"Trilobites", "Tourmaline" & "Pollution":

A Geospatial Index of NY State Geology for Google Earth, iPhones, iPads, etc.

How and why I constructed this database.

Otto H. Muller

Bergren Forum

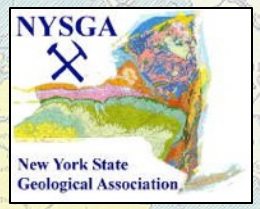
April 22, 2016

What are NYSGA field trips and guidebooks?

What were the initial goals of this project?

How did the project evolve?

What can we do with a Geospatial Index of NY Geology?



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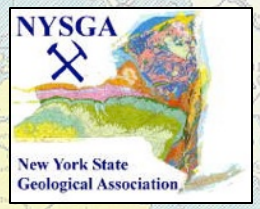
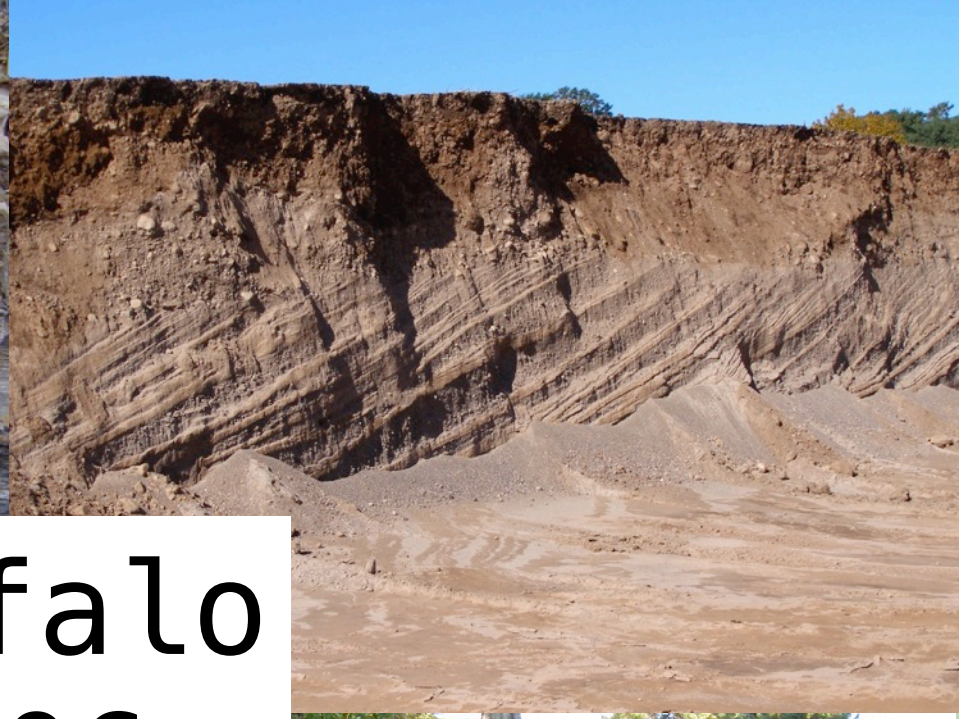


56 years of evolving thoughts
...about the same rocks

NYSGA
New York State Geological Association


Potsdam
Plattsburgh
Adirondacks
Clinton
Buffalo
Cortland
Oneonta
New Paltz

Potsdam 2004



Buffalo 2006

Cortland 2007

Adirondacks 2008

New Paltz 2009

Clinton 2012

Plattsburgh 2015

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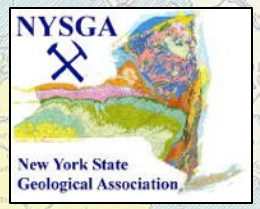


The Process

Scan Roadlogs from Guidebook or obtain PDF

Do Optical Character Recognition (OCR)

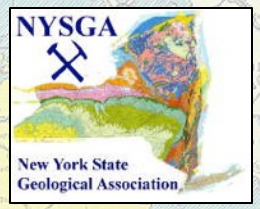
Plot route on Google Earth

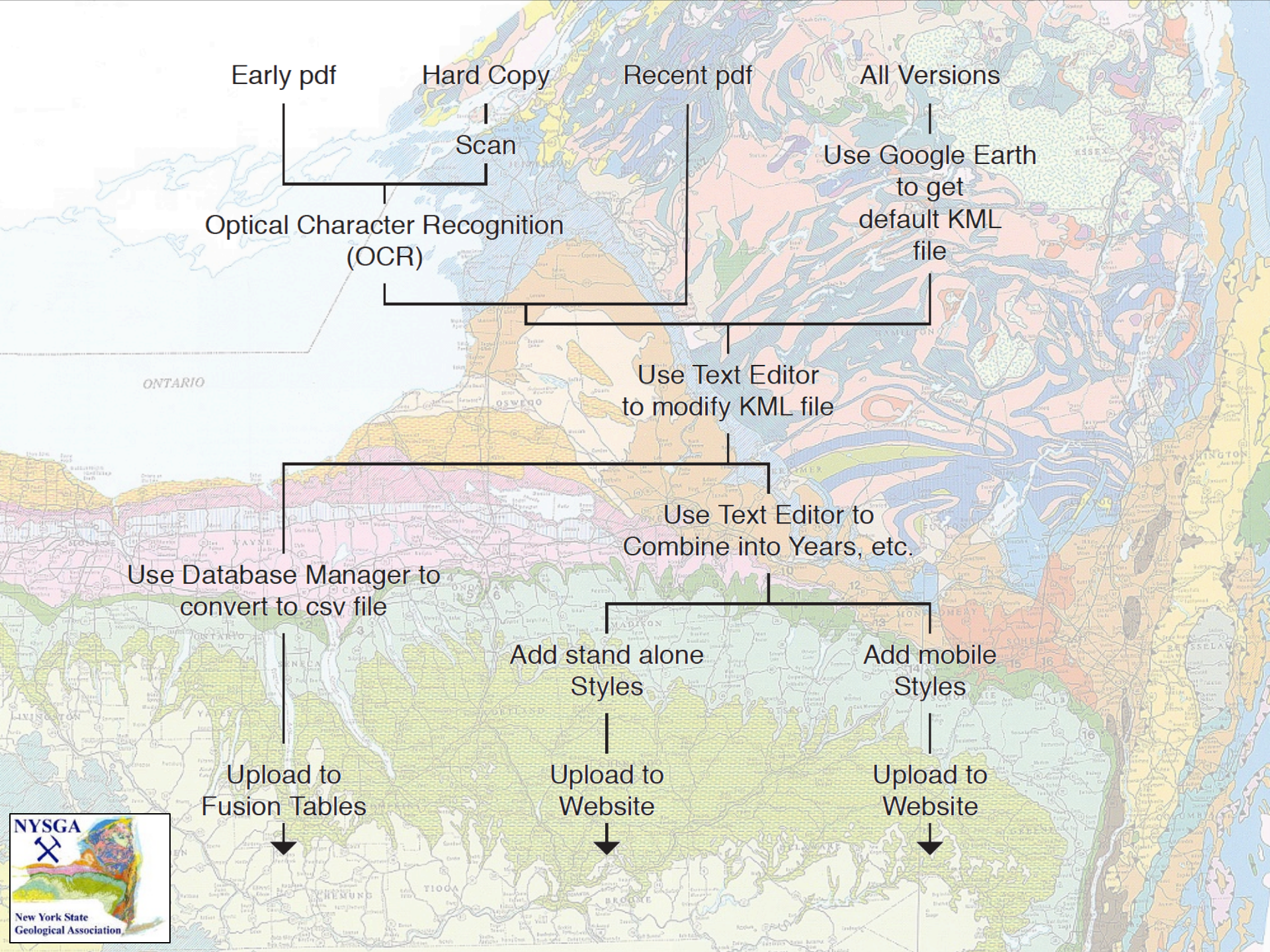
Put Placemarks on route with results from OCR

