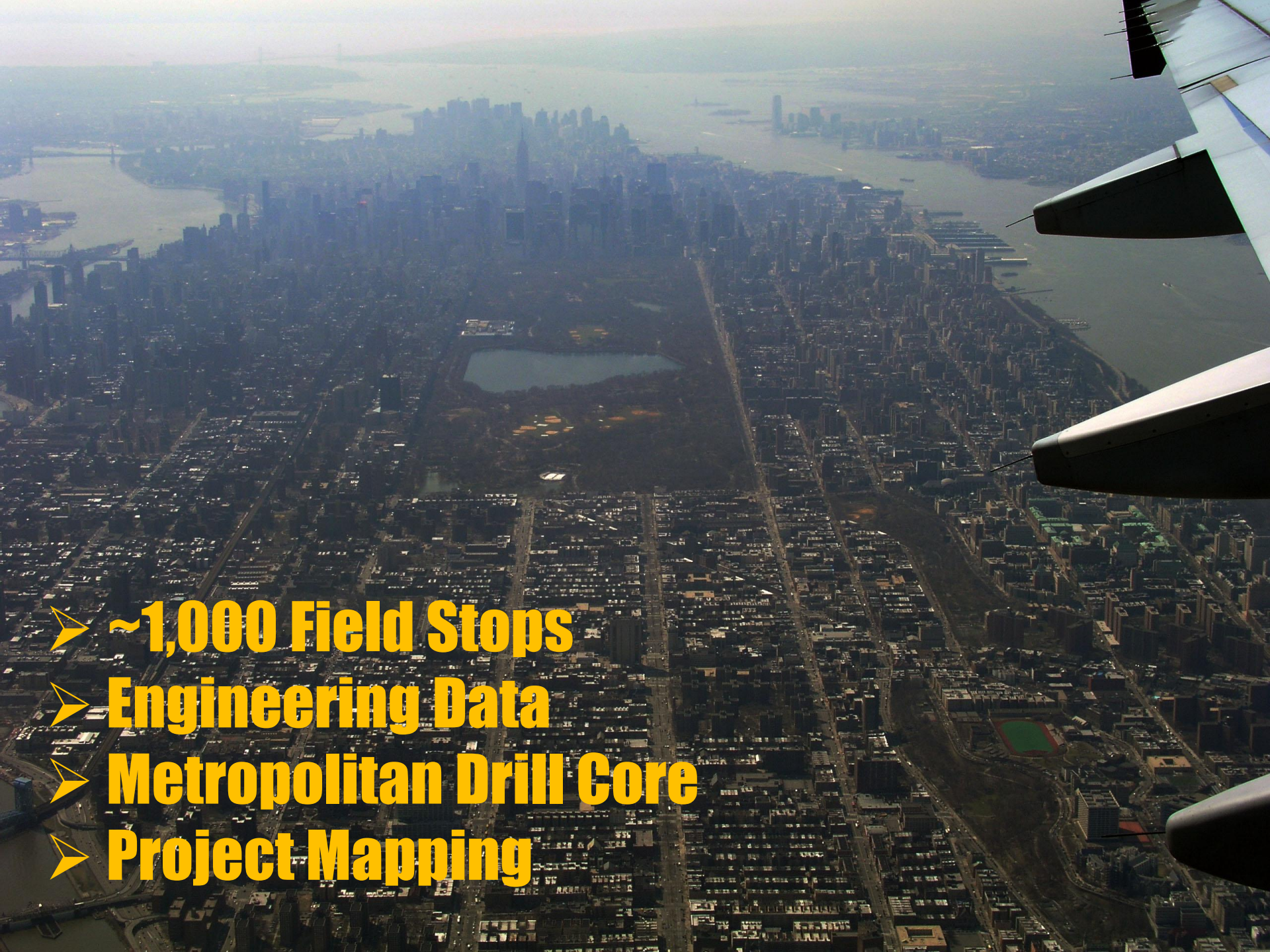
Cord+Ky+Gt+St ~25 km, 700°C

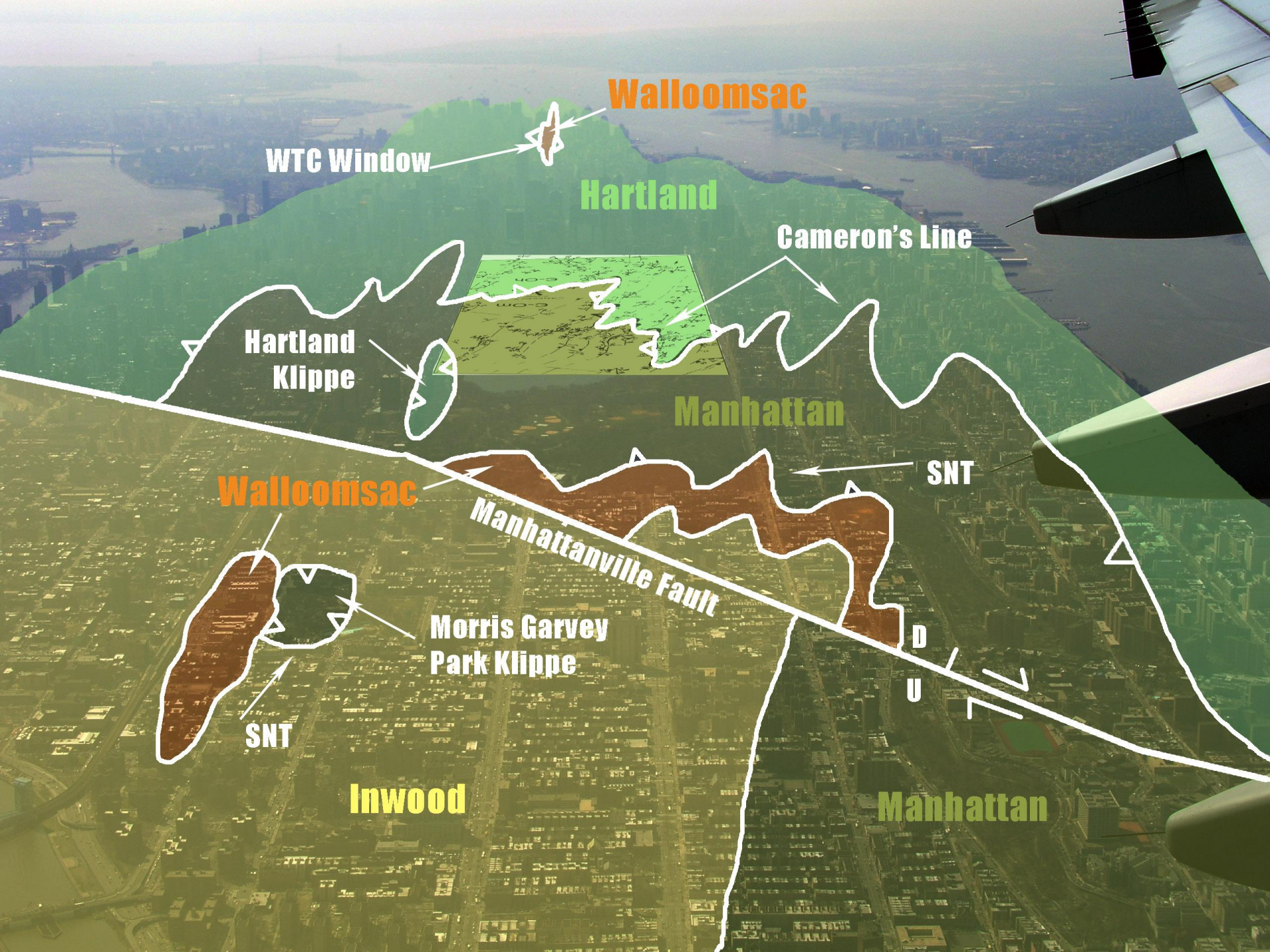
Merguerian 1977


Merguerian 1977


S2
S2
S2
S2
F1

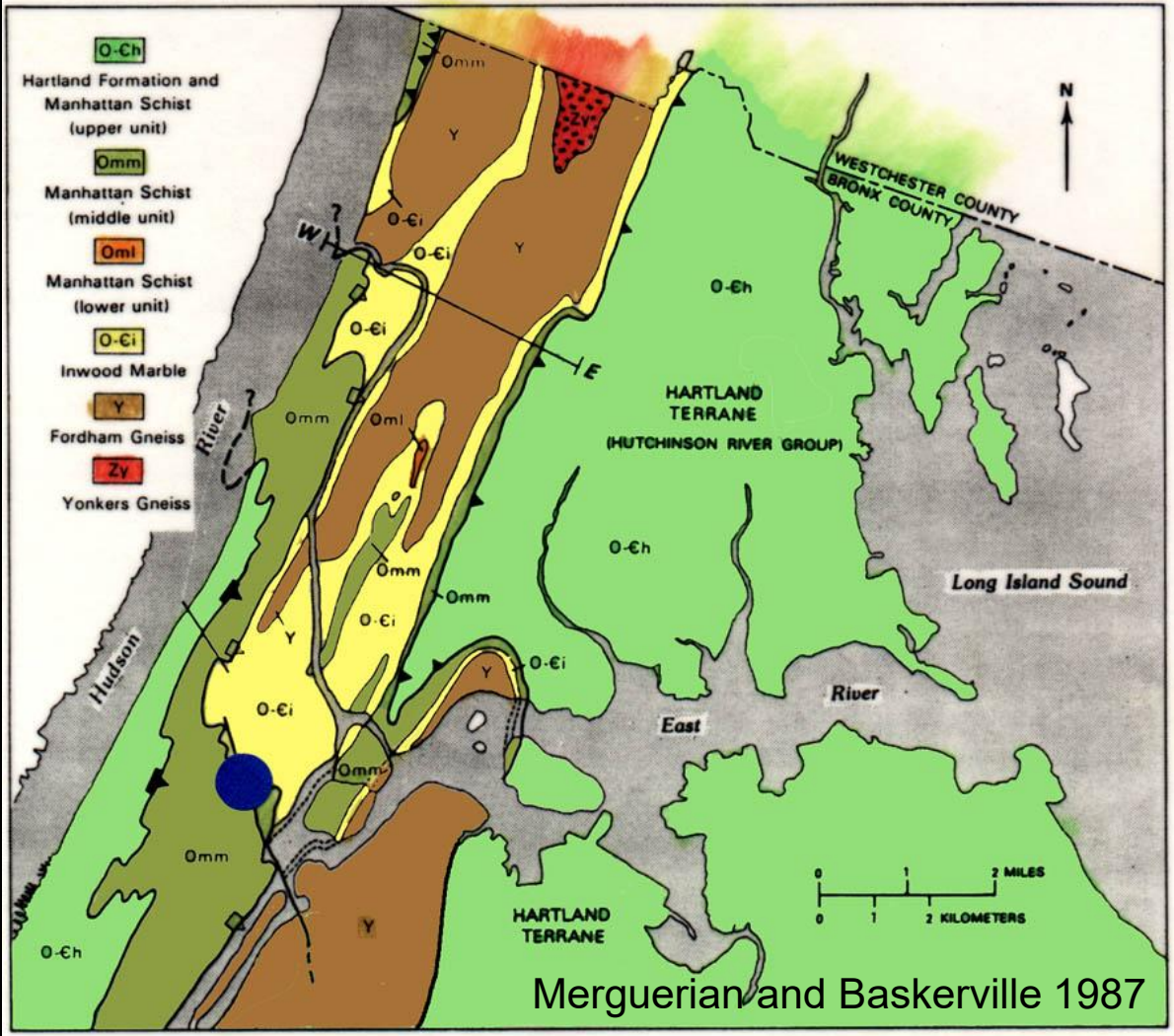
Merguerian 1977, 1987


~1,000 Field Stops
Engineering Data
Metropolitan Drill Core
Project Mapping

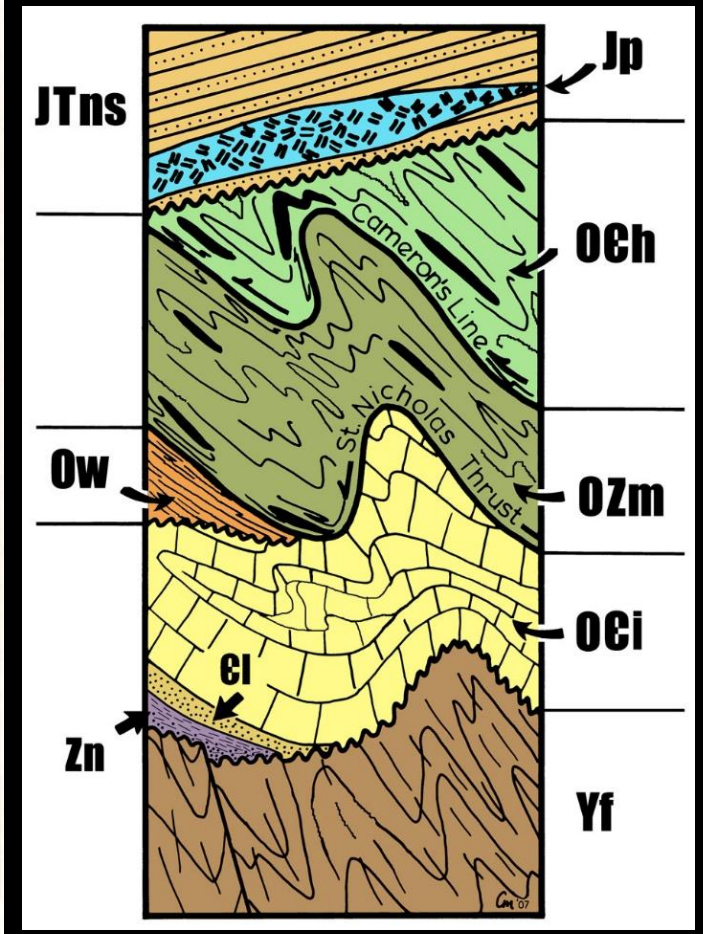

Walloomsac
WTC Window
Hartland
Cameron's Line
Hartland
Klippe
Manhattan
SNT
Walloomsac
Manhattanville Fault
Morris Garvey
Park Klippe
D
U
SNT
Inwood
Manhattan

