DEPARTMENT OF GEOSCIENCES

WESTERN MICHIGAN UNIVERSITY

In honor of the
Lloyd J. Schmaltz
Geology and Mineral Museum

Volume 10, Issue I
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On behalf of the Department of Geosciences, Welcome to the 2017 issue! We would like to dedicate this issue to the Lloyd J. Schmaltz Geology and Mineral Museum—the only STEM learning-centered museum on campus. The museum is located in Rood Hall and has been a prevalent spot to visit on campus since it first opened. The museum is continuously growing its collection of rocks and minerals and is in need of a renovation to maintain capacity for the growing collection. The department would like to create a comprehensive exhibit that will reflect the department’s, University’s and community’s need. We will be updating our current exhibit to accommodate experiential learning, a larger inventory, and expansion to other spaces within Rood Hall. Current faculty and staff have collaborated and would like to see the museum accommodate a highly interactive and child-friendly atmosphere that will display the whole story of the collection—from beginning to end.

The College of Arts and Sciences Dean’s Office has pledged $25,000 and the Department of Geosciences an additional $7,500 to initiate the Schmaltz Museum renovation project. We need your help in reaching our $300,000 goal for phase I. Any gift, no matter the size, will help ensure the museum remains a campus mainstay for years to come! The start date of this project is currently pending funding. Stay tuned!

To give, visit MyWMU.com/MuseumFund
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Dear Friends and Alumni

It gives me pleasure to report to you the state of our department for the 2016-17 academic year. It has been a GOOD year. Geosciences, one of the smallest departments in the College of Arts and Sciences, secured the second largest grant funding (1.2 million) in the College’s 28 units and the largest per faculty. Applications for our graduate programs soared, 66 graduate students are currently enrolled in our graduate programs, and we remain the only STEM unit ranked by the US News on campus. All of these elements are testament to the research excellence and productivity of our unit.

Over the last year, Geosciences initiated and led a campus wide initiative to develop WMU capabilities in the general area of Unmanned Aviation Systems (UAS). We are one of the very few campuses nationwide that have strong aviation, geophysics, and remote sensing programs and we ought to take advantage of these assets and expertise. A number of certificate programs will be offered a year from today by the College of Aviation, Geography, and
Geosciences. Ours will be led by a new tenure track faculty appointee at the Assistant/Associate level who will be selected in the current academic year. The successful candidate, a geophysicist, will be responsible for the development of a joint certificate with the College of Aviation on the applications of geophysical and remote sensing techniques in geological and environmental sciences. The new addition will be part of our ongoing attempts to broaden our research interests and to replace our retiree, an initiative that started some five years with the hire of an economic geologist (Dr. Joyashish Thakurta), a carbonate petrologist (Dr. Steve Kaczmarek), a basin analyst (Dr. Peter Voice), and a hydrogeologist (Dr. Matt Reeves).

Last year, new programs came in place and others will be on the books soon. We started offering our graduate hydro certificate in fall of 2017 and in the following year, the undergraduate hydro certificate. Our school credit hours are on the rise, 8724 in 2012-13 and 9656 in 2016-17. We are the lead STEM unit in on line offerings. Last year alone, we generated 4102 online credit hour offerings amounting to 42% of our total generated credit hours. We are responding to a national trend, where the young generation is showing a growing interest for online offerings. They are comfortable with digital platforms and many of them have part time jobs and appreciate the flexibility that comes with online offerings.

Geosciences had a face lift this last year. We completed the renovation of the remaining three classrooms and the three main auditoriums. This initiative started some five years ago and now our students can enjoy adequate and functioning classroom and lab space. I keep on telling our students, this comes with higher expectations from our end. We are currently working on developing adequate space for the faculty, students, and staff to meet, mingle, interact, and discuss issues of concern. A new lounge area is being constructed on Rood’s first floor for this purpose.

Our next major project is to renovate and expand Dr. Schmaltz’s Museum. The museum has precious items such as the Duncan’s mineral collection, now valued at over a million dollars, the mastodon fossils, the copper boulder excavated from the bottom of Lake Superior, and the shark teeth collection. We would like to develop the museum into an instructive, attractive and outreach museum, increase the security measures for our valuable collection, make room for additional collections, and in the future add interactive modules as well. New modern displays, lighting, flooring, and signage will be required. The project will be accomplished in phases, the first of which will require an investment of ~300K, 25k of which have been committed by the college, and 7k by geosciences. We are looking for donors to help us reach our goal and at the same time preserve and honor the legacy of the founder of our department, Dr. Lloyd Schmaltz. To give to the Lloyd Schmaltz Geology Museum Fund, visit MyWMU.com/MuseumFund or use the designated envelope provided in this newsletter.