Adjust content, styles, etc., of kml file

Clean up in Filemaker

Upload kml file to Web and to Fusion Tables

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Use Text Editor to modify KML file
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Use Database Manager to convert to csv file
Add stand alone Styles
Add mobile Styles
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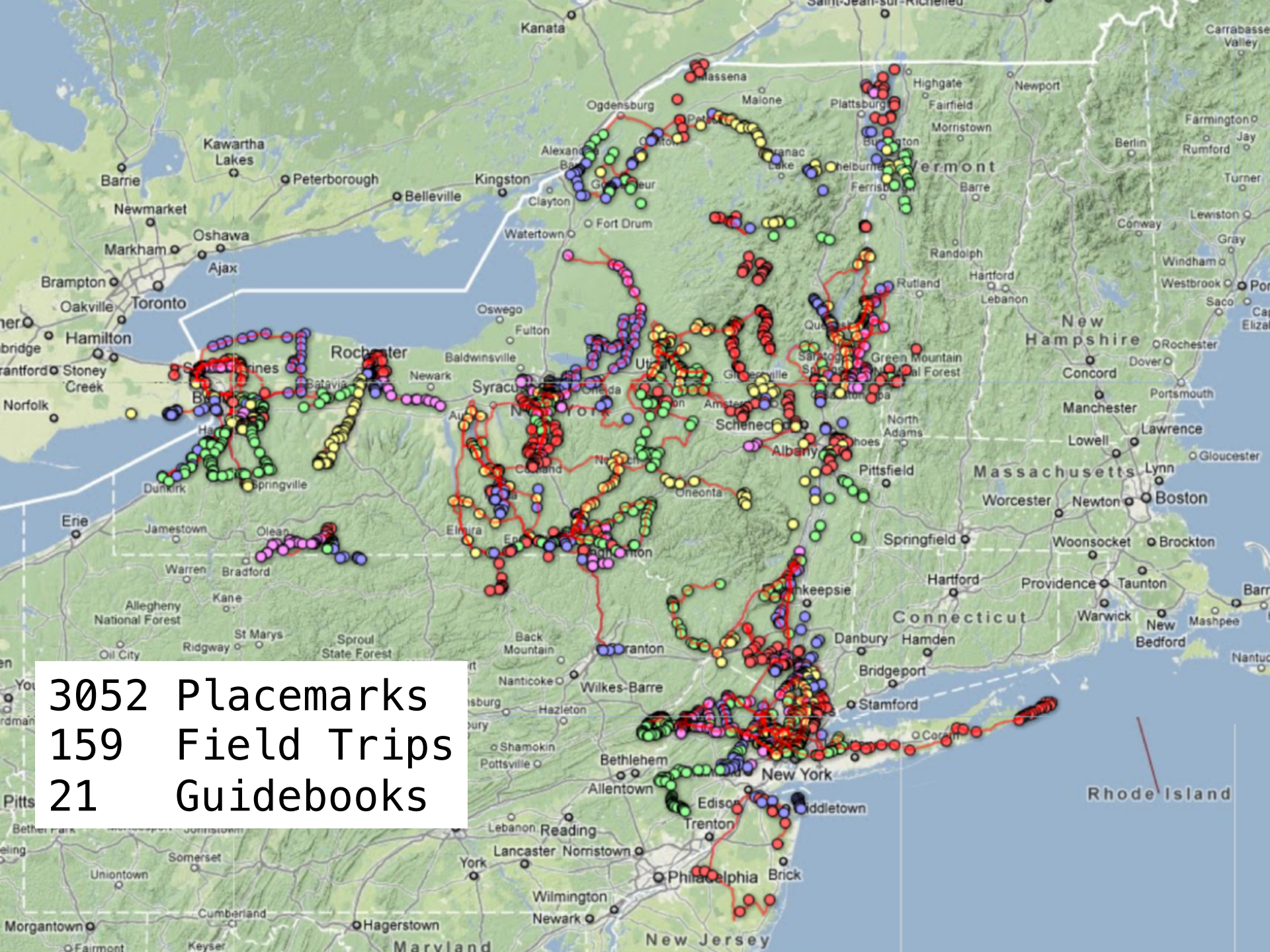
Upload to Website
ONTARIO
NYSGA
New York State Geological Association

Year	Host Institution	Location	Pages	Price	Year	Host Institution	Location	Pages	Price
1956	University of Rochester	Rochester	121	Free pdf	1984	Hamilton College	Clinton	352	$30.00
1957	NY State Museum	Wellsville	66	Free pdf	1985	Skidmore College	Saratoga Springs	268	$25.00
1958	City College of CUNY	Peekskill	51	Free pdf	1986	Cornell University	Ithaca	279	$30.00
1959	Cornell University	Ithaca	136	Free pdf	1987	SUNY New Paltz	Kingston	350	$30.00
1960	Hamilton College	Clinton	61	Free pdf	1988	SUNY Plattsburgh	Plattsburgh	278	$30.00
1961	R.P.I.	Troy	96	Free pdf	1989	OCCC	Middletown	302	$30.00
1962	Brooklyn College	Port Jervis	90	Free pdf	1990	SUNY Fredonia	Fredonia	437	$30.00
1963	SUNY Binghamton	Binghamton	116	Free pdf	1991	SUNY Oneonta	Oneonta	488	$30.00
1964	Syracuse University	Syracuse	126	Free pdf	1992	Colgate (2 Volumes)	Hamilton	258	$30.00
1965	Union College	Schenectady	111	Free pdf			Saranac Lake	75	
1966	SUNY Buffalo	Niagara Falls	116	Free pdf	1993	St Lawrence Univ.	Canton	271	$30.00
1967	SUNY New Paltz	Newburgh	128	Free pdf	1994	U. of Rochester	Rochester	590	$30.00
1968	Queens Coll. CUNY	Flushing	260	Free pdf	1995	Union College	Schenectady	425	$30.00
1969	SUNY Plattsburgh	Plattsburgh	183	Free pdf	1996	Coll. of Staten Island CUNY	Staten Island	178	$25.00
1970	SUNY Cortland	Cortland	139	$25.00	1997	Hamilton College	Clinton	264	$25.00
1971	SUNY Potsdam	Potsdam	150	$25.00	1998	SUNY Binghamton	Binghamton	135	$25.00
1972	Colgate; Utica College	Utica	222	$25.00	1999	SUNY Fredonia	Fredonia	412	$30.00
1973	SUNY Brockport	Rochester	177	$25.00	2000	Hobart & William Smith Colleges	Geneva	178	$25.00
1974	SUNY Fredonia	Fredonia	187	$25.00	2001	LDEO/ Columbia University	Lower Hudson Valley	204	$25.00
1975	Hofstra University	Hempstead	327	$30.00	2002	Colgate University	Lake George	375	$30.00
1976	Vassar College	Poughkeepsie	297	$30.00	2003	SUNY-Oneonta + Hartwick College	Oneonta	292	$30.00
1977	SUNY Oneonta	Oneonta	455	$30.00	2004	SUNY-Potsdam	Potsdam	283	$30.00
1978	Syracuse University	Syracuse	385	$30.00	2005	SUNY-Oswego	Oswego	125	$30.00
1979	RPI	Troy	457	$30.00	2006	SUNY- University at Buffalo	Buffalo	478	$30.00
1980	Rutgers at Newark	Newark, NJ	400	$30.00	2007	SUNY-Cortland	Cortland	187	$30.00
1981	SUNY Binghamton	Binghamton	282	$30.00	2008	Colgate University	Lake George	154	$30.00
1982	SUNY at Buffalo	Amherst	385	$30.00	2009	SUNY New Paltz	New Paltz, NY	254	$60.00
1983	SUNY Potsdam	Potsdam	103	$20.00	2010	College of Staten Island/CUNY	Staten Island, NY	190	$60.00

