



THE GREEN MOUNTAIN GEOLOGIST

QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

WINTER 1997 VOLUME 24 NUMBER 1

The Vermont Geological Society's Winter Meeting

Norwich University, Northfield, Vermont
Saturday February 15th
Coffee 9:30, Meeting Starts at 10

See inside for details.

Directions: The Winter meeting will take place in the Cabot Science Annex, which is the southernmost brick building at Norwich University. The building is on the west side of Rt. 12, 0.7 miles south of the Northfield post office. Park adjacent to the building or in the student parking lot to the south. Look for VGS signs at the south entrance.

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THE GREEN MOUNTAIN GEOLOGIST
 VERMONT GEOLOGICAL SOCIETY
 DEPARTMENT OF GEOLOGY
 UNIVERSITY OF VERMONT
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656-4479 or 644-2439, swright@zoo.uvm.edu

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 Please send it to the Treasurer at the above address.
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PRESIDENT'S LETTER

Thank you Larry Becker; you have served us well this past year and we are grateful. I came to Vermont and joined VGS in 1982. Somehow I escaped the responsibility of serving as President for 15 years, but I now look forward to the coming year. There are several ways that a new President of this society can approach the job. One end-member of what I see as a solid solution series (I see all life as solid solution series) would be to actively seek out the will of the membership and provide leadership to help accomplish the goals of that will. At the other end would be to actively push for implementation of programs and activities that he/she, as an individual, wishes the society would carry out. I suspect that I will work closer to the ends of the series than to the middle.

Upcoming VGS Members Questionnaire:

Eric Lapp is taking the lead to investigate the will of the membership by developing a questionnaire designed to determine what the members think the Society should be doing. Responses will be analyzed this spring, shared with the membership through the *GMG*, and then the Executive Committee will develop a set of recommendations based on the feedback from that effort.

Best Field Trip Stops in Vermont:

In my call for participation for the Winter meeting, I briefly described a project to develop a new publication titled something along the lines of "*Best Field Trip Stops in Vermont*." This volume would have a format similar to the DNAG Centennial Field Guide Volumes put out by GSA, but with a shorter 2-page format per site, including figures and references, along with a map key for travelers to use in constructing a "make your own field trip" through the state.

Vermont Geology Slide Show:

A second project that we will be exploring at the Winter Meeting is the development of a slide set for Vermont school teachers, perhaps available on a CD along with the viewing software. The idea is to solicit slides from all the members, categorizing them in a format similar to that of a standard physical geology "Table of Contents." Each slide would be accompanied by a sentence or two noting the location and describing the geologic features illustrated.

VGS on the World Wide Web:

Work has begun on development of a Vermont Geological Society web site, and we anticipate spending some money this spring to get it up and available. Those of you with access to this communications opportunity recognize that the limits on what can be made available are determined almost entirely by the energy of the people developing the site. The potential is there for offering preview slide shows of field trips, post-field trip slide shows, on-line availability of the *GMG*, and on and on. Ultimately, the success of our web site will depend on finding members with an interest in maintaining it so that it does not become stagnant. Fortunately, the nature of the web allows this activity to occur wherever someone is connected to the internet, so the job of "VGS WebMaster" need not belong to a resident.

Please let us know if you have an interest in participating in any capacity in any of these projects. Obviously, they will not succeed unless the members support them.

Dave Westerman Professor of Geology, Norwich University (802) 485-2337; westy@norwich.edu

WINTER MEETING PROGRAM

Norwich University
Northfield, Vermont
February 15, 1997

9:30 Coffee

10:00 Dave Westerman: *Three-dimensional modeling of plutonic facies having a low magnetic susceptibility contrast within the Giglio Monzogranite, Italy*

10:30 Helen Mango: *Stratigraphy of the Orwell 7.5' quadrangle, west-central Vermont*

11:00 Tania Bacchus: *Late Quaternary stratigraphy and evolution of the eastern Gulf of Maine*

11:30 Informal Presentations: *"Best Field Trip Stops in Vermont"*
Bring a couple of slides showing you favorite teaching stops.

12:00 Group Slide Show: Bring slides that you would like to include in a Vermont teaching set.

