

# *UMD Geological Sciences Newsletter for Alumni & Friends*

*Editors: Cathy Dziuk, Charlie Matsch, Claudia Rock*

Happy holidays everyone. This is the 30<sup>th</sup> edition of the geology department newsletter. Coincidentally, it has also been 30 years since my first academic interaction with UMD geology. There have been many significant changes in the department since 1977, the most significant of which involve faculty. Again this year we have additions to the faculty to announce, but also new equipment acquisitions, the great success of the Precambrian Research Center, the first Minnesota-based field camp, and the generous contributions from alumni and friends.

Last year I announced that Tim Demko returned to the oil patch leaving a huge gap in our sedimentology offerings. To complicate things, John Swenson is on sabbatical leave this year. However, our body count remains the same. Karen Gran joined our faculty this fall (see her article) on a two-year temporary appointment. Karen received her PhD in geology from the University of Washington and worked on the Twin Cities campus at the National Center for Earth-surface Dynamics, a National Science Foundation Science and Technology Center. Karen is a fluvial geomorphologist and specializes in stream dynamics and restoration. The other addition to the faculty is Matt Kuchta. Matt is finishing his PhD in paleontology at UW-Madison, but he and his wife Amanda Little have lived in Duluth for about three years. Matt is teaching sedimentology/stratigraphy and life and death of dinosaurs.

We are pleased to announce the acquisition of a new scanning electron microscope (SEM)! John Goodge led a group of investigators from several departments on a successful proposal to NSF. The SEM will be set up in a newly remodeled lab by early 2008, and we are currently searching for a full-time technician/lab manager to operate the facility. Thanks to John G. for all the hard work and please read his description of the new facility on page two.

Last year we announced the creation of the Precambrian Research Center administered by the Natural Resources Research Institute and co-directed by Jim Miller and Dean Peterson. The center has received generous support from industry and ran its first six-week field camp in northern Minnesota over the summer. The field camp was a resounding success and Jim Miller gives an overview of the activities on page eleven.

Once again the geological sciences faculty and staff thank our alumni and friends for their generous contributions to research and scholarship in geological sciences at UMD. Last year we reported on the opening of

the new microscopy lab, which has dramatically improved the quality of education in mineralogy and petrology. In addition, we reported on new research and scholarship funds set up by Charlie Matsch and Terry Swor. Since the last newsletter was sent out the Department of Geological Sciences has received gifts totaling over \$130,000. This total includes generous additions from Charlie Matsch, Ellen Marsden, Terry Swor, and Bill Crain and the continued generosity of so many of you. To emphasize the importance of your contributions, the payout from our endowments has allowed us to give out \$24,400 in scholarships, awards, and support for student-related activities during 2007. But we still have more to do. Our long-range goal is to provide scholarships to cover the entire cost of field camp for our students, fund graduate and undergraduate student research and travel to professional meetings, and continue to improve our laboratory facilities. I want to let all of you know that this level of support from alumni and friends is not typical of most departments; you are an exceptionally generous group.

In an effort to update you on the "State of the Department" I would like to report that we are beginning to "burst at the seams." Our number of undergraduates is up and we have nearly as many graduate students; reports by individual faculty will bring you up to date on many departmental activities. As for me, I have six active grad students with five finishing up in the near future (Phil Larson, PhD; Margretta Meyer, MS; John Quinn, PhD; Heather Arends, MS, and Irv Mossberger, MS). I also have several undergraduates working in the lab on various projects. My research and teaching have taken me to Poland to help develop a field-based course with Wroclaw University; I've been back to England to continue work on the spatial and temporal distribution of acid rain during the Industrial Revolution; and I took nine students and my son Ian to Iceland for 16 days. To compensate for the two weeks of missed school, we made videos of Ian describing the geology and history of Iceland and put them on the web for his class to see <[www.ian.agatelake.com](http://www.ian.agatelake.com)>.

So in closing, I would just like say that 2007 has been an exceptional year for UMD geological sciences and we are all looking to the future. Please stop by and visit any time. The coffee pot is always on.



## *SEM Acquisition at UMD*

*by John Goodge*

We continue to grow our equipment and instrumentation facilities. With funding from the National Science Foundation, in early 2008 we will acquire a new, analytical-level variable-pressure **scanning electron microscope (SEM)**. This instrument will greatly advance multi-disciplinary educational and research needs at UMD, including many areas of geoscience. **John Goodge** spear-headed a proposal to the Major Research Instrumentation program with co-PI's from the Biology, Chemical Engineering and Mechanical Engineering programs at UMD, and the Minnesota Geological Survey. The SEM will be used for morphological, textural and compositional characterization of materials critical to many research areas, including natural living and non-living systems and engineered/fabricated materials. The instrument will be capable of high resolution electron imaging (~3 nanometers), and a variable-pressure sample chamber will allow the imaging of soft, wet samples at low vacuum that normally dehydrate under vacuum. In addition to imaging in secondary-electron and back-scattered electron modes, we will equip the instrument with detectors for advanced materials imaging, compositional analysis, and microtextural analysis. These include an energy-dispersive x-ray analysis system (EDS), cathode-luminescence imaging system (CL), electron back-scatter diffractometer (EBSD), and low-vacuum secondary-electron detector (ESED). Together, the equipment cost is about \$400,000. The instrument will be housed on campus in the Chemistry building, and we are in the process of advertising for a new laboratory manager.

The fully-equipped analytical SEM will support ongoing research in Geological Sciences (petrology, mineralogy, structural geology, economic geology, geochronology, crustal evolution, and climate change), and it will provide an essential tool for research in other campus programs, including plant biology, microbial ecology, tissue engineering, carbon nanotube fabrication, and metal-matrix composites. Example uses of the instrument include:

- elemental analysis and element mapping of minerals and other solid materials (EDS)
- structural indexing of crystalline solids for phase identification (EBSD)
- determination of crystallographic preferred orientations in minerals (EBSD)
- imaging of the growth structure of zircon (CL)
- imaging of growth structures in speleothems and corals (CL)
- low-vacuum imaging of floral nectaries (SEI)
- study of biomediated corrosion in metals (SEI)
- low-vacuum imaging of fabricated carbon nanotube structures (SEI and BSE)
- analysis of mechanical abrasion in ceramic alloys (SEI)
- compositional and crystallographic analysis of asbestos (EDS and EBSD)

**ERIK BROWN** I'm continuing to develop new projects using our x-ray fluorescence core scanner (one of two instruments of this type in the US). This device allows rapid determination of the inorganic composition of sediments with 0.2mm scale resolution. Basically, you can put a 1.5 m core section into the device and after a few hours have mm-scale measurements of a suite of a dozen or more elements (for example, Al, Si, S, Ca, K, Ti, Mn, Fe, Rb, Sr, Zr, Pb). My major projects using the XRF are for evaluation of drill core taken in East Africa (in collaboration with Tom Johnson) and in western China (with Steve Colman). The other great thing about this instrument is that colleagues from around the US (even from Spain and Mexico) are coming to Duluth to use it.

I traveled to China for three weeks in May for a lake coring and sampling expedition. I hadn't been to China since 1995. It is a completely different place. Everything that you have heard about the changes taking place in that country can't even begin to describe what's been going on. I then coupled travel to the International Limnogeology Congress in Barcelona with a trip to Aix-en-Provence to visit old friends and renew collaborative ties.

We try to get to the cabin with the kids (Andrew, 11; Lianna, 9; and Matthew, 5) most weekends from June through August. Andrew landed a 31-inch northern, just big enough to get into the Duluth News Tribune's "Nice Fish" column. The kids never want to come back into town. Can't say I disagree with them!

**STEVE COLMAN** The past year was a busy one for me, as I continue to try to balance research, teaching, and administration of the Large Lakes Observatory (LLO). Activities such as renovating and operating our research vessel (RV Blue Heron) and trying to maintain modern laboratories in an old building were particularly time consuming this year. During spring semester, I taught a graduate seminar in global warming

that touched on some of the topics in our undergraduate and graduate paleoclimate courses, but focused more on current and future issues involving greenhouse gas emissions and warming climate.