NYSGA

New York State Geological Association

To order guidebooks, visit:
http://www.nysga.net/Guidebooks.html

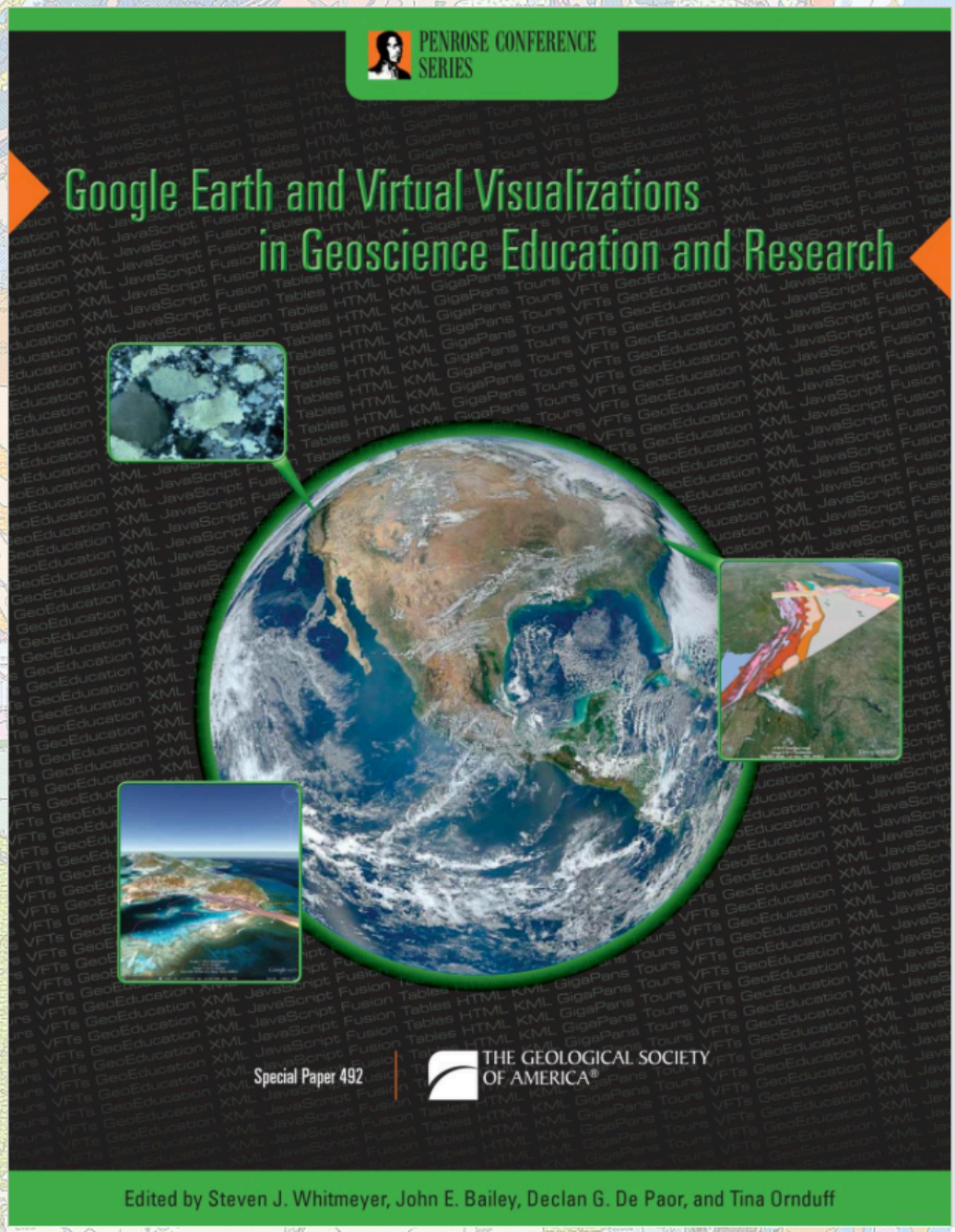

3052 Placemarks
159 Field Trips
21 Guidebooks

Complete instructions, useful for other Field Trip Guidebooks, can be found in GSA Special Paper 492:

Google Earth and Virtual Visualizations in Geoscience Education and Research

Whitmeyer, Bailey, DePaor and Ornduff, eds.

