

No 19625

BAKER BROOK "VOLCANICS" - FAULT SYSTEMS IN THE VERMONT VALLEY  
HERRMANN, Rolf and KIDD, W.S.F., Geological Sciences, SUNY at Albany,  
Albany NY 12222

Detailed mapping of the Vermont Valley between Danby and Wallingford, along the western flank of the Green Mountain massif, has revealed several major thrust faults, which can be traced through the field area. The major thrust fault known to the north of the field area (Pine Hill Thrust), continues to the south along a discontinuous line of basement slices. Parallel with and to the east of the Pine Hill Thrust, a mylonitic highly-strained rock unit has been identified, which separates Ordovician (?) black phyllites and the basement slices from the Ordovician and Cambrian carbonates to the east. This tectonically derived lithology, previously mapped as the Baker Brook "volcanics", shows a pervasive transposed and differentiated layering. The fault zone fabrics in these rocks display an anastomosing mylonitic foliation, locally containing coarser fragments derived from intermediate-silicic plutonic rocks, presumed to originate from the Grenville basement; other more mafic basement lithologies are suggested to have also contributed to the unit. Weakly deformed feldspathic porphyroclasts show recrystallization in microcracks, and large quartz grains developing subgrains; both are surrounded by the fine-grained quartz-sericite-chlorite-carbonate matrix. Asymmetrical feldspar porphyroclasts and recrystallized quartz grain shape fabric give a clear sense of shear. Adjacent Ordovician marbles are mylonites too, with a steeply plunging stretching lineation. This contact between the middle Ordovician black phyllites and the Cambrian to early Ordovician shelf units has previously been interpreted as an angular unconformity (Tinmouth unconformity). In contrast, we suggest there is a major thrust fault here, between the black phyllites and basement slices on the west, and the carbonates to the east. Rowley (1982) has previously suggested that the basement-phyllite contact is created by normal fault tectonics just prior to thrusting. The structural relationships of the shelf sequence are therefore significantly more complex than previously shown, consisting of several slices separated by major N-S trending faults. We also mapped substantial imbrications within the belt of Cheshire-Mendon adjoining the western side of the Green Mountain Grenville basement, in contrast to purely stratigraphic sequence from an intact unconformity shown on previous published maps. Some or perhaps all thrust faults must have transported the Green Mountains to some extent to the west, relative to units farther west of the Vermont Valley.

No 21608

EARLY ACADIAN FOLDING OF THE SEBOOMOOK GROUP, NORTH-CENTRAL MAINE

HIBBARD, James and HALL, S.A., Dept. of Marine Earth and Atmospheric Sciences, Box 8208, North Carolina State University, Raleigh, NC 27695  
The dominantly turbiditic Early Devonian Seboomook Group blankets a large portion of northern Maine; here it appears to be simply deformed by Early Devonian, Acadian, NE-trending upright folds with an axial planar slaty cleavage. However, our recent mapping at Scraggly and Millimagassett Lakes has outlined previously unrecognized map-scale folds (half-wavelength >1 km) in Seboomook-like strata that are overprinted at a high angle by the NE-trending folds and cleavage. The newly-recognized folds appear to represent an early phase of Acadian deformation.

At both lakes, the early phase folds are EW-trending, gently plunging, upright synclines, that lack an axial planar foliation. The folds are asymmetric, with north-facing limbs more steeply dipping than south-facing limbs. The fold at Millimagassett Lake is refolded by a NE-plunging main phase Acadian fold and overprinted by the accompanying Acadian cleavage. The syncline at Scraggly Lake clearly folds gabbro sills in the Seboomook-like strata and is overprinted at a high angle by the regional NE-trending Acadian cleavage.

The regional extent and mechanism of this newly-recognized early phase of Acadian deformation are uncertain at this time. The folds flank ENE-trending outcrop areas of apparently older rocks, indicating that they may be related to the uplift of these inliers early in Acadian orogenesis. The early phase folds may be related to folds previously reported from northeast Maine that trend athwart the typical northeast Acadian grain. The sequential change from EW-oriented early phase folds to NE-trending main phase structures suggests a significant rotation of local principal strain axes during Acadian orogenesis.

