Volume 39

2016

UMD

Earth & Environmental Sciences Newsletter for Alumni & Friends

In this issue:

-Invitation to our annual spring banquet (this means you!)

-New faculty introductions

-Blast from the Past

Happy Holidays, everyone.

Well another year has passed and there is no shortage of news. This year we said goodbye to Jim Miller as he is now retired and living the life in Thunder Bay; as you may know, Jim got married in September 2015 and chose Louise over us. We wish Jim and Louise all the best and we know that they are just across the border if we need them.

As we say goodbye to Jim, we turn around and welcome Salli Dymond to our faculty. Salli received her PhD in watershed hydrology from the University of Minnesota Twin Cities in 2014. Her research focuses on the movement of water through forested ecosystems, particularly the impact of natural and anthropogenic processes on the hydrologic budget. Salli's husband Ben is an assistant professor in Civil Engineering and we are excited to have them both at UMD.

Last year we introduced you to our two new faculty members, Latisha Brengman and Fred Davis. In order to accommodate their research labs and the necessary ventilation, we moved our teaching labs from the Chemistry building to Heller Hall and set Latisha and Fred up in the vacated space. Now you are probably wondering where we put teaching labs in Heller Hall? Rooms 202 and 206, which were once grad student offices were converted back into classrooms; turns out that is what they originally were. So now we have our teaching labs right down the hall and all of the lab supplies in Jim Miller's old office. This switch has worked out extremely well; chemistry was locked at night and all weekend, but now our students have 24/7 access to the labs and teaching materials.

This past summer the Wasatch-Uinta field camp celebrated its 50th anniversary. Some of you ventured out to the Chateau Apres in Park City for the on-site celebration and many more of you met up in Denver for the combined UMD, Wisconsin, Michigan State, Illinois, and Iowa celebration.

For those of you that we have not seen in awhile, I want to sincerely invite you to our annual department banquet. The dinner and awards ceremony is scheduled for Friday, April 14th. If you are interested in the banquet please email us at dees@d.umn.edu or give us a call 218.726.8385.

Wishing you all a Happy New Year!

To Our Donors:

We thank the following alumni and friends who have supported our students and programs with a charitable gift in the past year. Listed below are the names of individuals and organizations who donate funds to the Department of Earth & Environmental Sciences, and includes those donations that the University posted to our department accounts by press time.

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William J. Bangsund
Nancy J. Beaudet
John W. Beck
Jonathan H. Berg
Marta B. Bianchi & John Boone
Cynthia M. & Richard Bintzler
Alyssa L. Braaten
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Donald M. & Mary F. Davidson
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Please join us at Greysolon Plaza's Moorish Room on Friday, April 14th for an evening to reconnect with faculty, alumni and friends, and to meet our new faculty and current students!

Earth and Environmental Sciences Department
2017 Annual Banquet

Social hour starts at 5:30 pm - cash bar

Dinner served at 7:00 pm - Italian buffet with dessert

Program and award presentations begin at 7:30 pm

Parking is free after 5:00 p.m. (parking ramp behind the Sheraton, handicap accessible)

Price: $20 per person

Please RSVP by Friday, March 31, 2017

Phone: (218) 726-8385
or
E-mail: dees@d.umn.edu

Undergraduate Student Presentations

Spring 2016 UMD UROP Showcase
University of Minnesota, Duluth

Hanson, S., "Investigating Primary Mineralogy and Textures of the Biwabik Iron Formation, from the ~1.9 Ga Mesabi Iron Range, Minnesota"

20th Year UMD Undergraduate Research and Artistic Showcase

Essig, E., "3D Geological Mapping Using Terrestrial LiDAR at Soudan Underground Mine"

Dobosenski, J., "Evaluating the Effect of Climate Change on the Growth of Cisco (Coregonus Artedi) in Lake Superior"

Sager, T., "Evaluating H/V Analysis of Passive Seismic Data as a Means to Map Sediment Thickness in the Duluth-Superior Harbor"

Webster, C., "Gillies Lake Oxygen Isotope Analysis"

The Institute on Lake Superior Geology 2016
Duluth, Minnesota

Essig, E., Mooers, H., Gran, K., "3D Geological Mapping Using Terrestrial LiDAR at Soudan Underground Mine"

Lambert, C., Swenson, J., "Millennial-scale Shoreline Bluff Retreat Rates in the Western Arm of Lake Superior"

Puzel, R., Upton, M., Christenson, J., Ken, M., Spreitzer, S., Jirsa, M., "Geologic Mapping of Neoarchean and Proterozoic Rocks Near Kekekabic Lake, Northeastern Minnesota" by students of the Precambrian Research Center's 2015 Field Camp

Sager, T., Wattrus, N., "Evaluating H/V Analysis of Passive Seismic Data as a Means to Map Sediment Thickness in the Duluth-Superior Harbor"

VanderWaal, G., Schardt, C., "Influence of Mineral Liberation on Metal Leaching and Dissolution Rates in Ore Material and Associated Host Rock"

Graduate Student Presentations

The Institute on Lake Superior Geology 2016
Duluth, Minnesota

Asp, K., Clark, J., Eshler, K., Groff, P., Mcclendon, T., Rode, A., Salings, E., Spinelli, K., Vander Syst, K., Walsh, A., Larson, P., "Bedrock Geology of the Devilfish Lake Area, Cook County, Minnesota"

Asp., K., Schardt, C., "An Investigation of Ni and Cu Isotopic Fractionation in Basal Duluth Complex Cu-Ni-PGE Mineralization, Northeastern Minnesota"

