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NEW YORK GLACIOGRAM

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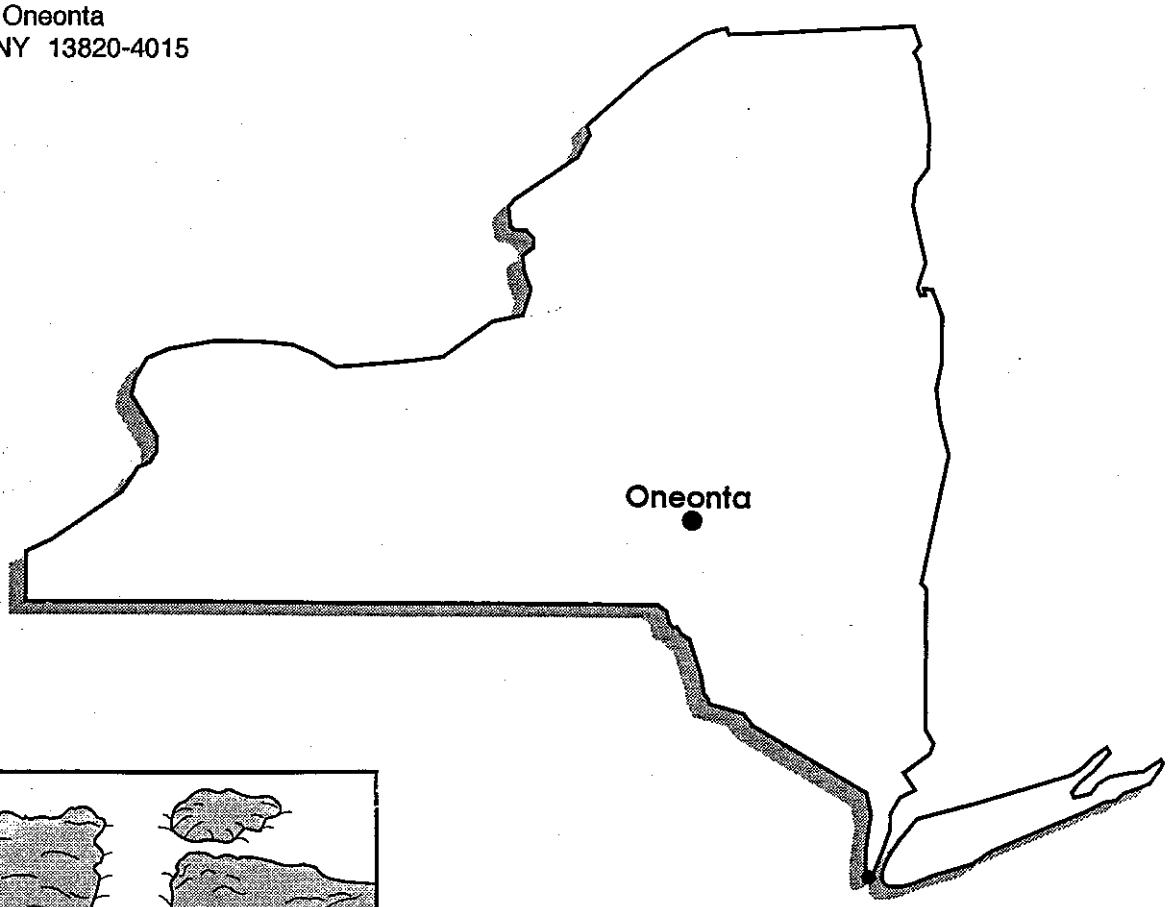

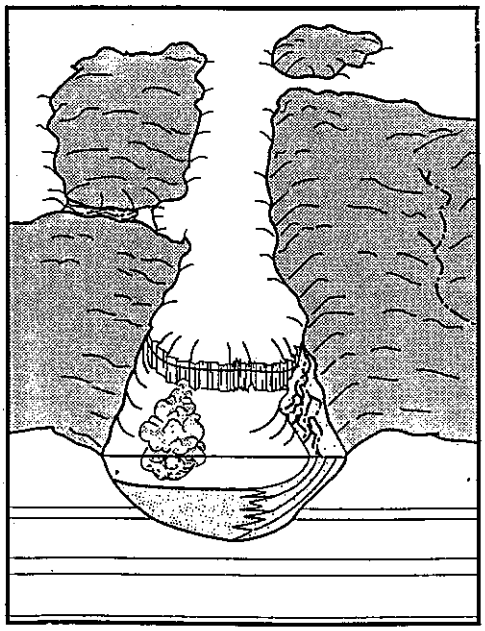

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EDITORIAL POLICY

The **GLACIOGRAM** is intended to be a collection of informal notes concentrating on Quaternary work that relates to New York State either directly or indirectly. The **GLACIOGRAM** is not a formal publication and is not circulated to libraries, nor to individuals not engaged or interested in Quaternary research. The information included is often of a preliminary and tentative nature, and as such, should not be quoted without direct communication with the appropriate authors. It is suggested that reference to information in the **GLACIOGRAM** be identified merely as informal communication.

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INVITATION FROM THE EDITOR

As you may know, the **Glaciogram** contains volunteered notes and project summaries. As the title implies, past issues have contained entries weighted toward Glacial Geology. Perhaps it's time to expand the coverage to also include topics that may be closely related to glacial geology, such as limnology, palynology, soil science, ground water geology, environmental geology, etc., but to date have not yet been included. Should your area of interest fall within this broader realm, please consider having your work included in the spring edition by forwarding a brief (300-500 words or less) summary at your convenience. Easily duplicated, simple, line diagrams and map figures (sorry, no photos) may also be submitted. Please pass this invitation on to friends and colleagues who may wish to share their work or be placed on the mailing list.

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Les Sirkin: 1934-2000

On 25 June 2000, we lost an able and versatile colleague, and a well-known, good friend. Dr. Leslie Arthur Sirkin, Professor Emeritus of Earth Science at Adelphi University, died unexpectedly at his summer home on Block Island, Rhode Island. Les was born in Dover, Delaware and grew up in snowy Watertown, New York. He received his undergraduate degree from Hamilton College, earned his M.S. at Cornell in 1957 and his Ph.D. at NYU in 1965. He joined the faculty at Adelphi University, in Garden City, New York, in 1962 and became the founding chairman of the Earth Science Department in 1967. Les' doctoral dissertation "Late-Pleistocene palynology and chronology of western Long Island and eastern Staten Island, New York" began his involvement with northeastern Pleistocene geology.