My two major NSF-funded projects are now well underway. One, entitled "Tracing the late Quaternary record of the Asian monsoon system: Paleoclimate history from the Qinghai Lake Drilling Project," with co-PI Erik Brown (Geological Sciences and LLO), is a study of past climates at Lake Qinghai, China. PhD candidate **Xiuju Liu** began work on this project in September. The other project, entitled "Testing the hypothesis of eastward Glacial Lake Agassiz discharge at the beginning of the Younger Dryas using marine seismic-reflection methods," with co-PI Nigel Wattrus (Geological Sciences and LLO), involves glacial deposits and drainage history of Glacial Lake Agassiz and Lake Superior. MS candidate **Jessica Gary** is partially supported by this project, and she participated in our nine-day research cruise on the Blue Heron in June. I helped Jay Austin get started on a project to examine historical records of lake level and temperature change in Lake Superior. Our first paper, with Jay in the lead, was published in Geophysical Research Letters in March. With the remarkable conclusion that Lake Superior's summer water temperatures are warming twice as fast as regional air temperatures, it attracted considerable attention from the media, including spots on two national newscasts (CNN's American Morning and NBC Nightly News).

The big news at LLO is that we were able to attract three new faculty to fill two new positions and a vacancy. The new positions were created to recruit Bob Hecky, who is a McKnight Professor, and Stephanie Guildford, a world-class team of biological limnologists, who will hold joint appointments with the Biology Department and LLO. We also hired a new assistant professor, Sergei Katsov, on a joint appointment between the Physics Department and

LLO. Sergei applies his Physics training to various processes in lakes, including early diagenesis of lake sediments. LLO now has a fair degree of balance, with at least two faculty on joint appointments with each of the departments of Biology, Chemistry, Physics, and Geological Sciences. Our graduate student population has about doubled as well, so there are a lot of new faces in the Research Lab Building.

**CHRISTINA GALLUP** It is November 8<sup>th</sup>, and we just had our first snowfall in Duluth. There is a kind of seasonality to academia that is both energizing and reassuring: new students begin studies, new projects get underway, students and projects develop and mature, and students graduate and projects wrap up.

I have two undergraduate students starting research projects with me this year: **Tyler Carlson**, who started last spring, and **Matt Pendelton**, who started this fall. Tyler and Matt are both working on fossil coral samples from Vanuatu that **Nick Freiburger** collected as a graduate student in 2006. Tyler is doing the U/Th dating of the samples to determine the tectonic/sea level history of the samples, while Matt is doing the X-Ray diffraction and thin section work to document the samples' preservation.

Two students with extensive expertise in U/Th dating are now nearing the end of their graduate degrees. **Kristin Riker-Coleman** is wrapping up her PhD on drowned corals from Hawaii and Papua, New Guinea. After intensive effort, she has found that submerged corals experience extensive diagenetic alteration, which limits her ability to use the corals to characterize sea level and tectonic rates. **Valerie Gamble** is finishing up her MS degree this year and has become a very sophisticated geochemist. She is working on U/Th dating of lake sediments from two large multinational coring expeditions: 1) Lake Malawi (in collaboration with Tom

Johnson here at UMD) in Africa and Lake Peten-Itza in Guatemala. Her samples are much more challenging to work on than coral or cave deposits, and she has really risen to that challenge.

I had the pleasure of having two excellent students graduate this last academic year. **Nick Freiburger** defended his thesis on Barbados fossil corals in December 2006 and graduated in January 2007. Nick had the distinction of proving me wrong! He worked on samples from an outcrop in Barbados that I had determined in 2002 recorded the glacial termination 135,000 years ago. Nick found that the samples' ages could not be replicated and in fact were only 126,000 to 129,000 years old. His findings mean that the corals did not record the glacial termination, but the interglacial period following the termination. His paper is being submitted to *GEOLOGY*. **Erin Endsley** defended her thesis on cave deposits from Mexico and graduated in May 2007. Erin traveled to Mexico with our collaborator Dr. Dave Hodell from University of Florida in August of 2006 to collect her samples, and traveled to Dr. Hodell's lab in January 2007 to measure the stable isotopes in a stalagmite from Tecoh Cave. By determining the chronology for the speleothem using U/Th methods, she was able to correlate the oxygen isotope signal in the speleothem with the climatic history of the region, including a period of drought in ~900 AD that may have caused the decline of the Mayan civilization. Dr. Hodell and I will use Erin's work as a launching pad to do further work on speleothems from Meso-America.

As winter sets in here in Duluth, it's a good time to reflect on the events and changes in the last year and to anticipate upcoming events. I am beginning new collaborations on cave deposits from South America and on young corals that will help to calibrate the radiocarbon timescale. I am very thankful to work with talented undergraduate and graduate students here at UMD and with knowledgeable faculty from UMD,

across the country, and around the world.

**JOHN GOODGE** continues his work on Antarctic basement geology, although primarily filtered through the lens of glacial deposits as a method of proxy sampling the mostly ice-covered continent. Also working on this project was **Devon Brecke**, who finished her MS degree in spring 2007 on a study of large glacial clasts in tills from the Transantarctic Mountains. These clasts have a provenance within the interior of Antarctica, but include some basement rock types that have age and geochemical signatures unique to Proterozoic basement rocks of North America. Thus, we have some very exciting and provocative evidence for connections between Antarctica and Laurentia as part of the supercontinent Rodinia. John and Devon, with others, presented results of this work at a quadrennial Antarctic earth science meeting at UC-Santa Barbara, at a tectonics symposium in Tucson honoring Bill Dickinson, and at the fall AGU meeting.

John is also working with several students on projects in the Precambrian of northern Minnesota. With Vicki Hansen and MS students **Emerald Erickson, Sally Goodman, Susie Karberg** and **Jenny Koester**, we are studying the structural-petrologic evolution of Archean granite-greenstone belts in the Superior Province in order to better understand how this classic type of Archean crust developed. With Jim Miller, we are working with students **Brian Goldner** and **Chris White** on the igneous petrology and mineralization related to emplacement of mafic igneous systems. All of us are learning how to squeeze the maximum amount of information from surface outcrop (sometimes limited) and drill core (always limited!).

John has also been active with the undergraduate Geology Club and local chapter of Sigma Gamma Epsilon. Among other activities, John and club members have been collecting and selling rock from northern Minnesota containing a well-known U-Pb zircon geochronology

standard. This fall John, along with students **Brandon Brayfield, Mike Etter, Mandi Gurske, Eric Stifter** and **Erik Tharalson**, collected 30 five-gallon pails of rock to send to geochronology labs in several countries. The proceeds from this fund-raising (about \$15,000!) go to the Geology Club in support of student activities, scholarships, and helping students purchase geological field gear.

The big news for John this year was learning in July that a \$400,000 proposal to the NSF has been funded to buy a **new SEM** for the Department and, more broadly, the Swenson College of Science and Engineering. If all goes according to plan, the SEM should be in place by early 2008. (See article on page 2.)

**KAREN GRAN** I am enjoying my first term with the UMD faculty, teaching geomorphology and continuing my research in the Minnesota River valley. My MS student, **Andrea Johnson**, spent last summer working on floodplain storage and valley evolution in the Le Sueur River basin as well as helping out with side-scanning LIDAR work on bluffs in the lower watershed. Her work is part of a larger effort run through the National Center for Earth-surface Dynamics (NCED) at the UMTC campus. We are working on bracketing rates of sediment delivery from streambanks, ravines, bluffs, and uplands in a large tributary of the Minnesota River in an effort to develop a sediment routing and storage model for the watershed. Andrea and Stephanie Day, a UMTC student, presented the results of their summer research at the fall national GSA meeting last week in Denver. Their poster was entitled "Sediment loading in the Le Sueur River, Minnesota River watershed."

I came to UMD from NCED where I spent the last year and half getting a new graduate program in stream restoration up and running. I was in charge of curriculum development and teaching as well as administrative duties such as advertising and recruitment. We had

eleven students in our first year, graduating half of them in May with a graduate certificate in Stream Restoration Science & Engineering. The other half will finish up this year. My position with NCED gave me great opportunity to learn more about stream restoration and to meet a number of stream restoration professionals locally and nationally. Now that the program is up and running, I am trying to stay involved by helping with class this fall and by keeping up with NCED's efforts to improve stream restoration training and education nationwide.