Brown, E., Miller, J., Balles, A., Helms, R., Penzel, G., Smith, L., "Geology of the Cherokee Lake Area of the Boundary Waters Canoe Area, Cook County, Minnesota - 2015 Precambrian Field Camp Capstone Mapping"

Mulcahy,C., Miller, J., Mahin, R., Beach, S., Nowack, R., "Emplacement and Crystallization History of Ni-CU-(PGE) Sulfide-mineralized"

Matko, M., Schardt, C., "Small Scale Microanalysis of Rock and Mineral Textures and its Relationship to Mineral Separation"

Upton, M., Puxel, R., Christenson, J., Ken, M., Spreitzer, S., Jirsa, M., "Geologic Mapping of Neoarchean and Proterozoic Rocks Near Kekekabic Lake, Northeastern Minnesota", by students of the Precambrian Research Center's 2015 Field Camp

Geological Society of America 2016
Denver, Colorado

Shea C., "A 7000 Year Oxygen Isotope Record of Climate Change in Southwestern British Columbia, Canada"

Treat, I., Gran, K., Lahr, E., "Ravine Alluvial Fans as Records of Holocene and Western Settlement Disturbances"

227th Meeting of the American Astronomical Society 2016
Kissimmee, Florida

Burley, P., "Astronomical Alignment of the Stonehenge Greater Cursus ca. 3480 BC"

Megalithic Odyssey Symposium 23016
Marlborough, Wiltshire, UK

Burley, P., "Stonehenge and Cranborne Chase: Monuments to the Origin of Life"

Leicestershire and Rutland Dowsers 2016
Groby, Leicestershire, UK

Burley, P., "Grand Design of the Stonehenge Landscape and the Station Stones of Stonehenge"

Bristol Dowsers 2016
Bristol, Bristol, UK

Burley, P., "Sacred Spherical Geometry"

2016 South American Space Generation Workshop & 1st Latin American Congress of Astrobiology
Lima, Peru

Tovar, D., "Active Volcanism on Venus? Insights from Venus Express Mission"

International Course of Volcanology 2016
University of Gerona, Olot, Spain

Tovar, D., "Detailed geological map of Fracture Zones on Aphrodite Terra (Venus) and their link to Tectono-Magmatic Structures"

Faculty News

Latisha Brengman

I am happy to be starting my second year here as a part of the UMD community!

Working predominantly in the Precambrian Eon (4600 – 541 million years ago), my research draws from a variety of disciplines including sedimentology, stratigraphy, geochemistry, and petrology to focus on questions relating to early Earth processes. To date, my research involves both field and laboratory work, and seeks to determine and test hypotheses related to Precambrian earth-system evolution using tools from sedimentology, petrogenesis, and element and isotope geochemistry.

The main rock type of interest to my work is called "banded iron formation", or "BIF" for short. These rocks formed between 3.8 and 1.8 billion years ago, at a time when most of the ocean is thought to have been without oxygen. Because they are formed in the ocean, BIF are unique rocks that can provide information about what the ocean was like in the distant past. My projects are centered around investigating the transfer of elements from the continents to the ocean, and the preservation of such signals in the rock record. By studying element cycling in the early ocean as it relates to the evolution of the crust-ocean system, we can better determine the conditions under which early life originated, radiated, and diversified.

Recently, undergraduate student Stephen Hanson and I have been working on an undergraduate research project (UROP) to decipher the primary mineralogy within different sections of the Biwabik Iron Formation from Minnesota. To distinguish primary minerals from secondary ones, Stephen was using high-resolution transmitted and reflected light microscopy, coupled with x-ray maps from the Scanning Electron Microscope (SEM) here at the Research Instrumentation Laboratory (RIL). He presented his work at the UROP showcase (November 15, 2016), and we will be presenting additional geochemical data and silicon isotope analyses of quartz cement from iron formation samples at the upcoming annual American Geophysical Union (AGU) meeting in San Francisco in December.

Erik Brown

My adventures continue. I am helping out in UMD's Graduate School and Research Office, working to support graduate students, to foster more interdisciplinary collaborations on campus, and to highlight UMD's research enterprise.

I still managed to maintain some of my own research activities. I led a drilling program in the Basin of Mexico (just south of Mexico City) in February-March 2016, with UMD participants including Byron Steinman, post-doc Mona Stockhecke, and MS student Laura Cappio. The 1065 m of sediments we recovered (6 weeks of 24/7 operations) should yield a 500,000 year record of environmental change and volcanic history directly relevant to the 20 million local inhabitants. I spent a lot of time negotiating with drilling contractors, and working on logistics to assure that the science crews were safe, housed and fed, and had good Wi-Fi connections.

Fred Davis

I enjoyed my first year here in the Department of Earth and Environmental Sciences. I had a great group of students in Mineralogy last fall and an inquisitive and insightful bunch in Earth's Dynamic Interior. I'm looking forward to teaching both courses again this spring, trying some new ideas, and meeting another group of UMD undergrads. The renovation of the Experimental Petrology Lab is underway. I hope to begin setting up shop in the spring and running high-pressure experiments next summer. In the last year I had an NSF proposal funded to perform experiments that will explore whether ancient crust recycled through subduction zones plays a role in generating magmas that erupt at Earth's surface today. These experiments will be the core of a thesis project for Amber Roberts, a new graduate student at UMD this fall. I spent much of last summer at the Smithsonian Institution National Museum of Natural History running experiments to investigate the effects on magma chemistry of varying the oxidation state of Fe in the Earth's mantle. I also had a paper accepted at American Mineralogist that describes a method for determining the Fe oxidation state of spinels in mantle peridotites. I didn't get a chance to pull my skis out of storage last winter, so I am excited to get out on the trails this year!