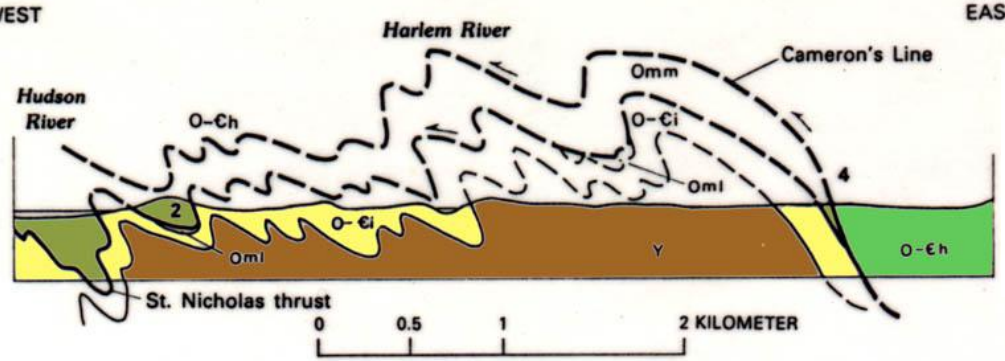
Proper Field Attire
for NYC
Field Work

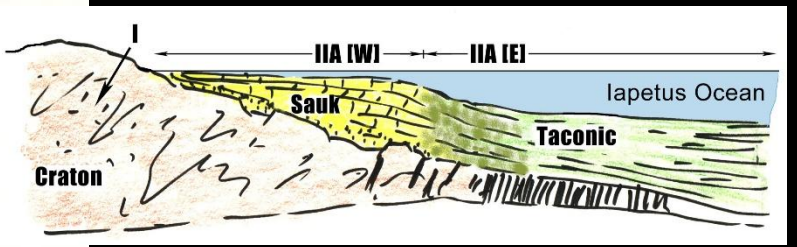
New York City

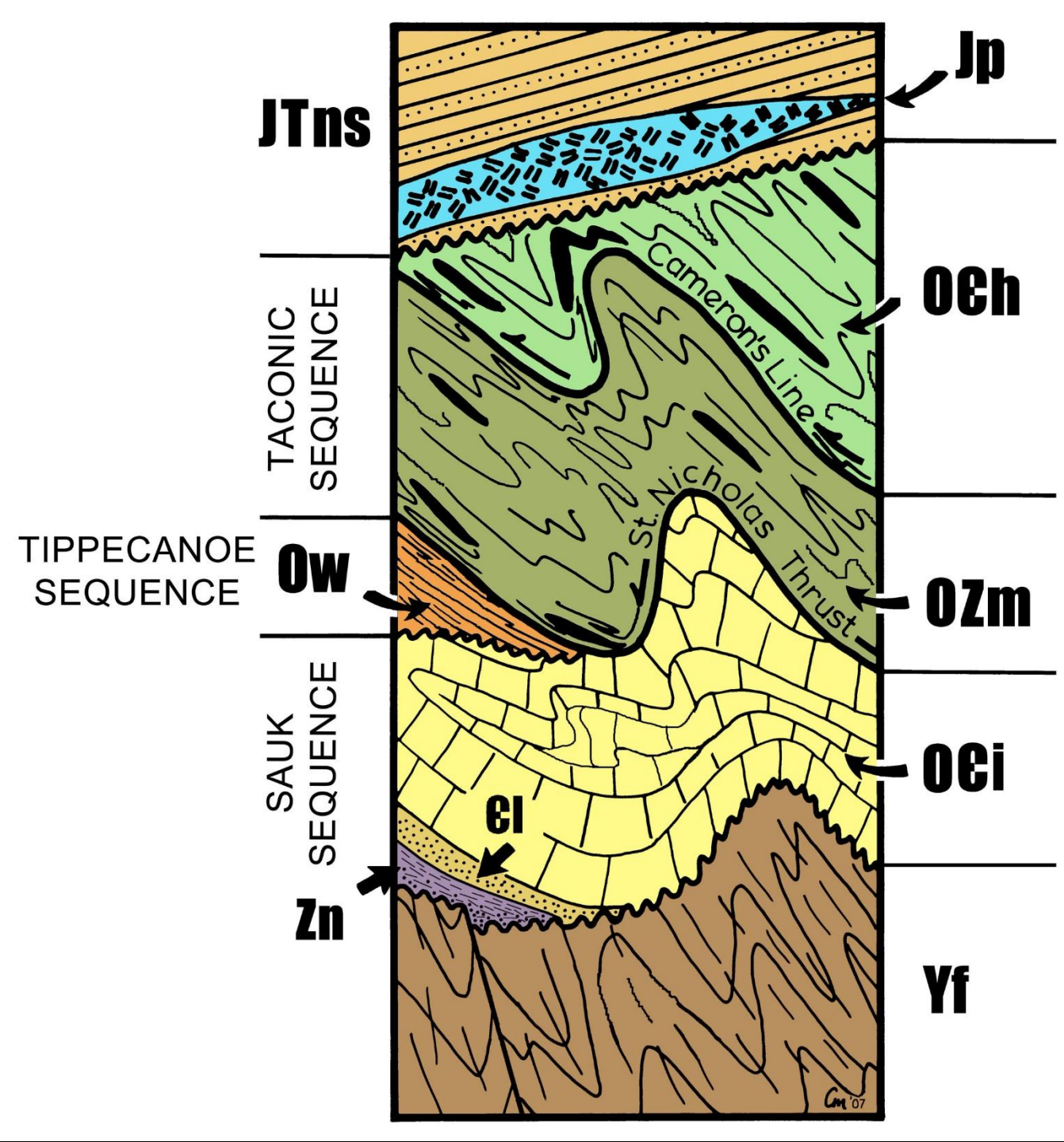


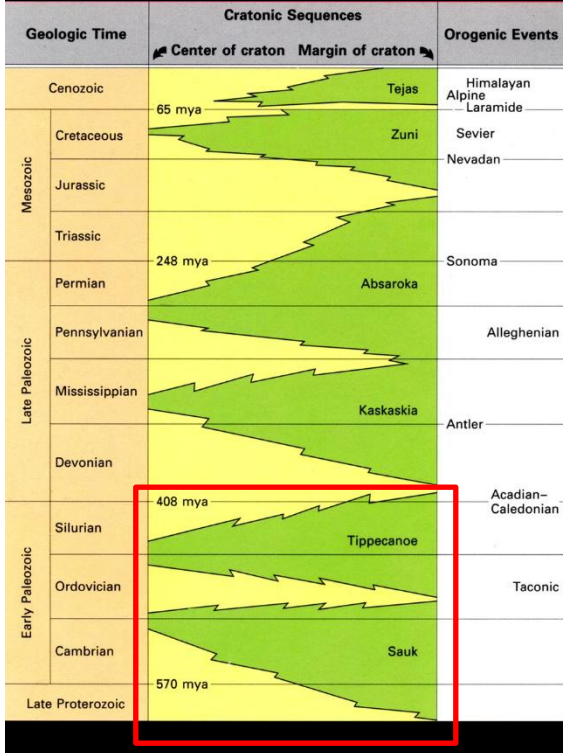
Merguerian and Baskerville 1987











Sloss, 1963

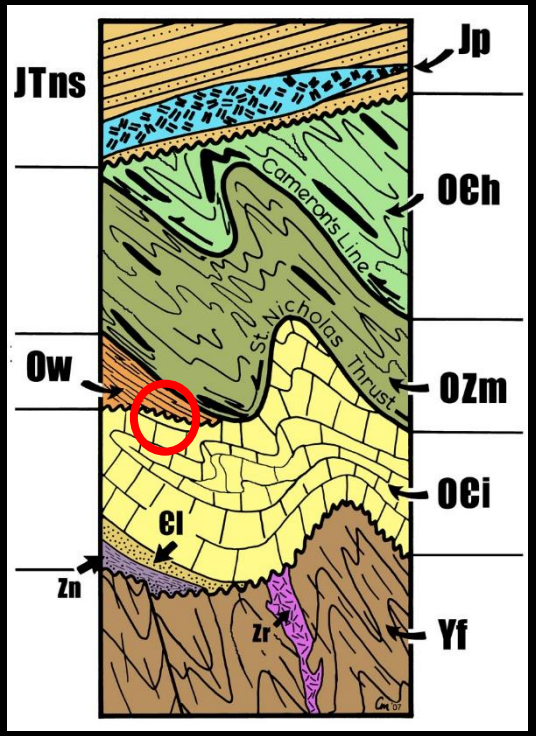
Taconic

Taconic

Tippecanoe

Sauk

Tippecanoe



Inwood Hill, Boro Hall, FDR, Verplanck Pt., Stony Point