Les was one of the original advocates for the Surficial Geology Map of New York. He attended the initial planning conference at Bear Mountain, NY in January 1981. He continued as a driving force until 1992 when a final summary conference was held at the State University of New York at Oneonta. He prepared reconnaissance surficial geologic maps of more than 60-7.5 minute quadrangles on Long Island and Staten Island and a dozen more for Westchester County, New York. His work served as the basis for the Lower Hudson Sheet of the Surficial Geologic Map of New York.

Les leaves behind his beloved wife, Judy FitzGibbon. He was the devoted father of Annie Sirkin Ledoux, Emily Sirkin Melcher, and Carolyn Sirkin, daughters with his late wife Joanne. The memorial service was held on Block Island on 29 July 2000.

(submitted by G. Gordon Connally and Donald H. Cadwell)

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Paul Bierman, Departments of Geology and Natural Resources, University of Vermont, Burlington, VT 05405; 802 656-4411 v; 802 656-0045 fax; pbierman@zoo.uvm.edu

We are excited about NE GSA which will come to Burlington this spring. March 12-14, 2001 at the Sheraton Burlington Hotel, Burlington, Vermont. There will be numerous sessions, field trips, and short courses that will of interest to surface process and Quaternary folks. Check the GSA web site for details and abstract submission information, http://www.geosociety.org/sectdiv/northe/01nemtg.htm#thm. For example, we hope that many of you will submit papers to the following:

SYMPOSIA

Glacial Processes in New England: A Symposium in Honor of Fred Larsen. Stephen Wright, (802) 656-4479.

Multidisciplinary Research Topics: Lake Champlain Basin. Pat Manley, (802) 443-5430; Tom Manley, (802) 443-3114.

Environmental Records from Large Estuaries Along the Northeastern U.S. Seaboard. Johan C. Varekamp and Ellen Taylor, (860) 685-2248.

THEME SESSIONS

Terrestrial Records of Late Pleistocene and Holocene Climate Change. Paul Bierman, (802) 656-4411.

Paleolimnological Records of Holocene Climate Change. Andrea Lini, (802) 656-0245; Mark Abbot, (413) 545-0229.

Slope Stability in New England Environments. Kyle Nichols, (802) 656-3398; Paul Bierman, (802) 656-4411.

Geologic Aspects of Environmental Problems in the Northeast. Jamie Shanley, (802) 828-4466; Scott W. Bailey, (603) 726-8902.

K-12 Education: Earth and Environmental Science. Christine Massey, (802) 656-1344.

SHORT COURSES

Sunday, March 11 (9:00 a.m.-5:00 p.m.) System Dynamic Modeling of Natural Environments: An Introduction to Stella. Al Cassell, School of Natural Resources, Jim Hoffman, Dept. of Botany, and Jack Drake, Dept. of Geology, University of Vermont. Please contact leaders for course specifics and requirements.

FIELD TRIPS

Sunday, March 11. Teaching Hydrology in the Winter, a Hands-On Field Trip. Leaders: Paul Bierman and Kyle Nichols.

Hope we see you all in Burlington this spring!

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W. D. Sevon, Pennsylvania Geological Survey, P.O. Box 8453, Harrisburg, PA 17105-8453; WSevon@dcnr.state.pa.us

My work for the last several years has focused primarily on production of the Landform Map of Pennsylvania. The map is now essentially completed and should be available as a digital file sometime in the not distant future. This map is the result of visual interpretation of the topography of Pennsylvania as shown on 1:50,000-scale topographic maps with 20-foot contours. Pennsylvania has full coverage with each map, sometimes two maps, showing a county. The concept was to subdivide the topography of the state into meaningful topographic subdivisions that were different from adjacent subdivisions and that could be shown on a map of 1:500,000 scale. These objectives are met in the completed map. A map of 1:450,000 scale is much better than 1:500,000 and 1:250,000 is really great if one has sufficient wall space. The subdivisions are province (largest), section, region, district, area (smallest) arranged in a hierarchical scheme that allows production of a map from the digital file showing whatever level of subdivision is desired. For example, the Survey now has available a new (2000) page-size, 1:2,000,000-scale map of Physiographic Provinces of Pennsylvania whose boundaries were produced from the Landform Map. The 1989 version of the Physiographic Provinces map had 18 province and section subdivisions. The 2000 version has 23 subdivision. The Landform Map has 569 subdivisions. The Landform Map will have an accompanying database containing a large variety of items including elevation, relief, slope, land cover, soil data, etc. The database is in progress and far from complete. The Landform Map has been combined with land cover from National Land Cover Data, a product of the US Geological Survey and the US Environmental Protection Agency. The correspondence of landform boundaries to land cover changes in some places is striking. All of this should be available as digital files via the internet early in 2001. Whether it is ever published in hard copy will depend on money becoming available. Anticipated immediate use for the Landform Map is as a base for ecological management by the Pennsylvania Bureau of Forestry. Other uses will be forthcoming. An earlier version of this map was shown at the Map Blast, NE GSA, New Brunswick, NJ, 2000. Assuming there will be a Map Blast at NEGSA in Burlington, VT, 2001, both of the above mentioned maps will be on display.

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Matthew S. Lachniet, Department of Earth Sciences, Syracuse University, Syracuse, NY, 13244, mlachnie@mailbox.syr.edu, Webpage: http://web.syr.edu/~mlachnie/

I am presently finishing my doctoral dissertation at Syracuse University on Quaternary and Glacial Geology. My research has two main foci. 1) paleoclimate records from Costa Rica, Central America, and 2) Glacial sedimentology and geology of the Bering Glacier, Alaska. My work in Costa Rica has largely focused on the glacial record present at altitudes greater than ~3,000 m, where a Quaternary glaciation has left traces of valley glaciers and small ice caps on the highest peaks of the Continental divide (Cordillera de Talamanca). The climatic contrasts at this site are most evident while standing on the highest peak (Cerro Chirripó, 3819 m) where one can see U-shaped valleys and moraines, and in the same view take in the distant beaches of the tropical Caribbean Sea and Pacific Ocean. Additional work is focused on paleoclimate records preserved in Costa Rican stalagmites, and the stable isotope hydrology and geochemistry of surface waters, from Lake Nicaragua to the border of Panamá, as well as stable isotope studies of lake sediment cores.