12:30 Lunch

VGS Executive Committee Meeting: *All members are invited to attend!*

WINTER MEETING ABSTRACTS

LATE QUATERNARY STRATIGRAPHY AND EVOLUTION OF THE EASTERN GULF OF MAINE

Bacchus, Tania S., Department of Environmental and Health Sciences, Johnson State College, Johnson, VT 05656, bacchust@badger.jsc.vsc.edu.

At the end of the last glacial maximum (ca. 18–22 ka) the southeastern edge of the Laurentide Ice sheet terminated in the Gulf of Maine on Georges and Browns Bank and at the Northeast Channel. Shelf basins >200 m deep preserve the record of changes in sedimentary environments that occurred during the past 18 ky as this ice subsequently retreated. The deglacial stratigraphy of the eastern Gulf of Maine consists of till overlain by glaciomarine mud and capped by postglacial mud. The glaciomarine portion of the succession comprises three distinct seismic facies. They are interpreted as an evolutionary sequence produced by: 1) an initial ice-proximal, ice-shelf environment (PGM facies) during early deglaciation of a basin, 2) an iceberg-calving phase (TGM facies), and 3) an ice-distal glacial environment (DGM facies), in which sedimentation occurs primarily from meltwater plumes, with subsidiary ice-rafted debris.

The glaciomarine stratigraphy within individual basins integrated with grounding-line deposits on the basin margins suggests that the eastern Gulf of Maine was deglaciated by stepwise ice-margin retreat through a series of small ice shelves with associated grounding lines and pinning points. Furthermore, the timing of deglaciation for this region indicates that the initial onset of deglaciation occurred somewhat earlier than documented from other, terrestrial portions of the Laurentide Ice Sheet. Thus, deglaciation of ice-marginal marine environments are very sensitive to marine influences such as sea-level, currents, and local topography, in addition to climatic fluctuations.

STRATIGRAPHY OF THE ORWELL 7.5' QUADRANGLE, WEST-CENTRAL VERMONT

Mango, Helen, Department of Natural Sciences, Castleton State College, Castleton, VT 05735; mangoh@sparrow.csc.vsc.edu.

Recent mapping in the Orwell 7.5' quadrangle has indicated the need to reassess the stratigraphy of the area. Past mapping (as summarized in the 1961 State Map) has used a mixture of formation and member names, drawn from three different regions: the northern Champlain valley, the southern Vermont valley, and New York State. Orwell is a place where these three regions meet, with the result that one basic lithology may have two or even three different names. I propose the following stratigraphy, which adopts the names currently most in use in this area. I also use only formation names; identifying members is often difficult in this region of incomplete outcrops and variable original lithology.

(The following descriptions are incomplete due to lack of space.)

Iberville Fm.	Black/dark gray carbonaceous, noncalcareous shale/slate/phyllite (= Hortonville or Ira Fm.)
Stony Point Fm.	Black, carbonaceous, calcareous slate
Glens Falls Fm.	Black/dark bluish gray thin-bedded limestone and shale
Orwell Fm.	Massive black limestone
Middlebury Fm.	Dark blue-gray slaty limestone (= Chazy Group: Valcour, Crown Point and Day Point Fms.)
Providence Island Fm.	Limestone and dolomite; some shale laminae (includes Bridport, Beldens, Weybridge and Burchards members)
Fort Cassin Fm.	Silty/sandy dark gray limestone (= Bascom Fm.)
Cutting Fm.	Massive gray nondescript dolomite; some chert and cross-bedded quartzite
Whitehall Fm.	Light gray massive siliceous dolomite (= Shelburne Fm.)
Ticonderoga Fm.	Light and dark gray vitreous thick-bedded dolomite (= Clarendon Springs Fm.)

All formations are Ordovician except the Cambrian Ticonderoga formation.