Christina Gallup

What better way to face challenging times than to help train new geologists and environmental scientists. I feel lucky to work with our students who continue to inspire me to do my best every day. I am also inspired by the commitment and ingenuity of my fellow faculty as we work to improve our curriculum for both the geology and environmental science programs and to foster integration of students and faculty in the department. As chair of the executive committee for the college, I also see the commitment of the college faculty to our mission of excellence in research, education, and outreach. We are especially self-reflective right now and are looking to examine how we treat each other as faculty, staff, and students on campus and ensure that we model the kind of behavior that leads to a productive work environment, an inclusive learning environment, and graduates who know how to work in diverse teams.

Gallup (continued on next page)

Gallup (continued)

My highlights of the last year include teaching the coral reefs field studies class in San Salvador, Bahamas in May with Professor Paul Bates from the Biology Department and our dive instructors Yan and Heidi Saillard. It was fascinating seeing the island after the impact of a major hurricane strike last October. It was the first time we taught the course in May and we were surprised by the difference in heat and bugs, though perhaps we shouldn't have been. Not surprisingly, the students rose to the occasion and we became a close-knit group. I am also excited to have a new graduate student, Claire Rabine, from University of Minnesota Morris, who is working on fossil corals with me. I am pleased to be going to the American Geophysical Union meeting in San Francisco in December to present research on using fossil corals to determine the recent tectonic history of a convergent margin in the South Pacific. Claire is contributing to this research and will be a co-author on the paper. I went to high school in San Francisco and find that I miss it like an old friend, so it will be great to see the city and to spend time with my Dad and brothers who still live there. Lastly, our family got a new addition this summer, an 8-pound Yorkie named Tank. He is a little dog with a big personality and my twins, Sophia and Max, now 7 (!), can't get enough of him.

John Goodge

I was on sabbatical over the past year, giving me a chance to catch up on research (literature review, writing manuscripts, interacting with colleagues); to start some new research collaborations (field work in Australia and visits to allied Antarctic geology, geography, and glaciology programs in Australia, UK and Denmark); and directing the RAID drilling project. Vicki and I spent several months based in Perth, giving us a chance to interact with colleagues at the University of Western Australia plus other universities in Washington, Canberra, and Tasmania. Highlights included field work in the Pilbara craton in northwest Australia, showcasing some of the world's oldest continental crust (~3.7 billion years old), and a later trip to the Galapagos Islands, home to some of the world's youngest rocks! The RAID project continues to go well. The drilling system arrived at McMurdo Station by vessel in January, where it has been hunkered down for the winter. With the coming austral summer, we're beginning Antarctic field trials in December of this year, drilling a set of three boreholes through about 600 m of ice into rock below. Our project website (www.rapidaccessicedrill.org) where you can sign up to get news and updates launched earlier this year, and gives background on goals and capabilities, I hope to be posting updates from the field trials to Facebook and Twitter this season, so stay tuned!

Karen Gran

I'm back in the middle of everything, after a wonderful year on sabbatical. I have a full class in Geomorphology and another sixteen students in Introduction to Stream Restoration, with many of them planning to continue on to the capstone course this spring. Next fall, we are working on a new stream crossing design course that will be taught jointly with the US Forest Service (USFS) and Civil Engineering and allow students to take a USFS short course and continue on to a design project.

On the graduate student front, Ian Treat continues work on ravine evolution in the Le Sueur watershed, while Anna Baker is continuing her research on phosphorus. Lara Scott has been monitoring a new restoration site on the North Shore to better understand the role of off-channel ponds on surface-groundwater exchange. A new student, Ellie Brown, will be monitoring bluff stabilization projects using a combination of terrestrial lidar scanning and structure-from-motion from drone footage (we got a drone!).

This past year I had a chance to catch up on a number of projects, travel more, and work with two firms on stream restoration-related projects to gain more experience to bring back to the classroom. Travel highlights including attending the Earth Educators Rendezvous in Madison in July and the Binghamton Symposium in Geomorphology in Fort Collins in September. On the home front, the kids keep growing (now in 4th and 8th grades), and we all still love living in Duluth.

Vicki Hansen

So this time last year I was in gorgeous Perth Australia, 'Oz' where I was honored to be named a Gledden Visiting Fellow, supported by the Institute of Advanced Studies, at the University of Western Australia (UWA). This was the second trip to Oz following on a trip to the Pilbara Craton-3.5 plus billion-year old rocks, in June. Academic year 2015-16 sabbatical also brought trips to the Galapagos, Arizona, Denmark, Sweden, and the UK (pre-Brexit!). The lattermost included a wonderful week-long Venus International Conference held at Oxford University providing a unique opportunity to consider Venus from her core to her very own *induced magnetosphere* (who knew?!) and all parts in between. The trip also afforded me one-on-one discussion time with my wonderful Madrid colleague and Venus partner in crime, Dr. Ivan López. I learned an incredible amount, while enjoying a truly amazing Harry Potter-type setting for three incredible meals a day in Great Hall fitting of young wizards. I snuck in time to explore gorgeous gardens, amazing Oxfordian architecture, museums, and even a pub or two. What a treat to bookend my academic sabbatical year with a comparison of Perth's relative youth and Oxford's rich history-lovely contrasts in gardens, arts, architecture, geological settings, culture, and, yes, even 'English' accents. Returning home to Duluth (further contrast in the above categories) included a wonderful summer and fall, with new bike trails to explore, our amazing natural setting, a wide range of weather, and of course, ultimately, a return to campus and the classroom. The past year was also most notable for the many planetary explorations within our solar system (and beyond) that I continue to learn from and enjoy as an armchair (web-surfing?) adventurer.

