The Champlain Thrust

News from the Department of Geology, UVM

2017-2018

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

As always, it has been an engaging and successful year. As you will see in this newsletter, faculty and graduate students have been busily pursuing research and churning out an impressive number of new publications. More information on the faculty's many exciting activities can be found on our newly redesigned website (http://www.uvm.edu/geology). Many kudos to Robin for all the energy and hours she has invested in the revamping of the site!!

As I mentioned in last year's newsletter, the annual meeting of the Northeastern Section of the Geological Society of America (NEGSA) will return to Burlington in March 2018 after a 17 year-long hiatus. This is a major event for us and we have been very busy with preparations and planning. I am afraid that life in the department will only become more hectic as we get closer to the meeting. A lot of information about the conference, including a very exciting technical

program and a list of events, is already available online at https://www.geosociety.org/ne-mtg. We anticipate that over 1000 participants will attend the meeting. We will keep our fingers crossed and hope that all goes smoothly. I guess you'll find out 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. Simply donate by returning to the Geology Dept. home page (uvm.edu/cas/geolgy) click on the "Ways to give" button at the bottom of the page, choose *"Secure Online Giving Form"* and select *"other"* to write in "Geology Department" for donations directly to the department. If you would like your donation used for a specific purpose, then please indicate. All of your funds 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!

New state geologic map on display in Perkins Geology Museum, Delehanty Hall

Spring 2018 Northeastern Section GSA meeting, Burlington, VT

For information contact:

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Department Faculty

Andrea Lini, Associate Professor **(Stable isotopes, Limnology and Climate Change)** Greetings from the world of stable isotopes and lake mud!

Since the last newsletter, my graduate student Matthew Kraft has been tirelessly working on his master's thesis. In fact, he is now writing it all up and will hopefully defend before the end of this semester.

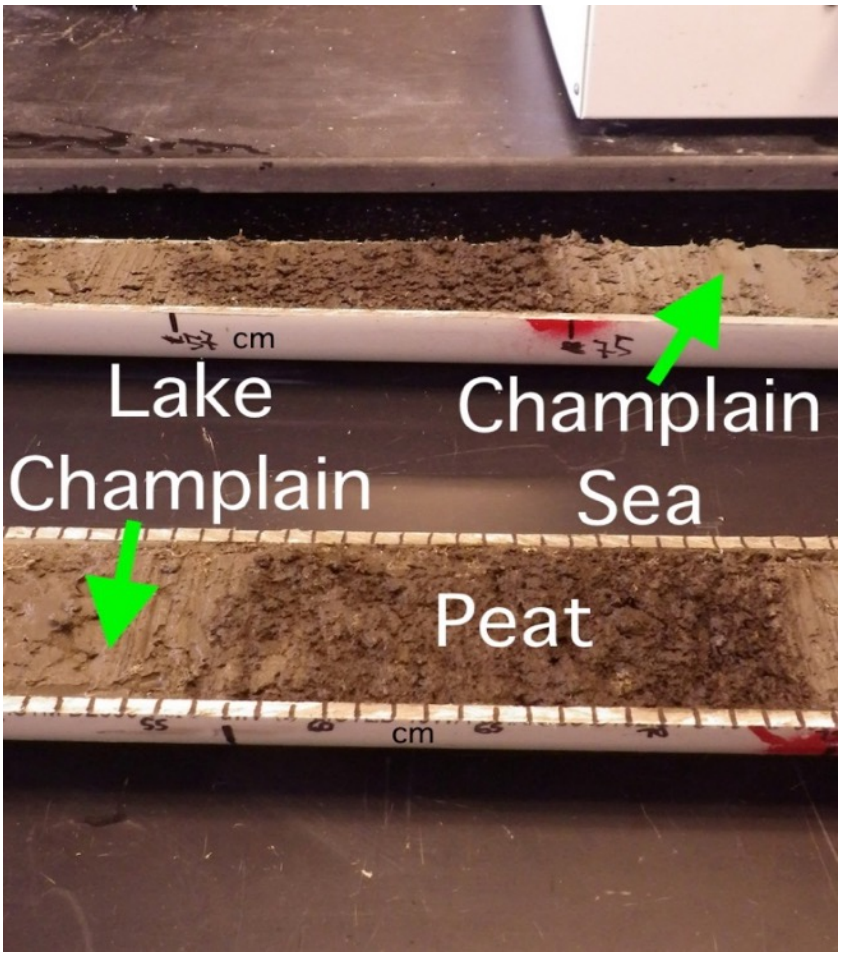
As I mentioned in the previous newsletter, the sediment cores he collected along a transect in St. Albans Bay, located in the Northeast Arm of Lake Champlain, record the transition from Champlain Sea to Lake Champlain. In this area of the lake, this transition is represented by an unconformity overlain by an up to 85 cm thick peat horizon. The cores have allowed us to better constrain the spatial extent, thickness and age variability of the peat layer within the bay. The peat horizon suggests the presence of a widespread wetland and a lake level 8-9 m lower than the present during the early Holocene. Radiocarbon dating indicates that this paleo-wetland occupied the entirety of the inner basin of St. Albans Bay from ~ 9,600-8,600 calendar years BP. The pattern of peat deposition is time-transgressive, reflecting increasing water levels due to differential tilting of lake basin due to isostatic rebound following the end of the Champlain Sea period. The examination of peat fossil assemblages indicates that the wetland formed in an entirely freshwater environment that was established post-Champlain Sea. Matthew was able to present his exciting findings at the annual meeting of the NE Geological Society of America in Pittsburgh in March 2017.

As an extension to Matthew's project, two senior undergraduate students (Taylor Norton and Jake Zanoni) worked on four additional cores that we collected in November 2016 to study the most recent history of St. Albans bay. This bay is currently one of the most eutrophic regions of Lake Champlain, and the new cores allowed us to investigate the impact that continued cultural eutrophication has had on this shallow bay during the past few decades. Previous data indicate that eutrophication of St. Albans Bay was concurrent with sewer installation and expansion in early 20th century, and again with urban development in the 1960–70s. The steady increase in algal organic matter deposition documented in the newly collected sediment cores suggests that, thus far, management practices implemented to ameliorate the conditions of the bay have unfortunately had little to no effect. Taylor and Jake presented their findings at the annual UVM Student Research Conference in April 2017.

The isotope lab was really buzzing with activity during the spring semester, when the students enrolled in my hands-on Stable Isotope Geochemistry course (Geol 234) were learning how to safely play with hot torches, liquid nitrogen, and vacuum lines. I am really glad to report that no one got hurt and that nothing was broken!!

