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The Vermont Geological Society
Spring Meeting
April 28, 2007, 8:30 AM
Delehanty Hall, Room 219
University of Vermont, Burlington, Vermont

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ABSTRACTS

TECTONIC EVOLUTION OF AN EXPOSED SECTION OF LOWER CRUST, WESTERN FIORDLAND, NEW ZEALAND

Robert Zimmermann, Department of Geology, University of Vermont, Burlington, VT 05405

Continental extension is a fundamental tectonic process. Metamorphic core complexes, which represent one mode of extension, provide valuable information on the behavior of different crustal layers during deformation in extensional tectonic regimes. The lower crust is one of these layers that are rarely exposed. This project presents a bedrock map and cross section of the 350 square-kilometer area surrounding Wet Jacket Arm, New Zealand, with structural data on a newly discovered ductile shear zone in the lower crust. The region records deformation associated with the breakup of Gondwana (110-102 Ma) and also the current oblique collision between the Australian and Pacific plates. Microstructural and outcrop analyses provide the basis for the interpretation of the deformation history of this exposed section of lower middle crust. The rocks composing the hanging wall of the recently named Resolution Island Shear Zone are interpreted to be the lower-crustal analog to the mid-upper crustal Paparoa metamorphic core complex in nearby Westland, New Zealand. The structures depict a symmetric core complex in the lower crust, bounded by ductile shear zones antithetic to several major detachment faults. The geometry of the upper plate in this ductile extensional regime is similar to a system of brittle conjugate faults, which is markedly different from core complex models from the western margin of North America and elsewhere. These models involve asymmetric structures defined by large, folded detachment faults controlled by the process of simple shear. In contrast, the core complex in western Fiordland appears to be a symmetric structure bounded by conjugate ductile shear zones. By restoring the displacement across the strike-slip Alpine Fault, the Paparoa core complex can be brought to coincide with these lower crustal rocks. This project presents a new variety of core complex, dominated by the mechanics of pure shear rather than simple shear.

CRUST–MANTLE INTERACTIONS DURING EXTENSION IN THE LOWER CONTINENTAL CRUST

Paul M. Betka, Department of Geology, University of Vermont, Burlington, VT 05405

The recent discovery of deep (~20kb, ~60km) granulite and ecologite exposures within Fiordland, New Zealand provide evidence of interactions between the lower crust and lithospheric mantle during continental extension. New data suggest that processes controlling extension in this setting are similar to those in oceanic core complexes. Strain in oceanic core complexes is accommodated by localized shear zones controlled by the metamorphic hydration of mantle dunite, peridotite and harzburgite at the upper amphibolite and greenschist facies rocks. In Fiordland, preliminary results indicate that metasomatism of granulite and eclogite material representative of the mantle and lower crust resulted in zones of weakening that accommodated strain during continental extension. These observations pose two fundamental questions about the behavior of the lower crust and lithospheric mantle during continental extension: 1) Does retrograde metamorphism of mantle rocks cause rheologic heterogeneities in the lower crust that control strain partitioning during deformation? and 2) Do the lower

continental crust and upper mantle behave similarly to processes documented in other settings, including oceanic core complexes?

Mapping of outcrop-scale (~10m^2) exposures of this shear zone indicate that shear strain is localized in an anastomosing array of high-strain amphibolite facies shear fabrics that envelope low-strain, eclogite and granulite facies rocks. Amphibolite facies shear fabrics envelope meter scale pod-shaped lenses of eclogite, and garnet granulite. Eclogite and granulite display cross-cutting clinozoisite- and hornblende-bearing veins, indicating they experienced brittle deformation during extension under high-pressure amphibolite-facies conditions. Amphibolite facies fabrics contain very strongly aligned hornblende and plagioclase stretching lineations that plunge strongly toward both ~25° and ~205°. Foliations in amphibolite shear fabrics wrap the pod-shaped lenses of eclogite and granulite, forming dome-and-basin structures. Initial results suggest that metasomatism of granulite and eclogite weakened the lower crust sufficiently to allow it to accommodate strain during continental extension, resembling strain localization mechanisms recently documented in oceanic core complexes.