Christian Schardt

2016 started with a bang - NRRI hosted a unique test laboratory that segregates rocks and ore using electricity. Matthew Matko is currently using this technology to study mineralization and alteration on a microscale. I also co-organized the annual Institute on Lake Superior Conference (ILSG) with Jim Miller. The event successfully showcased UMD student work and faculty/professional research from various institutions with ties to Lake Superior.

On the research front, a new project will investigate high-technology metals such as In, Ge, Ga, or Tl. Initial work will focus on a known Zn anomaly in the Vermilion district. Later work will expand to other regions to determine what controls the accumulation of these metals. Another new project explores alternative technologies to produce metallic titanium from TiO_2 resources in Minnesota. Continuing work on the Duluth Complex, I traveled to the Philippines to collect samples to study weathering, element mobility, and metal isotopic signatures of magmatic Cu-Ni-PGE deposits and laterites. Other ongoing projects include a collaborative project in the Vermilion district with the NRRI and the University of Wisconsin-Eau Claire, and a computer modeling study of the formation of seafloor brine pools and SEDEX-style mineralization. Because the UMD PRC field camp did not run this year, I was invited to teach field camp with the South Dakota School of Mines and Technology and spent four weeks in the Black Hills helping students acquire valuable field skills. For the department, I successfully acquired a rock polisher to produce teaching material and help student clubs raise funds; this also provides the opportunity to offer a rock polishing service to the community. In addition, a new, digital camera for reflected light microscopy will be purchased to improve our ability to document ore textures for both teaching and research purposes.

Byron Steinman

The last six months have been hectic for Kristin and me. In May we welcomed our child into the world, Charles Benedict Steinman! He is a happy, healthy, growing boy. His current favorite activities include bouncing up and down, putting things into his mouth, and pulling off your glasses. Mom took some time "off" (translation - she's working harder than ever) to spend with Charlie until he goes to day care next year. Overall, it has been an enriching experience, and we love our little guy!

On the science side of things, my first graduate student, Laura Cappio successfully defended her thesis this past May and is currently traveling with plans to apply for positions in secondary education. The student leader of my lab group is now Chris Shea, who is in the second year of his MS degree and is on track to graduate next summer. Chris is working on lake sediment cores from southern British Columbia in order to produce records of the timing and magnitude of drought. This fall I brought in two new graduate students, Kathryn Vall from North Dakota State University and Zach Wagner from Gustavus College. Kat will be working on lake sediment cores from Isle Royale that we collected this past summer. Her project will focus on using analysis of metals in the sediment to reconstruct the timing and intensity of ancient copper mining/annealing. Similar to Chris's project, Zach will be working on lake sediment cores from Central America and the Pacific Northwest to produce records of drought events over the past 8000 years. I've been fortunate to be part of several projects that recently came to fruition and have published six papers so far this year (one as lead author) in a variety of journals including “Nature, Global and Planetary Change”, and “Quaternary Science Reviews”. Kristin, Charlie, and I are having a great time together enjoying UMD and the great city of Duluth.

John Swenson

This year began on a sad note, with the death of our beloved poodle, Steffi, who for thirteen years provided a bottomless reservoir of laughs, unconditional love, and, with Sarah, unrivalled napping ability. She is missed dearly. Fozzie, the labradoodle, remains in good health and spirits and, in March of this year, welcomed a new playmate to the family. JoJo is the epitome of mutt-DNA testing reveals the following lineage (‘muttage’): 3/8 Labrador retriever (not unexpected); 1/8 Husky; 1/8 Boxer (!); 1/8 Rhodesian Ridgeback (!!); and 1/4 undifferentiated ‘small, working dog.’ What a cocktail! She resembles a small lab with some funny features, notably the pronounced forehead creases and long, thick tail of the Ridgeback; she is all black, save for a splash of white on her chest. Too smart, and a ton of energy, she desperately needs a job and a fenced-in yard. We love her to death and look forward to many years of her company and associated bedlam.

Per usual, I taught four classes-introductory geology, sedimentology and stratigraphy, well hydraulics, and energy resources-and conducted research on a wide range of sometimes disparate topics. As always, I am lucky to work with a great group of students: Rebecca Eiden is wrapping up her thesis work on the paleo-hydraulics of the Keweenawan Fond du Lac Formation and will defend next semester; Crystal Lambert, one of our great undergraduate Geology majors, completed her research on millennial-scale rates of shoreline/bluff retreat in western Lake Superior and presented her work at the Institute on Lake Superior Geology; finally, Gerrit VanderWaal, another fine undergrad, is wrapping up an ‘old school’ field-based study of Holocene sediment provenance in the western arm of Lake Superior. And, as I write this, I am enjoying a nice apple (a Black Oxford, if you are interested) from my orchard, which, despite my health-induced neglect, enjoyed a fantastic growing season.

Nigel Wattrus

Some of you may know that I have a temperature array buried in my front yard at home which I use to "watch" the ground freeze and thaw in the winter. This is an important problem in Minnesota and the northern tier states in general, because seasonal freezing requires the state to impose load restrictions on the trucking industry to protect roadways during the spring thaw. This coming winter I will be conducting an experiment at the UMD Farm to monitor the seasonal development of frozen ground using seismic waves. As the ground freezes the seismic properties of the near-surface sediments change. Each week, I will collect data at the experimental site I have established at the Farm. It should be a great dataset!