2012



NYSGA
New York State Geological Association

Year	Location	Pages
1956	Rochester	121
1957	Wellsville	66
1958	Peekskill	51
1959	Ithaca	136
1960	Clinton	61
1961	Troy	96
1962	Port Jervis	90
1963	Binghamton	116
1964	Syracuse	126
1965	Schenectady	111
1966	Niagara Falls	116
1967	Newburgh	128
1968	Flushing	260
1969	Plattsburgh	183
1970	Cortland	139
1971	Potsdam	150
1972	Utica	222
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1974	Fredonia	187
1975	Hempstead	327
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Year	Location	Pages
1986	Ithaca	279
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1989	Middletown	302
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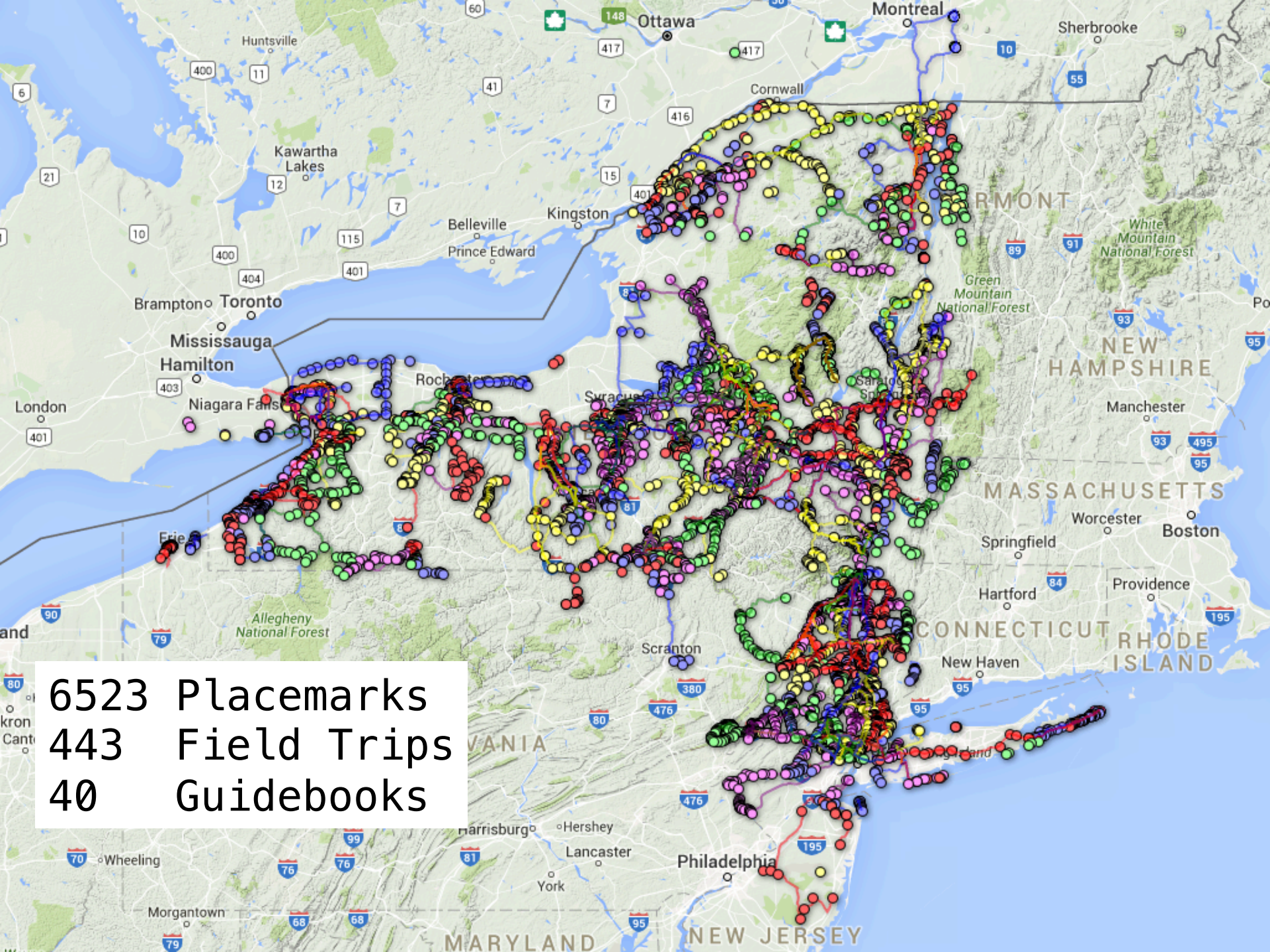
1991	Oneonta	488
1992	Hamilton	258
	Saranac Lake	75
1993	Canton	271
1994	Rochester	590
1995	Schenectady	425
1996	Staten Island	178
1997	Clinton	264
1998	Binghamton	135
1999	Fredonia	412
2000	Geneva	178
2001	Lower Hudson Valley	204
2002	Lake George	375
2003	Oneonta	292
2004	Potsdam	283
2005	Oswego	125
2006	Buffalo	478
2007	Cortland	187
2008	Lake George	154
2009	New Paltz	254
2010	Staten Island	190
2011	Syracuse	163
2012	Clinton	212
2013	Fredonia	222
2014	Alexandria Bay	
2015	Plattsburgh	359

Key:

Done by 2012
Done by 2015
Attended by AU students


6523 Placemarks
443 Field Trips
40 Guidebooks
Ottawa
Montreal
Sherbrooke
Huntsville
Cornwall
Kawartha Lakes
Kingston
Belleville
Prince Edward
Brampton
Toronto
Mississauga
Hamilton
Niagara Falls
London
Rochester
Syracuse
Erie
Allegheny National Forest
Scranton
Harrisburg
Hershey
Lancaster
York
Philadelphia
Wheeling
Morgantown
MARYLAND
NEW JERSEY
Green Mountain National Forest
White Mountain National Forest
NEW HAMPSHIRE
Manchester
MASSACHUSETTS
Worcester
Boston
Springfield
Hartford
Providence
CONNECTICUT
RHODE ISLAND
New Haven

Google Earth Pro

NYSGA 1971
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NYSGA 1991
NYSGA 1992.kml
NYSGA 1993
A1: PRECAMBRIAN GEOLOGY OF THE NORTHWEST ADIRONDACK
A2: THE POTSDAM-GRENVILLE CONTACT REVISITED (I)
A3: CAMBRO-ORDOVICIAN STRATIGRAPHY, SEDIMENTATION, AN
A4: THE LATE GLACIAL ORIGIN OF THE CLINTON COUNTY FLATR
A5: RETHINKING GRENVILLE-AGE DEFORMATION - DUCTILE SHEA
B1: BEDROCK EROSIONAL FORMS PRODUCED BY GLACIAL PROCES
B2: THE POTSDAM-GRENVILLE CONTACT REVISITED (II)
B3: SEDIMENTOLOGY AND DIAGEI
B3: SEDIMENTOLOGY AND DIAGENESIS OF THE POTSDAM SAND
STOP 1. Upper portion of the Theresa Formation.
Roadcuts on both sides of Route 37 expose tidal flat facies of the upper portion of the Theresa Formation. The basal beds
STOP 2. Middle portion of the Theresa Formation
The roadcuts at this stop expose the middle portion of the Theresa Formation. The rhythmic interbedding of yellow-white
STOP 3. Contact between Potsdam and Theresa fms.
The contact between the uppermost Potsdam Sandstone and basal Theresa Formation is exposed on the south side of Route
STOP 3a. Replicates last stop
This stop replicates the sequence observed at our last stop, and we will only stay a short time to examine the features of
STOP 4. Contact between lower and upper Potsdam Sandstone
The contact between the lower and upper portions of the Potsdam Sandstone is exposed in the roadcut on the
STOP 5. Proterozoic/Potsdam unconformity
The unconformity between the basal Potsdam Sandstone and underlying Proterozoic gneisses is exposed in the roadcut on
STOP 6. Typical lower Potsdam Sandstone
The roadcut on the southeast side of Route 12 exposes typical lower Potsdam Sandstone. Plane-bedded medium- and fine-
STOP 7. Proterozoic/Potsdam unconformity
The unconformity between the basal Potsdam Sandstone and Proterozoic gneisses is again exposed in these large roadcuts
STOP 8. Conglomerates in the Potsdam formation
These long roadcuts on Interstate Route 81 expose a sequence of conglomerates and pebble-cobble sandstones in the
B4: SOME CLASSIC MINERAL COLLECTING SITES IN ST. LAWRENCE

Google Earth & Street View

Earth Gallery

Tour Guide

STOP 5. Proterozoic / Potsdam unconformity

The unconformity between the basal Potsdam Sandstone and underlying Proterozoic basement gneisses is exposed in this roadcut on the southeast side of Route 12. This contact represents a time interval of some 600 million years. The basal sandstones here exhibit large-scale low angle planar-tabular cross bedding, and are devoid of trace and body fossils. The depositional setting for this facies is problematic, although shallow marine tidal inlet, beach or aeolian dune environments are potentially workable facies models.