COMPARISON OF HOLOCENE AGE MARINE SEDIMENT RECORDS: FOUR BAYS ON THE ANTARCTIC PENINSULA

Anne Christopher, Geology Department, Middlebury College, Middlebury, VT 05753

The bays along the Antarctic Peninsula (AP) experience differing climates based on slight variations in temperature and precipitation rates in relation to the bays' geographical position (latitude/longitude). These varying climatic conditions in turn affect the local glacial characteristic of each bay, which ultimately determines the sedimentology of the bays. This study focuses on four Holocene Kasten cores of marine sediment from the AP, specifically from Maxwell Bay and Lapeyréré Bay on the western side of the AP and Herbert Sound and the Firth of Tay on the eastern side of the AP.

Sedimentological records for each bay were constructed using physical properties (grain size, magnetic susceptibility, electrical resistivity, and porosity), clay mineral analysis, ice-rafted debris counts, and radiocarbon dating. The physical properties indicate where local climate swings are located within the cores; the clay mineral analysis clarifies whether the sediment is terrigenous (land origin) or oceanic (ocean origin); the ice-rafted debris counts display evidence for advance and retreat of the ice fronts within the bays; and the radiocarbon dating determines sedimentation rates. In addition, the distance of the core site to the coastline of the bays was taken into consideration. With these high-resolution sediment records, comparisons between the bays were made to observe if geographic locations (east versus west side of the AP) or glacial settings of the bays significantly impact the observed sediment characteristics. This information will enhance other Holocene sedimentological records of the Antarctic Peninsula.

A MULTI-PROXY CLIMATE RECONSTRUCTION ON LAKE SEDIMENT FROM THE UINTA MOUNTAINS, UTAH

Lee Corbett, Geology Department, Middlebury College, Middlebury VT 05753

Reader Lake and Elbow Lake, two high altitude lakes in the Uinta Mountains of Utah, are located about 2 km apart from each other in the same drainage basin. Despite their proximity, however, loss-on-ignition (LOI) curves on sediment cores retrieved from both lakes suggest that

they have had surprisingly dissimilar post-glacial histories. The goal of this study is to perform a multi-proxy climate reconstruction on both cores to clarify how each lake responded to climate changes, to elucidate how the various proxies are related, and to understand why the two lakes have behaved so differently.

LOI, biogenic silica (BSi), carbon to nitrogen ratios (C/N), and grain size distribution were analyzed at 1- or 2-cm intervals throughout both cores. AMS radiocarbon dating of terrestrial macrofossils indicates that the cores contain sediment starting ca. 14,000 years ago, and continuing through ca. 2,000 years ago (the uppermost, youngest, sediment in each lake was not retrieved). Overall, the Reader Lake record features high variability in LOI and BSi, while the Elbow lake record features a prolonged interval of elevated LOI and C/N ratios. Both lakes exhibit a major event centered on 4,000 years ago, possibly synchronous with the 4200 drought that has been widely identified throughout the western United States. In Reader Lake, this event is characterized by unusually high LOI and low BSi, suggesting a profound change in the character of sediment accumulating in the lake at this time. In Elbow Lake, this event marks the end of a 6,000-year period of heightened C/N ratios.

Because the lakes are located so close together, they have likely experienced the same climatic forcing during the post-glacial period. Therefore, the differences between the two records may lie in the geomorphology of the lakes themselves. Reader Lake currently has no inlet and therefore may have operated as a closed basin for most or all of its history. Elbow Lake, however, has an active inlet that feeds a large delta. This indicates that inwashing of terrestrial material, both organic and clastic, is an important contribution to sedimentation in the lake basin. The results of this study suggest that geomorphology has the potential to control each lake's response to climate changes.

POST-GLACIAL LAKE SEDIMENT RECORDS FROM NORTHEASTERN VERMONT, USA

Christopher M. Rodgers and Jeffrey S. Munroe, Geology Department, Middlebury College, Middlebury, VT 05753