The other project that I am particularly excited about is a project to use a drone to map shallow water bathymetry. In the past I have conducted several multibeam sonar surveys on the Great Lakes to map spawning sites used by lake trout. These are always hairy surveys because the water on these sites is always so shallow. This new approach applies photogrammetry to reconstruct a surface's shape from a collection of photographs of the object taken from various positions. This approach was recently used to reconstruct a 3D image of a temple in Syria that had been destroyed by ISIS. Karen Gran and I acquired a drone this past summer to test this concept for mapping landforms. I flew an evaluation survey in a gravel pit near Ely this summer. The results were spectacular! We are now getting ready to fly a survey in Amity Creek with one of Karen's graduate students, our first "real" survey!

On the home front, the big news in the Wattrus household was my son's graduation from Harvard last May. He's continuing on at Harvard, working on his Ph.D. in Stem Cell Biology so we'll have numerous excuses in the next few years to visit Boston! While we were in Boston for Sam's graduation, Jane and I took a side trip to western Massachusetts to visit Tom Johnson and his wife Kate. Tom retired from UMD last year and they have been busy renovating their new home in Shelburne Falls. Tom says "Hi". I'm sure he'd appreciate a hand if you're in the area!

Graduates

BS

Geological Sciences

Joseph Buchanan
Espree Essig
Brittany Hoover
Gary Kelner
Crystal Lambert
Ryan Puzel
Lauren Sable
Tyler Sager
Kelsey Schenck
Seth Veit

BA

Geological Sciences

Kristin Elmer
Samuel Letourneau
James Letsos
David Rostvold
Chad Theismann

MS

Geological Sciences

Kristofer Asp
Laura Cappio
Michael Doyle
Adam Leu
Sarah Sauer

BS

Environmental Science

Thomas Aaker
Samuel Berndt
Taryn De Rosia
Jamie Dobosenski
Danielle Gronhovd
Michael Huska
Benjamin Lafond
Jaden Materi
Lowell Moon-Sather
Ashlee Ricci
Dan Robel
Nathan Sorensen
Cole Webster
Nicholas Winter

Meet our New Faculty

Salli Dymond

I am excited to join the faculty of the UMD Department of Earth and Environmental Sciences in spring 2017. I grew up in southwestern Virginia (the state, not the town in Minnesota) and received both my BS and MS degrees from Virginia Tech. I moved to the Twin Cities in 2010 where I pursued a PhD in Watershed Hydrology. Upon defending in 2014, I briefly moved to Davis, California and worked as a research hydrologist for the USDA Forest Service. I missed winter greatly while in California and am thrilled to be moving back to Minnesota and putting down roots here. I look forward to exploring the area with my husband (who's a faculty member in Civil Engineering at UMD), my two-year old and six-week old daughters, and two dogs.

I am a forest ecohydrologist, meaning that I study water as it moves through soil, plants, and the atmosphere, typically in forested systems. Specifically, I am interested in how natural and anthropogenic disturbances affect the water budget of forests with an emphasis on the linkages between evapotranspiration, subsurface flow, and stream discharge. My research is largely field-based, utilizing sensors to detect water fluxes and volumes, yet I also include analytical procedures such as dendrochronology and isotope chemistry to provide information on current and past plant water use and transport. I am hoping to build a stable isotope hydrology laboratory at UMD that will allow me to study the movement of water across plants and landscapes.

At UMD, I am looking forward to helping lead the environmental science program and add to the diversity of courses currently offered. This spring I will teach a new course on watershed hydrology to undergraduates and graduate students in the Water Resources Science program. My ultimate goal at UMD is to excite the next generation of environmental scientists and managers by demonstrating how novel research and critical thinking can be used to solve applied problems. I look forward to developing relationships within the tight-knit community of students, faculty, and staff in the Department of Earth and Environmental Sciences and look forward to contributing to the success of this great department.

Faculty Emeriti News

Jim Grant

The New Year started off, as usual, with our annual trip to Los Cabos, then off to Park City for spring skiing, in which I did not participate very much. But this year was the 50th anniversary of the Wasatch Uinta Field Camp, in which I was very much involved since I arrived in the Minneapolis Geology Department in 1964. So it was good to see some of the early birds again, and visit with Ed and Sue Hosenfeldt, who were our hosts way back then at the Chateau Après in 1967. It was wonderful to go over Guardsman's Pass again and revive memories of Albion Basin where the spring flowers were blooming at the end of July, just as in years gone by. And there were still lovely skarns to be viewed - from a greater distance than when I was younger. Christabel and I went up again after the reunion, and saw two moose, which I'd not seen there before. We missed Bob Bright and his red jeep: Bob got us off to a great start!

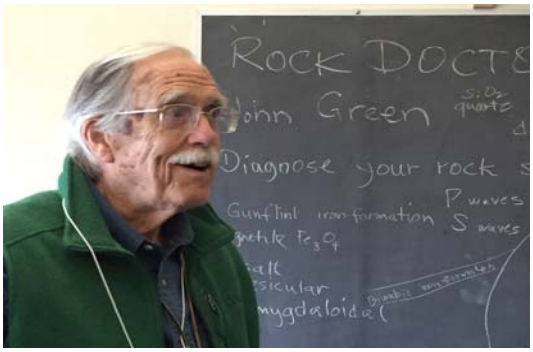
Thence back to more body-rebuilding: I had an aortic valve replacement in September, followed by a cluster of small strokes, followed by lots of rehab which continues still. I had the surgery at the U of M in Minneapolis, so that Christabel and I would be in reach of our wonderful support group, which is a tremendously big deal, in case you don't realize it!

