



The Champlain Thrust

News from the Department of Geology, UVM

2016-2017



Greetings from the Chair: Greetings from UVM Geology. Another year has passed and the Department is still standing!

Since the publication of last fall's newsletter, the leadership of the College of Arts and Sciences has (once again...) changed. After serving as interim Dean from July 2015 to June 2016, Prof. Williams (Bill) Falls, former Chair of the Department of Psychological Sciences, was appointed Dean of CAS in July 2016. This is great news for us, as even during the transition period after the resignation

of the previous Dean, Bill Falls has demonstrated to be very supportive of our small department. I believe this is the 7th CAS Dean since my arrival to UVM in 1995. Let's just hope that Bill will be at the helm of the college longer than the average three years!

As always, it has been an engaging and successful year for the Department. As you will see in this newsletter, faculty and graduate students have been busily pursuing research and churning out an impressive number of publications. More information on the faculty's many exciting activities can be found on individual's websites. See [Faculty](#) listing (<http://www.uvm.edu/~geology/?Page=faculty/faculty.php&SM=faculty-staffmenu.html>)

But now to some very exciting news: After a 17 year-long hiatus, the annual meeting of the Northeastern Section of the Geological Society of America (NEGSA) will return to Burlington in March 2018. Although it seems like a long time from now, this is a major event for us and preparations have already begun (there have been reports of Char and I frantically running around like headless chickens). There will be many interesting sessions and we anticipate that over 1000 participants will attend the meeting. Many more details will be available in the next newsletter.

Once again Jack has managed to collect all the information needed to put this newsletter together. As usual, not an easy feat! As always, we have Gabriela, Robin and Srebrenka to thank for keeping our small, but buzzing Department running smoothly. There is really never a chance for our support trio to get bored, and without them the place would fall apart pretty quickly!

On the financial side of Chairing, our budget was especially tight this year (but what's new about that?). Every donation helps, so please consider making a donation to support the UVM Geology Department. To donate, simply go to <http://go.uvm.edu/give> and write "Geology Department" and select "Other" or donate directly to the department. If you would like your donation used for a specific purpose, then please indicate. All your donations go directly to students. This really IS a case of "every dollar helps." On behalf of everyone in the Department, "thank you" for all your support!



Vermont State Bedrock map on display in Perkins Geology Museum, Delehanty Hall



Andrea Lini, Associate Professor (Stable isotopes, Limnology and Climate Change): Greetings from the Chair

Greetings from the world of stable isotopes, lake mud, tree rings, and dangerous predators!

Despite the anomalously warm winter, in February and March of this year my graduate student Matthew Kraft and I (with the help of a few fearless undergraduate students) were able to successfully retrieve a series of new sediment cores from St. Albans Bay, VT. We had to be particularly careful because of the unusually thin ice cover and were equipped with all sorts of safety devices including some ominous sounding Pick-of-Life Ice Awls. Fortunately, we did not have to use them!

The main objective of these risky coring expeditions was to expand on the findings of my previous graduate student, Ashliegh Belrose. Ashliegh was able to document the existence of a freshwater wetland that occupied part of St. Albans Bay shortly after the “demise” of the Champlain Sea. This ancient wetland is preserved in the form of a peat layer sandwiched between the Champlain Sea clays and Lake Champlain sediments. This was the first reported occurrence of such a deposit in the area, and allowed us to conclude that between 9,500 and 8,500 years ago her coring location was occupied by a wetland and that water levels must have been at least 8 meters lower than present during the Champlain Sea to Lake Champlain transition (you can download her completed thesis [here](#)).

Matthew is now tasked with providing more evidence for the existence of this paleo-wetland, focusing specifically on the lateral and temporal extent of the St. Albans Bay peat layer. The four new cores (up to ~ 3 m in length) that we were able to collect this past winter, all contain the same peat layer first found by Ashliegh in 2013. Matthew presented his preliminary results (in record time) in March at the annual meeting of the NE Geological Society of America (see [abstract](#)). The next steps include obtaining good age control by radiocarbon dating selected samples of the peat layer and the few individual plant fragment we were able to find in the youngest Champlain Sea sediment. Matthew has spent most of the summer analyzing core samples for a variety of geochemical parameters that will allow us to reconstruct temporal changes in aquatic productivity within the bay, as well as identify time periods when inputs of material washed in from the bay’s watershed were most significant. During the fall, he will focus on the peat layer itself by analyzing microfossil and plant remains. Ultimately, we hope that this ancient wetland deposit will provide us with exciting insights into the dramatic environmental and ecological shifts that must have occurred during the transition from Champlain Sea to Lake Champlain.

On the “non-strictly-geology” research side, there has also been some good progress: The dendro-climatological (i.e., tree rings) work that Shelly Rayback from the Geography Department and I have started several years ago is still going strong. We recently submitted a manuscript to *Plant, Cell & Environment* that aims at understanding the physiological influences of changing climate, rising atmospheric carbon dioxide and acid deposition on trees in mid-latitude forests. Being able to assess forest vulnerability to environmental change is critical, given the role that forests play in the climate system.

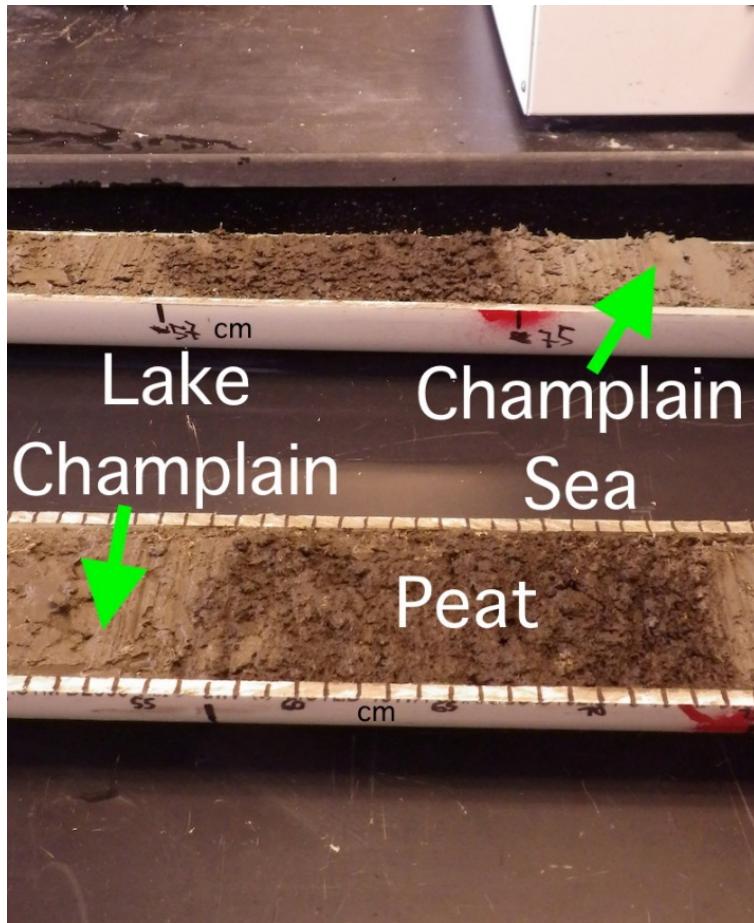
A couple of newsletters ago (time sure flies!) I mentioned a study in collaboration with colleagues from the UVM Rubenstein School of Environment and Natural Resources that involved analyzing the isotopic composition of hair from Mongolian wolves, along with various plants and other mammals from a Semi-Desert Region of Mongolia. The data have finally seen the light in the Mongolian Journal of Biological Sciences.

Not too long ago I was approached by a PhD student from the UVM Plant Biology Department who asked me if I would be interested in analyzing well-preserved fossilized leaf samples from the Triassic of New Mexico. Of course I couldn't say no! Preliminary results of his study were just presented at the annual GSA meeting in Denver (see [abstract](#)).

As you can see, there's no risk of ever getting bored in the lake and isotope labs!!



Matthew resting after all the hard work!



Peat layer sandwiched between Champlain Sea and Lake Champlain sediments in one of the St Albans Bay cores.



Paul Bierman, Professor, (Geomorphology, Geohydrology, Isotope Geology Applied to Landscape Change): It's been a busy last two years working on papers for publication. We've barely made a dent in the backlog of lab data with 14 papers published in 2015 and 9 papers in 2016 with 4 more accepted or in press. They range pretty much around the world with several from Greenland, two from New England, a couple from Australia, and even some laboratory methods. We even published data gathered back in 1995 from Baffin Island.