Continuous sediment cores were retrieved from two ponds in Brighton, Vermont in order to reconstruct the post-glacial climate of this area. Both of these ponds, Beecher (373 m asl) and Nulhegan (352 m asl), are located within the Nulhegan Basin, a prominent topographic lowland underlain by a quartz monzonite pluton. The ponds are located less than 4 km apart, and both feature simple bathymetry, maximum depths of ~4 m, minor inflow and outflow, and shorelines densely vegetated by bog and boreal forest vegetation. Sediment was retrieved with a 2-inch diameter Livingstone corer operated from the ice surface; overall, more than 15 m of sediment were collected from the two ponds. Based on AMS radiocarbon dating of terrestrial macrofossils, the record for Beecher Pond extends from ~11,200 cal yrs BP to ~770 cal yrs BP, with a sedimentation rate of 0.44 mm/yr. A wood fragment from a depth of 40 cm in the Nulhegan Pond core returned a date of 1,100 cal yrs BP. Most %LOI values for the two lakes range from 35 to 45%, with a general increase over time. Both records also feature dramatic transient departures to higher and lower %LOI values. The fluctuations consist of steadily rising or falling values that abruptly shift to trend in the opposite direction. This characteristic, and the sedimentation rate determined for Beecher Pond, suggest that the %LOI fluctuations track changes in the amount of organic matter accumulating in the lakes over centennial timescales. If

%LOI is considered a proxy for aquatic productivity, then these records reveal notable variability in the post-glacial period. Future work will investigate the possible synchrony of these changes between the two lakes, and with climatic variability noted in previous paleoclimate studies from the region.

A GEOMORPHIC ASSESSMENT OF THE 'WHITE ROCKS SLIDE', WALLINGFORD, VERMONT

Desiree M. Violette and John G. Van Hoesen, Green Mountain College, One College Circle, Poultney, VT 05764

White Rocks Slide (WRS) is located on a west-facing slope in the Wallingford Quadrangle of east-central Vermont. WRS is composed of block talus ranging from ~0.5 meters to ~4.0 meters and lacks evidence for a finer-grained supporting matrix. The cliff-forming unit in this area is the Cheshire Quartzite and is also the dominant lithology of the blocky talus observed covering the length of the slide.

We analyzed the fabric of surface clasts on four distinct regions of the WRS to test for a preferred orientation. In addition, we used ArcGIS to characterize the slope, aspect, potential solar insulation, variations in regional lithology, and develop a geomorphic map of the slide. Solar insulation was modeled using Solar Analyst 9.2 within the ArcGIS framework (Fu and Rich, 1999).

Fabric data suggests a preferred orientation for all regions of the slide. In addition, modeled solar radiation levels on both the ridge and slide are relatively low compared with the surrounding landscape. We suggest that these low insulation values would increase the likelihood of snow surviving into the early summer months and provide a low-friction transport surface with the debris fed through freeze-thaw of the strongly fractured Cheshire Quartzite (Lee, 1989).

URANIUM-ENRICHED GROUND WATER, KNOX MOUNTAIN PLUTON, VERMONT: OCCURRENCE AND LITHOLOGIC CONTROLS

Michael Gleason, Geology Department, Middlebury College, Middlebury, VT 05753

Since 2003, seven ground water wells in Marshfield and Peacham, VT have demonstrated uranium (U) concentrations exceeding EPA and VT Department of Health maximum contaminant levels (MCLs). Due to the prevalence of unregulated private wells in the area, the extent of U contamination is unknown, posing the potential for a major public health concern. The contaminated wells tap deep fractured-bedrock aquifers of the Knox Mountain Pluton, implicating lithologies within this Devonian intrusion as likely sources. This study combines ground water and bulk-rock geochemistry to assess, respectively, (1) the distribution of U-enriched ground water in the study area; and (2) the potential of differing lithologies within the pluton as sources of U and associated radioactivity in the ground water.

Of 19 private wells sampled in the study area, three contain U in concentrations above the VT Dept. of Health MCL of 20 ppb. Two of these three also contain gross alpha (GA) in levels exceeding the EPA MCL of 15 pCi/L. U and GA demonstrate a significant positive correlation for the wells sampled ($P<0.001$, $n=19$), suggesting that U is the predominant radionuclide

occurring in the ground water. While U and GA levels do not vary systematically with well depth, they do show generally higher levels in wells within the central part of the northern pluton.

Bulk-rock geochemistry confirms the significant heterogeneity of rock types within the pluton identified by previous work. Lithologies sampled in the northern pluton can be divided into four significant groups based on mineralogy and rare-earth element chemistry: (1) biotite-rich pluton, (2) biotite-poor pluton, (3) late-stage pegmatites, and (4) late-stage aplites and veins. Neither major element nor radionuclide content suggests that the geochemistry of the four lithologies varies systematically throughout the pluton.