Considerable variation in color pattern is evident in the Potsdam Sandstone, with the basal 0.5-1.0 meters white to light grey in color, whereas the upper portion of the outcrop exhibits the pink, red, orange and salmon colors often seen in the Potsdam Sandstone used as a building stone. In this section, the deeply colored beds contain abundant tiny (2-50 micron) disseminated hematite and leucoxene crystals with these pigments both surrounding detrital quartz grains and imbedded in later authigenic silica cement. Highly corroded grains of detrital magnetite and ilmenite in the colored sandstones appear to have been the source of iron and titanium which subsequently precipitated as hematite (probably with a goethite precursor) and leucoxene under oxidizing diagenetic conditions. The white sandstones immediately above the unconformity contain no hematite or leucoxene, although limonite-goethite halos of relatively recent origin are locally developed around magnetite grains. The pristine condition of the majority of magnetite and ilmenite grains indicates that these basal sands never suffered a persistent oxidizing diagenetic history. The proximity of these unoxidized grains to the underlying pyritic gneisses suggests that the pore waters near the contact were "Eh-buffered" by the alteration of pyrite and Fe-silicates in the gneisses, thus preventing breakdown of the magnetite and ilmenite, and the subsequent precipitation of pigmenting agents.

Note that the sole surface of the lowermost sandstone bed mimics the shape of the underlying (now weathered) basement erosional surface.

B.W.Selleck
NYSGA 1983 Trip 9 Stop 5.00

What are NYSGA field trips and guidebooks?

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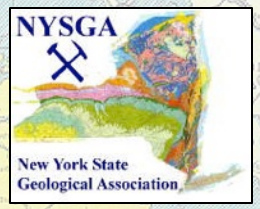


The Progress

Began with a goal of putting trips on GE

OCR of road logs permits searching

Google Fusion table permits filters and custom output

But Fusion Tables are “Experimental”

FileMaker database leads to secure future

FileMaker Go permits use in the field

Export capabilities:

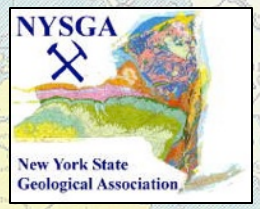
As kml or kmz files:

Google Earth Mobile

PDF Maps

As csv files:

Pocket Earth



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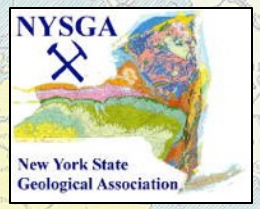

Search for "Trilobite"

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DataForPDFMaps Oct2015

Number of Records Found: 113

113

1968 E 7.00	STOP 7. South end of Pine Hill.
1994 B5 3.00	STOP 3. KASHONG CREEK, LOWER FALLS
1973 B 2.00	STOP 2. Jacox Run
1994 A4 5.00	STOP 5. OAKS CORNERS QUARRY. SOUTH WALL.
1972 F 1.00	STOP 1. Solsville Member, Marcellus Formation, Hamilton Group
1986 1 5.00	STOP 5. SENECA STONE QUARRY
1994 B2 1A.00	STOP 1A-GENESEE RIVER GORGE AT LOWER FALLS ON RG&E ACCESS ROAD
1982 B1 4.00	STOP 4. North End, Niagara Gorge Near Lewiston, New York.
1994 B5 1.00	STOP 1: JAYCOX RUN
1992 A6 6.00	STOP 6. LOWER TRENTON GROUP, SUGAR RIVER
1994 A4 6.00	STOP 6. SENECA STONE QUARRY.
1974 G	STOP 1. Penn Dixie Quarry, Buffalo Southeast quadrangle