My research team includes nine Ph.D. students: Mustafa Emil (Turkey), Karem Abdelmohsen (Egypt), Sita Karki (Nepal), Hanna Pankratz (USA), Esayas Gebremichael (Ethiopia), Abdullah Othman (Saudi Arabia), Hossein Sahour (Iran), Abdel Aziz Aljammaz (Saudi Arabia), and Guzalay Sataer (China). Abdullah successfully defended his thesis in summer II and accepted a tenure track position starting in spring of 2018 in Umm al-Qura University, Saudi Arabia. Last year, our research team delivered over fifteen contributed and invited talks in the annual meeting of the GSA (Denver), AGU (San Francisco), the GSTM meeting in Germany, Cairo and Ain Shams Universities, Cairo, Egypt. Four articles were published in year 2016-17 in the GSA Bulletin, Surveys in Geophysics, Earth Science Reviews, and IEEE Selected Topics in Applied Earth Observations and Remote Sensing. A fifth is in press in Science of the Total Environment. Three others are currently being reviewed in Surveys in Geophysics, Geological Society America (GSA) Bulletin, and Journal of Geophysical Research (JGR). Our ongoing projects are currently funded by the National Academy of Sciences, the NASA GRACE program, the Saudi Geological Survey, the Charlotte County in southwest Florida, and the Qatari Ministry of Municipality and Environment. These projects apply integrated approaches to address a wide range of geological and environmental problems including the assessment and prediction of algal bloom occurrences in southwest Florida, groundwater extraction-related land deformation in central Arabia, mass variations and sustainable utilization of modern and fossil aquifers in Michigan and Arabia, and geohazards associated with salt dome intrusions and landslides.

Geosciences continues to deliver on all fronts through the collective efforts of its faculty, staff, students, and those of the dedicated members of its Advisory Council. Last year our Carla Koretsky accepted the position of the Dean of the College of Arts and Sciences and a few months later, Heather Petrovic accepted the Associate Dean position in the College. They both bring structure, energy, dedication, and innovation to the College and we are happy to see that Geosciences ambassadors, represented in Carla and Heather, are doing a lot of good to the College and the University.

I am looking forward to seeing you all at our spring banquet on April 20 2018. Our spring and fall banquets are cherished by all of us, as they provide opportunities to recognize our student’s achievements, meet with you, and get your feedback on our plans. Our students love to hear about your success stories and aspire to follow your steps.
THE MICHIGAN COPPER ERRATIC

This large piece of native copper, shaped like the state of Michigan, was formed as hot, copper-rich water flowed through fractures in the Precambrian volcanic rocks of Michigan’s Upper Peninsula more than a billion years ago, and deposited masses of pure copper within the fractures.

Glaciers, advancing and retreating through the region about 35,000 years ago, eroded the ancient volcanic rocks and the copper veins in them. When the glaciers melted about 10,000 years ago, pieces of copper, such as this specimen, were left strewn along with other glacial deposits throughout the region.

Shortly after the glaciers retreated, the first Native Americans entered the lake superior region and used this "float" copper for implements, ornaments, and weapons. These same early people also discovered the parent copper veins and started mining copper in what, thousands of years later, became the world famous Michigan Copper District of the Keweenaw Peninsula.
Dr. Dan Cassidy

Hello Everyone:

I’ve very been busy in the last couple of years, mostly doing two things: (1) putting my graduate courses in Hydrogeology online, and (2) doing research on plant-based surfactants and developing a novel combined remedial strategy. I’m sure you know that making our Hydrogeology courses available online is an essential part of our new Hydrogeology Certificate, which Matt Reeves has done an admirable job getting up and running. Although I was initially opposed to putting any classes online, for pedagogical reasons, I’m learning that when done properly online classes have certain advantages that face-to-face courses do not have. With my last 3 MS students, and a very motivated undergraduate student, I have been doing research on plant-based surfactants (e.g., saponins) used to remediate sites contaminated with non-aqueous phase liquids (NAPL). Applying “green chemistry” to surfactants for use in remediation is what I dedicated my sabbatical leave to a few years back. It took me a few years, but it looks like my last two MS students have generated quality research that will result in some solid publications on surfactants in site remediation. I’ve also been researching the combination of two remedial techniques; in situ stabilization and chemical oxidation. Most amendments used for in situ stabilization are cementing agents and/or lime, which can be used to activate persulfate. Persulfate is a strong oxidant, but when activated under alkaline conditions (provided by the cementing agents), the sulfate radical is generated, which is an extremely strong oxidant capable of degrading most organic contaminants. This combined remedy has already resulted in some publications, two of which are co-authored with a recent MS student.
Dr. Michelle Kominz