Although U levels are generally highest in wells tapping biotite-poor pluton, bulk-rock analysis reveals relatively low U (2.6-5.7 ppm) in this lithology. High concentrations of U (23.2-28.7 ppm) in late-stage dikes suggest their potential role as a source; however, ongoing analyses of U solubility in the various lithologies should help clarify the significance of each to U ground water contamination.

POTENTIAL ULTRAMAFIC-DERIVED ARSENIC CONTAMINATION IN BEDROCK WATER WELLS IN NORTH-CENTRAL VERMONT

Colleen Sullivan, Geology Department, Middlebury College, Middlebury, VT 05753

Analysis of 30 bedrock ground water wells in the vicinity of Stowe, Vermont reveals three wells with arsenic concentrations that exceed the EPA MCL of 10 ppb, with two of the wells producing water containing 86 and 275 ppb As. Seven additional wells contained between 1.5 and 7.0 ppb As. The wells are located in the Stowe, Ottaquechee, Moretown, and Hazens Notch Formations, and possibly penetrate isolated serpentinites.

Geochemical analysis of the Stowe, Ottaquechee, Moretown, and Hazens Notch Formations from the present cooperative research with Jon Kim of the Vermont Geological Society and previous theses (Bright, 2006; Anderson, 2006; Morris, 2006) are combined to form a suite of 99 samples. Complete geochemical analyses have been performed on 76 of the samples, which document low concentrations of arsenic in schists and quartzites (mean = 8.6 ppm; SD = 15.3; N = 20) and greenstones (mean = 4.1 ppm; SD = 13.9; N = 33) compared to ultramafic rocks which contain high arsenic concentrations between 9.5 and 449 ppm (mean = 63.7 ppm; SD = 94.1; N = 23).

Metasedimentary rocks show low to moderate correlations between arsenic and elements expected of a sulfide source (e.g., Fe, Cu, Ni; e.g., R^2 for Ni and As = 0.42) which suggests a potential mixture of sulfide and non-sulfide sources of arsenic. Scanning electron microscopy-energy dispersive spectrometry (SEM-EDS) analysis of thin sections from the Barnes Hill ultramafic body have not identified a particular trace mineral that contains arsenic; instead, it appears that the arsenic is disseminated throughout the serpentine, possibly substituted into tetrahedral layers in serpentine. Such speculation is supported by recent work by Hattori et al. (2005), who indicate that arsenic becomes incorporated into serpentine during hydration and metamorphism of ultramafic rocks associated with orogenic events.

The elevated concentrations of arsenic within the rocks from the Barnes Hill and other regional ultramafic rocks along a transect from Waterbury to Lowell, and the general lack of elevated arsenic in regional metasedimentary rocks and greenstones, suggest that the ultramafic rocks are

the source of the high arsenic concentrations in the ground water. Further work includes additional SEM element maps, and geochemical and age-dating analysis of groundwater samples that produce from serpentinites north of Stowe.

FATE OF ORCHARD-DERIVED ARSENICAL PESTICIDES IN NEW ENGLAND STREAMS

Elizabeth J. Barclay, Carl Renshaw, Benjamin Bostick, W. Brian Dade, and Francis Magilligan, Department of Earth Sciences, Dartmouth College, Hanover, NH 03755

While flume studies suggest that flow interactions between a stream and its bed can potentially impact the transport and fate of dissolved and suspended contaminants, these impacts are less well documented in the field. Of particular interest in New England is the transport and fate of arsenic in alluvial hyporheic sediments derived from orchards where arsenic-based pesticides were widely used in the early 1900's. We are investigating the distribution of arsenic contamination in hyporheic sediments not only longitudinally downstream from their presumed source, but also vertically in the stream bed. We have identified two field sites in southern New England that drain disturbed orchard lands, as well as one control site where no agricultural influence has occurred. At the two sites below orchards we have taken, at downstream intervals of several hundred meters, vertical profiles in 5-cm increments down to 25 cm. In a companion study we are also investigating the temporal variation in the vertical distribution of an atmospherically derived short-lived radioisotope ^{7}Be. We have found relatively little variation in vertical distribution of contaminants, possibly suggesting significant penetration and more or less uniform mixing of contaminant loads to depths of several tens of centimeters and more. The ^{7}Be activity in the stream is closely correlated to samples adjacent to the streambed indicating that sediment washed into the stream is infiltrating into the bed down to 8 cm relatively quickly. We have also found that the longitudinal decrease in sediment contaminant concentration with distance from the source cannot be explained by dilution alone, suggesting some of the contamination entering the streams is being sequestered. The significant penetration of the contamination into the stream bed suggests that stream bed storage may be partially responsible for the rapid attenuation downstream. These results demonstrate that hyporheic sediments can filter and store potentially large amounts of contaminants for long periods of time and thus stream bed interactions have a significant impact on the transport and fate of suspended contaminants.

