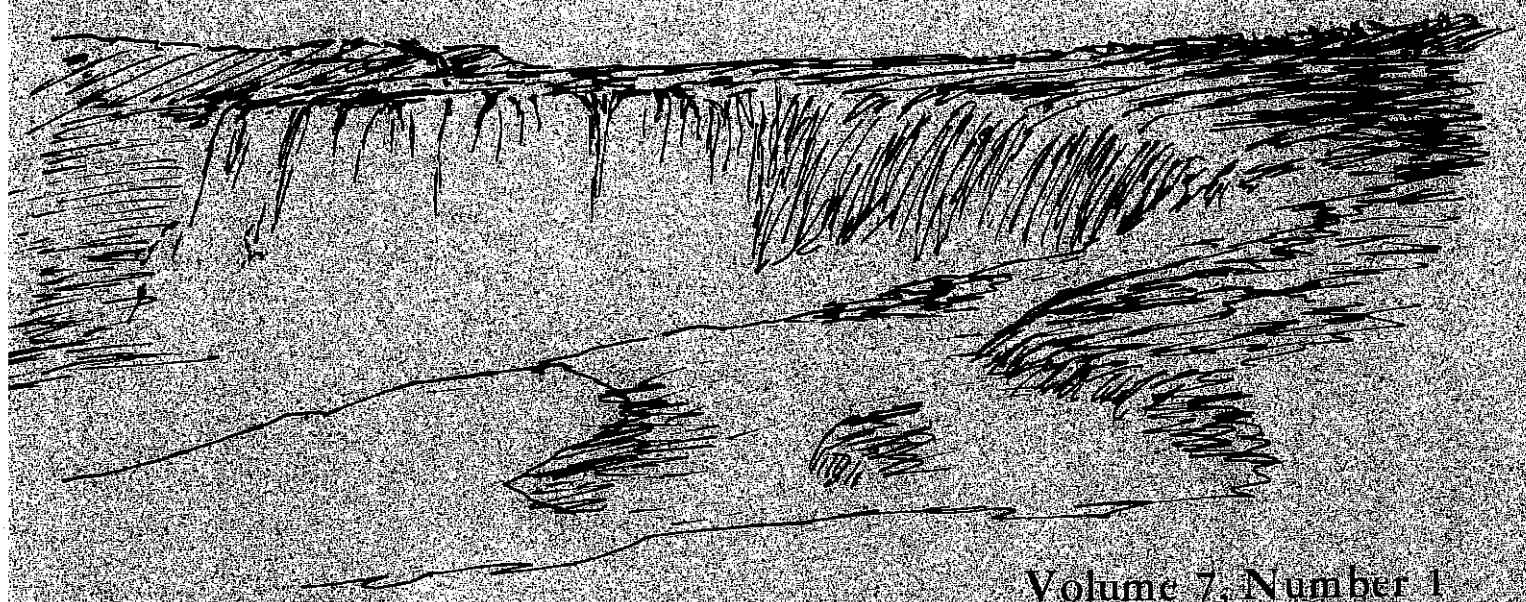
NEW YORK GLACIOGRAM



Volume 7, Number 1
February 1972

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The fold-in map is a striae compilation for the Binghamton region (1:250,000 U.S.G.S.).

GUEST EDITORIAL

STRATIGRAPHIC REMINISCENCES

George W. White

In my paper at the November, 1970 GSA Milwaukee symposium on Wisconsinan tills I discussed the history of investigations and classification of Wisconsinan drift in the central interior. Only a very small part of the oral presentation and a somewhat longer, but still brief, part of the written text dealt with the various bases for rock-stratigraphic classification of tills. The present discussion can only be a summary based mainly on my personal experience and in my association with my students and associates. Our own rock-stratigraphic usage has been cooperative and has evolved over a period of almost 20 years.

As we all know, the earlier Stratigraphic Code provided exceptions for the Pleistocene. This history is presented in excellent detail in the new Bulletin 94 of the Illinois Survey (pp. 37-47) and does not need to be reviewed here. Our concern is rather with how did Pleistocene rock-stratigraphic classification develop and where is it now.

Multiple tills were recognized in the Middle West before 1865, but they were regarded as interesting phenomena and the continuity of separate till sheets was not assumed. The variation in composition was assumed to be related to underlying bedrock, rather than to vertical variation of different till units. Also by implication, although different soil types on different tills began to be recognized scores of years ago, it was assumed that a given till continued to the base and such differences in soils were not used for stratigraphic purposes.

The first real study of texture and lithology of glacial till (aside from the boulder and cobble erratics) was by Krumbein in 1933 in a paper in the Journal of Geology, in which he reported on variations in some tills of Illinois. In 1937,

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Presented at Pleistocene Symposium, Grand Forks, N.D., February 2, 1971
The "chatty" style is deliberate in order to preserve the informal approach.

F.C. Kruger (better known for his work in economic geology) wrote on the sedimentary and petrographic study of some glacial drifts in Minnesota. Nobody took up these studies and continued them.

My work in northeastern Ohio with theU.S.G.S., beginning in 1949, was with the Water Resources Division. Although the major interest was at first, as with almost all glacial geology then, with surface morphology, the subsurface became more and more important and we wanted to see if something could be done about subsurface glacial deposits and how they related to water. Robert Smith in Summit County had thousands of well records and John Winslow shortly after in Cuyahoga County and in Portage County began to collect many well records. In looking at the tills that first field season for the U.S.G.S. it soon became apparent that the clay-rich till to the north -- now called Hiram -- had a mapable boundary with a coarser till -- now called Kent -- to the south and southeast. In considering how to characterize these tills I sought the aid of Professor Jack Hough, then my colleague at Illinois who was in charge of our work in sedimentary petrology and was developing new methods in various directions. He urged me to collect quart-sized samples over a considerable area and see what turned up in the mechanical analyses. After the first few analyses it became evident that the data were falling into fairly neat compartments. This seemed promising enough to secure support for a student, Vincent Chester Shepps, who worked on samples collected over several counties and produced a table of 76 analyses which were then statistically treated. His classic paper in the Journal of Sedimentary Petrology in 1953 reported on this study. He found that the texture of the 76 samples fell into three fields which did not overlap. (Murray in Wisconsin about this time had a paper based on 5 or 6 samples.) By that time we had found several outcrops of one till over another and the analyses of these confirmed our belief that these were truly separate tills and could be traced for long distances. Shepps found that a complete analysis was not necessary to characterize a till. but that the determination of the proportion of silt, sand and clay was suf-

ficient, and this is the basis upon which we have operated ever since in the thousands of analyses that have been made. Shepps was a man of high intelligence, great manual skill, artistic ability and fertile imagination. His tragic death in 1967 was a great loss to the geological profession.

We became so excited over these findings that Professor C.A. Chapman thought thin-section analyses would show other interesting things, and so oriented blocks were collected the next field season and sent off for large thin sections. Robert F. Sitler, now at Kent State University, studied these sections and his work was reported in cooperation with Dr. Chapman in the Journal of Sedimentary Petrology in 1955. The textural differences shown in the thin sections were even more striking and positive than those from the mechanical analyses. Of course the various kinds of minerals showed up beautifully. Sitler could tell which of three tills an unknown sample was in ten seconds. I think that the thin section study of tills needs to be revived. Sitler was able to show preferred orientation of the micas and even of the poles of the quartz fragments. Sitler went on to a study of heavy minerals and of other unusual elements in the tills and has produced two more papers of great interest.

About this time Aleksis Dreimanis, at the University of Western Ontario, began his petrographic study of tills. He emphasized the heavy minerals. He has very fine exposures along the north shore of Lake Erie and in a large quarry near London. The presence of several tills was obvious and he began to do stratigraphic work in the 1950's on the Ontario tills. His characterizations of tills by heavy minerals is outstanding.

With our studies of several counties during several field seasons in northeastern Ohio and in northwestern Pennsylvania it became more and more evident that the units that could be characterized on the basis of textural differences, could be followed long distances, and that they maintained the same general character. We began to think of them as "real" formations and it became necessary to refer to

these by name. The first names were of course the old-fashioned ones of mixing up time and rock terms and we called these tills Tazewell, early Cary and late Cary. These names as rock terms appear in reports until 1960 or after.