My work at the Bering Glacier, Alaska, is part of a larger project headed by P. Jay Fleisher, Ernie Muller, and Dorothy Peteet, as well as contributions of many others. My contribution to this larger project has been the microstructural analysis of modern, Holocene, and Pleistocene diamicts to elucidate depositional and post-depositional mechanisms. Our results suggest that microstructures in tills are related to deformation style, and microstructures of other deposits (i.e. outwash) may record glacier advances in the absence of a till sheet. We presently have some 45 thin sections of glacial sediments that we are analyzing for a more complete story.

Unfortunately, my research pursuits on the Quaternary Geology of New York have been limited to my observations from airplane windows and cars while travelling to other field sites outside of the State! I hope to remedy this someday when I actually have free time.

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Paul Karrow, Department of Earth Sciences, University of Waterloo, 200 University Avenue West, Waterloo, Ontario, Canada N2L 3G1; phone 519-885-1211; FAX 519-746-7484, <pfkarrow@sciborg.uwaterloo.ca>

As Gordon Connally remarked last time, progress on some work seems to imitate glaciers. George White had two favorite expressions some may recall:"We're off like a herd of turtles", and "We're off in a cloud of snail dust" -- also appropriate sometimes.

Our only true New York project, Fernbank, continues to millimetre forward. KEVIN SEYMOUR (ROM) has submitted a preliminary report on fish remains, with several families present but most specimens are non-specific or indeterminate. JOCK MCANDREWS has completed a new (vis-a-vis 1972) pollen ddiagram (19 samples vs. previous 10) and ALAN MORGAN reports some interesting insects are present. Work by JUNE MIRECKI on amino acid analysis of mollusc shells will be in progress later this year. ART BLOOM showed me a new small exposure of peat and silt north the previous exposures in early June on my way back from NE FOP and samples are in process. Results on plants are awaited from Jock and on molluscs from BARRY MILLER.

The Grand River tufa dated at about 9500 B. P., which is a nice minimum age for the valley incision. Unfortunately, the pollen (pers. Comm. FRANCINE MCCARTHY) were not preserved well enough to be useful. I am enquiring into possible U/Th dating as may be applied to carbonates.

The Meaford (Georgian Bay) stump site continues to intrigue. Installation of several beach wells along the cottage row has revealed the presence of a pre-Nipissing valley filled with organic sediment at least to a depth of 4-5 m. A transect of probing is planned to define the valley if possible.

As this summer was cool and wet rather than the dry and warm predicted, our planned excavation through the Don Fm. at the Brickyrad was disappointing. We sampled the upper half but two large pits to bedrock failed to provide safe sampling conditions for the lower half because of water inflow and collapse of slopes.

Another alluvial fan at Cudia Park, Scarborough, was sampled last fall and this summer. Two charcoal concentrations were found in this sequence which should provide a better chronology since pollen seems of little help -- the previously sampled fan had little pollen preserved (F. MCCARTHY, pers. comm.). Samples await processing for recovery of fossils.

Three trips to North Bay in April, May, and August, provided five more survey profiles related to Algonquin and Nipissing water levels and all the known sites within reasonable access from bench marks have now been surveyed. All previous surveys from '95 to '97 on Manitoulin Island and '98 to '00 at North Bay have now been plotted up by summer assistant JORDAN SEVERIN, who is doing his B. Sc. thesis on Quaternary stratigraphy in a Woodstock limestone quarry, which I'm supervising.

New M.Sc. student Verena Kulak, has a biology background and will work on a paleoecology project.

A review of Ontario neotectonic studies with OWEN WHITE is in progress and was fortified with a field visit to three popup localities near Peterborough in July. The paper will be submitted this fall for a special issue of Tectonophysics on neotectonics in the northeast. A paper on geological and paleoenvironmental history 10,500 to 8,500 B.P. has been submitted for an archeology volume. Figure revisions are nearly completed for papers on the Woodbridge site and Woodstock quarry stratigraphy. The diachronic classification for the eastern and northern Great Lakes appeared in Quaternary Research in July and a marl mollusc paper is in press for January 2001 in the Journal of Paleolimnology.

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Parker Calkin, Institute of Arctic and Alpine Research, U. Colorado, Boulder; 3802 Lakebriar Drive, Boulder, CO 80304

I am enjoying my retirement (from University of Buffalo) in Boulder, but have kept up on geology following many lectures (of others) at INSTARR, as well as the Geology Department. The geologists have had quite a few lectures focused around Precambrian glaciation and other ice-oriented topics in the past few years. I also work with the Colorado Scientific Society - the Denver Regional society for general geologists which is 118 years old this year.

Thanks to former students David Barclay (Cortland) and Greg Wiles (Wooster College), I have continued to spend short summer seasons in Alaska. We are gathering data to complete a 2000-year tree-ring chronology, as well as rounding out glacial chronologies at sites in the Gulf of Alaska including Sheridan and Sherman glaciers and Columbia Glacier. Rain in July gave us a tough time this past summer. A short review of our coastal Holocene glaciation studies will come out in a few months (hopefully) in Quaternary Science Reviews - as part of a special volume on Berengian problems.

As for New York, Ernie Muller and I are trying (not too successfully) to come up with some original Quaternary geologic setting material for a forthcoming symposium volume related to the Hiscock paleoecology site north of Batavia. This will be organized by Richard Laub of the Buffalo Museum of Science.

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Aleksis Dreimanis, Department of Earth Sciences, University of Western Ontario, London ON N6A 5B7 CANADA

Drumlins of Lake Ontario basin and reinvestigation of Baltic Sea bluffs in W. Latvia

This May, John Darren Delgaty successfully defended his M.Sc thesis "Morphology, composition and origin of Ontario lobe drumlins in the Pickering-Bowmanville area, Ontario and at Chimney Bluffs State Park, Wolcott, New York State", (375 pages). It was based upon detailed investigation of lake bluff sections, measuring till fabric and origination of glaciotectonic deformation and lithologic investigation of all till units. He concluded that glacial erosion, deformation and deposition participated in the formation of drumlins, and meltwater channel gravels occur in some of them. Both Simcoe-Kawartha and Ontario lobes were active in the area north of Lake Ontario, with the final shaping of drumlins by the Ontario lobe.