A FLUVIAL RECORD OF LAND-USE CHANGE IN THE OTTER CREEK BASIN, VERMONT

Carrie Childs, Geology Department, Middlebury College, Middlebury, VT 05753

Significant land-use changes have occurred throughout North America as a result of human habitation. Native American and European settlers both made significant alterations to the natural landscape for survival, resulting in a disruption of otherwise "natural" ecological, biological, and geologic cycles. As populations increased dramatically over the last two centuries, these alterations became more prevalent and pronounced.

As part of the Otter Creek Integrated Watershed Study this study aims to bridge the gap between historical geographic information concerning industry and land-use changes in the Otter Creek

Basin and the geologic sediment record. Two cores extracted from the Otter Creek Delta underwent ICAP spectral analysis, grain size analysis, magnetic susceptibility determination, x-ray diffraction, and x-ray and digital photography in order to determine if changes in historical industry or known large events have physical proxies in the cores.

Significant wood-chip layers were observed occurring randomly down the length of a 3-meter core taken from the modern delta (OCD-2). These layers include potentially not-naturally occurring wood chips and shavings and pieces of charcoal, possibly indicators of extensive wood-based industries up-stream. Initial ^{210}Pb dating of the upper 10 cm revealed significant bioturbation, requiring further dating analysis. Trace metal analysis in the core revealed increasing contamination in the upper layers of sediment, particularly concerning Pb and P concentrations. This may be a result of the introduction and subsequent use of tetraethyl lead as an anti-knock agent in leaded gasoline from 1920 to 1950, and introduce the possibility of fertilizer contamination. Further testing is being done to determine arsenic and mineralogy of specific silica-rich zones in the cores.

SULFUR OXIDIZING BACTERIA IN THE FRASASSI CAVE SYSTEM, ITALY

Danielle Eastman, Gregory Druschel, Jenn Macalady, Dan Jones, and Lindsey Albertson, Department of Geology, University of Vermont, Burlington, VT 05405

The Frasassi Cave System, located in the Marche Region of central Italy, is forming in Jurassic-aged Calcare Massiccio limestone of the Apennine Mountains. Research on this karst system focuses on its sulfur chemistry and on the microbes that inhabit its aqueous subterranean environments. Microbial communities of sulfur-reducing and sulfur-oxidizing organisms in the aqueous regions of the Frasassi caves, as well as on the walls and ceilings, are catalysts for the majority of the oxidation-reduction reactions involved in sulfur cycling through the caves. These reactions fuel sulfuric acid production and represent a biological feedback to sulfuric acid speleogenesis. Using electrochemical techniques, specifically voltammetry, we were able to identify the chemical differences that may relate to the selection of different microbial communities. The comparison of a number of cave sites and ecosystems provides unique information to better understand the pathways through which sulfur is oxidized, the rate at which this happens, and the chemical parameters specific to each microbial niche. The understanding of chemical cycling through these simple aqueous environments can be applied to the investigation of sulfuric acid speleogenesis as well as to more complex environments.

GEOCHEMICAL SULFUR CYCLING AND ORGANIC INTERACTIONS ASSOCIATED WITH MICROBIAL COMMUNITIES AT GREEN LAKE, NEW YORK

Lydia G. Smith and Gregory K. Druschel, Department of Geology, University of Vermont, Burlington, VT 05405

