
THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

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CALL for ABSTRACTS
VGS Spring Meeting, April 15, 2000
Middlebury College
Abstracts Due By March 24, 2000

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President's Letter

Greetings Members,

This is the second time I am serving as your president. I hope that you will give me feedback and comment. Please let me know what direction you feel that the society should be going in. As in my prior term of office, I feel that the society has a responsibility and the ability to effect change in Vermont classrooms. Earth science week in October is the opportunity to effect change.

Alan Liptak and Kristen Underwood did a wonderful job in association with Earth Science Week in and out of my classroom. Alan gave a wonderful talk about ground water and glaciers. Alan and Kristen showed the students the sampling process for the observation wells on Mt. Abraham Union High School property.

I am looking forward to an exciting year with VGS. We have planned a summer outing to the Cold Regions Research Center as arranged by Larry Gatto, one of our past presidents. The fall field trip will be led by Stephen Wright.

As we enter the new millenium (by some counts), I urge all members to be active and contributory to the society.

Respectfully yours,

Shelley Snyder
VGS President
Mt. Abraham Union High School
Bristol, VT 05443
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EARTH SCIENCE WEEK '2000
OCTOBER 8 - 14

Call for Abstracts!!

Spring Meeting of the Vermont Geological Society Saturday, April 15, 2000 8:30 am

Spring 2000 Presentation of Student Papers
Hosted by: Department of Geology, Middlebury College
Middlebury, Vermont

The Vermont Geological Society will hold its Spring 2000 meeting at Middlebury College in Middlebury, Vermont. The meeting is dedicated to students conducting research in the geological sciences. Undergraduate and graduate students are encouraged to submit abstracts outlining the results of their research. Abstracts covering all aspects of the geological sciences are welcome and will be published in the Spring issue of the *Green Mountain Geologist*. The Charles Doll Award for outstanding undergraduate paper will be presented. A cash award for "Best Paper and/or 2nd place" will also be presented based on quality of the research, the abstract, and presentation of the paper.

Abstracts should be limited to one double spaced 8.5 x 11 inch sheet and can include figures. Font size should not be less than 10. Please submit both a paper and electronic copy (e-mail or disk; e-mail preferred) of abstracts, reviewed by the student's advisor, to the editor at the address given below. Disks should include both a formatted and "text only" version of the abstract (either Mac or IBM; IBM preferred). Abstracts submitted by e-mail should be sent to marjieg@dec.anr.state.vt.us. Oral presentations will be limited to 15 minutes with 5 minutes for questions. Two slide projectors and an overhead projector will be available.

Deadline for Abstracts: Friday, March 24, 2000

Send abstracts to:

Marjorie Gale
Vermont Geological Survey
103 South Main St., The Laundry Building
Waterbury, VT 05671-0301

For additional information contact Shelley Snyder at 658-0575 or Marjie Gale at 241-3608 (o) or 899-5002 (h).

SOCIETY NEWS

New Officers

President - Shelley Snyder; Vice-President - Christine Massey; Treasurer - Kristin Underwood; Secretary - Jeff Hoffer. Other board and committee chairs are: Board of Directors - Kent Koptiuch, Kristin Underwood and Marjorie Gale; Geological Education Committee Chair - Christine Massey; Advancement of Science Committee Chair - Rolfe Stanley; Publications Committee Chair - Marjorie Gale. The GMG will be co-edited by Marjorie Gale, Jeff Hoffer and Peter Gale. Stephen Wright will enjoy a well-deserved vacation from the GMG and we are grateful for all the time he spent on behalf of the society as GMG editor, meeting coordinator, interim treasurer and society jack-of-all-trades. He will continue to be membership chairman and the main contact at UVM, directing information and mail to the appropriate new board and committee members and advising those members. Please welcome our new officers and offer to assist whenever possible with various tasks and activities of the society.

VGS Projects

One goal of this past year was to establish a realistic schedule of events and activities which we could all support. You may or may not have noticed the absence of the winter meeting this year and last. Low attendance at the winter meetings, combined with the likelihood of bad weather, persuaded us to abandon the winter meeting. Northeast GSA and NEIGC afford local opportunities to stay abreast of geologic research in the northeast. We are continuing to support the spring student meeting, summer field trip, fall field trip with annual meeting/dinner, and four issues of the GMG. The executive committee is very interested in maintaining or increasing the VGS role in Earth Science Week.

Earth Science Week 1999

Earth Science Week involved many of our members and is generating increased interest among teachers as we head into our third year. The Vermont Geological Society, the Vermont Geological Survey at DEC, and Perkins Museum at University of Vermont are the three primary organizations that publicize and coordinate activities for the week. Several businesses also participate. This past year we asked libraries across the state to have special displays and story hours during the week, although we do not know how many participated. The following people and

organizations volunteered to organize events, lead field trips, speak in classrooms, judge posters, offer workshops, and contribute prizes: Christine Massey (Perkins Museum), Larry Becker (Vermont Geological Survey), Shelly Snyder (Mt. Abraham Union HS), Peter Gale (Stone Environmental), Marjorie Gale (Vermont Geological Survey), Kristin Underwood (Griffin International), Alan Liptak (Griffin International), Jon Kim (Vermont Geological Survey), Helen Mango (Castleton State College), Barry Doolan (University of Vermont), Jeff Hoffer (Hoffer Consulting), Alice Blount (OMYA), Ruth Gibbud (OMYA), Tracy Rushmer (University of Vermont), Laura Cadmus (Agency of Natural Resources), Rock of Ages Visitor Center, Fleming Museum, Lake Champlain Basin Science Center, Maria Stadlmayer (Agency of Natural Resources), Green Mountain Club, and Ginger Anderson (Agency of Natural Resources).

Calendar

February 4: Pre-registration Deadline for NE GSA Meeting

March 13-15: NE Geological Society of America, New Brunswick, NJ

March 22: Deadline for student abstracts

March 22: Deadline for submission of articles for Spring 2000 GMG

April 7: Publish Spring GMG

April 15: Spring VGS Meeting, Middlebury College, Middlebury, VT

May 1: Student Research Grant Proposals Due

June 1: Research grant money awarded

June 16: Deadline for articles and news items for Summer GMG

July 22: Spring/Summer Field Trip, CRREL, Hanover, NH

Sept. 1: Deadline for articles and news items for Fall GMG

Sept. 15: Publish Fall GMG

**Sept. 23: Fall Field Trip led by Stephen Wright, Business meeting,
election of officers and dinner to follow field trip**

Oct. 8-14: Earth Science Week

Welcome to the Perkins Geology Museum!!

When is the last time you visited the *Perkins Geology Museum* at the University of Vermont? Have you seen the T-Rex hologram? Examined the Vermont State Fossil, the Charlotte Whale, up close and personal? Seen the Dinosaur Trackway? Or just browsed among the specimens from the Vermont State Collection?

We were fortunate to have a major face lift in 1993, which updated all of the exhibits and displays. The museum showcases rocks, minerals, and fossils from Vermont and around the world. A seismograph records daily seismic activity and visitors can view hand specimens through a small microscope. A 1931 relief model shows Vermont topography, the "Dark Room" highlights fluorescent minerals, and the geologic timeline spans the entire length of the museum.

The Perkins Geology Museum houses many excellent examples of fossils from the ancient reef limestones on Isle La Motte, VT and mineral assemblages from the ultramafic complex in Eden Mills, VT. Other important Vermont specimens include local Brandon lignites, Mount Holly mammoth tusks, and Vermont building stones.

We maintain a "waste" rock pile in the courtyard outside behind Perkins Hall in the event that students want to take a rock sample with them after a museum visit. Please feel free to add your "extra" samples to the pile if you are cleaning house, and would like to give your old rocks a good home. Interested K-12 students make great collectors!

Museum Hours: 9am-5pm (M-F), Weekends, & Holidays

Location: Perkins Geology Hall, University of Vermont, Burlington, Vermont 05405-0122 (just off Colchester Avenue next to the Fleming Museum)

Parking: in UVM Visitor's Lots (M-F) and next to Perkins Hall (weekends & holidays)

Geologic Information and Museum Tours: (802) 656-8694

Education Specialist, Christine Massey: (802) 656-1344

STATE GEOLOGIST'S REPORT

Laurence R. Becker, State Geologist
Vermont Geological Survey
103 South Main Street
Waterbury, Vermont 05671-0301

Surficial Geology

The Vermont Survey delivered the State's first digital surficial geologic map products supported through the STATEMAP grant program. Maps are complete for the Montpelier, and Barre West 7.5 minute quadrangles and the eastern half of the St. Johnsbury 7.5 x 15 minute sheet. The geologic mapping was performed by Frederick D. Larsen (Norwich University), Stephen Wright (University of Vermont), George Springston and George Hazelton (Clemson University Ret.) respectively. A digital database of located water wells, bridge, and hazardous waste borings accompanies each map. The data base includes depth to bedrock, depth to the top of each unit in the log, yield in gpm, static water level, lat/long, water resources #, town, and map number. Cross-sections were drawn for all maps and a thickness map of the overburden deposits is available for the eastern half of the St. Johnsbury quadrangle. Thanks go to Jonathan Kim for setting up digital protocols with the assistance of Laura Cadmus of the Information Management Section of the Agency and to Marjorie Gale for data base work and contract administration. Jon Kim digitized the maps and Laura Cadmus produced a map of well locations on a topographic base.

STATEMAP Geologic Advisory Committee Meeting

The STATEMAP advisory committee met on November 9, 1999, to advise on a policy for the STATEMAP grant submittal on November 18, 1999. As a long-range plan, the committee agreed that geologic mapping in select areas would be directed at societal problems. The mapping can lead to outcomes that improve and protect the public health and safety. It is anticipated that in future years these needs will be primarily in the area of surficial geologic mapping and the understanding of these materials in the third dimension. (Though there was considerable discussion of the applied need for bedrock information). This year's STATEMAP application focuses attention on the landslide hazard, watershed studies for flood hazard mitigation, and aquifer/recharge area identification. The intent is

to produce general resource maps that include framework geologic information with derivative products that address the societal problems linked to the three proposed subprojects.

The committee agreed that the following three proposed subprojects all have merit: Surficial geologic map and database for the Jeffersonville 7.5 minute quadrangle; Surficial geologic map and database for the Great Brook Watershed on portions of the Plainfield, Barre East, and Knox Mountain 7.5 minute quadrangles; and Surficial geologic map and database for the Arlington 7.5 minute quadrangle. For the Jeffersonville quadrangle and the Great Brook Watershed, hazard maps of slope instability and erosion are planned derivative products. An aquifer and aquifer recharge area map will accompany the Arlington quadrangle. Monies for the Vermont Survey will be included in cooperation with the University of Vermont to drill logged borings and place piezometers (to understand ground water conditions) in the existing Jeffersonville landslide area and above the school playing fields to better understand landslide risk. The Selectboard of Cambridge met on November 8 and supported the proposed geotechnical work.

Glacial Geomorphology - Alaska Field Trip

The State Geologist visited glacial geomorphology training areas in Alaska during a trip organized by the Midwestern State Geologists and the USGS. (They have approached Congress for an appropriation to do surficial geologic mapping in four Midwestern states). The field trip focused on the ice marginal deposits of glaciers in Prince William Sound and the Bering Glacier east of Cordova, Alaska as an analog of the many glacial deposits found in New England and the northern Midwestern States. Seeing glacial deposition in action was a real eye opener and will help Vermont develop a surficial mapping program. The Meares glacier in Prince William Sound was an excellent analog of till formation in the Taconics because of similar eroded rock types. The outwash near Weeping Pete Island at the Bering glacier displayed a gravel and sand sequence that has aquifer potential when buried. (These sequences occur in New England.) Truly a spectacular trip with hopes of a follow up slide presentation to explain glacial geomorphology and its meaning for Vermont.

New England Intercollegiate Geologic Conference and Surficial Mapping Symposium

The 91st annual New England Intercollegiate Geological Conference (NEIGC) was held October 1-3 and featured field trips highlighting recent research in Vermont. The successful "Surficial Geologic Mapping in New

England Symposium", sponsored by the Vermont Survey, the USGS, and the University of Vermont, was held on Thursday, September 30. Participants from Maine, Connecticut, Rhode Island, New York, Illinois (a leader in new map products), Vermont, and the USGS presented a range of material on current research, methods, and processes. The surficial mapping community also participated in the follow up field trips that highlighted the work supported by the Vermont Survey. Surficial geology trips by Stephen Wright, George Springston, George Hazelton, and Fred Larsen focused on results of mapping in the Montpelier, St. Johnsbury, and Barre West quadrangles.

New State Bedrock Map

In March, the State Geologist and Marjorie Gale visited the US Geological Survey in Reston, VA for two days to learn about the steps to bring the new state bedrock map from hand-drafted compilation copies to the final paper and digital products. Meetings were held with Nick Ratcliffe of the USGS, the technical editors, geologists, cartographers, and printers who will be working with the state to produce these maps. The State Map layout was presented and discussed in detail. The map is now planned to be published on five 42"X58" sheets and will include the 1:100,000 scale map plus unit descriptions, a stratigraphic correlation chart, cross-sections, references, a tectonic map, a metamorphic map, and geochronological data.