Family is doing well. Christine still runs summer science programs. Marika is a junior in High School and shoots biathlon (she competed in Alaska last year) while Quincy is in her last year of Middle School and running cross country and skiing like crazy.

I haven't been able to do any fieldwork this year and missed GSA for the first time since 1988 due to old age (well, torn hip tendon and ligaments) so doing lot of physical therapy to get strong and fieldworthy again!

Some recent publications:

Sosa., V., Bierman, P. R., Nichols, K. K., Rood, D. H. (2016) Long-term erosion rates of Panamanian drainage basins determined using in situ ^{10}Be . *Geomorphology*. Volume 275, p. 1–15. doi:10.1016/j.geomorph.2016.04.025

Sosa., V., Bierman, P. R., Fernandes, N. F., Rood, D. H. (2016) Denudation rates of Brazilian watersheds constrained with cosmogenic ^{10}Be . *Geomorphology*. v. 268, Pp. 54–63, doi:10.1016/j.geomorph.2016.05.024

Wohl, E., Bierman, P. R., Montgomery, D. R. (2016) Earth's Dynamic Surface: The Past 50 Years in Geomorphology, chapter of Geological Society of America Special Paper. 10.1130/2016.2523(01) GSA Special Papers, v. 523,

Corbett, L., Bierman, P. R., Davis, P.T. (2016) Glacial history and landscape evolution of southern Cumberland Peninsula, Baffin Island, Canada, constrained by cosmogenic ^{10}Be and ^{26}Al . *Geological Society of America Bulletin*.

Corbett, L., Bierman, P. R., Rood, D. H. (2016) Constraining multi-stage exposure-burial scenarios for boulders preserved beneath cold-based glacial ice in Thule, Northwest Greenland. *Earth and Planetary Science Letters*. v. 440, p. 147–157. doi:10.1016/j.epsl.2016.02.004

Corbett, L. B., Bierman, P. R., Rood, D. H. (2016) An approach for optimizing in situ cosmogenic ^{10}Be sample preparation, *Quaternary Geochronology*. v.33., 24-34. <http://dx.doi.org/10.1016/j.quageo.2016.02.001>

Portenga, E. W., Rood, D. H., Bishop, P. and Bierman, P. R. (2016) Isotopic evidence for a mid-Holocene landscape response to Aboriginal burning in southeastern Australia. *Geology*. doi:10.1130/G37257.1

[download pdf](#)

[see press release](#)

[NBC news story](#)

McPhillips, D., Hoke, G. D., Liu-Zeng, J., Bierman, P. R., Rood, D. H. Niedermann, S. (2016) Incision of the Yangtze River Gorge at the First Bend determined by three-nuclide burial dating. *Geophysical Research Letters*. 10.1002/2015GL066780

Bender, A. M., Amos, C. B., Bierman, P.R., Rood, D. H., Staisch, L., Kelsey, H., Sherrod, B. (2016) Differential uplift and incision of the Yakima River terraces. *Journal of Geophysical Research, Solid Earth*. 10.1002/2015JB012303

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Marika competing at biathlon in Alaska and Quincy running XC in Shelburne



The whole family on skis in Alaska



John M. Hughes, Professor (Mineralogy, Crystallography, Crystal Chemistry): Each year at this time Jack Drake asks us to summarize our past year, which is a time to reflect; many thanks to Jack for this effort!

It has been a busy and productive year. Lots of invited talks and lots of travel. Last year I took over as Graduate Coordinator for Laura Webb, who was on a well-deserved sabbatical, so my teaching obligations changed slightly. My new course in crystal chemistry continues to be a joy to teach, and the students are very responsive. I also had the strange feeling of completing my last grant from the National Science Foundation, which has generously supported my research with students throughout my career; sincere thanks to the Foundation. Some of the results of that grant are listed below in 2016 papers.

It has been a wonderful year personally. Susan and I are well, and enjoy our grandchildren at every opportunity. We spent a delightful week with them at our SC home, logging lots of beach time at Folly Beach. But the big news is that our daughter was married on September 24 to Adam Behrmann, who grew up in Stellenbosch, South Africa but now lives in the Bay Area. At the time of this writing the wedding is three weeks away, and hopefully by press time I will be able to provide a wedding picture! For now, the attached picture will have to do.

If any alums are in the area, please stop by to introduce yourself; I enjoy meeting UVM Geology alumni.



John and Susan at daughter Rebecca's wedding, Tomales Bay, CA

Best to everyone,
John

Publications

Tansman, G.F., Kindstedt, P.S., and Hughes, J.M. (Accepted) Minerals in food: Crystal structures of ikaite and struvite from bacterial smears on washed-rind cheese. *Canadian Mineralogist*.

Kampf, A.R., Hughes, J.M., Nash, B.P. and Marty, J. (In Press) Kegginite, $Pb_3Ca_3[AsV_{12}O_{40}(VO)] \cdot 20H_2O$, a new mineral with an ϵ -isomer of the Keggin anion. *American Mineralogist*.

Hughes, J.M., and Kampf, A.R. (In Press) Who's who in minerals: John Francis Rakovan. *Rocks and Minerals*.

Hughes, J.M., Harlov, D., Kelly, S.R., Rakovan, J., and Wilke, M. (2016) Solid solution in the apatite OH-Cl binary system: compositional dependence of solid solution mechanisms in calcium phosphate apatites along the Cl-OH binary. *American Mineralogist*, 101, 1783-1791.

Kampf, A.R., Hughes, J.M., Nash, B.P., and Marty, J. (In Press, Frank C. Hawthorne Volume) Vanarsite, packratite, morrisonite, and gatewayite: four new minerals containing the $[As^{3+}V^{4+,5+}_{12}As^{5+}_6O_{51}]$ heteropolyanion, a novel polyoxometalate cluster (invited paper). *Canadian Mineralogist*.

Kampf, A.R., Nash, B.P., Marty, J., and Hughes, J.M. (In Press) Mesaite, $CaMn^{2+}_5(V_2O_7)_3 \cdot 12H_2O$, a new vanadate mineral from the Packrat mine, near Gateway, Mesa County, Colorado, USA. *Mineralogical Magazine*.

Kampf, A.R., Hughes, J.M., Nash, B.P., Marty, J., Cooper, M.A., Hawthorne, F.C., Karpenko, V.Y., Pautov, L.A., and Agakhanov, A.A. (In Press) Revision of the formulas of wernerbaurite and schindlerite: Ammonium- rather than hydronium-bearing decavanadate minerals. *Canadian Mineralogist*.



Keith Klepeis, Professor, Structural Geology, Tectonics & Field Geology:

Greetings, This past year has been a very enjoyable one for me. It represents the 16th consecutive year I've supervised student research projects on geological problems in Vermont with colleagues at UVM and the Vermont Geological Survey (VGS). This year seemed as busy as ever on that front.

Undergraduate **Michael Chirigos** (class of 2016) presented the results of his Senior research project at Northeast GSA in Albany, New York. Mike studied structures in the foot wall of the Champlain Thrust at a previously unstudied exposure of the fault in Shelburne. To top it off, he also won the best undergraduate poster at the meeting! Three of my other students, **Eleanor Johnson**, **Will Klein**, and **Sara Lott**, also completed their Senior research projects on the evolution and origin of different fracture sets in the Champlain Valley. Together they did a superb job and made some great headway on Structural Geology research in Vermont.

My research in New Zealand also has been going well. Graduate students **John Gilbert** and **Hannah Blatchford** did a great job looking at the kinematic evolution of ductile and brittle fault zones in Fiordland National Park. Hannah finished her MS thesis in August (2016) and, a few weeks later, started a PhD program at the University of Minnesota. John also is doing a fine job and ready to set a defense date in a week or so. **Carson Mitchell**, one of our Seniors, worked closely with Hannah and John on some newly discovered pseudotachylite exposures. These exposures tell a story of ancient earthquakes and are promising to change our view of how transform plate boundaries form. Back in Vermont, my new graduate student, **Matthew Merson**, just joined our Department and already is making great progress on choosing a topic for his research. I'm also happy to report that one of my former graduate students, **Jeff Webber**, just began a job as an Assistant Professor at Stockton University in New Jersey. The job is field-oriented, which is perfect for Jeff! With all this interest in doing field geology, it's been a great year for geological research in Vermont.