**JIM GRANT** This year we've taken seriously the advice of lots of our previously-retired friends: if you want to travel, do it now! Christabel really retired from the Bong Heritage Center in December, leaving it in good hands with the new director. So, we can do these things. We started off with a spot of skiing at Park City, over at Deer Valley, which has changed from the mosquito-infested swamp on the wrong side of the tracks when we started field camp forty years ago! Then off to South Africa for a family wedding in Johannesburg – the whole family from Minnesota went, cousins meeting cousins they had only heard of, on both sides of the family, as we both have cousins down there. On the way home, we went with Christabel's sister to some of the WWI sites in France and Belgium. My uncle was killed there in the last days of the war, and Christabel's father was invalidated out of the trenches twice. Peaceful farming country with rolling hills and green pastures and neat villages and neat cemeteries of young folk, some in marked graves, some in bits and pieces in mass graves, and a deeply moving commentary on the futility of most war. Anyone who visited there could not have started Iraq.

We were able to be home for a little while, then off to Europe for a friend's 70th birthday. We visited some old friends in Wuerzburg, amid vineyards and picturesque villages. Thence to Austria and "Sound of Music" country. A little further on is the Grossglockner with the Pasterze

glacier, to which we climbed down and down and down. The glacier must have receded about 700' in elevation and about a third of a mile in distance since 1960. Vivid testimony to global warming. Thence we went through Prague, a delightfully vibrant city, and to Dresden, still rising from the ashes of WWII, eventually ending up in the Black Forest, where the migmatites were just as beautiful as 30 years ago when we were there on sabbatical. Then back home until a family wedding up in Canada in October, with no more travel until after Thanksgiving. It's good to be home.

Meanwhile, our grandkids, Tara, almost 3, and Alex, now 15 months, both gurgle with laughter, and are not to be resisted. We go down to Minneapolis a lot these days. Fiona is getting back into her communications business again, and she and her Mum are on the same board down there, with Fiona as Chair-elect! Ian's import business has moved to different quarters, just off Hwy 100 and Hwy 7, and more into the wholesale end, which allows him to relax his schedule to a mere 5-6 days. Christabel at last has time to get into her family genealogy, which is really addictive – she found a fourth (?) cousin back in Ireland who's similarly afflicted, and the two of them keep the email buzzing. She can now garden in a more leisurely manner, and think up all sorts of things for me to do. As for me, my colleague in Melbourne has moved to Germany, but email still works. His update on THERMOCALC was published this summer, and still seems to fit well with my experimental data, which it should, since the revision was largely based on those data. Anyway, it means that it's high time I finished my modeling of the Laramie results and moved on. I've also gotten into an interesting alteration problem from Namibia, with my Wuertzburg friend. So, I have an excuse to do some more isocon work, which is almost as addictive as genealogy.

Now, it's down to Minneapolis for Thanksgiving, off to Baja for a week, then Christmas at Lake Nebagamon, which is enjoying the first snowfall of the season.

With best wishes for a Happy Christmas, and an excellent New Year!

**JOHN GREEN** Retired life is percolating along well here. From my mini-office in the old "Drone Room" I keep my fingers in various geological pots (MGS mapping, leading field trips, talks and short courses), mostly involving the North Shore Volcanics and other Midcontinent Rift rocks, but I should be putting more time into clearing up my office.

I try to maintain and promote geological awareness and protection of significant sites as a member of the Commissioner's Advisory Committee for the MN DNR's Scientific and Natural Areas and Natural Heritage programs. I'm still involved with Sugarloaf (The North Shore Stewardship Association) and the Superior Hiking Trail Association, and have been having fun bushwhacking through the hills west of Two Harbors scouting the route of the Trail's last stretch, between TH and Duluth. (Construction has already started.) This spring saw the publication of my last couple of years' labor of love, a 48-page booklet "Natural History and Geology along the Superior Hiking Trail through Duluth." This 39-mile trail section has some of the greatest parts of the whole 300-mile trail, and includes the lakewalk through downtown.

Jan continues her workaholic involvement with the MN Forest Resources Council, the MN Center for Environmental Advocacy, and Hawk Ridge Bird Observatory. She has also joined our Duluth Township's Planning Commission, where she keeps an eye on land-use issues in local development proposals, especially along the Lake Superior coast. Never a dull moment.

In late March-early April Jan and I made a break for the South to avoid some of the mud season here, soak up some sun, do some birding, and generally explore southeastern Arizona, and in June we took a trip to southwestern Minnesota's

prairies, where we took in some of the natural areas with their birds, wildflowers, and many nearby wind turbines. We had our usual family visit to Maine and NH in August, seeing my sister, Jan's two brothers, our two daughters and five grandchildren, and escaping some of the drought at home. All in all, a good year.

**VICKI HANSEN** Structure/tectonics and planetary studies at UMD move forward with new students bringing fresh ideas and directions. **Taylor Nordberg** graduated in December, just after last year's newsletter. It was extremely hard to see Taylor go as he played such a critical role in lab productivity. Taylor joined the ranks of the working, and hopefully is traveling the world, and discovering gold. Last spring we finally got the Venus Artemis Quadrangle (V-48) off to USGS for review; three other Venus quadrangles are sitting in the wings at USGS waiting—but our jobs are done at this point (except for galleys). Undergraduate **Erik Tharalson** has taken on a major role in mapping the last of our Venus VMaps, Agnesi, V-45, which we hope to get off to USGS sometime early in 2008. Undergraduates **Kirsti Hakala**, **Erik Tharalson**, **Brandon Brayfield** and **Joe Jacobs** have each been busy with Venus UROP projects. Kirsti worked on Monte Carlo modeling of Venus' crater population, while Erik, Brandon and Joe are each busy mapping. (Kirsti moved across state lines to play hockey for UW-Superior; we wish her the best, and hope that she'll stop in the lab from time to time). MS graduate students **Bhairavi Shankar** and **Emily Bjornnes** are also involved in Venus research. Bhairavi is conducting a global survey of Venus' circular lows, a class of coronae that we distinguish from the general population (yup, you guessed it, these distinctive features are circular and they mark amphitheater-like lows); we use the term "circular lows" in order to distance the analysis from genetic interpretations that might hamper unbiased scientific study. Emily has

been constructing Monte Carlo models to examine whether Venus' crater population can be explained by equilibrium resurfacing, rather than just catastrophic resurfacing (it can!). Bhairavi, Erik and I presented at the NASA Mappers' meeting in Tucson in June (Why can't they schedule desert meetings in the winter? Although we did have a few wonderful hikes in the desert, Bhairavi's and Erik's first experience in that environment.), where we took in tours of NASA Mars High Rise (impressive imagery!) and the NASA Phoenix Mission (impressive computers!—talk about terabits of data!). Emily, Erik, Bhairavi and I just returned from GSA in Denver; Erik and Bhairavi presented posters, and Emily and I gave talks, all on the last day of GSA, Halloween 2007.

But all is not Venus in the group! **Emerald Erickson**, **Sally Goodman**, **Susie Karberg**, and **Jenny Koester**—the so called Shear Zone Ladies—spent their summer stomping and canoeing around northern Minnesota collecting tons of oriented samples, and reams of structural data. Undergraduates **Amanda Putz** and **Hillary McGown** provided expert field assistance. Amanda graduated after attending UMD's first PRC (Precambrian Research Center) field camp, whereas Hillary should be around the department a bit longer. The Shear Ladies (shear elegance) are each studying a different Archean shear zone with the goal to understand the kinematic and metamorphic history of each zone, and implications for Archean tectonic processes. Archean tectonics is quite a hot area of research currently, both academically and with renewed interest in mineral resources. Emerald, Sally, Susie and Jenny have been extremely successful in securing outside funding for their projects from the GSA, and from ILSG. I expect that the four of them will make quite a splash at ILSG this coming spring. **Tom K. Johnson** joined the group this past fall. Tom comes to us from the Environmental Engineering field, with a degree in Civil Engineering from North Dakota State University. Tom has really immersed himself in geosciences; he jumped in feet first by

attending the PRC field camp this summer, followed by a full semester load of geology graduate course work. Last we checked, Tom was still breathing!