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 another busy and productive year. We have continued to publish both old and new data sets, many with collaborators from around the world. All but two of the papers are led by students or postdocs! The oldest data - Pat Larsen's are now fully published in QR (they ripened well over 20+ years!). The future looks bright too with three new NSF grants this year supporting the cosmolab. One, in collaboration with Oberlin College, will take me and a UVM MS student to Cuba so we can study the effect of organic agriculture on soil erosion. Another will dip into our sample archives for a bit of empirical nuclear physics determining the ratio of 26Al/10Be in river sediments around the world. Most importantly, we have landed 5 years of support as an NSF community faculty where students and faculty can come to process samples for cosmogenic nuclide analysis. We expect 10-12 visitors per year and Lee Corbett (UVM MS and PhD) will be leading the charge. Family-wise, Marika is heading to college next year and hopes to ski competitively on the carnival circuit and Quincy is tearing up track and cross country with many top 3 finishes in big races. Been expanding my horizons with recent conferences related to solid-Earth response to glacial coming and goings including the fate of the Greenland Icesheet (Buffalo, got to see Niagara Falls) and Iceland (got to see lots of lava flows).

Marika and Quincy at Cross country meet at CVU in Hinesburg

Christine and me at fumorales in Iceland in the pouring rain

2017

Neilson, T. B., Schmidt, A. H., Bierman, P. R., Sosa-Gonzalez, V., and Rood, D., (2017), Efficacy of in situ and meteoric 10Be mixing in fluvial sediment collected from small catchments in China. Chemical Geology. /doi.org/10.1016/j.chemgeo.2017.09.024

Bierman, P. R. and Portenga, E., (2017) Beryllium Isotopes, in Encyclopedia of Geochemistry (W.M. White, ed.), Springer https://doi.org/10.1007/978-3-319-39193-9_81-1

C. Knudsen, J. R. Hopper, P. R. Bierman, M. Bjerager, T. Funck, P. F. Green, J. R. Ineson, P. Japsen, C. Marcussen, S. C. Sherlock & T. B. Thomsen, (2017). Samples from the Lomonosov Ridge place new constraints on the geological evolution of the Arctic Ocean. In: Pease, V. & Coakley, B. (eds) Circum-Arctic Lithosphere Evolution. Geological Society, London, Special Publications, 460. https://doi.org/10.1144/SP460.17

Sosa-Gonzalez, V., Schmidt, A. H., Bierman, P. R., and Rood, D., (2017), Spatial and temporal replicability of meteoric and in situ 10Be concentrations in fluvial sediment, Earth Surface Process and Landforms. 10.1002/esp.4205.

Corbett, L., Bierman, P. R., Stone, B. D., Larsen, P.. and Caffee, M. W. (2017), Cosmogenic nuclide age estimate for Laurentide Ice Sheet recession from the terminal moraine, New Jersey, USA, and constraints on Latest Pleistocene ice sheet behavior, Quaternary Research. doi.org/10.1017/qua.2017.11

Reusser, L., Bierman, P. Rizzo, D. M., and Rood, D. H., (2017) Characterizing landscape-scale erosion using 10Be in detrital fluvial sediment: slope-based sampling strategy detects the effect of widespread dams. WRR - technical note. 10.1002/2016WR019774

Singleton, A. A., Schmidt, A. H., Bierman, P. R., Rood, D., Neilson, T. B., Greene, E. S., Bower, J. A., and Perdrial, N. (2017) Effects of grain size, mineralogy, and acid-extractable grain coatings on the distribution of the fallout radionuclides 7Be, 10Be, 137Cs, and 210Pb in river sediment, Geochimica et Cosmochimica Acta. Volume 197, 15, Pages 71–86
http://dx.doi.org/10.1016/j.gca.2016.10.007
(download pdf)

Portenga, E. W., P. Bishop, D. H. Rood, and P. R. Bierman (2017), Combining bulk sediment OSL and meteoric 10Be fingerprinting techniques to identify gully initiation sites and erosion depths, J. Geophys. Res. Earth Surf., 122, doi:10.1002/2016JF004052.

Corbett, L. B., P. R. Bierman, D. H. Rood, M. W. Caffee, N. A. Lifton, and T. E. Woodruff (2017), Cosmogenic 26Al/10Be surface production ratio in Greenland, Geophys. Res. Lett., v. 44, issue 3, p 1350-1359 doi:10.1002/ 2016GL071276.

Koester, A., Shakun, J., Bierman, P.R., Corbett, L., Davis, P.T., Braun, D., and Zimmerman, S. (2017) Rapid thinning of the Laurentide Ice Sheet in coastal Maine, USA during late Heinrich Stadial 1, Quaternary Science Reviews, http://dx.doi.org/10.1016/j.quascirev.2017.03.005

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John M. Hughes, Professor (Mineralogy, Crystallography, Crystal Chemistry): As I write this, I am scrambling to get everything done over the summer that I had hoped for! Susan and I spent our usual summer in Charleston, SC, and I will be heading back after the total eclipse on August 21. We balance our summers between walks on Folly Beach and work, and it has been a productive summer working on structure papers! We are nearing the end of the respite when family comes to visit and we sneak time away from the visit to get things done.

It has been a good year. I list the papers published to date (August 1) in 2017, and there are more to come. I am privileged to work with smart, productive people, which is a gift! Gina Accorsi finished her thesis and graduated, and I also worked with a Doctoral student in Food Science on minerals in cheese; you may have seen a summary of his work in the Vermont Quarterly. It is nice to work with talented students…

Our single-crystal diffractometer was dissembled and prepared for the move to the new STEM building, and I look forward to working in that new lab. It should be a wonderful new academic year of teaching and working with students; I look forward to it. I put off preparing syllabi for as long as possible while doing my structure work, but alas, I could not put it off any longer, as fall classes start in three weeks!

2017Papers

Tansman, G., Kindstedt, P., and Hughes, J.M. (Accepted) Crystallization and demineralization phenomena in washed-rind cheese. *Journal of Dairy Science JDS-17-13067*.

Lupulescu, M.V., Hughes, J.M., Chiarenzelli, J.R., and Bailey, D.G. (2017) Texture, crystal structure, and composition of fluorapatites from the magnetite-fluorapatite deposits, Eastern Adirondack Mountains, New York. *Canadian Mineralogist*, 55, 399-417.

Kampf, A.R., Nash, B.P., Hughes, J.M., and Marty, J. (2017) Burroite, $Ca_2(NH_4)_2(V_{10}O_{28})\cdot 15H_2O$, a new decavanadate mineral from the Burro mine, San Miguel County, Colorado. *The Canadian Mineralogist*, 55, 473-481.

Tansman*, G.F., Kindstedt, P.S., and Hughes, J.M. (Accepted) Crystallization and demineralization phenomena in stabilized paste white mold cheese. *Journal of Dairy Science JDS-16-12259*.