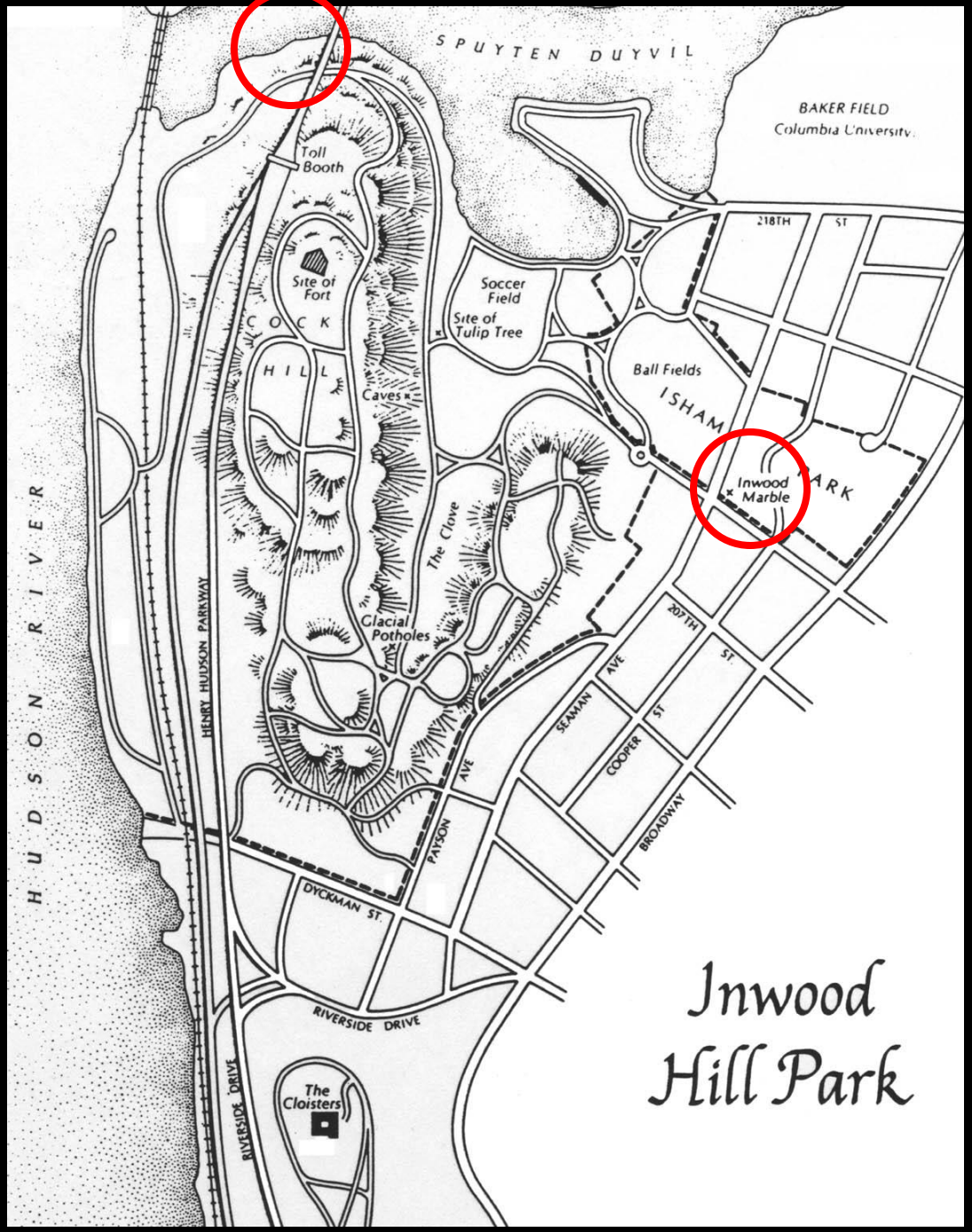
Annsville, Manhattan A, Martinsburg, Normanskill +

454 Ma base VT - Fossils

N293 - I-95 Grand Concourse, Bronx - Walloomsac ("Balmville")

Tippecanoe

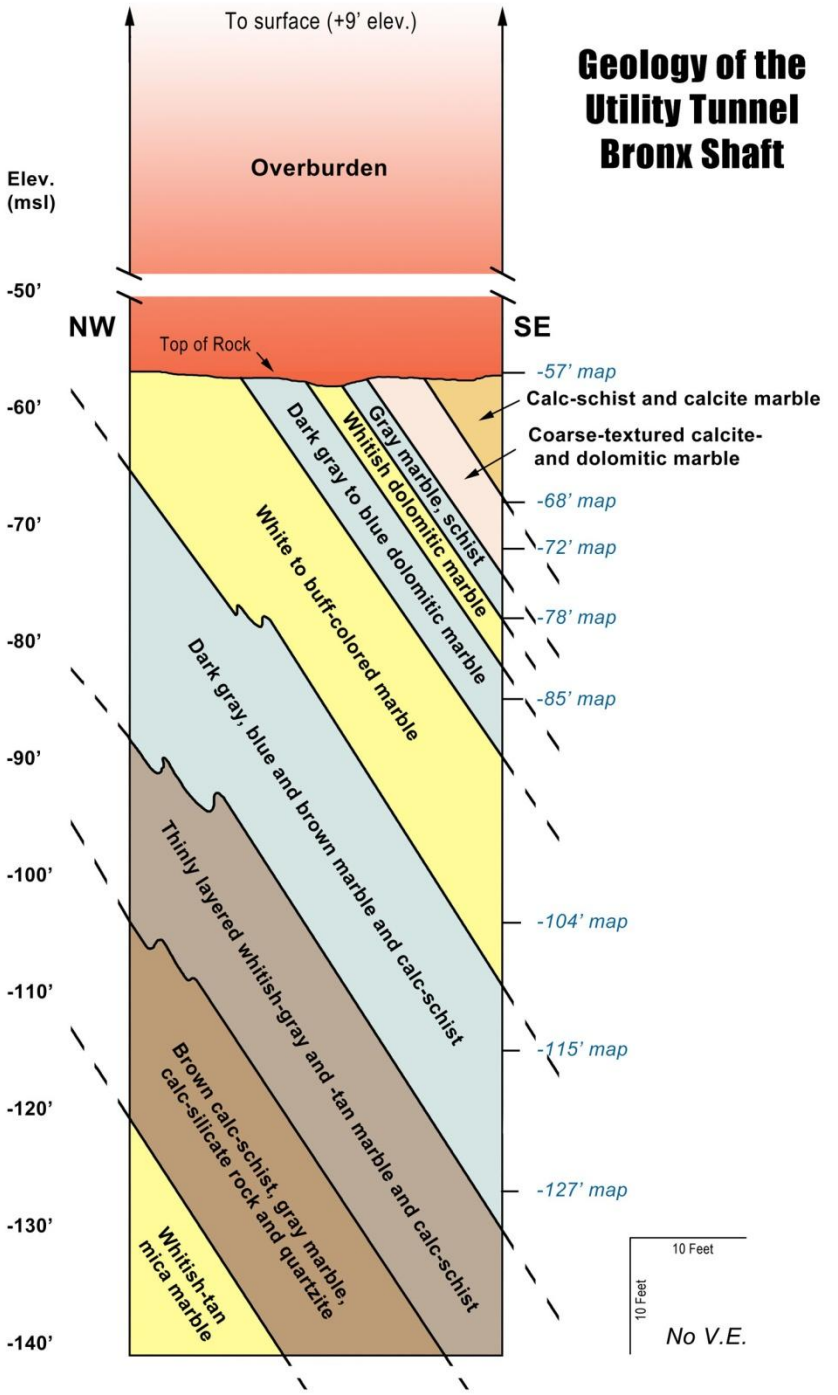
N622 – Warren Street, So. Manhattan (Ow)



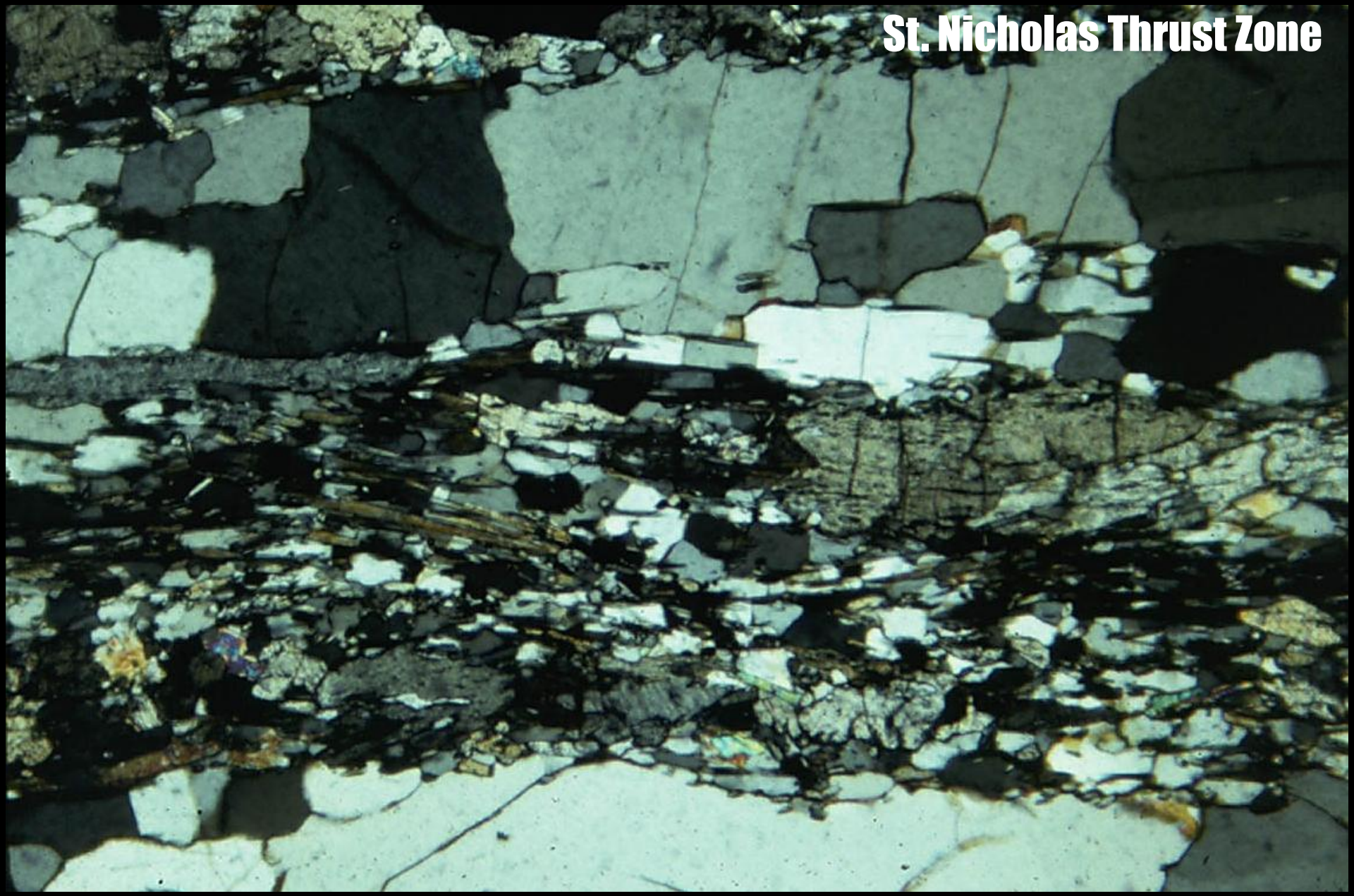
Interlayered with Walloomsac at I-95 Bronx; NW Tip of Manhattan; Morris Garvey Park; Con Ed Cable Tunnel