W en the work on texture to differentiate tills was coming along so well which the thin section studies confirmed, we began cooperation with Professor R.E. Grim on the clay minerals and John B. Droste joined our group in the field to collect samples for clay mineral studies. Droste assisted in mapping in northeastern Ohio briefly and then took extensive part in some elaborate mapping in northwestern Pennsylvania. Some of his clay mineral studies were in cooperation with his younger associate J.C. Tharin. Droste and Tharin soon discovered that the clay mineral changes in the various weathering zones were definite and predictable and the five different weathering horizons could be determined from the character of the alteration of the clay minerals. This was of enormous help where only the bottom part of a buried weathered profile existed. This work resulted in a series of publications from 1956 through about 1960. It dealt with the sequence of the weathering changes in the various tills, as well as the character of the clay minerals in the unaltered tills. Droste discovered that the older tills had kaolinite, the younger ones did not. There were some other more subtle differences. Somewhat similar studies in the 1960's were initiated in the laboratiries of Illinois Geological Survey, but as far as I know the Droste sequence of weathering changes in tills of the Allegheny plateau has not been approached by any later workers.

In 1959 Bulletin G 32 of the Pennsylvania Geological Survey on the Glacial Geology of Northwestern Pennsylvania appeared. It included a large and beautiful map of which V.C. Shepps oversaw the drafting and printing (he was by that time Editor of Pennsylvania Survey) and the combined reports of Shepps, Droste and Sitler were presented in the map and text. The stratigraphic table was the most elaborate to that time and began to differentiate age from rock names and the map shows the different tills at the surface by rock name rather than by time name. The rock names were however not strictly and legally defined, although the tills were

described in textural and mineral terms.

As my associates and I became more aware of standard stratigraphic naming principles and with the encouragement of Dr. Frye of the Illinois Survey, a brief paper was prepared, "Classification of Wisconsinan Deposits in Northeastern Ohio", published as U.S.G.S. Bulletin 1121 - A, in order to legalize the names for Survey usage in reports which were then in process. The U.S.G.S. legalization of a stratigraphic name can be a cumbersome and time-consuming business, but happily the Chairman of the Geologic Names Committee was and is Dr. George V. Cohee, alumnus of the University of Illinois and a long time personal friend. The arrangement was done in a telephone call to Cohee from the Survey Office in Columbus with District Geologist and others standing by with open mouth! In ten minutes the names were reserved and the only necessity was to write a letter confirming the telephone conversation. Seeing the way in which red tape could be cut "within the lodge" several others later have asked me to be their intermediator in such procedures and I have been glad to do so if their case was a worthy one. In this little Bulletin 1121- A the rock-stratigraphic names of Mogadore, Kent, Windham, Lavery, Hiram and Ashtabula were formally defined and from thence forward appear in boldface type in U.S.G.S. Stratigraphic Lexicon. (Two or three years earlier Frye and associates had similarly proposed strictly defined stratigraphic names in Kansas, but the 1960 U.S.G.S. proposal was certainly the first for the eastern United States.) From then on the use of these already legally defined names was perfectly easy in any U.S.G.S. publication.

In U.S.G.S. Professional Paper 424 - C, 1961, several other names were defined and cleared through George Cohee. These were the names for Wisconsinan tills in the Killbuck lobe, the earlier ones had been

from the Grand River lobe.

Since that time a series of Ohio county reports for Stark County, Portage County, Wayne County, Trumbull County, Richland County (in press), we have been using the stratigraphic principles with a textural and more and more complete mineralogical characterization of each till in the region and its correlation within the whole lobe.

In the early 1960's Stanley M. Totten carried on the laboratory work and extended it into a precise determination of carbonate percentage in the various tills. The details of this work are available in his two theses, but only the summaries have been published. The carbonate percentage, of course, varies among the tills in a definite fashion.

Totten also began work on feldspar content of tills and modified existing methods for determination of feldspars. Others who followed him, especially Johnson, Moran and Gross, have elaborated these methods still further. Now the determination of feldspar and the differentiation between K-feldspar and plagioclase has become routine and is carried through on production line basis. These men have published on their present sophisticated methods. The quartz-feldspar ratio of a till is now another diagnostic characteristic.

In renewed work in northwestern Pennsylvania in the late 1960's, there was fortuitous development of great and extensive exposures along two interstate highways and greatly increased strip mining. In association with Totten, Gross and Moran we were able to extend the stratigraphic work to the earlier Wisconsinan and still earlier drifts and tills. We had such a wide coverage, and Moran and Gross were so statistically inclined and computer knowledgeable, that work not only on differences in feldspar content, quartz content and carbonate and texture among tills, but also the lateral differences were studied

in great detail and statistically analyzed in a very sophisticated way. Preliminary report of this work by Gross in Pennsylvania Geological Survey Bulletin 55 has just appeared. The work is summarized in my paper in the Quarterly Journal of the Geological Society of London, which was presented before the Society in 1968 and published in 1969. The trend surface analyses created quite a stir and Gross and Moran's complete paper on these in the Grand River lobe in a forthcoming symposium volume is eagerly awaited. It will be a landmark in the study of Pleistocene materials. It illustrates beautifully that Pleistocene geology is the "application of the principles of geology to the study of Pleistocene material and to the elucidation of Pleistocene history". It is necessary to have not only a knowledge, but an expert knowledge of the bedrock geology, geomorphology, glacial deposits, glaciology, sedimentation and sedimentary petrology, statistics, chemistry and so on to produce a paper like theirs.

As an aside, I might say that in the vigorous discussion after the oral presentation of the 1968 London paper various questioners had to be reassured that these units were indeed rock units, and could be followed long distances. Some went away still unbelieving. However there were two Englishmen there who had seen the materials with us in the field and they confirmed my statements and diagrams. Fortunately, I had Kodachrome slides which showed continuity and my English friends assured the skeptics that they were not faked! All in all it was a most interesting experience.

I am not unmindful that Pleistocene stratigraphy has been done elsewhere. Nebraska and Kansas have extensive stratigraphic publications, although Nebraska is mainly on stratified materials. Stone in Minnesota, Christiansen in Saskatchewan, Dreimanis and his associates, and Karrow and his associates in Ontario have named rock-stratigraphic

units. Somewhat before 1960, Frye and his associates at the Illinois Survey began stratigraphic studies in the tills of Illinois. The Illinois Circular 285, 1960, on classification time-stratigraphic classifications, and legally and rigorously defined rock-stratigraphic units, including the Altonian loesses. A series of Illinois papers rapidly followed and culminated in the classic Bulletin 94, which has just appeared and which undoubtedly all of you hold in your hot little hands.

From the Illinois work and the work in the Allegheny plateau, it now is shown that the description of a till must include not only its stratigraphic position and associations and correlation, but it must be defined in terms of texture, mineral composition, including quartz, feldspar, heavy minerals, clay minerals, "odd contents" and a penetrating study of a large area must include lateral variations, preferably shown by trend surface maps. Color enters in and particularly the color of the weathered material. If the material is at the surface something can be said of the soil type developed on it.

WHERE DO WE GO FROM HERE? A promising additional field for investigation is that of fossil contents, both microfossil and fragments of whole macrofossils. This has been done in Holland by one investigator and there is some beginning of this in Illinois. Just as the mineral content is diagnostic for some tills, so the fossil content should be diagnostic in tills. (I do not here refer to fossils in loess.)

Another area for very fruitful investigation, which can be carried on in a group that has members acquainted with and developing the newest methods in sedimentation, is the sedimentary character of the deposits, not only of the till, but especially of the outwash material associated with the till and particularly of any bedded

inclusions in the till. It should be possible to go far toward determining under what conditions these included deposits were laid down before they were incorporated.

Another very fruitful area is that of structural geology applied to drift deposits, both till and outwash. Structural geology in the classical sense and then in the experimental sense should be profitable. Tills do have structure. What is the structure and how is it arranged and how did it originate? Somebody will make a real name for himself in this field.

Subsurface study will involve more and more exploratory drilling and sample study. Geophysical methods (such as those used in Saskatchewan) will be elaborated and become routine. The day of the Army pick and the acid bottle is not over, but they must be supplemented by a drilling rig, a laboratory and other "back-up" facilities. But the most important element will still be the geologist who must be a "real" geologist who can use and do geology, not just a narrow specialist.

I wish I were just starting --- exciting times are ahead.

PARKER E. CALKIN 9/5/71

John Barnes has recently completed his M.A. Thesis "Sedimentological study of tills of the Gowanda area" (Cattaraugus Creek delta area). He clearly documents the highly weathered character of a buried till sheet overlying organic material (>48,000 yr. B.P.) and the erosional unconformity between the organic-bearing horizon and subjacent red till. The occurrence of a red till here is not clearly understood as there are no occurrences between there and the Buffalo area to the north. Paul Fickett (M.A. thesis near completion) has shown that the transition from red to gray till in the Buffalo area is mainly related to the change southward from limestone to shale bedrock and also some topographic controls. This summer I will attempt to put some of the stratigraphic information on Erie Co. together and make some tentative correlations with southern New York, Pennsylvania, and adjacent parts of Ontario.

