EDITORIAL POLICY

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

Parker E. Calkin
Parker Calkin – Geology, University at Buffalo

Timing of Pleistocene glacial events in New York State – by Ernie Muller and I was published in Canadian Journal of earth Science, v. 30, p. 1829 – 1845 (1993) (See Muller entry). Otherwise, I have been rather nonproductive in New York State affairs. Two students working on the buried valley of the Allegheny (Eric Pefley) and on the glacial map of Monroe Co. (Mike Lienk) are rumored to be finishing their work soon. Steve Metzger has defended his thesis on the Eskers of New York State and it should be turned in soon. I had an undergrad student start studying the lacustrine terraces along the New York shore of Lake Erie. However, I haven’t heard from her since the first few weeks of school and almost certainly have scarred her off.

I continued to work on Holocene glaciation in Alaska – David Barclay and I will be in Yakutat Bay area this summer with Lamont-Doherty tree-ring people (Greg Wiles and Gordon Jacoby). Will be in West Antarctic in December and January looking for elusive trimlines of the Late-Holocene ice sheet (with student DAvid Barclay, Greg Wiles, and Hal Borns).

Let me call your attention to announcements of up-coming local meetings of great importance to glacial types. The announcement for the Northeast Friends of the Pleistocene indicates that April 29th is the deadline for registrations. The Preliminary Announcement for the New York State Geological Association field meeting is also included. Note that this is a preliminary announcement so further details will be coming to regular recipients of these announcements later. I am looking forward to the Friennds Trip and of course the trip of Dick Young and Goodman, Cole and Lehmann in October.

What do you think of the included cryptic announcement from Mike Wilson?
FINAL ANNOUNCEMENT
NORTHEASTERN FRIENDS OF THE PLEISTOCENE
MAY 20-22, 1994

Late Wisconsinan to Pre-Illinoian (G ?) glacial and periglacial events
in eastern Pennsylvania

LED BY: Duane D. Braun, Geography & Earth Science, Bloomsburg University of PA. 17815
Edward J. Ciolkosz, Agronomy Depart., Pennsylvania State University
Jack B. Epstein, United States Geological Survey
Jon D. Inners, Pennsylvania Geological Survey

TENTATIVE FIELD TRIP PLAN:
Friday, May 20, 1994, 1:00 to 5:00 PM:
Optional trip to the Rupert Watergap on the North Branch Susquehanna, the most critical choke point for John Shaw's hypothesized catastrophic sub-glacial flood that supposedly formed the drumlin field in New York State.

Saturday, May 21, 1994, 7:45 to 5:00:
Stop 1: Late Wisconsinan terminus: deposits and soil development exposed in a 50 m deep sand & gravel pit.
Stop 2: Late Illinoian (pre-Illinoian B ?) terminus: deposits, weathering, and colluvial mantle exposed in a 50 m deep, 3 km long, abandoned anthracite strip pit.
Stop 3: LUNCH and Anthracite museum at Eckely Miners Village.
Stop 4: Pre-Illinoian (B, D or G ?) deposits, and colluvial mantle exposed in a 100 m deep, active anthracite strip pit (exposure dependent on stage of multiple bench stripping activity).
Stop 5: Pre-Illinoian (B, D or G ?) deposits, weathering, paleosols, and colluvial mantle sequence exposed where a stream cascades into an abandoned anthracite strip pit.
Stop 6: Pleistocene ridge-top tor, boulder colluvium exposure, and regional overlook (weather permitting!).

Sunday, May 22, 1994, 7:45 to 3:00:
Stop 1: Southern limit of Laurentide ice (pre-Illinoian G ?), erratics and distribution of remnant deposits.
Stop 2: Southern limit of Laurentide ice (pre-Illinoian G ?), morainic landform, glacial or periglacial?
Stop 3: Boulder field and boulder colluvium exposure at the base of a sandstone strike ridge (Blue Mtn.).
Stop 4: LUNCH at park picnic area, more boulder colluvium.
Stop 5: Pre-Illinoian (G ?) intensely weathered outwash exposed in a road cut.
Stop 6: Boulder colluvium, 100 m long and 5 m deep along contour outcrop showing regularly spaced boulder concentrations (stone stripes?), overlies pre-Illinoian glacial deposits elsewhere in the area.