I spent some time in May, reinvestigating, together with Dr. Vitaly Zelčs, the Baltic Sea bluff sections in W. Latvia, which I had studied for my Mag. rer nat. thesis in 1936. My present stratigraphic interpretation (presented at the Peribaltic Field Symposium in Denmark on August 30) differs in one area from that of 1936 and from interpretations published by several authors during 1970-1993. The more than 30 km long bluff section will be reinvestigated by Dr. V. Zelčs and his students. The differences in stratigraphic interpretation are caused mainly by extensive glacitectonic deformation. A paper on the adjoining area, co-authored with L. Kalniņa and S. Mūrniece, based upon test drilling data, is in press in Quaternary International, to be published this fall. I m presently reinvestigating the last ice age stratigraphy of lake Erie basin.

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Robert Titus, Hartwick College, Oneonta, NY 13820

I continue to describe Catskills area glaciations for general audiences in the Woodstock Times and Kaatskill Life magazine. Recently I have begun writing for the Greenville Press as well. This year I have done, among others, articles on drumlins near Greenville and on the Grand Gorge advance of the ice in the North/South Lake Park area. In the upcoming year I will be continuing work throughout the Catskills, especially along the Catskill front. This work is not intended to be professional science, it is rarely peer-reviewed, and should not be considered part of the formal scientific canon. It is aimed at the general public in hopes of increasing public knowledge about our glacial past.

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Bruce Selleck and Janet Baran, Department of Geology, Colgate University, Hamilton, NY

Calcium carbonate cementation in kame terrace gravel is a widely-distributed phenomenon in south-central New York (Holmes, 1939; Schmidt, 1947; Aber, 1979). Calcite, and more rarely aragonite, cements masses of gravel and sand to form 'cement-rock' in many gravel quarry exposures. In general, calcite cements are found in gravel that is rich in fragments of limestone derived from Paleozoic strata to the north. Clasts of cemented gravel conglomerate are also present in these deposits, suggesting that pre-late Wisconsin cementation occurred to form conglomerates that were eroded and re-deposited.

We have used field work coupled with Petrographic and stable isotope analyses to study calcite-cemented gravel from the Norwich, New York area in considerable detail. Our preliminary results include:

1. *In situ* cementation, post-dating deposition of the gravel (probable age of terrace gravel deposition is ~15,000-18,000 years; Cadwell, 1972) and cemented clasts of gravel (cementation predating terrace deposition) are common in the Norwich terraces. *In situ* cements examined all lie above the present water table.

2. *In situ* carbonate cements in the Norwich terraces consist of calcite that forms isopachous pore-lining and pore-filling prismatic fabrics which clearly precipitated from water-filled pores (phreatic cement fabrics). Multiple layers of prismatic cement (calcite crystals 1-5 mm in width) are common, with large voids nearly completely filled with cement 2-3 cm thick. Multi-layer cements show internal dissolution and re-growth surfaces. The presence of phreatic cement fabrics above the present water table suggests either higher water tables in the past or, more likely, precipitation of cement in groundwater ponded above low-permeability zones as ephemeral 'perched' water table aquifers.

Pendant, microstalactitic, and crustose meniscus cements of vadose origin are also present and commonly associated with zones of phreatic cementation. In general vadose cement post-date phreatic zone cement in samples where both are present.

3. Conglomerate clast cements are commonly single-layer isopachous prismatic calcite. Clasts vary from highly rounded to slightly rounded; some clasts contain fragments of oxidized rock suggesting pre-transport weathering.

4. Conventional radiocarbon ages were determined as follows (all ages in uncorrected radiocarbon years bp):

Multilayer prismatic calcite; *in situ* cemented gravel: 4510 +/- 85
Single layer prismatic calcite; *in situ* cemented gravel: 4775 +/- 85
Single layer prismatic clacite; conglomerate clast: >32,000

The Holocene age for the *in situ* cements suggests that there was relatively minor contribution of 'dead' carbon from Paleozoic carbonate and that most of the carbon in these cements was derived from soil and groundwater that was in open chemical communication with the atmosphere. The older age of the clast cement is consistent with conglomerate clast derivation from cemented pre-late Wisconsin age terrace deposits.

5. $\delta^{13}C$ and $\delta^{18}O$ data (PDB standard) from *in situ* phreatic prismatic cement, *in situ* vadose microstalactic cement and conglomerate clast single layer prismatic cement microsamples are presented graphically below. The sublinear array of $\delta^{13}C$ values suggest that carbonate ion in calcite was derived from a mixture of isotopically lighter (more negative) soil organic CO_2 and heavier atmospheric CO_2 or marine limestone carbonate. As noted above, ^{14}C dating suggests limited 'dead' carbonate from limestone, so an atmospheric source for the heavier carbon is preferred. The high permeability of the coarse gravels allowed the system to remain open to the atmosphere. The heaviest carbon isotope signatures are found in vadose cements, supporting the conclusion that isotopically heavy carbon in the system had an atmospheric source.

$\delta^{18}O$ data from *in situ* cements are consistent with precipitation of calcite at local groundwater temperature (`15°C) from waters having a $\delta^{18}O_{SMOW}$ OF ~ -8 TO -11 per mil. Modern local groundwater has $\delta^{18}O_{SMOW}$ in the range of -10 to -12, consistent with the values predicted. Cement from transported clasts esembles *in situ* phreatic cements in terms of $\delta^{13}C$, but averages 2-3 per mil heavier in $\delta^{18}O$. This suggests that the clast cements precipitated from isotopically heavier waters or at lower temperatures than *in situ* cements.

These data suggest that the pre-late Wisconsin hydrologic system in which clast cements precipitated differed subtly from the Holocene system. Modern water isotope characteristics of the northern Appalachian Plateay of New York are strongly influenced by proximity to Lake Ontario which provides a source of isotopically light water to local hydrologic systems via lake effect precipitation. If the Great Lakes were smaller than today, we would expect water isotopes in central New York State, and the carbonate that precipitates from groundwater, to be isotopically heavier than today.