Kampf, A.R., Nash, B.P., Marty, J., Hughes, J.M., and Rose, T.P. (2017) Hydropascoite, $Ca_3(V_{10}O_{28})\cdot 24H_2O$, a new decavanadate mineral from the packrat mine, Mesa County, Colorado. *Canadian Mineralogist*, 55, 207-217.

Kelly*, S.R., Rakovan, J.F., and Hughes, J.M. (2017) Column anion arrangements in chemically oned ternary chlorapatite and hydroxylapatite from Kurokura, Japan. *American Mineralogist,* 102, 720-727.

Tansman*, G.F., Kindstedt, P.S., and Hughes, J.M. (2017) Minerals in food: Crystal structures of ikaite and struvite from bacterial smears on washed-rind cheese. *Canadian Mineralogist,* 55, 89-100.

Kampf, A.R., Hughes, J.M., Nash, B.P. and Marty, J. (2017) 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,* 102, 461-465.

Kampf, A.R., Nash, B.P., Marty, J., and Hughes, J.M. (2017) 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*, 81, 319-327.

The two faces of Charleston:
Our grandkids at the beach, and the effects of Hurricane Irma.

Best to everyone,
John

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

This past year has seen lots of new discoveries in Vermont geology. Last Spring, undergraduate ***Connor Remington*** presented the results of his research at northeast GSA on using drone surveys to interpret the evolution of a Mesozoic fault zone in Essex Junction. Connor worked closely with ***Jon Kim*** (Vermont Geological Survey), ***John Van Hoesen*** resolution topography, UAVs, and GPS into field education programs. We are now using these new techniques to study the evolution of the Champlain thrust fault (including at Lone Rock Point), which is the subject of UVM graduate student ***Matthew Merson***'s Masters thesis. Matthew is working with undergraduate ***Erin Dundas*** and I to produce 3-D virtual maps of the Champlain fault zone core and damage zone.

Two other students, ***Kyle Titsworth*** and ***Samantha Portnoy*** also began new projects on faults and shear zones. Both Kyle and Sam are working with Laura Webb and I on some new techniques to date repeated fault motions. The gist of the approach is that most fault zones expose a variety of materials, including frictional melts, that can be dated using the $^{40}Ar/^{39}Ar$ method. These new techniques are helping us determine how fault movements caused surface topography to grow quickly during the formation of young mountain ranges.

In addition to mentoring students, I also have been involved in writing a large ~80-page government report on the "Future of Research in the field of Tectonics." This report was sponsored by the National Science Foundation and has involved contributions from ~65 scientists from around the country. The document highlights some exciting new areas of tectonics research that promise to lead is to major breakthroughs in the near future. The report will be published in October, 2017.

I'm also happy to report that one of my graduate students, ***Hannah Blatchford***, completed a superb Masters thesis on lower crustal deformation and magmatism in New Zealand. Hannah just started working on her PhD at the University of Minnesota. Her field new area is in Norway. I also accepted two new graduate students (***Griffin Moyer*** and ***Christopher Eddy***) this year who are just getting started looking at faults and shear zones and their interaction with fluids and magma. With all this new activity, it's been a great year for geology in Vermont.

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.

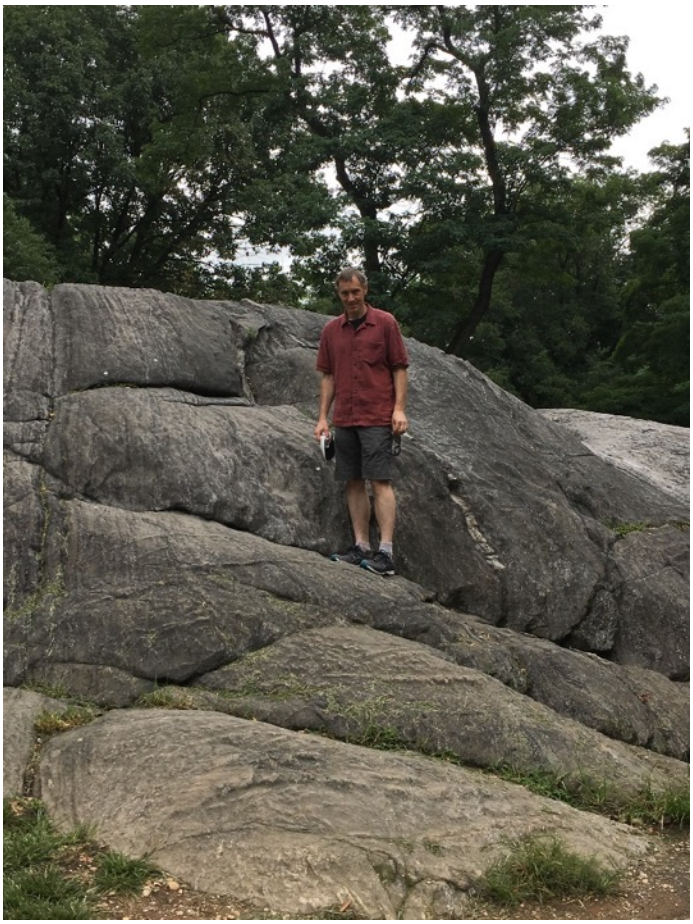
Johnson E., and Lott, S., 2016, Fracture Patterns within the Monkton and Clarendon Springs Formations and their Origins, UVM Student Research Conference, April 28, 2016, Davicenter ,http://www.uvm.edu/~uvmsrc/?Page=archive/2016/presentation.php&SM=archive/_archivemenu.html&pkNetidStudent=ejohns21.

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.



Examining exposures of high grade gneiss in Central Park, New York

Exploring the geological history of a coal mine in Pennsylvania with Gabriela Mora-Klepeis.

Char Mehrtens, Professor (Stratigraphy, Sedimentation, Carbonate Petrology): Annual greetings! I hope that this edition of the newsletter finds everyone well and happy. This is mid-semester in autumn, so things are very busy around the Department. I'm taking a break from Strat/Sed and offering a first year seminar in oceanography. It's been a while since I taught this and while the basics haven't changed, there is SO much real-time data available on the web now, that it took a good chunk of last summer to get the labs and activities together. It is a lot of fun to teach, however and teaching first year students is always an eye opening experience. How you parents of teen agers survive this, I don't know!

Last spring/summer saw the publication of three papers from the research project I've been doing with Barb Tewksbury in Egypt. One of those was UVM M.S. Steven Gohlke's thesis work on deformation bands and the timing of folding and faulting in the Cretaceous-Paleocene in Egypt. Laura Webb and I are currently co-advising grad student Henry McGuire on a project to compare outcrop-based and well log gamma ray data to through the Monkton stratigraphy. Henry hopes to finish this winter and join the "oil patch" in the spring.