I hope that everyone had a productive and fascinating 2016-17 year. The main difference for me this past academic year was that I was in charge of the departmental seminar series. My welcome to facilitating the seminar began like this... “There is no money to support the seminar this year.” Would any alumnae reading this like to start a new fund to support departmental seminars? I think that might be a great thing. Despite this, we had a robust seminar series. I prevailed upon colleagues and friends, resulting in 11 WMU-speakers including; one from biology, Todd Barkman; one Ph.D. candidate, Matt Rhine; seven faculty members from this department (including our current Dean, Carla Koretsky); and our geosciences specialist, Tom Howe III. We also managed several external talks with 3 academics from within the state of Michigan, 2 from a little further afield, in the Midwest and one IODP (International Ocean Discovery Program) sponsored speaker from California. Additionally, two seminar slots were devoted to short talks with 3 faculty and 5 graduate students participating. All told, I think we had a pretty interesting set of talks.

Of course this meant that I was also teaching presentations and communications in the spring semester. This is a job that I love and hate. It is a ton of work, but very rewarding. One of the things that I like best about it is really getting to spend some time getting to know a few of the undergraduate majors who have been my advisees for 3 or more years. This group was a real pleasure to work with. And, because there is so much one-on-one time, it was a ton of work.

Quantitative basin analysis kept me and 10 graduate students quite busy in the fall. In the spring I orchestrated the online Ocean Systems class. My first time doing that in the regular semester. The relaxed schedule compared to Summer was kind of nice while the increase in numbers to 130 students was a little daunting.

Meanwhile, Katie Dvorak continues to refine and revise her ideas on why the Canterbury Basin is no longer acting like a passive margin as she works her way towards a Ph.D. defense. And Jack Hybza has begun working with me on Michigan basin maturation, expanding Kirk Wagenvelt’s modeling to a number of wells across the basin. And in July, I will be bringing my preliminary Northwest shelf of Australia results to Bremen, Germany for a post-cruise meeting of the IODP Expedition 356 scientists. I am hopeful that I will be able to bring my computer with me. That is, as they say, “up in the air”. Nothing is quite as sure as change.
Greetings friends and alumni:

It was another good year. It seems that I was attending a thesis-proposal defense or a thesis defense every other week. Sarah VanderMeer (soon to be Ph.D.?) has completed her field work and nearly finished the final iteration of her mapping of the Pictured Rocks National Lakeshore area. She has been on the job search, and nearly landed at Eastern Michigan University, but—so close, and the search goes on. Scott Feldpausch defended at the end of the spring semester, Nick Panyard graduated with an M.A. degree, and Chris Roth is near the end of completing his graduate studies with a M.A. degree. Nate Charlton is still working for the Parks Service. Dr. Heather Petcovic, his thesis chairman, has become Associate Dean of the College of Arts and Sciences, so Heather and I don’t have the day-to-day opportunities for discussion that we had before. I’m just hoping that Nate will simply surprise me one day and be here to defend. New graduate students keep popping up and keeping me busy. Ben Seiderman, Karl Backhaus, Nick Moleski, and Alexander Koerber have already completed their thesis project defenses, and are out busy doing summer field work. I suspect their busy summer translates into an upcoming busy fall for me.

This year, five of our graduate students, Matt Hemenway, Clay Joupperi, Mohamed Al Musawi, Jack Hybza, and Zaid Nadhim, formed our new “Geo-Broncos” team to enter the “American Association of Petroleum Geology” (AAPG) international “Imperial Barrel Award” (IBA) competition. The team was first given all the geological and geophysical exploration data (the exact same data that they would acquire as an oil-and-gas company exploration team) for a potential area-of-interest, and was then given six weeks to organize, research, analyze, and interpret all the data. They then had to present their results and drilling recommendations to a panel of industry experts. I was their faculty advisor, and Kyle Patterson (a recent WMU geo-graduate, now working for Miller Energy) was their “outside consultant”. Dr. Bill Harrison also added his geo-oil-business acumen to the mix, and Linda Harrison was the “official” team photographer. Many long nights, weekends, and much presentation practice ensued, but it all paid off. The team took second-place silver at the AAPG Northeast Section Regional competition, earning bragging rights and $500 for the department. Go Geo-Broncos!