Sauk

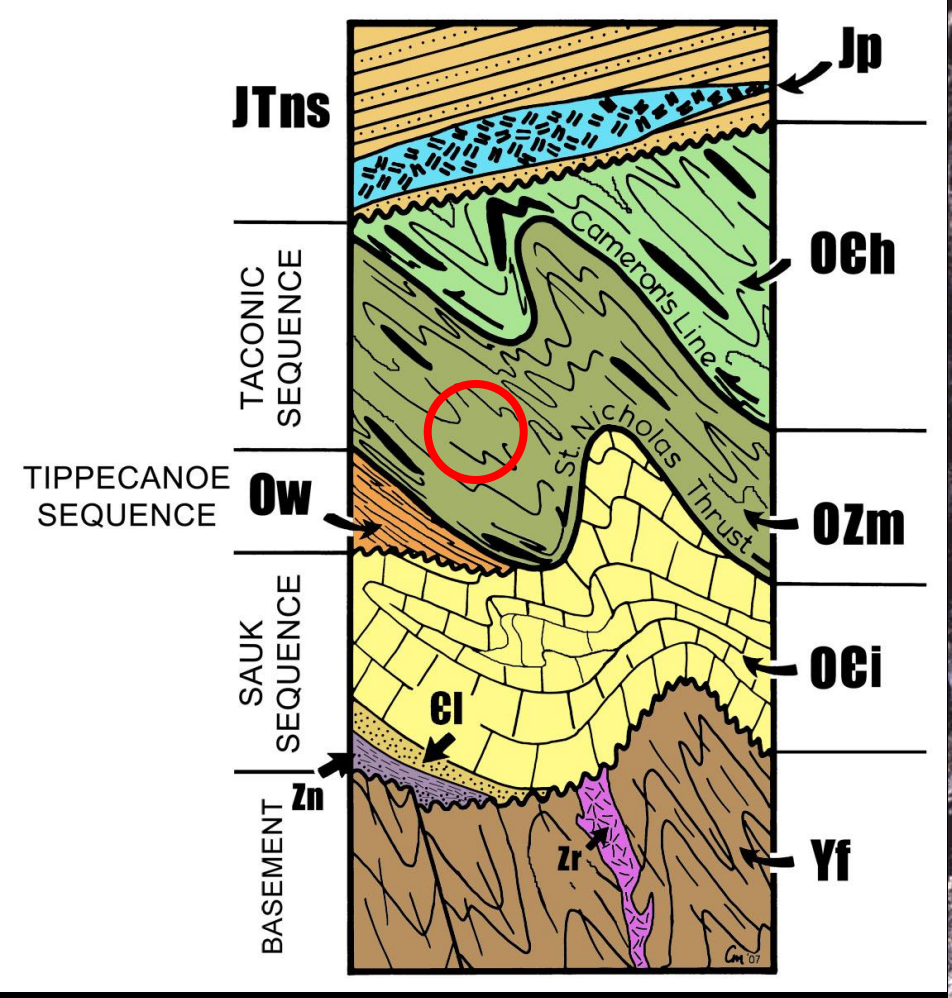
Sub-unit	Thickness (Feet)
1 - Calc-schist and calcite marble	> 6’; top not exposed
2 - Coarse-textured calcite- and dolomitic marble	4.0
3 - Dark gray marble and calc-schist	3.0
4 - White to buff-colored dolomitic marble	2.0
5 - Dark gray to blue dolomitic marble	5.0
6 - White to buff-colored marble	11.0
7 - Dark gray, blue and brown marble, calc-schist	11.0
8 - Thinly layered whitish-gray and -tan marble and calc-schist	10.5
9 - Brown calc-schist, gray marble, calc-silicate rock and quartzite	11.5
10 - Whitish-tan micaceous marble	>11.5’; base not exposed
	Aggregate thickness exposed > 75.5’




Inwood Hill Park, NYC
Utility Tunnel
and Bronx Shaft
(approx.)
Isham
Park
NW
SE
Є-Oh
Ow
Є-Om
Є-Oi
Є-Om
Є-Oi
Є-Oi
Yf
Yf
Inwood Hill Park
Data SIO, NOAA, U.S. Navy, NGA, GEBCO



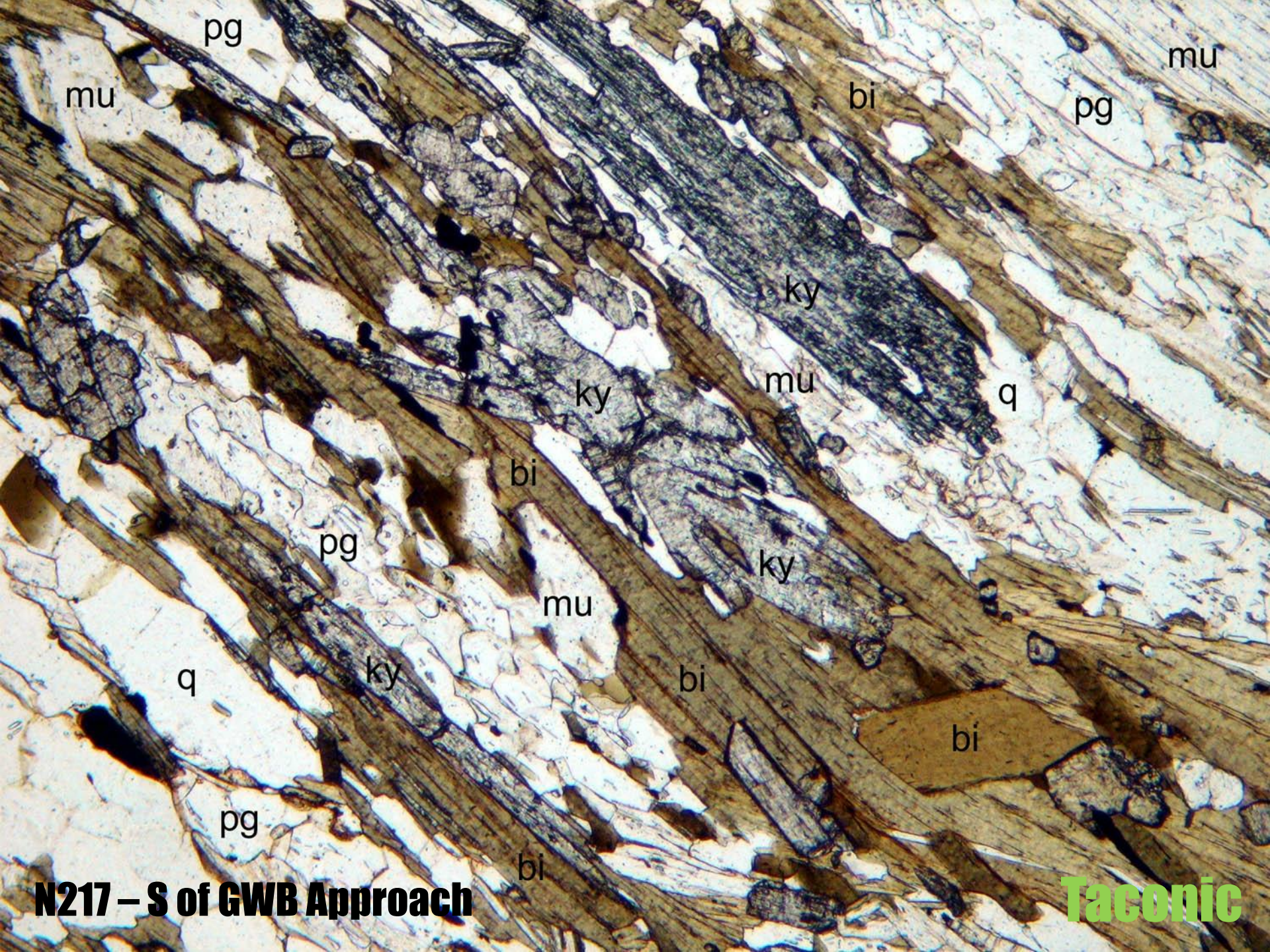
NO67 – Inwood Hill Park - Manhattan Schist - OZm



Manhattan Gneiss, Schist, Granofels, Amphibolite - OZm

F_3 Folds of S_2 ---------→

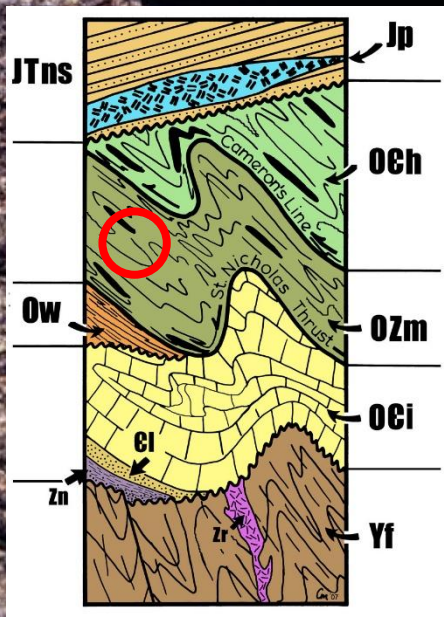
Waramaug, Manhattan C, Hoosac



N217 – S of GWB Approach

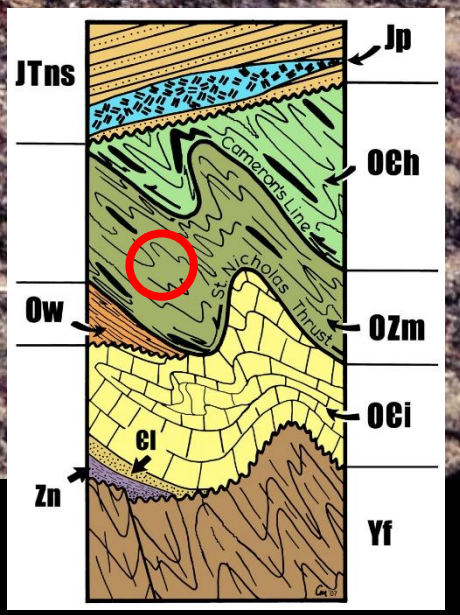
Taconic

Taconic



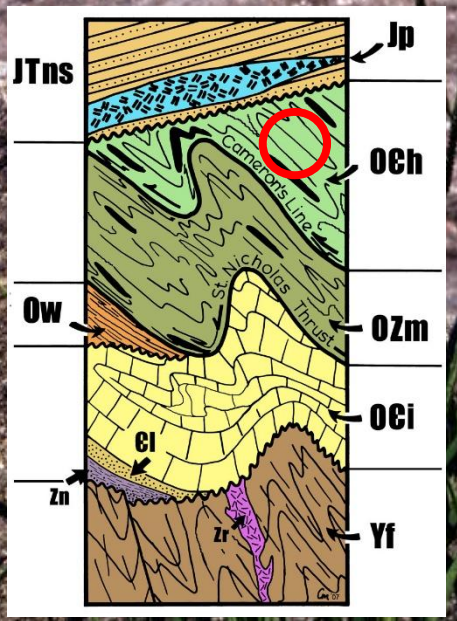
N283 – Morris Garvey Park - Kyanite Nodule - OZm