In a fit of madness, Andrea and I agreed to co-Chair the 2018 Northeast GSA meeting here in Burlington and that is turning out to be the organizational nightmare that I thought it would be. Wondering about how many cheese platters to order, how many electrical outlets we need in the exhibition hall and other pressing matters is a constant background buzz in my brain. It is shaping up to be a great meeting but I will need a vacation after it. Too bad it's in the middle of the spring semester.

Speaking of vacations, 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 and got away to do one canoe trip up in Quebec. Summers seem to get shorter and shorter. Here's a photo of me tearing up a lake in the ADKS on my party pontoon.

Another hard day at the "office" in the Adirondacks

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

Publications:

Origin of an Extensive Network of Non-tectonic Synclines in Eocene Limestones of the Western Desert, Egypt, Barbara J. Tewksbury[a], Elhamy A. Tarabees[b], and Charlotte J. Mehrtens[c] 2017 Journal of African Earth Sciences

Audio-magnetotelluric surveys to constrain the origin of enigmatic narrow synclines in Eocene limestone, Western Desert, Egypt, Elhamy A. Tarabees[b], Barbara J. Tewksbury[a] Charlotte J. Mehrtens[c] Abdellatif Younis, 2017, Journal African Earth Sciences

Evolution of the Regional East-West Fault System of Southern Egypt: Evidence from Cretaceous Siliciclastic Cover Rocks of the Southeast Western Desert, Barbara J. Tewksbury[a], Charlotte J. Mehrtens[c] , Steven Gohlke[c] and Elhamy A. Tarabees[b], 2017 Journal of African Earth Sciences

Laura Webb, Assistant Professor (Igneous petrology and Geochronology)

Hello alumni and friends of UVM Geology,

It has been another busy year and I have had the pleasure of working with wonderful students who continue to make exciting discoveries in the geology and tectonic evolution of Vermont. Masters students Cheyne Aiken and Evan Tam and Geology BS Beth Pidgeon have revealed new information on the timing of exhumation of high-pressure rocks in the Tillotson Peak complex in the Ordovician and an intriguing Silurian tectonic signal in the Green Mountain anticlinorium. Geology BS Patrick Sullivan dated pseudotachylyte (frictional melts from paleo-earthquakes) found in the Arrowhead Mountain thrust fault in Milton, Vermont. His data and other results from collaborative work with Jon Kim at the Vermont Geological Survey and Professor Keith Klepeis have allowed us to demonstrate evidence for reactivation of the Taconic thrust faults during the Devonian Acadian orogeny. Reactivation seems to a major theme related to studies we are conducting in the $^{40}Ar/^{39}Ar$ geochronology laboratory, including some new work with Keith Klepeis on rocks from Fiordland that bear on the Cenozoic evolution of the Pacific–Australian plate boundary evolution. Consider supporting the UVM Noble Gas Geochronology Laboratory by keeping us in mind for your radiometric age dating needs and letting your colleagues know that we are here to serve the educational and professional geoscience community.

Best regards,
Laura

Petrology students examining garnet-grade outcrops of the Gile Mountain Formation along the White River in Royalton, Vermont.

Students in the field geophysics course are engaged in a service-learning project with the UVM Consulting Archaeology Program. Here they are preparing for ground penetrating radar surveys to map out the location of a Revolutionary War trench at the Chimney Point historical site in Addison, VT.

Selected publications & conference abstracts *(UVM student authors in italics)***:**

Heumann, M.J., Johnson, C.L., Webb, L.E., 2017, Plate interior polyphase fault systems and sedimentary basin evolution: Case study of the East Gobi Basin and East Gobi Fault Zone, southeastern Mongolia, Journal of Asian Earth Sciences, in press. doi: 10.1016/j.jseaes.2017.05.017.

Webb, L.E., Klepeis, K.A., Kim, J., and *Sullivan, P.*, 2017, Reactivation of Taconic Thrust Faults in the Late Acadian Orogenic Front. 2017 EarthScope National Meeting. Anchorage, Alaska.

Tam, E., Webb, L.E., and *Aiken, C.L.*, 2017, Role of the Prospect Rock Fault in the Exhumation of High Pressure Rocks in North-Central Vermont. (EOS, Transactions, American Geophysical Union).

Cordova, J.L., Schermer, E., Mulcahy, S.R., and Webb, L.E., 2017. Initiation and early evolution of a subduction zone: T-t-D history of the Easton metamorphic suite, northwest Washington State, Geological Society of America Abstracts with Programs. Vol. 49, No. 6, doi: 10.1130/abs/2017AM-303853.

Aiken, C., and Webb, L.E., 2017. Exhumation of the Tillotson Peak complex in northern Vermont. Northeastern North-Central Joint Section Meeting of the Geological Society of America. Pittsburgh, Pennsylvania.

Brombin, V., Webb, L., Bonadiman, C., Marzoli, A., and Coltorti, M., 2017. A geochronological study of mafic and acidic lavas from Veneto Volcanic province (North-East Italy), EGU General Assembly 2017, Vienna, Austria. Geophysical Research Abstracts, Vol. 19, EGU2017-6410, 2017.

Stephen Wright, Senior Lecturer (Glacial geology, Geomorphology, Environmental Geology): I spent most of the summer mapping the surficial geology of the Bolton Mountain Quadrangle and surrounding areas which includes the Joiner Brook valley (the Bolton nordic and downhill ski areas lie in the headwaters of this valley), Little River valley (home to the Waterbury Reservoir), Cotton Brook, and Miller Brook, areas I've worked in before. Four undergraduate students worked with me during June (see below photo) and another graduate student in Earth Science education worked with me later in the summer. The geology of this area was very interesting and it was lovely to have an excuse to explore areas in-between the sites I already knew well. This was my first field project where I had the opportunity to work using the LiDAR imagery as a base-map. One of the striking landforms visible on the lidar are landslides. These occur across the area we mapped in on a wide variety of scales, but some of these slides are huge! Additionally, many other smaller-scale landforms are visible in the imagery that I'm sure we would have missed. The students will be working on their maps this fall and will present the results of their work during the Northeast GSA meeting we're hosting in March. Hope to see many of you at the NEIGC field conference in Bethel, Maine the end of September or at one or more of the GSA meeting in Seattle or Burlington in the coming year.

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.