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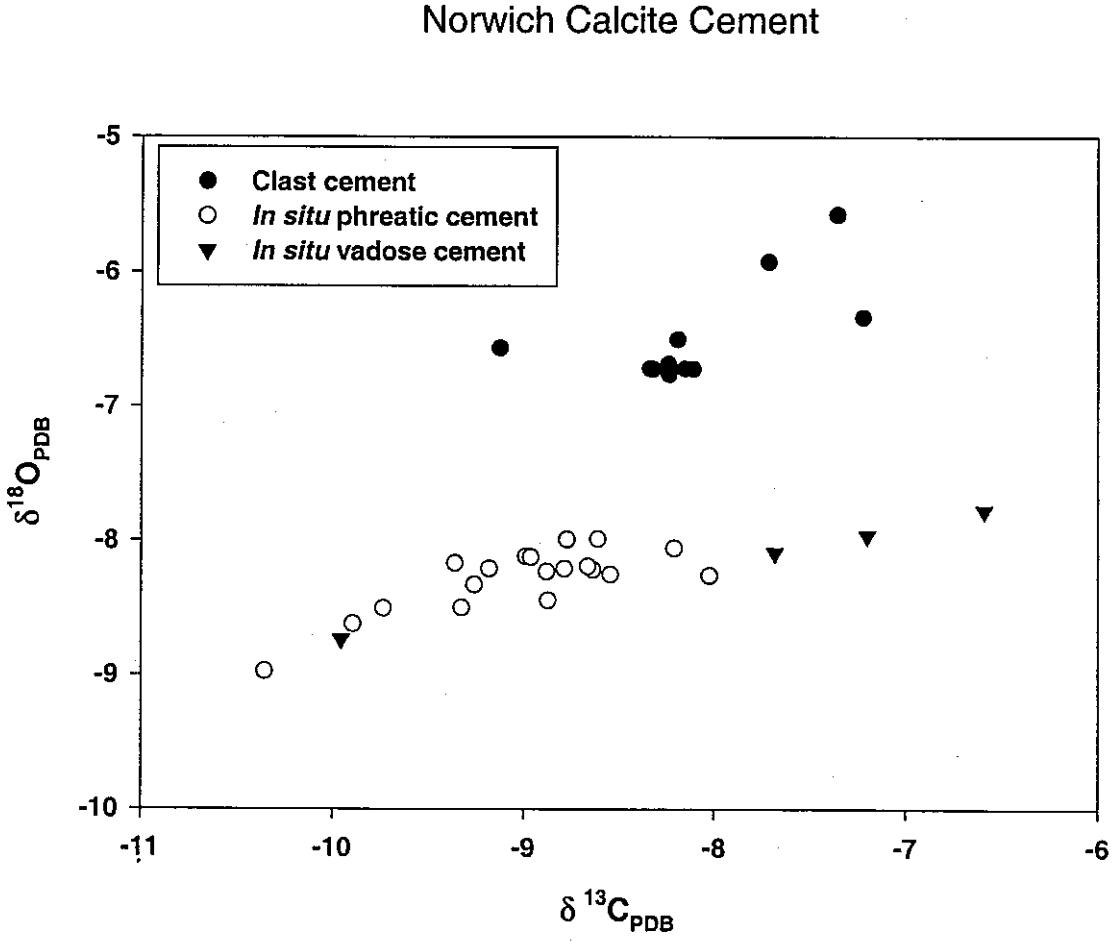

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After returning from stimulating field work in June at Bering Glacier with colleagues Ernie, Muller, Matt Lachniet, Palmer Bailey, and P. Jay Fleisher, plus two of Jay's students, I completed the field work for the surficial geology of the Prattsville and Gilboa 7.5 minute quadrangles, in the Catskills. I plan to digitize the data this winter and begin the process of having all surficial geologic information available through our website http://www.nysm.nysed.gov This information is prepared with ArcView, and will be able to be downloaded, the same as bedrock and surficial 1:250,000 scale maps are presently available. Cultural information will eventually be available, but presently has to be obtained separately.

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Duane Braun, 400 East Second Street, Bloomsburg University, Bloomsburg, PA 17815-1301; dbraun@husky.bloomu.edu

During the summer of 2000 we completed the surfical deposit mapping of 10 - 7.5' quads. centered on the Great Bend area and extending from just south of Binghamton to just south of Hancock, New York. Thirty or so varve outcrops were discovered within the area of proposed glacial lake Great Bend. At all sites the varves were observed to be sandwiched in between a basal till unit and an overlying till or ice-contact-stratified-drift unit. This indicates that the lake first developed upon initial recession of the ice and was then over-ridden by a significant readvance (10 to 20 km) of the ice. No lake sediments have been observed overlying the glacial deposits. This suggests that final recession was exceptionally rapid and/or erosion has removed the lake sediment veneer. There are considerable amounts of colluvium derived from till on all the toeslopes in the area indicating significant erosion of the slopes.

In the 1960s Don Coates suggested that a glacial readvance occurred in the Great Bend area itself. The distribution of the over-ridden lake sediments indicates a broader readvance from at least Stevens Point to Franklin Forks PA, an east - west distance of 30 km.

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John P. Szabo, John P. Szabo, Professor and Chair of Geology, Geology Dept., Univ. of Akron, Akron, OH 44325-4101; Voice: 330-972-8039; Fax: 330-972-7611; <jpszabo@uakron.edu>

I am finally getting some research done now that I have figured out this chair job. It looks like another four-year term because three full professors took early retirement. Holly Trembczynski finished her thesis on river terrace correlations to ancestral levels of Lake Erie west of Cleveland and is now gainfully employed by an environmental company in Illinois. I need to work on publication of her research. The work on the Tower City cores is continuing; Kristine Bradley has completed the lab analyses. We are in the process of combining some of units identified by the engineers into larger packages. We have received an AMS date of 14,400 radiocarbon years on a twig from lacustrine silts about 16 m below the surface but still above modern lake level. I cleared off the lower part of the Garfield Hts. section that is from the upper loess down to the top of the gravel. Michel Lamothe wants to try some more OSL dating, and I'll be sampling soon. I'm traveling south to Columbus to examine some of the big exposures at the School for the Deaf. They have some well-developed fracture systems but the units have not been identified. There are some other exposures nearby. I'm still pondering the drainage reversal in the Cuyahoga Valley. Terraces are well developed north of the Defiance Moraine
but do not may much sense south of that landform. An 80-page issue of the "Ohio Journal of Science" on fractures in tills will be published soon.