I have mostly been trying to keep up with students, grads and undergrads, but I had a few papers come out this year. Our paper on Venus resurfacing arguing that catastrophism cannot work finally came out—Hansen and Young, 2007, a chapter in GSA Special Paper 419. I also had an invited paper in Chemical Geology, on Venus' LIPs (Large Igneous Provinces), making Earth-Venus connections. Just this month Earth's Oldest Rocks was published, in which I had an invited chapter on Venus as analogs for Early Earth. Finally, I have a paper scheduled for publication in GEOLOGY this December in which I present a hypothesis for how subduction and rifting—basically plate tectonics—may have begun on early Earth. The paper is embargoed until it appears in GEOLOGY—lucky you, or this newsletter contribution would go on and on. All of us in the lab wish everyone the best, and we welcome you to stop by to visit.

**TOM JOHNSON** This has been a pretty quiet year compared to some—no major field work, but lots to do in the lab, what with some 600 meters of Malawi drill core waiting to be analyzed. Our first publications from the Malawi Drilling Project just came out in the past month—two in the Proceedings of the National Academy of Sciences (Scholz, Johnson et al., 2007; Cohen et al., 2007) and one in Geophysical Research Letters (Brown, Johnson et al., 2007). Our main discoveries thus far are about drought and abrupt climate change. The African tropics experienced far more severe droughts prior to 65,000 years ago than during the last glacial maximum (LGM) at 21,000 years ago. These megadroughts recurred at about 20,000 year intervals, with progressively more intensity further back in time, to at least 130,000 years before present. This came as

quite a surprise to us, for previous studies of ocean sediment cores suggested that aridity in the tropics pretty much tracked glacial ice volume. We are finding quite a different story! The other big surprise came from Erik's great new instrument, the scanning X-Ray Fluorescence machine that allows us to analyze sediment cores in high resolution for a variety of major and trace elements, with relatively little investment of time and expense. Erik soon spotted evidence for abrupt climate change in the Malawi drill core from the north basin, looking very much like the so-called "Dansgaard-Oeschger Events" of the Greenland ice cores. We pursued the issue further and found, indeed, that our record was one of D-O events – the first to be reported from anywhere in Africa. Moreover, it appears that these events may hit tropical Africa before hitting Greenland, as part of a global pattern of climate variability called the "Bi-Polar Seesaw." (We paleoclimatologists have such great terminology, don't we?) We are also busy generating a record of past temperature variability for Lake Malawi, using an organic geochemical indicator called TEX-86. More on that next year!

Four graduate students are pursuing the analyses on the Malawi drill core. **Junmin Shi**, who is working on his PhD, is carrying the XRF analyses deeper down core, and finds the recurrence of drought extends further back in time, like clockwork, every 20 meters of sediment – every 20,000 years? Perhaps – we have to refine our dating to see. Milankovitch is smiling with anticipation. **Melissa Berke**, also pursuing the PhD, is carrying out TEX-86 analyses for past temperature on cores from several East African lakes, and will soon dip into the deeper strata of the Malawi drill core. **Martijn Woltering**, a MS student in our Water Resource Science Program and advised by Joe Werne in LLO/Chemistry, has generated a TEX-86 temperature record for Lake Malawi that now extends back 75,000 years, with some interesting surprises. The LGM was

not the coldest time in this period. All three of these students will be presenting their results in December at the annual fall meeting of the American Geophysical Union in San Francisco. **Valerie Gamble**, advised by Christina Gallup for her MS research, has been wrestling with U/Th dating of Lake Malawi carbonates. Such dates do not come easily, but Valerie is finally turning up some very promising results, providing the most reliable age estimates of our sediments that are older than the range of C14 dating (about 40,000 years).

With the departure of Tim Demko, I took on the teaching of Earth History last spring semester. This is the first time I have taught this course since 1978! OK, the history of the Earth has not changed all that much over the intervening three decades, but our understanding of that history has, not to mention my memory of the eras! It is great to be back to teaching one of the core courses for our undergrads, especially getting out on the outcrops with the students. I look forward to continuing to teach Earth History in the next few years – it puts me back in the realm of "real geology" from time to time.

All's well on the home front. Kate is turning out some fabulous paintings, and is now displaying some of her work locally on the walls of the New Scenic Café up the North Shore. We get up to our cabin on Vermilion from time to time, but not nearly as often as we would like. Daughter Heidi and her family are still living in Shanghai, where she and Neil teach in an American international school, and love it. They came back for two months this past summer, so we had lots of quality time with them and our dear grandson who is now four, with quite the vocabulary in Mandarin Chinese! Son Ryan has moved to Newport Beach, California, where he continues his employment as a software engineer in aviation electronics, an active social life (read that as not yet married with children for me to dote on, dammit), and frequent forays into the surf. He is still in the National Guard and,

fortunately, has not been called upon to serve in the Middle East.

So another good year has passed by, all too fast, but with much to write home about. I very much enjoyed meeting up with past alums at this year's GSA meeting in Denver, and look forward to more such encounters. Feel free to stop by my office when in Duluth!

#### CHARLIE MATSCH

Everything goes well with me. I continue to enjoy the opportunities that retirement brings, and the simple life of a still-curious geologist with no complicated agenda to heed and the wonders of the North Shore to explore whenever I want.

Trips away from Duluth included a ten-day foray to the Rio Grande Valley, following the Great Texas Coastal Birding Trail along the lower Texas coast. Although mainly in search of birds (there were lots of them to see), I wanted to also experience an environment new to me. A late spring visit to the Minnesota River Valley east and west of the Big Bend at Mankato brought back memories of my time piecing together the Pleistocene stratigraphy in southwestern Minnesota. (Question often asked of me: "Why does the Minnesota River take a right angle turn at Mankato toward the Mississippi River in St. Paul?" For a well-worded answer see H.E. Wright, 1972, *Geology of Minnesota*, A Centennial Volume, P.K. Sims and G.B. Morey, Editors, p. 575.)

I took another nostalgia trip in September, to Maine. In the fall of 1977 I spent about three months traveling across Ontario visiting glacial sedimentary rocks of Precambrian age, e.g., the Gowganda Tillite, and then exposures of Late Pleistocene-Early Holocene glacial marine sediments along the "downeast" coast from Bar Harbor to Passamaquoddy Bay. This was in preparation for a 1979 visit to West Antarctica to study rocks associated with the Late Paleozoic glaciation of Gondwanaland. The fall of 1977

was the wettest ever. The fall of 2007 was sunny and dry. It was comforting to see very little change along this part of the coast, not heavily visited by tourists, not noticeably changed by recent development, and still preserving a way of life that I had come to admire during my Air Force and college years in Maine.

I continue to keep track of what's going on with the department, and I visit the campus frequently. To questions like: "You're retired, Charlie! What are you doing here?" my stock response is: "This is my village!" And so it is. To all of you, my best wishes for a great New Year.

**JIM MILLER** In this, my seventh year in Duluth, I have moved away from my role as representative of the "Northern Branch" of the Minnesota Geological Survey, and have become more involved as an adjunct faculty member and graduate advisor in the Department of Geological Sciences. Most of my activities over the year have focused on teaching, advising, and most significantly, planning and implementing the programs for the new Precambrian Research Center at UMD in its inaugural year.

During the 2006-07 academic year, I held a temporary academic appointment to fill in for Penny Morton while she directed the study abroad program in Birmingham, England. In the fall semester, I taught Mineralogy, which was a bit of a challenge since my last exposure to that topic was as a TA 25 years ago. In the spring semester, I taught Advanced Earth Science for Teachers (GEOL 4110) for the fourth time, a freshman seminar on Minnesota's Geologic History (GEOL 1045), and an advanced seminar on the Geology and Mineral Deposits of the Duluth Complex (GEOL 5100). The freshman seminar class was particularly enjoyable since that has been a subject I had taught as non-credit adult education classes for many years through the Compleat Scholar program at the Twin Cities campus.

As mineral exploration activity heats up on the Duluth Complex and elsewhere in the Lake Superior

region, more incoming graduate students are being attracted to thesis topics on the petrology of mafic intrusions and related ore deposits. Presently, I am advising four graduate students; two in their second year and two in their first. **Chris White**, from the University of Wisconsin Oshkosh, is looking to understand the petrology and mineralization in a portion of the South Kawishiwi Intrusion that hosts the Nokomis deposit (formerly the Maturi Extension). **Brian Goldner**, from Gustavus Adolphus College, is being supported by Kennecott Exploration to study the petrology and Ni-Cu-PGE mineralization of the Tamarack Intrusion - a small ultramafic intrusion recently discovered in Aitkin County, just west of Duluth. First year student **Dan Costello**, who comes to us from St. Norbert's College in De Pere, Wisconsin, is planning a thesis project to map and evaluate the petrology of the troctolitic-anorthositic Tuscarora Intrusion along the northern margin of the Duluth Complex. Dan's research will involve mapping in areas of the BWCA that experienced major wildfires over the past two years. Another first year student, **Ryan Dayton**, from the University of Wisconsin Eau Claire, is presently considering a couple of thesis topics related to economic geology and igneous petrology.