Teaching assignments seem to have settled down into more of a pattern. I’m still doing my usual GEOS 1000 “Dynamic Earth,” GEOS 3220 “Ocean Systems” (both classroom and on-line), and GEOS 1500 “Natural Hazards and Disaster” during the spring semester. Despite having taught these courses for some years now, there is always new material and updates to keep me busy. It must be good, because it’s still fun!

This past summer, for the first time in ten years, and after 3 years of being my last year, it actually was my last. Dr. Peter Voice taught the GEOS 4380/4390 field mapping course this year. Peter first took the course as a WMU geo-undergraduate student, and then, while working on his Master’s degree, helped Dr. Ron Chase as a TA for the course. So, he is obviously well qualified, and now, it’s his turn to take it over.

However, we are now revamping the course, expanding it into a three week modular-type format (similar to our very successful hydrogeology field camp). So, I may not have had to teach the course this year, but I did not escape all the paperwork (and for years to come). Unfortunately, it also caused a lot of paperwork for Dr. Michelle Kominz who had to reconcile the field course changes with all the Geosciences department’s requirements and descriptions for all the majors, minors, degree programs, etc., etc…… but, it’s done. Now all we need to do is develop the new, one-week long, Geo-Techniques module for the program. Good thing it’s fun.

Back at home, I only had to use the snow blower four times this entire winter, but due to the mild weather, all the bushes, grass (and bugs - to make it even more fun) are now growing like crazy. The work might seem to go away for a while, but it always tends to “even-out”. Be careful what you wish for.
Dr. Peter Voice

Good day everyone! The past year has been exciting for me – I took on many new challenges and kept quite a few other projects going. I was promoted to Faculty Teaching Specialist, a full-time position that includes teaching, graduate advising, and directing the CoreKids outreach program.

Teaching kept me busy this year with several new classes under my belt. In the fall, I taught a graduate course in clastic petrography and provenance, which was a nice way to get back to some of my old work on detrital zircon geochronology and provenance. In the spring, I tackled structural geology for the first time. Chris Schmidt’s help, I was able to put together lectures and labs for the students – it was definitely a learning experience for me, as it had been a while since I had done a stereonet. Hannah Pankratz very ably covered the lab and is helping me put together a lab manual for next spring. Over the summer, I also had the opportunity to teach our geologic mapping course for the first time since I helped Ron Chase with that course as a teaching assistant. We enjoyed mostly good weather and saw some great rocks!

I am also preparing a new class for Fall, 2017 – Dinosaurs! It will be a new general education course designed as a science without lab course. This is the perfect time to offer that course, considering all of the new discoveries in the field.

For the Survey, I have embarked on a new project to develop a comprehensive database of historic mineral production statistics for the state of Michigan. In the past 150 years, Michigan has produced over 300 million metric tons of rock salt, 1.5 billion metric tons of iron ore, and 6.5 million metric tons of copper! I am working on a report with all the data and hope to have it published next year. I have also developed teaching resources highlighting this information and made two presentations about that at science teacher meetings.

Dr. William Sauck

Here are some highlights since July 31 of 2016. Our Aug. trip to our home in Sao Luis, Brazil was restful, with quality beach time. Then, back to my full-time Fall semester job. I was assisted in Geos-5600, a small class of 12, by my experienced TA, Hannah Pankratz. Geos-6500, GPR, had a small but dedicated class of six.

My Spring (off) semester again allowed us to escape the MI winter with a New Year’s Eve flight to Brazil for Jan., Feb., and into the first week of March. My mature coconut, mango, cashew and other trees provided abundant fresh fruit, as did the acerola bushes and banana plants. It is fun to be gardening in Jan-Mar.

Spring provided a trip to the SAGEEP conference in late March, again in Denver. I presented my work in passive seismic over the part of the Kalamazoo moraine to the W of Kalamazoo, as well as Scott Feldpaush’s paper about his gravity and passive seismic work in Barry Co. April was busy with Scott’s thesis defense, and a pair of thesis proposal defenses by two of Dr. Kehew’s advisees who are also doing a substantial amount of passive seismic work; Ben Seiderman and Karl Backhaus. In May I was involved in the thesis proposal defense of one of Dr. Sultan’s students, Hannah Pankratz.