I hope all of you are doing well. With best wishes,
Keith

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Publications

Chirigos, M., Kim, J., Klepeis, K.A., and Van Hoesen, 2016, Using photogrammetry to analyze structures in a tectonic sliver in the foot wall of the Champlain thrust, Shelburne, Vermont, NE GSA, Albany. Geological Society of America *Abstracts with Programs*. Vol. 48, No. 2, doi: 10.1130/abs/2016NE-272366.

Chirigos, M.; Kim, J.; Klepeis, K., and Van Hoesen, J. 2016, Using Photogrammetry to Analyze Structures in a Tectonic Sliver in the Foot Wall of the Champlain Thrust, Shelburne, Vermont II, Vermont Geological Survey Open File VG16-1.

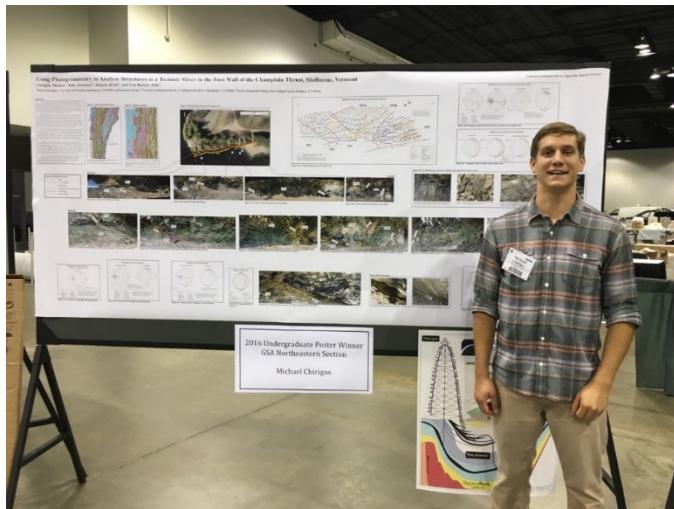
Johnson E., and Lott, S., 2016, Fracture Patterns within the Monkton and Clarendon Springs Formations and their Origins, UVM Student Research Conference, April 28, 2016,Davicenter ,http://www.uvm.edu/~uvmsrc/?Page=archive/2016/presentation.php&SM=archive_archive.html&pkNetidStudent=ejohns21.

Blatchford, H.J., Gilbert, J.B., Klepeis, K.A., Schwartz, J.J., Turnbull, R.E., Jongens, R., and Stowell, H.H., 2015, Oblique intra-arc convergence and transpression accompanying high-flux magmatism in the mid-lower crust of a Mesozoic continental arc in Fiordland, New Zealand, Geological Society of America *Abstracts with Programs*. Vol. 47, No. 7, p.767.

Miranda, E. and K. Klepeis, 2016, The interplay and effects of deformation and melt on the rheology of the lower continental crust, Fiordland, New Zealand, *J. of Structural Geology*, (in press).

Betka, P., Klepeis, K., and Mosher, S., 2016, Fault kinematics of the Magallanes-Fagnano fault system, southern Chile; an example of diffuse strain and sinistral transtension along a continental transform margin, *J. of Structural Geology*, v. 85, p. 130-153, doi:10.1016/j.jsg.2016.02.001.

Klepeis, Keith, A., Joshua Schwartz, Harold Stowell and Andrew Tulloch, 2016, Three-dimensional structure of the lower crust and the evolution of vertical and horizontal mass transfer processes at the root of the Fiordland magmatic arc, New Zealand, *Lithosphere*, L490, doi:10.1130/L490.1.



Michael Chirigos, the 2016 Undergraduate Poster winner at GSA's Northeastern Section, presents his award-winning poster at the national meeting in Denver in October 2016.



Graduate students Hannah Blatchford and John Gilbert present a poster showing the results of their New Zealand research at a national meeting of the Geological Society of America.
Photo by Keith Klepeis.



Keith Klepeis co-leads a field trip for the New York State Geological Association with Jon Kim, which included a stop to view the Champlain Thrust at Lone Rock Point.



Laura Webb and graduate student Sam Lagor explain the geology of the Champlain Thrust at Lone Rock Point for participants in a *Earthscope* workshop in Vermont.
Photo by Keith Klepeis.



Char Mehrtens, Professor (Stratigraphy, Sedimentation, Carbonate Petrology): Annual greetings! I'm fresh back from GSA Denver and seeing UVM alums. Laura Cuccio (B.S. 2016) was the most recent of those, with a poster on her first summer of field work on her M.S. at Utah State. Emily Siegel (B.S. 2012) and I caught up and chatted over her work in the Denver area with energy companies, including the latest ones that do borehole/well casing integrity work. Also working in the oil patch is Ron Parker (M.S. 1986), who started up his own business doing borehole imaging for drilling companies.

Maurice (Mo) Colpron (M.S. 1990) is now running the entire bedrock geology program for the Yukon Geological Survey. Paul Myrow (M.S. 1983) is still doing both great music and great science at Colorado College. Marianne Warren (M.S. 1990) is coming through town next week to show a colleague some of the local "greatest hits" outcrops. I'll walk them through the Salmon Hole and Redstone outcrops while Marianne digs out her old camp Stanley field notes for "Crash Bridge" and other stops.

Closer to home, I'm still enjoying teaching Strat/Sed and my "How the Earth Works" class. The last of the papers with Barb Tewksbury (Hamilton College) and I on the structural evolution of the Cretaceous-Eocene stratigraphy of Egypt is in press in a volume on the geology of northern Africa. My part of the paper incorporates much of the work from Steven Gohlke's (2014) M.S. Thesis. Steven's working in the "oil patch" in Houston.

Laura Webb and I are co-advising grad student Henry McGuire on a project that will (I hope) finally move my years of work on the Monkton towards a conclusion. Henry will be trying to obtain detrital zircon ages for the Monkton as well as complete an outcrop-based gamma ray log for this unit, to better identify cycles. Both data should help us with correlations to the Cambrian sequence in New York.

In a fit of madness, Andrea and I agreed to co-Chair the 2018 Northeast GSA meeting here in Burlington. I look at it as throwing a complicated wedding for 1000+ people, some of whom you know pretty well and others you've never seen before. Wish us luck on this one. At least after it's over I have an excuse to go on another vacation trip that summer.

Speaking of trips, there were no major jaunts this year besides my annual spring break visit to Jack and Ruthie Drake out in California. They tolerate my crashing in their cottage and indulge my need to golf and eat good Mexican food. I spent another summer at my cottage in the Adirondacks. Summers seem to get shorter and shorter.

Please keep sending news of your activities. It is ALWAYS great to hear from everyone.

Publications

Mehrtens, Charlotte J., Webb, Laura E., Harrington, SusanMarie, DeSanto, Dan, Berman, Elizabeth, 2016, Writing and Information Literacy in the Geosciences: A Pilot Project to Improve Student Understanding and Communication, *Geol. Soc. Am Abstr with Prog.*

Tewksbury, Barbara J., Tarabees, Elhamy A., Hanafy, Mahmoud I., Mehrtens, Charlotte J., and Kenneth Christle 2016, Origin of an extensive network of enigmatic synclines in Eocene limestone of the Western Desert, Egypt. *Geol. Soc. Am Abstr with Prog.*

Tewksbury, B., E. Tarabees, C.J. Mehrtens, 2016, Is hypogene karst a plausible model for formation of extensively developed non-tectonic synclines in Eocene limestone of the Western Desert, Egypt? Extended Abstr. with Progr. Deep Karst Symposium



With Ron Parker and Paul Myrow unwinding at Denver G.S.A. 2016



Laura Webb, Assistant Professor (Igneous petrology and Geochronology)
Hello alumni and friends of UVM Geology,

Another busy year has come and gone. Over that time, we (myself, graduate students Cheyne Aiken and Evan Tam, and undergraduate Beth Pidgeon) have ramped up new research in Vermont on the exhumation of blueschists and eclogites in the Tillotson Peak complex and the possible role of the Prospect Rock thrust in that subduction-exhumation saga. In spring, 2016, Sam Lagor completed his MS thesis entitled “The Relationship Between Magmatism and Deformation During the Acadian Orogeny: A Case Study from Eastern-Central Vermont”. A common theme in all of these projects is building on the excellent foundation of mapping and field-based studies of Vermont geology with integrated geochronology and microstructural analyses to better constrain the absolute timing of events and rates of processes.