While teaching and advising are enjoyable and rewarding, the most thrilling (and exhausting) aspect of the past year has been getting the Precambrian Research Center programs off the ground in my role as its co-director. The focus of most of my energies was devoted to planning and implementing the logistics and curriculum for the inaugural season of the six-week Precambrian field camp, which ran this past summer (see article in this issue). Last fall and winter, I gave talks about the PRC field camp at ten geology departments in Minnesota and Wisconsin. This promotional work evidently paid dividends with the enrollment of 15 students to the camp. Other PRC activities included building the PRC website (check it out at [www.d.umn.edu/prc](http://www.d.umn.edu/prc)), fundraising for the PRC Foundation by soliciting

corporate and individual memberships, and planning for the first PRC-sponsored professional workshop. Corporate and individual memberships to the PRC Foundation, a gift account within the Swenson College of Science and Engineering has raised over \$100,000 since fundraising began last April. These funds will be used to subsidize the cost of the field camp, to provide graduate research assistantships (Chris White is the first recipient of a PRC-GRA), and to make small grants available to students conducting field-based research projects on Precambrian geology of the Lake Superior region. Next May, the PRC is sponsoring a seven-day professional workshop on field studies of greenstone belt geology, metamorphism, alteration, and mineralization. For more info:

[www.d.umn.edu/prc/workshops](http://www.d.umn.edu/prc/workshops)

The workshop is being organized by George Hudak and Ron Morton and is the first of a semi-annual series of PRC workshops that are intended to provide specialized field training to professional geologists in a variety of topics related to field studies of Precambrian geology. In the current semester, I am busily promoting the 2008 field camp and continuing fundraising activities. Speaking of which - we would welcome your support of the PRC as an individual or corporate member. If you are interested in becoming a member, go to:

[www.d.umn.edu/prc/memberships](http://www.d.umn.edu/prc/memberships)

**PENNY MORTON** After a year in England, where it was abnormally wet, it felt strange to come back to a hot, dry (drought even) Duluth in July. As the first snowflakes were falling last night, I began to miss the warmer, wetter England. No, not really. Ron and I are waiting for snow so that we can ski this winter.

I am back teaching mineralogy—in our new mineralogy lab. It is fantastic! Much easier to teach in—however, time will tell if the students learn better. They will still need to put in the time. I am also teaching economic geology, with Ron. We took a field trip to the

Sturgeon Lake area with the students—it poured with rain; however, I think they all learned something about VMS deposits.

A group of us (from Math, Biology, Education and me) were awarded an NSF grant for Graduate Fellows and K-12 education. The grant is for five years and supports up to ten graduate students per year to work with a teacher mentor in a middle or high school. Rather than a traditional TA, these students work up to ten hours a week in a K-12 classroom. They are responsible for designing some interactive labs and lesson plans that can involve their research. The students (and teacher) in the classroom have interaction with a graduate student doing research, whereas the grad student will be better prepared to teach (at any level) or simply to interact with lay people, so as to explain their science to them. The overall purpose of the grant is to increase science education in the schools, especially for the underrepresented in science. Presently three of our graduate students are supported by this grant.

I have just come back from GSA in Denver and managed to see a few of you—would like to have seen more. I saw some of your names on abstracts, but we never connected. I am sorry about that. Teaching and being Director of Graduate Studies this semester is keeping me more than busy, but I will have time next semester to buckle down to work—I feel Cu-Ni calling. Please stop by if you are in the neighborhood!

**RON MORTON** England has had a lasting effect on me. No, I don't have an accent, but I do have a Mini-Cooper. There were just so many in England (of course not the models sold here), and I really liked them so I decided I should have one. I ordered one from Birmingham, a Cooper-S, and wouldn't you know, I was just getting ready to leave in early January when I got an e-mail from BMW (Mini-Cooper division) inviting me to their Oxford plant to watch my Mini being built—wish I could have! Anyway, my Mini arrived in

Minneapolis in March and so far it is a great, fun car to own and drive.

The book I began in Birmingham, "Gooseberry Falls to Grand Portage," was ready for copy editing on my return to Duluth and was published in July. Needless to say, I spent an inordinate amount of time working on it from January to the end of July, having spent a lot of time writing it in England. Nancy Nelson, one of our MS graduates, also spent huge amounts of time editing the book and, at the same time, trying to teach me punctuation and proper grammar. She did a marvelous editing job, but unfortunately, I think I failed her punctuation exam!

And, yes, I am working on the third and final North Shore book that will tie the first two together. I did the "field" work in July and August and have just finished writing a first draft.

We had a great Christmas in Birmingham as Chris (and his wife Tracy) and Megan (and her boyfriend Steve) came over for the holidays along with good friends from Duluth. Amid all the traveling and celebrating everyone agreed that one of the highlights of Birmingham was the Christmas pantomime at the Hippodrome Theater. The Christmas pantomime is a British tradition and is a kind of slapstick comedy that is a parody of a classic fairy tale, so the Hippodrome was full of kids. They did Cinderella this year and it was absolutely hilarious. The live fireworks inside the Birmingham symphony music hall after the 1812 overture on New Year's Eve was pretty great as well.

A good part of May and June were spent repairing the destruction done to our yard during the installation of our in-ground "geothermal" heating system. Part of the installation process involved digging two one-hundred-foot long trenches that are ten feet wide and ten feet deep—all in red clay. It took two months to get the yard landscaped and grass and gardens in and growing. I now think it was worth it (no more oil or gas), and the air conditioning is great.

Speaking of which, it is cold enough outside for snow flurries to happen, the first of the season. I hope

we do get some snow, for it was really sad in January to return to brown, hard ground in Duluth from green, wet Birmingham.

So, here's to cold and snow and skiing as well as health and well-being. Hope you all have had a great year.

**DICK OJAKANGAS** My long-time colleague from overseas, Herr Dr. Direktor Professor Wolfgang von Schlummerklutz from the World Panzerenkotklotzen Institute in Europe, visited UMD and gave his presentation on Panzeren-kotklotzen at the weekly Geology seminar in January. He is still a bit weird.

Visited Sue (the world's largest, most complete and most famous *T. rex*) at the Field Museum in Chicago while attending the International Association of Culinary Professionals meeting. I accompanied Peach, so I could eat. Also got to the field museum in NYC - excellent displays on evolution.

The ILSG was at Lutsen this year. I only lasted one day, however, as I tore the quadriceps muscle off my left knee at stop one of a pre-meeting field trip. Twelve hours later I was in surgery at St. Mary's. (Had to do it quickly, so I could get to UMD's graduation that weekend, at which Peaches was awarded an Honorary Doctorate of Humane Letters.) A year before on a field trip, I tore off the other quad. Peach just said, matter-of-factly, that I am lucky that I don't have four legs. Now, I ask you, is that sympathy or not?

I was honored to present an invited lecture on Antarctic Wildlife to the 4th grade at Mahtomedi grade school, with a granddaughter in attendance.

We had a ten-day trip to Greece in August. The geological highlight was the island of Santorini which blew in 1646 B.C., and led to the legend of Atlantis. Greek food, wine, beer and olives were great. So was the Acropolis, a limestone erosional remnant with the Parthenon on top.

Taught another geological course for the University for Seniors last spring.

Drove a lot of roads for Roadside Geology of Minnesota. It is nearing completion, believe it or not (I don't either) and may be out next fall! (How many cookbooks has Peaches written since I started this book? Many, including one on 500 casseroles that will be out next fall.)

We leave in 48 hours for India. You have fun, too!