We are continuing to make progress on the bedrock map. Field work this summer focused on preparing for the NEIGC field trips, compiling and editing maps based on new field data, and mapping new areas in the Worcester Mountains in order to have consistency from north to south. Wally Bothner and Jo Laird, both from the University of New Hampshire, completed their map of the Tillotson Peak area at a scale of 1:24000. This work is the last additional new bedrock data to be added to the Mt. Mansfield one-degree sheet. Peter and Thelma Thompson spent most of the summer and fall working on revisions to the geology in numerous areas of the Mt. Mansfield sheet, dovetailing with the NEIGC field trip that they led with Barry Doolan. Peter Thompson continued to work on the compilation of both the Mt. Mansfield and Montpelier sheets through December as part of his sabbatical from Cornell College. We greatly appreciate all his contributions and commitment to the project. Jon Kim and Marjie Gale mapped in portions of 4 quadrangles in the Worcester Mountains to provide constraints for continuing and revising the geology from the Mt. Mansfield sheet south onto the Montpelier one-degree sheet. They also worked with Rolfe Stanley and Barry Doolan to compile geology from Belvidere Mountain east and south to Mt. Elmore in conjunction with

the NEIGC field trip that they led with Jo Laird. As the year draws to a close, the fieldwork for northern Vermont is complete. The northern Vermont group ended their field season reluctantly in early December, having now identified many areas that they would like to map in more detail or look at again! We plan to draft the compilation from the one-degree sheets this winter. Additional edits will be completed next summer as questions resulting from the scientific review process are resolved.

NEIGC Bedrock Trips - Studies Previously Supported by the Vermont Survey

Bedrock trips led by Peter Thompson, Thelma Thompson, Barry Doolan, Jon Kim, Marjorie Gale, and Jo Laird presented a unified transect of the geology of northern Vermont. Field trip participants came from universities throughout New England and were very receptive to the changes made to the bedrock map in Vermont. The field trip stops and accompanying geologic papers are published in the 1999 NEIGC Guidebook available through the University of Vermont.

New England and New York State Geologists: Aquifer Issues

The New England and New York State Geologists met with the USGS to discuss potential regional cooperation on aquifer issues. The thrust of the discussion was the geologic information needs for defining both bedrock and surficial aquifers. Examples of recent work by the USGS in New Hampshire to correlate well yield with data from detailed bedrock geologic mapping in two quadrangles showed statistically significant trends associated with various rock structures. New England and northern New York have similar aquifers in that water is obtained in fractured bedrock as well as surficial deposits.

In the past, the Vermont Survey has proposed studies to better define available water in fractured bedrock in growth areas where the bedrock is the primary source. The Vermont Survey has also focused surficial mapping in areas where higher yielding wells could be tapped to meet community demands. The New England and New York State Geologists agreed to meet again to focus on the geological and societal issues and discuss a vehicle for regional cooperation.

Jeffersonville Landslide

The State Geologist explained the geologic setting and the likelihood of future slide events to the Governor, State officials, Federal agencies and Senator Leahy's office at the Jeffersonville landslide. Jon Kim produced a

very useful schematic cross-section in Adobe Illustrator that facilitated the geologic explanation.

The Vermont Survey has proposed a hazard mapping initiative that will integrate the identification of the landslide and floodplain erosion hazard, both examples of slope instability. The Vermont Survey is querying other States as to how they handle the landslide issue from hazard identification through notification. The California State Geologist was contacted because he conducted a national survey of State Geological Surveys for the Association of American State Geologists. The survey indicates that California, Oregon, and Washington are most active as expected. Others that have reported property loss damage are: Colorado, Idaho, Kentucky, New York, Wyoming, Montana, North Carolina, Ohio, Missouri, Utah, and Nebraska.

St. George Villa Trailer Park

State Geologist Larry Becker, Jon Kim of the Vermont Survey, and Dennis Nealon of the Water Supply Division visited the St. George Villa trailer park and vicinity to better understand the geologic setting and factors contributing to elevated levels of radionuclides in existing wells. Representative samples were collected for chemical analyses from the various geologic domains to see if there is a rock type or unconsolidated material that is devoid of the radionuclides of concern. Practical matters such as access, ownership, and if a new clean source with sufficient yield in the vicinity of the trailer park is geologically possible were considered. Any acceptable geologic setting would also have to be capable of supplying the necessary yield to make up for well water that exceeds standards.

Slate Belt - Request to Purchase State Land

The State Geologist is meeting his statutory responsibility to provide technical information and advice regarding the management of mineral resources on state owned lands. Forest and Parks has been approached by a slate quarry owner who would like to purchase state land to expand his quarry from an existing location. There are two issues: whether there are geologically significant features on the piece of state property and determining the nature of the mineral resource and its worth to the State. The Vermont Survey visited the property in October and will analyze the resource potential during the winter of 2000.

Earth Science Week

The second annual Earth Science Week celebration, held during the week of October 10-16, 1999, provided an opportunity to encourage stewardship of the Earth and to expand public awareness and understanding of geology and its role in water and land use decisions, ecological issues, and hazard mitigation. The week was co-sponsored by the Vermont Survey, the Vermont Geological Society, Perkins Museum at the University of Vermont and the American Geological Institute. Governor Dean provided his much appreciated support by proclaiming the week. Many thanks go to Marjorie Gale, Christine Massey, Shelley Snyder, and Kristen Underwood for organizing the week's activities. Numerous geologists in Vermont volunteered as classroom speakers during the week. Geologists also participated in the Geologist-in-the Parks event at five locations in Vermont. A poster contest for school children, guest speakers at UVM, a mineral workshop sponsored by OMYA, Inc., and a field trip led by the State Geologist for the Green Mountain Club rounded out the Earth Science Week activities

Vermont Science Teachers Association

The Survey participated in a full day conference sponsored by the Vermont Institute of Science Math and Technology (VISMT), which focused on Vermont science and math education standards. We distributed about 400 publications covering topics such as the surficial geology of Vermont, guides to favorite geology web sites, and earthquake hazard curriculum. The Vermont Survey spoke with many science teachers at the middle and high school levels, other non-formal science educators, and attended a workshop sponsored by the Eisenhower National Clearinghouse for Mathematics and Science Education. The conference helped focus our attention on developing field trips, resources and activities that will align with the Vermont Framework of Standards and Learning Opportunities.

White River Watershed Association

On October 23, 1999, Jon Kim of the Vermont Survey conducted a four-hour field-based "Geology of the White River Watershed" workshop for the White River Watershed Association in Randolph, Vermont. The workshop covered bedrock and surficial geology, soils, geologic controls on the morphology of streams, and the influence of rock type on ground water quality.

Emergency Management Meeting for Towns and RPC - Natural Hazards

Emergency Management sponsored meetings in Waterbury for Regional Planning Commissions and Towns to hear from cooperators on how they can provide mitigation assistance. The State Geologist presented information on the recent landslide in Jeffersonville, stream erosion concerns, and the stream geomorphology work that is underway. As FEMA would like to address all hazard issues in project impact applications, the State Geologist discussed earthquake risk in Vermont and presented HAZUS output for the city of Burlington showing a potential damage scenario. On August 26th, the Vermont Survey received a request from the Addison County Regional Planning Commission for a letter of support for a Project Impact application to FEMA that will include a natural hazard component.

New England Association of Environmental Biologists

On March 10, the State Geologist spoke to a gathering of New England biologists at the annual meeting of NEAEB held at Ascutney, Vermont. The studies managed by the Vermont Survey that have focused on fluvial geomorphology, watershed land use, water quality, and aquatic ecosystems were discussed. Phase I results were summarized as human-induced land use changes cause various hydrologic and geomorphic adjustments, including alterations in the size and timing of flood peaks and in the magnitude and type of soil erosion. The Phase II watershed study seeks to identify, in Vermont, the type and magnitude of hydrologic and geomorphic reaction, alterations in sediment distribution, and the integrity of aquatic ecosystems as affected by land use activities. Mike Kline of the Water Quality Division followed with a discussion of considerations for the protection and restoration of stable stream morphology. Both made a case to the biologists that morphology of streams is definitely worth considering when approaching the problems of aquatic habitat protection and flooding/property loss concerns.

Phase II Stream Geomorphology Reports Finalized and Meeting Held

Over the last 2 years, the Vermont Survey has completed two phases of scientific study to understand the relationship between land-use change, gravel removal from streams and changes in stream morphology. The scientific information will be used as a base to develop management strategies for flood hazard mitigation and watershed hydrology protection.

Phase II of the Watershed Hydrology Protection and Flood Hazard Mitigation four phased plan is complete. On November 3, 1999, the consultants, Center For Watershed Protection, Aquafor Beech, and Step by Step, presented the results of *Watershed Hydrology Protection and Flood Mitigation Phase II - Technical Analysis, Stream Geomorphic Assessment, and Impact Assessment of Instream Management Practices (Gravel Extraction)*. Members of the Water Quality Standards Committee were invited to make comment with a number of additional invitees from the public sector. The Vermont Ski Areas Association, Vermont Natural Resources Council, and the U.S Fish and Wildlife Service from Concord, N.H. were in attendance.

Granville Natural Channel Design

As an outgrowth of the Phase II gravel extraction study, the Vermont Survey managed a fluvial geomorphology study resulting in a natural channel design for a 5000-foot section of the Upper White River in Granville. The design brief, final design plans, and the tender documents (bid documents for contractors) were delivered by Aquafor Beech LTD of Kingston, Ontario in August, 1999.

Land Stewardship - Pine Mountain Wildlife Management Area Biodiversity Project

Along with other element teams, the State Geologist reported on the findings and recommendations of the Geology/Soils and Climate team studying the Pine Mountain Wildlife Management Area in Groton/Topsham. Some of the geology/soils and climate recommendations are as follows: 1) Geology/soils and climate data should be collected and displayed in useful formats in the early coarse filter stage as a base of information for other element analyses; 2) For public land, the best examples of physical settings that support biodiversity within a particular eco-region that are a result of geology/soils, and climate should be preserved.

The Vermont Survey has received a number of requests for geological data as a layer of information when the physical attributes of land are assessed. Jason Benoit of the Vermont Leadership Center (VLC) in East Charleston, Vermont, which is a non-profit organization that promotes outdoor leadership skills, ecological awareness, and natural history training for students, teachers, and local residents approached the Vermont Survey about the possibility of developing a cooperative relationship. The Vermont Survey has offered limited technical assistance for their geology-based educational programs in the form of geology field and classroom seminars, construction of various geologic maps of their property (they

have access to 2500 acres), and guidance and assistance with the preparation of GIS-based educational displays for their base lodge. The Vermont Survey views this as a "train the trainers" project in which geology as an element of good land stewardship is presented to a non-profit group that will in turn promote the use of geologic information for the understanding and wise use of property.

Well Driller's Advisory Committee

As a member, the State Geologist displayed and discussed a number of bedrock map and surficial geology products that can be used by the drilling community and the hydrogeologic consultants. There was much interest in the thickness of overburden/depth to bedrock and surficial geology maps that the Vermont Survey is developing. The drillers would very much like to know the thickness and nature of the overburden when estimating costs to the homeowner. Perhaps there is a saturated coarse-grained material in the unconsolidated material over the bedrock that can be tapped to save the homeowner money. If the driller has to go through the overburden to bedrock than the overburden must be cased. The thicker the overburden the higher the estimated costs. From experience with different rock types, when the driller reaches bedrock the rock types displayed on the map can help predict whether a sufficient yield can be easily obtained or the task of collecting sufficient yield may be more difficult. Some formations have a sulfur water smell.

Bedrock maps are one of the information tools that a hydrogeologist will use to locate fractures that have the potential of producing higher yields to serve groupings of houses or commercial users. The driller's were interested in any statistical analysis of well yields for different formations in Vermont.

Association of American State Geologists - Statistician

The State Geologist, currently serving as elected Statistician for the Association of American State Geologists, delivered the Statisticians Report for 1998 to all State Surveys. The report, based on questionnaire responses from 40 State Geological Surveys, summarizes personnel, income, and expenditures. The combined total for expenditures for geological surveys of \$124,137,859.00 includes \$95,000,000.00 for geologic research and administration and the remaining funds spent on cooperative programs with federal agencies such as the US Geological Survey and the EPA. Nationally, geological surveys employ over 2000 professional and support personnel.

VERMONT GEOLOGICAL SOCIETY DUES STATEMENT 2000

Dear VGS member:

Membership dues for 2000 are \$15.00 for Members and Associate Members, \$20.00 for a family membership with one newsletter subscription, and \$8.00 for Student Members. Membership dues are used to publish the *Green Mountain Geologist*, to finance our Student Research Grants, and to cover the costs associated with meetings and field trips. If your address, phone, or e-mail address has changed since last year, please fill in this information below, if not, leave the form below blank. A new membership directory will be published with the Summer GMG. Return this form with your check for the appropriate amount made payable to the Vermont Geological Society by March 30, 2000. Send your payment to Kristin Underwood, Treasurer; Vermont Geological Society; Department of Geology; University of Vermont; Burlington, VT 05405-0122. Thank you.

Name:

Date:

Street or Box:

City, State, ZIP:

Work Phone:

Home Phone:

e-mail address:

Fax No.:

Circle Type of Membership:

Member (\$15)

Student Member (\$8)

Family (\$20)

Amount Due: _____

Additional Contribution to VGS Research Grants: _____

Total Enclosed: _____

Vermont Geological Society Student Research Grants

are designed to aid our future geologists investigate Vermont's geo-history

Help the VGS to promote a deeper insight into Vermont Geology.