Green Lake, located in Fayetteville, NY, is a mermocitic lake with significant geochemically influenced microbial activity. The permanently stratified water column is characterized by the presence of an oxic/anoxic chemocline in which an abrupt chemical contrast provides potential energy for the microbial coupling of reduced/oxidized forms of sulfur intermediates (S, HS^-, polysulfides, etc.), as well as C, N, and P. Two vertical profiles of *in situ* electrochemical data were compiled in the fall of 2006. A solid-state electrode system, consisting of PEEK working,

reference, and counter electrodes, was weighted and lowered at 1 meter increments. Several cyclic and square wave voltammetry scans were run at each increment and recorded on the computer. The oxic/anoxic interface was determined to be at 21 meters below the surface based on increasing anoxic conditions with depth (oxygen became depleted with increasing sulfide), and this water was pink because of abundant purple sulfur bacteria. Water samples from this depth were obtained with a Niskin bottle and kept for lab experimentation. Distinct sulfide peaks were observed on the voltammograms as well as other unknown peaks of sulfur intermediates. Polysulfide salts, NaS_4 and NaS_5 (S_4^{2-} and S_5^{2-}) were synthesized through the procedure published by Rosen and Tegman (1971) to characterize these signals. Lab experiments involved voltammetric analysis of hydrogen sulfide additions to the Green Lake water, in hopes of building a calibration curve for the determination of sulfide and polysulfide concentrations through the profile. Sulfide additions to fresh Green Lake water samples resulted in a reaction that consumed sulfide and formed a precipitate, likely elemental sulfur. This reaction only occurred in scans run with fresh Green Lake water, before less recalcitrant organic molecules broke down. This is indicative of a reaction between sulfide and dissolved organic matter which has been linked to sulfur colloid precipitation by Heitmann and Blodau (2006) and illustrates the important link between organic chemistry and sulfur cycling in these types of systems.

PRESIDENT'S LETTER

Hello all,

The Society has field trips lined up, a VGS Lecturer in Jon Kim, and the Spring VGS Meeting coming up soon (see details for all of these in this issue). The VGS is healthy and active, as witnessed by the nice turn out at the Winter Meeting at Norwich, where several people traveled in bad weather to attend—and thanks to all of you.

Marjie Gale of the Vermont Geological Survey recently sent out a reminder of Earth Science Week, October 14-20, and I encourage each of you to find a way to use that event to generate interest and awareness of our discipline. The theme this year is "The Pulse of Earth Science", focusing on geoscience research and earth science in education and society. See that? Education and society. While people are more and more aware of science (especially through 'global warming'), science leadership in our society is eroding. Erosion—we know something about that, and we know it is hard to stop, so we all have to get creative and help promote education and awareness of geoscience.

The Spring Meeting is on April 28th, at the University of Vermont, so please attend and enjoy the student scholarship. See you at the meeting or in the field.

Best wishes,
Rick Dunn, President

WINTER MEETING MINUTES

Following the presentations associated with the Winter Meeting held at Norwich University, a quorum was declared and President Rick Dunn called the Executive Committee Meeting to order. Treasurer Steve Howe indicated that the financial condition of the Society remains sound. The total VGS membership (individuals + institutions) is holding steady at about 120.

Steve Howe also reported for the Advancement of Science Committee and indicated that one new research grant had been awarded to Colleen Sullivan from Middlebury College. In an effort to encourage new membership, it was agreed that research grant awardees would now receive a one-year cost-free VGS membership, including electronic receipt of the *Green Mountain Geologist*, in the hopes that they will retain a long-term affiliation with the Society. It was also reiterated that research grant awardees must present their results at a professional conference (e.g., Spring VGS meeting, NEGSA).

The Committee briefly discussed the status of upcoming VGS field trips. Peter Thompson of the University of New Hampshire has tentatively agreed to lead the summer field trip to the Woodstock–Quechee area and Dave West of Middlebury College has tentatively agreed to lead the fall field trip to the Middlebury area. Details of these trips will be forthcoming.

The Committee noted that the Society's new Lecturer, Jon Kim of the Vermont Geological Survey, is offering two separate talks on groundwater problems and will be speaking at Alfred University in April. The Committee approved a motion that the VGS Lecturer would be reimbursed for mileage, and if necessary, per diem meals and lodging expenses, at the standard federal rates.

Steve Howe reported that John Van Hoesen was working on setting up in the next few months a ListServ for the Society, hosted by Green Mountain College, for the purpose of discussing all aspects of Vermont Geology. Rick Dunn agreed to contact Stephen Wright to come up with ways, including the design of a poster, to promote VGS membership, particularly among students. He also noted that he would be stepping down after his two-year term as President is up following the Annual Meeting in the fall. Vice President George Springston agreed to his nomination as a candidate for President to succeed Rick, and both Dave West and Steve Howe indicated they would also agree to be candidates for their respective positions. The Committee will be looking into nominating a candidate for Vice President to succeed George.