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9/28/71

PAUL F. KARROW

I had a limited field program this summer exploring stream valleys east of Lake Huron between Bayfield and Southampton, Ontario. I was seeking and found fossiliferous terrace deposits graded to the Algonquin and Nipissing levels. A date near the end of the rise to the Nipissing level should come from a paleosol at Southampton. Barry Miller, Kent State U. Ohio, has agreed to study the molluscs. The rest of the summer was spent in writing and several partly finished papers resulted. A preliminary report and maps of the Stratford-Conestogo area, mapped in 1965-68 for the Geological Survey of Canada, was published as their Paper 70-34 in August.

Dr. Anne Morgan is continuing her study as a Post-Doctoral Fellow of fossil beetles of the Scarborough Formation at Toronto and Port Talbot interstadial deposits. Dr. Alan Morgan, now on the staff of the Department of Earth Sciences, has been mapping glacial geology near Thedford, Ontario. He has recently discovered areas of patterned ground (soil polygons) in Southern Ontario and studies are planned to map out their distribution and characteristics.

Dr. Allan Ashworth, a Visiting Professor in the Department this year is studying the fossil beetles of Lake Algonquin peats near Kincardine, Ontario, and other postglacial sites.

Dr. Peter Fritz, a new staff member in Earth Sciences, is continuing his oxygen-isotope paleotemperature studies on postglacial deposits. He is applying this technique to bogs in southern Ontario and hopes to establish eventually a climatic record and means of correlation in sediments.

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JOHN H. McANDREWS 10/1/71

Parker Calkin and I are continuing our study of the section along Nichols Brook in Erie Co., New York. The radiocarbon date at the bottom of the section is 14,900 years B.P., yet the pollen diagram shows no T or herb zone which should be of this age. Spruce needles are found throughout the section and there are no macrofossils of tundra plants. We are now checking the existing dates which are on marl with a specially collected sample of spruce cones and wood.

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KERNAN W. DAVIS 10/4/71

Subsurface explorations have been conducted or are underway in several upstate valleys.

Drive samples, rock cores, reconnaissance and seismic profiles were used. Some surprises were found. East of Truxton village, in the bottom of a broad, U-shaped valley, through which the Tioghnioga River flows, redrock was found only nine feet below the surface! This will be checked out by further exploration. In the Black River valley, not far from Boonville, over one hundred feet of overburden (mostly sand) covers the contact between the Paleozoic sediments and the Precambrian crystiline rocks. The contact has been penetrated by rock core drilling. Explorations are being conducted in the Sixmile Creek valley south of Ithaca. This valley contains a complex of till, lacustrine and outwash deposits.

The results of this work will not be published but probably will be available for inspection in our Albany headquarters office.

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DONALD H. CADWELL 1/19/72

A radiocarbon date of 16.650±1800 yrs. B.P. has been obtained from wood collected in a kettle hole bog near Chenango Forks, N.Y. The bog is at least 36 feet deep and has peat (0-19 ft.), silty peat (20-25 ft.), clayey peat (26-32 ft.), and silty clay (32-36 ft.). The wood for the date was obtained from 30-32 ft. The silty clay between 34 and 36 ft. is barren of pollen. Numerous kettles are located in this area where there is >50 ft. of sand and gravel capped in places with >10 ft. of till. The bog is located at the north end of a valley

plug, in the Chenango River Valley, formed at a retreatal ice margin of a Woodfordian ice sheet. This was an east-west ice margin between Chenango Forks and Harpursville, N.Y.

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GEORGE C. KELLEY 10/14/71

My efforts recently have been directed towards surficial mapping of the Kent and Ellsworth quadrangles in western Connecticut. These map areas are in juxtaposition to the tier of quadrangles in which the Connecticut-New York boundary is located. Problems in the glacial history of this region are closely related to problems in the glacial history of New York State, particularly in the area east of the Hudson River.

Still-stands of an active, retreating ice margin are evidenced by deposits observable in southwestern Connecticut, and also northwest of the Housatonic Highlands in New York State. Deposition southeast of the Housatonic Highlands in west-central Connecticut is characteristic of downwasting of stagnant ice masses. It appears that the ice of the Hudson River Valley lobe entered western Connecticut and spread southeastward during the late Wisconsin time. The Hudson and Housatonic Highlands were of sufficient relief to become nunataks during late stages of deglaciation. Their ridge-like configuration restricted ice flow to the southeast, initiating stagnation of ice masses, blocks and tongues in the "shadow" southeast of the Highlands.

Numerous abandoned fluvial channels have been investigated on upland ridges in this region. Some support pre-late Wisconsin glaciation while others, associated with the latest deglaciation, indicate that poorly integrated drainage and frequent drainage changes prevailed as differential melting of stagnant ice masses

exposed new thresholds and drainage routes.

Meaningful dates for correlation of events in western Massachusetts and Connecticut are still elusive, and I have nothing to add. I am currently applying palynological techniques to samples from several bogs in an effort to clarify characteristics of climatic changes which have occurred in this area in Recent time.

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DAVID KRINSLEY 10/14/71

G. Gordon Connally and I have done some work which has shown that a field of active dune sands approximately 2250 square kilometers in area existed between Albany and Glen Falls, New York after retreat of the last Wisconsinian glacier. The dunes were probably active between 12,600 and 6,000 years ago, B.P.

Geof. Boulton of the University of East Anglia and I have been studying quartz grains taken from various environments in and on modern glaciers from Switzerland and Greenland; quartz cleavage is quite obvious when grains of about 100 microns are studied with the scanning electron microscope.

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WALTER S. NEWMAN 10/14/71

Completion of a fourth field season in the Berkshires and Housatonic River valley furthered understanding of the glacial Lake Great Falls-Sheffield episode. Evidence for the glacial lake yields two contrasting figures for tilt rate. A reasonably well defined strandline along the west side of Robbins Swamp, south of Canaan, Connecticut, and towards the southern end of the lake basin, is tilted northward at about 10'/mile. However, the surface of the Elmwood Cemetery Delta, one mile northeast of

Great Barrington, Massachusetts, has an elevation of 610'. Since the bedrock spillway of Great Falls 16 miles south is rather firmly established at about 650', a tilt rate of nearly four feet per mile is established. The difference between the two rates seems real and I suspect both are probably correct. What we are seeing is a decrease in rebound rate as deglaciation of the Housatonic Valley proceeded from south to north. I would like to have compared my data with those of Connally and Sirkin presented at the last F.O.P. gathering but my kodachrome of Gordie's plot didn't come out too well.

One of my graduate students, Jane Rutledge, is working up the pollen stratigraphy of three bogs in my field area: two high elevation localities on Canaan Mountain in the South Canaan, Connecticut, quadrangle, and a lower elevation bog in the Sharon, Connecticut, quadrangle.

Potpouri: New Radiocarbon dates from the Long Island area find that the Montauk Archipelago became a peninsula prior to 5500 years ago (see Newman and others, 1968, for the big picture). New sea level data from western Long Island Sound urges a sea level at 66 feet below present mean high water at about 12,300 years ago. The latter date conflicts with a date from the nearby Throgs Neck Bridge which suggests a sea level at -114 feet at 12,000 years B.P. Still another date at Iona Island (Newman and others, 1969) finds sea level at -94 feet some 12,500 years ago. Differential tilting is fine but I have to warp the plane in curious ways to fit them all in.

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DAVID L. GROSS 10/15/71

The main news item about Pleistocene geology from the Illinois Geological Survey is the forthcoming 21st annual Midwest Friends of the Pleistocene meeting which will be held in east-central Illinois, May 12-14, 1972. The trip will organize Friday evening, May 12, at Danville, Illinois and will include a Saturday field trip near Danville, a Saturday evening banquet, and a Sunday morning trip in an area south of Danville. The general theme will be "Pleistocene stratigraphy of east-central Illinois" and the participants will be treated to a tour of almost a dozen tills. W. Hilton Johnson, Leon R. Follmer, David L. Gross, and Alan M. Jacobs will be the leaders.