Students receiving assistance through the program will present their research results at the VGS Spring Meetings. Your generosity will help cover a lot of terrane!



To contribute to the **VGS Student Research Grant Program**, clip or copy this form and send it, along with your check or money order made payable to VGS, to:

Kristen Underwood, Treasurer, Vermont Geological Society
Department of Geology, University of Vermont
Burlington, Vermont 05405-0122

- *I'VE ENCLOSED MY TAX-DEDUCTIBLE CONTRIBUTION TO BE DEDICATED TO THE VGS STUDENT RESEARCH GRANT PROGRAM.*

TOTAL GIFT: \$ _____

NAME: _____

ORGANIZATION: _____

ADDRESS: _____

CITY: _____ **STATE:** _____



VGS MEETINGS in 2000

SPRING – April 15, Student Papers, Middlebury College

SUMMER – July 22, Field Trip to CRREL, Hanover, NH

FALL – September 23, Field Trip TBA

Editors' Favorite Web Sites

Volcano World (beautiful images):

<http://volcano.und.nodak.edu/vw.html>

Canadian Center for Remote Sensing (tutorials; images)

<http://www.ccrs.nrcan.gc.ca/ccrs/eduref/edurefe.html>

Ocean Planet Homepage (turn your speakers on):

http://seawifs.gsfa.nasa.gov/ocean_planet.html

Rob's Granite Page (rocks with a sense of humor):

<http://uts.cc.utexas.edu/~rmr/index.html>

The Talk.Origins Archive (evolution discussion):

<http://www.talkorigins.org/origins/faqs.html>

A Geologist's Lifetime Field List:

<http://www.uc.edu/geology/geologylist>

Triassic-Jurassic Working Group at Rutgers

<http://www-rci.rutgers.edu/~schlisch/>

e-mail the address of your favorite web site to marjieg@dec.anr.state.vt.us

Other news items:

Vermont Field Trip Guidebooks Available:

1999 NEIGC Field Trip Guides for Vermont are available through the Geology Dept., Perkins Hall, UVM, Burlington, VT 05405 for \$18.00 plus \$3.00 shipping.

1997 NEIGC Field Trip Guides for Vermont are available through the Dept. of Natural Sciences, Castleton State College, Castleton, VT 05735 for \$18.00 plus \$3.00 shipping.

VGS Treasurer's Report

December 16, 1999

Dear President and Board:

I have received nearly the last of the Treasurer's records, as of yesterday. Based on my brief review of the records, the financial position of the Society remains strong. Once I have had a few weeks to fully review the set of records, I will forward to the Board a more detailed financial report.

Checking Account Balance, 12/16/99: \$1,759.61

Paperwork has been processed to permit my signature on the Society's checking account. Our account has remained with Vermont National Bank, during the initial phases of recent banking mergers/ buyouts. However, it will be transferred from VNB to Chittenden Bank in early March of 2000 when the banking merger/ buyout process is completed.

Thanks to Steven Wright's extra efforts, following the resignation of Alan Carpenter as treasurer, the 1999 membership dues were deposited in July 1999. Three additional checks for member dues, received within the last couple of months, were deposited today and are reflected in the above balance.

I look forward to continuing to serve the Society in a new role as Treasurer. I welcome any feedback and suggestions from the Board and from the membership.

Respectfully submitted,

Kristen L. Underwood

THE GREEN MOUNTAIN GEOLOGIST
VERMONT GEOLOGICAL SOCIETY
DEPARTMENT OF GEOLOGY
UNIVERSITY OF VERMONT
BURLINGTON, VERMONT 05405-0122

The GREEN MOUNTAIN GEOLOGIST is published quarterly by the Vermont Geological Society, a non-profit educational corporation.

Executive Committee

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Secretary	Jeff Hoffer	229-1113
Treasurer	Kristen Underwood	865-4288
Board	Kent Koptuch	878-1620
of	Kristen Underwood	865-4288
Directors	Marjie Gale	241-3608

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THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

SPRING 2000

VOLUME 27

NO. 2

The Vermont Geological Society's Spring Meeting

Presentation of Student Papers

Dedicated to Rolfe Stanley

Middlebury College
Saturday, April 15, 8:30 AM

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President's Letter

Dear Members,

I sadly write this letter to you all. We have heard about Rolfe Stanley's passing. He has left a void in the geologic community that will not be easily filled. As I sat in the memorial service for him, I remembered as a new student in geology going to see him for the first time. In 1973, I was terrified. I remembered the poster that hung on the back of his door "Yeah though I walk through the valley..." said it all. It may hang there still. It did the last time I saw him. Dr. Stanley was a formidable man to a new and insecure geology student. Our relationship remained the same throughout my undergraduate career. It wasn't until years later that I began to get acquainted with and really got to know the caring individual underneath his hard rock exterior.

It was a long time before I could think of him as Rolfe rather than Dr. Stanley. On recent reflection over my acquaintance with Rolfe I worked hard for him in Structural Geology. At that time he was gracious, helping me to dismount rocks I had scrambled up (I was pregnant). Five years later I was beginning to think of him as Rolfe. I enrolled in Plate Tectonics and he was wonderful (I was pregnant, again). We joked in class about my "cravings" for hard rock geology. The last class I took with Rolfe was System Dynamics. I know he used and enjoyed the program, Stella, on many levels. Through his encouragement to take the class, I have a vehicle to pass on a piece of Rolfe's legacy to my students as do many other teachers.

I am looking forward to the student papers in April. The papers look like they will be interesting this year. I hope to see you all there. This meeting of the Vermont Geological Society will be dedicated to Rolfe Stanley as a tribute to his continued and long-standing dedication to the study of the earth and to education.

The summer field trip will be a site visit to the Cold Regions Research and Engineering Laboratories in Hanover, New Hampshire. It has been several years since the Society has visited this facility. It should be exciting. Thank you Larry Gatto for doing this for us.

Yours,

Shelley F. Snyder
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Summer Field Trip to CRREL !!!

**Vermont Geological Summer Meeting
Saturday, July 22, 2000, at 10:00 am**

We will meet at CRREL, Hanover, NH at 10 am. For more information contact Shelley F. Snyder, VGS President, at 802-453-2333 or e-mail ssnyder@mtabe.k12.vt.us

Direction to CRREL: Take Exit 13 from I-91 north;
East across Connecticut River to Hanover;
Continue east thru light in Hanover;
Left on the road along the east side of the Dartmouth Green;
Continue north straight thru light on Rt. 10;
1.5 mile to CRREL on west side of Rt. 10.

Directions to CRREL are available on the web page @ www.crrel.usace.army.mil Click on: About CRREL Local travel information for maps and directions.

**Directions to the Spring VGS Meeting
Middlebury College
April 15, 2000
8:30 am**

Take Rte 125 west, past the Catholic Church, up hill through the college. Go over the crest to bottom of the hill as it flattens to a valley; turn right onto the winding driveway (may have road sign saying Bicentennial Way by April). Continue up the driveway and park in the large parking lot on the west side of Bicentennial Hall. Don't worry about the sign saying faculty and staff only.

Meeting is in Bicentennial Hall, Room 220. Come in the west door from the parking lot, go up the first stairs you see to the Great Hall; room 220 is first lecture room in the south wing off the Great Hall. Coffee and donuts at 8:30; meeting begins at 9:00 am.

VGS Calendar

- | | |
|-------------|---|
| April 7: | Publish Spring GMG |
| April 15: | Spring VGS Meeting, Middlebury College |
| May 1: | Student Research Grant Proposals Due |
| June 1: | Research grant money awarded |
| June 16: | Deadline for articles/news items for Summer GMG |
| July 22: | Summer Field Trip, CRREL, Hanover, NH |
| Sept. 1: | Deadline for articles and news items for Fall GMG |
| Sept. 15: | Publish Fall GMG |
| Sept. 23: | Fall Field Trip led by Stephen Wright |
| | Business meeting, election of officers and dinner to follow field trip |
| Oct. 6 - 8 | NEIGC, Orono, ME |
| Oct. 8-14: | Earth Science Week |
| Dec. 28: | Deadline for articles and news items for Winter GMG |
| Jan. 15: | Publish winter Green Mountain Geologist (GMG) |
| Mar. 12-14: | NE Geological Society of America, Burlington, Vermont |
| March 28: | Deadline for student abstracts, Deadline for submission of articles for Spring 2001 GMG |

SPRING MEETING PROGRAM
Middlebury College, Bicentennial Hall
Room 220, April 15, 2000

- 8:30 Coffee**
- 9:00 Elizabeth Hunter: THE MINERALOGY OF CHAMOSITIC OOLITHS IN THE RAASAY IRONSTONE, INNER HEBRIDES, SCOTLAND**
- 9:15 Caleb W. Holyoke, III: MELTING AND DEFORMATION: EXPERIMENTAL RESULTS FROM TWO CONTRASTING CRUSTAL ROCK TYPES**
- 9:30 Erin K. Taylor: GEOCHEMICAL AND REGIONAL CHARACTERISTICS OF THE AVERILL PLUTON, NORTHEAST KINGDOM, VERMONT**
- 9:45 Joshua Nathan Cole: QUANTITATIVE STRAIN ANALYSIS OF THE AUREOLE OF THE VICTORY PLUTON, NORTHEASTERN VERMONT, USING THE FRY TECHNIQUE**
- 10:00 Patrick Keane: ANALYSIS OF THE NATURAL DISTRIBUTION OF STABLE CARBON ISOTOPES IN VERMONT LAKE ECOSYSTEMS**
- 10:15 John Crockett: HYDROLOGIC RESPONSE OF A SMALL URBAN WATERSHED TO A SUMMER STORM: CENTENNIAL BROOK, BURLINGTON, VT**
- 10:30 BREAK**

- 10:45 Nathan P. Donahue:** CORRELATION OF AUGEN GNEISS ERRATICS FROM CENTRAL VERMONT WITH THEIR SOURCE AREAS IN QUEBEC
- 11:00 Brooke Laundon:** MAJOR AND TRACE ELEMENT GEOCHEMISTRY OF WEATHERED ULTRAMAFIC ROCKS AND OVERLYING SOILS, LUDLOW AND DUXBURY, VERMONT
- 11:15 Justin Klein:** METAMORPHISM IN THE CONTACT AUREOLE SURROUNDING THE MAIDSTONE PLUTON AND ITS RELATIONSHIP TO METAMORPHISM OF THE AUREOLE SURROUNDING THE VICTORY PLUTON AND THE MONROE FAULT, NORTHEASTERN VERMONT
- 11:30 Nina Johnson:** THE PHYSICAL EFFECT OF LOGGING ON SOIL QUALITY NEAR ABBEY POND, GREEN MOUNTAIN NATIONAL FOREST, VERMONT
- 11:45 Joshua J. Nothwang:** GEOCHEMICAL CHARACTERISTICS OF SOILS IN OLD-GROWTH AND HISTORICALLY LOGGED FORESTS, GREEN MOUNTAIN NATIONAL FOREST, VERMONT
- 12:00 Daniel Eurich:** UNIVERSITY OF VERMONT BASELINE WATER QUALITY
- 12:15 Break followed by announcement of awards**

Student Abstracts

THE MINERALOGY OF CHAMOSITIC OOLITHS IN THE RAASAY IRONSTONE, INNER HEBRIDES, SCOTLAND

Elizabeth Hunter, Middlebury College

The Raasay Ironstone is a Jurassic sedimentary rock located in the southeastern part of the Island of Raasay, Inner Hebrides, Scotland. Outcroppings are found on the southeastern coast of the island at the Raasay Iron Mine, where it is a typical ironstone, and also at Beinn Na Leac, where the laterally equivalent bed contains chamositic chlorite but is similar to a red limestone rather than an ironstone. The bed at Beinn Na Leac is dissected by a mafic dike, and samples from this site were collected along a transect from proximal to the dike to ~160 m away along a bedding plane perpendicular to the dike. Though previous studies have examined the microstructure and microchemistry of iron ooliths in the Raasay Ironstone, as well depositional environment of the ironstone, little is known about the clay mineralogy or specific crystal structures of the chlorite-group minerals. X-ray diffraction (XRD) analyses were conducted on both oriented and randomly-oriented < 5 micron sample mounts prepared from samples collected at various localities along the vertical and horizontal stratigraphy of the ironstone. Initial results indicate that the clay fraction of the ironstone is predominantly calcite, quartz, siderite, and chlorite group minerals, specifically interstratified chamositic 7Å/14Å phases. The iron ooliths present in the ironstone are chamositic chlorite and are the dominant mineral in samples taken from the former Raasay Iron Mine (55% to 67% of the rock). Within samples taken from Beinn Na Leac, chamosite content comprises < 5% of the rock. Preliminary analysis of the interstratification of 7Å and 14Å layers in the chamosite reveals that, with increasing proximity to the higher temperature dike intrusion, the proportion of 7Å layers increases. These data imply that 14Å layers transformed to 7Å layers with increasing temperature conditions. This is an interesting conclusion given that previous studies indicate 14Å layers predominate at higher temperatures. At the Raasay Iron Mine, the chamositic clay is essentially a pure 7Å phase. All chamosite is of the 1bb polytype. These data imply low-grade diagenetic conditions.