Taconic

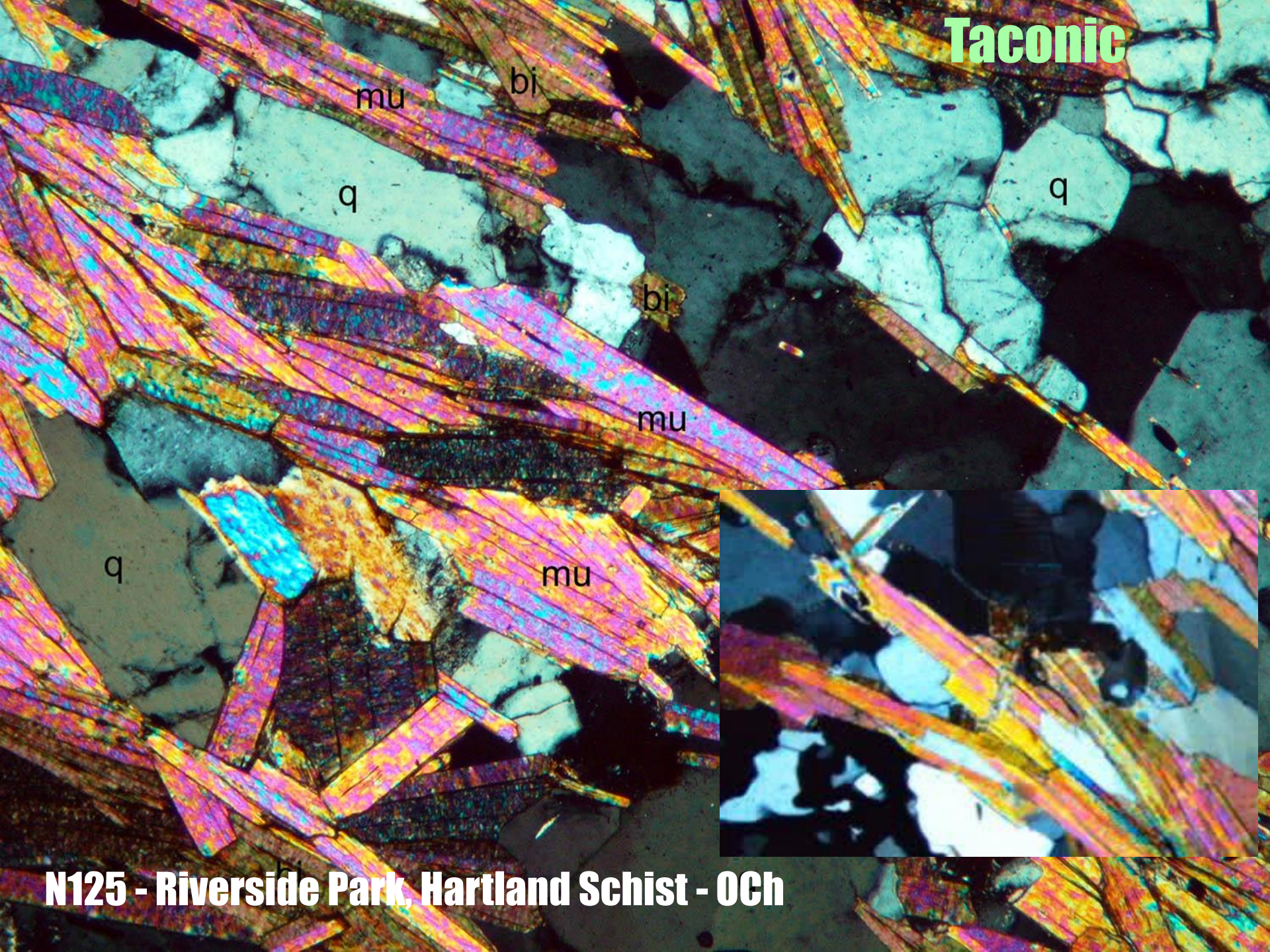


N284 – Morris Garvey Park – Ky+Sill+Gt Augen - OZm

Taconic

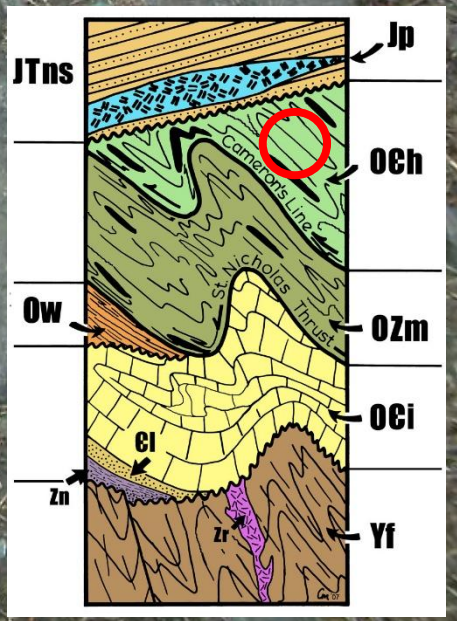


N114 - Riverside Park, Hartland Schist - OCh



N125 - Riverside Park, Hartland Schist - OCh

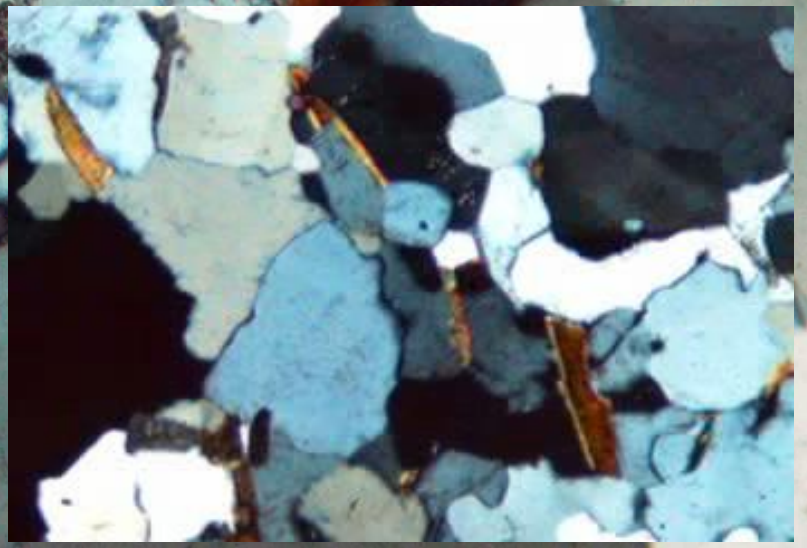
Taconic



SW Central Park, Hartland Granofels - OCh

N624 – Warren Street - OCh

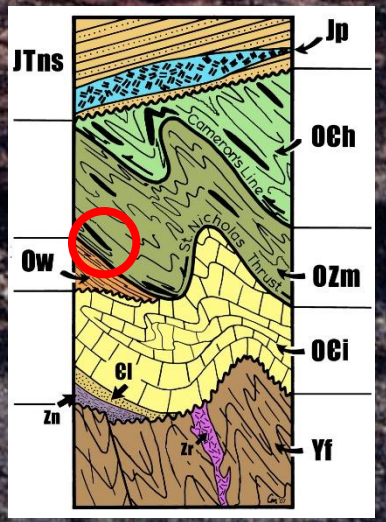
Taconic



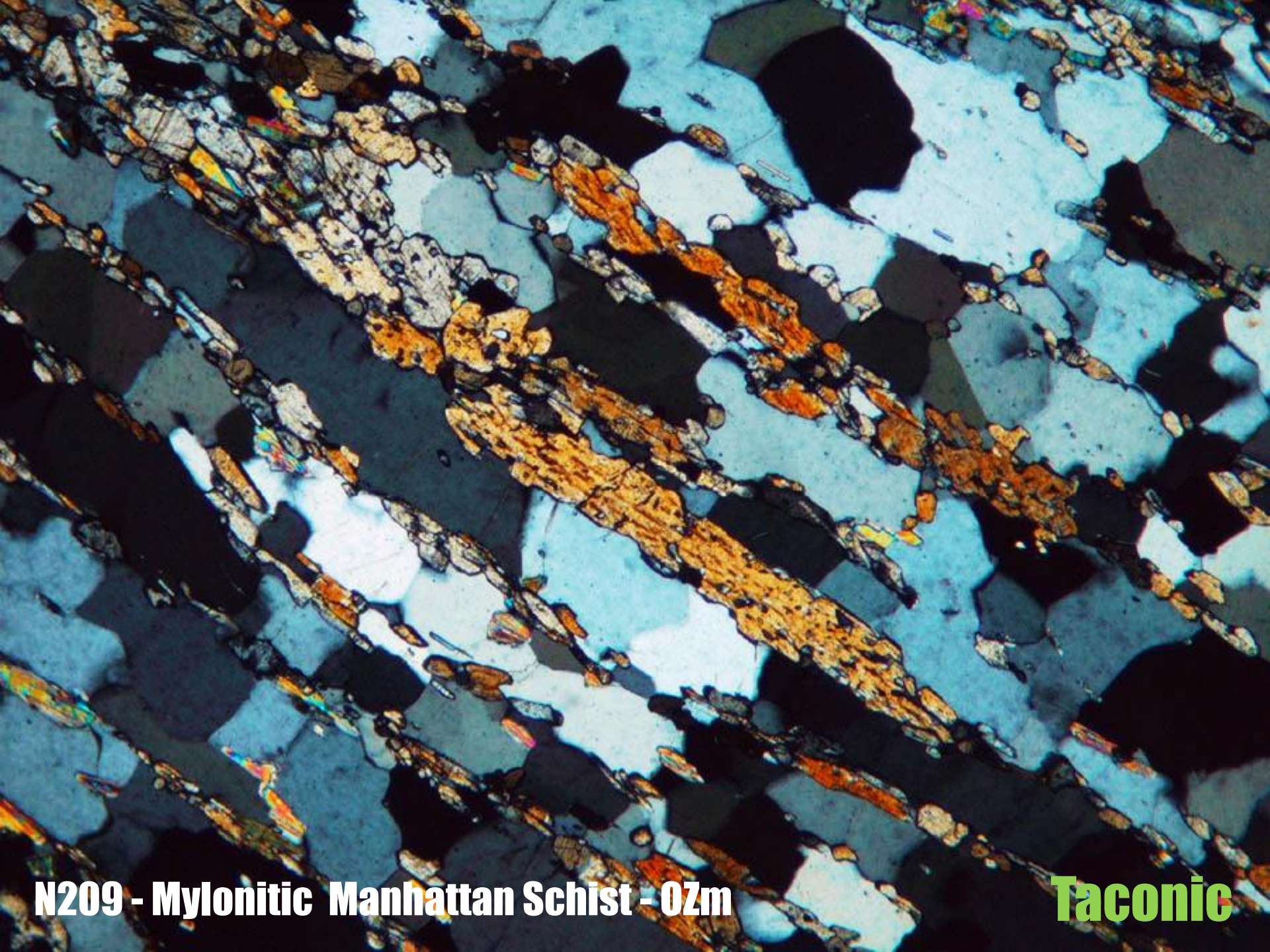