**RIP RAPP** Rip is off the payroll and slowly thinking about real retirement. Currently he has one book and two articles in press and keeps out of serious trouble by co-authoring two more books: 1) 'The Shang in Context: Yinxu, Huanbei, and the Huan River Valley', likely to be published by Yale University Press, and 2) 'The Bronze Age Coasts of Greece and Aegean Turkey', to be published by Hesperia. He is in residence at UMD no more than eleven weeks a year but can always be reached at: 218-726-7629 or [grapp@d.umn.edu](mailto:grapp@d.umn.edu)

**NIGEL WATTRUS** Every November when I write my piece for the newsletter it seems like I've had a busy year. This year has been no different! One of the things that I

really enjoy about my job is the opportunities for international travel that it brings! This summer I spent three weeks in Indonesia collecting seismic surveys on two lakes (Matano and Towuti) with Jim Russell from Brown University. These surveys were preliminary surveys intended to see if these lakes might contain long sediment records that could be sampled to reconstruct the region's paleoclimate record. The results were very encouraging and we are now planning on submitting a follow-up proposal to return in 2010 to collect piston cores and additional seismic data with an airgun which will allow us to see deeper. Ultimately, if these surveys are successful and we are able to document a long, continuous sedimentary record, we will propose a drilling project to collect long cores for the paleoclimate study. This was my first trip to this part of the world. It was a great experience and I was very impressed with the ingenuity of the local people whom we worked with. It seemed they could solve just about any problem that cropped up!

Earlier in the summer, Steve Colman and I began the first field season of our project to look for evidence that Glacial Lake Agassiz overflowed into Lake Superior prior to the Marquette re-advance of the Laurentide Ice Sheet. Freshwater from

this overflow event has been proposed as a mechanism for disrupting thermohaline circulation in the North Atlantic 12,900 years ago, causing the Younger Dryas cooling event in northern Europe. We spent nine days collecting seismic data off the northwestern Canadian bays of Lake Superior where later overflow events from Lake Agassiz have been documented. These will be used to reconstruct what the "signature" of an overflow event looks like in the lakefloor sediments. We will use information when we return to Thunder Bay next summer to look for evidence of the earlier Younger Dryas overflows. We were joined on this cruise by **Jessica Gary**, a new graduate student, who will be working with us on the interpretation of these data.

This past spring I had opportunity to visit several universities and colleges on campus visits with my daughter, Sally, who is a senior at Duluth East High School this year. I must say it was a very interesting experience being on the "other side" of a campus visit! It only seems like yesterday that she was starting kindergarten when we moved to Duluth. My, how time flies!

## NEW BOOKS ON AREA HIKING TRAILS

"Natural History and Geology Along the Superior Hiking Trail through Duluth, Minnesota" is the title of a new book authored by **John C. Green**. Dr. Green is a retired geology professor, naturalist, and hiker who has spent countless days roaming the hills of Duluth and the North Shore. He helped lay out the route of the Superior Hiking Trail through Duluth. Here's what he has to say about the book: "The 39 miles of the Superior Hiking Trail through the City of Duluth pass through many areas of fascinating landscape, including world-famous geological features with panoramas, shady old-growth forests, and many other ecological land types. This booklet will help hikers appreciate the remarkable natural history made accessible by the trail." For more information, go to [www.shta.org](http://www.shta.org)

In his newest book, Gooseberry Falls to Grand Portage, Geologist **Ron Morton**, along with biologist Steve Morse, takes walkers on a guided tour of hiking trails within eight state parks located along Minnesota's North Shore of Lake Superior. Using easily recognizable waypoints the authors detail the natural history, scenic vistas, trail conditions, and intriguing historical places seen and/or encountered on 30 different walks within the parks. This book is a companion trail book to the popular "Walking Guide to the Superior Hiking Trail" by Ron and Judy Gibbs published in 2006. For more information visit [www.rockflowerpress.com](http://www.rockflowerpress.com)



*"The rocks are the final court of appeal" Francis Pettijohn*

## Precambrian Field Camp – Season 1

by Jim Miller



This past summer, the Precambrian Research Center at UMD ran the first season of a one-of-a-kind field camp. The camp teaches students mapping techniques that are best suited to field studies of Precambrian rocks of the Canadian Shield. By all measures, the camp was a rousing success.

The Precambrian field camp was attended by 15 students - four from UMD and the remaining mainly from schools throughout Minnesota and Wisconsin. Jim Miller (MGS), Dean Peterson (NRRI) and George Hudak (UW-Oshkosh) served as full-time instructors, with assistance on various projects by Terry Boerboom (MGS), Val Chandler (MGS), John Goodge (UMD), Mark Jirsa (MGS), Howard Mooers (UMD), Mark Severson (NRRI), and Nigel Wattrus (UMD). The six-credit course ran for six weeks from mid-July to late August. Although students worked six days a week, commonly ten-hour days, and often under very hot and humid conditions, they consistently kept a positive attitude throughout.

The first two weeks of the camp were run out of UMD. Daily mapping exercises included 1) structural and outcrop mapping at Thomson Dam; 2) an introduction to geophysical field methods (gravity, ground magnetics, seismic); 3) mapping mafic cumulate rocks of the Duluth Complex at Spirit Mountain; and 4) mapping intrusive and volcanic rocks along the North Shore near Tettegouche State Park. The latter exercise included a day of mapping along Lake Superior, by canoe.

For weeks three and four, we moved the camp to Vermilion Community College in Ely. There, students started on a stratigraphic correlation project along the Biwabik Iron-formation that included core logging and measuring section in one of the taconite mine pits. Next, students conducted a two-day project of mapping along the basal mineralized contact of the Duluth Complex. At the end of the third week, we arranged an evening of mapping by lamplight along the main adit of the Soudan Iron Mine. During week four, students conducted a multifaceted mapping project on greenstone belt geology and overlying glacial geology in the Fivemile Lake area west of Ely.

The true highlights of the summer were the capstone mapping projects during week five. Here, students chose field mapping projects that entailed detailed bedrock mapping in previously unmapped wilderness areas, most in the BWCA. George Hudak mentored three students on mapping greenstone belt geology in the Twin Lakes area west of Ely. Mark Jirsa led four students into the BWCA off the Gunflint Trail, which had been intensely burned over in the Cavity Lake Fire of July 2006. Jim Miller worked with two students in the eastern prong of the Duluth Complex in the Homer Lake area off the Caribou Trail. Dean Peterson supervised a group of five students in mapping project of a gabbroic macrodiike in the Nickel Lake-Gabbro Lake area of the BWCA. Upon returning to UMD for the final week, students worked on digitally compiling their capstone mapping data into ArcView and then creating geologic maps in Illustrator.

As we all look back on the camp, there is little we would change for next year. We have already begun to promote the 2008 field camp and expect that it will not be long before we get more applicants than the 20 student limit we have set.

Most of the students would likely say that the field camp experience has been very beneficial to their academic and professional careers. Three have already found jobs in the minerals industry, while three others have entered graduate school at UMD this year to pursue MS degrees on Precambrian topics. Many who returned to school to finish their BS degrees are intending to either apply to UMD for graduate school next fall or to seek employment in the minerals industry. We wish them all good luck.

If you would like to see more photos from last year's camp or see the geologic maps that were produced from the capstone projects, please visit the PRC website <[www.d.umn.edu/prc](http://www.d.umn.edu/prc)>

We would also like to extend an open invitation to any UMD alumni to visit the camp any time. Just give us a shout as to when you are coming.



## ALUMNI NEWS

**Adeeb, Riyad A.**, MS 07, defended his thesis in May 2007–Fluvial Evolution in the Jurassic Morrison Formation, Southern Utah: What Caused It? He is employed as a Geologist for Chevron in San Ramon, California. His email address is <[aliad002@d.umn.edu](mailto:aliad002@d.umn.edu)>

**Albers, Paul**, MS 06, is employed at Duluth Metals Limited as Project Geologist on the Maturi Extension Project in Ely, Minnesota.