In addition to preparation for the field trip the main activity during last summer was a continuation of the Survey's research on the geology of Lake Michigan. Jerry A. Lineback and I led a two week cruise on the R. V. INLAND SEAS in the southern one-third of the lake and we will be spending much of the winter sifting through an additional 125 cores and 1400 miles of reflection seismic profiles. The results of the Lake Michigan work are being published in the Illinois Geological Survey Environmental Geology Notes Series.

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ALEKSIS DREIMANIS 10/18/71

Last summer I was teaching "Glacial and Pleistocene Geology" at the Summer School of the University of Western Ontario to a group of enthusiastic teachers who were keen to do independent field and laboratory projects from the areas near their schools. Together with U.J. Vagners, I completed a paper on "The effect of lithology upon texture of tills", and worked on several other

projects still in progress.

In September Hugh Gwyn defended successfully his Ph.D. thesis, "Heavy mineral assemblages in tills and their use in distinguishing glacial lobes in the Great Lakes Region" (in the area from Lake Superior to Adirondacks, both inclusive).

This year, four new graduate students joined the Pleistocene group at our department, selecting the following topics for their theses:

Rauno Aaltonen - "Geology of the City of London"

Ronald M.W. DiLabio - "Indicator tracing in Late Wisconsin drift at the Icon Mine, Mistassini, Quebec"

Mrs. Karin B.-M. Ek-Mills - "Waterlaid till"

Robert C. Ross - "Gravel deposits east of London, Ontario"

Dr. Ron W. May is staying at our Department as post-doctoral fellow, dealing mainly with quantitative treatment of analyses of Pleistocene deposits. In order to re-evaluate the results of many hundreds of quantitative analyses of Pleistocene deposits which have accumulated at our Department during the last 20 years, Dr. Peter G. Sutterlin and myself, aided by Ron May and Mrs. B. Aaltonen, will use the SAFRAS System for development of a computer storage file, and analysis of all these data. Most of them are from Ontario, but a good number is also from the State of New York.

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GEORGE H. CROWL 10/19/71

The Wisconsinan Border in Northeast Pennsylvania

I have remapped a portion of the glacial border in Pennsylvania beginning at the Lehigh River near White Haven, and tracing the border west to the Susquehanna River at Berwick, and thence north to the Appalachian Front near Benton. Much of the border is the edge of Late Wisconsinan ground moraine, whereas end moraine occurs only locally in topographically favorable positions close to the mountain slopes. Characteristically these patches of end moraine lie behind the till border and indicate slight retreat of the ice front prior to deposition of the end moraine segments. Glaciofluvial material is associated with the border only in the valley of south-flowing streams - Nescopeck Creek north of Freeland, the Susquehanna River near Berwick, and Fishing Creek and Huntington Creek near Benton. No stratigraphic sequence within the Wisconsinan has as yet been found.

The presence of "Illinoian" drift is confirmed at some places beyond the Wisconsinan border. These "Illinoian" deposits are more restricted than shown on the current geologic map of Pennsylvania, but no attempt was made to define their border.

The present mapping confirms much of the mapping by Lewis and Wright in 1884 and denies many revisions by Leverett in 1934. Changes in the border are relatively minor.

The drift is fresh. It is continuous with young drift to the east between the Lehigh and Delaware rivers, and with the "terminal moraine" in New Jersey. On these bases the border is defined as Late Wisconsinan in age.

The critical work on the border in northeast Pennsylvania lies north of Benton, beyond the area completed this summer. The

division between Early and Late Wisconsinan deposits lies to the north in the Appalachian Plateau, between Benton and the Pennsylvania-New York boundary.

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ALAN M. JACOBS 10/19/71

My paper entitled "Statistical Considerations for Grain-size Analyses of Tills," has been published in the Journal of Mathematical Geology, v. 3 no. 3. For those who do not subscribe to the Journal and need a copy, request Reprint 1971-H from the Illinois Geological Survey. Also, for those environmental geomorphologists who like the Survey's McHenry County report and the Environmental Geology Notes, look for the Survey's "Geology for planning in St. Clair County, Illinois" (A.M. Jacobs, compiler). The publication will include 8 fold-out maps (4 in color) on different land and resource uses. The report goes to the printer this month.

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RICHARD F. MADOLE 10/22/71

During the summer of 1971 the following were completed: (1) mapping of the glacial geology of the Ward (Colo.) Quad. for the U.S.G.S. GQ Map Series, to be co-authored with Delores Gable of the U.S.G.S.: (2) a paper on "Neoglacial Facies in the Colorado Front Range; and (3) coring of glacial lake sediments and bogs as part of an NSF funded project to obtain C_{14} dates and the palynologic record for glaciation and deglaciation in the northern Colorado Front Range.

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GARRETT G. HOLLANDS 10/25/71

During the summer of 1971 I worked in western New York mapping the surfical geology of the Colden quadrangle and further investigating the drainage between the Valley Heads and the Hamburg moraines. I was able to complete mapping the Colden quadrangle and I am now beginning laboratory studies of the till and lacustrine sediments of the quadrangle.

A summary of hypotheses derived from my summer's work in the Colden quadrangle follows:

1. Ice retreat from the Valley Heads Moraine northward through the Colden quadrangle to the Hamburg Moraine was interrupted by a short readvance to the position of the Gowanda Moraine. Portions of the Gowanda Moraine consist of linear ridges parallel to the ice front. One such section has been streamlined, indicating overiding of a small portion of the moraine by an active ice front. Two directions of striae found on bedrock possibly record both the initial advance southwestward through the Golden quadrangle and the short readvance of the ice to the Gowanda Gowanda Moraine.

2. Readvance to the Gowanda Moraine was very short, possibly less than a mile. I do not believe that the Gowanda Moraine is the maximum moraine of the Port Huron advance, and I favor the hypothesis that the Hamburg Moraine is the Port Huron maximum.

3. Retreat of the ice within the Colden quadrangle is recorded by a succession of lateral moraines on the valley sides, kame deltas in valleys and on valley walls, ice marginal drainage channels on the uplands, and proglacial lakes in the valleys.

4. Ice-contact features and the shape of portions of the kame deltas indicate that tongues of ice extended southward into the north-south valleys of the Colden quadrangle, particularly at the time of formation of the Gowanda Moraine.

5. Lacustrine sediments, many of which are varved clays, were found on the valley sides and on the valley floors. The lake that occupied the valley of the West Branch of Cazenovia Creek in the Glendwood-Colden-West Falls area was part of the drainage system mentioned in the last issue of the Glaciogram. Progressively lower kame delta and delta levels indicate a minimum of five lake levels, four which can be correlated with successively lower outlets.

6. Approximately one-half mile south of the town of Colden an organic zone discovered in sediments indicate a proglacial lakeshore environment. The organic zone was found in lacustrine silts and clays that lie upon less than 17 inches of colluvium, which in turn overlies till. The organic layer is approximately 2 feet thick and consists of wood, needles, pollen, and spruce cones and is tenatively correlated with the spruce zone environment. Above this zone about ten feet of interbedded gravel, sand, colluvium and further lacustrine silts and clays contain organic material. The wood and pollen is to be examined in detail and a C-14 date is expected in the near future. This date should serve as a maximum date for the formation of the lake in the Colden Valley and thus a minimum date for the Valley Heads Moraine and a maximum date for the Gowanda Moraine. When this date is considered in conjuction with the dates which Muller and Calkin have obtained for the Valley Heads Moraine and Calkin's date of Lake Whittlesey sediments we should have a good bracket of dates

for both the Valley Heads Moraine and the Gowanda Moraine.

7. Lacustrine sediments found in the northern portion of the Colden quadrangle are tenatively correlated with Lake Whittlesey if not with a higher (Lake Arkona) Lake Erie level.

I hope soon to complete and publish my work in the Colden quadrangle and on the drainage and Pleistocene history of the area between the Valley Heads Moraine and the Gowanda Moraine in western New York.