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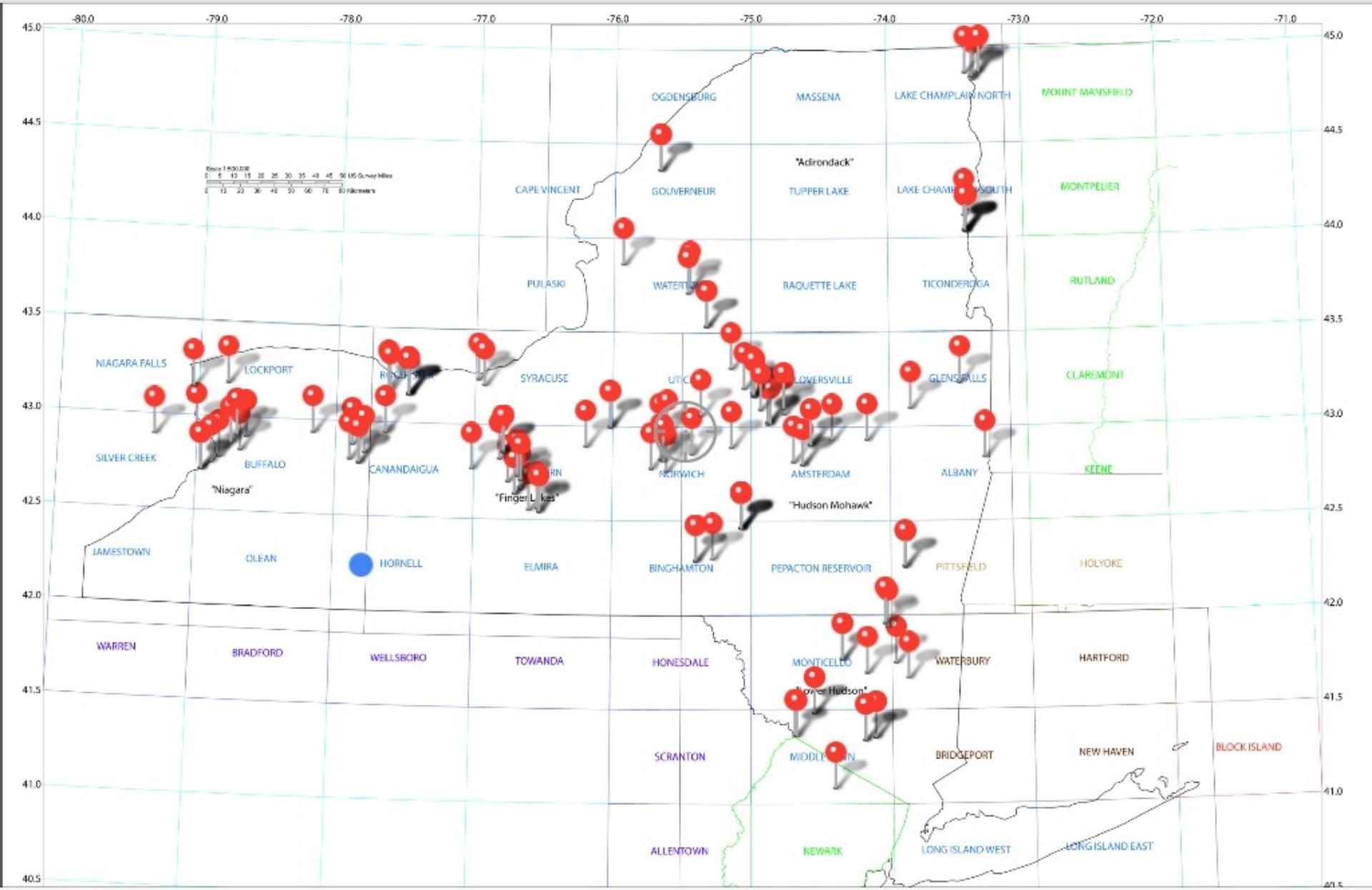
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OGDENSBURG
MASSENA
LAKE CHAMPLAIN NORTH
MOUNT MANSFIELD
"Adirondack"
CAPE VINCENT
GOUVERNEUR
TUPPER LAKE
MONTPELIER
PULASKI
RAQUETTE LAKE
TICONDEROGA
RUTLAND
NIAGARA FALLS
LOCKPORT
SYRACUSE
GLENS FALLS
CLAREMONT
SILVER CREEK
BUFFALO
CANANDAIGUA
NORWICH
AMSTERDAM
ALBANY
KEENE
"Niagara"
"Hudson Mohawk"
JAMESTOWN
OLEAN
HORNELL
ELMIRA
BINGHAMTON
PEPACTON RESERVOIR
PITTSFIELD
HOLYOKE
WARREN
BRADFORD
WELLSBORO
TOWANDA
HONESDALE
MONTICELLO
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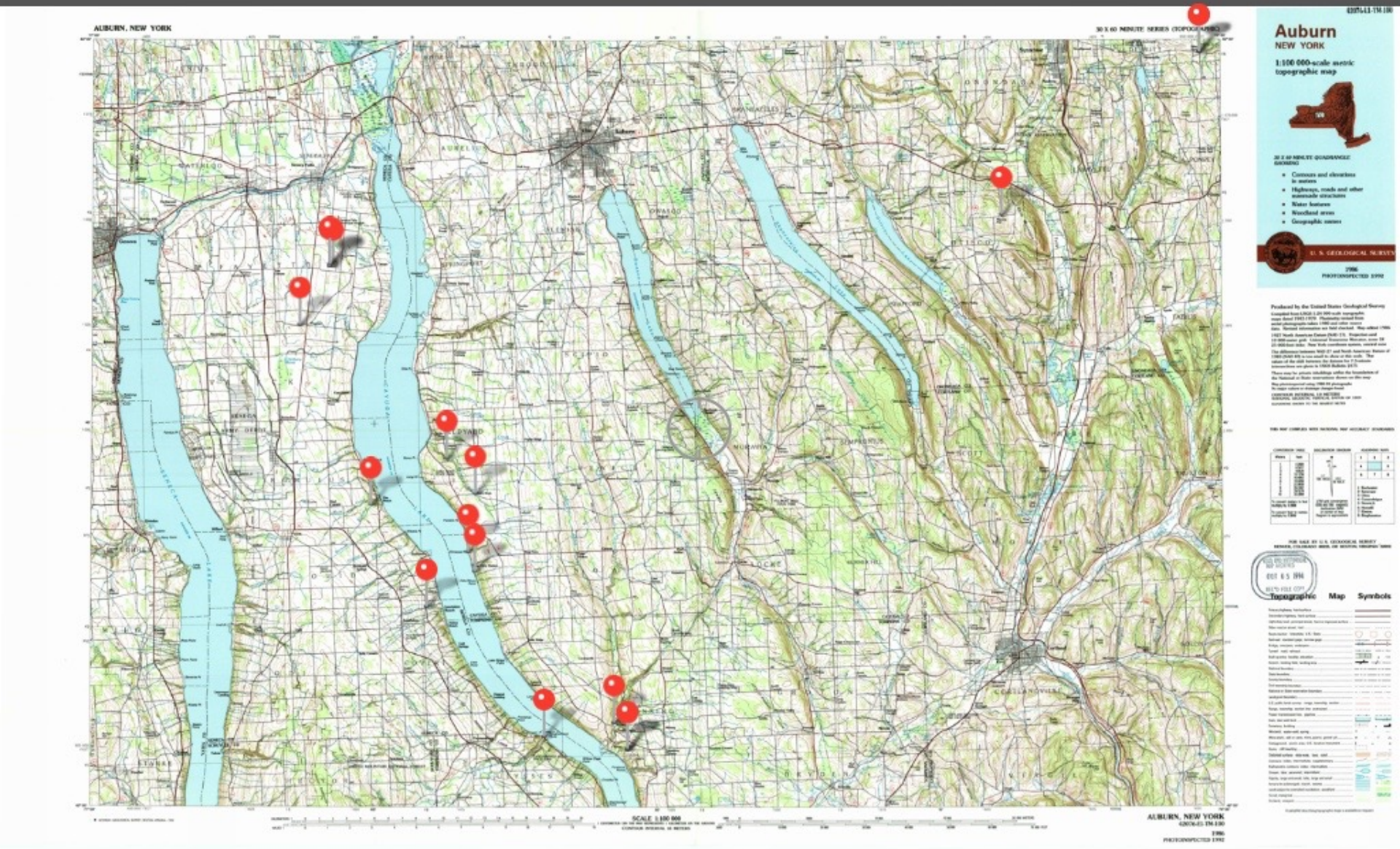
SCRANTON
BRIDGEPORT
NEW HAVEN
BLOCK ISLAND
ALLENTOWN
NEWARK
LONG ISLAND WEST
LONG ISLAND EAST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NEW YORK
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Topographic Map Symbols
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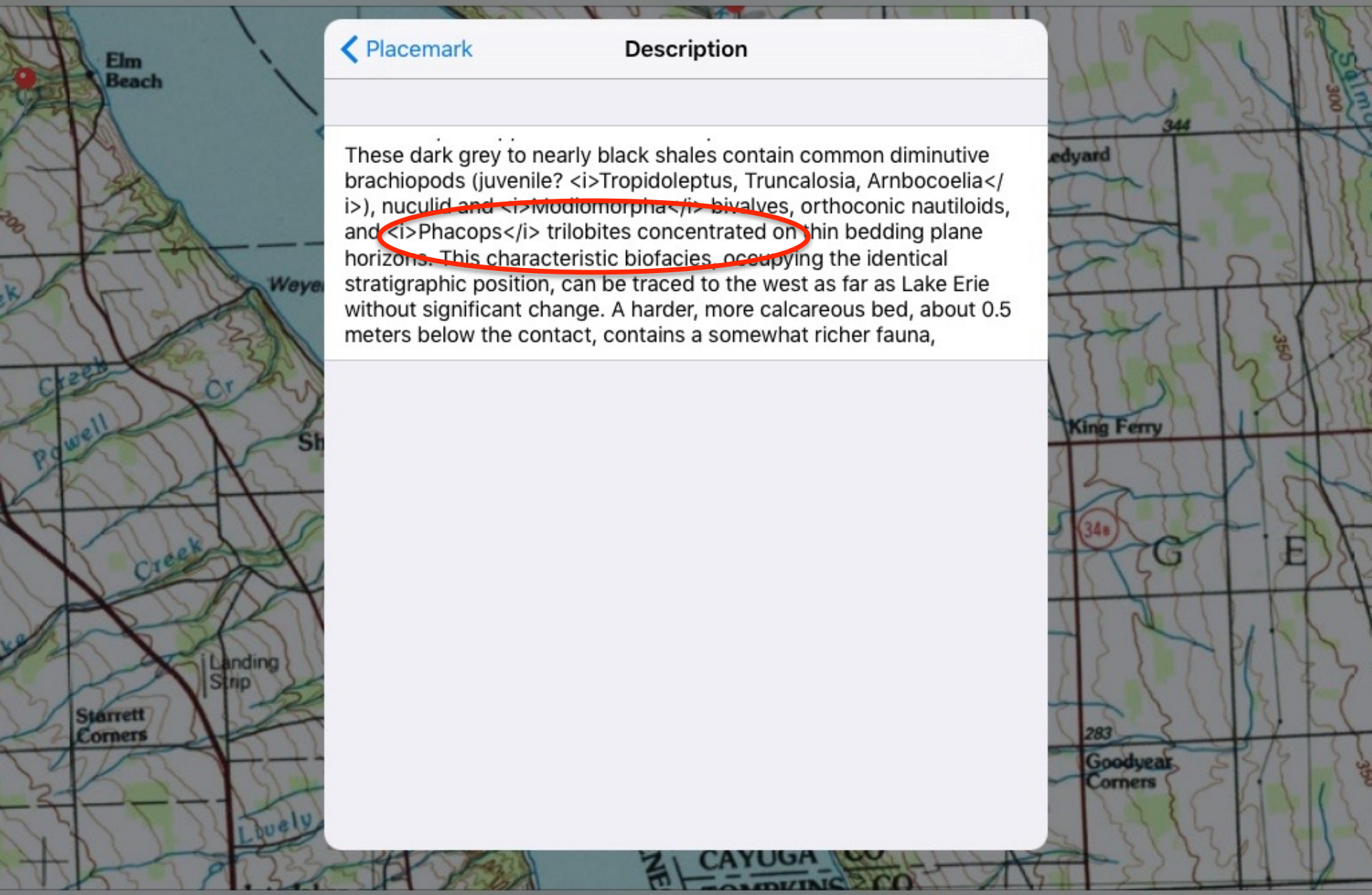
Elm Beach
Creek
Bloomer Creek
LAKE
Black Rock
Ledyard
Franklin Pt
Weyers Pt
Creek
Barnum Creek
Cr
Groves
Powell
Sheldrake
Elmwood Pt
King Ferry
King Ferry Station
Sheldrake Springs
Creek
Cats Elbow Point
Landing Strip
Kidders
Starrett Corners
Sheldrake
Run
Lovely
Interlaken Beach
Atwaters
Goodyear Corners
Interlaken
SENEC
CAYUGA CO
TOMPKINS CO
2000 ft
1 km