And finally for this edition of the newsletter, my Minnesota River Valley maps from 50 years ago are really honestly almost finished, and should be published by the time this newsletter is out! That is very satisfying for an old codger and would not have come to pass without the folks at NRRI, especially Steve Hauck and Julie Oreskovich, to whom I owe immeasurable thanks!

Christabel and I wish you all a very happy Christmas and a wonderful New Year!

John Green

I'm still doing pretty well in my 17th year of retirement, trying to keep up with goings-on in the Midcontinent Rift. During this past year PolyMet's EIS for their proposed Cu/Ni – PGE mine was deemed "adequate" and the long permitting process is underway at the DNR. I led a few field trips for various groups, the biggest of which was co-leading (with Terry Boerboom) a weekend trip along the North Shore in Cook County for the Institute on Lake Superior Geology in May. As usual, I've checked out a number of "meteor-wrongs" for citizens. Perhaps the most interesting was a huge local boulder not of Sudbury impact breccia, as the finder thought, but of Archean conglomerate from the Boundary Waters.



Jan and I took a trip in late May to the Connecticut River Valley to visit family and old family gravestones in Connecticut, Massachusetts, and New Hampshire including

Green (continued on next page)

Green (continued)

distant cousins (several times removed) who were State Geologists of both Massachusetts and New Hampshire in the 1800s. Jan continues to serve on the Board of Minnesota Audubon and to work intensively on the Minnesota Breeding Bird Atlas project.

Post-election blues: we're really troubled by our president-elect's (and his party's) scientific illiteracy, and especially with regard to our international position on global warming.

Jim Miller

Greetings from the Great White North. I write this on US Election Day and can't help but think that, depending on the results, I have beat the mass migration into Canada. After retiring from UMD last May, I moved out of my UMD offices, quickly sold my Duluth home and most of its contents, moved to my wife Louise's home near Thunder Bay, and promptly became a permanent resident of Canada. Louise and I spent much of the summer and early fall traveling to visit my family in the states, including trips to Pennsylvania, Minnesota, Illinois, Colorado, and Montana. This fall, we have been involved in putting a small addition onto our cozy lakeshore home. We live on Lake Superior with a great view of the iconic Sleeping Giant greeting us each day. More notably, we feel "giddy" (quoting John Playfair) to be situated on a great unconformity between Archean granite and Paleoproterozoic iron formation!

In my "retirement", I plan to periodically stay engaged in <u>fun</u> geology. Mostly this means continuing to be involved in my passion for public outreach with field classes at North House, University of Minnesota and elsewhere. For the upcoming winter term, I will be a contract lecturer at Lakehead and teach Igneous Petrology (the last class I taught at UMD). I also have several standing consulting contracts with local exploration companies to do my favorite activities - petrographic work and geologic mapping. In all this, I'll do my best to abide by Louise's definition of "periodically".

Ron Morton

It has been a fun year but time goes way too fast. In June Penny and I spent two weeks traveling around Iceland with friends. Since we were last there, about five years ago, the quality of the food has greatly improved as have the number of tourists. In January we spent a week skiing out in Big Sky, and also made a couple of trips to Florida to visit my dad; he spent most of the summer here in his cabin.

Penny attended the 50th reunion of the Wasatch-Uinta field camp in Park City. She got to spend some quality time in her old room at the Chateau; I'm not sure if she also got to enjoy Ed's famous mystery meat. She continues as the associate dean of the Swenson College of Science and Engineering, but starting in January will be working only half-time.

My new book, "From Jay Cooke to Two Harbors: A Walking Guide to the Superior Hiking Trail," written with Judy Gibbs, has just been published. Currently I am working with Carl Gawboy on our fourth book titled "Nanaboujou and the Winter Maker: Ojibwe Earth and Sky Stories."

Other than that we are very much enjoying our three grandchildren as well as our relaxed, if busy, life in the Northwoods. With gardening, hiking, skiing and adventures with our grandkids, including many s'mores campfires, all is pretty darn good. So all the best to everyone and hoping your fall has been as warm and lovely as ours.

Dick Ojakangas

I keep moving on my four-wheeled walker. I'm planning on installing a coffee cup holder, a wine glass holder, and a siren. I gave a talk at ILSG Duluth, entitled, "What Happened in Northern Minnesota Between 2700 Ma and 1900 Ma? The Answer Is In the Pokegama Formation: A Multicycle Sedimentary History!" For the UMD University for Seniors, I taught "A Medley of Geologic Topics": "THE BIG PICTURE of Continental Drift & Plate Tectonics, Development of Geologic Thought, Evolution and the Fossil Record, Extinctions, and Whales and Whaling". Also presented a lecture at the Minnesota Minerals Education Workshop: "The Origin of MN Iron Ore". I gave two lectures on a FinnFest USA cruise, Boston to Montreal, and presented "The North Shore and More!" to Minnesota Naturalists Association at Wolf Ridge.

Peaches published her 30th cookbook, HOMEMADE, which is also her memoir. I've been following her to Norsk HostFest in Minot, North Dakota where she was inducted into the Scandinavian American Hall of Fame (the only Finn!), to the American Swedish Institute in Minneapolis for a book launch, to a Finnish Heritage event in Detroit, a fundraiser for Bethany Crisis Nursery (LSS) at the Kitchi Gammi, Duluth.