**Anderson, Wayne**, BS 77, moved to Canyon Lake, Texas, about 30 NW of San Antonio in 2005. His email address is <[WLA4947@aol.com](mailto:WLA4947@aol.com)>

**Baresch, Elizabeth**, BS 04 (MS 07 – University of South Carolina), completed an internship with Anadarko Petroleum Corporation in Houston last summer. In December 2006, she began working for Pioneer Natural Resources in Dallas. She is still a member of the MN Air National Guard and did a tour of duty in Iraq during the summer of 2005. Her email address is <[Elizabeth.Baresch@pxd.com](mailto:Elizabeth.Baresch@pxd.com)>

**Becker (Smith), Kim**, BS 02, was married in October 2006 and is now living in Villa Grande, California. Her address is P O Box 57, Villa Grande, California 95486. Kim's email address is <[ksmith2@d.umn.edu](mailto:ksmith2@d.umn.edu)>

**Brecke, Devon**, MS 07, defended her thesis in April 2007–Provenance of Glacially Transported Material Near Nimrod Glacier, East Antarctica: Evidence of the Ice-covered East Antarctic Shield. Devon resides at 5986 Reynolds Avenue, Dorchester, Wisconsin 54425.

**Butterfield, Peter**, BS 92, is a consulting geologist (mineral exploration) based in Olympia, Washington.

**Carlson, Kurt**, BS 99 (MS Western Michigan University), is currently residing at 5298 Miller Trunk Highway, Hermantown, MN 55811. He is looking forward to settling in Duluth permanently.

**Castañeda, Isla S.**, PhD 07 (MS University of Colorado-Boulder), is doing her post-doc research at the Netherlands Institute for Sea Research. Her email address is <[islacastaneda@gmail.com](mailto:islacastaneda@gmail.com)>

**Chilian, Armen**, BS 93, is Vice President Exploration for Ontex Resources Ltd. of London, Ontario, Canada.

**Cronk, Bill**, is Project Manager for Dundee Precious Metal Inc.'s Black River Project near Bathurst Inlet, Nunavut, Canada. His email address is <[bcronk@dundeeprecious.com](mailto:bcronk@dundeeprecious.com)>

**Endsley, Erin A.**, MS 07, defended her thesis in May 2007–Late Holocene Droughts Recorded in Speleothems from the Maya Lowlands of the Yucatan Peninsula, Mexico. Erin currently resides in Menomonie, Wisconsin. Her email address is <[eaendsley@yahoo.com](mailto:eaendsley@yahoo.com)>

**Erickson, Ryan**, MS 07, defended his thesis in December 2006–The Sequence Stratigraphy of the Chinle Formation in the Dinosaur National Monument Region, Utah and Colorado, USA. He is currently employed as an Adjunct Professor at the University of Wisconsin, Superior. Ryan's email address is <[eric0616@d.umn.edu](mailto:eric0616@d.umn.edu)>

**Fitz, Thomas**, MS 88, (PhD 99 University of Delaware) is an Associate Professor at Northland College. His email address is <[tfitz@northland.edu](mailto:tfitz@northland.edu)>

**Freiburger, Nicholas**, MS 07, defended his thesis in December 2007–New U-Series Fossil Coral Dates from the Last Interglacial Terrace, Barbados, West Indies: A Re-Evaluation of Evidence for Termination II. He is currently employed as a Geologist at Chevron in Houston, Texas. Nick's email address is <[nfryburger@hotmail.com](mailto:nfryburger@hotmail.com)>

**Goodman, Chris**, BS 86, now resides at 370 Craig Main Street, Craig, Montana 59648.

**Huber, James**, PhD 01, runs his consulting firm, James K. Huber Consulting, from his home at 2573 58<sup>th</sup> Street, Vinton, Iowa 52349.

**Isenberger, Bob**, BA 69, resides at #8 – 41 Spruce Street, Toronto, Ontario M5A 2H8. His email address is <[rc.i@sympatico.ca](mailto:rc.i@sympatico.ca)>

**Johnson, Alan**, BS 61, is currently working at Resource Development Consultants as a Mineral Resource Analyst in British Columbia. His email address is <[johnsonalan37@hotmail.com](mailto:johnsonalan37@hotmail.com)>

**Kort (Flater), Jill**, BS 03, married in January. She and her husband reside at 9726 E State Road 13, Poplar, Wisconsin 54864.

**Krahulec, Ken**, BS 76, is working as a Project Geologist at Utah Geological Survey. He resides at 6188 W. 3500S, West Valley, Utah 84128.

**Larson, Phil** (BS 93) and **Katie** (BS 94) have moved back to Duluth after living and working in Anchorage, Alaska. Katie is a Project Geologist for Golder

Associates at their Duluth office. Phil is working for Cleveland Cliffs.

**Levy, Eric**, MS 89, is a recruiter for Mineral and Chemical Specialties. If you are looking for a job, he can help. You can reach Eric at (303) 859-0059, or visit his website at <[www.min-chemspecialties.com](http://www.min-chemspecialties.com)>

**Linscheid, Eric** (MS 90) and **Mary** (BS 84), continue to enjoy island life and encourage former classmates to look them up when in Alaska. Their address is PO Box 316, Kodiak, Alaska 99615.

**Lufholm, Peter**, BS 72, Vice-President of Saga Petroleum, also serves as President of the West Texas Geological Society. If you have questions about careers in Geology, Peter would be more than happy to help. He can be contacted at (432) 687-6200 or by email at <[plufholm@sagapetroleum.com](mailto:plufholm@sagapetroleum.com)>

**Magloughlin, Jerry**, BS 83, associate professor at Colorado State University also started JFM Geosciences, Inc. fall 2005 ([www.jfmgeosciences.com](http://www.jfmgeosciences.com)). The company does high quality video, animations, and photography for various geoscience applications from teaching to industry. On the home front, Katie is now three and has already accompanied her dad on numerous geology and video explorations.

**Manley, Andy**, BS 80, now resides at 3708 Charles Stewart Drive, Fairfax, Virginia 22033. His email address is <[manleyas@cox.net](mailto:manleyas@cox.net)>

**Moulzolf, Gerald**, BA 91, became the Manager at American Engineering Testing, Inc.'s office in Bonita Springs, Florida ([www.amengtest.com](http://www.amengtest.com)) in November 2006. His email address is <[gmoulzolf@amengtest.com](mailto:gmoulzolf@amengtest.com)>

**Neisse, Jeffrey**, BS 00, is currently employed as a Staff Hydrogeologist at ProSource Technologies, Inc. Jeffrey currently resides in Shoreview, Minnesota. His email address is <[jneisse@prosourcetech.com](mailto:jneisse@prosourcetech.com)>

**Nordberg, Taylor**, BS 07, is currently working as a Junior Geologist at Hemis Gold Corporation. He can be contacted via email at <[hemisgeology@yahoo.com](mailto:hemisgeology@yahoo.com)>

**Norton, Kevin**, MS 02, is currently pursuing his PhD (cosmogenic nuclides and alpine erosion) in Hannover, Germany. His email address is <[k.norton@mineralogie.uni-hannover.de](mailto:k.norton@mineralogie.uni-hannover.de)>

**Rieser, Michael**, MS 05, now resides at 379 South Van Ness, San Francisco, California 94103. His email address is <[michaelrieser@gmail.com](mailto:michaelrieser@gmail.com)>

**Ruddy (Schulte), Pauline**, (BS 94) is now working at ASRC Energy Services in Anchorage, Alaska. Her email address is <[Pauline.ruddy@asrcenergy.com](mailto:Pauline.ruddy@asrcenergy.com)>

**Schneider, Robert**, BS 81, is employed in the petroleum industry at Seismic Micro-Technology in Houston, Texas, after working at the University of LA-Lafayette for four years. His email address is <[rvschneider@consolidated.net](mailto:rvschneider@consolidated.net)>

**Smith (Duprey), Deborah**, BS 96, earned a BAsC in education from the University of Minnesota Duluth in 2004. She has been teaching chemistry in Aitkin for three years. Deb was married in February to Jonah, and they are expecting their first child in December.