UVM students Katelyn Czyzyk, Amanda Rossi, Emma Marsters, and Peter Sarkis (mostly hidden) along the Waterbury Reservoir dam. During the course of our mapping we found much evidence of the extensive work involved in building the dam during the depression, including the areas occupied by Camp Smith, the CCC camp set up to house people working on the dam, but also the extensive rock, gravel, and

Julia Perdrial, Assistant Professor of Geochemistry. This has been another fun and busy another fun and busy year: Malayika and Jesse are working hard on their MS theses and both received funding this year: Malayika was awarded the Vermont Space Grant Consortium (VTSGC) Graduate Research Fellowship for her project "Soil aggregates: what role do they play in the generation of dissolved organic carbon?" Jesses project "Expanding the concept of the Critical Zone from Terrestrial to Planetary Systems: What can we learn about weathering on Mars?" received support through the VT-NASA EPSCoR Faculty Research Awards. Both are now entering their final year here in the department of Geology and are pretty busy. Another MS student joined my group, Max, who will be working in the recently installed EPSCoR field sites (see below).

This was a great funding year for my group since I was awarded my first NSF grant as lead PI. Together with researchers from UVM, PennState and the University of Reno, Nevada we will combine different modelling techniques and experiments to tackle the question why dissolved organic matter fluxes in streams increase in many forested systems. The collaborative project, "Combining complex systems tools, process-based modelling and experiments to bridge scales in low temperature geochemistry" will begin in January 2018.
Speaking of field sites, this summer we spend quite some time and energy installing the rest of the Vermont EPSCoR sites with a great team of faculty, graduate students and undergraduate inters (see pictures). These installations kept us busy for a good chunk of the summer. After we were done with installing sub surface instrumentation we continued with research in lab and field

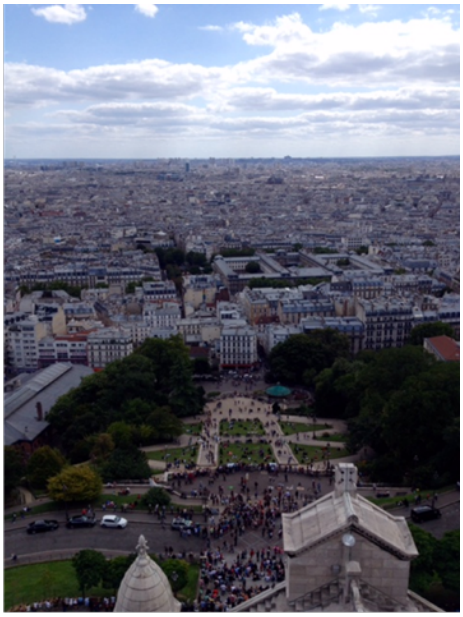
I also got to travel this summer: first I joined the 1st Geobiology Society Conference in Banff, Canada where I presented some of my research on the critical zone. One of the highlights was the field trip to the Burgess Shale fossil beds! Later in summer I chaired a session and presented some research at the Goldschmidt conference in Paris.






Previous page:
Top: Thomas and Riccardo prepare logger casings (left). Amanda holds a tray of soil samples (center) and Kunal and Colleen "dig" a soil pit (right). Bottom: backfilled soil pit (left), building solar panels (center) and a well-deserved break (right).

https://www.burgess-shale.bc.ca/stephen



A little hike in the vicinity of Banff (left). Olenoides in the Burgess shale (my camera gave out during the fieldtrip and the picture is taken from www.burgess-shale.bc, center). Paris viewed from Sacre Coeur. The conference center is all the way in the back (right).

Papers in 2017:

- Wymore, A.S., West, N.R., Maher, K., Sullivan, P.L., Harpold, A.A., Karwan, D., Marshall, J.A., **Perdrial, J.N.,** Rempe, D.M., Ma, L. (2017). Growing New Generations of International Critical Zone Scientists. Earth Surface Processes and Landforms.
- McIntosh, J., *Schaumberg, C.,* **Perdrial, J.N.,** Harpold, A.A., *Vazquez-Ortega, A*., Rasmussen, C., Vinson, D., *Zapata-Rios, X*., Brooks, P.D., Meixner, T., Pelletier, J., Derry, L., Chorover, J. (2017). Geochemical evolution of the Critical Zone across variable time scales informs concentration-discharge relationships: Jemez River Basin Critical Zone Observatory. Water Resources Research.
- Clark, K.E., Shanley, J.B., Scholl, M.A., Perdrial, N., **Perdrial, J.N**., Plante, A.F., McDowell, W.H. (2017). Tropical River suspended sediment and solute dynamics in storms during an extreme drought. Water Resources Research.

Conferences in 2017:

- **Perdrial, J.N.,** *Landsmann, M.,* ***Cincotta, M.***, Adair, C., (2017). Do clay minerals affect dissolved organic matter bioavailability in batch experiments? Goldschmidt Conference, August 13 – 19, Paris, France (poster).
- **Perdrial, J.N.** (2017). Carbon dynamics from a Critical Zone perspective: interfaces at the catchment and molecular scale. 1st Geobiology Society Conference, June 11-14 (2017) at Banff, Canada (invited talk).
- *Ehrenkranz, J.*, ***Armfield, J., Cincotta, M.*****, Perdrial, J.N.** (2017). Mapping changes in soil composition due to the recovery from acidification: a combined lab and field study. Student Research Conference, April 27, Burlington, VT.
- *Landsmann-Gerjoi, M*., ***Cincotta, M.*****, Perdrial, J.N., C. Adair** (2017). Mapping changes in soil composition due to the recovery from acidification: a combined lab and field study. Student Research Conference, April 27, Burlington, VT.

Funding in 2017:

- **NSF-GG:** 2018-2021. $300,204. *"Collaborative Research: Combining Complex Systems Tools, Process-Based Modelling and Experiments to Bridge Scales in Low Temperature Geochemistry"*. Lead-PI.
- **VT-NASA EPSCoR Faculty Research Awards:** 2017/2018. $13,249. *"Expanding the concept of the Critical Zone from Terrestrial to Planetary Systems: What can we learn about weathering on Mars?"* Lead-PI.
- **VTSGC Graduate Research Fellowship Competition:** 2017/2018. $26,500. *"Soil Aggregates: What role do they play in the generation of dissolved organic carbon?"* Lead-PI.