No 29941

GRAND MANAN ISLAND AND THE PRECAMBRIAN DEVELOPMENT OF THE AVALON TERRANE

HILYARD, Mark D., Department of Geology, Hartwick College, Box 668, Oneonta, NY 13820

The metamorphosed quartzites, limestones, and shales on the island of Grand Manan provide stratigraphic evidence in support of the model of Nance (1987) for the Precambrian evolution of the Avalon Terrane in Eastern Canada. Here we see the development and collapse of a stable continental platform after the Grenville Orogeny at 1000 Ma, followed by subduction of a small ocean basin underneath Eastern Canada. The rocks of the eastern shore of the island are tentatively correlated to the Green Head Group of St. John, New Brunswick. If this correlation holds then these rocks of eastern Grand Manan are the remnants of an ancient passive margin. This stable shelf collapsed as intracontinental rifting of eastern North America began 800 Ma ago, producing a small ocean basin referred to as the "Avalon Sea". This seafloor was subducted beneath North America at approximately 630 Ma, reconnecting Avalon to Eastern

Canada. This tectonic event is recorded on the island by the presence of the Coldbrook Group. The Coldbrook Group consists of 630-640 Ma metavolcanic rocks ( $^{40}\text{Ar}/^{39}\text{Ar}$ ; Nance, 1987) that have been metamorphosed to greenschist facies and can be seen on the smaller islands off the eastern shore of Grand Manan.

If the metasedimentary rocks of Grand Manan are part of the Green Head Group, and if they are intruded by the Coldbrook Group, then these relationships would support current models for the Precambrian evolution of the Avalon Terrane. However, all contacts between the metasedimentary rocks and the Coldbrook Group are tectonic. No simple intrusive relationships are observed. Further petrologic and geochemical studies are required to constrain the correlation of the rocks on Grand Manan to the Green Head Group of St. John, New Brunswick.

No 23622

CONNECTING CLIMATIC AND GEOLOGIC PROCESSES: AN EXAMPLE USING A HIGH RESOLUTION SEDIMENTARY CORE FROM THE UPPER CHESAPEAKE BAY  
HINNOV, L.A., Department of Earth and Planetary Sciences, The Johns Hopkins University, Baltimore, MD 21218; BRUSH, G.S. and BRUSH, L.M., Department of Geography and Environmental Engineering, The Johns Hopkins University, Baltimore, MD 21218

A high resolution record of sedimentation rates from 1798-1980 A.D. was reconstructed along a sedimentary core taken from deposits near the mouth of the Susquehanna River (Furnace Bay). First, a preliminary chronology was established by identifying historical pollen horizons along the core. Sedimentation rates were then estimated for each 2-cm interval in the core by adjusting the average sedimentation rate between dated horizons to the total pollen concentration measured in the interval. This yielded a 182-year long time series of fluctuating sedimentation rates at variable time spacings  $\Delta t=1-3$  years.

This time series reveals that sedimentation rates in the upper Chesapeake have increased three-fold since European settlement. This has been accompanied by a significant increase in the variance of the short-term fluctuations. These trends can be traced to gradual increases in land use. Spectral analysis of the short-term variations reveals a suite of statistically significant frequencies comparable to those of precipitation time series and the Susquehanna River discharge record. We conclude that sedimentation in the upper Chesapeake Bay is a good proxy indicator of short-term climatic processes affecting the region.

No 16245

CONCENTRATIONS AND LOADS OF NUTRIENTS AND SELECTED HERBICIDES DISCHARGED FROM TWO SPRING BASINS IN THE CUMBERLAND VALLEY, PENNSYLVANIA  
HIPPE, Daniel J., WITT, Emitt C., III, GIOVANNITTI, Rhonda M., U.S. Geological Survey, 840 Market St., Lemoyne, PA 17043

The Northern Cumberland Valley is an intensively agricultural area with accompanying high pesticide use. A preliminary study indicated that water resources in karst terrain of the valley is susceptible to contamination from agricultural chemicals. For 1 year, ending in May 1991, the U.S. Geological Survey has gaged and sampled water discharged from two adjacent spring basins in karst terrain of the valley. The project objective was to determine concentrations and estimate loads of nutrients and selected pesticides, particularly triazine and chloroacetamide herbicides and their metabolites, that discharge from Alexander and Mount Rock Springs.