Finally, in an effort to increase participation at the Winter Meetings, the Committee agreed to reinstitute a "general theme" for future Winter Meetings. The theme for the 2008 Winter Meeting will be "Holocene Climate Change." It was reiterated that all presentations need not be associated with the meeting theme, however, efforts would be made to attract speakers who fit into the theme. The meeting was adjourned.

Respectfully submitted,
David West, Secretary

TREASURER'S REPORT

The financial condition of the Society continues to be very strong. As of April 9, 2007, the Society's checking account balance was $ 6,343.14. To my knowledge, there are no outstanding bills.

The following members have been approved for membership in the Society since the last report: Jason Clere, Portland, Maine; Carey Hengstenberg, Burlington, Vermont; James Nizamoff, Proctor, Vermont; and Matt Trieber, Bellows Falls, Vermont.

Respectfully submitted,
Stephen S. Howe, Treasurer

ADVANCEMENT OF SCIENCE COMMITTEE REPORT

This year, the Society's Winter Meeting in March was designed purposely without a theme. Dave Westerman kicked the meeting off with his review of Devonian plutons in Vermont, followed by George Springston's discussion of a rockfall hazard assessment of Vermont highways, and concluding with Rick Dunn's description of mapping colluvium near potential archeological sites in Greece. As always, members are encouraged to contact me with any suggestions they may have for topics or presenters for next year's meeting.

The Committee received no applications to the Society's Research Grant Program by the deadline of March 31, 2007. Applications for the second round are due October 1, 2007. Please see the Society's website for details.

The Committee gratefully acknowledges the contributions to the Society's Research Grant Program by the following members:

Laurence R. Becker
E. Stanley Corneille, Jr.
Jeanne C. Detenbeck
Barry Doolan
Albert W. Gilbert, Jr.
Timothy W. Grover
Barbara L. Hennig
Jefferson P. Hoffer
Jon Kim
Carl Koteff
Frederick D. Larsen
John A. Malter
Helen Mango
J. Gregory and Nancy W. McHone
Alexis P. Nason
William D. Norland
George Springston
Sharon Strassner
Roger and Terry Thompson
David West

Respectfully submitted,
Stephen S. Howe, Chair

VERMONT STATE GEOLOGIST'S REPORT

A bill related to groundwater mapping was passed by the Vermont Senate in March 2007. This bill will still need to be considered by the Vermont House. The following is the text from the bill:

S.92 AN ACT RELATING TO GROUNDWATER MAPPING
It is hereby enacted by the General Assembly of the State of Vermont:
Sec. 1. 10 V.S.A. § 1416 is added to read:
§ 1416. GROUNDWATER MAPPING

(a) In accordance with the requirements of subdivision 1392(a)(4) of this title to identify and map the groundwater resources of the state, the secretary of natural resources shall establish a groundwater mapping program within the office of the state geologist. The groundwater mapping program shall identify public water supply sources and groundwater sources that may serve as future public water supply sources. The office of the state geologist shall also identify areas of interest that require additional mapping, including location of water wells, mapping of surficial geology and bedrock, and, if funds are available, geophysical studies.

(b) Prior to October 15, 2007, the secretary of natural resources shall develop a schedule for mapping the groundwater resources of the state. In developing the schedule for mapping the groundwater resources of the state, the secretary shall give priority to municipalities, watersheds, and other areas subject to development pressure, groundwater supply shortages, groundwater quality issues, or commercial groundwater withdrawal. The secretary shall submit the schedule required by this section to the legislative study committee on groundwater regulation and funding, the senate committee on natural resources and energy, and the house committee on fish, wildlife and water resources.

(c) The secretary of natural resources may adopt rules implementing the requirements of this section.

Sec. 2. AGENCY OF NATURAL RESOURCES GROUNDWATER FUNDING REPORT

(a) On or before October 15, 2007, the agency of natural resources shall report to the senate committee on natural resources and energy and the house committee on fish, wildlife and water resources with a recommendation for funding the groundwater resources of the state as required under sections 1392 and 1416 of Title 10. The report shall include:

(1) A summary of the current groundwater mapping conducted or completed by the agency of natural resources, including use of compiled groundwater data, well driller reports, and other groundwater data.