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Summer field work began in late May with a week at Sheridan Glacier. Joined by BERG (Bering Glacier Research Group) associate Palmer Bailey, former Director of CRREL, and two Oneonta students (Evan Mankoff and Mike Senglaub), we re-mapped the Sheridan Lake basin and measured basic water properties (temperature, turbidity) as part of an ongoing project to develop a data base. Hopefully, we'll be ready to report at NEGSA in Burlington next spring. This was followed by our 13th consecutive field season at Bering Glacier, where we were joined by Don Cadwell, Ernie Muller and Matt Lachniet. Ernie, Matt and I continued field investigations on the Bering foreland in late June to map the extended Bering/Steller/Martin River glacial system of the Late Pleistocene. Plans call for our return late in the 2001 field season when lingering snow is least restrictive.

Most of July was devoted to a Keck project in the Juneau area. Bob Newton (Smith College), Bob Carson (Whitman College) and I had the privilege of working with eleven gifted undergraduates on field-oriented, student research projects focusing on various aspects of the valleys holding the Mendenhall, Herbert and Eagle Glaciers.

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This past field season brought me to places rich with glacial geology while supporting enthusiastic and capable students. First,work began on mapping the glacial geology and hydrogeology of the Arlington quadrangle,Vermont. I am making progress revising the surficial map completed decades ago, targeting areas that might add the most new information to our current picture there. So far the exposures are neither numerous nor of good quality. It's rare to be wishing for more gravel pit operations. Senior honors thesis student Alan Baldivieso is also working in the quadrangle to decipher the region's bedrock and surficial hydrogeology under contract with the State of Vermont. Much progress was made over the summer going through the well records list in Arcview and paring the list down to several hundred which can be confidently correlated to homes. The well data do reveal separate carbonate and glacial overburden aquifers as anticipated. Continuing work will result in preparation of an overburden thickness/depth to bedrock map, water table and/or piezometric surface maps for each identifiable aquifer,stratigraphic cross sections,and ground water flow models. The surficial geologic map and accompanying products mentioned above will be packaged with an explanatory text meant for county and town land use planners. We want this geology to be immediately useful to a wide audience.

A portion of my month's stay in Southeast Alaska was spent visiting senior honors thesis student Marlene Duffy who was working at the Mendenhall glacier in Juneau under the auspices of a Keck Consortium research project whose faculty included Jay Fleisher. Marlene decided to pursue an ice flow and erosion project,examining the polished,striated and moulded form of a bedrock spur across the valley which continues to be uncovered by the retreating glacier. The freshness of the features enabled detailed mapping of the rock spur with the goal of determining the nature of the interaction between ice and rock as the ice flowed along,then over this obstacle in its path. Marlene plans to model the ice flow...something I trust she as a math double major will have success with versus my meager knowledge of the subject. Seeing the ice behave at the Mendenhall in a way analogous to toothpaste being squeezed from a tube was illuminating.

The rest of my stay in Alaska certainly had a glacial connection,spending a bit of time on the Walker glacier in British Columbia as a diversion from a rafting trip down the Tatshenshini River at flood stage and kayaking around the Riggs and McBride glaciers in the East Arm of Glacier Bay. However, it might be stretching to call this work.

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In early October I took a trip up to Whitehall, NY to look at "Cookes Island" for the U. S. Army Corps of Engineers. They plan to pile more dredge material on it so we were coring and mapping what we could find underneath their previous dredge spoil (1938 and later). Although we found no Holocene sediments that could contain archaeological remains we did find an intact peat bed as well as possible Lake Vermont silts. We are going to get several radiocarbon dates and probably also have samples analyzed for pollen and plant macrofossils.

I also found some striations on the bedrock which appear to conform to a generally southeasterly advance at the onset of glaciation. The azimuth I measured was 125 degrees but I did not correct for declination on my Brunton. The measurements were made on an extension of the "South Rock" which is separated from the other "North Rock" outcrop by a trough feature which is being filled with dredge material. These two rock outcrops are the only fast land in the area, and the "island" is largely manmade. These are the only references on the area I have come up with at this point so I welcome others and/or comments by email (dthieme@hotmail.com or dthieme@ptd.net)

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This past summer I went back to southern Alaska with Jim Milligan (undergraduate student here at SUNY Cortland) to continue work on reconstructing late Holocene climate change. Several productive weeks included extensive sampling of an old growth forest buried and preserved by an advance of Nellie Juan Glacier about 400 years ago. Tree-ring analysis of these samples, some of which are over 500 years long, is the priority for the remainder of this year and probably next summer too. We also worked for a week in Blackstone Bay; beautiful weather, lots of great photos of iceberg-calving and terrestrial termini, but alas no subfossil wood.

My work on New York glacial geology is unfortunately suffering from the time demands of the southern Alaska project. My plans to get back into the Adirondack High Peaks to continue my work on late Pleistocene local glaciation keeps getting postponed; hopefully I'll find some time in the next year and will be able to report on some progress. I am also interested in trying to develop a long tree-ring chronology for New York state using wood preserved primarily in bogs, lakes and alluvial settings, and would be interested in hearing from anyone who has tried similar work or who knows of potentially useful deposits. Minimum criteria for tree-ring analysis is moderate to good preservation of the wood and at least 100 growth rings. Any leads or information would be appreciated.

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New Video: THE RISE AND FALL OF LAKE HITCHCOCK
New England's Greatest Glacial Lake, 43 min.
ISBN 0-9616520-5-5

The creation, duration, and destruction of Glacial Lake Hitchcock was the most important event in the geologic and human history of the Connecticut Valley. Fourteen thousand years ago you could have paddled Glacial Lake Hitchcock for over 200 miles from central Connecticut to northern New Hampshire and Vermont where the remnants of the last ice age still calved ice bergs into the lake. This video journey tells amazing stories of Lake Hitchcock with excellent views, including many air shots, diagrams, animations, a bit of humor plus interviews with researchers (Janet Stone, Julie Brigham-Grette, Tammy Rittenour, Jack Ridge, Steve Mabee, Al Werner), contributers to the many new views of Lake Hichcock's history and importance.