NOTE: On Sunday, Stop 1 will be most distant from the conference hotel (33 mi.) and each successive stop will be closer to the hotel (Stop 6 will be 12 mi. from the hotel). Also, all stops on Sunday will be shorter than on Saturday due to limited outcrop and time constraints. Stop 1 and 2 may be combined.

REGISTRATION DEADLINE: APRIL 29, 1994

Due to hazardous nature of some stops, trip will be limited to first 100 respondents.
Pre-registration is required for all conferees so that group "release forms" can be made up for attendees to sign upon arriving at the conference hotel.
PRELIMINARY ANNOUNCEMENT

66th ANNUAL MEETING.

NEW YORK STATE GEOLOGICAL ASSOCIATION

"Geology of the Rochester Area of New York; Fairchild’s Genesee Valley Geology Revisited."

Friday, October 7 through Sunday, October 9, 1994

The sixty-sixth annual meeting of the New York State Geological Association will be hosted by the University of Rochester, Department of Earth and Environmental Sciences. The meeting will be held on Columbus Day weekend, October 7 through 9, and will feature two days of field trips as well as tours of geochemistry and rock magnetics laboratories, and guest speakers and special events. The headquarters will be at the Department of Earth and Environmental Sciences located in Hutchison Hall at the University of Rochester River Campus. The usual registration and informal welcoming reception with cash bar and an open house of the department will be held on Friday night between 6 and 10 P.M. Full day field trips on Saturday, October 8, will begin at 8 A.M. in Parking Lot B outside of Hutchison Hall at the University. Larger trips will use buses; others will use private or university vans. Sunday’s trips will be half day and by private vehicles, and will commence at 8:30 A.M. and run until approximately 2:30 to 3:30 P.M.

We intend to offer a broad spectrum of field trips, covering an array of surficial and bedrock geology, and overviews of environmental geologic problems, geomorphology and urban geology. We would welcome additional suggestions for field trips from anyone.

The Genesee Valley area features an excellent cross section of Mid Paleozoic sedimentary rocks, ranging in age from the Late Ordovician to the Late Devonian. Upper Ordovician Queenston red beds and overlying Lower to Mid Silurian mixed carbonates, shales and sandstones, including the well known Clinton hematites, are exposed in the heart of Rochester itself. To the south are exposures of Late Silurian evaporites, shales and eurypterid-bearing dolostones, through fossiliferous beds of the Middle Devonian Onondaga Limestone. Overlying black and dark gray, exceptionally fossiliferous shales of the Middle Devonian Hamilton Group are exposed in tributaries of the Genesee River south of the Thruway. Outstanding exposures of Upper Devonian shales and siltstones of the "Portage" facies crop out in the spectacular cliffs of the Genesee River gorge at Letchworth Park, "the Grand Canyon of the East". Many of the outcrops in the Genesee area and the immediate vicinity are extraordinarily fossiliferous, and the strata themselves have been subject to substantial reinterpretation in the light of event and sequence stratigraphy, taphofacies, and models of foreland basin dynamics.
The Genesee region is also a classic area for the study of surficial and glacial geology. The Genesee Valley was occupied by an extraordinary sequence of proglacial and moraine dammed lakes. Classic examples of eskers, kames, kettles and drumlins can be viewed in areas such as Mendon Ponds Park and in the Pinnacles Hills moraine, within the city of Rochester itself. Within the past decade, Pleistocene sand and marl deposits in the Genesee Valley have yielded an exquisite mastodon skeleton, as well as other fossils. The basic outlines of the complex Pleistocene geologic history of the Genesee Valley were established by Herman Leroy Fairchild. However, renewed interest in surficial deposits, together with radiocarbon dating, have yielded a substantially modified picture in the past several decades.

The Rochester area is also an ideal region for the study of urban geology and environmental hazards and problems. These include landslides and slumps within Pleistocene sediments around the Irondequoit Bay region, problems of river erosion and flood control, including spectacular examples of migrating meander loops in the modern Genesee River, and the development of hazardous waste dumps in several places in the region.

The Annual NYSGA Banquet and business meeting will be held on Saturday night, starting with a mixer at 7:30 P.M. with dinner at 8:00 P.M. A brief business meeting and guest lecture will follow. Tentative plans include a banquet in the University’s student union.