Taconic
N567 - Central Park - Hartland
Amphibolite - OCha

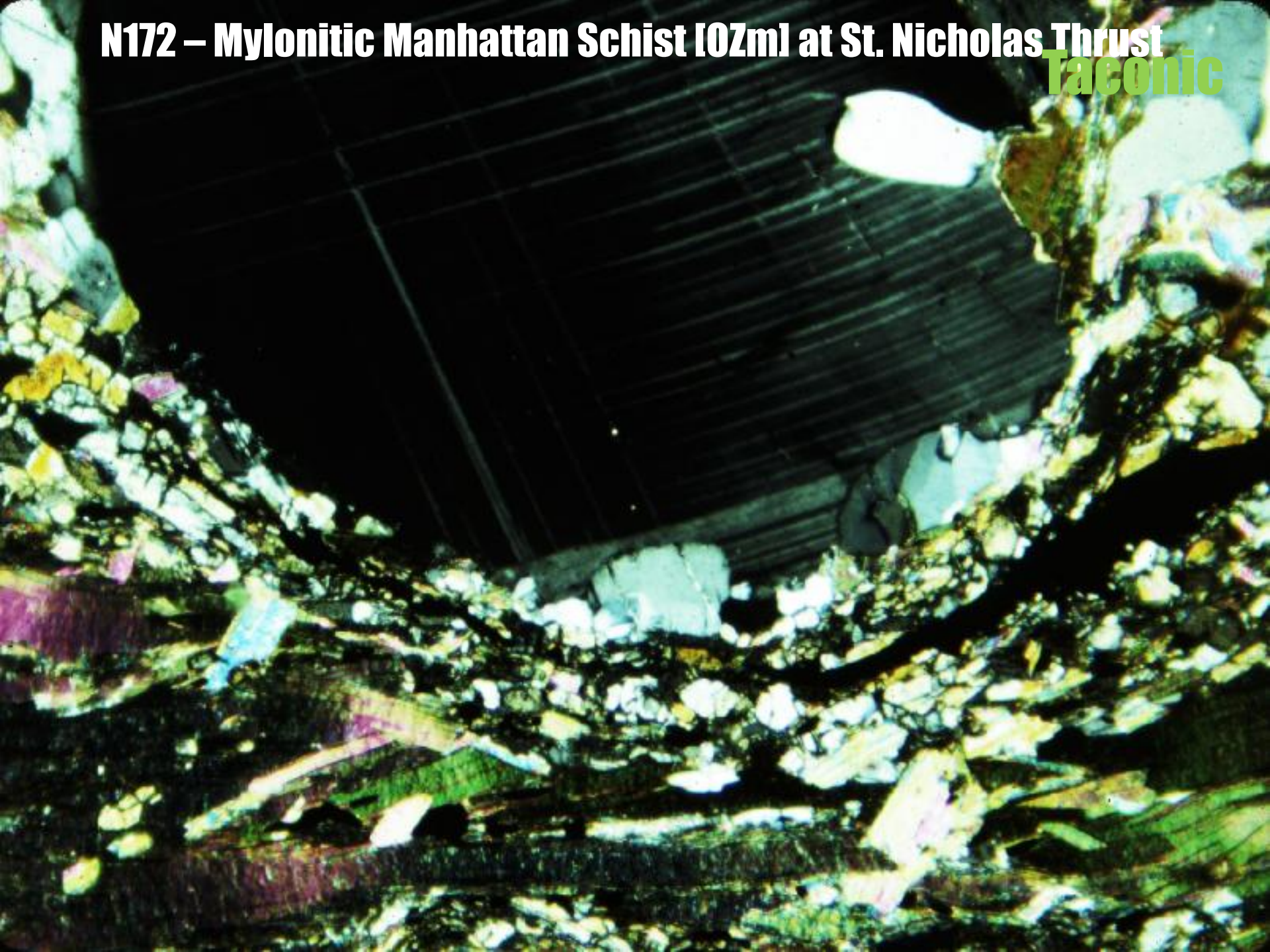
CL and SNT Structural Features

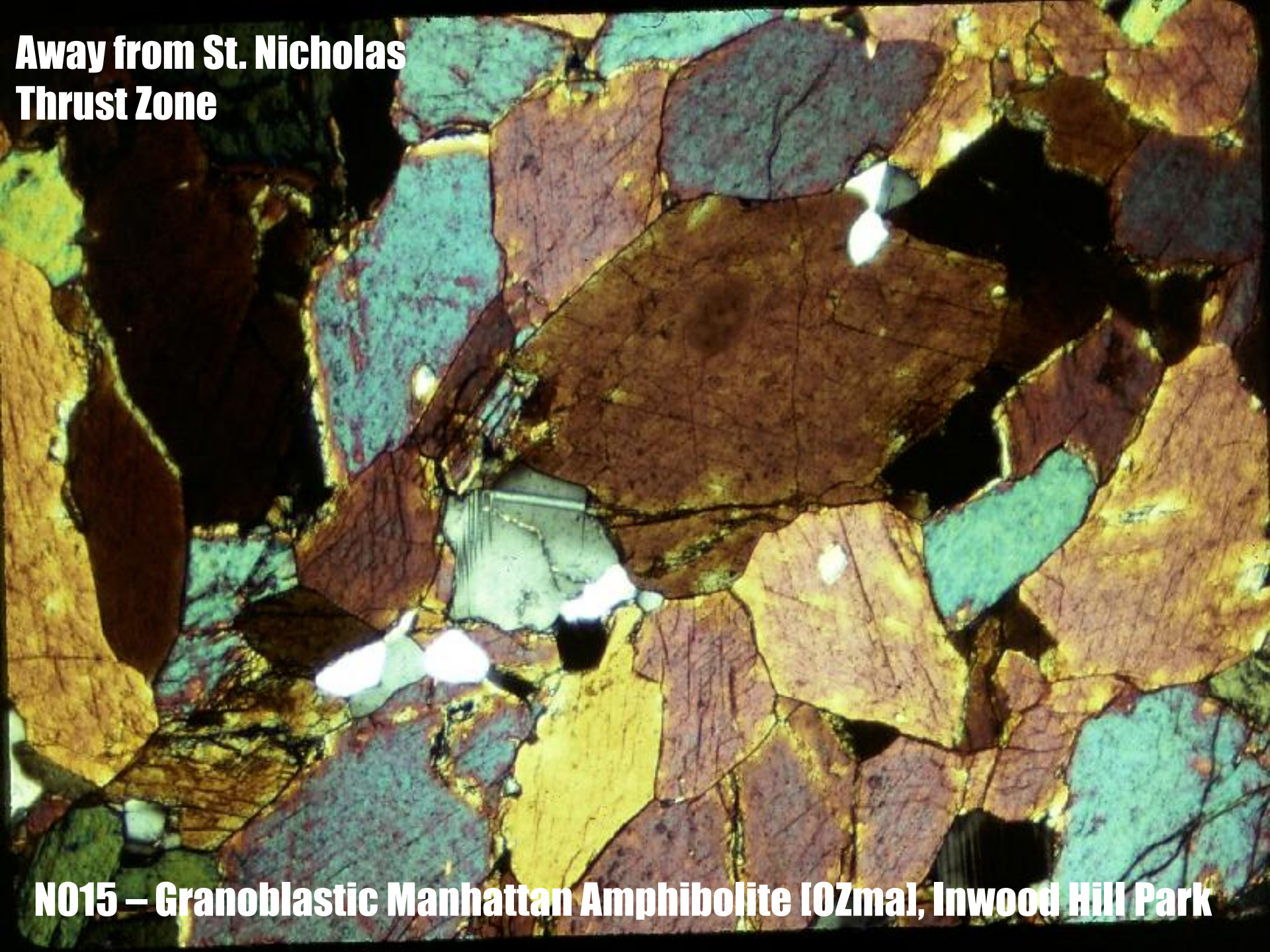
Taconic

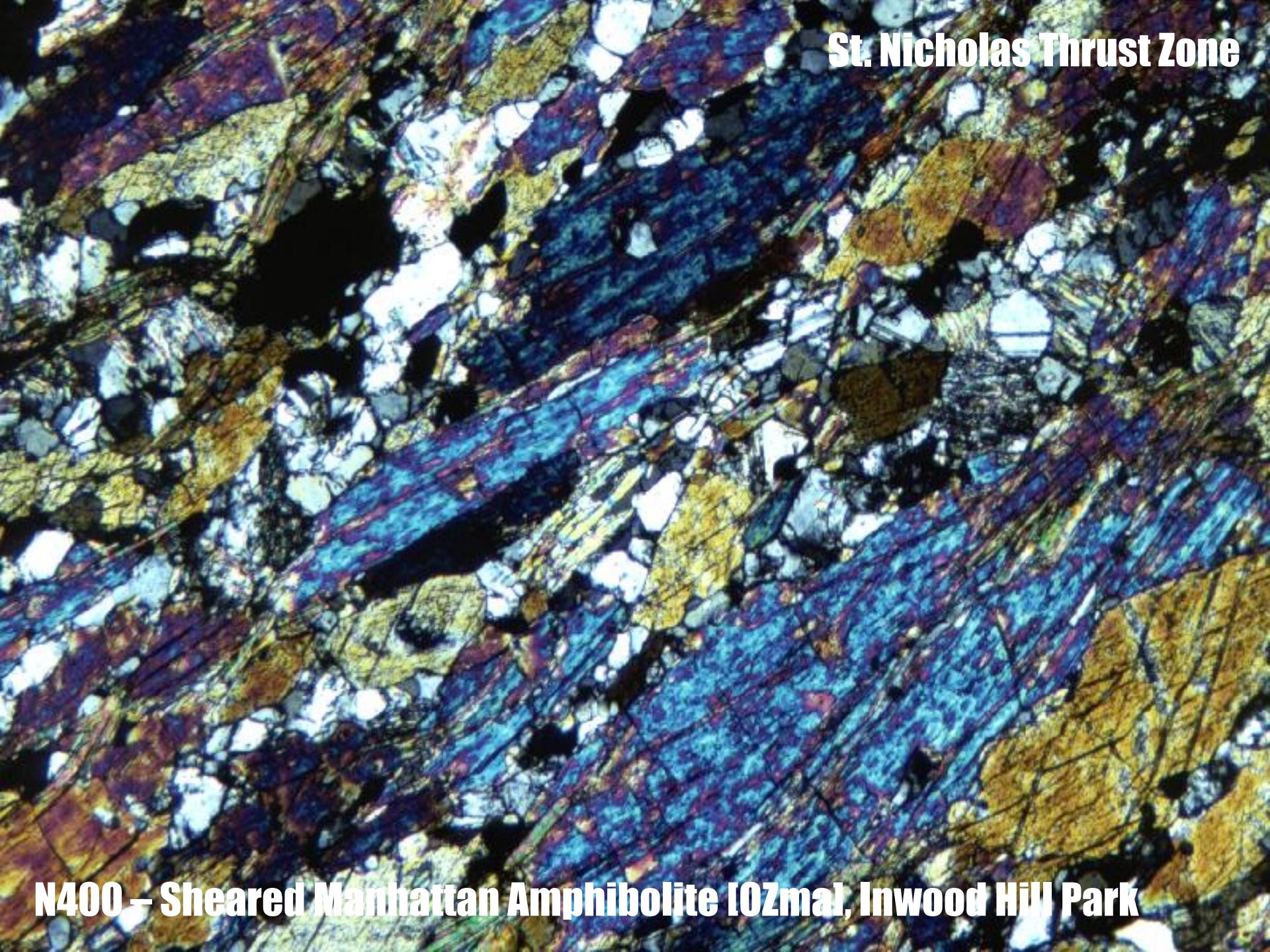


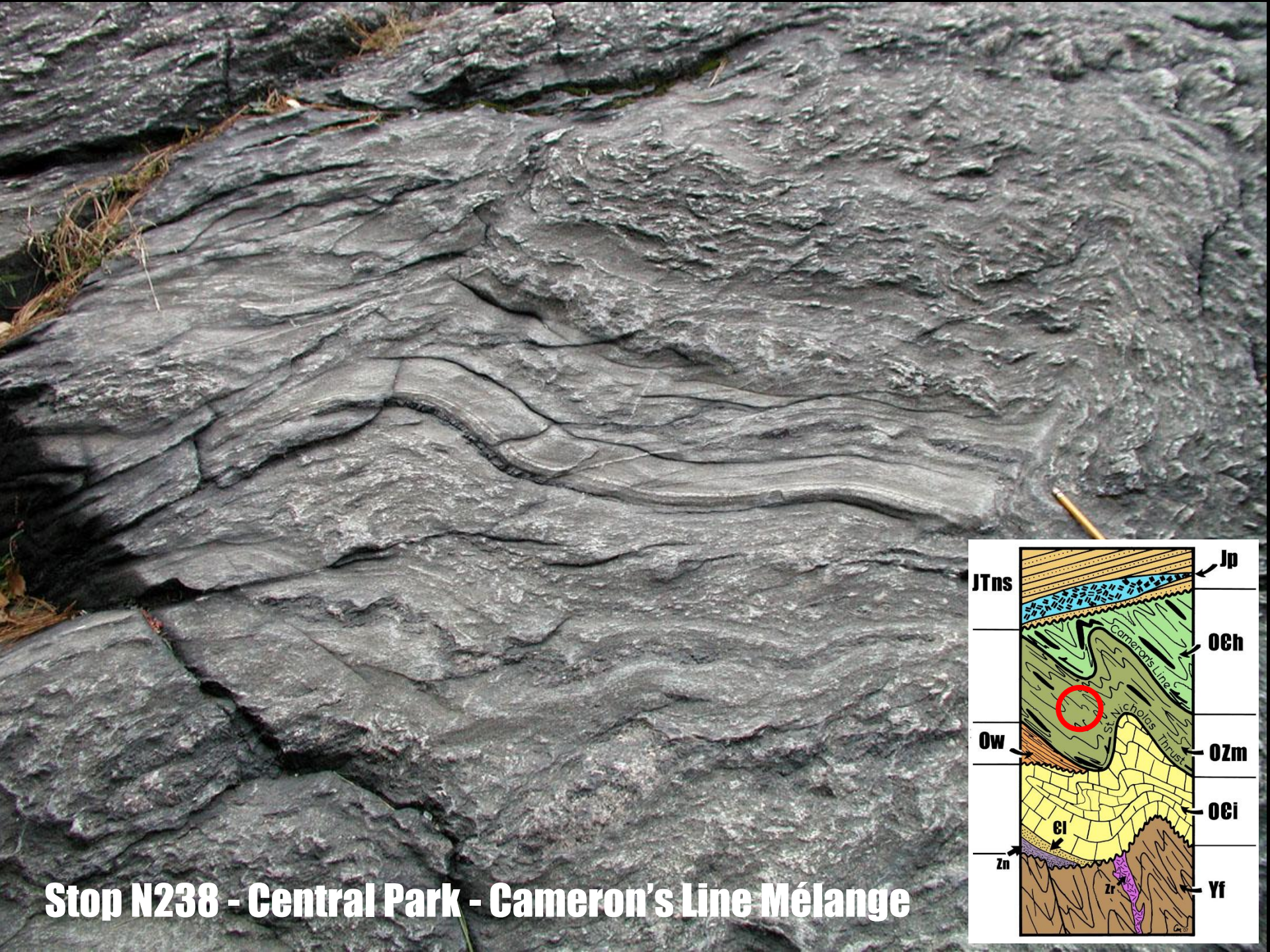
N177 - St. Nicholas Park - Sheared Manhattan Schist - OZm


N209 - Mylonitic Manhattan Schist - OZm
Taconic


N172 – Mylonitic Manhattan Schist [OZm] at St. Nicholas Thrust