(2) A summary of the appropriations and personnel currently available to the agency of natural resources for groundwater mapping.

(3) An estimate of the appropriations and personnel necessary to fund the mapping of the groundwater resources of the state as required by sections 1392 and 1416 of Title 10 and a proposal for incorporating such appropriations into the agency of natural resources' annual budget.

(b) Upon completion of the report required by this section, the agency of natural resources shall submit the report to the legislative study committee on groundwater regulation and funding.

Respectfully submitted,
Laurence R. Becker, State Geologist

ANNOUNCEMENTS

VERMONT GEOLOGICAL SOCIETY LECTURER PROGRAM

The goal of the Vermont Geological Society Lecturer Program is to offer local colleges, universities, and high schools the opportunity to invite a member of the VGS to speak at their institution on timely topics within the broad realm of earth and environmental sciences. The program is primarily intended to reach those departments which either do not hold a regularly scheduled seminar series or whose finances do not permit them to invite external speakers to present talks on a regular basis. Any costs associated with the Lecturer's travel, lodging, and meals are borne entirely by the Vermont Geological Society.

Jon Kim, Ph.D., Geologist/Environmental Scientist, at the Vermont Geological Survey in Waterbury, Vermont, is our 2007 Lecturer. Jon is offering the following two lecture topics: "Nitrate Contamination of a Bedrock Aquifer in Central Vermont" and "Application of Tectonics to Groundwater Problems in Vermont." For scheduling information, see the Society's website at *www.uvm.org/vtgeologicalsociety/lecturer_program.html*

VGS SUMMER FIELD TRIP: FROM WOODSTOCK TO QUECHEE GORGE

The summer field trip will be held on Saturday, August 11, 2007. We will meet at 9 AM in the parking lot *west* of Quechee Gorge, on the north side of Route 4. Rest rooms are available at the Visitor Center *east* of the gorge.

Pete Thompson and Dave DeSimone will show us the results of their recent project to characterize aquifers in the town of Woodstock. We will look at well logs and cross sections that show evidence for a confined sand and gravel aquifer in the valleys, and discuss models for recharge to that important resource. Outcrops will be selected to illustrate both the jointing characteristics of the bedrock and the significance of a zone of steeply dipping layers to the geohydrology. Peter will also present evidence for refolded nappes and topping directions across the Standing Pond Volcanics.

The trip will end up at Quechee Gorge in the town of Hartford. If you are interested in camping at Quechee Gorge State Park either Friday or Saturday nights, please e-mail Peter so he can reserve a group area, if there's enough interest. Greg McHone hopes to join the trip to show us a mafic dike in the gorge, and others will be on hand to discuss hypotheses regarding the gorge formation.

STUDENT RESEARCH GRANT APPLICATIONS

Students and secondary school teachers are encouraged to apply to the VGS Research Grant Program by October 1, 2007. Downloadable Research Grant Program applications are available from the Society's website at *www.uvm.org/vtgeologicalsociety/grantpolicy.html*. For those without Internet access, forms may be obtained by writing to Stephen Howe at the Dept. of Earth and Atmospheric Sciences, University at Albany, ES-351, 1400 Washington Avenue, Albany, NY 12222-0001. Tel: (518) 442-5053; e-mail: showe@albany.edu

VERMONT GEOLOGICAL SOCIETY CALENDAR

April 28, 2007:	Spring Meeting, University of Vermont
August 11-12, 2007:	Summer Field Trip
October 14-20, 2007:	Earth Science Week
October 28-31, 2007:	Geological Society of America Annual Meeting

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Saint Albans, VT 05478-1224

ADDRESS CHANGE?
Please send it to the Treasurer at the above address

Vermont Geological Society
Spring Meeting
April 28, 2007, 8:30 AM
Delehanty Hall, Room 219
University of Vermont, Burlington, Vermont

Directions to University of Vermont:

Delehanty Hall is located on the old Trinity College Campus adjacent to the University of Vermont. From I-89, take exit 14 (Main Street–Route 2 exit), and go west (towards the lake) to East Avenue. Turn right on East Avenue and go to the end of East Avenue and proceed straight across Colchester Avenue and into the driveway. Delehanty Hall has a slate exterior and large granite blocks in front of it. Once on the driveway, bear around to the left and the parking lot is in the rear.