In June, Kelly and I made a 6-day trip to the Black Hills, covering from the far S (Mammoth Hot Springs – a great place to see the excavations), through Mt. Rushmore, Crazy Horse, and into the N at Lead. This brought back memories of a trip there to the Homestake Gold mine with my advisor from the U of Arizona way back in 1965 to do some experimental underground IP work at the 4800 ft level. At that time the first neutrino detector experiment was being installed in a large opening at that level (we worked beyond that in a tunnel without ventilation or interfering wires and tracks). That early neutrino detector operated for decades and won some physicists a Nobel Prize. The mine closed some years ago, part of it is now called the Sanborn Observatory, and they are now installing a WIMP detector where the neutrino detector was. They have also slowed the lift a great deal, so that it doesn’t drop to 4800 ft at about 25-30 mph any more (something about grad students and researchers getting sick). The Sanford museum/visitor center on the surface is worth a visit.
Dr. Joyashish Thakurta

I have started two new research projects with two of my new graduate students Nick Moleski and Alex Koerber. Nick completed his bachelor’s degree at WMU while Alex did his bachelor’s degree at Winona State University, MN. Nick’s M.S. project is on the characteristics of polymetallic sulfide mineralization at the economic mineral prospects of the Penokean Volcanic Belt in northern Wisconsin and UP Michigan. Alex has started to work on the petrological and geochemical characteristics of the Echo Lake intrusion in UP Michigan. Alex’s project is funded by a Canadian Exploration company called Altius Minerals Inc., based in St. John, New Brunswick, Canada. The project now includes additional samples from the nearby Haystack and Bluff intrusions. The objective is to determine the age(s) of these intrusions and to examine their similarities with the mineralized systems in Eagle and Tamarack intrusions based on petrological and geochemical characteristics. Nick’s project is carried out with sampling and data support with Aquila Resources, Menominee, MI.

A new project is being planned on newly discovered lithological units at the East Eagle Intrusion with support from Lundin Mining Company, Toronto.

In fall 2016, I have taught a new undergraduate course called “Competing for Natural Resources” for students in the College of Arts and Sciences, regardless of their background. The course was taken by 12 students with a large variety of disciplines. In spring 2017, I started teaching a new course on advanced “Igneous and Metamorphic Petrology” for graduate students and upper level undergraduate students who have taken the introductory courses in Mineralogy and Petrology.

I have started collaborative research partnerships with two groups of geologists one at Institute of Geology and Geophysics, Chinese Academy of Sciences and another at School of Resource Environment and Earth Sciences, Yunnan University, China. We have worked on several articles two of which are under review. The articles are based on different aspects of the Central Asian Tectonic Zone particularly on the occurrences of zoned mafic-ultramafic intrusions.

I have been invited to write a book chapter on the economic prospects of Alaskan-type complexes for publication in “Processes and Ore Deposits of Ultramafic-Mafic Magma through Space and Time” by Springer. The article is now in press. I have been invited to write an article on hydrothermal mineral deposits for a special issue on hydrothermal economic mineral resources in the journal “Minerals”.

I have organized two presentation sessions at the Annual Meeting of the Geological Society of America in September 2016 on the multidisciplinary aspects of research on the Midcontinent Rift system, along with Ben Drenth and Bill Canon from the US Geological Survey.
Dr. Heather Petcovic

The past year has been a time of great change. On the research front, my NSF-funded Geo-Needs project (http://serc.carleton.edu/geoneeds/index.html) wrapped up its final work in the fall. I continue to collaborate on several projects related to spatial thinking, including a comparative study of how students understand remote sensing concepts in a field-based exercise versus a lab activity. I had the pleasure of giving an invited departmental seminar talk at both Arizona State University and the University of Delaware in the past year. Starting July 1, I will direct a new project seeking to reform the preparation of science teachers at WMU through creation of a summer program involving scientific research, teaching preparation, and teaching practice. I am delighted to collaborate on this effort with Steve Kaczmarek (Geosciences), Todd Ellis (Mallinson Institute and Geography), Steve Bertman (Institute of the Environment & Sustainability), and Paul Vellom (Teaching, Learning, and Educational Studies).