**Syverson, Tim**, BS 81, has been living and working in the Pacific Northwest for the past 25 years. He is an associate geologist at Landau Associates based out of Edmonds (Seattle), Washington. They are currently recruiting for qualified candidates. Please visit their website at <http://www.landauinc.com/employment.htm>. Tim's email address is <[tsyverson@landauinc.com](mailto:tsyverson@landauinc.com)>

**Twing (Ristow), Nicole**, BS 99, is current employed at Trihydro Corporation in Laramie, Wyoming. If you are looking for work, please visit the company website: <https://www.trihydro.com/public/careers>. There are usually openings for geologists, especially entry level. Nicole currently resides at 1206 S 4<sup>th</sup> Street, Laramie, Wyoming 82070

**Wahlstrom, Robert**, BS 79, has been employed at American Engineering Testing as a Duluth Regional Manager since 2005. (He enjoys tipping a beer with Kiff Samuelson, BS 79, at Fitger's Brewhouse.) He currently resides at 560 Hackmore Drive, Eagan, Minnesota 55123

**Wittkop, Chad**, PhD 04, is working as a visiting assistant professor at the University of Wisconsin – Eau Claire. His address is 1404 Frederic Street, Eau Claire, Wisconsin 54701. Chad's email address is <[wittk004@d.umn.edu](mailto:wittk004@d.umn.edu)>

**Neil Pope**, MS 80, passed away in January 2006.

### LOOKING FOR A JOB?

Our electronic service for individuals seeking jobs in the geology field is working well. As we receive announcements about new employment opportunities, we will forward the notices to you electronically. It's fast and easy! To add or remove your name to our jobs email list, go to <http://lists.d.umn.edu/mailman/admin/geol.jobs>, click on [Geol.jobs](#), and fill out the short online form provided. You can subscribe or unsubscribe at any time. If you need assistance with this process, please contact Cathy at <[geol.d.umn.edu](mailto:geol.d.umn.edu)>

### Scholarships, Awards and Other Notable Mentions

The *Outstanding Graduate Student Award* recognizes a geology graduate degree candidate for the greatest overall contribution to the Geological Sciences Department, including scholarship. This award is given in memory of Ralph W. Marsden, who was respected the world over as a scientist and person. He was head of the Geology Department from 1967 to 1974 and retired from UMD in 1980. It is also in memory of Randy Seeling, who was a graduate student in Geology at UMD and completed his Master's degree in 1977. He met an untimely death in May 1979 in an accident while touring Europe. This year there were four recipients of this award, **Roger Bannister** (MS), **Nick Freiburger** (MS), **Jon VanAlstine** (MS) and **Nick Lang** (PhD).

The *Outstanding Graduate Teaching Assistant Award* for the 2006-07 academic year was presented to **Valerie Gamble** in the amount of \$200.

The *Outstanding Senior Award* (Ralph W. Marsden Fund and the SME) is a \$750 award given to the outstanding graduating senior on the basis of scholarship. This year's recipients were **Alyson Cartwright** and **Taylor Nordberg**.

The **Hugh Roberts Scholarship** is an award given to the outstanding junior geology major, determined by scholarship. This award is given in memory of Hugh Roberts who was an internationally known consulting geologist from Duluth. **Joseph Jacobs** is the 2007 recipient of the \$600 scholarship.

The *SME Tools-Of-The-Trade Award* is given to outstanding sophomores in the form of \$300 worth of geological field gear. **Hillary McGown** and **Eric Stifter** were presented this award at the 2007 SME Minnesota Section Mining Symposium luncheon.

The *Roderick Syck Field Camp Scholarship* is awarded each summer to the UMD student with the highest achievement at field camp. **Alyson Cartwright** (Wasatch-Uinta Field Camp) and **Ashley Anderson** (PRC Field Camp) were each awarded \$500 for their efforts in 2007.

Undergraduate student **Erik Tharalson** was selected to receive a rock hammer donated by Estwing for his exceptional performance in Geologic Field Methods.

**Field Camp Scholarships.** All UMD students attending field camp in 2007 received \$1,500 in scholarships, which covered the entire tuition portion of their expenses! The scholarships and recipients are shown below:

*R.C. Bright Field Camp Scholarship* – **Ashley Anderson** and **Kat Rocheford**

*Robert Heller Field Camp Scholarship* – **Ashley Anderson**, **Amanda Gurske**, **Kat Rocheford** and **Corey Wendland**

*"Rip" Rapp Field Camp Scholarship* – **Victor Vosen**

*Roderick Syck Field Camp Scholarship* – **Blake Lemcke**, **Corey Wendland** and **Kelly Wendt**

*Ralph Marsden Field Camp Scholarship* – **Amanda Gurske**, **Amanda Putz** and **Erik Tharalson**

*Charlie Matsch Field Camp Fund* – **Amanda Gurske**, **Amanda Putz** and **Kelly Wendt**

*Lempi M. & John W. Pagnucco Scholarship* – **Brandon Brayfield**, **Alyson Cartwright** and **Joe Jacobs**

*Descriptions of these funds, as well as information on how to make a donation to the Department, can be found on our website at <[www.d.umn.edu/geology/](http://www.d.umn.edu/geology/)>*

#### **James R. Frantes Graduate Fellowship**

A few years ago, we established the James R. Frantes Graduate Fellowship in remembrance of one of our graduate students. Funding for this fellowship came mostly from the Frantes family and our own faculty. All interest from this fund is matched by the 21<sup>st</sup> Century Graduate Fellowship Fund. To date we have awarded four \$1,000 fellowships. They went to **Emily Bjonnes**, **Sally Goodman**, **Jessica Gary** and **Dan Costello**. These students can use these funds in any way in pursuit of their graduate degree. We anticipate that we will be able to offer two to three of these each year.

## Undergraduate Student Presenters and Contributors

Geological Society of America

Denver, CO

**Tharalson, E.R.** and Hansen, V. L., The Corona Conundrum, Agnesi Quadrangle Venus: Geological Society of America Abstracts with Programs.

UMD Undergraduate Research and Artistic Fair

**Johnson, Grace**, Flow Patterns of the Laurentide Ice Sheet and Dispersal of Erratics.

NASA Mappers MeetingPlanetary Science Institute

Tucson, AZ

**Tharalson, E.R.** and Hansen, V. L., 2007, Preliminary Geologic Map of Agnesi Quadrangle, V-45 (25-50S/30-60E), [conference abstract and oral presentation] in, Abstracts of the Annual Meeting of Planetary Geologic Mappers.

## Graduate Student Presenters and Contributors

Geological Society of America

Denver, CO

**Bjornes, E.**, Hansen, V. L., Swenson, J. S., Maclin, R., Equilibrium Resurfacing of Venus: Results of Monte Carlo Modeling.

**Costello, Dan**, Mineral Chemistry as a Tool to Determine the Origin of a Mafic Pegmatite Within the Duluth Complex of Northeastern Minnesota.

**Johnson, Andrea L.**, Sediment Loading in the Le Sueur River, Minnesota River Watershed. Co-authors on the paper were Stephanie S. Day, Andrea L. Johnson, Karen Gran, Lesley A. Perg, and Carrie Jennings.

**Quinn, John J.**, and Mooers, H.D., Hydrostratigraphic Correlation – or the Lack of It – in Multi-Scale Investigations in Glacial Drift.

**Shankar, B.** and Hansen, V. L., A Global Survey of Venus' Circular Lows (CLs), a Subset of Coronae.

Institute on Lake Superior Geology

Lutsen, MN

**Taylor, Michael L.**, Pleistocene Glaciation as a Mechanism for Emplacement of High-salinity Groundwater at Anomalously Shallow Depths in the Lake Superior Basin".

NASA Mappers MeetingPlanetary Science Institute

Tucson, AZ

**Shankar, B.** and Hansen, V. L., 2007, Preliminary Global Survey of Circular Lows, a Subset of Venusian Coronae.

American Geophysical Union

San Francisco, California

**Shi, Junmin** and **Berke, Melissa** will both make presentations on Lake Surface Temperature Variability in Lake Malawi since the Last Glacial Maximum (December 2007).

10th International Symposium onAntarctic Earth Sciences

Santa Barbara, CA

**Brecke, D. M.**, and Goodge, J. W., 2007, Provenance of Glacially Transported Material Near Nimrod Glacier, East Antarctica: Evidence of the Ice-covered East Antarctic Shield, in A. K. Cooper, C. R. Raymond, et al. (eds.), A Keystone in a Changing World.

## 2007 Graduates

BA

Cartwright, Alyson  
Heimgartner, Katherine  
Rocheford, MaryKathryn

BS

Lemcke, Blake  
Nordberg, Taylor  
Rechel, Reid  
Wendt, Kelly

MS

Adeeb, Riyadh Ali  
Brecke, Devon  
Endsley, Erin  
Erickson, Ryan  
Freiburger, Nicholas  
Hoffman, Adam  
Mohr, Jere

PhD

Castañeda, Isla S.