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WILLIAM D. SEVON 10/25/71

This summer I worked almost exclusively in Wisconsinan glaciated terrain observing and mapping many interesting bedrock and glacial features. I also spent some time with George Crowl reviewing his progress in tracing the 'terminal moraine' northwestward from the Lehigh River toward New York state. The first part of the summer was spent working with Tom Berg in the Brodheadsville quadrangle (southeast corner reference: Long. 75° 22' 30"; Lat. 40° 52' 30") where we mapped the edge of the 'terminal moraine' and a variety of glacialfluvial and periglacial deposits. The rest of the summer was spent in the Buck Hill Falls quadrangle (southeast corner reference: Long. 75° 15'; Lat. 41° 07' 30"). The eastern escarpment of the Pocono Plateau passes northeastward through this quadrangle with a local escarpment relief of about 500 feet and upper plateau elevations of 2000 - 2100 feet. The topography apparently had considerable influence on ice movement and striae orientations south of the escarpment deviate up to 40° west of the general S 10° W regional trend indicated on top of the plateau. End moraine development occurs in the Buck Hill Falls

area (south of the escarpment) and to the northwest on the plateau and is probably related to a recessional buildup rather than a readvance of Wisconsinan ice. The end moraine on the plateau surface is bounded on the south by a zone about a mile wide in which boulder colluvium slopes and valley bottom boulder fields are extensively developed. These deposits presumably represent periglacial reworking of slightly earlier deposited Wisconsinan very bouldery till. Similar deposits are not found associated with the end moraine at lower elevations in the Buck Hill Falls area. This difference may reflect either a difference in climatic regime because of the local relief or a difference in underlying bedrock, or both.

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JOSEPH A. CAGGIANO, JR. 10/26/71

Field work in the Belchertown, Mass. quadrangle is nearing completion and hopefully will be completed before the snow flies. Two significant discoveries were made during the summer. More than 4½ feet of organic muck was augured from a closed kettle that quakes when jumped on. I plan to probe the kettle soon and hope to find material suitable for dating. Deposition of the 350 foot glaciofluvial sequence in which the kettle occurs is an event that predates Lake Hitchcock in the Connecticut valley.

Several exposures were found which indicate that stratified drift was deposited in contact with ice at the levels at which Lake Hitchcock beaches occur. One channel filling, very poorly sorted pebble and cobble gravels with abundant mud in the matrix, flowtills, and lacustrine kettle fillings suggest an ice marginal event which predates Lake Hitchcock. Failure to find any good well-sorted beach sediments suggests that the shallow water of

Lake Hitchcock was an environment of low energy such that very little wave and/or current modification of poorly sorted glaciofluvial sediments or topography occurred. Such an occurrence suggests several working hypotheses each of which has yet to be fully evaluated. Perhaps others who have worked on Lake Iroquois (or other Pleistocene lake beaches) can suggest information relative to the energy levels present in the shallow waters of proglacial lakes.

Some of the critical exposures referred to above were temporary and are no longer available. I wholeheartedly support Al Randall's suggestion in the last Glaciogram that pictures and records of such exposures be stored so that the information is available long after the exposures are gone or permanently covered.

Work will continue this winter on the analysis of till texture, heavy minerals, and clay mineralogy of the tills of the Belchertown quadrangle.

The need for geological input in environmental protection is very evident in the Belchertown quad. In one case, a "sanitary" landfill is located within 2,000 feet and 90 feet higher than a municipal well field. The landfill is in a Lake Hitchcock delta; the wells obtain water from sand and gravel several tens of feet below varved clays. The well field was established long after the landfill was in use, but no consideration was given to the hydrologic connection, if any, between the delta and the producing aquifer. Leachate from the landfill is not being monitored as a check on possible pollution. The establishment of septic systems in areas of thin (less than 5 feet) till over bedrock is also disturbing. In some cases, bedrock was struck in excavations for house foundations at depths much less than those necessary for

installation of septeic systems. Standing water was observed long after rainfall in cellar holes of this type.

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CHAUNCEY D. HOLMES 11/1/71

Five summer weeks in the hospital (major surgery) modified considerably my geological plans and hopes for the year, but at present I am recovering satisfactorily.

My recent professional efforts have been directed chiefly toward promoting geologic awareness and knowledge among the general citizenry, first by a booklet on the glacial history of the local area (title, FROM NELSON TO CHITTENANGO: A Geological Journey). As you may surmise, the journey is through time rather more than through distance. Incidentally The Cazenovia Republican, in Cazenovia, is handling sales at $2.50 plus tax.

The second project is a topographic model representing about 1460 square miles of this same area, and is now on display in our local library. It will be shown for a week or more at the office of The Cazenovia Republican, then it will probably go to the Tully High School library. It is proving to be of much general interest.

Our Junior High peat-pollen students made good progress last year in spite of the inconvenience of uncompleted laboratory facilities in the new building. This particular project is nearing completion.

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JANE L. FORSYTH 11/4/71

My research was slowed this year while travelling abroad. Following the trip to central Europe in late August of 1970 (highlighted by the exhilerating experience of a first view from

Jungfraujoch on a magnificently clear day) came a tour to Africa (in January, 1971) to see the animals, which we saw very well (though excitement on the trip was increased by being held up in Uganda at the time of the political coup there). Then in March came a personal trip to New Zealand, a sort of private INQUA, where the effects of large active faults were demonstrated, even within the city of Lower Hutt, by members of the N.Z. Geological Survey, and the thrilling glaciers on the west side of South Island which plummit down the Alpine Fault scarp from magnificent mountain at over 9,000 feet into dense rain forest almost at sea level, were observed.

An article relating geologic substrates and some species of plants in Ohio was recently published in The Explorer magazine, of the Cleveland Museum of Natural History, off-set reprints of which will soon be available from Jane. Two new projects in this area of "geobotany" are the nature of and geologic history revealed by prairies in Ohio's "Prairie Peninsula", and the tree communities present on shallow dolomite on the Lockport cuesta of Michigan's Upper Peninsula (as compared with those of the Erie Islands). These studies on the relation of plants and substrates continue to be the subject of increasing interest to me, and I would welcome correspondence with any other geologists interested in the same area and/or who have successfully used this relationship in their geologic work. In addition, I am still working on a contribution to the geologic history of the Erie Islands, and am in the process of completing a study of some narrow, post-till and pre-Maumee, ice-marginal lacustrine areas in westcentral Ohio (near Lima).

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KEITH M. HUSSEY 11/7/71

SHORT NOTES

A K-AR DATE ON THE ROCKY MOUNTAIN PEDIMENT SEQUENCE, NORTH-CENTRAL NEW MEXICO[1]

For almost a century, the flights of broad erosion surfaces arranged in step-like fashion at the foot of the moutains of west-central United States have piqued the minds of many geologists. Not only are there still some differences of opinion regarding the origin of these pediments, but the estimates of their age range over several million years.

The age determination described in this note makes it possible to establish a minimum age of 4.3 m.y. for the oldest pediment surface on the Philmont Scout Ranch, north-central New Mexico. The basalt flow that was dated covers the highest pediment (Uracca surface) in this area, thus is younger than the surface. However the paleosol under the basalt, and the relatively large vertical distance between the Uracca surface and the next younger surface, both indicate a greater difference in age between these two oldest surfaces than between any two successively younger surfaces, suggesting that development of the younger pediments could have taken place in Pleistocene time (assuming the Plio-Pleistocene boundary to be 2.5 to 3.0 million years old).

The age determination and petrography are by the Field Research Laboratory of Mobil Research and Development Corporation, Dallas, Texas, and sponsored by the New Mexico Bureau of Mines and Mineral Resources. The constants used in calculating the age are: $\lambda_\varepsilon = 5.85 \times 10^{-11}/yr; \lambda_\beta = 4.72 \times 10^{-10}/yr; K^{40}/K_{total} = 1.22 \times 10^{4}$ g/g.

1. (Isochron/West, no. 2, August 1971)

M-FRL1388 K-Ar (whole rock) 4.3±0.1 m.y.

Uracca Mesa basalt flow (36°24'15"N, 104°59'18"W; Uracca Mesa, Philmont Scout Ranch, Union Co., NM) covering the Uracca surface, the highest pediment surface in this area. Phenocrysts of plagioclase and lesser olivine and biotite in a ground mass of plagioclase, pyroxone, olivine-iddingsite, and iron oxides; shows virtually no alteration except iddingsite after olivine. Analytical data: K = 1.536%; $\overset{*}{Ar}^{40}$ = 1.175 and 1.174 x 10^{-11} moles/gm; $\overset{*}{Ar}^{40}/\Sigma Ar^{40}$ = 56, 48%. Collected by: K.M. Hussey, Iowa State Univ.

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GEORGE M. BANINO 11/12/71

At James R. Dunn & Associates we have continued to be involved in problems related to Quaternary deposits and processes.

In a study of the environmental impact of the expansion of a large residential development, Dave Sommers investigated Lake Albany deposits. The work required a detailed description of the lake bed deposits and a compilation of available subsurface data.

George Banino and Jim Dunn investigated joint blocks relating to foundation conditions at the Blenheim-Gilboa Pumped Storage Facility. The drag of glacial ice across the bedrock opened joints as much as six feet, plucked out individual and joint-bounded blocks and tilted many others. The total cumulative movement for each of the two prominent joint sets enabled a vector to be drawn showing the direction and magnitude of glacial drag.