On a personal note, I continue to be grateful for living and working in such a wonderful place. And, after eight years in Vermont, I’ve finally found my way to enjoy some time on the all the beautiful waterways in our region. I bought a paddle board this summer and have a new hobby. It’s also proven to be a new way to approach otherwise inaccessible outcrops. I enjoyed a great day in August with my close friend and fellow geologist, Suzanne Baldwin from Syracuse University, when we paddled from North Beach to the Champlain Thrust at Lone Rock Point. I’m pretty sure I could wield a geologic compass while on my board to measure strikes and dips, but taking oriented samples may prove to be more challenging!

Best regards,
Laura

Selected publications/conference presentations:

Mehrtens, C., **Webb, L.E.**, Harrington, S., Desanto, D., and Berman, E., 2016. Writing and Information Literacy in The Geosciences: A Pilot Project to Improve Student Understanding and Communication, Geological Society of America Abstracts with Programs. Vol. 48, No. 7, doi: 10.1130/abs/2016AM-277481.

Tsai, C.-H., Liu, C., **Webb, L.**, and Keyser, W., 2016, New P-T and Geochronological Constraints on High-Pressure Garnet-Bearing Paragonite-Epidote Amphibolite in the Yuli Belt, Eastern Taiwan. Goldschmidt Conference, Yokohama, Japan.



Cheyne Aiken, Evan Tam, and Beth Pidgeon enjoying lunch on Prospect Rock during fieldwork in July, 2016, with views of the Lamoille River in the background.



Fall 2015 GEOL161 Field Methods in Geophysics Class with Jon Kim from the Vermont Geological Survey at the classic Champlain Thrust outcrop at Lone Rock Point.



Laura Webb “mushing” at the Ice Park in Fairbanks, Alaska. Visiting the Ice Park was a group outing for the NSF EarthScope Steering Committee that held its biannual meeting at the University of Alaska, Fairbanks in March 2016



Stephen Wright, Senior Lecturer (Glacial geology, Geomorphology, Environmental Geology): I spent most of the summer mapping the surficial geology of Weathersfield, a town which borders the Connecticut River immediately south of Mount Ascutney (~20 miles south of White River Junction). During the first part of the field season I supervised four UVM students, both geology and environmental science majors, who were learning how to map surficial materials. We set up camp at Wilgis State Park along the Connecticut River and took advantage of the river after several of our hot days in the field. This was the first field season where I've relied entirely upon our phones for recording our location and field observations. The UVM Spatial Analysis Lab has a site license to the Fulcrum mapping app. I was able to design a mapping app specific to our project that provided the framework for recording our field observations. As we worked our observations were saved to the “cloud” enabling any one of us to see where everyone else had been and recorded observations. It was also reassuring knowing that these observations were being stored as we worked, meaning that a lost or malfunctioning phone was not going to mean a loss of data.

We also had the opportunity to spend a day running Ground Penetrating Radar (GPR) transects across the broad valley occupied by the North Branch of the Black River. Ground penetrating radar, as the name implies, directs radar into the ground and records reflections from materials with different dielectric properties, which usually corresponds to bedding. The hope here is to

see large-scale sedimentary structures occurring in the modern alluvium and hopefully a buried esker and glacial outwash below the alluvium.

The students will work this fall creating maps and cross-sections of their field area and interpreting the geologic history of this area which they will present as posters at the NEGSA meeting in Pittsburgh this coming March.

As of this writing it appears that the Regional Geology class will be absent from the Geology Department curriculum for yet another year. As I haven't been to Colorado since that last regional trip in 2012, I treated myself to 2 weeks of hiking/exploring there in early August, always on the lookout for other areas to bring students in future years. It was lovely to be out west again and to get a few of those amazing above-tree-line vistas. Please stop by if you're in the area and I look forward to seeing a few of you at the NEGSA meeting in Pittsburgh this coming spring and perhaps on an NEIGC field trip in October.

was lovely to be out west again and to get a few of those amazing above-tree-line vistas. Please stop by if you're in the area and I look forward to seeing a few of you at the NEGSA meeting in Pittsburgh this coming spring and perhaps on an NEIGC field trip in October.

Email: Stephen.Wright@uvm.edu

Publication

Wright, S.F., 2015, Late Wisconsinan ice sheet flow across northern and central Vermont, USA; Quaternary Science Reviews, 129: 216–228.



Mitch Miers pulls a Ground Penetrating Radar (GPR) rig on a sled across a recently hayed meadow at the base of Little Ascutney Mountain on a hot day in early July. Will Vincett uses a GPS meter to record the location of the transect while Steve Arcone (CRREL) follows with the device recording the survey



**Probing “soils” within a shallow swale along the base
of Little Ascutney Mountain.**



UVM students Mitch Miers and Stephen Maglio negotiating a wetland crossing while mapping part of the Black River Valley this last summer

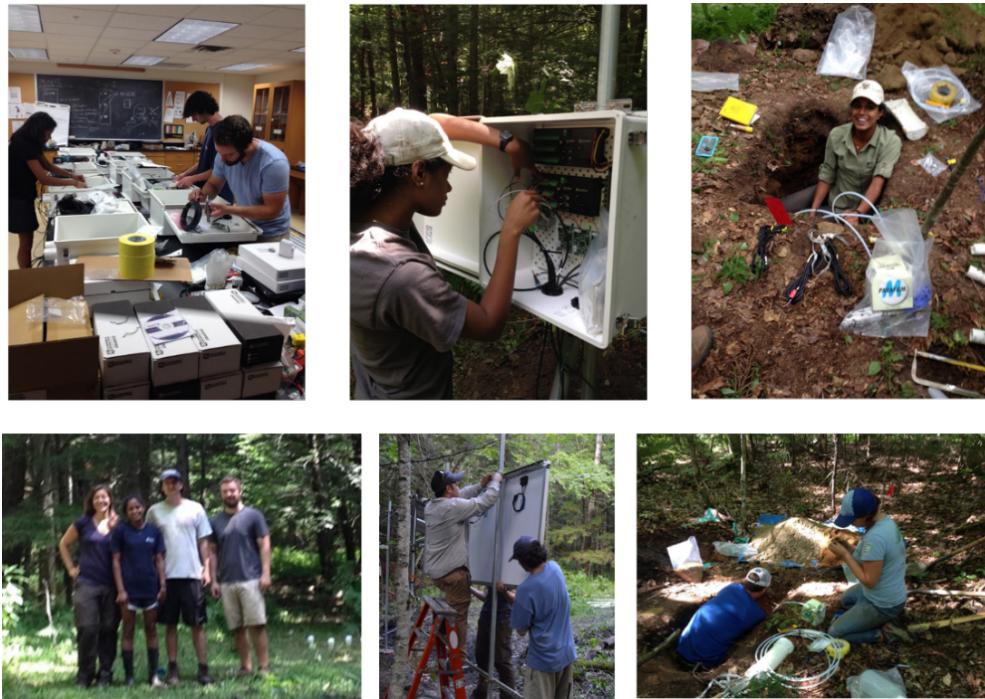


Julia Perdrial, Assistant Professor (Geochemistry): This has been another fun and busy year: Alyson, a MS student working with me on the Mad River corridor just defended her thesis “*Using aqueous soil extracts to study organic matter leaching from soils of different river corridor land cover in Vermont*” and is handing in her final revisions as we speak. We’ll be finishing up a publication featuring her exciting results in the next couple of weeks.

While Alyson was finishing up, two more MS students joined my group, Malayika and Jesse, who will be working in two forested catchments here in Vermont. One of the catchments is called Sleepers River, a USGS research station, where Malayika and undergraduate researchers Jack, Ben and Tyler already worked this summer. The other field site is close to Wade Brook where all of us installed a lot of instrumentation for the newly funded EPSCoR project. These installations kept us busy for a while and would not have been possible without Malayika, Ben, Jack and faculty of the EPSCoR team!

I also had a busy summer traveling: first I joined the Luquillo Critical Zone Observatory (LCZO) all hands meeting in Puerto Rico and marvelled at the wonderful jungle nature. Being interested in how streams link long term carbon stores (forested mountain soils and oceans), I was excited to see this connection in very close proximity.

Another trip was to the Goldschmidt Conference in Yokohama where I chaired a session, gave a talk and led an Early Career meeting (first time in Japan!!).