Taconic


Away from St. Nicholas
Thrust Zone
N015 – Granoblastic Manhattan Amphibolite [OZma], Inwood Hill Park


St. Nicholas Thrust Zone
N400 – Sheared Manhattan Amphibolite [OZma], Inwood Hill Park


Stop N238 - Central Park - Cameron's Line Mélange
JTns
Jp
OCh
Cameron's Line
St. Nicholas Thrust
Ow
OZm
OCi
Cl
Zn
Zr
Yf

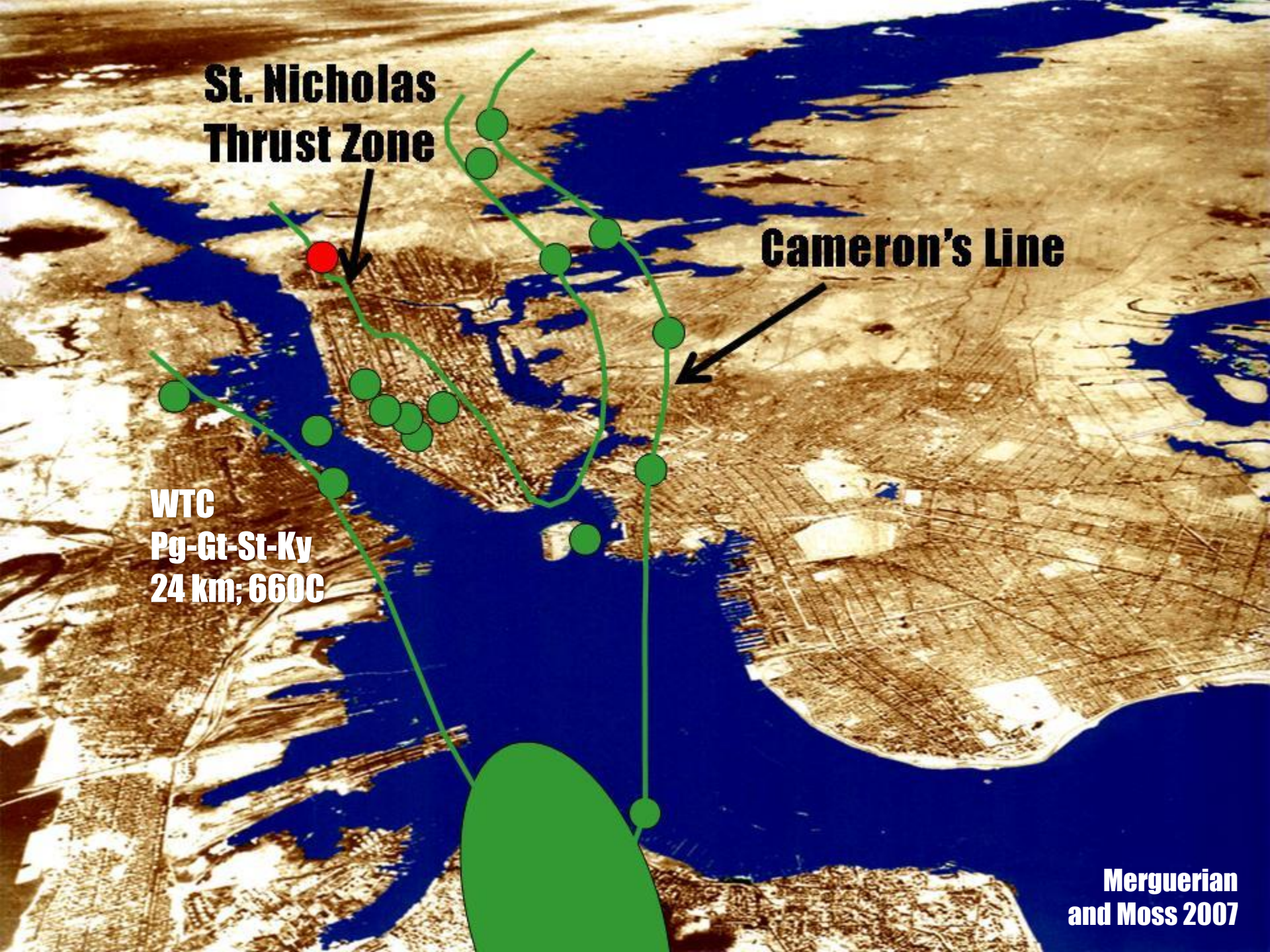
First Look – SW Corner 43rd Street 6th Avenue – Durst Bldg. Excavation