Placemark

Description

These dark grey to nearly black shales contain common diminutive brachiopods (juvenile? Tropidoleptus, Truncalosia, Arnbocoelia), nuculid and Modiomorpha bivalves, orthoconic nautiloids, and Phacops trilobites concentrated on thin bedding plane horizons. This characteristic biofacies, occupying the identical stratigraphic position, can be traced to the west as far as Lake Erie without significant change. A harder, more calcareous bed, about 0.5 meters below the contact, contains a somewhat richer fauna,

iPad 4:05 PM 58%
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STOP 1. KING FERRY STATION

Back | Add Data

Locality: Exposure along lake shore road extending from Elmwood Point, 1.6 miles south to near Cats Elbow Point, King Ferry Station, Cayuga Co., N.Y. (Sheldrake 7.5' Quadrangle).

References: Cooper (1930).

General Description: The south-dipping strata along the Cayuga Lake shore bluffs at King Ferry Station display the complete Wanakah Member (King Ferry Member of Cooper, 1930, in part), which is here somewhat over 30 meters thick (Fig. 8), over a lateral distance of about 1.6 miles. The Spafford and Owasco Members, comprising the uppermost 11 meters of the Ludlowville Formation are exposed at the southern end of this road near Cats Elbow Creek (Stop lC). The King Ferry locality is the most basinward, and thickest of the sections being examined on this field trip. A progressive northwest transition to an even thicker sequence of poorly fossiliferous, bioturbated, silty shales can be observed along the western margin of Cayuga Lake, as at Big Hollow Creek.

STOP 1A. ELMWOOD POINT

Upper Ledyard Member.--At section 1A we will examine the lower contact of the Wanakah shale at the base of a bed which we here designate the Elmwood Point bed for this locality. The uppermost two meters of the Ledyard Member can be seen below the Elmwood Point bed; the upper contact forms a prominent notch in the bank. These dark grey to nearly black shales contain common diminutive brachiopods (juvenile? *Tropidoleptus, Truncalosia, Arnbocoelia*), nuculid and *Modiomorpha* bivalves, orthoconic nautiloids, and *Phacops* trilobites concentrated on thin bedding plane horizons. This characteristic biofacies, occupying the identical stratigraphic position, can be traced to the west as far as Lake Erie without significant change. A harder, more calcareous bed, about 0.5 meters below the contact, contains a somewhat richer fauna, including the brachiopod *Athyris*, which is absent to the west, and gives the first hint of facies change which becomes increasingly apparent to the east and southeast, as at Cascade (Stop 2).

Wanakah ("King Ferry") Member.

The base of this member is marked by the very widespread, mollusk-dominated Elmwood Point Bed (equivalent to the Mt. Vernon bed or "*Strophalosia*" bed; Grabau, 1898-1899; Cooper, 1930), which, at this locality, remains nearly unchanged from its appearance in western New York except for the common occurrence of the brachiopod *Mucospirifer* and the absence of *Truncalosia* ("*Strophalosia*") . A major coarsening-upward cycle, about 18 meters thick, overlying this stratigraphic marker bed, begins with dark grey silty shales and culminates in massive, fretted, *Zoophycos*-burrowed siltstone. This

1986	2	1A.00	C.E.Brett, G.C.Baird.	42.67	-76.67

Search for "Tourmaline"

4:21 PM

55%

DataForPDFMaps Oct2015

Number of Records Found: 54

54

1968 G 1.00	STOP 1. Orchard Beach Park (STOPS
1967 F 3.00	STOP 3: Museum Village Klippe
1989 A3 3.00	STOP 3. MUSEUM VILLAGE KLIPPE: ALLOCHTHONOUS PRECAMBRIAN LEUCOGNEISS RESTING ON CAMBRO-ORDOVICIAN WAPPINGER DOLOMITE
1993 A1 4.00	STOP 4. Steer's Head outcrop
1989 A3 7.00	STOP 7. ORANGE TURNPIKE: POUGHQUAG QUARTZITE (LOWER CAMBRIAN)
1976 B1 4.00	STOP 4. Northern margin of the Crystal Lake pluton.
1962 B 1.00	STOP 1.
1978 A2 5.00	STOP 5. 3.3 miles east of Speculator, New York.
1993 B4 1.00	STOP 1. J & L STEEL CORP. BENSON MINES. STAR LAKE. NY
1977 A10 3.00	STOP 3. 3.3 miles east of Speculator, New York.
1967 F 2.00	STOP 2: Shawangunk Conglomerate
1993 A1	STOP 14. Hermon-type granitoid gneiss of the Grey's School body