Top: Malayika, Ben and Jack prepare logger casings (left). Malayika wires the oxygen sensors in (center) and installs soil solution samplers (right). **Bottom:** Julia, Malayika, Jack and Ben in the field (left). Nate, Jack and Ben fix a solar panel (center) to supply power to the sensors. Andy and Farrah install soil moisture sensors (right).



Left: View from a beach near Luquillo to the mountains where the stream originates. Right: a black water stream enters the ocean.

Recent papers:

Li, L., Maher, K., Navarre-Sitchler, A., Druhan, J., Meile, C., Lawrence, C., Moore, J., **Perdrial, J.N.**, Sullivan, P., Thompson, A., Jin, L., Bolton, E.W., Brantley, S., Dietrich, W., Mayer, K.U., Steefel, C.I., Valocchi, A., Zachara, J., Kocar, B., McIntosh, J., *Bao, Ch., Tutolo, B.M.*, Beisman, J., Kumar, M., Sonnenthal, E. (2016). Expanding the Role of Reactive Transport Models in Earth Surface Processes. *Earth Science Reviews*. In press

Caulk, R. A., E. Ghazanfari, **J. N. Perdrial** and N. Perdrial (2016). "Experimental investigation of fracture aperture and permeability change within Enhanced Geothermal Systems." *Geothermics* 62: 12-21

.Vázquez-Ortega, A., D. Huckle, **J. Perdrial**, M. K. Amistadi, M. Durcik, C. Rasmussen, J. McIntosh and J. Chorover (2016). "Solid-phase redistribution of rare earth elements in hillslope pedons subjected to different hydrologic fluxes." *Chemical Geology* 426: 1-18.

J.N. Perdrial, Thompson AA, Chorover J (2015) Soil Geochemistry in the Critical Zone: Influence on Atmosphere, Surface- and Groundwater Composition. In: Giardino JR & Houser C (eds) *Principles and Dynamics of the Critical Zone. Developments in Earth Surface Processes*. Elsevier. p 173-201

Stielstra C, Brooks PD, Lohse KA, McIntosh JM, Chorover J, Barron-Gafford G, **J.N. Perdrial**, Barnard HR, Litvak M (2015) Climatic, Landscape, and Edaphic Controls on Soil Carbon Fluxes in Seasonally Snow Covered Forest Ecosystems. *Biogeochemistry* 123: 447-465

Recent conferences:

Perdrial, J.N., (2016). Investigating controls on stream water carbon dynamics in varied climates: Luquillo as endmember of a CZO climosequence ? Luquillo CZO All hands meeting, June 06-08, Luquillo, PR

Perdrial, J.N., Hampsch, A., Adair, C., (2016). Bioavailability of Carbon of a Vermont River Corridor is a Function of Landcover. Goldschmidt Conference, June 26 – July 1, Yokohama, Japan. *Talk*.

Landsmann-Gerjoy, M., **Perdrial, J.N.** (2016). Does Dissolved Organic Matter Interaction with Clay Minerals affect C Bioavailability? UVM Student Research Conference, April 28, Burlington, VT.

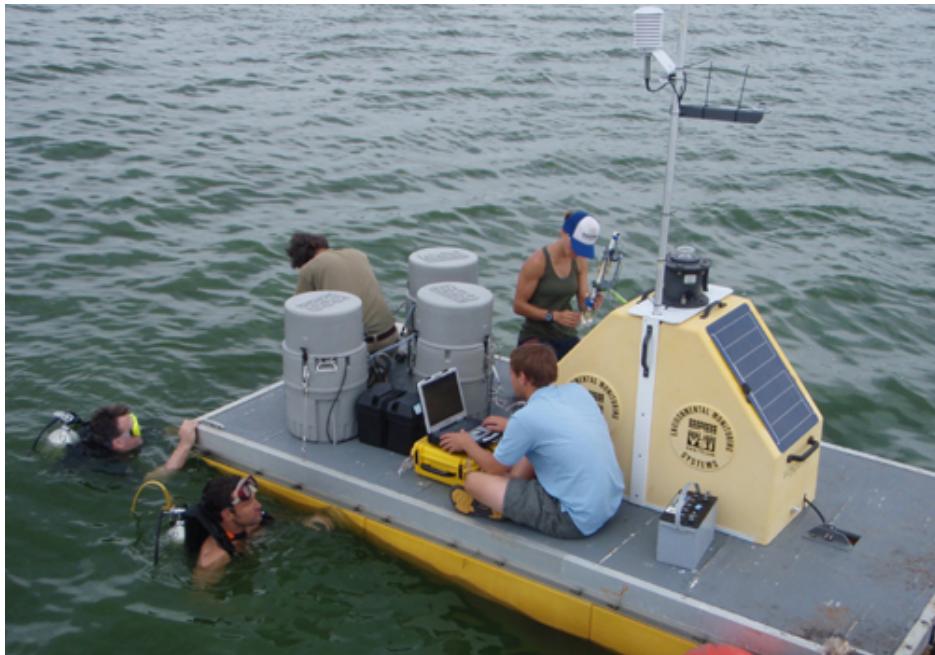
Evans, I., Hampsch, A., Cincotta, M., **Perdrial, J.N.** (2016). Does sample preparation impact carbon absorbance and fluorescence properties of soil leachate? Vermont Geological Survey Student Conference, April 30, Middlebury, VT.

Email: Julia.perdrial@uvm.edu



Andrew Schroth, Research Assistant Professor (Low Temperature Geochemistry, Limnology and Oceanography) It has been an exciting year for my research group. My first Geology MS student, Braden Rosenberg, graduated this past spring. The first chapter of his thesis was reviewed in *Biogeochemistry*, and we are currently addressing those reviews. I envision that his paper will be published in that outlet before the new year. New MS student, Meg Leduc (Lyndon State '16) joined the group this past summer (after interning the previous summer) and is working on developing a new method for examining phosphorus reactivity in sediments. She will use this method to examine biogeochemical and physical drivers of P composition in sediments near the sediment-water interface of Missisquoi and Saint Albans Bays of Lake Champlain. I am also currently advising Austin Wilkes' honors thesis, which examines how regional leaf fall during the autumn influences the chemistry of iron and carbon in local streams. We have received 2 large NSF grants this year. One stems from NSF EPSCoR with many collaborators across UVM and other institutions in the state (including Julia Perdrial from our department!). This grant will focus on understanding how extreme weather events impact water quality across the Lake Champlain Basin system, and what components of the system either promote or suppress the resiliency of water quality during and after such events. Myself and former UVM faculty member, Greg Druschel, received a grant from EARS-Suschem within NSF to continue to study the interaction of iron and phosphorus in sediment-water systems, some of which will be directly related to Meg's thesis work. My first PhD student from RSENR, Peter Isles, graduated this past spring and is now a post doc at Umea University in Sweden. Group research studying iron dynamics in the Gulf of Alaska and its watershed is ongoing, with papers currently submitted to *Global Biogeochemical Cycles* and *Geophysical Research Letters*. I am also particularly excited about a new research direction which focuses on the behavior of iron and phosphorus in lakes under ice cover. I recently published a paper in *Environmental Science and Technology* on this subject, and a follow-up

paper first authored by former post doc Dongjoo Joung is under review in *Limnology and Oceanography*. I am always keen to chat with alumni on the phone or in person, so please reach out if you are in the area. Best, Andrew



Missisquoi Bay Microbiological Sampling Platform



Nico Perdrial: “I am a true Vermonter!”. This is what our son, Niilo, 7, told me this morning when I ask him if he would get cold going to school in shorts. These few words illustrate well the family’s integration. It’s been a warm winter and a hot summer (and it will keep on going) which helps adjusting to the weather. Our family went to many hikes (our favorite remains Camel’s Hump), me and Niilo started skiing while Julia snowboards and we spend numerous evenings by the lake over the summer. I love being able to lock my office at 5, hop into the car and chill out on the beach during the summer. I continue working on the behavior of radionuclides in soils through my collaboration with the University of Arizona, university of California (Merced), Pacific Northwest Natl Laboratory and Lawrence Berkeley Natl Lab. I also develop new collaborations with researchers all over the US and in Europe. For example I am doing new research on the adaptation of streams to climate change in Puerto Rico (see the image). I also am working closely with colleagues at Kent State U (Ohio) and U of Georgia on the deciphering of nanoscale soil sorption processes which allowed my finishing MS student (Jenny Bower) to visit the