You will accompany a Tufts University class and other researchers into the field where they collect and study sediments from the thick clay deposits of the old lake floor to concretions to sand dunes. You will discover the answers to many mysteries such as what caused Lake Hitchcock's dam and what caused it to break. What color was the lake? Why is the shoreline tilted? What caused pingos and sand dunes on the lake floor and what do they tell us about ancient climate conditions? How did Lake Hitchcock cause the waterfalls that were and are so important for the river ecosystem and hydropower? Plus learn about glacial flow and melting, eskers, islands in the lake, and our abundant and important groundwater resources.

This fast-paced program is of interest to audiences from middle school through college and adult. Running time: 43 minutes. It has been digitally edited for high quality, and has an original soundtrack and professional narration.

Public performances have attracted large, enthusiastic audiences and reviewers comment that "The Rise and Fall of Lake Hitchcock is truly an outstanding bit of educational film making," J. Ridge, Tufts University, and "This interesting and sometimes humorous video introduces many processes and land forms of the glacial geologic environment. It is a very useful resource for geology classes even beyond the Connecticut River Valley", C. Dorion, Orono, ME.

To purchase a copy, information and an order form can be found at the web site listed above, or call for more information.

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A conference in Albany, sponsored by the New York Geologic Survey last spring merged the interests of New York archeology and glacial geology communities in stimulating fashion. Another major step in the same direction will be the symposium on the intensively investigated Hiscock Site northeast of Batavia, scheduled for October 1, 2001 by the Buffalo Museum of Science.

Hosted last June by Julie Brigham-Grette and a topflight team of trip leaders, the Northeast Friends of the Pleistocene benefitted from an excellent review of glacial history and geomorphology of the Connecticut Valley.

Watch now for news of the next reunion, the first week of June 2001, when Serge Ochietti and associates will host the Friends in Quebec, examining evidence of what happened while the continental ice sheet withdrew north of the international border.

This past summer, with Jay Fleisher and other BERGers (Bering Glacier Research Group), I returned to Alaska to observe changes taking place during Bering Glacier's recovery from the 1993-95 surge, and to interpret glacial history on the extensive Bering Glacier foreland. The most unique discovery, disinterred by thinning ice near the terminus and found by Palmer Bailey, was evidence of human occupance -- our own pre-surge campsite.

BERG began in 1988, following New York Geological Survey's publication of Map and Chart Series No. 40 (Surface Geology of New York, at 1:250,000 scale). The initial objective was to better understand the nature and origin of New York landscape features by analogy with present active shaping of a glacial landscape in Alaska. As it develops, the analogy works in reverse as well, for New York's through valleys provide a key for recognition of similar topography where the compound MartinRiver/Steller/Bering Glacier overrode moderate hill country between the Chugach Range and the ocean.

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Now in my seventh year at Union College, this (my first) entry to the Glaciogram is far overdue! At Union I teach introductory courses in Environmental and Historical Geology, and upper level courses in Geomorphology, Glacial and Quaternary Geology, and Lakes and Environmental Change. My research is focused primarily on the glacial and climatic history of the tropical Andes Mountains of Peru, Ecuador, and Bolivia, but increasingly I have found equally interesting research in the Capital District and surrounding region of eastern New York, which involves far less travel and considerably fewer logistical hurdles!

In the Andes, our focus is on the late glacial interval (Rodbell and Seltzer, 2000; Rodbell, 2000), on lake sediment cores that span the last glacial maximum (Seltzer et al., 2000), and on records of El Niño events that are preserved in lakes in southern Ecuador (Rodbell *et al.*, 1999). Each summer we spend between 3 and 5 weeks in the Andes, and typically I am accompanied by 1-2 Union College seniors each summer. Their thesis research projects have played an important part of our research, and many of these seniors have gone on to Quaternary graduate programs (University of New Mexico, Syracuse University, University of Alaska, and SUNY Albany).

One interesting project, which is close to completion, is the late Quaternary tephrochronology of southern Ecuador as documented in mm-thick tephra layers in organic-rich cores from 5 alpine lakes in Las Cajas National Park. We geochemically fingerprinted glass and phenocrysts for each eruption using the electron microprobe at the Department of Earth and Environmental Sciences at Rensselaer Polytechnic Institute. AMS ^{14}C dates of macrofossils reveal that the most widespread tephra were deposited ~2390, 5290, 7170, 8790, and 10, 210 cal yr BP; the youngest of these coincides with an eruption of Nevado Cotopaxi (5897 m asl), ~225 km north of the lakes. We have yet to determine the source volcanoes for the older tephras. Nevertheless, the tephrochronology has proven to be a very useful tool for precisely correlating among proxy indicators of environmental change recorded in multiple lake cores.

Local research projects have been led by my senior thesis students, whose research has focussed on two main themes: late-glacial to Holocene lake sediment records from Collin's Pond and Ballston Lake, and the geomorphic and lake sediment record of cirque glaciation in the Catskill Mountains. Collin's Pond, an oxbow lake on the north side of the Mohawk River, contains a high resolution record of Mohawk River floods. Radiocarbon dates of only ~1.0-1.4 ka from the base of 5-8 meter-long cores that penetrate the full lacustrine sequence reflect the episodic deposition of overbank silt and sand from flooding events of the Mohawk River. One can clearly see the effect of European settlement and of industrial activity on sedimentation rates, heavy metal deposition, and charcoal abundance. In contrast, cores from Ballston Lake, a long and narrow lake basin in the avulsed channel of the paleoMohawk River, yield radiocarbon

ages of ~11,000 ^{14}C yr BP at the base of 8 meters of lacustrine sediment. Present research on Ballston Lake is to complete a high resolution pollen record of the late glacial, and to devise some means to core through what we think could be ~40m or more of mm-scale rhythmically-laminated sediment at the base of the 33-meter deep, meromictic southern basin of the lake. This combination of a thick sediment sequence in a deep basin makes it very challenging to retrieve a complete sediment core.

Work in the Catskills has focussed on the Schoendorf cirque, a north facing cirque at the head of Johnson Hollow Brook (see p. 84-85 of Caldwell, 1986). In 1997 we cored the moraine dammed lake in the floor of this cirque and obtained a basal radiocarbon age of ~10,300 ^{14}C yr B.P., which approximately dates the transition from inorganic, rhythmically -laminated silt to organic-rich gyttja. The date suggests the possibility that this cirque became ice-free as late as the end of the Younger Dryas. I would like to take several other cores from this lake to confirm the timing of deglaciation, and to acquire some exposure ages (^{10}Be or ^{26}Al) from the erratics on top of the moraine that impounds the lake basin to determine the timing of the culmination of the latest phase of cirque glaciation. From my review of the literature it seems that this is one of the better cirques in the northeast that provides strong evidence for post Laurentide cirque glaciation.