MELTING AND DEFORMATION: EXPERIMENTAL RESULTS FROM TWO CONTRASTING CRUSTAL ROCK TYPES

Caleb W. Holyoke, III, University of Vermont

Differentiation of the crust is accomplished through partial melting of the mid to lower crust. Partial melting will produce felsic products which migrate to the upper crust leaving a chemically depleted residue in the lower crust. In order for melt migration to occur, however, there must be a network of flow paths. The permeability of the lower crust is too low ($\sim 10\text{-}21\text{ m}^2$) for melt to flow. Melting can generate an abnormal fluid pressure causing rocks to deform in a brittle rather than ductile manner. However, the rate of pore pressure development will also be a factor in the development of flow paths. Static experimental studies of dehydration melting of pelites have determined that dilational strain produced during melting can form a crack network. However, this only occurs when muscovite is present in the source rock. When biotite-only bearing parent rock is partially melted under static conditions, cracks do not form. This is due to the negligible dilational strain associated with melting and also suggests that a low melt pore pressure accompanies some biotite dehydration melting reactions. The stoichiometry, solid-solution effects in biotite, and melt productivity of the melting reaction all control this behavior. The hypothesis tested here is the rate of build-up of melt pore pressure will be significantly different between biotite and muscovite-bearing assemblages. In contrast to muscovite-bearing rocks, melt pore pressure development in the biotite assemblage may be very slow or non-existent.

GEOCHEMICAL AND REGIONAL CHARACTERISTICS OF THE AVERILL PLUTON, NORTHEAST KINGDOM, VERMONT

Erin K. Taylor, University of Vermont

The Averill Pluton is a medium- to coarse-grained biotite granite, which intrudes Early to Middle Devonian metasedimentary rocks of the Gile Mountain and Ironbound Mountain Formations. It is one of up to twenty Late Devonian granitoid plutons exposed in eastern Vermont. These plutons were originally described as part of the New Hampshire Plutonic Series emplaced during or after the Acadian Orogeny in New England. As part of a larger study on the origin and emplacement of the Averill Pluton, the bulk geochemistry of the pluton is being used to investigate its magmatic history.

Several samples from the Averill Pluton were analyzed. The major element data include SiO_2 , Al_2O_3 , CaO , MgO , Na_2O , K_2O , Fe_2O_3 , and MnO , and the minor and trace element data include TiO_2 , P_2O_5 , Cr_2O_3 , Rb , Sr , Y , Nb , and Ba . The majority of the samples, 15 of 19, were tested for REE, including Y , La , Ce , Pr , Nd , Sm , Eu , Gd , Tb , Dy , Ho , Er , Tm , Yb , Lu , Th , and U . Geochemical data were plotted on variation and spider diagrams. Bulk chemistry (SiO_2 content, An content, Peraluminosity Index, and Mg number) were contoured on the outcrop map pattern. In addition, differences in geochemistry were used to determine if the Averill Pluton is composite pluton or if it formed from a single intrusive event. The amount of trace and rare earth elements in the southeastern samples are very uniform, and overall indicate a calc-alkaline affinity. Geochemical contours drawn mimic this behavior. They show that the center and the northwest portions of the pluton have lower SiO_2 content and Peraluminosity Index, and a higher An component than the outer edges. The highest $\text{MgO}/\text{MgO}+\text{Fe}_2\text{O}_3$ ratios are also towards the center of the pluton and in the northwest corner. This indicates a more mafic component in the middle and western portions of the pluton.

The Averill fault, located in the northeast part of the pluton is oriented N30E, parallel to the regional deformation trends. Several roof pendants (?), magmatic foliations defined by biotite and other solid-state deformational fabrics throughout the pluton are consistent with this trend. The outcrop pattern indicates that an anisotropy, oriented N30E and possibly an extension of the Averill Fault, continues through the entire pluton. The nature of the geochemical contours may be explained by: (1) Uplift and preferential erosion of the pluton west of the Averill Fault, and/or (2) fractional crystallization, differentiation and assimilation processes. The similarity in bulk rock and trace element geochemical characteristics suggests the Averill Pluton was emplaced as a single intrusive event.

QUANTITATIVE STRAIN ANALYSIS OF THE AUREOLE OF THE VICTORY PLUTON, NORTHEASTERN VERMONT, USING THE FRY TECHNIQUE

Joshua Nathan Cole, Middlebury College

Strain analysis of plutonic rocks and their contact aureoles is a critical means of interpreting emplacement kinematics, but is limited by the weaknesses inherent in the quantitative analysis techniques. The Fry technique is a center-to-center strain analysis developed by Norman Fry in 1979. It analyzes the relative distances from the center of one object, such as an ooid, to another. Because the objects will grow closer in the direction of the minimum principle finite strain, and further apart in the direction of the maximum principle finite strain, the distance can be used to determine strain.

I used contact metamorphic porphyroblasts in rocks from the contact aureole of the Victory Pluton to complete a Fry analysis of strain within the aureole. The Victory Pluton is located in the Northeast Kingdom of Vermont, and is part of the Devonian New Hampshire Plutonic series associated with the Acadian orogeny (Doll et al., 1961). The Monroe Fault roughly bisects the pluton, and it has been shown that pluton intrusion occurred during fault movement (Hannula et al., 1999).

The orientations of the strain ellipsoid for each of the samples collected are similar in orientation. The long axes of the strain ellipsoids plunge predominantly towards the east, while the short axes of the ellipsoids plunge subhorizontally towards the south. There does not appear to be any significant pattern of subvertical elongation or concentric flattening around the pluton, such as are associated with diapirism or balloon style emplacement. These results indicate that the majority of syn-intrusion strain in the contact aureole of the Victory Pluton was caused by regional deformation, and that the emplacement mechanism for the pluton is most likely fault-related. This hypothesis is supported by foliation data from the contact aureole (Hannula, et al., 1999).

ANALYSIS OF THE NATURAL DISTRIBUTION OF STABLE CARBON ISOTOPES IN VERMONT LAKE ECOSYSTEMS

Patrick Keane, University of Vermont

Isotopic and elemental signatures of organic matter preserved in lake sediments provide significant insights into the individualistic response of lacustrine ecosystems to anthropogenic disturbances and to extreme climatic events. However, to better interpret this kind of data a better understanding of the physical, chemical, and biological parameters controlling the isotopic and elemental composition of lacustrine primary producers, the most significant source of sedimentary organic matter, is required.

Carbon isotopic analyses of land plants (for comparison), dissolved inorganic carbon (DIC), aquatic macrophytes, and algae indicate significant variability within and among the studied lakes. The data suggest a general relationship between lake trophic status and isotopic composition of DIC and lake biota, but other factors, such as bedrock lithology, are also important. Less negative delta-13C values are found in eutrophic to hypertrophic lakes and lakes located in carbonate-rich bedrock. More negative delta-13C values are typical for oligotrophic lakes. A similar relationship between lake productivity level and carbon isotopic signature is also found in surface sediments collected from the studied lakes. However, the interpretation of the sediment isotope data is complicated by the fact that lacustrine sedimentary organic matter has multiple sources, namely phytoplankton, macrophytes, and organic detritus entering the lake from the watershed. We have used elemental ratios (C/N) in combination with stable isotopes to determine which of these sources is the dominant one in each lake.

The inferred correlation between isotopic composition and productivity levels provides a powerful tool that we are now applying to studies of sediment cores to monitor the response of lake ecosystems to known increases or decreases in nutrient loads.

HYDROLOGIC RESPONSE OF A SMALL URBAN WATERSHED TO A SUMMER STORM: CENTENNIAL BROOK, BURLINGTON, VT

John Crockett, University of Vermont

A rain event causes significant change to stream hydrology. A storm occurring from 12 to 1 PM on June 29, 1999 produced 0.91 cm of rain, and its effects were observed in the Centennial Brook watershed in Burlington, VT. Water samples and channel cross section measurements were taken at one site at Centennial Brook, a second site at Wool Pullery Brook a tributary to Centennial Brook, and a third site downstream from the confluence of the two brooks. The storm hydrograph constructed from the data showed peak discharge at Site 1 occurring 60 minutes after sampling began at 0.18 m³/s. Sites 2 and 3 peaked at 110 minutes with values of 0.32 m³/s and 0.51 m³/s, respectively. Total suspended solids (TSS) reflected the storm hydrograph with peak values at Site 2 of 1.2 g/L. Conductivity and pH were inversely related to discharge with minimum values of 380 mmhos at Site 1 and 7.49 at Site 2 occurring at peak discharge. Chemical parameters generally decreased in concentration values and increased in flux values with increasing discharge. Chemical species that deviated from this general trend were K⁺ which increased with discharge at Sites 2 and 3 and NO₃⁻, which increased with discharge at Site 1. Most cation and anion concentrations such as Mg²⁺, Na⁺, Cl⁻, and K⁺ were highest at Site 2 and lowest at Site 1 for all sampling intervals. Exceptions to this trend include SO₄²⁻ which was greatest at Site 1 and lowest at Site 2. For all anions and cations, Site 3 exhibits the highest flux levels which peak at approximately 100 minutes and decline with decreasing discharge. With the exception of NO₃⁻, fluxes for all species at Site 1 decrease with time over the entire sampling period regardless of discharge. In contrast, fluxes at Sites 2 and 3 were found to be highly correlative with discharge. TSS levels at all sites reflect the stream bed composition and may not be an accurate indicator of storm runoff quality. Conductivity levels reflect the dilution effect of increased discharge. The pH data exhibit the acidifying effect of the precipitation on the naturally basic streamwater. The sharp increase of all flux levels shows the first flush effect of the precipitation. These chemicals are representative of the salts that form on drying soil and then are easily dissolved and flushed out during the initial stages of a storm. The rise in K⁺ concentration is possibly due to leaching from biological material or exchange sites on clay material within the soil. Anthropogenic impact can be most clearly observed in Cl⁻ flux levels which are likely to reflect road salt residue from the previous winter as well as other pollution sources. Differences between fluxes at Site 1 compared with Sites 2 and 3 could be due to a detention pond located at the headwaters of Centennial Brook.

CORRELATION OF AUGEN GNEISS ERRATICS FROM CENTRAL VERMONT WITH THEIR SOURCE AREAS IN QUEBEC

Nathan P. Donahue, Norwich University

Distinctive augen gneiss erratics found in the central Vermont have been tentatively traced to their source area in the Grenville Province of Quebec, Canada, near St. Gabriel de Brandon. The cobble and bedrock samples are correlated in hand specimen by their porphyritic texture with phenocrysts dominantly of 1 to 5 cm potassium feldspar and minor plagioclase phenocrysts of similar size, in a coarse-grained matrix of biotite, hornblende, quartz, and varying percentages of orthoclase and oligoclase. Significant amounts of magnetite occur in all samples as an accessory mineral. All samples are foliated, some mylonitic in character while others display variable degrees of deformation. In thin section, the cobble and bedrock samples are the same petrographically and texturally. Orthoclase phenocrysts are somewhat recrystallized with internal patches of mosaic quartz, and feldspars. Hornblende is hydrothermally altered on cleavage surfaces, and some biotites contain chloritized zones. Magnetite is accompanied by minor sphene, and is locally altered to hematite. Other minor accessory constituents are apatite and zircon.

The Hunterstown Batholith is the major source area suggested for this augen gneiss indicator fan and is located 110 km northeast of Montreal, Quebec, and is mapped as part of the Morin Complex. Another smaller source is 36 km west of the batholith near the town of Lac Lasalle. The general ice movement during the last glaciation could also verify these source areas. Compiled striations for ice movement in northwest New England suggest that material from south-central Quebec could be carried southeast to central Vermont. Other evidence consists of isopleths for indicator fans mapped by Norwich University students down glacier from the Knox Mountain, Barre, Braintree and Glover plutons indicate a south-southeast direction for movement of the last ice sheet.

Overall, geochemical analysis shows that the trace elements in the cobble and bedrock samples correlate very well to each other. The four bedrock samples which show the greatest similarities are located in the central part of the massif which is also greater in elevation than the surrounding area suggesting it as a primary source. Cd, Nb, Zr, and Ce all show strong correlations with narrow field groupings for both the cobble and primary bedrock source. The cobbles are, however, depleted in Rb as a result of the weathering of potassium feldspars. A secondary source of the same magma formed isolated intrusions in the Lac Lasalle massif to the west where severe glacial plucking greatly sculptured the topography.

MAJOR AND TRACE ELEMENT GEOCHEMISTRY OF WEATHERED ULTRAMAFIC ROCKS AND OVERLYING SOILS, LUDLOW AND DUXBURY, VERMONT

Brooke Laundon, Middlebury College

The discontinuous ultramafic belt that runs the length of Vermont is the product of two orogenies, the Taconian and Acadian. These ultramafic rocks typically contain about 0.5% of both Ni and Cr, which are both known to have adverse impacts on plant communities and other aspects of ecological systems. Furthermore, the high ratio of Mg:Ca ($> 30:1$) in many ultramafic rocks significantly limits plant growth.

ICP-AES major and trace element analyses of rock, rock weathering rinds and overlying soil horizons were determined for two localities in the ultramafic belt, one at Ludlow VT and the other at Duxbury VT. Average pH values of the A, E, B and C horizons at Ludlow were 4.8, 4.6, 5.3 and 5.6, respectively. At Duxbury, average pH values of the A, E, B and C horizons were 4.4, 4.1, 4.2 and 3.9, respectively. Given that these soils are relatively high in Eh, it can be predicted that both Cr and Ni would be mobile in the soils at these pH conditions.