Advance Photon Source synchrotron in Chicago. Currently I am fostering a collaboration with researchers from the universite de Grenoble (France) to look at atomic scale modification of minerals in the environment. I published one paper and have 3 papers submitted for 2016. I also have 4 papers that are expected to be submitted by December. Most of these papers are authored by students. I welcome Gant Reeder, a new MS student in my group who will expand the work of My current MS student Jenny Bower who investigate the mobility and speciation of legacy lead in Burlington soils. Grant will in particular investigate the effects of competitive sorption in soil contaminant speciation. Several undergraduate are working in the lab this year (Garrett Hazebrouck, Amy Lewis, Katelyn Czyzyck) which provides a great ambiance. In addition to the continued teaching of Environmental Geology (GEOL055), Geocomputing (GEOL195) and Introduction to Environmental Science (ENSC001) I started teaching Earth System Science (GEOL001) this fall. On the side I also taught a shortcourse on GIS to many of the geology faculty and grad students this semester. Check out the new logo design of my group below.
Email: Nicolas.Perdrial@uvm.edu
Website: <http://nicolasperdrial.weebly.com/>

Publications:

Caulk R., Ghazanfari E., Perdrial J. and **Perdrial N.** (2016) - Experimental investigation of fracture aperture and permeability change within Enhanced Geothermal Systems. *Geothermics*, 62.

Perdrial N., Thompson A. LaSharr K.**, Amistadi M.K. and Chorover J. (2015) - Quantifying particulate and colloidal release of radionuclides in waste-weathered Hanford sediments. *Journal of Environmental Quality*, 44, 945-952.

Clark K.-E., Shanley J.B., Scholl M.A., **Perdrial N.**, Perdrial J.N., Plante A.F. and

McDowell W.H. (Submitted)- Tropical river suspended sediment and solute dynamics in storms during an extreme drought. For submission to: *Biogeochemistry*.

Greene S.*, Bierman P. and **Perdrial N.** (Submitted) - Towards a better understanding of Beryllium-10 and Beryllium-9 dynamics in river sediments. *Geochimica et Cosmochimica Acta*.

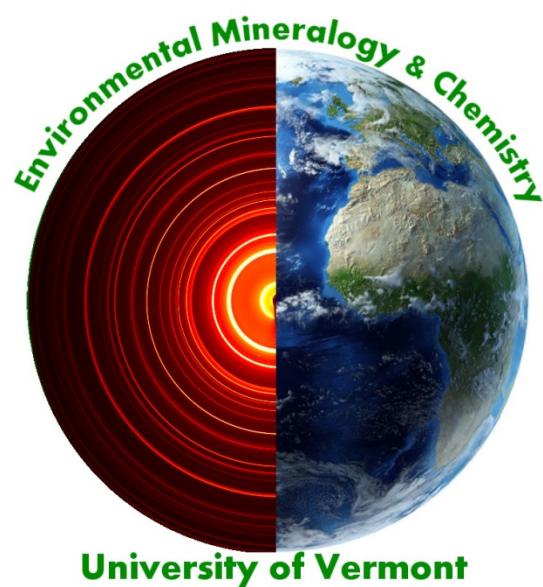
Singleton A., Schmidt A., Bierman P., Rood D., Neilson T., Greene S.,* Bower J.* and **Perdrial N.** (Submitted) - Effects of Grain Size and Mineralogy on the Distribution of the Fallout Radionuclides 7Be, 10Be, 137Cs, and 210Pb in River Sediment. For submission to: *Geochimica et Cosmochimica Acta*

Bower J. and **Perdrial N.** (2015) - Impacts of competitive sorption processes on Pb bioavailability in urban soils. *GSA annual Meeting*, Baltimore, MA, USA.

Greene S., Bierman P. and **Perdrial N.** (2015) - Comparing meteoric 10Be, in situ 10Be and native 9Be across three watersheds. *GSA annual Meeting*, Baltimore, MA, USA.



Top: A very cool desquamation in Puerto Rico
Bottom: The new Environmental Mineralogy and Chemistry logo



STAFF



Robin Hopps, Office Administrator: The UVM Geology Department continues to be a great place to work because of our outstanding students, faculty and staff. This semester the Department has 44 majors, 10 graduate students, and 1 PhD student through the Rubenstein School. Visit us in Delehanty Building and see the Perkins Museum of Geology too.

I enjoy my ten-month position in the office, where I'm updating the department website to comply with the University's new format. We are fortunate to have excellent workstudy students serve as [Perkins Geology Museum](#) Assistants; we have a few new exhibits, some enhanced, and a few inchoate. I also enjoy being out of the office from mid-June to mid-August for my landscaping business. I planted loads of perennial plants this season, plus had a great visit to Maine's Bates-Morse Mountain Conservation Area while staying at the Morse Mt house called *Neph*. Adjacent to Popham Beach, Seawall Beach, with its salt marshes, beach and coastal uplands, is one of the few remaining classic barrier beaches on the Atlantic Coastal Plain. Lastly, due to car trouble, we canceled our camping trip and had a stay-cation in Addison County, VT, which was not a bad default.

Please stay in touch by sending an email to geology@uvm.edu, or to john.drake@uvm.edu. We are accepting images of geologic features, and field and lab work for the department's new website. Please send to: Robin, robin.hopps@uvm.edu

Gabriela Mora-Klepeis, Senior Research Technician: Greetings everyone! It has been another busy year here in the Geology Department. It is hard to believe that we moved from Perkins to



Delehanty Hall 12 years ago. Our great facilities attract a lot of visitors all year round. Last year I was able to attend the Geological Society of America annual meeting in Baltimore. I really appreciate the generosity of the Dean's office (College of Arts & Sciences) for their assistance that covered part of my expenses. It was nice to see former students at the meeting. In addition to my general duties I still am the College of Arts & Sciences representative in Staff Council. We had a great summer and that allowed me to enjoy the outdoors since May! One of my favorite activities is doing a boot camp class outdoors on

Wednesday evenings. That outdoor training helped me prepare for running the third leg of the Burlington marathon (on Battery street). In addition, I completed my fourth triathlon in late July finishing in third place in my category. The best part was being able to celebrate the completion of the triathlon with Jack and Ruth at their Grand Isle cabin. In August I had the opportunity to be in Washington, D.C. for a couple of days. It was great to explore the National Monuments and the Smithsonian- the natural history museum of course! Even though it has been another busy year, I always have time to show you our building, so please stop by, I'll be happy to give you a tour!

Email: Gmora@uvm.edu

<http://www.uvm.edu/~geology/?Page=faculty/moraklepeis.php>



As close as we could get!!!!



The meteorite exhibit at the Smithsonian is spectacular!



Srebrenka Mrsic: Administrative Coordinator: I have worked in the Geology Department since May 16th, 2008 and been in the US since 1997. After these 8 full years at UVM I can tell that I am still very happy to be here especially in this department. It's a real pleasure to work with every single person in the Department, all the faculty, students and staff. I am so proud to share last year's Graduate Student Senate (GSS) award with my coworker and a really good friend Robin Hopps as the "Ida Russian Support Person of the Year 2014-2015." I am proud to be a part of the Geology team!

Srebrenka

Email: [srebrenka.mrsic @uvm.edu](mailto:srebrenka.mrsic@uvm.edu)



Dan Jones, Research Technician: It has been a busy year in the lab! Everything has been progressing smoothly! We have analyzed samples from the Veneto Volcanic Province in Italy, the Karakorum fault zone and the Himalaya, southeastern Mongolia, Taiwan, Fiordland in New Zealand, the Coastal Batholith of central Chile, and of course the Acadian orogeny right here in Vermont!

Emeriti Faculty



Barry Doolan Summer of 2016 is gone and now we are preparing for cooler weather. Wood is stacked and ready and plans being made for fall and winter travel. Sandy and I had a good summer taking care of 5 of Kristan's goats on our property. They started out as kids but will return to Does Leap Farm for Spring breeding. Summer saw a lot of golf for me that was special as a good part of it was played with my grandson Peter (13 years) who is learning the game. Peter is directly behind me in the picture.

Yes, we had another reunion this year. Last year was the Doolan clan ..this year was Sandy's side. Almost all of her sisters and brother's families made it to Fletcher for a few days in August. Good fun.