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Andrew Schroth, Research Assistant Professor (Low Temperature Geochemistry,Limnology and Oceanography: It has been a busy year for our Watershed and Lake Biogeochemistry Group. We have begun working on two new NSF-funded research projects, both focused on Lake Champlain Basin systems. One project, funded by NSF EPSCoR, focuses on understanding how extreme hydro-meteorological events cascade through the social-ecological system of the Lake Champlain Basin and what properties across the social-ecological system promote or suppress the resilience of water quality. Andrew is co-leading the project's Natural Science Team with Carol Adair (RSENR). Post doc Erin Seybold joined the group to work on this project after completing her PhD at Duke University. PhD students Brittany Lancellotti (co-advised with C. Adair and J. Perdrial) and Wilton Burns (co-advised with J. Stockwell) also joined the team coming from University of Rhode Island and New Hampshire respectively. Schroth was also awarded an NSF EAR Geobiology and Aqueous Geochemistry Grant (in collaboration with Adjunct Geology Professor Greg Druschel) to study how redox fluctuations enhance or suppress the mobility of phosphorus in sediment-water systems by impacting the speciation of P and Fe in sediment and water. Two new MS students in Geology joined the team to work on that project, Meg Leduc (Johnson State) and Austin Wilkes (UVM). Current students and post docs have also been actively publishing their work. Former PhD student Peter Isles published two new papers this year from his doctoral work studying the chemical and physical drivers of algal blooms in *Biogeochemistry* and *Inland Waters*. Current PhD student Matt Vaughan published the first chapter of his dissertation using high-frequency sensor data to study nitrate and DOC loading during storm events across watersheds of different land-use in *Water Resources Research,* and Matthew hopes to defend his PhD this spring. Former MS student, Braden Rosenberg, published the first chapter of his thesis focused on the geochemistry of iron and phosphorus in snowmelt and summer storms in *Biogeochemisty*. Former postdoctoral scientist DJ Joung, published our research comparing drivers of under ice Fe and P biogeochemistry in Shelburne Pond and Missisquoi Bay in *Limnology and Oceanography*. We have also published two new papers related to our ongoing work around glacial supply of iron to the Gulf of Alaska in *Geophysical Research Letters* and *Global Biogeochemical Cycles*. The 2017 papers from my group are listed below. I hope that everyone is well!

Cheers,

Andrew

*Isles P.D.F., Rizzo, D.M., *Xu, Y., **Schroth A.W** (2017) Modeling the drivers of interannual variability in cyanobacterial bloom severity using self-organizing maps and high-frequency data. *Inland Waters* doi/10.1080/20442041.2017.1318640

Schroth, A. W., J. Crusius, S. Gassó,C. M. Moy, N. J. Buck, J. A. Resing, and R. W. Campbell (2017), Atmospheric deposition of glacial iron in the Gulf of Alaska impacted by the position of the Aleutian Low, *Geophys. Res. Lett*., 44, DOI:10.1002/2017GL073565.

Crusius, J., **Schroth, A.W.,** Resing,J.A., Cullen, J. and Campbell, R.W. (2017), Seasonal and spatial variabilities in northern Gulf of Alaska surface water iron concentrations driven by shelf sediment resuspension, glacial meltwater, a Yakutat eddy, and dust, *Global Biogeochem. Cycles*, 31, DOI:10.1002/2016GB005493.

*Vaughan, M.C.H, Bowden, W.B., Shanley, J., Vermilyea, A., Sleeper, R., Gold, A., Pradhanang, S., Inamdar, S., Levia, D., Rowland, R., Scott, A., **Schroth, A.W.** (2017) High-resolution dissolved organic carbon and nitrate measurements reveal differences in storm hysteresis and loading based on land cover and seasonality. *Water Resources Research* DOI: 10.1002/2017WR020491

*Joung, D., *Leduc, M. *Ramcharitar, B., *Xu, Y., *Isles, P.D.F., Stockwell, J.D., Druschel, G.K.,Manley, T., **Schroth, A.W.** (2017) Winter weather and lake-watershed physical configuration drive phosphorus, iron and manganese dynamics in water and sediment of ice-covered lakes. *Limnology and Oceanography.* DOI: 10.1002/lno.10521

*Isles P.D.F., *Xu, Y. Stockwell, J.D. **Schroth A.W**. (2017) Long-term climate-driven changes in energy and mass inputs systematically alter nutrient concentration and stoichiometry in deep and shallow segments of Lake Champlain. *Biogeochemistry.*

*Rosenberg, B. and **Schroth A.W** (2017) Coupling of reactive riverine iron and phosphorus species during hot transport moments: impacts of landcover and seasonality. *Biogeochemistry* DOI: 10.1007/s10533-016-0290-9

Schroth (right) with Saul Blocher (Research Technician-center) and Wilton Burns (PhD candidate-left) deploying sensors to monitor algal blooms and biogeochemistry in St. Albans Bay as part of a new NSF-funded research effort

Nico Perdrial: I can't believe that the year went by so fast. It's been a great year filled with great research, teaching and advising. Julia, Niilo and I are making the most of Vermont and enjoy skiing, swimming and camping at the appropriate seasons. Last winter was so warm I didn't get to ice skate outside (my favorite winter activity) and one could wonder whether this is the new status quo.

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. Last year I was mentioning the beginning of a collaboration on the adaptation of streams to climate change in Puerto Rico. The recent events on the Island with the pass of hurricane Maria and the terrible devastation it endured (see images below) are clear evidences of a changing climate and the absolute necessity of take responsibility for our action as a species. Ironically, my trip to Puerto Rico last January (along with Andrew Schroth) was to attend a conference on the impact of extreme climate events on aquatic biogeochemical cycles and fluxes and while a great deal of interesting research was presented there, it occurred that much remain to be done to begin understanding the ramifications of these events on the environment.

My group is still working on deciphering nanoscale soil sorption processes, in particular Pb in soils and Jenny Bower successfully defended her MS in 2017 and published her first article, coauthored with 2 undergraduate students, in Environmental Pollution. I presented her results at the Goldschmidt conference in Paris last summer. Grant Reeder is pursuing the work of Jenny, more specifically running experiments to determine the mechanisms responsible for Pb transformation in soils. He is on track to defend next spring. Working with researchers from the universite de Grenoble (France) I am also looking at the atomic scale modification of minerals in the environment and Adele Conde (BS at Virginia Tech) started a MS in my group which aims at studying the weathering mechanisms of apatite. Julia and I are also exploring a new research avenue with the obtention of a NASA-EPSCoR seed grant to study the modification of the surface of Mars upon human colonization.

Several undergraduates are working in the lab this year helping on various project (Amanda Rossi, Landon Williamson and Christian Wurzburger) or completing their honor's thesis (Paige Greenfield – Optimization of zeolite/clay pellets for phosphate sequestration). Last year I taught Earth System Science (GEOL001) for the first time and I loved the opportunity to impact so many young brains and sparkle their interest in geology. This year I continue teaching Geol001 and Geocomputing (GEOL195) in the fall and will continue teaching Environmental Geology (GEOL055) in the spring. I will also teaching a freshman class entitled "Planetology" in the spring.