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Research continues in New York on several fronts.

I'm still working with Bill Kappel in the Tully Valley and a part of this effort has recently appeared as a USGS Fact Sheet ? "History of Landslides at the Base of Bare Mountain, Tully Valley, Onondaga County, New York". The fact sheet describes the record of paleolandslides in the Tully Valley and is an outgrowth of the B.S. thesis completed by my student Moira Walker. Contact me, or Bill, if you would like a copy of the fact sheet. Also related to the Tully Valley, I presented a paper reviewing the various landslide follow-up studies at last year's Geomorphology Symposium on "Geomorphology in the Public Eye". A manuscript from the conference has made it through USGS peer review and will be part of the symposium volume.

Surficial mapping for STATEMAP also continues. The Skaneateles 7.5 quad has been submitted to the survey and work continues on this summer's focus, the Spafford quad. My student Julie Engel is using ArcInfo to look at glacial erosion patterns in this and the adjacent Finger Lakes valleys as part of her B.S. thesis. With 7.5' mapping data from most of the quads in Onondaga County now compiled and in the process of being GIS'd, I think it might be time to try to say something about the glacial history of this region. We'll plan on doing that next year at both Burlington and Boston.

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Here is our GSA abstract, which has been accepted for the GSA-Reno national meeting in November, if you are interested in something from New Hampshire. Paul Bierman and I have proposed to extend this study to other mountainous areas throughout northeastern United States, but the NSF has been reluctant to fund us so far. We have a manuscript based on the GSA abstract about ready to submit to Science. I also collected more samples from boulders at Pineo Ridge in southeastern Maine during the NEIGC earlier this month for cosmogenic exposure dating, to provide additional dating control and calibration of nuclide production rates should we obtain additional funding.

OLD SURFACES ON NEW ENGLAND SUMMITS IMPLY THIN LAURENTIDE ICE

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The abundance of 10-Be and 26-Al in frost-riven bedrock samples collected from the summits of Mt. Washington in New Hampshire and Mt. Katahdin in Maine is much higher (1.5 to 8 times) than expected had the peaks been covered by active, erosive ice during the last glacial maximum (LGM) about 21.5 ky calibrated 14-C years ago. Samples from the summits of Mt. Washington have 10-Be model exposure ages of 124 and 22 ky; one sample from Mt. Katahdin has a model age of 25 ky (assuming production rates of Nishiizumi et al., 1989). In contrast, other near-summit samples (n=3) and boulders (n=5) from the Basin Ponds moraine on Mt. Katahdin have an average age of 12.7 +/- 0.7 ky. A single boulder from the well-dated Pineo Ridge moraine complex in coastal Maine (13.2 to 14.0 cal 14-C ky BP) can be used to estimate integrated 10-Be and 26-Al production rates of 5.8 to 6.1 and 38.3 to 40.7 atoms/(g*yr) at 60 m asl and 44 degrees N. The mountain-top samples are consistent with two different scenarios, both of which have significant implications for understanding the spatial and temporal pattern of glaciation and glacial erosion in New England: 1) LGM Laurentide ice was thinner than previously supposed leaving the top of Mt. Katahdin exposed since early stage 2 and parts of Mt. Washington's summit exposed since stage 6, 2) both summits were covered by glacial ice during the LGM, but the ice was thin enough to be frozen to its bed. Thus, the cold-based ice was unable to erode much rock, allowing nuclides to be inherited from prior periods of exposure. In either case, Laurentide ice in New England during the LGM was thinner than previously believed, consistent with low basal shear stresses and/or the presence of active ice streams.

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My students John Rayburn (Ph.D. candidate) and Steve Hensler (M.A. student) have continued their studies on pro-glacial lakes. Steve has been re-examining evidence of high-level lakes impounded in the Cayuga Lake basin during ice retreat. Detailed field mapping in the Enfield Glen-Newfield area has led him to an understanding that high-level local lakes were impounded in the upper Enfield Glen area due to ice blockage in the Cayuga Trough and outlet control at Pony Hollow to the southwest. Retreat of the ice led to lake lowering, with resulting outflow and sedimentation in and around the present site of Newfield. Some of the sedimentation from these lakes was impressive--for example, more than 30 m of foreset beds are exposed just northeast of Newfield where drainage of the high lakes emptied into an early "Lake Ithaca" impounded in the southern Cayuga trough. He is currently completing a re-evaluation of the levels of Lakes Ithaca, Newberry, Dana, etc., in the southern half of the Cayuga trough to better understand the rate and pattern of post-glacial isostatic rebound. He and I led a well attended trip to view this work at the NYSGA meeting held in Geneva in September. Steve's findings in the Cayuga trough, coupled with our organization of the field trip, has led me to the Seneca trough, where fewer high-level pro-glacial lakes developed due to a stable lower-elevation outlet at Horseheads. In contrast to the Cayuga trough, deltas are broad and extensive landforms. I hope to spend considerably more time studying this area, and ultimately examining the pro-glacial lake history of other Finger Lakes, over the next few years.

John Rayburn was busy continuing to map Lake Vermont shorelines last summer. The New York side now been investigated from the Canadian border to just north of Ticonderoga, and the Vermont side from South Burlington to Bristol. John sampled lacustrine sediment from both outcrop and core. The lacustrine clays are strongly laminated, suggestive of the varve record in other northeastern pro-glacial lakes. This lends support to Jack Ridge's initial correlation to the New England Varve Chronology, which will be a focus of continuing work. Datable material (mostly birch seeds) was recovered from Fort Ann phase laminated clay at an outcrop near Plattsburgh, New York. Other samples are still being investigated. Finally, John is making preliminary calculations of volume loss for the drop from the higher (older) Coveville phase level to the lower (younger) Fort Ann phase level with the data collected to date. This calculation and its implications will (hopefully) be presented at the Northeastern GSA in Burlington, Vermont next spring. Ultimately we plan to use the results of mapping and chronologic studies to better constrain the timing and flux of changing freshwater flows into the North Atlantic during deglaciation.