The triazine herbicides atrazine, prometon, and hexazinone, as well as the soil metabolites deethylatrazine and deisopropylatrazine, were detected in water from Alexander and Mount Rock Springs. Atrazine and deethylatrazine were present in water from both springs throughout most of the year. Prometon and Hexazinone were only present in spring discharge following periods of precipitation. Mean daily concentrations of atrazine in water from both springs was 0.20 micrograms per liter, with an annual atrazine load of 0.5 and 0.6 kilograms from Alexander and Mount Rock Springs, respectively. Mean daily concentrations of deethylatrazine were 0.3 micrograms per liter in water from Alexander Spring and 0.4 micrograms per liter in water from Mount Rock Spring, and an annual deethylatrazine load of 1.1 and 1.3 kilograms, respectively. Mean daily concentrations of nitrate in water from Alexander and Mount Rock Springs were 5.1 and 5.6 milligrams per liter as nitrogen, and the annual nitrate load was 17,000 and 18,000 kilograms, respectively. Mean daily concentrations of total phosphorus in discharge from both springs was 0.02 milligrams per liter as phosphorus, and the annual load was 57 and 61 kilograms from Alexander and Mount Rock Springs, respectively.

No 16242

ASSESSMENT OF HERBICIDE CONTAMINATION OF WATER RESOURCES IN CUMBERLAND AND LANCASTER COUNTIES, PENNSYLVANIA USING ENZYME-LINKED IMMUNOSORBENT ASSAY METHODS

HIPPE, Daniel J., WITT, Emitt C., III, BAUMBACH, Gary E., BRIGHTBILL, Robin A., GIOVANNITTI, Rhonda M., CHAR, Stephen J.

U.S. Geological Survey, 840 Market St., Lemoyne, PA 17043

Enzyme-linked immunosorbent assay (ELISA) methods for analysis of triazine herbicide residues were used in five water-resources