Publications:

Perdrial N., Vazquez-Ortega A., Wang G., Kanematsu M., Mueller K.T., Um W., Steefel C.I., O'Day P.A. and Chorover J. (In Review) - Uranium speciation in acid waste-weathered sediments: the role of aging and phosphate amendments. Applied Geochemistry.

Bower J.A. Lister S., Hazebrouck G. and **Perdrial N.** (2017) - Geospatial evaluation of lead bioaccessibility and distribution for site-specific prediction of threshold limit. Environmental Pollution, 229, 290-299.

Clark K.E., Shanley J.B., Scholl M.A., **Perdrial N**., Perdrial J.N., Plante A.F., McDowell W.H. (2017) - Tropical river suspended sediment and solute dynamics in storms during an extreme drought. Water Resource Research, 53.

Kamali-Asl A., Ghazanfari E., **Perdrial N**., Bredice N. (In Review) - Experimental Study of fracture response in granites subjected to hydrothermal conditions relevant for Enhanced Geothermal Systems. Geothermics.

Wang, G; Um, W; Wang, Z; Reinoso-Maset, E; Washton, N; Mueller, K; **Perdrial, N** ; O'Day, P; Chorover, J. (2017) - Uranium Release from Acidic Weathered Hanford Sediments: Single-Pass Flow-Through Experiments. Environmental Science and Technology. 51, 11011-11019.

Singleton A., Schmidt A., Bierman P., Rood D., Neilson T., Greene S., Bower J. and **Perdrial N.** (2016) - Effects of Grain Size and Mineralogy on the Distribution of the Fallout Radionuclides 7Be, 10Be, 137Cs, and 210Pb in River Sediment. Geochimica et Cosmochimica Acta, 197, 71-86.

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

Talks

Perdrial N., Bower J. and Singer D.S. (2017) - Speciation, distribution, mobility and prediction of Pb in an urban soil. Goldschmidt Conference, Aug 2017, Paris, France.

Perdrial N., Clark K.E., Shanley J.B., Plante A.F., McDowell W.H. (2017) - Can the mineralogical signature of suspended sediments inform on the dynamics and resilience of river systems impacted by extreme climate events at Luquillo, Puerto Rico? AGU Chapman Conference, Jan 2017, San Juan, Puerto Rico.

Clark K.E., Shanley J.B., Stallard R., Scholl M.A., Plante A.F., Perdrial J., Murphy S., **Perdrial N**., Gonzalez, McDowell W.H. (2017) - Impacts of extreme climate events - drought and hurricane - in the Luquillo Mountains on riverine carbon and nitrogen. AGU Chapman Conference, Jan 2017, San Juan, Puerto Rico.

Clark, K. E., Shanley, J. B., **Perdrial, N**., Scholl, M. A., Perdrial, J. N., Plante, A. F., McDowell, W. H. (2016) Tropical river suspended load and solute dynamics in storms interrupting an extreme drought, Luquillo Critical Zone Observatory, Puerto Rico, AGU Fall Meeting, San Francisco, California, USA.

Perdrial N. (2016) - Cold-war radionuclides legacy in the environment: Solving the problem one experiment at a time. Invited Talk, Department of Civil and Environmental Engineering, UVM.

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Some of the effects of Hurricane Maria (September 20, 2017) on Puerto Rico. a) El Junque forest in January during the Chapman conference (credit: KC Clark). b) The same forest after the hurricane (note: this is a tropical forest, trees do not lose their leaves like deciduous forests - credit: Miguel Leon). c) and d) Some landslide impacts on the island. Red dots identify the location of roads and buildings impacted by the landslides. (https://landslides.usgs.gov/research/featured/2017-maria-pr/)

STAFF

Robin Hopps, Office Administrator: The UVM Geology Department continues to be a great department because of our outstanding students, faculty and staff. At present, the Department has 15 graduate students, 46 majors, and 17 minors. Stop by Delehanty Building to visit us, as well as see the Perkins Museum. Please stay in touch by sending an email to geology@uvm.edu. You can also see the list of lectures for the Geology Seminar Series on the UVM Geology website at: http://www.uvm.edu/cas/geology/news-and-events/newsletters
Email: robin.hopps@uvm.edu visit: http://www.uvm.edu/perkins/

Dan Jones, Research Technician: What a great year for the Noble Gas Lab! We've hosted several students, as well as analyzing samples from Fiordland in New Zealand as well as right here in Vermont, and even some 2 billion year old biotites from Ellesmere Island in Greenland! I had an exciting year personally as well. I was able to return to Alaska for a wonderful, two week long road trip!

Srebrenka Mrsic: Administrative Coordinator: I have worked in the Geology Department since May 16, 2008 and been in US since 1997. After these nine full years at UVM I can tell that this is the best job in my career of 34 years including my work experience in my home country of Bosnia. It is a real pleasure to work with every single person in the Department, all faculty, students and staff. I am so proud to be part of the Geology team and help our undergraduate and graduate students to grow educationally and professionally.
Srebrenka Email: srebrenka.mrsic @uvm.edu

Gabriela Mora-Klepeis, Senior Research Technician: Greetings from Delehanty Hall. It has been another busy year! I just celebrated my 15-year anniversary working for the Geology Department. This year I was able to work on the mineral collection that is used for our courses. After doing some research, I was able to acquire a comprehensive suite of specimens that include a nice variety of core and mantle minerals. Now I am in the process of organizing and incorporating the new minerals into the collection. In addition to my duties in the Geology Department, I am still part of the Personal and Professional Development committee for Staff Council. On a personal note, I am happy to report that I completed my 5th triathlon in late July with about the same time of last year! Since Jack & Ruth were away at that time we organized a bike ride during Labor Day weekend around their camp that culminated with the traditional barbecue there. In July, while attending a wedding in Pennsylvania I had an opportunity to visit a coal mine. In August Keith and I took a few days off and went to New York City where we visited the Museum of Natural History. So even in my vacation time I enjoy being a geologist. Hope everyone is doing well and if you are in the area please stop by, I'd love to show you around!

New York City

Bike ride with Keith and Jack in South Hero.

Email: Gmora@uvm.edu http://www.uvm.edu/~geology/?Page=faculty/moraklepeis.php

Emeriti Faculty

Barry Doolan Hello to all UVM Geology alumni and friends. Another summer has bit the dust. Time to button up the gardens put up the wood and send the goats home to Does Leap Farm**.** Read a lot of books; some good, some not and played plenty of golf with good days and bad. But the most important events for the Doolans' include the move back to Vermont by daughter Katie and her family. If someone told me 50 years ago that my family would all live in Franklin County Vermont I would have said "Fat chance of that happening!"…but it's true. So the picture below for those who may have forgotten: Son in law George grands Zoe and Peter and daughter Kristan and on the right daughter Kate, husband Ian, grands Maddie and Leah. It's been a great summer for us and we look forward living through the seasons with all the families within 20 minutes of each other.