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NICHOLAS K. COCH 11/29/71

I have just finished a study of the Bowers Hill-Newport News South Quadrangles for the Virginia Division of Mineral Resources. The study area straddles the James River Valley and has given us an opportunity to correlate the Pleistocene coastal features found south of the James River with those being studied by Jerre Johnson and Ken Bick (College of William and Mary) on the York-James Peninsula. The stratigraphic sequences in the two areas are comparable although there are some interesting differences in altitudes of certain contacts. There also seems to be less stratigraphic evidence for post-Norfolk (Sangamon?) sea level changes on the York-James Peninsula.

For the last two years we have been working at Queens on the marine geology and morphology of the Gardiners Bay-western Block Island Sound area between the north and south forks of eastern Long Island. The area contains deep (to minus 350 feet) channels along the northern edge which seem to have no sediment finer than pebble gravel at their bases. Differences in percentages of encrusting organisms on the sides of each of the rock clasts in these channel bottoms suggest that they are not being moved at present. In each of the channels, the rock bottoms are underlain by finely laminated pink clay similar to the glacio-lacustrine clays of the Connecticut River Valley. These deep channels seem to be the unfilled (or exhumed?) parts of an extensive proglacial river system which drained into the Block Island Channel in the late Pleistocene. Cruises planned for this spring and summer should give more details on the late Pleistocene paleogeography of this area.

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JOHN D. VITEK 11/30/71

I am a new staff member of the geography department at SUNY at Buffalo. Our department is currently strengthening its offering in physical geography - geomorphology. In addition to myself, Thomas E. Wolfe, Ph.D. candidate from McMaster University, specializing in karst geomorphology, has been added to the staff.

Presently, my research activities center around completion of my Ph.D. dissertation at the University of Iowa under the direction of Dr. Neil E. Salisbury. My interest is Pleistocene Landforms, or specifically periglacial and glacial geomorphology. My dissertation focuses on mound micro-topography in south-central Colorado. The study area centers on Mt. Blanca of the Sangre de Cristo Mountains and the surrounding eight county area. The mounds, approximately 36 feet in diameter and varying from six inches to 30 inches in height, are being examined for their spatial distribution, physical characteristics, and process of formation in ten sampled areas. Interest in these features resulted from exposure to them during geomorphic mapping of the area presently being completed by Dr. Salisbury. An abundant variety of patterned ground features, rock glaciers, and alpine valley glaciation features are present in this area of Colorado. Snow and presumably ice exists year-round on the north face of Mt. Blanca. My future research will include additional studies in the Sangre de Cristos, beginning in the summer of 1972, and the development of research projects on the landforms of continental glaciation in western New York.

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G. GORDON CONNALLY 12/1/71

My work in New York State this past summer consisted of brief visits to Dutchess and Columbia Counties where I attempted to trace ice-marginal positions and locate deltas of Lakes Albany, Quaker Springs, and Coveville.

All the deltas plotted almost exactly where I predicted them in the projections I displayed at the Friends meeting last spring in Glens Falls. Lake Albany deltas are decidedly the best developed and can be found on almost every stream. Deltas from the later lakes are not present everywhere and are well developed only along major streams - a not unexpected manifestation. I will present a paper on the Hudson Valley Lakes, with a highly speculative view of their rebound history, at the northeast section meeting in Buffalo.

I found it impossible to trace ice marginal positions across the Taconic allocthon. Thus, I am now working with two alternate hypotheses. My original working hypothesis was that a series of retreatal positions, marked by esker fans and other ice-contact deposits, could be mapped. However, I failed to find any evidence that I would interpret as marking active-ice margins. I now have adopted a new working hypothesis that the esker fans present in Columbia County, and well documented by Bob LaFleur in Albany County to the north, indicates only the edges of stagnant ice masses left in isolated valleys in the fairly rugged Taconic topgraphy. My previous work in Washington County fits the latter hypothesis since I could not locate any ice margins there either (even though the Luzerne readvance position must be there somewhere)

Since most of my work over the past two years has been in Pennsylvania it has gone unrecorded in the Glaciogram. However, some of my observations have tempted me to speculate about the eastern Finger Lakes - western Catskills where Don Cadwell and Jim Kirkland are working. Don has reported the possibility of a glaciation intermediate to "Olean" and Valley Heads" that may have a terminus south of Binghamton and Jim has illustrated some very interesting, if somewhat confusing, ice marginal positions in the Catskills. Cadwell's glaciation has a Valley Heads style (morphology) and Olean lithologies which was part of the concept of MacClintock and Apfel. I see three possibilities: (1) that this is the equivalent of the advance that formed the Almond Moraine-Kent Drift west of the Finger Lakes (2) that this is a pre-Almond-Kent but post-Terminal Moraine-Olean Drift glaciation, or (3) that this is a disguised Olean retreat. I think that the projected terminus is too far south to accept the first possibility. On face value the second has much more appeal. In order to evaluate the third possibility we must answer the question: what would retreatal Olean Drift look like - would it have the same style that it exhibits to the west? The Olean glacier either originated in, or passed over, the Adirondacks. As the glacier wasted would the Adirondacks not emerge first? If they did, what would happen to the ice in their lee? Would it not be expected to show signs of stagnation not necessarily manifested during active retreat to the west? Would anyone be able to furnish me an answer in less than the year needed for the next Glaciogram?

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JOHN F. HARSH 12/1/71

Hydrology of the Stream-Aquifer System near Cortland, N.Y.

The investigation is designed to define the physical and hydrologic relationships of the stream-aquifer system in the upper Tioughnioga Basin, near Cortland, New York. Objectives of the study are: (1) to relate water level changes in observation wells to river stage; (2) to delineate areas of water movement between ground and surface water and within the aquifer using water quality parameters; and to determine and examine hydraulic properties and other physical features of the aquifer system. Hydrogeologic data of this type are useful for efficient management and operation of a combined ground and surface-water resource.

An inventory of all wells in the study area provides necessary data for constructing hydrogeologic maps showing distribution, thicknesses, and qualitative aspects of hydraulic properties of various lithologic materials. Aquifer test data will be analyzed to determine parameters describing the hydraulic characteristics of the aquifer system. Knowing the hydraulic properties, future water level changes may be estimated at any distance from the pumped well and at any time. Information of this type is useful in the spacing of future wells, either for water supply or drainage for construction purposes.

A network of observation wells and river-stage measurements will provide data to determine the effects that streamflow changes have upon ground-water levels. Measurement of selected water quality parameters serve as tracers for origin and for velocity and direction of fluid flow.

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JOHN T. ANDREWS 12/2/71

Research activities for the 1971 field season were centered in three areas: the Cumberland Peninsula, Baffin Island; coastal British Columia, near Ocean Falls, and the San Juan Mountains of Colorado.

A total of twelve people from the Institute of Arctic and Alpine Research and associated departments participated in a multi-disciplinary program on Baffin Island. This included studies in the glacial geology and isostatic recovery, glaciology of a small corrie glacier, and energy balance measurements from ground stations, instrumented aircraft and satellite. These last three programs were conducted by R.G. Barry and J.D. Jacobs of INSTAAR. The results of the geological program, conducted by D.R. Pheasant, G.H. Miller, W. Isherwood, A. Mears and myself, indicated the existence of three weathering zones, the youngest of which is composed essentially of fresh looking till, but which in fact dates from 120,000 years and younger. In this area, the early Wisconsin was much more extensive than either the mid- or late-Wisconsin advances.

In British Columbia, Robert Retherford and myself are working with archaeologists on sea level changes, and in the San Juan mountains, Paul Carrara and myself are involved in investigating the alpine geomorphology, and its relationship to the current cloud seeding program.

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G. MICHAEL CLARK 12/3/71

The International Geobotany field conferences and symposia will be held in the spring of 1973 at Knoxville, Tennessee hosted by the University of Tennessee. Persons desiring advance information on registration and submission of papers should contact:

Dr. Clifford C. Amundsen
Graduate Ecology Program
The University of Tennessee
Knoxville, Tennessee 37916

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SAMUEL HARRISON 12/4/71

Rich Kornbrath and Sam Harrison (Allegheny College) are investigating frost disintegration of fine-grained sediments (till and some recent sediments). A laboratory study aimed at defining conditions favoring the growth of both needle ice and small ice lenses (½ inch) in sediments is being carried out in conjunction with field monitoring of the rate of ice-lens disintegration of sediment exposed in roadcuts and streambanks.