Tentative agendas for the Saturday field trips are as follows:


A2. Pleistocene geology of the Rochester and Genesee Valley area. R.S. Young, leader.


A4. Stratigraphy and facies relationships of the Eifelian Onondaga Limestone and lower Marcellus Shale in western and west central New York State. C. Ver Straeten and D. Griffing, leaders.

A5. Paleontology and stratigraphy of the Moscow and Genesee Formations (Middle Devonian; Givetian) in the type area, Genesee Valley New York. C. E. Brett and G.C. Baird, leaders.

A.6 Biostratigraphy, facies relationships and community paleoecology in the Late Devonian, Genesee, Sonyea and West Falls groups in western New York (tentative). D. Woodrow, Jeff Over and W.T. Kirchgasser, leaders.
The agenda for Sunday, October 9, 1994, will feature shorter versions of the surficial and environmental geologic trips, as well as more in depth looks at several particularly fossil-rich or mineral-rich localities in the Genesee Valley area. The trips include the following:


B3. The stratigraphy, paleontology and minerals of the Silurian Penfield dolomite in the Rochester area. Leaders to be determined.


B5. Stratigraphy and eurypterid paleoecology of the Upper Silurian, Salina and Bertie groups. S. Ciurca and R. Hamell, leaders.


Housing

There are several economy hotels in the Rochester area, with the rates ranging from about $30.00 to approximately $70.00 per night for a single room.

Information

For further details please send a postcard with name and address to Dr. Carlton E. Brett, Department of Earth and Environmental Sciences, NYSGA Fall Meeting, University of Rochester, Rochester, New York 14627.
David DeSimone—Geology, Williams College

This past field season was a busy one. For meetings, I chose to accompany Dave Franzi and Jack Ridge on their NYSGA trip from Plattsburgh. A fine time. Of course GSA-Boston drew my attention for several days—as much as could be spared from teaching responsibilities. Curiously, I wound up spending a good deal of time sitting in on the KT symposium. Gerta Keller, co-chair of that exciting series of talks, recently came to Williams to give two lectures. I found it intriguing that she has a late Cretaceous gradual temperature decline and sea level drop followed by a rapid warming and sea level rise. The former took place over approximately 60,000 years, with the latter taking 6,000–10,000 years according to her data. Sounds a lot like a glacial cycle, doesn't it? To my knowledge, and hers upon questioning, there is no evidence of ice for the terminal Cretaceous. What an interesting path for future investigations! Does anyone out there wish to combine forces and tackle the issue?

I just returned from the Seventh Keck Research Symposium in Geology held on the Trinity University campus in San Antonio. There, I presented a talk which introduced the posters completed by the five pairs of sophomores who spent four weeks with me and Bob Newton (Smith) investigating aspects of the surficial geology and hydrogeology of the VT-NY-MA tri-state area. Some very interesting original research was accomplished. The Abstracts Volume of these investigations and of the other seven Keck projects can be obtained from Beloit College, Dept. of Geology, Beloit, WI 53511. Each abstract is really a mini-manuscript of four pages length. The sophomore project I directed was co-funded by NSF and included five minority students from outside the consortium. This is a wonderful opportunity for students. Contact me if you would like to learn more about Keck opportunities for your sophomore majors who qualify as minorities. There are two Keck-NSF projects again this summer, a hard rock
project in Quetico and a remote sensing project in San Antonio. Ten slots await filling with promising potential or bona fide majors.

Closest to my own research, one pair of students mapped and investigated the Otter Creek channels heading on Nipmoose Hill eastern Rensselaer County. They described an anastomosing set of channels scoured to bedrock with miniature scabs preserved on the channel floors and related the flood channel history to draining of lower stages of Lake Bascom in the Hoosic Valley. These two students will pursue publication of an expanded version of their abstract, perhaps in Northeastern Geology.

Other project topics included surficial geologic mapping in Vermont and Massachusetts, a hydrogeological investigation of a closed landfill in Pownal, VT, and a geochemical study of the headwaters of the Batten Kill in southern Vermont. All in all, a fine set of results.