On the teaching front, I had a blast accompanying the Geology Club students on their trip to South Dakota in May. Despite a few near-freezing nights and a day of snow, we enjoyed the Badlands, Black Hills, and Devil’s Tower, plus plenty of corn, cattle, and glacial drift along the way. Thank you all for a wonderful time! My research group had a big change this year, as Andrew Bentley finished his Ph.D. in June and moved to a postdoctoral research position at the University of Northern Colorado. Congratulations Dr. Bentley! Laura Tinigin (M.S./Ph.D.) and Peggy McNeal (Ph.D.) continue, and we will welcome two new students in the fall.

The biggest change took place in January, when I took a position as Interim Associate Dean with the College of Arts and Sciences. In this new role, I support research efforts, undergraduate and graduate programming, strategic planning, resource allocation, diversity and inclusion initiatives, and more in the math and science departments across the College. This became a permanent position in July, and I am delighted to join James Cousins (fellow Associate Dean) and Carla Koretsky (Dean). While I will miss being in the department on a day-to-day basis, and definitely miss working directly with students, I am excited by the opportunity to have a hand in shaping the future of the College. For certain, more changes are in store for the coming year as we welcome Dr. Edward Montgomery as the new president of WMU. Stay tuned!
Dr. Andrew Caruthers

Greetings friends of the department and Alumni! I have enjoyed a very productive year in terms of my current and future research activities. In December 2016, I was fortunate to have been awarded a grant from the National Geographic Society ($25,000) to study the end Triassic and Early Jurassic mass extinctions in eastern Panthalassa. This is an international collaboration that will involve extensive fieldwork in southern Alaska. Our study is aimed at investigating the impact of these extinction events and their regulatory mechanisms on the remote former volcanic islands of Wrangellia; located at low tropical paleo-latitudes in eastern Panthalassa during Late Triassic time. Most recently, our team has also been asked to submit a larger grant proposal to the Leverhulme Trust that would support field and laboratory activities (for this project) over the next three years. We are anticipating several publications from this summer’s fieldwork and are hoping to further expand its scope into other geographic regions (and paleoenvironments) of western North America.

In other research news, I am also working with Steve Kaczmarek to develop another international collaboration that is focused on exploring the significance of the organic carbon isotope record in halite sequences of the Silurian Salina Group (Michigan Basin). We are currently working to secure long-term funding for this project, which will support graduate student theses and will provide a springboard for publications and further funding opportunities.

In terms of publishing, I am also happy to report a paper published in Earth and Planetary Science Letters, two manuscripts in review in Geology and Bulletins of American Paleontology, and another in preparation to be submitted this summer. Lastly, I have been asked to sit on the advisory committees for two Ph.D. students, Matt Rine (WMU) and Selva Marroquín (Virginia Tech); and to also take part in an international geoscience programme (supported by UNESCO and IUGS) that is focused on the Toarcian Oceanic Anoxic Event [Project # 655]. This is an international and multidisciplinary project with 88 researchers from 23 countries.
Dr. R.V. Krishnamurthy

The 2016-17 year went by rather fast. The stable isotope lab continues to be active in various research applications. Ph.D. student, Shelby Hurst received a number of grants. She had the chance to attend a major meeting such as the American Geophysical Union’s annual meeting in San Francisco for the first time. She also garnered enough external funding to attend the prestigious Goldschmidt conference in Paris this year. I had the rare opportunity to be the main examiner of a Ph.D. dissertation at the University of Helsinki. The main examiner is called the “opponent”, the main advisor is called the ‘Custos” meaning custodian in Latin. The candidate is called the “Respondent”. The Custos is responsible for conducting the proceedings but cannot ask any questions. The synopsis of the thesis is examined by two external reviewers who will advise if the candidate can propose a public defense. Once that is approved, the opponent is selected. Ten days before the public examination the thesis shall be “nailed” to a board in the University Main Building so any one can take a look. The nailing is probably a tradition inherited from Martin Luther, who tacked his 95 theses to a church door in Wittenberg in 1517.