Mg:Ca values of ultramafic rocks analyzed in this study range from 160:1 at Ludlow to 70:1 at Duxbury. Weathering rind Mg:Ca ratios are 160:1 at Ludlow and 80:1 at Duxbury, suggesting that Mg and Ca are leached at equal rates from the rock. High Mg:Ca ratios in soils formed directly from chemical weathering of Vermont ultramafic rock would imply plant stress. However, Mg:Ca ratios of the soils analyzed in this study are 1:1 to 1:2. These values reflect a significant detrital component in the soils, which produces Mg:Ca ratios far more suitable for plant growth than purely ultramafic-derived soil.

Analyses of trace metal content in rock, weathering rinds and overlying soils will help to determine Ni and Cr mobility in this environment.

METAMORPHISM IN THE CONTACT AUREOLE SURROUNDING THE MAIDSTONE PLUTON AND ITS RELATIONSHIP TO METAMORPHISM OF THE AUREOLE SURROUNDING THE VICTORY PLUTON AND THE MONROE FAULT; NORTHEASTERN VERMONT

Justin D. Klein, Middlebury College

The Acadian Maidstone Pluton intrudes along the Monroe Fault, which forms the boundary between the metasediments of the Connecticut Valley trough and the Bronson Hill belt. The metamorphic grade for its aureole ranges from sillimanite grade near the contact to garnet grade further away. Comparison with the aureole of the Victory Pluton, located to the southwest, suggests the two aureoles are similar in many ways. Both plutons are bisected by the Monroe Fault and contain a well defined sillimanite zone near the contact of the pluton. In the aureoles of both plutons, andalusite is only found west of the Monroe Fault, and has been partially to completely replaced by muscovite and staurolite. Staurolite is also only found west of the Monroe Fault, and is partly replaced by muscovite and chlorite. East of the fault, deformed clots of decussate muscovite and tourmaline may represent staurolite pseudomorphs. Garnet from both aureoles within close proximity to the fault contains inclusion trails at high angles to the dominant foliation. This suggests that deformation was syn or post contact metamorphism. East of the Victory Pluton, sillimanite + k-feldspar and cordierite-bearing assemblages have been found, but these assemblages have not been seen east of the Maidstone Pluton. Microstructures and mineral assemblages in the aureole of the Maidstone Pluton, which are similar to those in the aureole of the Victory Pluton, indicate that contact metamorphism likely occurred during movement along the Monroe Fault.

THE PHYSICAL EFFECT OF LOGGING ON SOIL QUALITY NEAR ABBEY POND, GREEN MOUNTAIN NATIONAL FOREST, VERMONT

Nina Johnson, Middlebury College

This study investigates the effects of logging on soil quality, specifically the physical properties of soil in the Green Mountains of Vermont. The study location is centered near 44° 02' 08" N Latitude, 73° 03' 23" W Longitude in the Abbey Pond area of the Green Mountain National Forest. Here, historically logged National Forest land shares a boundary with an old growth forest (the Battell Biological Preserve) to the south. Four soil pits were excavated, two in the logged area and two in the old growth area. All four pits have similar elevations, parent material (till) and attitudes. The only difference between them is the vegetation. Each pit was described by horizon and samples were taken from each horizon.

In the lab, analyses for particle size distribution, bulk density and total organic matter were carried out. Particle size distribution was facilitated with the Coulter LS230A Laser Diffraction Particle Size Analyzer. Preliminary analyses show that there is no significant difference between the various A horizons. However, the E and B horizons differ. There is more clay in the E horizon of the old growth soils and comparatively less in the logged forest soils, but greater amounts of clay in the B horizons of logged soils than in the old growth soils. This may be due to greater infiltration and translocation in the logged forest as a result of decreased canopy and less transpiration. Bulk density is greater in the old growth forest soils than in the historically logged soils. This may be due to the recent accumulation of tree litter and organic matter on the soil surface as a result of logging practices. Total organic matter content was investigated by heating the samples and calculating the amount of organic matter lost after ignition at 360° C. It was concluded that the soils in the logged areas have more organic matter than the old growth areas. The O and A horizons of the historically logged soils are thicker than the old growth soils and have greater weight percentages of organic matter than old growth soils.

Low bulk density in the logged soils may explain why clay particles have mobilized to lower horizons in the logged soils to a greater extent than in the old growth soils. The high organic matter content in the upper horizons may contribute to excessive infiltration and translocation of clays. These organics are not absorbing the increased water supply due to 1) the decreased forest canopy from logging, and 2) decreased absorption of water and nutrients via transpiration due to logging and tree removal.

GEOCHEMICAL CHARACTERISTICS OF SOILS IN OLD GROWTH AND HISTORICALLY LOGGED FORESTS, GREEN MTN NATIONAL FOREST, VERMONT

Joshua J. Nothwang, Middlebury College

Research investigating the possible impacts on soils of forest harvesting practices has been documented for the last several decades. Previous studies in the United States and Canada have indicated that harvesting, primarily in clearcut form, leads to a significant decrease in available and total soil nutrients (Mroz et al. 1985, Pennock and van Kessel 1997, Tew et al. 1986). These decreases are caused by direct removal of organic matter and pH-induced leaching from precipitation.

This study attempts to examine the impacts on soils of selective harvesting in the northern forest of central Vermont. Four soil pits were sampled and described in deep, loamy, well-drained spodosols of Middlebury, Vermont (Soil Survey of Addison County 1971). Two soil pits were located in old-growth hemlock forest of the Battell Biological Preserve, while the remaining two were located in historically logged northern hardwood forest of the Green Mountain National Forest. Each horizon of the four soil pits was subjected to several analyses. Horizon thickness and pH were initially determined. Concentrations of total K, Ca, Mg, Na, Si, Al, and Fe were analyzed using ICP-AES. Concentrations of available forms of these nutrients will also be analyzed using ICP-AES, as well as nitrate and phosphate, which will be analyzed using spectrophotometry.

The O and E horizons in the old-growth soil pits are considerably thicker than comparable horizons in the historically logged soil pits, indicating some loss of soil material. Samples in the historically logged soil pits exhibit a lower average pH, indicating 1) decreased solubility of P, an essential nutrient for vegetation, and 2) increased solubility of toxic Al. A positive correlation between the total concentrations of relatively insoluble Si, Al, and Fe suggests these concentrations are controlled by the presence of silicate minerals in the soil. An inverse relationship between total concentrations of K and Si, Al, and Fe indicates that K is not controlled by the presence of silicate minerals, but by active soil processes. Total K concentration in the old growth soil pits is low in the A and E horizons and high in the Bt and B2 horizons, indicating ongoing illuvial/elluvial processes in these pits. This is in contrast to the historically logged soils, which are characterized by relative depletion of K in the B horizons. These preliminary results indicate that soils of the northern forest are negatively impacted by selective harvesting practices. Further analysis using the spectrophotometer and ICP-AES will likely confirm this conclusion.

UNIVERSITY OF VERMONT BASELINE WATER QUALITY DATA

Daniel Eurich, University of Vermont

Baseline water quality data was collected for the University of Vermont's main campus starting on July 16, 1999 and ending on November 16, 1999. Top of casing water levels, temperature, and conductivity were measured on a weekly basis using the Fleming, Wills, and Williams well nests. Water samples were collected monthly and analyzed for inorganic compounds at the Plant and Soil Science laboratory, Burlington, VT. This study was performed to see how the main campus ground water system responds to precipitation events as well as how salt applications affect ground water quality.

Water levels at the Fleming, Wills, and Williams well nests declined throughout the dry summer of 1999. Then, approximately 4 inches precipitation fell on September 16 and 17, 1999 increasing water levels as much as 4.94 feet in two weeks (well #8). For the September 16 and 17 event, well #2 had a recharge lag time of about 2 weeks. Water levels continued to increase until mid-November where they then decreased. Well screens for all wells are located in comparable material consisting of sand and varying amounts of silt and gravel.

Water temperatures generally decreased as the air/water interface depth increased. Well #2 was the most thermally dynamic well with a total temperature variation of 4.5 degrees. Well #2 also had the lowest temperatures, which I believe are a result of its location on a lawn, in contrast to wells at Williams and Wills, which are surrounded by asphalt and concrete.

The highest initial conductivity values were measured at well #7 (2.85 milliseimens/cm), #8 (2.74 milliseimens/cm), and #5 (2.54 milliseimens/cm) located in the Wills and Williams well nests. The highest water conductivity is found in wells near walkways and roadways where the University of Vermont applies salt to melt winter snow. The lowest conductivity was measured in Fleming well nest, well #2 (0.602 milliseimens/cm) where no salt is applied. The September 16 and 17 precipitation event increased conductivity in all wells; wells #8 (2.43 milliseimens/cm) and #5 (1.29 milliseimens/cm) increased most significantly, 87% and 41%, respectively.

Chloride, sodium, sulfate, calcium, potassium, magnesium, and sulfur are found in significant quantities dissolved in the ground water. After the September 16 and 17 precipitation event, concentrations of these constituents increased significantly in wells #8 and #5, the same wells in which conductivity rose significantly. Well #8 had the highest level of chloride (1620 mg/L) which exceeds the secondary maximum contaminate level set by the EPA by 6.5 times. Chloride and sodium were the best correlated of all elements, $r^2=0.93$.

Vermont Geological Society Student Research Grants

are designed to aid our future geologists investigate Vermont's geo-history

Help the VGS to promote a deeper insight into Vermont Geology

Students receiving assistance through the program will present their research results at the VGS Spring Meetings. Your generosity will help cover a lot of terrain!

To contribute to the **VGS Student Research Grant Program**, clip or copy this form and send it, along with your check or money order made payable to VGS, to:

Kristen Underwood, Treasurer, Vermont Geological Society
Department of Geology, University of Vermont
Burlington, Vermont 05405-0122

- *I'VE ENCLOSED MY TAX-DEDUCTIBLE CONTRIBUTION TO BE DEDICATED TO THE VGS STUDENT RESEARCH GRANT PROGRAM.*

TOTAL GIFT: \$ _____

NAME: _____

ORGANIZATION: _____

ADDRESS: _____

CITY: _____ **STATE:** _____

1997 NEIGC Guidebooks Still Available!

The cost of the 1997 NEIGC guidebook has risen to \$22.00 plus \$3.00 shipping. Please make checks payable to

"Castleton State College - 1997 NEIGC"

Department of Natural Sciences

Castleton State College

Castleton, VT 05735

STATE GEOLOGIST'S REPORT APRIL 2000

Laurence R. Becker, State Geologist
Vermont Geological Survey
103 South Main Street
Waterbury, Vermont 05671-0301

Over three days, a group of State Geologists visited with federal partners to discuss areas of mutual interest. The highlight of the trip was the "Pick and Gavel" award given by the Association of American State Geologists(AASG). The award is "to recognize individuals who have made significant contributions to advancing the role of geoscience in public policy and have supported AASG's mission in government affairs". Representative Jim Gibbons, a geologist representing a Nevada district and Dr. Rita Colwell, Director of the National Science Foundation (NSF), were honored at the Cosmos Club. Dr. Colwell is a microbiologist who is supporting Earth Science initiatives at NSF. The NSF is providing funds for the State Geologists to mentor undergraduate students in geologic field mapping. Vermont received funds in 1999 and worked with Dr. Steven Wright at UVM who mentored two students. The Vermont State Geologist attended a meeting the following day at NSF where other avenues of educational cooperation were discussed.

An interesting note is that two of the five or so geological associations that are sponsoring fellows in Congress are in Vermont congressional offices. Melody Brown Burkins from the Geological Society of America is in Senator Leahy's Office and Dave Hunter from the American Geophysical Union is with Senator Jeffords. We discussed the Statemap program and a coming landslide initiative from USGS. Apparently, fellows are helping to organize a Congressional Natural Hazards Caucus. An invitation has gone out from Senators Ted Stevens and John Edwards for colleagues to become charter members.

Other visits for Vermont were Federal Emergency Management Agency (FEMA), United States Geological Survey (USGS), Environmental Protection Agency (EPA), the National Resource Conservation Service (NRCS), and the National Research Council. FEMA presented information on its map modernization program that includes a component called "riverine erosion". FEMA is considering adding this component to their flood plain hazard maps. At USGS a new National Landslide Initiative is

in its early stages of development. Vermont suggested that USGS coordinate with FEMA to combine the landslide and the riverine erosion hazard into a slope instability initiative much as we plan to do here in Vermont. When Congress is approached, the states that do not have landslide potential will be interested in supporting a hazard mapping program because of the flood erosion component.

At both the EPA Office of Water and at EPA Research, the State Geologist discussed Vermont Geological Survey's experience with radionuclides in ground water and the need to better understand geology to find new water sources that are devoid of radium and gross alpha emitters. Much research is ahead of us. At NRCS there are ways to coordinate in regards to "deep soil" investigations, agricultural waste pond liner design, stream geomorphology, and the geologic component of NRCS dam safety rehabilitations.

At the National Research Council, we met with the Directors of the Board of Earth Sciences and Resources; the Commission on Geosciences, Environment, and Resources; the Water Science and Technology Board; the Radioactive Waste Management Board; Ocean Sciences; and Meteorology.

Summer Field Trip to CRREL !!!