Big news for us was the birth of Leah Schwartz to my daughter Katie and Ian. Check out the small head in Ian's arms in the center of the photo. Many trips to the Portland Many trips were made this summer to introduce ourselves to the new addition and help out. Kristan and her husband George continue to prosper with Does Leap Farm. I proudly cite the feature cover

article about them and the farm in the summer edition of *Vermont Fences*. Unbelievable to me is the fact my granddaughter Zoe Van Vlaanderen is attending UVM this year! She is apparently happily enrolled in the Integrated Social Sciences Program (ISSP) that some of you may remember as undergrads.

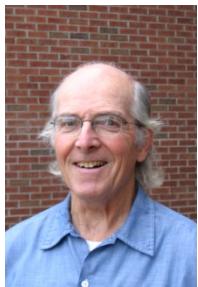
Next month we are off for 12 days in Sorrento- Positano area of Italy. Thought it was about time I had a first hand look at Vesuvius and Pompeii We are doing the trip free of any tour guides or groups so any of you who have spent time there, please feel free to share your favorite “must – sees” with us.

I hope all of you are well and enjoying life. As always feel free to stop by Fletcher if you are back in Vermont and/or contact us by email.

Be well, Barry



Doolan/MacConnell Clan Gathering – summer 2016



Jack Drake: Greetings all, It has been another great year for Ruthie and me. As usual we spent 1 December 2015 to 15 April 2016 in Carpinteria, CA, about 12 miles down the coast from Santa Barbara. We have been going there for about 10 years now so we have quite a few permanent resident friends and activities we can begin almost immediately. A highlight of our arrival, for us, are the Christmas Bird Counts for both Carpinteria and Santa Barbara. Other than that we keep busy with volunteer activities, golf, and the many cultural

events available at UCSB and Santa Barbara itself. Back in Vermont we continue to enjoy the beautiful spring, summer and fall that VT has to offer. We still have the camp on the east shore of South Hero which we use as enticement to get our granddaughters to come east for a while each summer. I also manage to coerce Char and Barry out to the golf course occasionally, visit Char at her ADK cabin, do triathlons with Keith and Gaby (Gaby does the whole thing, Keith and I share), and spend some time at Ruthie's family house on Mount Desert near Acadia (where we hike and eat lobsters). So life is good (or as a friend of ours says – "far from bad").

This year we are trying to include alumni news in the "Champlain Thrust" so I am looking forward to renewing old friendships. Best to you all, and make sure to contact me (or someone else in the department) if you are ever in town.

Stay in touch, Jack
Email: john.drake@uvm or jcdrakevt@gmail.com.



At a friend's ranch near Paso Robles, CA, last winter



David Bucke: Greetings to all of you UVM rock folks out there. Donna and I continue to continue. It seems that each year carries the same basic story and that each year flies by more quickly. (16 retirement ones have gone by already!) As usual, we're very contented with our retirement caretaking activites here in rural Essex and are so blessed to have family so close. I've done just about zero formal geologic work but continue to thoroughly enjoy soaking up the stories told by the rocks and landscapes that we see as we travel and I try to give some interpretations to the "pretty" or "interesting" samples that kids and adults bring to me with amazing frequency.

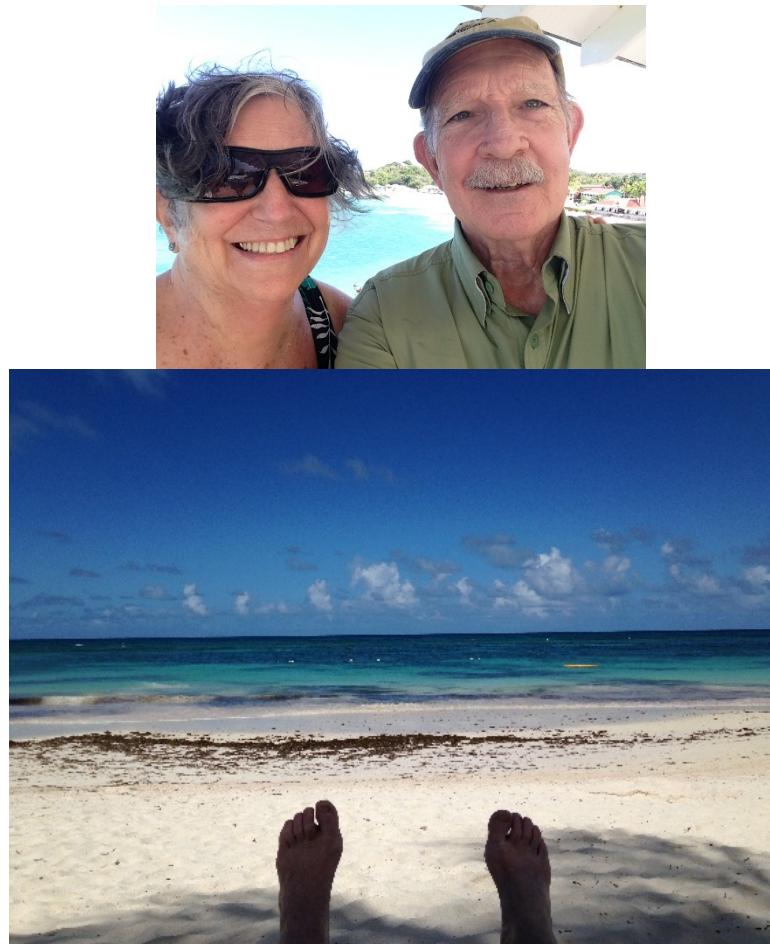
Unfortunately, though, our landscape enjoyment has been diminished this year. Our usual 6-8 week fall RV journey out west is not happening for the first time in a loooong time. A few health issues have required that we stay close to home this year. (Some anemia and breathing hassles.) The good news in that story is that the doctors think they've finally found an underlying treatable cause and things seem slowly be on the mend. Before those botherations got too severe, we were able to get away in late February for a relaxing (decadent?) 8 days in Antigua. And then in April we spent a couple weeks at one of our favorite camping areas, Ft. Pickens, which is located on a barrier island across the bay from Pensacola, FL. It's part of the Gulf Islands National Seashore. You must visit there if you're ever in the area. (Ah, memories of Regional Geology trips with Allen.) A very special part of that visit was that we packed some tents in the RV and our 2 youngest granddaughters, 3 of our daughters, and one of our sons-in-law all were able to fly down and join us there.

Donna and I send along our best wishes to everyone out there and may it be a great year.

Dave Bucke

Our new email address is: ddbucke@gmail.com

I think my UVM mail still works & flips into the gmail box -- but maybe not.



Working hard in Antigua

Graduate student information, research and activities can be found at
www.uvm.edu/geology/?Page=gradresearch.html&SM=oppmenu.html
and
www.uvm.edu/geology/?Page=enews/graduate_students.html

**THIS YEAR'S OUTSTANDING GRADUATE TEACHING
ASSISTANT WENT TO . . . Hanna Blatchford**



RECENTLY COMPLETED M.S. THESES

Go to <http://www.uvm.edu/~geology/?Page=gradresearch.html&SM=oppmenu.html>
in order to access copies of theses and progress reports

2016

Hannah Blatchford, 2016, The Structural Evolution of a Portion of the Median Batholith and Its Host Rock in Central Fiordland, New Zealand: Examples of Partitioned Transpression and Structural Reactivation.

Alyson Hampsch, Using aqueous soil extracts to study organic matter leaching from soils of different river corridor land cover in Vermont.

Samuel Lagor, The Relationship between Magmatism, Deformation, and Metamorphism during the Acadian orogeny: A Case Study from the Knox Mountain Pluton, Green Mountains, Vermont.