THREE-DIMENSIONAL MODELING OF PLUTONIC FACIES HAVING A LOW MAGNETIC SUSCEPTIBILITY CONTRAST WITHIN THE GIGLIO MONZOGRANITE, ITALY

Westerman, David S., Department of Geology, Norwich University, Northfield, VT; Faggioni, Osvaldo and Innocenti, Fabrizio, Dipartimento di Scienze della Terra, Universit di Pisa, Pisa, Italy

Two main plutonic facies characterize the intrusive monzogranite complex of the island of Giglio within the Tuscan Archipelago, Italy. These rocks were emplaced 5.0 Ma, transporting abundant foliated and non-foliated inclusions to a shallow depth in the imbricated Mesozoic cover. The outer zone of the complex, the Pietrabona facies, is strongly foliated with oriented minerals and flattened xenoliths, and exhibits rhythmic modal layering. The inner zone, the Arenella facies, is poorer in biotite, is non-foliated, and contains K-megacrysts. The trend of the facies contact at depth has been modeled using a three-dimensional analysis based on a detailed geomagnetic survey. The magnetic anomaly connected with the discontinuity is quite low, due to the small difference between the magnetic susceptibilities of the two granitic facies. Development of this model of inversion of the magnetic field, which is in good agreement with the geological interpretation, was made possible by 1) accurate control of the time-earth field variations and the consequent temporal reduction, 2) a very low level of artificial magnetic noise, 3) the high density of the magnetic survey, 4) detailed knowledge of the mapped geologic contact between facies and of their petrologic characteristics, and 5) direct local measurement of the magnetic susceptibilities of key lithologies. The model shows idealized trends of the geologic contact, as projected in three E-W sections, with eastward dips in the range of 21° to 54°. This model supports the geologic hypothesis that the Pietrabona facies represents an external shell of the shallowly emplaced Giglio monzogranite intrusion.

STATE GEOLOGIST'S REPORT

Laurence R. Becker

Vermont State Geologist and Director, Vermont Geological Survey

Marjorie Gale

Marjorie Gale is the new incumbent in the Geology/Information and Education position. For those of you who do not know her, she comes to the Department with a range of experiences that will advance the goals of the Vermont Survey to meet its statutory responsibilities.

Marjorie has experience in both geology and education. Since 1994 she has worked part time under contract to the Vermont Survey assisting the University of Vermont with compilation and preparation of the new Vermont bedrock geologic map. She has taught science to sixth and seventh graders and has been the President of a parent-teacher organization in her children's elementary school. Ms. Gale received her B.A. in Geology, cum laude, from the University of New Hampshire in 1974. She completed her M.S. in Geology at the University of Vermont in 1980. Her thesis research focused on bedrock mapping, structural analysis, and metamorphic petrology of the Belvidere Mountain area in Vermont. In 1992-1994, she was employed part time by Target Reservoir Analysis in Oklahoma City, Oklahoma to conduct scanning electron and xray diffraction analyses to evaluate potential hydrocarbon-producing sedimentary rocks.

Marjorie has primarily raised her family over the last 15 years and is eager to experience the exciting opportunities that full time work can bring. For her first three months as geologic information specialist, Marjorie Gale reports that over 100 requests were met including those made by phone contact, e-mail, walk ins, and for publication sales.

Bedrock Mapping

In December 1996 STATEMAP funds were awarded for the final summer of bedrock mapping in 1997. Approximately two thirds of the requested funds were awarded.

Missisquoi Bay

Data collection for verification and model calibration began on October 2 with the placement of two S-4 current meters and an acoustic Doppler current profiler unit on the bottom that measures the vertical current profile. Water level sensors were placed on either side of the causeway and by the shore on the Canadian side in the northern part of

the Bay. A meteorological station was established as well. A drogue study of current direction was completed.

Stream Geomorphology

The Vermont Survey is coordinating a study of watersheds in the uplands that show recent changes in stream morphology that could be caused by development, natural inputs, or some combination of the two. The study also has a component of flood hazard mitigation and identifying acceptable urban practices to protect streams in the uplands/lowlands from degradation. The State Geologist facilitated a meeting on October 29th of the work-group that includes all elements of the Agency of Natural Resources in order to design a request for proposal to uncover the cause of change.

Seismic hazards

As of October 1, 1996, the Vermont Survey will receive National Earthquake Hazard Reduction funds to develop a seismic hazard program. Initial efforts will focus on education and defining the seismic hazard on unconsolidated materials in the Northwestern part of the State, as structures in northwestern Vermont show potential to be subject to damage from events that might occur outside Vermont.

WATER NEWS

Kent S. Koptiuch, CGWP

The USGS' role in water quality monitoring will be expanded in 1997. As part of President Clinton's environmental initiative, \$45 million in additional funding will be available (assuming approval by Congress) over the next four years for the USGS to expand their National Water Quality Assessment Program (NAWQA).