Barring any changes of status for me here at Williams, the forthcoming field season will, in part, be consumed by another Keck project. This one, for juniors which leads to their senior honors theses, will study glacial and periglacial geomorphology in the Clark's Fork area of Montana and Wyoming, just outside of Yellowstone. The project is being directed by Bob Carson (Whitman) and has Eric Leonard (Colorado College) and myself aboard as faculty. I am looking forward to it and to re-starting an investigation of deltas and water planes in the Hudson and Champlain lowlands to address the issue of our "anomalously low" tilts for Lake Albany and succeeding lake levels.
Aleksis Dreimanis and Stephen Hicock---Geology, University of Western Ontario

Aleksis Dreimanis has completed a paper on the west end of the St. Thomas moraine in southwestern Ontario—a unique waterlain moraine. On the higher ground between Wallacetown and St. Thomas it is a low and broad till rise capped by numerous sandy and gravelly crevasse filling ridges, many of them with squeezed-up Port Stanley till in their cores.

No topographic expression of the moraine is visible between Wallacetown and the north shore of Lake Erie. The bluff sections along Lake Erie reveal two small buried ridges several tens of metres lower than the moraine on land. The lower ridge consists of basal till, the upper one of "waterlain till" and glaciectonically deformed glaciolacustrine sediments. A partly floating ice stream, being part of the Erie lobe, is suspected to be responsible for the formation of the lower two ridges, while the terminus of the main lobe on higher ground began to stagnate and Lake Maumee waters entered its crevasses.

Another paper is in preparation with C. Gordon Winder and Rauno Aaltonen on the urban geology of the City of London, Ontario. Aleksis is planning to continue his investigations of subglacial sedimentation this summer.

---------------------------------------------


Within the National Geologic Mapping Program the New York STATEMAP will receive support for detailed surficial geologic mapping in the White Plains and South Onondaga 7 1/2 minute quadrangles for 1994. The New York State Geological Survey will be the program administrators. Drs. Les Sirkin and Gordon Connally will map in the White Plains quadrangle and Dr. Donald Pair will map in the South Onondaga quadrangle.

---------------------------------------------

8.
As you may have already heard at the Annual Meeting of GSA in Boston (paper by Ernie Muller) or the Northeast Section Meeting in Binghamton (paper by Don Cadwell), the surge of Bering Glacier continues to be vigorous. Last June BERG [Bering Glacier Research Group consisting of Ernie Muller (Syracuse University), Don Cadwell (NY State Geological Survey), Chuck Rosenfeld (Oregon State University), Palmer Bailey (CRREL) and Austin Post (U.S. Geological Survey)] discovered crevasses forming on domed ice due to passage of a kinematic wave from the trunk glacier into the Bering piedmont lobe. The energy reached some parts of the terminus in mid-July causing a surge to press ice into Lake Vitus at the southern margin and onto a foreland island along the eastern front. By mid-September most of the piedmont lobe was deformed by doming over subglacial highs. Throughout the fall advancing ice altered the peripheral drainage system by closing outlets and displacing lake water by rising sub-bottom ice. Since then we have monitored activity by return visits in October, November, January and March. Ice continues to advance along the eastern piedmont margin at rates that vary from 3.1 to 7.1 m/day as a 15-20 meter high wall of broken, house-size ice blocks are thrust forward. Interestingly, the rate at any given location has varied seasonally, and is different along the ice margin. It appears as though rate of movement is influenced by both relief of subglacial terrain and differential flow within the piedmont lobe. Meltwater discharge was about 60% less through the fall and winter than last June. Whether this is seasonal or surge-related remains to be determined. Ice continues to thicken against the Grindle Hills near the piedmont apex and upvalley at Override Ridge, a bedrock reference for surge intensity. It is clear that crevassing has increased upglacier through the winter and now reaches well into the Bagley Ice Field. Observations in late March suggest multiple bulges recently passed down the trunk at the base of Waxell Ridge.

BERG plans to return for most of June and shorter periods throughout the summer with two SUNY-Oneonta undergraduates and an Oregon State graduate student to continue our field work and monitor surge activity, primarily along the eastern piedmont terminus. CRREL will supplement our data base with a continuation of ice-penetrating radar surveys initiated last fall.
Paul F. Karrow---Earth Sciences, University of Waterloo

Although I seem to have been writing "forever", progress on the backlog seems frustratingly slow. A note on bedrock popups has just come out in *Geographie physique et Quaternaire*, the only paper published so far on work underway since 1988 on raised shorelines on Manitoulin Island. After a two-year lapse I plan to return there in early May after G.S.A. in Kalamazoo to continue the surveys. The full range of shorelines from Algonquin down through Nipissing is best revealed in the east part of the Island. The western part is not high enough to reach Algonquin and is more bush covered and less accessible by road anyway.