**Vermont Geological Summer Meeting
Saturday, July 22, 2000, at 10:00 am**

We will meet at CRREL, Hanover, NH at 10 am. For more information contact Shelley F. Snyder, VGS President, at 802-453-2333 or e-mail ssnyder@mtabe.k12.vt.us

Direction to CRREL: Take Exit 13 from I-91 north;
East across Connecticut River to Hanover;
Continue east thru light in Hanover;
Left on the road along the east side of the Dartmouth Green;
Continue north straight thru light on Rt. 10;
1.5 mile to CRREL on west side of Rt. 10.

Directions to CRREL are available on the web page @
www.crrel.usace.army.mil Click on: About CRREL Local
travel information for maps and directions.

Editors' Favorite Web Sites

Thanks to Greg McHone for sending some addresses and suggestions for geology sites:

You might be interested in a research web site that I have been building on the largest volcanic province, called CAMP (Central Atlantic Magmatic Province). The address is:

www.wesleyan.edu/~jmchone/CAMP.html

I am also heading a group to develop a web site (still in construction) on Connecticut geology, aimed especially at teachers and their students. Perhaps someone in Vermont can start something like it:

www.wesleyan.edu/ctgeology

The editors' favorite is reached through Greg's CT geology page and is a virtual field trip site

<http://www.wesleyan.edu/ctgeology/geotrips.html>

Please e-mail your favorite sites to us: marjieg@dec.anr.state.vt.us

UVM Geology Seminar Series

April 17, 2000, 4:15 PM, Room 200, Perkins Hall, UVM

Christian Teyssier, University of Minnesota, will present a talk entitled "Partial Melting of Crust and Evolution of Orogens"

VGS Treasurer's Report

April 5, 2000

Dear President and Board:

The financial condition of the Society remains strong. Below is the Income Statement for the period January 1, 2000 through March 31, 2000.

The checking account balance is \$2,432.84 as of March 31, 2000. All bills received by me have been paid and are reflected in the above balance. I welcome feedback and suggestions from the Board and membership.

Sincerely,

Kristen L. Underwood

Income and Expenses 1/1/00 through 3/31/00

INCOME

Total Dues	\$598.00	
Dues-Family	\$120.00	
Dues-Institution	\$15.00	
Dues-Member	\$455.00	
Dues-Student	\$8.00	
Interest	\$4.88	
Student Research Grant Contributions*	<u>\$267.00</u>	
TOTAL INCOME		\$869.88

EXPENSES

Postage (12/99 GMG)	\$52.80	
Minuteman Press (12/99 GMG)	<u>\$102.25</u>	
TOTAL EXPENSES		(\$155.05)
TOTAL INCOME – EXPENSES		<u>\$714.83</u>

*The Society gratefully acknowledges the generous contributions to the student Research Grant funds received from the following members during the first quarter of 2000: Peter and Thelma Thompson, Jeff Hoffer, Jeanne C. Detenbeck, Sharon Strassner, G. Scot Applegate, Arthur W. Gilbert, Jr., A. P. Nason, Barbara L. Hennig, Lawrence W. Gatto, J. Gregory & Nancy W. McHone, Shannon Foster, Roger & Terry Thompson, Craig Heindel, and Jack Jemsek. THANKS!!

THE GREEN MOUNTAIN GEOLOGIST
VERMONT GEOLOGICAL SOCIETY
DEPARTMENT OF GEOLOGY
UNIVERSITY OF VERMONT
BURLINGTON, VERMONT 05405-0122

The GREEN MOUNTAIN GEOLOGIST is published quarterly by the Vermont Geological Society, a non-profit educational corporation.

Executive Committee

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| Publications/Editorial Committee Chair | Marjie Gale |

ADDRESS CHANGE?

Please send it to the Treasurer at the above address.

-Printed on Recycled Paper-

VERMONT GEOLOGICAL SOCIETY - DUES STATEMENT 2000

Membership dues for 2000 are \$15.00 for Members and Associate Members, \$20.00 for a family membership with one newsletter subscription, and \$8.00 for Student Members. Membership dues are used to publish the *Green Mountain Geologist*, to finance our Student Research Grants, and to cover the costs associated with meetings and field trips. If your address, phone, or e-mail address has changed since last year, please fill in this information below, if not, leave the form below blank. A new membership directory will be published with the Summer *GMG*. Return this form with your check for the appropriate amount made payable to the Vermont Geological Society by March 30, 2000. Send your payment to Kristin Underwood, Treasurer; Vermont Geological Society; Department of Geology; University of Vermont; Burlington, VT 05405-0122. Thank you.

Name:

Date:

Street or Box:

Check No.:

City, State, ZIP:

Work Phone:

Home Phone:

e-mail address:

Fax No.:

Circle Type of Membership:

Member (\$15)

Student Member (\$8)

Family (\$20)

Amount Due: _____

Additional Contribution to VGS Research Grants: _____

Total Enclosed: _____

THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

Summer 2000

VOLUME 27

No. 3

SUMMER FIELD TRIP TO CRREL and ELIZABETH MINE

Sat., July 22, 2000
(see Page 3 for details)

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PRESIDENT'S LETTER

Dear Members,

The student papers in April were all wonderful. Congratulations to those who were recognized with awards. Thank you judges Barry Doolan, Steve Howe and Kristen Underwood for making the hard decisions.

Thomas Christopher Lamon applied for and received the Vermont Geological Society Research Grant. He will be mapping the evolution of pre-Acadian collapse structures in the Quebec-Vermont Appalachians. We look forward to hearing about his research at a future VGS meeting.

The spring meeting really brings into focus one of the goals of the Vermont Geological Society. That goal is to support and encourage the study of geology. To that end I would like to encourage you all to consider being a mentor to a student, teacher, or colleague. In the May 2000 Geotimes, Dean A. McManus issues a call for mentors primarily in higher education. I would like to extend that call to include teachers and student teachers in elementary and high schools as well. During Earth Science Week in early October I hope that you all will become involved in some facet of public education, by talking to a group of school children, encouraging a colleague, or leading a field trip. Whether you are in public or private sector, education or retired, you can mentor another. To mentor is to be an advisor, role model, coach and friend to a student or colleague.

The summer field trip will be a site visit to the Cold Regions Research and Engineering Laboratories in Hanover, New Hampshire. It has been several years since the Society has visited this facility. It should be exciting. Thank you Larry Gatto for doing this for us.

Yours,

Shelley F. Snyder
Mt. Abraham Union High School
Bristol, VT 05443
802-453-2333

ssnyder@mtabe.k12.vt.us

Vermont Geological Society Summer Meeting

Cold Regions Research Laboratory in the morning and the
Elizabeth Mine in the afternoon.

Saturday, July 22, 2000, at 9:30 am

*Pre-registration is required **
(call or e-mail Shelley by July 19)

We will meet at CRREL, Hanover, NH at 9:30 am for coffee and donuts. The tour will run from 10:00 am-11:00 am, followed by a lunch break and drive to the Elizabeth Mine. The Elizabeth Mine tour will run from 1:30-3:00 pm and has the following requirements:

- everyone on the mine-site tour must read and sign a Release of Liability form
- all Liability forms will be collected before the tour starts
- no one will be allowed on the tour without signing the form
- no pictures can be taken during the mine tour
- no one can explore the old buildings on the mine site; they are dangerous

*For more information contact Shelley F. Snyder, VGS President, at 802-658-0575 or e-mail ssnyder@mtabe.k12.vt.us

Directions to CRREL:

Take Exit 13 from I -91 North;
East across Connecticut River to Hanover;
Continue east thru light in Hanover;
Left on the road along the east side of the Dartmouth Green;
Continue north straight thru light on Rt. 10;
1.5 mile to CRREL on west side of Rt. 10.

Directions to CRREL are available on the web page:

www.crrel.usace.army.mil

Click on: About CRREL Local travel information for maps and directions.

STATE GEOLOGIST'S REPORT

Rolfe Stanley

Almost 20 years after graduate school, I had the privilege of getting to know more of Rolfe Stanley. As some of you remember him from the late 70's, he was a strong leader who sometimes seemed hard to approach outside of his immediate circle of structure students and colleagues. I asked to take his New England geology class as a chance to understand the developing plate tectonics framework for the region. A most enjoyable class that still provides me a base to understand new concepts and where they fit in the regional picture.

Fast forward to 1996 and the Northeast GSA meeting in Buffalo, N.Y.. Now as new State Geologist, we met with USGS and other interested parties to make plans to complete the field mapping for the new State Bedrock geologic map. I acted as moderator and experienced a small measure of acceptance in a world that I had only been looking into from the outside. After the session, Jon Kim took Rolfe and a few of us to the home of the original buffalo wings - a kind of ground zero for pepper loving palates. Around the table Rolfe and I had a chance to catch up and share some stories.

As the new map developed, he made a number of visits to the office and I got to know him better. I found whatever hard exterior there may have been had long since passed. He was gregarious and funny with a very human side. Sort of an open heart in rough field clothing.

I find that I am much affected by his passing. He represents much that is good about standing up for what you believe in; mentoring with complete commitment students who showed a desire and commitment themselves; a pull-no-punches honesty; and dedication to family during the hard times.

He would sometimes talk with us of his role as caregiver, I think, as a way to lift some of the weight when away from home. With experience we come to understand what is most important in life and Rolfe showed himself to be a kind and loving person that anyone could admire and want to emulate.

As a geologist, this office intends to honor his legacy by completing the new bedrock map by designating Rolfe Stanley as Editor (Posthumous).

Please see the following news item that explains the plan for map completion.

Bedrock Map Completion

The new State bedrock geologic map project was scheduled for delivery for scientific review this winter, but suffered a serious setback with the untimely death of Rolfe Stanley. The State Geologist and Marjorie Gale, met with P. Patrick Leahy, Chief Geologist of the USGS Geologic Division, John Pallister, Program Coordinator for the National Cooperative Geologic Mapping Program, David Russ, Eastern Regional administrator, and Nick Ratcliffe, USGS map editor, to discuss the level of commitment, cooperation and funding involved in completing the map project, the seriousness of the loss of Rolfe, and our plans for both digital data and paper copy map. Our agreed upon proposal retains Rolfe Stanley (posthumously) and Nicholas Ratcliffe as Chief Editors and adds Marjorie Gale and Peter Thompson (now affiliated with University of New Hampshire) as Associate Editors. We are fortunate to have a group of dedicated regional compilers-Nick Ratcliffe, Barry Doolan, Charlotte Mehrtens, Peter Thompson, Doug Rankin, Marjorie Gale, Jon Kim, and Greg Walsh - who continue to actively work on the map.

We expect a delay of approximately a year to enter scientific review. The meetings were productive because we affirmed our mutual commitment to the completion of the Vermont State Bedrock Map project and established a plan, preliminary time frame, and communication needed for our team effort to be successful.

Earth Science Educational Outreach - National Committee

The Vermont State Geologist is Chair of the Association of American State Geologists Earth Science Education Committee. At the invitation of the American Geological Institute (AGI), the State Geologist attended the kick off meeting of AGI's Earth Science Outreach Advisory Committee (Publisher of Geotimes). Vermont and many state geological surveys have been active in Earth Science Week sponsored by AGI. Meeting topics

included: action items for advancing Earth Science Week; government affairs, Inside Science TV, coordinating press and public affairs activities; the AGI Environmental Awareness Series; and developing effective outreach strategies. In addition to giving Vermont a national outlook on educational outreach issues, Vermont will go back to the state geological surveys for consideration of action items.

Laurence R. Becker, State Geologist
Vermont Geological Survey

VGS Calendar

- | | |
|-------------|---|
| July 22: | Summer Field Trip, CRREL, Hanover, NH |
| July 29-30: | Burlington Gem & Mineral Club Annual Show* |
| Sept. 1: | Deadline for articles and news items for Fall GMG |
| Sept. 15: | Publish Fall GMG |
| Sept. 23: | Fall Field Trip led by Stephen Wright
Business meeting, election of officers and dinner to follow field trip |
| Oct. 6 - 8 | NEIGC, Orono, ME |
| Oct. 8-14: | Earth Science Week |
| Oct. 12: | Geologists-in-the-Park |
| Dec. 28: | Deadline for articles and news items for Winter GMG |
| Jan. 15: | Publish winter Green Mountain Geologist (GMG) |
| Mar. 12-14: | NE Geological Society of America, Burlington, Vermont |
| March 28: | Deadline for student abstracts, Deadline for submission of articles for Spring 2001 GMG |

*Burlington Gem and Mineral Club Annual Show

JULY 29 - 30, 2000
Tuttle Middle School - off Dorset Street
South Burlington, VT

Contact Bill or Ethel Schuele for more information:
(802) 863-5980

www.burlingtongemandmineralclub.org/

NEWS FROM THE PERKINS MUSEUM

Geology in the News!

Three fifth grade home-schooled students from Jericho, Vermont were honored at the Perkins Museum on May 10, 2000 for their proposal to NASA's "Mission to Mars" program. The students won the New England contest for their project titled 'Marsmology'- a proposal to study the interior of Mars using seismic waves. Their proposal went on to win NASA's national competition as well!

Keith Klepeis, UVM Geology Dept., and Gabriela Mora-Klepeis, UVM Geology Dept., acted as science mentors for the students. Keith, Gabriela, other representatives from the UVM Geology Dept., and representatives from the Vermont Space Consortium at UVM were on hand to present the students with certificates of merit and honor the students' creative scientific work. The local press and television were on hand to document the ceremony.