2	S.W.F. Grant*: ACRITARCH BIOSTRATIGRAPHY AND δ13C OF LIMESTONES FROM THE EARLY CAMBRIAN FORTEAU FORMATION, NW NEWFOUNDLAND [023648] ...	8:20 A
3	Paul K. Strother, John H. Beck*: PALEOPALYNOLOGY OF THE ARISAIG GROUP (SILURIAN), NOVA SCOTIA: RESULTS OF AN INITIAL SURVEY [022378] .....	8:40 A
4	Paul K. Strother*: A REVIEW OF THE FOSSIL EVIDENCE FOR THE EXISTENCE OF LAND PLANTS FROM SILURIAN ROCKS OF PENNSYLVANIA [022377] .....	9:00 A
5	Richard H. Lindemann*, David A. Melycher: CONSIDERATIONS ON VARIATION IN TENTACULITES GYRACANTHUS (EATON) FROM THE MANLIUS LIMESTONE (LOWER DEVONIAN) AT SCHOHARIE, NEW YORK [022088] .....	9:20 A
6	Daniel Goldman*: TAXONOMY AND EVOLUTION OF THE ORTHOGRAPTUS QUADRIMUCRONATUS SPECIES GROUP (GRAPTOLITHINA) [021665] .....	9:40 A
COFFEE BREAK .....		
7	James C. Brower*: GROWTH AND FUNCTIONAL MORPHOLOGY OF EUPTYCHOCRINUS SKOPIAOS, A DWARF CAMERATE CRINOID FROM THE ORDOVICIAN [022110] .....	10:20 A
8	Barbara A. Lusardi*, Detmar Schnitker, Daniel F. Belknap: ENVIRONMENTAL EVOLUTION OF THE GULF OF MAINE [018829] .....	10:40 A
9	M. A. Fedonkin, Ellis L. Yochelson*: DEPOSITIONAL ENVIRONMENT OF VENDIAN FOSSILS FROM ZIMNY (WINTER) COAST, WHITE SEA, NORTH RUSSIA [002905].....	11:00 A
10	Kenneth M. Schopf*, Paul J. Morris: A MUSCLE SCAR AND OTHER NOVEL FEATURES FROM STEINKERNS OF HYPOMPHALOCIRRUS: A NEW GLIMPSE INTO PARAGASTROPOD ANATOMY [021826] ...	11:20 A
11	Paul J. Morris*: TOWARDS A MONOPHYLETIC CLASS PARAGASTROPODA: FUNCTIONAL MORPHOLOGY AND PHYLOGENY OF CONVERGENT PALEOZOIC NEARLY-PLANISPIRAL MOLLUSCS [021828] .....	11:40 A
STRUCTURE/TECTONICS I: NEW ENGLAND TECTONICS Harrisburg Hilton, Ballroom 5, 8:00 A.M.		
Thomas R. Armstrong and James H. Sevigny, Presiding		
1	J. H. Sevigny*, G. N. Hanson: TIMING OF MAGMATISM AND METAMORPHISM IN THE SOUTHERN CONNECTICUT VALLEY SYNCLINORIUM [011062] .....	8:00 A
2	Antonio Lanzirotti*, Gilbert N. Hanson: AGE CONSTRAINTS ON THE DEFORMATIONAL AND THERMAL HISTORY OF THE STRAITS SCHIST, SOUTHWESTERN CONNECTICUT [011061] .....	8:20 A
3	T. R. Armstrong*: PROGRESSIVE EVOLUTION OF ACADIAN DYNAMOTHERMAL EVENTS IN SOUTHERN VERMONT: EVIDENCE FOR TIME TRANSGRESSIVE DOME DEVELOPMENT [020177] .....	8:40 A
4	Rolf Herrmann*, W.S.F. Kidd: BAKER BROOK "VOLCANICS"-FAULT SYSTEMS IN THE VERMONT VALLEY [019625] .....	9:00 A
5	Margaret D. Thompson*, Rachel J. Burks: SHEAR BAND FABRIC IN LATE PROTEROZOIC ROXBURY CONGLOMERATE, BOSTON, MA [021776] .....	9:20 A
COFFEE BREAK .....		
6	R. H. Moench*, W. A. Bothner, R. G. Marvinney, S. G. Pollock: THE SECOND LAKE RIFT, NORTHERN NEW ENGLAND: POSSIBLE RESOLUTION OF THE PIERMONT ALLOCHTHON-FRONTENAC FORMATION PROBLEM [023958] .....	10:00 A
7	Robert G. Marvinney*, Wallace A. Bothner, Stephen G. Pollock: THE FRONTENAC FORMATION: A RECORD OF SILURIAN MARGINAL BASIN DEVELOPMENT IN MAINE, QUEBEC, NEW HAMPSHIRE, AND NORTHEASTERN VERMONT [001675] .....	10:20 A
8	James Hibbard*, S. A. Hall: EARLY ACADIAN FOLDING OF THE SEBOOMOOK GROUP; NORTH-CENTRAL MAINE [021608] .....	10:40 A
9	R. Hon*, L. S. Hanson, C. Gabis, D. C. Bradley: GEOCHEMISTRY AND TECTONIC SIGNIFICANCE OF THE DEVONIAN CARRABASSETT FORMATION, CENTRAL MAINE [021755] .....	11:00 A
10	Stephen G. Pollock*: MELANGE AND POLYPHASE DEFORMATION IN THE ROSAIRE GROUP, MAINE APPALACHIANS [005561] .....	11:20 A

11	J. V. Lynch*: ACADIAN COMPRESSION AND EXTENSIONAL COLLAPSE RECORDED IN SILURIAN COVER SEQUENCES, CAPE BRETON ISLAND, NOVA SCOTIA [025005] .....	11:40 A
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POSTER SESSION I: CONTAMINANT HYDROGEOLOGY, ENVIRONMENTAL  
GEOLOGY, AND SEDIMENTOLOGY  
Harrisburg Hilton, Ballroom 1 & 2, 8:00 A.M. - 12:00 Noon

Authors will be present from 9:00 to 11:00 A.M.