Currently, NAWQA tracks the water quality trends in thirty-five major river basins and groundwater systems throughout the country. The new funding will be aimed at making the USGS database more accessible to the general public by expanding existing USGS programs on the internet and the world wide web. The initiative also calls for the USGS to partner with the EPA and private utility companies to provide routine summaries and updates to the public, presumably on a forum-based platform. (It seems somewhat hard to believe that it will cost taxpayers \$11.5 million annually to divulge public information; I hope that some of these funds are earmarked for other worthwhile causes).

VERMONT GEOLOGICAL SOCIETY BUSINESS & NEWS

Vermont Geological Society Research Grant Awards

The Vermont Geological Society is proud to announce that two students will be receiving funds from the Society to aid in their research. **Sarah Brown**, a graduate student at the University of Vermont, will receive money for ¹⁴C dating of samples she is extracting from Ritterbush Pond (Eden) as part of a project titled: "*Cause, Timing, and Distribution of Inorganic Horizons in Vermont Lake Cores.*" **William Stansfield**, an undergraduate student at Johnson State College will receive funding to aid his preparation of thin sections for a research project titled: "*Petrography and spatial distribution of crustal xenoliths within a segmented en echelon monchiquite dike, Johnson, Vermont.*" Both students will present the results of their research during the Spring 1998 Meeting of the Vermont Geological Society.

Spring Funding

The Vermont Geological Society is currently accepting student research proposals for funding to be distributed late this spring. The deadline for spring applications is **April 30, 1997**. Request a description of the Research Grant and Grant Applications from Stephen Wright (656-4479; swright@zoo.uvm.edu).

Fall Field Trip and Meeting

Only a few colored leaves interfered with the view of recently altered stream channels, Huntington River terraces, active alluvial fans, and Miller Brook valley eskers on the VGS Fall Field Trip. Approximately 30 participants provided lively feedback to the field trip leaders when they weren't concentrating on the journey across the Huntington River on a long, skinny, wobbly log. The day concluded with a fine dinner in Waterbury where the proposed slate of officers was voted in and a brief Executive Committee meeting followed (minutes to be published in the Spring 97 GMG). This year's new officers are: Dave Westerman (President), Tania Bacchus (Vice President), Jeff Pelton (Secretary), and Kent Koptiuch (Board of Directors). See back page for contacts.

Vermont Geological Society Membership Directory

The Directory is being updated as member renewals are received. Expect a new, updated Membership Directory to accompany the Spring issue of the GMG.

SEMINARS, MEETINGS, AND FIELD TRIPS

- February 10: University of Vermont Spring Geology Seminar Series (4 P.M) "*Characterizing geological materials and processes with ion-beam techniques: Investigations of cation diffusion in feldspars*" Daniele Cherniak, R.P.I.
- February 24: University of Vermont Spring Geology Seminar Series (4 P.M) "*Magmatic underplating: An example from the Ivrea Zone, northern Italy*" Jim Quick, U.S.G.S. Reston.
- March 3: University of Vermont Spring Geology Seminar Series (4 P.M) "*Solutions and subduction: Aqueous geochemistry at high pressures*" Craig Manning, UCLA.
- March 10: University of Vermont Spring Geology Seminar Series (4 P.M) "*Post orogenic evolution of the Appalachians: How high were they and when did they get low?*" Michael Hulver, University of Chicago.
- March 17-19: **Northeastern Section Geological Society of America Annual Meeting**, King of Prussia, PA. Info: see December 1996 issue of *GSA Today* or www.geosociety.org
- March 24: University of Vermont Spring Geology Seminar Series (12 P.M) "*The compositional evolution of the earth's mantle*" Bill McDonough, Harvard University.
- March 24: University of Vermont Spring Geology Seminar Series (4 P.M) "*The composition of the continental crust: The view from down-under*" Roberta Rudnick, Harvard University.
- March 31: University of Vermont Spring Geology Seminar Series (4 P.M) "*Early Paleozoic volcanism in Vermont*" Ray Coish, Middlebury College.
- April 7: University of Vermont Spring Geology Seminar Series (4 P.M) "*Glass geothermometry: Using glass composition to quantify volcanic processes*" Rosiland Helz, Mineralogical Society of America Lecturer for 1996-7.