New Minerals and Rocks

The Perkins Museum recently acquired a collection of rocks from the State Geologist's office which were collected and curated by Charles H. Richardson of Syracuse University, Syracuse, New York. Charles Ratte volunteered many hours during the past two years sorting and weeding through the collection. The collection is not believed to be the "cabinet collection" lost after the 1927 flood. However, the collection does contain the Richardson "graptolites" which have since been discounted as flakes of mica.

The museum also just received many rock and mineral samples from a private collector in Shelburne, Vermont. Most of the samples are syenite from the Mount St. Hilaire region of Quebec. If you know of interested collectors or teachers who might want a sample of an interesting fluorescent rock, please contact: Christine Massey, (802) 656-1344 or cmassey@zoo.uvm.edu.

Digital Archive of Human-Induced Landscape Change

This program is designed to involve high school science students and their teachers directly in active geologic research at the University of Vermont. High school students will compile historic photographs that show human impact on landscape in New England as a result of development, clear-cutting, floods, storm damage, landslides, etc.

Such photographs can be found in the students' homes, in the homes of their older relatives and neighbors, in local historical societies, and in local libraries. Students will attempt to relocate the place from which each photo was taken. The site will be mapped using a hand-held GPS and the scene photographed using a digital camera provided by our program. Students will caption their photographs in detail using local reference sources including interviews, library research, and field observations. All images will be brought to the students' school and scanned using NSF-funded equipment that will be loaned to each high school for 6 to 8 weeks. The final result will be a pair of photographs, new and old, located on a map and captioned by the student explaining the historic impact and the landscape response. Photographs from around the state will be accessible in an interactive and educational web-database on the internet to be located at <http://geology.uvm.edu.landscape> when complete.

For more information, please contact: Laura Mallard, (802) 656-8694 or lmallard@zoo.uvm.edu.

Earth Science Week Poster Contest

The Perkins Museum is proud to help facilitate the upcoming Earth Science Week 2000 Poster Contest for Vermont K-12 students. Posters will be accepted next fall during Earth Science Week, October 8-14, 2000, at the museum. Judges from UVM and VGS will award prizes in a late afternoon award ceremony at the Perkins Museum. Please spread the word to your favorite student or teacher. For more information, please contact: Christine Massey, (802) 656-1344 or cmassey@zoo.uvm.edu.

PERKINS GEOLOGY MUSEUM T-SHIRTS

T-shirts are now on sale from the UVM Perkins Geology Museum depicting the Vermont State Fossil, the Charlotte Whale. The artwork is a detailed line drawing of the Charlotte's front half created by Ian Hodgdon, UVM Geology major class of 2001, and is quite handsome. T-shirts are 100% cotton, long-sleeved, charcoal ink on a dark khaki shirt, and cost \$15.00. Stop by the museum and speak with Christine Massey (802) 656-1344 or send a note and a check for \$18.00 (to cover postage) to her at the UVM Geology Dept., Perkins Hall, Burlington, VT 05405-0122. Please make checks payable to UVM.

STUDENT PRESENTATIONS

Thank you to all the students for the presentations at our Spring Meeting. Congratulations to Joshua Cole from Middlebury College for receiving the Charles Doll Award for Outstanding Undergraduate Presentation. Joshua presented a paper on strain analysis at the Victory pluton. The first place award winner was Joshua Nothwang, also from Middlebury College, and the second place award winner was Caleb Holyoke III from the University of Vermont. We look forward to more great presentations of student research at next year's meeting!

Web Site: <http://www.anr.state.vt.us/geology/vgshmpg.htm>
NEW! 1961 Centennial Geologic Map of Vermont
available on CD-ROM ---> \$10.00

Vermont Geological Society Student Research Grants

are designed to aid our future geologists investigate Vermont's geo-history

Help the VGS to promote a deeper insight into Vermont Geology.

Students receiving assistance through the program will present their research results at the VGS Spring Meetings. Your generosity will help cover a lot of terrane!



To contribute to the **VGS Student Research Grant Program**, clip or copy this form and send it, along with your check or money order made payable to VGS, to:

Kristen Underwood, Treasurer, Vermont Geological Society
Department of Geology, University of Vermont
Burlington, Vermont 05405-0122

- ***I'VE ENCLOSED MY TAX-DEDUCTIBLE CONTRIBUTION TO BE DEDICATED TO THE VGS STUDENT RESEARCH GRANT PROGRAM.***

TOTAL GIFT: \$ _____

NAME: _____

ORGANIZATION: _____

ADDRESS: _____

CITY: _____ **STATE:** _____



ANNOUNCEMENTS

The cost of the 1997 NEIGC guidebook has risen to \$22.00 plus \$3.00 shipping. Please make checks payable to "Castleton State College - 1997 NEIGC"

The 1961 Centennial Geologic Map of Vermont is now available on CD-ROM as jpg files. Plot files are included. The CD is available for \$10.00 through the Vermont Geological Survey, 103 South Main St., Laundry Building, Waterbury, VT 05671 or call 802-241-3608.

New Web Site: The Burlington Gem and Mineral Club is now on the web! The address is: <http://www.burlingtongemandmineralclub.org/>

EARTH SCIENCE WEEK 2000

HELP WANTED!!!

Earth Science Week 2000 will again feature a poster contest at Perkins Museum and a Geologist-in-the-Parks day at six Vermont parks. The Vermont Geological Survey and the Department of Forest and Parks are working together to schedule school group visits to several parks throughout Vermont on Thursday, October 12. We already have 450 children scheduled to visit and hike with our volunteers.

Volunteers and parks are listed below: Larry Becker, Hubbard Park in Montpelier; Helen Mango, Emerald Lake State Park; Marjorie Gale, Mt Philo State Park; Laura Mallard, Button Bay State Park; John Warren and Roger Haydock, Mt. Ascutney State Park; and Jon Kim and Rob Farley at Little River State Park. Demand is high for this activity and we need to run it for two days to accommodate all requests and keep the sizes of groups manageable. Additional volunteers are needed for Ascutney on October 10, Button Bay on October 10 & 12, and Emerald Lake on October 10 & 12). Please contact Marjie Gale at 802-241-3608 if you can help out!

VGS TREASURER'S REPORT

June 16, 2000

Dear President and Board:

The financial condition of the Society remains strong. The checking account balance is \$3,009.03 as of June 16, 2000. All bills received by me have been paid and are reflected in the above balance. I welcome feedback and suggestions from the Board and membership. The Society gratefully acknowledges the generous contributions to the Student Research Grant funds received from the following members during the second quarter of 2000: A. P. Nason, Ron Miller, and Cassie Major - Thank You!

Sincerely,
Kristen L. Underwood

THE GREEN MOUNTAIN GEOLOGIST
VERMONT GEOLOGICAL SOCIETY
DEPARTMENT OF GEOLOGY
UNIVERSITY OF VERMONT
BURLINGTON, VERMONT 05405-0122

The GREEN MOUNTAIN GEOLOGIST is published quarterly by the Vermont Geological Society, a non-profit educational corporation.

Executive Committee

President	Shelley Snyder	453-2333
Vice President	Christine Massey	656-1344
Secretary	Jeff Hoffer	229-1113
Treasurer	Kristen Underwood	865-4288
Board	Kent Koptuch	878-1620
of	Kristen Underwood	865-4288
Directors	Marjie Gale	241-3608

Geological Education Committee Chair	Shelley Snyder
Advancement of Science Committee Chair	Rolfe Stanley
Public Issues Committee Chair	Philip Jones
Publications/Editorial Committee Chair	Marjie Gale

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Please send it to the Treasurer at the above address.
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**THE
GREEN
MOUNTAIN
GEOLOGIST**



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

Fall 2000

VOLUME 27

No. 4

**FALL FIELD TRIP
AND
ANNUAL MEETING
Jeffersonville, VT**

**Sat., Sept. 23, 2000
(see Page 3 for details)**

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PRESIDENT'S LETTER

Dear Members,

We should be well on our way to setting up the new slate of officers. If you do not plan on going to the business meeting, please mail in your absentee ballot.

The summer field to, the Cold Regions Research and Engineering Laboratories in Hanover, New Hampshire and the Elizabeth Mine in Vermont were very exciting. Thank you again Larry Gatto for setting this field trip for us.

I would like to encourage all members to take an active role in promoting the study of geology. This can be done in a number of ways- participation in Earth Science Week by encouraging an individual or class of students in this week long celebration of earth science studies, invitation of a class of students or individuals to a field site while taking data, or talking to students in the classroom setting.

The fall field trip will be lead by Stephen Wright. It should be an exciting trip and will be followed by our Annual Meeting at Café Banditos in Jeffersonville.

Yours,

Shelley F. Snyder
Mt. Abraham Union High School
Bristol, VT 05443
802-453-2333

NOMINEES FOR OFFICERS, 2000-2001

The following members have graciously agreed to accept the nominations for officers for 2000-2001:

President: Shelley Snyder
Vice-President: Ray Coish
Secretary: Jeff Hoffer
Treasurer: Kristen Underwood

Vermont Geological Society Fall Meeting

Glacial Geology of the Jeffersonville Quadrangle and Adjacent Areas

9:30 am, Jana's Bakery

And

Annual Meeting and Election of Officers

4:30 pm @Café Banditos, Jeffersonville

Saturday, September 23, 2000, at 9:30 am

Pre-registration is requested for the trip and meeting*

*** Call Shelley Snyder (802-453-2333; 802-658-0575) or e-mail
Marjie Gale (marjieg@dec.anr.state.vt.us) by September 19**

Meeting place: Jana's Bakery in Jeffersonville @ intersection of
Route 15 and Route 108 South. Sandwiches can be purchased here.

Meeting time: 9:30 am

Field trip will start in Smugglers Notch, progress North down Route 108
through Jeffersonville and continue north into Bakersfield. Be prepared to
go on several short hikes. Shovels will be an asset. Field trip leader:
Stephen Wright.

Please join us for the Annual Meeting and Elections immediately following
the field trip. The meeting will be held at Café Banditos on Route 108 in
Jeffersonville. The restaurant has a full service bar and serves a varied
menu including Mexican food, burgers, chicken and seafood. Plan to meet
there around 4:30pm. If it's warm they'll seat us on the deck.

STATE GEOLOGIST'S REPORT

STATEMAP grant award for summer 2000

The Division's Statemap grant that supports geologic mapping in the summer of 2000 is fully funded and mapping is underway. The competitive grant which is peer reviewed was "well written with good graphics" according to the letter from the review committee. The three projects are: Surficial geologic map and database for the Jeffersonville 7.5 minute quadrangle (Dr. Stephen Wright of UVM); Surficial geologic map and database for the Great Brook Watershed on portions of the Plainfield, Barre East, and Knox Mountain 7.5 minute quadrangles (George Springston and Lori Barg, independent consultants); and Surficial geologic map and database for the Arlington 7.5 minute quadrangle (Dr. David DeSimone of Williams College). For the Jeffersonville quadrangle and the Great Brook watershed a hazard map of slope instability and erosion is a planned derivative product. An aquifer and aquifer recharge area map will accompany the Arlington quadrangle. Monies for the Division are included in cooperation with the University of Vermont to drill logged borings and place piezometers (to understand ground water conditions and landslide risk) in the existing Jeffersonville landslide area and above the school playing fields. The Selectboard of Cambridge met on November 8, 1999 and supported the proposed geotechnical work. This year's grant is the highest award to date that the Division has received through Statemap at \$70,210.

Slope Instability - Jeffersonville, Smuggler's Notch, Springfield, Westmore

On July 13, the Vermont Survey assisted in the acquisition of seismic refraction data in the vicinity of the Jeffersonville landslide. The depth to bedrock coupled with ongoing cooperative mapping by the University of Vermont Geology faculty and students will help direct a drilling program. Drill holes will be used to set ground water monitoring to better understand the mechanism of landslide failure and have a basis for future predictions. Some way to monitor tilt in the boreholes over time is under consideration.

On April 25th, in cooperation with the Facilities Engineering Division, the State Geologist and Jon Kim visited the site for the proposed Smugglers Notch Resort snowmaking pond on Edwards Road in Jeffersonville with Morris Root of Root Engineering. The purpose of the visit was to examine the geologic context of the proposed site in order to determine the potential for slope failure below the proposed pond.

On May 24 the Vermont Survey, at the request of the State Emergency Management Division, traveled to Springfield, Vermont to examine the geologic context of a house close to an unstable slope above a stream. The Survey projects a one to three year risk

to the foundation of the house at the top of a till slope eroding primarily through colluvial action.

On May 17 the Vermont Survey traveled to Westmore, Vermont, on the east shore of Lake Willoughby, to examine the site of a large rockslide (18' X 14' X 4' slab) that damaged Route 5A and took out a guardrail. Fracture mapping by Jon Kim and Marjorie Gale was very helpful in understanding the geologic context of the slide

Isle La Motte Fossil Reef

A group of land protection interests met with the U.S. Bureau of Land Management (BLM) in a meeting sponsored by Forest, Parks and Recreation. BLM is beginning to explore potential projects in the eastern United States and land acquisition or cooperation in some way at the Isle LaMotte Ordovician Reef piqued their interest. They explained their process and their need for the State to take the lead in any effort to involve BLM. There is a deadline to enter the BLM proposal process in late May, but there was much discussion of whether this would be too early to go forward with a proposal before all the interests are balanced. The group then visited the fossil reef. The State Geologist presented the geological context at three locations and the importance of protecting this world class example of an Ordovician reef.