#### HYDROGEOLOGY

James C. Adamski*: GEOCHEMISTRY AND HYDROGEOLOGY OF A FRACTURED CRYSTALLINE-ROCK AQUIFER IN THE PIEDMONT PHYSIOGRAPHIC PROVINCE, HOWARD COUNTY, MARYLAND [008652] .....	Booth 1
Thomas K. Weddle*, Marc C. Loisel, Craig D. Neil: BACKGROUND WATER QUALITY IN STRATIFIED DRIFT AQUIFERS IN MAINE [002008] .....	Booth 2
Stephen E. Gould*, Carl O. Moses: HYDROGEOCHEMICAL CONTROLS ON THE ALKALINITY OF TWO LAKES IN THE POCONO MOUNTAINS, NORTHEASTERN PENNSYLVANIA [015615] .....	Booth 3
Daniel J. Hippe*, Emitt C. Witt III, Gary E. Baumbach, Robin A. Brightbill, Rhonda M. Giovannitti, Stephen J. Char: ASSESSMENT OF HERBICIDE CONTAMINATION OF WATER RESOURCES IN CUMBERLAND AND LANCASTER COUNTIES, PENNSYLVANIA USING ENZYME-LINKED IMMUNOSORBENT ASSAY METHODS [016242] .....	Booth 4
Dan Eliot Verrillo*, C. Brannon Andersen: DETERMINING EXCHANGEABLE CATIONS IN MUDSTONES: APPLICATIONS TO GROUNDWATER GEOCHEMISTRY [019733] .....	Booth 5
James M. Martin-Hayden*, Gary A. Robbins: APPARENT PLUME ATTENUATION AND DISTORTIONS DUE TO VERTICAL CONCENTRATION AVERAGING IN MONITORING WELLS [016432] .....	Booth 6
John W. Jengo*: APPLICATION OF BOREHOLE GEOPHYSICS AND SEQUENCE STRATIGRAPHY FOR DELINEATING AN AQUIFER SYSTEM IN CRETACEOUS AGE SEDIMENTS IN THE NEW JERSEY COASTAL PLAIN [014426] .....	Booth 7
Dennis J. Low*: CASING DEPTH--SURROGATE FOR REGOLITH THICKNESS? [016248] .....	Booth 8
Aaron Green*, Frederick L. Paillet, Joseph T. Gurrieri: A MULTI-FACETED EVALUATION OF A GASOLINE CONTAMINATED BEDROCK AQUIFER IN CONNECTICUT [016430] .....	Booth 9

#### ENVIRONMENTAL GEOLOGY

Samuel H. Baughman II*: ROCKSLIDES: FACTORS AND PREVENTIVE MEASURES THROUGH DESIGN [023596] .....	Booth 10
Andrew P. De Wet*, Sean Bisch: ENVIRONMENTAL IMPLICATIONS OF THE PROPOSED PUMPED HYDROSTORAGE PLANT AT CUFFS RUN IN YORK COUNTY, PA [020247] .....	Booth 11
William D. Lilley*, George H. Moreau: SITE SCREENING FOR HEAVY METALS WITH X-RAY FLUORESCENCE [025347] .....	Booth 12
J. Richard Jones*, Ann G. Kim, Joseph P. Slivon, Andrew M. Kociban: A LABORATORY STUDY OF CONTAINMENT BARRIERS FOR COAL WASTE BANK FIRE EXTINGUISHMENT [023921] .....	Booth 13
William M. Goodman*, Andrew G. Hunt, Kathleen M. Fregelette: TERRAIN SUITABILITY FOR LANDFILL SITING IN NEW YORK STATE [023462] .....	Booth 14
David O. Cook*, Sidney Quarrier: ACID SULFATE DRAINAGE IN CONNECTICUT [001669] .....	Booth 15
Jonathan Leahy*, Michael Wing, Jeff Chiarenzelli: EFFECTS OF A LEACHATE FROM A MUNICIPAL LANDFILL ON A SEASONAL STREAM [010629] .....	Booth 16
Douglas G. Mose*, George W. Mushrush, Charles E. Chrosniak: ANALYSIS OF RECOVERY AND REMEDIATION METHODOLOGY IN A 100,000+ GALLON SUBSURFACE HYDROCARBON CONTAMINATION PLUME [019774] .....	Booth 17

#### REMOTE SENSING

Robert J. Altamura*, David P. Gold: RADARGEOLGIC INTERPRETATION OF THE EVERETT QUADRANGLE, PENNSYLVANIA AND PART OF THE DURHAM QUADRANGLE, CONNECTICUT [014472] .....	Booth 18
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# 1992 ABSTRACTS WITH PROGRAMS



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