Persistent writing has seen the submission of two papers: buried valleys drilled and geophysically logged north-east of Waterloo with John Greenhouse and a paper on vertebrate sites near Tampa, Florida. Others in late preparation stages deal with the Mill Creek MI interstadial site, a Lake Algonquin fossil site near Georgian Bay, an interglacial fossil site in Washington State, and one on the Waterloo moraine. The last is with Vico Paloschi who completed his M.Sc. on the subject about a year ago and a paper on it was presented at Boston G.S.A. A paper with Brenda Hann, former PDF and now at University of Manitoba, completes a study of Cladocera from the Toronto interglacial and is in press with *Journal of Paleolimnology*.

K. Rajakaruna is now completing his M.Sc. on Phase 1 drilling for subsurface stratigraphy which was funded by the Region of Waterloo for hydrogeology of the Waterloo moraine. Phase 2 is the subject of work by successor Simon Gautrey. This work is shedding much new light on the internal structure of an interlobe (Georgian Bay-Ontario lobes), partly palimpsest complex with depths to rock of over 100 metres.

Jenny Yang is progressing in her M.Sc. work comparing mollusc records from Gage Street, Kitchener, and Bishop Street, Cambridge, marl deposits. Remi Farvacque will return to Pukaskwa National Park, east shore of Lake Superior, to complete field work for his geoarchaeological study of raised shorelines, and Andy Stuart will extend his B.A. work on shorelines and Paleo-Indian sites into an M.Sc. thesis at Thunder Bay, northwestern Lake Superior.

Other work underway includes completing a paper on the Woodbridge site, near Toronto, which has been studied for over 30 years and new fossils keep appearing, and one on a marine clay freshwater marl and peat succession at Victoria, B.C.

It is now a little over a month to the GAC meeting here in Waterloo in May which precludes attending Midwest and Northeastern Friends trips on adjacent weekends. I do plan to attend AMQUA in Minnesota then visit my two students at Lake Superior on the way home. Beyond that I do not have any further meeting plans this year.
I. Peter Martini---Land Resource Science, University of Guelph

It is a bit long I have written you...too busy I guess. I seem to have missed your e-mail address: please send it back to me. An old e-mail address of a colleague of yours (Greg Wiles) I had, does not seem to work.

This time I suppose I like report two of my activities in areas not too far from New York. Both deal with my long lasting interest in the study of the Hudson Bay region and the Sediments of Southern Ontario: that is the study of cold climate sediments.

1. For Hudson Bay we are now looking a bit closer to the rivers of the Hudson Bay Lowland. For a while there was a renewed interest in the area because Ontario Hydro was proposing to build several dams in the Moose River Basin. Now everything has been postponed and although it was realized by public officials and Hydro how little was known about those subarctic system it still very difficult to get adequate funding to work there. At the moment a student of mine (Tania Poehlman) is studying the water and sediment dynamic at the head of the Moose River estuary. We are interested in particular in establishing the evolution and growth pattern of large sandbars downstream from islands. That study is also of interest because the two villages in the have and are still growing at a fast rate. The human interference with the river, combined with the persistent post-glacial isostatic uplift of the region start to generate some navigational problems.

2. The study of the Quaternary sediments of Southern Ontario as taken some interesting twists recently. For one we (I and Mike Brookfield) are trying to determine whether and how some aspects of sequence stratigraphy can be applied to Quaternary lacustrine deposits. For another, we are looking at the effect of large to catastrophic floods in lacustrine deposits. For many years we have been sitting on data from the Bowmanville Bluffs (northshore of Lake Ontario east of Toronto) simply because any explanation we tried was rather unsatisfactory. The magnificently exposed sections show a very complicated stratigraphy and sedimentology related to the direct effect of the glacier in the lakes. For instance, deep buried valleys exist filled with various materials; we are in the process to analyze in details such fillings and establish, we hope, whether they represent tunnel valleys or lake lowstand events.

**************************
Completion of the New York State Surficial Geology Folio at 1:250,000 (NYSM MSG # 40) a few years ago was a notable achievement. However, mapping of surface materials on reconnaissance scale is only a platform for essential work toward interpretation of the regional stratigraphic framework and detailed mapping of local relationships.