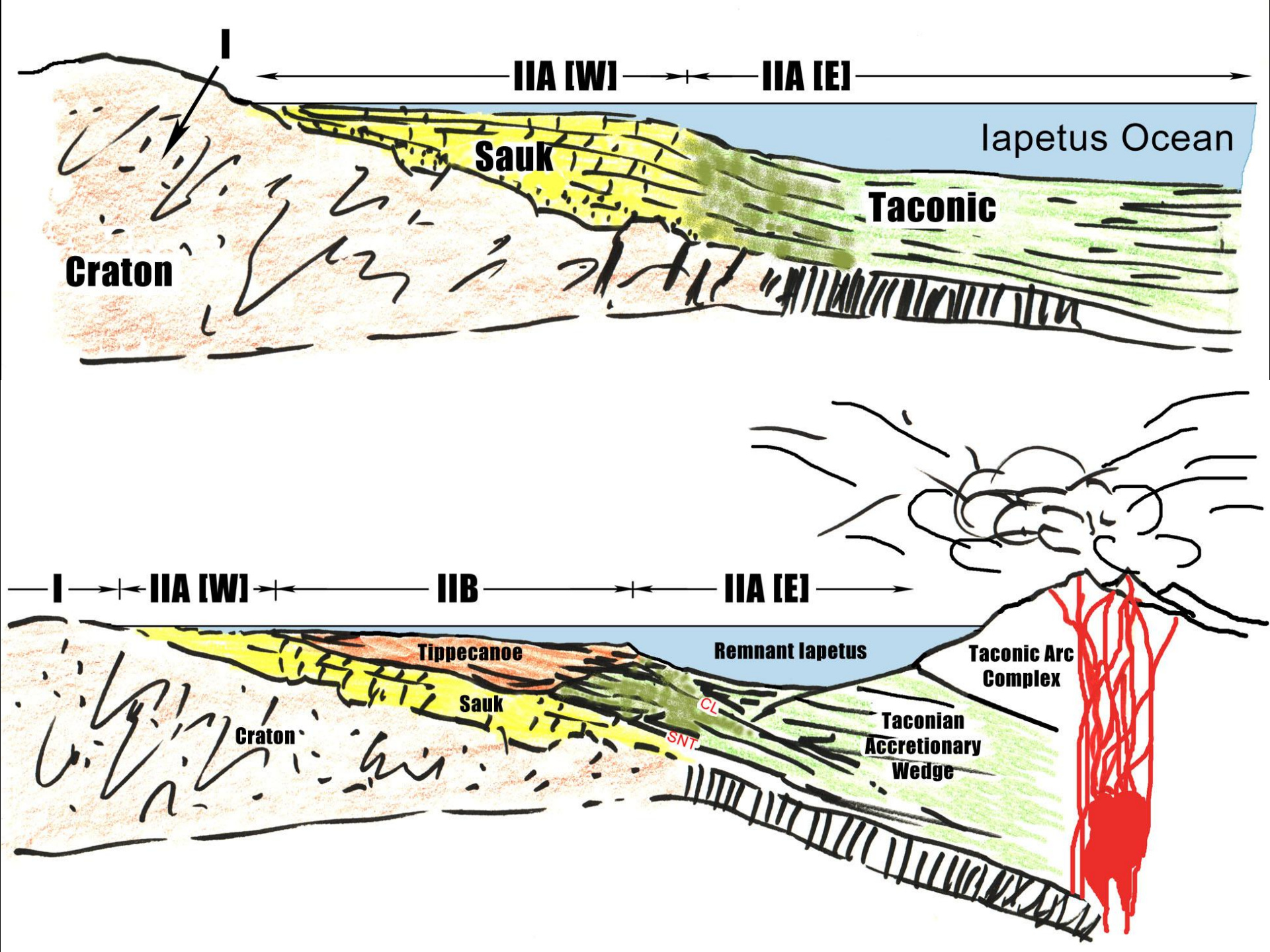

Serpentinite with Talc-Chlorite-Biotite Shear Envelope

Sheared Western Margin

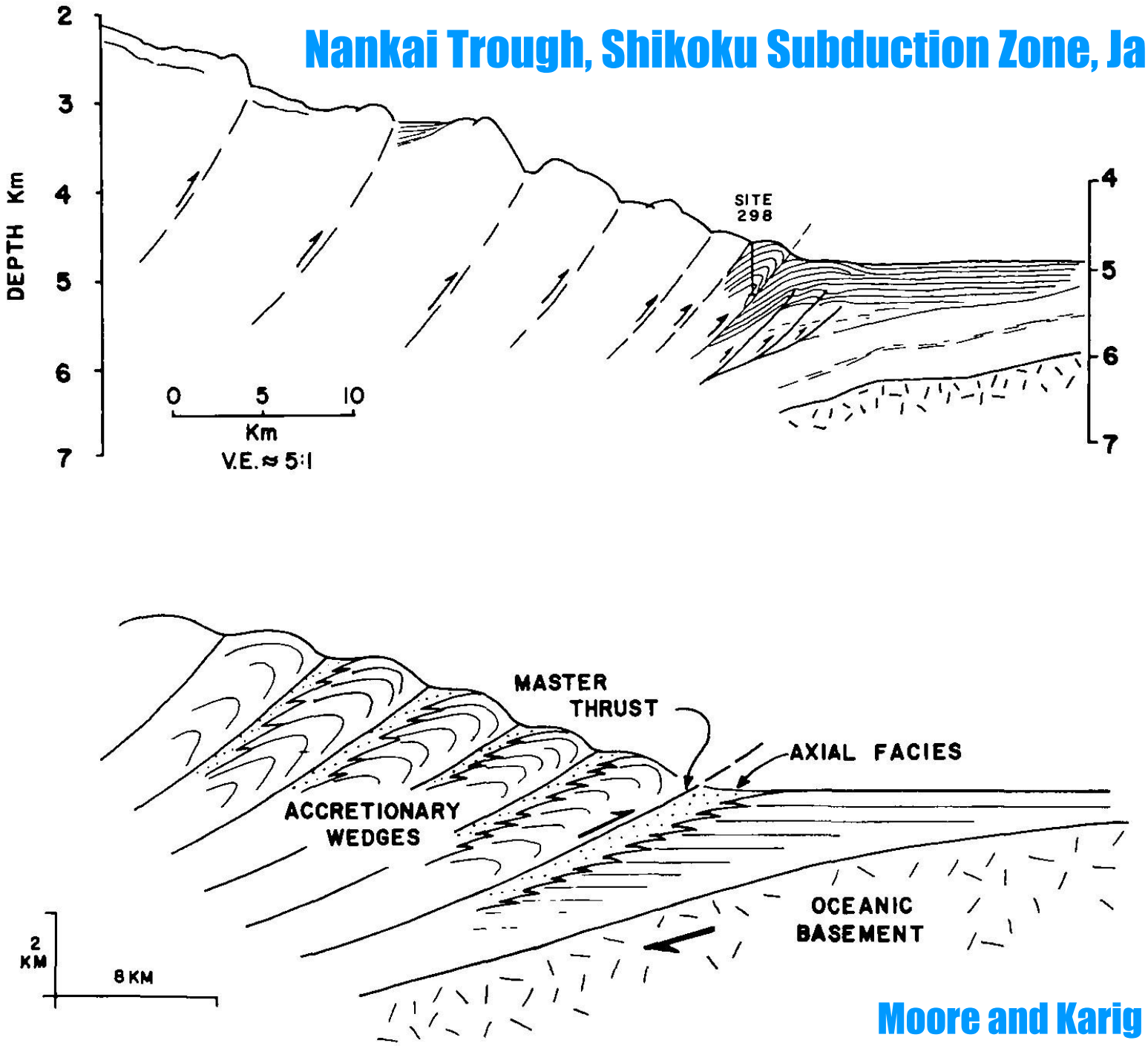
Merguerian and Moss 2005


Cigar-Shaped Mass with Steep Plunge Southward
Base Not Exposed
>10 m Long Dimension
70º
Merguerian and Moss 2005


St. Nicholas
Thrust Zone
Cameron's Line
WTC
Pg-Gt-St-Ky
24 km; 660C
Merguerian
and Moss 2007

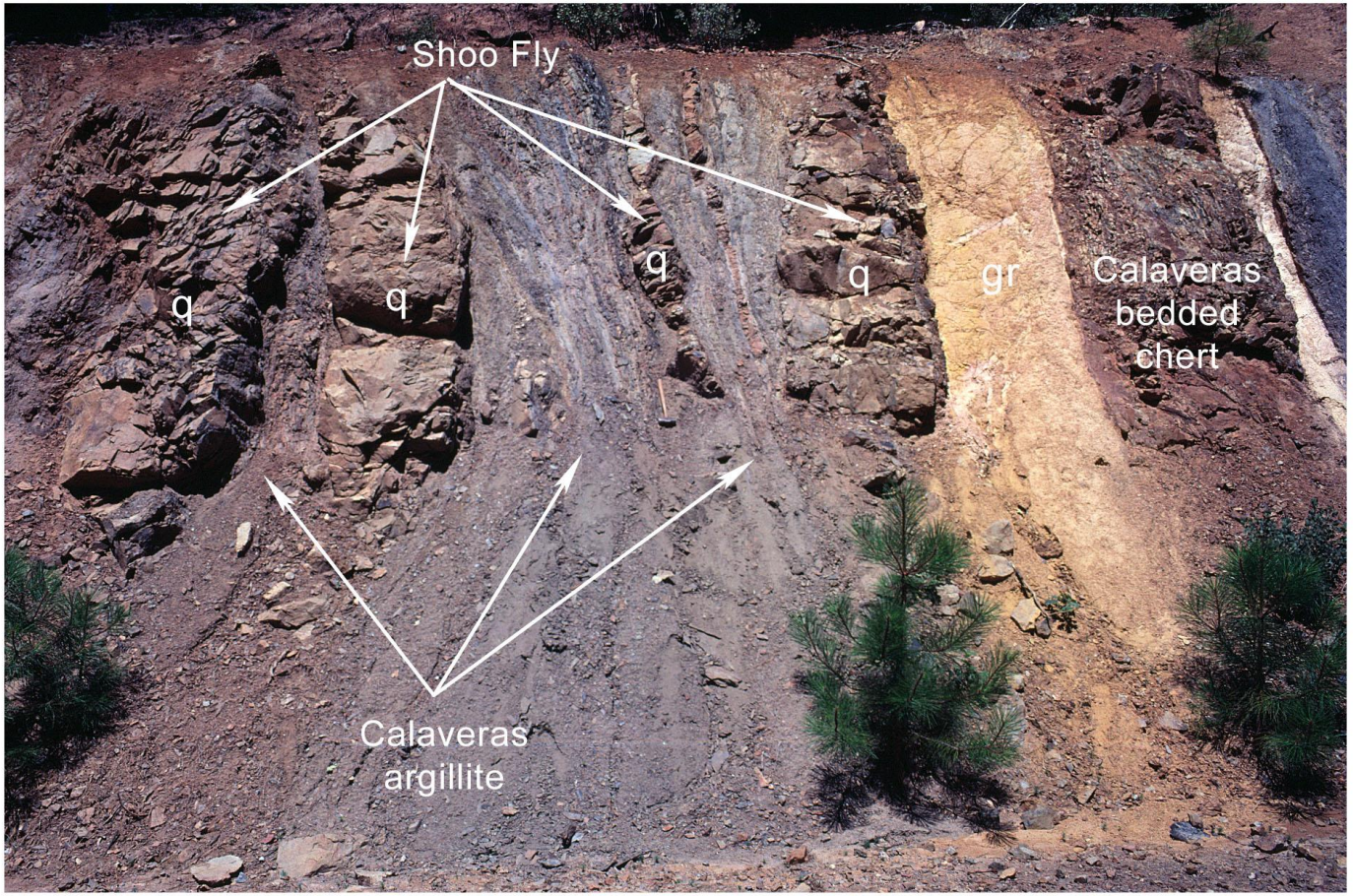

I
IIA [W]
IIA [E]
Iapetus Ocean
Sauk
Taconic
Craton
I
IIA [W]
IIB
IIA [E]
Tippecanoe
Remnant Iapetus
Taconic Arc
Complex
Sauk
CL
Taconian
Accretionary
Wedge
Craton
SNT

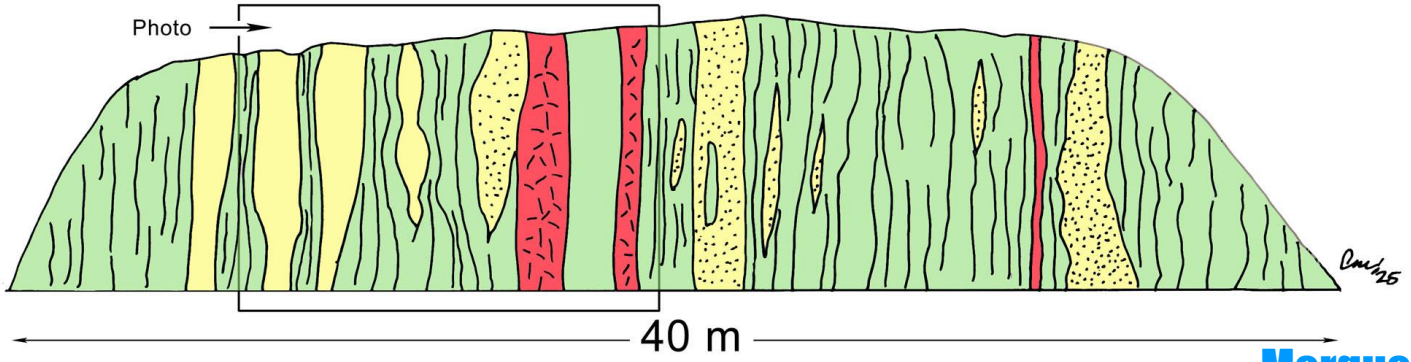
Nankai Trough, Shikoku Subduction Zone, Japan



Moore and Karig 1976

Calaveras-Shoo Fly thrust, Sierra Nevada foothills metamorphic belt





Merguerian 1985a


DUKE
OK, That's It!
I've Heard Enough!
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