Two other milestones also occurred this year: Sandy and my 50th wedding anniversary AND our ten year anniversary since she gave me one of her kidneys in 2007!

We will return to Italy to celebrate this month this time to Sicily for two weeks. Last year we went to Sorrento Italy and a Lancia Fulvia similar to the one we owned in 1970's followed us home. (see pic below) . Sandy is assured that no other cars will cross the Atlantic. I will close with a few pictures of my young granddaughters and a pic of a happy meeting of Sandy, me, **Laura Mallard,** and **Carey Hengstenberg** at the Waterbury Arts and Crafts fair this summer . Nice Surprise. Also I am very proud to congratulate our own **Craig Manning** for receiving this year's coveted **N L Bowen award in Petrology.**

That's all for this year. If any of you make it to Vermont, please come and visit us in Fletcher.

Three Generations of the Doolan Clan gathering in Fletcher

Above Left: Barry and Sandy only a few years ago; Above Right: The new addition to our family, a Lancia Fulvia;

Below Left and Right: Katie's kids enjoying life in Fletcher

M.S. Alums Carey Hengstenberg (L) and Laura Mallard (R)
at the Waterbury Arts and Crafts Fair, Summer

Jack Drake: Greetings to all. Another year, another newsletter. I am still at it, but as they say – life is good. We still spend 4 – 5 months during the winter in California near Santa Barbara (where winter never comes). We just rent a small cottage in Carpinteria, a small town 12 miles south, and spend our winter birding, golfing, enjoying the cultural activities is Santa Barbara and doing volunteer work. I help out in a used book store that raises money for the library, am a member of "Seal Watch" a group that tries to protect a beach area where harbor seals pup, and also work with "Carpinteria Beautiful". Ruthie has been a volunteer in an afterschool homework program for elementary school students, most of whom are Hispanic. It has been great because it has given us access to a whole different culture. Life in Vermont is the usual mix of Burlington and our camp on Lake Champlain. Our granddaughters especially like the water sports, fishing, swimming, stand-up paddle boarding. We managed to fit in golf with Barry, biking with Gaby and Keith and visiting Char in the Adirondacks etc. This year we also spent 3 weeks on Mt. Desert (adjacent to Acadia National Park). And by the time you read this we will have been to Cuba, one of the stops on my "bucket list" (if nasty politics don't intervene). So life has been and continues to be full and fun!!

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.

Son Nathan, his wife Jennifer, granddaughters Lydia (L) and Pascale (R)

At The Wild Center, Tupper Lake NY, while visiting Char in the ADK's

David Bucke: Hello out there to all of you in the UVM Rocks Nation.

The Bucke household has continued to cruise in retired mode. Gardening and mowing and general grounds keeping at our Sleepy Hollow "estate" are still favorite pastimes. As years move on, however, the mode does get some new looks. For instance, we now have 7 chickens raised from chicks that are providing way more eggs than we can use. On a sad note, we have sold our RV motor home. No more 6-to-8 week travels across our wonderful country. Some medical hassles for Dave, labeled "cold agglutinin hemolytic anemia" (Google it if you want), keep us closer to home except for maybe a quick foray for couple of weeks at a time. Donna views the end of our long road adventures in a positive light by relishing the memories of all the great things we've been able to see and do "out there". I just longingly wish we could do more.

We still hope to be able to continue our 10-12 day getaways going to somewhere warm during the winters. Last February we spent 12 wonderful warm, relaxed days in Sint Maarten mostly on the Dutch side of the island (thus the spelling). It's so sad to see the devastation Hurricane Irma caused there. Our travels do allow us to clearly visualize the places and empathize with the people experiencing terrible events like the Caribbean and Gulf Coast hurricanes as well as the recent California fires having visited those areas a number of times.

Oh yes, we do have some very special good news! Our second daughter, Karen, has become a grandmother! Her daughter, Allie, gave birth to a sweet little guy, Bodhi, in late July. I guess that makes us great grandparents, doesn't it? Bodhi and his parents live in VA across the river from DC. We're proud and happy but I'm still a bit uneasy holding a little guy like that -- afraid I might break him.

The picture is from Christmas 2016 but, hey, we still look the same. [Very little change since our arrival at UVM in 1969 :>)] Our best to you all,
Dave & Donna

Our new email address is: ddbucke@gmail.com .
I think my UVM mail still works & flips into the gmail box -- but maybe not.

With great grandson Bodhi.

Graduate student information, research and activities can be found at

www.uvm.edu/geology/?Page=enews/graduate_students.html

This year's outstanding Graduate Teaching Assistant Alison Denn

RECENTLY COMPLETED M.S. THESES

All theses: http://www.uvm.edu/~geology/?Page=gradresearch.html&SM=oppmenu.html

2017

Gina Accorsi - Fingerprinting Wolframite: An Atomic/Crystallographic, Chemical and Spectroscopic Study Along the Solid Solution Series

Jennifer Bower - Speciation, Distribution, Prediction, and Mobility of Lead in Urban Soils: A Multiscale Study

Alison Denn - Detecting Landscape Response To Perturbations By Climate And Base Level In Central Pennsylvania Using In-Situ 10Be and 26Al

John Gilbert - Crustal Deformation During Arc-Flare Up Magmatism: Field And Microstructural Analysis Of A Mid-Crustal, Melt Enhanced Shear Zone

Michael Ingram - 4d Strain Path Recorded In The Lower Crust During The Transition From Convergence To Continental Rifting, Doubtful Sound, Fiordland, New Zealand

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 10Be 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 - Understandng 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

HURRAY FOR THE LIBERAL ARTS and GEOLOGY MAJORS!!

Graduating seniors with Stephen Wright at commencement ceremonies, from left to right: Will Vincett III, Jack Ehrenkranz, Jake Zanoni, Stephen Maglio, Connor Remington, Taylor Norton, Elisabeth McElwee, Patrick Sullivan

2017 Charles G. Doll Award winners: *Patrick Sullivan (left) and William K. Vincett III (right)*

2017 Bucke Award winner: *Brooke Phillips*

2017 MSA Undergraduate Prize Winner: *John L. Sawyer Shaw*

To learn more about undergraduate student opportunities, go to:
http://www.uvm.edu/cas/geology/research-student-opportunities/student-opportunities

COME SEE US AT THE FOLLOWING:

***2018 NATIONAL GSA Meeting:*.22 - 25 October, Seattle, WA, USA**

***2018 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/

2018 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

On the next few pages 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.
Enjoy a trip down Memory Lane!!

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 truly a blast from the distant past – check out the following photo from the very first regional Geology trip in 1975!!!!