Several stratigraphic studies that were recently wrapped up after being a long time a-borning (SEPM 1992, Spec.Pub. 48:385-396; QR, 1993 40:163-169; CIES, 1993, 30:1829-1845) have served, in my mind, to make clear how primitive our basic knowledge of New York glacial geology remains.

It is heartening, however, that even while studies like these were in the mills, ongoing research was answering some of the questions and questioning some of the answers they contain. In this regard, I have in mind Dick Young's study of exposures in the Dugan Creek area of the mid-Geneesee Valley, and thesis research by Petruccione and Wellner in the Finger Lakes region, as well as work in Pennsylvania, Ohio and Ontario.

In case Todd Miller doesn't mention it, I call attention to his recent study of the anatomy of a particular Valley Heads Moraine in "Glacial Geology and the Origin and Distribution of Aquifers at the Valley Heads Moraine in the Virgil Creek and Dryden Lake - Harford Valleys, Tompkins and Cortland Counties, N.Y." (USGS Water Resources Report 90-4168).

Young's note in the Glaciogram last fall caught the attention of a number of us interested in resolving differences between evidence from Irondequoit Bar and the western part of the Ontario Basin relative to the minimum level of Early Lake Ontario.

Paul Karrow suggested an informal workshop as a useful way of evaluating the evidence to resolve, or at least, to clarify the differences. He suggested the NEGSA meetings in Binghamton (3/25-26) as a possible venue for such a session. Unfortunately, I could not attend NEGSA this year, so I am not up to date regarding discussions that may have occurred.

As Don Cadwell was preparing to represent BERG with a report at Binghamton on the surge of Bering Glacier, Jay Fleisher and I FAXed him the hot news that Bering Glacier was just entering our camp of last summer. At last we had running water in the "john" and ice in the kitchen! The surge that began in late spring of 1993 continues unabated. However, local signs of ice thinning just below the Bagley Ice Field were noted for the first time in late March. ... Plans call for continued field study of the Bering Glacier surge this summer.

*******************************************************************************

12.
<table>
<thead>
<tr>
<th>CONTRIBUTORS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parker E. Calkin - Dept. of Geology, University at Buffalo, 415 Fronczak Hall, Buffalo, NY 14260</td>
<td>1</td>
</tr>
<tr>
<td>NE Friends of Pleistocene</td>
<td>2</td>
</tr>
<tr>
<td>NYS Geological Association</td>
<td>3</td>
</tr>
<tr>
<td>David DeSimone - Dept. of Geology, Williams College, Williamstown, MA 01267</td>
<td>6</td>
</tr>
<tr>
<td>Aleksis Dreimanis - Dept. of Geology, University of Western Ontario, London, Ontario, Canada N6A 5B7</td>
<td>8</td>
</tr>
<tr>
<td>Robert H. Fakundiny - New York State Geological Survey, 3140 Cultural Education Center, Albany, NY 12230</td>
<td>8</td>
</tr>
<tr>
<td>P. Jay Fleisher - Department of Earth Sciences, State University College at Oneonta, Oneonta, NY 13820-4015</td>
<td>9</td>
</tr>
<tr>
<td>Stephen Hicock - Dept. of Geology University of Western Ontario, London, Ontario, Canada N6A 5B7</td>
<td>8</td>
</tr>
<tr>
<td>Paul F. Karrow - Department of Earth Sciences, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1</td>
<td>10</td>
</tr>
<tr>
<td>I. Peter Martini - Dept. of Land Resource Science, University of Guelph, Guelph, Ontario, Canada N1G 2W1</td>
<td>11</td>
</tr>
<tr>
<td>Ernest H. Muller - Dept. of Geology, Syracuse University, Heroy Laboratory, Syracuse, NY 13244</td>
<td>12</td>
</tr>
<tr>
<td>Henry T. Mullins - Dept. of Geology, Syracuse University, Heroy Laboratory, Syracuse, NY 13244</td>
<td>13</td>
</tr>
<tr>
<td>Michael P. Wilson - Dept. of Geosciences, SUNY College at Fredonia, Fredonia, NY 14063</td>
<td>13</td>
</tr>
</tbody>
</table>