You all have a good year, too!

Rip Rapp

Now 86 years old I am slowly fading away. Went to my last scientific meeting last fall in Barcelona, Spain. Likely to go to GSA in the future only when there is something special I have to do. Still go to campus fairly often. Most of my articles submitted are slowly coming out. Second volume of my autobiography finished. What is left?

Student Scholarships, Awards and other Notable Mentions

Outstanding Graduate Teaching Assistant Award (Randy Seeling): Todd Kremmin

Outstanding Graduate Student (Ralph & Ellen Marsden & Randy Seeling): Nathaniel Mitchell, Edward Gazzetti

Outstanding Senior Award-Geology (Ralph & Ellen Marsden): Crystal Lambert

Outstanding Senior Award-Environmental Science (Barr Engineering): Jamie Dobosenski

Outstanding Junior Award-Geology (Hugh Roberts Scholarship): Stephen Hanson

Outstanding Junior Award-Environmental Science (Barr Engineering): Gina McClanahan

Tools-of-the-Trade Award: Lino Rauzi, Anthony Wetzel

Harry & Margaret Walker Research Fund Scholarship: Paul Burley, Andrew Dennison, Ross Salerno

UMD Crain Family Scholarship: Ann Hunt

Cliff Natural Resources Scholarship: Eric Pierre

Jill & Terry Swor Scholarship: Stephen Hanson, Gina McClanahan, Lino Rauzi, Anthony Wetzel

Estwing Geology Field Methods Award: Anthony Wetzel

Kenneth E. Differt Scholarship: Annika Whitcomb

UMD Peterson Memorial Scholarship: Tyler Untiedt

Frantes Graduate Fellowship: Elizabeth Brown, Kristi Kotrapu, Claire Rabine, Margaret Upton

Roderick Syck Outstanding Field Camp Performance Award: Eric Pierre

Richard Patelke Scholarship: Todd Kremmin, Matthew Matko, Ross Salerno, Connor Mulcahy, Adam Leu, Kristofer Asp, Crystal Lambert, Espree Essig, Ryan Puzel, Sebastian Szymutko, Gerrit VanderWaal, Stephen Hanson, Ann Hunt, Nathan Koski, Dallas Jacobs

FIELD CAMP SCHOLARSHIPS:

Robert L. Heller Field Camp Scholarship: Stephen Hanson, Samuel LeTourneau

"Rip" Rapp Field Camp Scholarship: Matthew Stewart

Charlie Matsch Field Camp Scholarship: Matthew Stewart, Eric Pierre, James Letsos

Steven & Karen Brand Geological Sciences Field Camp Scholarship: Ann Hunt

Ralph & Ellen Marsden Scholarship: Gerrit VanderWaal

Lempi M. & John Pagnucco Scholarship: Ethan Engstrom, Seth Veit

Faculty Emeriti Scholarship: Stephen Hanson

R.C. Bright Scholarship: Ethan Engstrom

Blast from the past...

When we left UMD in 1979, little did we know the traverse we would be making: El Paso (UTEP-Chair), Houston (Exxon Research—Satellite Imagery), DeKalb (NIU– Chair and Provost office), and finally Boulder, Colorado (GSA– Executive Director). Along the way I did manage to keep my affiliation with SEG and was the recipient of the Marsden Award in 2004, we purchased and remodeled a miner's shack in Park City (enjoyed by Field Camp folks over time), and both Mary and I became involved in golf, tennis and bike riding. I even took up doing short triathlons for a spell, but now geo lectures and scrapbooking, while Mary has focused on quilting. After retiring we remodeled a family dwelling here in Tubac, Arizona (45 miles south of Tucson) and made the move. Although our sons and their families are in California and Colorado, we see them with RV trips in the summer. As we reflect upon our 50th wedding anniversary, we both can say that for all our travels, Duluth and UMD, particularly the Geology Department, remains first in our hearts.

SOCIETY OF ECONOMIC GEOLGISTS

UMD's student chapter of the Society of Economic Geologists had a fantastic year. Led by four excellent officers (Espree Essig, President; Stephen Hanson, Vice President; Sebastian Szymutko, Treasurer; and Crystal Lambert, Secretary), the highlights of our year were the fall and spring field trips.

Our fall field trip involved a tour of the Soudan Underground Mine State Park and the Minnesota DNR Drill Core Library in Hibbing, Minnesota. Our tour of Soudan involved access to the MINOS physics laboratory, a walking tour of one of the drifts, and access to an exceedingly unusual borehole ejecting billion-year-old brines.

The spring field trip comprised a week-long tour of southwestern Arkansas and southern Missouri, where we visited a historic cinnabar mine and Arkansas' only igneous intrusion (courtesy of the Arkansas Geological Survey); the hot springs and quartz mines of the Ouachita Mountains; and the Vibernum Trend, home to world-class Pb-Zn MVT deposits. Unfortunately, we were not able to get a tour of Doe Run's operations as previous years, but we managed to find areas of interest near Pilot Knob, Missouri, like Elephant Rocks State Park.

by Gerrit VanderWaal

GEOLOGY CLUB NEWS

The UMD Geology Club was actively involved in promoting geology and expanding our member's knowledge of geological processes throughout the 2015-2016 academic year. During the fall semester our club formulated new concepts to help promote and expand our membership base as well as increase member participation. In addition to successful "Dinner with Professor" events carried over from previous years, the Geology Club participated in fall trips along with the SEG (Society of Economic Geologists). As part of the fall trip, students were able to tour the underground Iron Mine Museum in Soudan, as well as the Minnesota DNR Drill Core Library in Hibbing. This provided some hands on exercises working with drill cores, and allowed students to gain a deeper understanding of the geologic processes responsible for the deposits in Soudan. Members also participated in a joint tour with the Economic Geology class, going underground at the Eagle Mine in Michigan.