State Lands Management Plans and Geology

The State Geologist and Marjorie Gale met at the U.S. Natural Resources Conservation Service (NRCS) White River Office with Roy Burton, Springfield District State Lands Forester and Tom Villars of NRCS. Roy requested a meeting with Geology to better understand how the Division can provide geologic information for state lands management plans in his district. Distilled information for plans would flow from geologic maps and be displayed in useful formats for non-geologists. Areas of interest on State lands are: geologic sources of calcium for tree growth, the physical system that supports biodiversity, general geology for educational purposes, unique geologic sites, depth to bedrock, potential geologic hazards, sand and gravel, and other mineral resources including ground water. Two plans that would benefit from geologic information that are at various stages in the review process are Townshend and Roaring Brook.

Information and Education

Recent requests highlight the uses of newly packaged information. The well and boring data Excel spreadsheet created for our surficial map projects are available and easily distributed via e-mail. Soil scientists with the USDA in Williston recently requested the data for the Burlington, Colchester, Barre West and Montpelier quadrangles. The Mineral Resource Data System (MRDS), updated in 1998, is

available as paper copy and in GIS. The MRDS provides locations and information on all known active and inactive quarries in Vermont. The data have been queried by consulting companies looking for reclamation projects in Vermont, architects seeking replacement stone for historic buildings, and a citizen seeking information on a proposed marble quarry site. The 1961 Centennial Geologic Map of Vermont has been recently converted from targa to jpg files and we are now able to distribute that map on CD-ROM in a format which most individuals and universities will be able to access. Lastly, the stream geomorphology studies produced in 1998 and 1999 are available through our office. The executive summaries of these studies are posted on our public web site at <http://www.am.state.vt.us/geology/egshmpg.htm>.

On June 8, Jon Kim of the Geologic Division led a full-day field trip for a Watersheds class from Sterling College. The trip focused on the relationship that the underlying geology has to drainage patterns, drainage divides, water chemistry, and botany.

State Geologist's Liaison Meeting - D.C.

In March a group of State Geologists visited with federal partners to discuss areas of mutual interest. Significant visits for Vermont were FEMA, USGS, EPA, NRCS, the National Research Council, and the National Science Foundation. FEMA presented information on its map modernization program that includes a component called Ariverine erosion. FEMA is considering adding this component to their flood plain hazard maps. At USGS a new National Landslide Initiative is in its early stages of development. Vermont suggested that USGS coordinate with FEMA to combine the landslide and the riverine erosion hazard into a slope instability initiative much as we plan to do here in Vermont. When Congress is approached, the states that do not have landslide potential will be interested in supporting a hazard mapping program because of the flood erosion component.

At both the EPA Office of Water and at EPA Research, the State Geologist discussed Vermont's experience with radionuclides in ground water and the need to better understand geology to find new water sources that are devoid of radium and gross alpha emitters. Much research is ahead of us. At NRCS there are ways to coordinate in regards to Adeep, soil investigations, agricultural waste pond liner design, stream geomorphology, and the geologic component of NRCS dam safety rehabilitations.

The National Research Council just released a report "A Watershed Management for Potable Water Supply" which assesses the science of New York City's strategy for managing watersheds in the Catskills to avoid costly filtration. The National Science Foundation is providing funds for State Geologists to mentor undergraduate students in geologic field mapping. Vermont received funds in 1999. Other avenues of educational cooperation were discussed.

An interesting note is that two of the five or so geological associations that are sponsoring fellows in Congress are in Vermont congressional offices. Melody Brown

Burkins from the Geological Society of America is in Senator Leahy's Office and Dave Hunter from the American Geophysical Union is with Senator Jeffords. We discussed the Statemap program and the coming landslide initiative. Apparently, fellows are helping to organize a Congressional Natural Hazards Caucus. An invitation has gone out from Senators Ted Stevens and John Edwards for colleagues to become charter members.

State Geologists Annual Meeting, St. Louis, MO- June 2000

Federal cooperators presented status reports and opportunities for cooperation and collaboration. The USGS continues to pursue a new landslide initiative in cooperation with the State Geologists. Vermont is on the State Geologist's hazard committee which is helping to develop the landslide proposal that will go to Congress. FEMA will have a national release in September of earthquake loss predictions in terms of dollars. Average annual loss ratio and average annual loss per capita brings the Eastern United States into focus. It is hoped that the national release will be coordinated with Emergency Management Agencies and the State Geologists. USEPA updated the State Geologists on the radon, radionuclide, and arsenic rules that are out to public review. The Kansas State Geologist, in the thick of the debate over the teaching of evolution, presented resolutions from the American Geological Institute and other science organizations on the subject.

Radionuclides in Groundwater

Jonathan Kim attended the New England Interstate Water Pollution Control Commission annual meeting in Lowell, MA. He presented the "Geological Context for Elevated Radionuclide Levels in Groundwater: St. George, Vermont" which resulted from the cooperation between the Vermont Survey and the State's Water Supply Division.

Per the request of the Vermont Dept. of Health, the Vermont Survey put together a GIS-based geologic report to provide a geologic context for the high gross alpha levels that have been measured from private bedrock water wells in the Town of Milton.

The State Geologist and Jon Kim met with the town health officers of Milton and Colchester while searching for variation in the mineralogy of the dolomite in the Clarendon Springs Formation. The trip was to better understand correlations between the source of the radioactivity in the rocks and high readings in drinking water from wells. The health officers and the Division toured the areas where houses have registered higher readings. Samples of mineral anomalies in the formation were also taken. The hope is to later use a gamma ray spectrometer in the area of concern to search for higher readings.

On August 3, the Division met with Melody Brown Burkins, D.C. environmental staff for Senator Leahy and Bob Paquin in the Montpelier office. The status of State efforts

to respond to the radionuclide problem were discussed. We focused on the need for a map to identify areas where radionuclides are more likely to be found. Also, maps will help if community ground water systems make more sense in certain situations when nearby aquifers are devoid of radionuclides.

Vermont/Quebec Regional Correlations

From August 14-17 the Vermont Geological Survey and the Geological Survey of Canada co-sponsored a four day field trip to Quebec and northern Vermont to examine correlative bedrock zones. This trip gave Quebec geologists a chance to scientifically evaluate recent work done on the new Vermont State Bedrock Map and to exchange ideas with the Vermont geologists. Attending the trip were Jon Kim and Marjorie Gale of the Vermont Geological Survey, Barry Doolan of the University of Vermont, and Jo Laird, Wally Bothner, and Peter Thompson of the University of New Hampshire. The Quebec contingent consisted of Alain Tremblay, Sebastien Castonguay, and Jean Bedard of the Geological Survey of Canada. The State Geologist joined the group in Vermont.

Laurence R. Becker, State Geologist
Vermont Geological Survey

VGS Calendar

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|-------------|---|
| Sept. 23: | Fall Field Trip led by Stephen Wright
Business meeting, election of officers and dinner at Café
Banditos in Jeffersonville to follow field trip |
| Oct. 6 – 8 | NEIGC, Orono, ME |
| Oct. 8-14: | Earth Science Week |
| Oct. 9&10: | Perkins Museum Open House |
| Oct. 12: | Geologists-in-the-Park |
| Dec. 28: | Deadline for articles and news items for Winter GMG |
| Jan. 15: | Publish winter Green Mountain Geologist (GMG) |
| Mar. 12-14: | NE Geological Society of America, Burlington, Vermont |
| March 28: | Deadline for student abstracts, Deadline for submission of
articles for Spring 2001 GMG |

ANNOUNCEMENTS

The cost of the 1997 NEIGC guidebook has risen to \$22.00 plus \$3.00 shipping. Please make checks payable to "Castleton State College – 1997 NEIGC"

The 1961 Centennial Geologic Map of Vermont is now available on CD-ROM as jpg files. Plot files are included. The CD is available for \$10.00 through the Vermont Geological Survey, 103 South Main St., Laundry Building, Waterbury, VT 05671 or call 802-241-3608.

New Web Site: The Burlington Gem and Mineral Club is now on the web! The address is: <http://www.burlingtongemandmineralclub.org/>

THANK YOU !

The Society gratefully acknowledges the generous contributions to the Student Research Grant funds received from the following members:

Peter and Thelma Thompson
Jeff Hoffer
Jeanne C. Detenbeck
Sharon Strassner
G. Scot Applegate
Arthur W. Gilbert, Jr.
A. P. Nason
Barbara L. Hennig
Lawrence W. Gatto
J. Gregory & Nancy W. McHone
Shannon Foster
Roger & Terry Thompson
Craig Heindel
Jack Jemsek

Also, thanks to all those people who volunteered for the society this year as officers, field trip leaders, judges, Earth Science Week volunteers, and activity organizers.

EARTH SCIENCE WEEK-OCT. 8-14, 2000**POSTER CONTEST**

In celebration of Earth Science Week, the VERMONT GEOLOGICAL SOCIETY and PERKINS GEOLOGY MUSEUM are sponsoring a poster contest for Vermont students in grades K-2, 3-5, 6-8, & 9-12. There will be a \$30 cash prize for each grade group.

Due Date: Posters should be RECEIVED by 5:00 pm Friday, October 13, 2000. An Awards Ceremony will be held on Tuesday, October 24, 2000 at 5:00 pm at the Perkins Museum (Colchester Ave. in Burlington)

For more information contact the Perkins Museum at 656-8694 or Christine Massey at 656-1344.

OPEN HOUSE FOR TEACHERS at the PERKINS MUSEUM

Monday and Tuesday, October 9 & 10, 2000, 2-5pm

UVM Burlington Campus

Teachers are invited to visit with Museum staff about the Earth Science exhibits in the Perkins Museum between 2:00-5:00pm.

Call the Perkins Museum at (802) 656-8694 for details and parking information. The Perkins Museum is housed in the Geology Department of the University of Vermont and is free and open to the public.

GEOLOGIST-IN-THE-PARKS

The Vermont Geological Survey, Vermont Geological Society and the Department of Forest and Parks are working together to schedule school group visits to several parks throughout Vermont on October 10 & 12. We have 450 children scheduled to visit and hike with our volunteers.

Volunteers and parks are listed below: Larry Becker, Hubbard Park in Montpelier; Helen Mango, Emerald Lake State Park; Winslow Ladue, Larry Becker and Marjorie Gale, Mt Philo State Park; Laura Mallard and Craig Heindel, Button Bay State Park; John Warren, Roger Haydock, Greg Walsh, Bob Anderson and students, and Jon Kim, Mt. Ascutney State Park; Jon Kim, Rob Farley and Kent Koptiuch, Little River State Park, and Peter Gale, Groton State Forest. Demand is high for this activity and we will host it for two days to accommodate all requests .

For more information on Earth Science Week events in Vermont go to:
<http://www.anr.state.vt.us/geology/vgshmpg.htm>

VGS TREASURER'S REPORT

September 4, 2000

Dear President and Board:

The financial condition of the Society remains strong. Please see the attached Income Statement for the period January 1, 2000 through August 31, 2000.

The checking account balance is \$3,048.20 as of August 31, 2000.

All bills received by me have been paid and are reflected in the above balance.

I welcome feedback and suggestions from the Board and membership.

Sincerely,

Kristen L. Underwood

Income and Expenses
1/1/00 through 8/31/00

INCOME

Total Dues		\$1,489.00
Dues-Family	\$140.00	
Dues-Institution	\$15.00	
Dues-Member	\$1,310.00	
Dues-Student	\$24.00	
Interest		\$16.86
Student Research Grant Contributions		<u>\$514.00</u>
TOTAL INCOME		\$2,019.86

EXPENSES

US Post Office (stamps, GMG Distribution)		\$159.72
Minuteman Press (GMG Publishing)		\$374.95
Student Research Grant Awards (VGS Spring Mtng)		<u>\$155.00</u>
TOTAL EXPENSES		\$689.67

TOTAL INCOME – EXPENSES		<u>\$1,330.19</u>
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ABSENTEE BALLOT 2000

Vermont Geological Society

Please enter your name and address here:

Officers:

President	Shelley Snyder	_____
	_____	_____
Vice-President	Ray Coish	_____
	_____	_____
Secretary	Jeff Hoffer	_____
	_____	_____
Treasurer	Kristen Underwood	_____
	_____	_____

Board of Directors (Select 2)

Kent Koptiuch	_____
Kristen Underwood	_____
_____	_____

If you will not be attending the VGS 2000 Annual Meeting, please complete this ballot and return it no later than Sept. 21, 2000 to:

Jeff Hoffer, Secretary, Vermont Geological Society
 Dept. of Geology, Perkins Building
 University of Vermont
 Burlington, VT 05405

THE GREEN MOUNTAIN GEOLOGIST
VERMONT GEOLOGICAL SOCIETY
DEPARTMENT OF GEOLOGY
UNIVERSITY OF VERMONT
BURLINGTON, VERMONT 05405-0122

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Executive Committee

President	Shelley Snyder	453-2333
Vice President	Christine Massey	656-1344
Secretary	Jeff Hoffer	229-1113
Treasurer	Kristen Underwood	865-4288
Board	Kent Kophuch	878-1620
of	Kristen Underwood	865-4288
Directors	Marjorie Gale	241-3608

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Public Issues Committee Chair	Philip Jones
Publications/Editorial Committee Chair	Marjorie Gale
Advancement of Science Committee Chair	Stephen Howe

ADDRESS CHANGE?

Please send it to the Treasurer at the above address.

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