Braden Rosenberg, High Flow Events As Hot Moments of Reactive Fe and P Export: Impacts of Land Cover and Seasonality

2015

Ashliegh Belrose - The Champlain Sea/Lake Champlain Transition Recorded In The Northeast Arm Of Lake Champlain, USA-Canada [Read Ashliegh's Thesis](#)

Thomas Neilson - Determining impacts of land use on sediment yield in Southwestern Chinese Rivers using ^{10}Be and short lived isotope

2014

Ryan Brink- A petrological and provenance comparison of the late Lower Cambrian Monkton (Vermont) and the late Lower/early Middle Cambrian Altona Formations (Northern New York), along the Laurentian margin of Iapetus

Kathryn Dianiski - Structural evolution and deformation of the lower crust: Insights from microstructural analysis and geochronology of Vancouver Arm and Crooked Arm in Fiordland, New Zealand

Jacob Menken - Response of Tourmaline Atomic Arrangement to Thermal Treatments

Alice Newman - Understanding lower crustal deformational processes: A structural and kinematic analysis of Vancouver Arm and Breaksea Sound in Fiordland, New Zealand

Lucas (Luke) Reusser PhD: Quantifying Human Impacts on Natural Rates of Erosion Along Continental Margins

Ana Vang - The Geomorphic Effects of the Vermont Interstate System

2013

Patrick Dyess - Low-temperature TitanIQ thermobarometry of Taconian Cover-rocks of Rochester, VT [Read Patrick's Thesis](#) and/or [Appendices](#)

Angel A. García Jr. - Elemental Sulfur Nanoparticle Coarsening Kinetics and Changes in Raman and Voltammetric Signals [Read Angel's thesis](#)

Steven Gohlke- Insights into the origin of a zone of slipped deformation bands from the Seiyal Fault, Western Desert, Egypt

Alice Nelson - The Concentration of In Situ ^{10}Be in Fluvial Sediments as a Tool for Deciphering 6 My of Greenland Ice Sheet History from a Marine Sediment Core

Megan Scott - The Tectonic Influence on the Depositional Environment of the Middle Ordovician Middlebury Formation [Read Megan's thesis](#)

HURRAY FOR THE LIBERAL ARTS!!



**Pat Nee Winner of the Charles Doll Award for
Outstanding Senior Geology Major**

**ADDITIONAL WINNERS of GEOLOGY DEPARTMENT PRIZES AND AWARDS ARE
LISTED ON THE FOLLOWING WEB PAGE**

<http://www.uvm.edu/geology/?Page=honors.html>

COME SEE US AT THE FOLLOWING:

2017 NATIONAL GSA Meeting: 22 - 25 October, Seattle, WA, USA

***2017 NORTHEAST SECTIONAL GSA Meeting: 19 – 21 March, Pittsburgh, PA
(in conjunction with the North Central Section)***

***NATIONAL AGU Meeting: Check the following website for up to date information:
<http://www.agu.org/meetings>***

**NEIGC: Check for information, dates and specific location at
<http://www.salemstate.edu/~lhanson/NEIGC/>**

**2017 Alumni/Reunion Weekend at UVM!!!! (Note that this coming year it is in the fall!)
check <http://alumni.uvm.edu/reunion> for more information
Make sure that you get in touch with us so we can show you around!!**

**Visit our website for links to more department information and activities
<http://www.uvm.edu/geology/> and <http://www.uvm.edu/perkins>**

Regional Geology in “recent” years

After a hiatus of several years we hope to revive this program that was so much fun for faculty and student alike and add to the photo collection!. Below are several pictures from past trips so you can relive the experience. We hope that those of you who went on Regional found it to be great educational experience.

See the following pages for photos from Regional geology!!



Regional Geology, 2012 on a “warm” summer day in Colorado



Colorado Regional Geology class (2011) stymied by snow in the South Lottis Creek Valley. From left to right: Sam Hellman, Sam Kleh, Parker Richmond, Doug MacLeod, Abi Ruksznis, Ryan Stredny, Jo Palmer (TA), Hank Ainley, Sandra Cronauer, Abby O'Donnell, Emily Siegel, and Elizabeth (Ollie) Olliver.



Regional Geology, Iceland, 2010



2009 Regional geology students: Matt Bansak, Ben Henry, Greg Parrish, Will Hackett (TA), Maggie McMillan, Tyler Vendituoli, Holly Crimmins, Mary Snyder, Mike Ingram, and Shane Snyder at the base of a weathered Tertiary lava flow near Del Norte, Colorado.



Italian Regional Geology, 2008



Regional Geology, Colorado, 2007: Pat Niggel, Gary Peters, Pat Tobin, Corey Coutu (TA, partially hidden), Jessica Schechter, and Kirsten Stokes studying the contact relationships between Paleozoic carbonate rocks and Laramide intrusive rocks near Cumberland Pass, Colorado



Regional Geology, Italy, 2006



**Regional Geology 2005 in front of the “Maroon Bells” near
Aspen, Colorado**



**Iceland Regional Geology Crew enjoying
summer sun, August 2004**



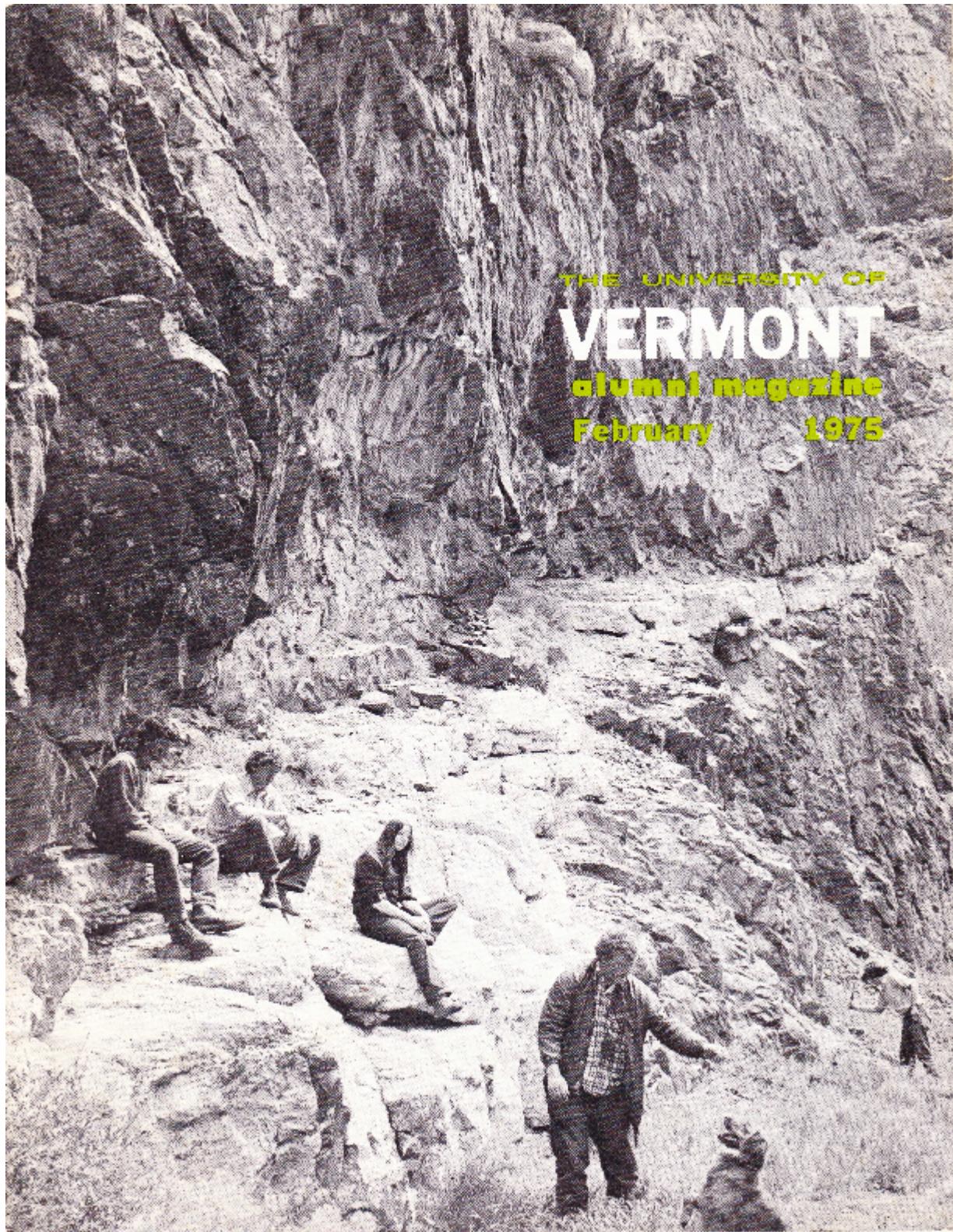
Regional Geology 2003 enjoying the Maine coast

“A blast from the past”



Regional Geology from 1986! Can you identify these people??

AND . . . the very first regional Geology trip in 1975!!!!



Story featured in Vermont Alumni Magazine; read article in the 2016 Dept. Alumni News