As a club we designed and produced numerous vinyl sticker designs as well as custom pieces for various students and organizations. This was a very successful fundraiser during fall semester. We also prepared for our spring fundraiser event, the "Adopt a Rock" sale. We collected, categorized and sorted numerous mineral and fossil samples, which were then sold on campus. In the spring the club co-hosted another trip to the Iron Mine Museum in Soudan along with SEG and SME. Following the Soudan tour we participated in a tour of the future Polymet mine site. The last part of the semester the club focused on coordinating the department banquet and promoting student participation at the ILSG conference which was hosted here in Duluth. It was a very successful and fun academic year. We would like to thank all the students, parents, faculty and staff for making it a great success.

by Sebastian Szymutko

ENVIRONMENTAL SCIENCE CLUB NEWS

The Environmental Science Club is all about getting out and giving back to the community. After the Derechos (very damaging windstorm) that tore through the North Shore this August, club members were eager to get out and assist with trail remediation. We teamed up with COGGS (Cyclists of Gitchee Gumee Shores), a chapter of the International Mountain Biking Association, and took part in clearing of the woody debris that blocked many of the bike trails in Hartley Nature Center. While the season is coming to an end for our collaboration with COGGS, the club is back at it in Hartley Nature Center assisting in clearing of the invasive plant species Buckthorn. Never the type to let harsh weather conditions keep us at bay, the club has unlimited opportunities for students year-round including: various professor presentations, tours of research facilities in Duluth, and community outreach to the local public schools. Meetings are held bi-weekly and membership is open to everyone. *by Paige Melius*

WASATCH-UINTA FIELD CAMP

2016 was a great year to attend the Wasatch-Uinta Field Camp. Not only were there 76 participants overall, but it was the 50th Anniversary. Schools involved this year were from California, Illinois, Michigan, Minnesota, New York, Pennsylvania, and Wisconsin.

There were seven UMD students: James Letsos, Ethan Engstrom, Matt Stewart, Gerrit VanderWaal, Samuel Letourneau, Seth Veit, and myself; one UMD faculty member: Karen Gran; and one UMD post graduate: Allie Severson (Danger). The lucky seven Wasatch attendees decided to spend a week before camp exploring; this included much of Yellowstone National Park, getting our daily cutthroat trout catch in and hiking some extraordinary trails. We also visited surrounding cities like Chamberlain, South Dakota, Billings, Montana, and Salt Lake City, Utah making our presence known. Thankfully there were no flat tires, bear sacrifices, or thundering stampedes. Judging by the weight of the trailer and little void space left in the vehicles, we appeared well prepared for the six-week journey…, but we had no idea what we were in for. One would think after surviving nearly four years of intense geological labor UMD enforces upon us northern acclimated and blizzard dedicated students, that we should be well prepared for Utah, well… sorta. If standing in a nice breathtaking 113 degree hair dryer breeze to help evaporate liters of sweat off your skin mixed with two cans of 99% DEET, one paint bucket of SPF 500, and a lifetime supply of moleskin sounds like a pleasant jaunt down the trail, then the Wasatch-Uinta Field Camp is the one for you. The academic traveling package will include an unlimited supply of kamikaze gnats, piercing flies, and unyielding mosquitos. For recreation, everyone gets to discover a legendary amount of Earth history frozen in time through field mapping, that includes but not limited to: ascending Everest sized hill slopes with hazardous gradients, dodging falling uphill debris of various grain sizes, gazing far into the bright scorching distance in search of a cloud for shade, and outflanking mountain lions on a skeleton ridden landscape.

Aside from the menagerie of alien terrains and hostile wild species, field camp became a memorable benchmark for our graduating class. We visited the heat crematorium of the San Rafael Swell, indulging ourselves with some of the best sequence stratigraphy exposed at the surface. We had the privilege of visiting a pair of Newmont Gold mines in the famous Elko, Nevada region and learned the important aspects of economic geology for gold. Towards the end of the tour we were given permission to gorge in endless piles of fresh gold ridden ore filling our vehicles to the brim. We even got to witness two "shots" (controlled explosions). I was doing fairly well avoiding flat tires until we started driving around in the mine. Thanks to Kurt Burmeister and his swift geological pit crew equipped with rock hammers and tire irons, we continued the tour in record time. There was some nice R&R at the Grand Tetons National Park, nothing better than looking at a mountain while sitting in a river with crystal clear glacial water.

Home base for camp was hosted generously by Ed Hosenfeld and family at the famous Chateau Apres nestled comfortably in Park City, Utah. The 73 ± 3 students, depending on daily injury reports, dispersed to nearby mapping areas throughout the week. We started off on more simple projects such as: Peoa, Chalk Creek and Deer Creek, then worked our way into more involved projects like Bonanza and Albion Basin. The latter two are some remarkable places not only for geology, but very scenic as well. Going to Utah for a six-week class sure sounded like a long detention sentence, instead it ended up being one of the best experiences a student geologist could ask for. After drinking enough water to float a ship and dedication from all the students, instructors, staff, and Hosenfeld family, field camp 2016 became a great success and a memorable experience for all UMD participants.

by Eric Pierre

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What's New?

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Name

Contact information

Degree earned and graduation year

A short paragraph with your news