The public examination traditionally starts at 12 o’clock. Formal dress is a rule for the member of the panel. Gentlemen usually wear a tailcoat with a white tie and a black waistcoat, or if agreed, just a dark suit. Ladies wear a black dress without a hat. An Opponent and Custos with doctoral degrees may wear graduation hoods or gowns. The doctor’s hat is carried in the hand when entering and placed on the table when seated. For the whole occasion there are a number of rules to be followed. The members of the panel enter the auditorium, the Respondent first, then the Custos, and finally the Opponent(s). All the people in the hall must rise. After the opening of the session by the Custos, the Respondent delivers an introductory lecture, lectio praecursoria, lasting normally 20 minutes. Then, according to the protocol, the Respondent remains standing and says: “Mr. / Madame Opponent, I now call upon you to present your critical comments on my dissertation.” The Opponent then stands up to give a short talk on the scientific significance of the dissertation topic or other general aspects of the subject matter. After the talk, both the Opponent and the Respondent seat themselves, and dialogue between them begins. In principle, the Respondent may just answer the questions, and is not allowed to ask anything, except for clarifications of a question. The audience is not allowed to intervene, and normally the Custos also just listens. After the detailed criticism, the Opponent stands up to deliver his or her final summary of the examination. The Respondent listens to it standing, and says a few words of thanks to the Opponent. Finally, the Custos stands up to announce the examination is completed. The three of them walk out in the same order while the audience rise. Afterwards, the Opponent submits a written evaluation statement to the faculty, which at its following session decides about the approval of the dissertation and the conferment of the degree. This decision is based on the Opponent’s statement and the report of the Custos. Thus the candidate has defended her thesis exactly as Martin Luther did in 1517! The tradition will continue.

I also had an invitation to present a paper at a conference on climate change held in Cambridge, UK. During the conference we took a tour of the famous university town and saw where Isaac Newton, Watson and Crick, Stephen Hawkins and several giants of science, literature and politics went to school or worked. Cambridge University has produced a large number of Nobel Prize winners and Prime Ministers in addition to famous poets. The Botanical Garden that is part of the University is truly amazing. Here one could see the tree which was derived from the original tree under which Newton sat and an apple fell over his head, giving birth to classical physics! I had the honor of sitting under that tree, but no apple fell on my head!
Dr. Stephen Kaczmarek

Hello Fellow-Broncos. Another busy year is now behind us, and I can no longer claim to be the new guy in the department (welcome, Dr. Matt Reeves!). It’s been a productive and exciting second year at WMU. As far as teaching goes, I had another great group of students in Physical Geology, Sedimentation and Stratigraphy, and my new graduate course, Carbonate Petrology. We continued a tradition started by Dave Barnes of going to Kentucky for the undergraduate Sedimentation and Stratigraphy field trip. The students got their fill of Paleozoic rocks from the Appalachian Basin, and experienced the perils of late autumn camping. The students in my graduate course spearheaded a field trip to Austin, Texas for four days in February to examine some Mesozoic limestones and dolomites. Over 400 rock samples were collected as part of the course project to investigate the genetic origin of the dolomites in the Upper Glen Rose Fm. Upon our return to the wintery weather in Kalamazoo, numerous geological and geochemical datasets were acquired using the new analytical instrumentation in my lab (details below). In the end, the students got an authentic field experience, and the preliminary dataset will be used as part of a larger study on the diagenesis of the area.

On the research front, I’ve now got seven extremely talented graduate students working their fingers to the bone on a wide range of carbonate-related projects. The NSF-funded X-ray fluorescence is now operational and has been collecting massive amounts of elemental data from drill cores curated at MGRRE (Matt Hemenway-M.S. and Mohamed Al Musawi-M.S.). The X-ray diffractometer has been running nonstop over the past year in an effort to evaluate using specific mineralogical parameters as proxies for dolomitization conditions (Cameron Manche-Ph.D.). The new scanning electron microscope was delivered in February, and is being used extensively in two Ph.D. projects. The first will attempt to unravel the diagenetic history of Eocene carbonates in Qatar (Brooks Ryan-Ph.D.). This work is part of a collaboration between academia and industry funded by ExxonMobil Research Qatar. The SEM will also be used to continue ongoing research efforts to understand the diagenetic origins of limestone microporosity (Mohamed Hashim-Ph.D.). We’ve been extremely busy this year going after federal dollars to more fully test a new methodology for extracting carbon isotope data from halites in the Michigan Basin (Matt Rine-Ph.D. & Dr. Andrew Caruthers-Research Specialist). We also continue to investigate the stratigraphy of Silurian reefs as part of a large carbon-sequestration project funded through the Department of Energy (Zaid Nadhim-M.S.). And last, but certainly not least, ongoing laboratory experiments examining the fundamental controls on dolomite nucleation and growth kinetics continues at full speed (Hanna Cohen-M.S.).

In addition to being fun to work with, this gifted team of graduate students has helped produced numerous peer-reviewed publications, conference presentations, and invited campus talks over the past year, all of which have aided our efforts to show the carbonate world how fantastic it is to be a Bronco! If you ever find yourself in Rood Hall, please stop by; we’d be happy to give you a tour of the new labs and show off our new analytical instrumentation.