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Delete
View
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Tourmaline
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NOTES
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ITEMS
STOP 1 Gorge and Ri...
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WATERTOWN
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EPPING
GLENS FALLS
BELLOWS FALLS
BOW
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BRATTLEBORO
BRUNSWICK
HOLLIS
NEWBURY
ATHOL
WESTFORD
GLOUCESTER
EVERETT
PITTSFIELD
HUDSON
WESTFIELD
DUDLEY
ROCKLAND
RAYNHAM
TOLLAND
HYDE PARK
TORRINGTON
BEACON
DEERPARK
SEYMOUR
GROTON
LITTLE COMPTON
MOSCOW
VERNON
POCONO MANOR
WESTWOOD
RIVERHEAD
MORRISTOWN
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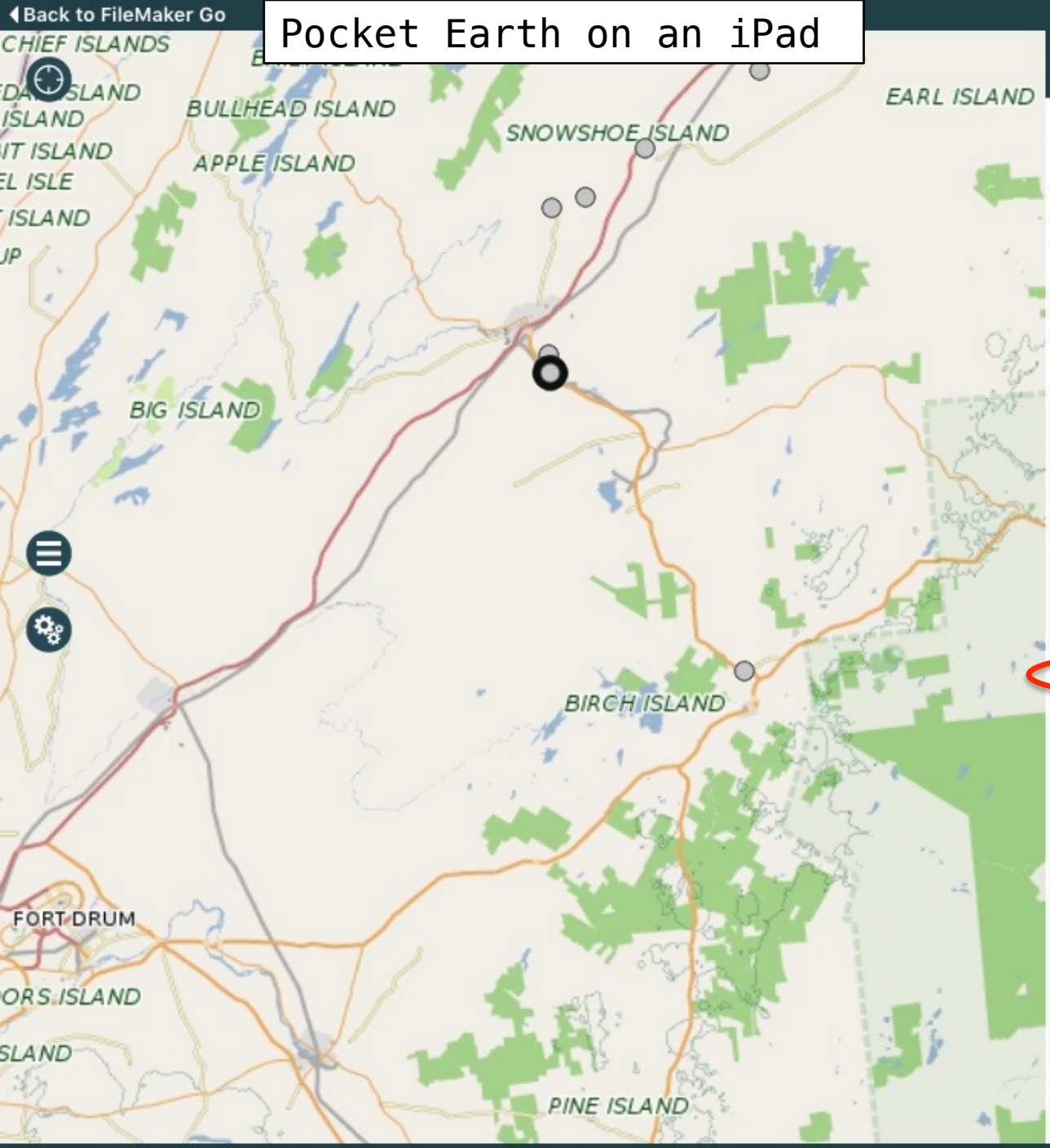
42.23556°N 73.10445°W



Back Note Edit

intrude Popple Hill Gneiss. Radiometric ages include an Rb-Sr whole rock age of 1197 +/- 53 Ma by Douglas Mose (in Carl and others, 1990), and a zircon U-Pb age of 1183 +/- 7 Ma by Jeff Chiarenzelli (in McLelland and others, 1992). These intrusions are slightly older than most anorthosite, mangerite, charnockite and granite (the AMCG intrusive suite of McLelland, 1986) in the Highlands.

Antwerp granite at this outcrop has surrounded and isolated a segment of cream colored marble that is shaped like a "steer's head" (resembling an illustration in a Zane Gray western novel). Major minerals include microcline, plagioclase, quartz, hornblende and biotite. Minor minerals include tourmaline, magnetite, ilmenite, apatite, zircon, titanite and secondary chlorite. Note the veins of quartz and tourmaline in symplectic intergrowth.

Intrusive origin is not easy to demonstrate for many Lowland gneisses, given the multiple deformation and high-grade metamorphism. Dikes and sills within marbles are especially susceptible to rupture, displacement and rotation, and many of the contacts are tectonic in origin. Selvage of scapolite, diopside, mica and quartz occurs between the meta-granite and marble at this outcrop, but the presence of selvage may be indicative of

Search for "Pollution"

4:40 PM

51%

DataForPDFMaps Oct2015

Number of Records Found: 6

6

1975 B4 2.00	STOP 2. The building on your left is the rator.
1985 A3 5.01	Ciba-Geigy Plant and wastewater treatment plant.
1980 D 6.00	STOP 6. Sewage Treatment Plant
1975 A5 5.00	STOP 5. Area for sewage outfall line
1973 A 9.06	Loon Lake
1980 D 4.04	Cross Berry's Creek.

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Fishers Island
Long Island Sound
Cross Berry's Creek.
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STOP 2. The building on your left is the South Shore Incinerator
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STOP 5. Area for sewage outfall
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Area for sewage outfall line from Cedar C
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In order to curtail estuarine pollution, a se
outfall lines extending across the bay and
islands into the ocean have been proposed
first to be completed (1973). While there
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progressive succession of different barrier
the return of the native flora.
M.P. wolff, P.J.R. Buttner, R.A.Brady, F.A
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Data SIO, NOAA, U.S. Navy, NGA, GEBCO

6 years of work, so far:

40 Guidebooks

443 Trips

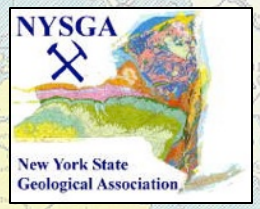
6,523 Placemarks

2,482 Stops

4,041 Views

(155,096 lines of code and data)

...but, why?



I believe that an important reason to study at AU is to live among a community of scholars.

Teaching/Learning is becoming more and more standardized: Textbooks today come with Webwork, quizzes, assessment instruments, etc. Whether a course is online, on weekends, on ground at a community college to which one commutes, or on ground at AU, makes little difference if such books and ancillaries are used.

So, why would someone choose to come to AU?

AU has the advantage of being a **residential** college. Living for four years with faculty who are passionate about their scholarly activity is an experience which cannot be replicated in other, non-residential, learning environments.

This advantage is lost if we fail to give scholarship by our faculty the respect it deserves.