John Clendenin and Sam Harrison (Allegheny College) are studying the hydrogeology of fracture traces in Crawford County in cooperation with George Schiner of the U.S. Geological Survey. The study will attempt to correlate the presence of fracture zones in this area with groundwater yield, hardness, and anion chemistry. The fracture traces are surprisingly visible on air photos despite a covering of glacial drift which is several tens of feet thick in many areas.

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PHILIP WAGNER 12/7/71

I have become heavily involved in environmental applications of geomorphology, glacial geology, and hydrogeology. The following are some examples of current projects:

1. Hiking-trail erosion in the Green Mountains: A computerized study of slope, tree cover, trail traffic, etc. to determine the extent and causes of erosion and to provide information for judicious planning of new trails.
2. Sanitary landfills: Seismic, resistometer, and limited geochemical analyses of existing landfills as well as development of a new regional site for solid waste disposal.
3. Population growth constraints imposed by groundwater: Evaluation of groundwater limitations in northern Vermont, based on quantification of the hydrologic cycle.
4. Determination and application of transmissibility and storage coefficients in septic waste disposal: Application of well hydraulic techniques to a septic system to identify reliable parameters for septic system design.

As you can imagine, some of the above is pretty "grim" work, but students enjoy sinking their teeth into something "Relevant", even if pungent.

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WALTER M. TOVELL 12/10/71

During the past summer, 33 days were spent echo-sounding, seismic profiling, and coring in Georgian Bay and the North Channel of Lake Huron. The work was a co-operative venture of the Geological Survey of Canada, Ottawa, Ontario, Canada Centre for

Inland Waters at Burlington, Ontario, the Department of Geology of the Royal Ontario Museum, and the Great Lakes Institute, University of Toronto. About 2700 miles of continuous profiling were completed, and 95 stations cored and/or sampled. Cores included three long (+40 ft) piston cores. The vessels used in the project were the C.C.G.S. Porte Dauphine, and the C.S.S.Limnos.

The data are now being reviewed, and the pollen stratigraphy investigated. The project scientists were Dr. C.F.M. Lewis and Dr. George Hobson of the Geological Survey of Canada, and Dr. Walter M. Tovell, Department of Geology, Royal Ontario Museum. Dr. J.H. McAndrews is looking into the pollen stratigraphy.

Data from these and previous cruises indicate that the Georgian Bay Basin contains sediments of glacial, late glacial, and post-glacial ages. The glacial sediments are 'varved' red clays, similar to those in other lake basins. Late glacial and recent sediments are clays and silty clays that vary considerably in thickness.

The gravity cores obtained on the cruises are in the collections of the Royal Ontario Museum, and are available for study.

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ERNEST H. MULLER 12/31/71

My field work last summer involved checking of parts of the Niagara 1:250,000 sheet and mapping in the northwestern quadrangles of the Finger Lakes 1:250,000 sheet. Striking exposures were open along the new east-west expressway, particularly in the vicinity of Hornell and Almond. Two miles southwest of Arkport two tills with intervening lake sediments were temporarily exposed in excavations for an overpass. In September, Clarence Gehris

(Brockport) and I came a-running at the report of peat beneath the overlying till, but we were disappointed to find it a postglacial bog deposit instead. Gehris and a student at SUNY Brockport report a radiocarbon-dated pollen profile from a bog in the Arkport Moraine at 1850 feet above sea level, 1.5 miles north of South Dansville (Arkport Quad.). I hope he will have more to say about this and other recent work on postglacial forest migration in western New York.

During the fall term, compilation of the Niagara sheet has proceeded as slowly as our move to the new Heroy Geology Laboratory across campus. Scheduled for last September, the move is now just getting under way. The Geology Department is scheduled to be entirely in the new building by the beginning of the spring term.

On September 6th, following an afternoon downpour in the High Peaks area of the Adirondacks, debris flows developed rapidly at several locations on Whiteface Mountain. The most damaging among them rendered the chairlift inoperative, leaving passengers stranded for as long as three hours. This incident raises question regarding possible disturbance of slope stability in areas of ski development in the northeastern states. If any of you have information on similar occurrences in other ski areas of New England and New York I will be much interested to hear from you.

Frank Wright, a graduate student at Syracuse University, is well-advanced in mapping and field investigations of the several quadrangles immediately north and east of Oneida Lake from Camden to Trenton. He will be in the field briefly this summer and hopes to have his dissertation ready for defense early in the fall.

Last April 23rd, the Syracuse Herald-Journal carried an item about the find of a tooth and portion of the jawbone of a mastodon by two schoolboys along the streambed near Hamilton High School. The suggestion was made that the material might be submitted for radiocarbon dating, though perhaps its suitability might be questioned. How about that, Dan Miller, down there at Colgate? Do you know anything more about this occurrence, the field relationships, or subsequent laboratory work?

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RICHARD P. GOLDTHWAIT 12/3/71

OSU Quaternary and Geomorph people are up to the same wide range of things. I am finishing editing of both the "Till" and "Wisconsin" volumes. These seem to be over the hump. I'm working again (final?) on the date complications (11,200 two dates) from L. Wayne (or Warren) in northern Ohio. I have an pre INQUA paper on Tasman-Pukaki Valley, N.Z. reactivated for finishing. Our restudy of Red Rock Ice Cliff just came out CRREL Tech. Rpt. 224, and Paul Mayewski is working on former thicker Antarctic glaciations. I'm trying to wind up writing on Postglacial isostatic uplift of Glacier Bay (4 cm/yr). Hopefully, we may get another study or two (glacier hydrology and drumlins) up there next summer. Had fine working visits there and with U. Mass. group at Malaspina Lake last summer. Next summer I will try to update and consummate work on the Pine River esker for that article. Mike Quinn here is finishing Champaign (interlobate) County for me, and we may have new projects and men in New Hampshire and Alaska nex next summer. Marc Hoyer is finishing detailed study of the sediments in the preglacial (Ohio) Teays Valley, abandoned parts.

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DONALD R. COATES 12/4/71

The 1971 summer was active and I like to think, productive. I finished editing and the logistics so that the proceedings volume from our first annual symposium Environmental Geomorphology could be published in August. I finished the field work and the manuscript on the paper I presented at the second symposium "Hydrogeomorphology of Delaware and Susquehanna Basins". A large component of this work deals with glacial influences of the hydrology, and glacial processes are shown to have been crucial in determining low flow regimes of tributary streams. Marie Morisawa is currently editing for publication papers that were presented at our Quantitative Geomorphology Symposium. I also completed another manuscript whose fate is now being decided at Boulder (GSA).

In late summer I was able to spend a delightful month abroad, in Scotland, England, and Switzerland. While in northern England I spent one week with Professor Cuchlaine A.M. King mapping in the Lake District and the Pennine Mountains. It is with great pleasure that I announce that Dr. King will be a visiting professor at our institution during the 1972-73 academic year. Her trip and residency is sponsored by the National Science Foundation under the Senior Foreign Scientist Program. We hope to hold some affairs in her honor, so will be in touch with you at a later date. Dr. King and I are currently collaborating on analyses of corrie and corrie-like features of Great Britian and eastern United States.

An item that is currently keeping me out of trouble concerns the three-volume series that I am editing and writing on the theme of Environmental Geomorphology and Landscape Conservation. With luck the first volume will be published by early summer, 1972. I am always looking for articles I may have missed on this topic and

if you have favorites that fall in the category, I would be happy for the information.

At least a part of the 1972 summer has already been planned since at that time Marie Morisawa and I will start a 2-5 year joint project on environmental studies of the shoreline of Long Island. This is being done under the auspices of the Sea Grant Program (NOA

I have recently received two Carbon-14 dates from wood samples recovered from an observation well program conducted by Alan Randall. The site is the floodplain area of the Chenango River near Binghamton. Wood from a 20 ft. depth is about 2650 yrs. BP and wood from about a 40 ft. depth is 3800 yrs. BP. We believe these dates are rather significant, and will write a paper describing features in this area. To my knowledge these are the first C-14 dates of floodplain materials at these depths in southern New York. They should assist us in deciphering some of the stratigraphy of such deposits.

I hope my six theses candidates will read this and realize I would have difficulty reviewing properly all 5 Ph.D. and 1 M.A. manuscript if they all arrived at the last minute. Those that should finish this spring are Don Cadwell (Deglaciation in central New York), Jean Jacques Flint (Reevaluation and extension of Horton's laws), Steve Kowall (Hydrogeologic comparison of plateau and folded terranes), and Bob Newton (Glacial geology of the Ossipee area, N.H.).

The cover was again drawn by Chris Neuzil, now an officer in the Navy cruising in the Mediterranean.

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ROBERT K. FAHNESTOCK 1/3/72

Two items: Through INSTAAR I will be working with Rich Madole of Albion College and Tom Meierding of Western Illinois on the glacial geology of the Colorado Front Range in the headwaters of the Colorado and Frazer Rivers and their tributaries. The first seasons work suggests that we will be able to cover a large area in considerable detail.

Bill Metzger, (Fredonia) and I have concluded from map interpretation and field work that the ancient Allegany Valley now occupied by the Connewango and part of the Cattaraugus Creek Valleys in Western New York can be traced through the Niagara escarpment into the Lake Ontario Basin. Sanfords GSC map 1263A suggests that it enters the peninsula at the present outlet of Grand River and we believe that it emerged through the escarpment in what is now the buried valley being reexcavated by 14 Mile Creek a few hundred yards west of the Brock U. campus near St. Catherine Ontario. It appears to enter Lake Ontario in the slight bend of the shore to the north of this point. This is the approximate location of the arrow on Hough's Great Lakes map which was dismisse by Straw (1963) in his discussion of the Dundas Valley. Neither Hough nor Straw presented evidence for their conclusions. Our evidence is (1) indentations in the Lake Ontario shore and escarpment (at least as large as St.Davids) (2) the drainage pattern, within the escarpment embayment, quite similar to those in buried valleys in the Lake Erie escarpment (3) absence of bedrock in the valley of 14 Mile Creek.

We would welcome correspondence with anyone interested in the problem.

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G. GORDON CONNALLY 12/1/71

A PROPOSED FINALE[1]

In 1965 I put into operation a suggestion from Ernie Muller and started a round-robin letter to be circulated among those people actively working on Pleistocene problems in New York State. Since the round-robin format proved ineffective Don Coates volunteered, at NYSGA in Buffalo, to receive letters from those involved and then to duplicate them and recirculate them in turn to the participants a couple of times each year. Thus, Don became the "father of the Glaciogram" and I claim to be one of the grandparents.

Under the able editorship of Don Coates the New York Glaciogram expanded and flourished. It first annexed the Illinoian of Pennsylvania (2:1), quickly conquered Wisconsin and New Hampshire (2:2), then advanced through Arizona (4:2) and Iceland (6:1) and now threatens the Pennsylvanian of Illinois.

We are now facing a decision - or a number of decisions - concerning the future of the Glaciogram. Ernie Muller expressed his opinions in a guest editorial in 6:1 and seemed to favor further expansion, including subscriptions for those who receive it. It has now been proposed by Don Coates, and seemingly a accepted by everyone but me, that we now cut down to a single issue each year, probably to be issued in January. Clearly, the Glaciogram has both expanded well beyonds its initial limited aims and retracted from some of those aims.

Ernie Muller reviewed the rationale for the Glaciogram in 1:1 and again in 6:1. To quote him, the idea was to have

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[1]Unsolicited statement

our ideas "circulating rapidly enough to be current, yet informal enough to have the advantages of conversation; without the strictures of copyright, yet providing immediate availability of information to those who can best use it."

I suggest that the Glaciogram has outlived its original function and may even have outlived its usefulness. It is now an artifact of a once imperative need to communicate. Why is it now only an artifact? Perhaps we no longer need to communicate in this manner. Most of us now see one another in the fall at NEIGC and national GSA, in the winter at the northeast section GSA, and in the spring at NYSGA and the Friends meeting and communicate more readily on a person-to-person basis. Perhaps we have just become too big. Ernie suggested a "pre-launch test" for my Moraine Map - my original intent and that of the New York Survey - but 200 copies are needed and the cost is probibitive for me or the Survey. Perhaps we have just lost interest! Don says he frequently has to send duplicate requests and reminders to get us to contribute.

Whatever the problems, the New York Glaciogram does not meet the original needs that brought it forth. Over 90% of those on the mailing list have little or no direct interest in New York and only half the communications now bear, however indirectly, to active research in the State. Many communications are announcements of publications or other accomplishments that are readily gleaned from abstracts or in private conversation and they are usually stale news by the time they appear.

Don Coates has done a marvelous job for six years. I think we owe him not only our sincere appreciation and a vote of confidence - but also our permission to cut down the enormous

work load that the Glaciogram has become. When all you chieftains get together to do your thing, you might consider returning to the original format and limited circulation. Alternatively, you might be brave enough, bold enough, and imaginative enough to just say "Stop". Perhaps we no longer need a Glaciogram. Five times each year we can get together and mourn its passing.

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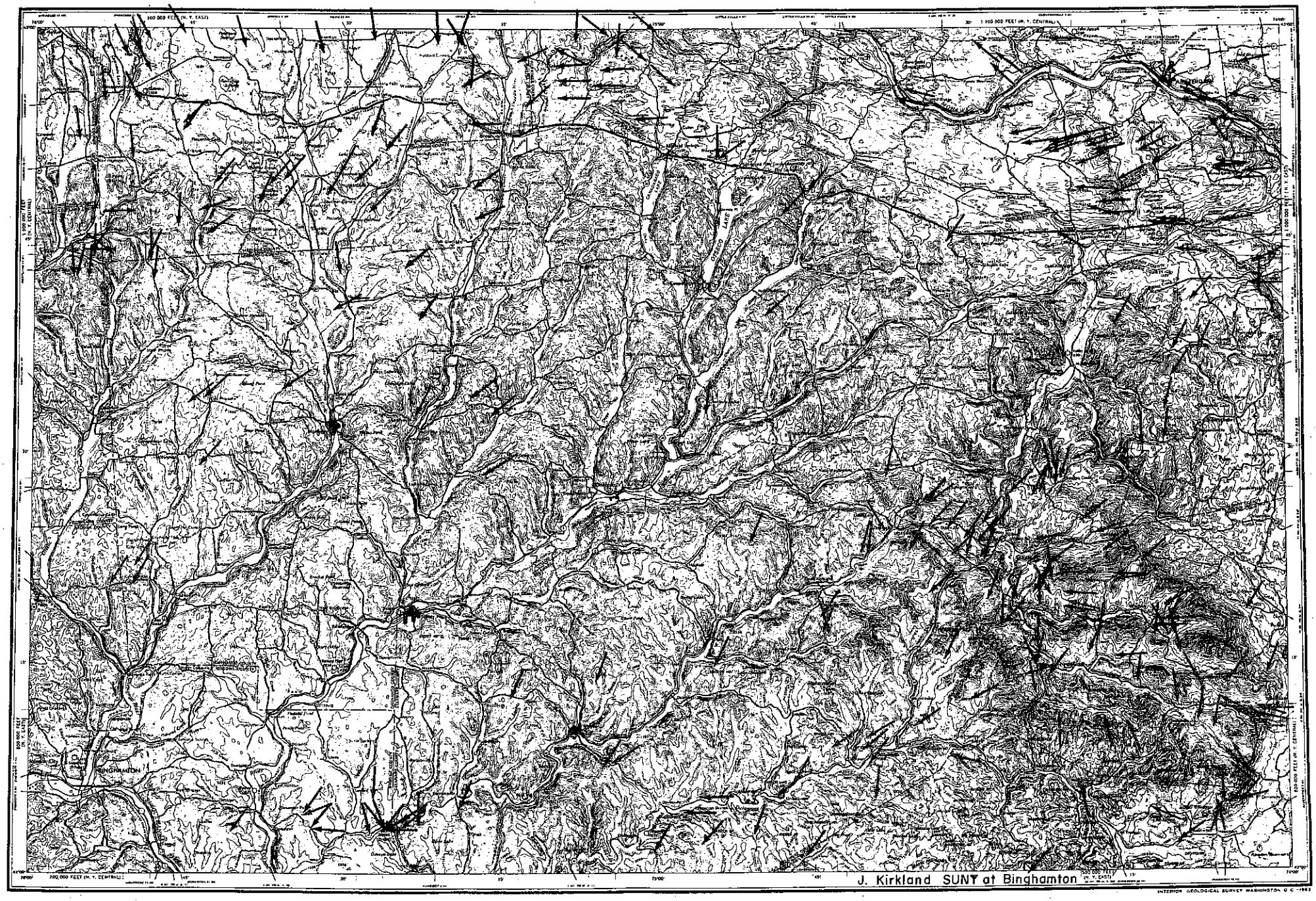

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