Best Regards,
Steve K.
As a part of a course project for Carbonate Petrology, graduate student, Khalid Haji Omar (M.A.) used the gas-powered core-plugger to sample the outcrop in Austin, TX. Cameron Manche (Ph.D.) pictured in the background taking field notes.
Greetings Everyone!

I’ve successfully completed my first year here at Western! It has been an intense but rewarding year dedicated to research, course development, expanding the Hydrogeology Field Course and Hydrogeology Certificate Program, working towards forming educational and research partnerships in Florida, getting to know the Geosciences Faculty and many of the undergraduate and graduate students, and settling into the Kalamazoo area with my family. Phew, some of the details of the past year are a blur at this point. I’d like to thank all of the Geosciences Faculty and Staff for all their help and support during this transitional year.

WMU is an excellent place for research and teaching, and the students have greatly impressed me with their motivation and commitment to learning. Two Doctoral students, Romeo Akara and Xiang Fan, will be joining my research group in the Fall, and I am currently working with Ryan Cascarano, Clay Joupperi, and Neal Turluck on Master’s projects involving contaminant transport at surface water – ground water interfaces and characterizing oil and gas reservoirs in the Michigan basin. Other research projects include the use of conservative tracers to understand chemical transport and retention in boreal catchments in Alaska (see pictures), characterizing septic effluent transport times in southwest Florida, assessing climate change impacts on water resources in semi-arid basins in California and Nevada, and investigating the interaction of the regional stress field on fracture permeability and radionuclide migration on the Nevada National Security Site.
Hi Everybody. The past year for me was fairly typical. I continue to be involved in the Michigan Geological Survey mapping programs sponsored by the USGS. We are working in Cass County now for new mapping and I am also coordinating a composite county map of Calhoun County, which we have mapped over a period of four years. This involves stitching together the 7.5 minute quads, which is done by our GIS expert Sita Karki, and then addressing all the issues that arise when three different people did the mapping, such as making the units and contacts consistent between adjacent quads. This is almost finished. The drilling that we do along with the surface mapping is always interesting and we drilled about 75 borings in the Calhoun project, many of them going to bedrock. The map alone is not the final product—the fun part comes in trying to apply the new information towards a better understanding of the glacial processes and sediments, which are poorly known compared to other states. We are also starting to refine the glacial chronology a little with OSL (Optically Stimulated Luminescence) dating. The Calhoun mapping formed the basis of a paper I wrote with several others for an upcoming GSA Special Paper on the glacial geology of the Midwest, which I am also co-editing with Brandon Curry of the Illinois State Geological Survey. Two former PhD students, Andy Kozlowski and Brian Bird, also have papers in the volume, so WMU will be well represented. Two new MS students—Ben Seiderman and Karl Backhaus—started glacially based thesis projects last year, and Sarah VanderMeer is just about finished with her PhD project in Pictured Rocks National Lakeshore. We got a USGS EDMAP grant for Karl’s mapping project in Branch County.

Other things that are going on include a revision of my geology for engineers textbook for a new publisher: Waveland Press. The deadline is the end of the year and I’m hoping that is somewhat realistic. It’s a big job. I’ve been taking some geology trips lately, last summer to look at volcanism at Mt. Shasta and Medicine Lake volcanoes in northern California, and this summer in the Colorado Front Range. These are field courses through the Chautauqua program for science teachers—not highly technical but a chance to see really spectacular geology.

As I write this I am starting a sabbatical during which I hope to start to put together a regional surficial geology map for SW Michigan. That will take a while to finish. I am also thinking more about transitioning out of here to Maine for retirement, which is not too far down the road. My three daughters and two grandkids live there, so it seems like a logical place for me to head for after WMU. But I have to come back for at least two years after the sabbatical.

To the left are a few photos I’ve taken during the past two years: the tower karst along the Lijang River in China, Mount Shasta with the Little Glass Mountain obsidian flow in the foreground, and the Hickory Run boulder field in Pennsylvania (the largest of these periglacial features in the Appalachians).
This has been an eventful and productive year for me both professionally and creatively. Upon taking on a new online course, GEOS 1000 - Dynamic Earth, I decided that students taking the course would benefit from having more online pedagogical material from the professor that stands in for a traditional lecture. I’ve taken on the task of building a series of science videos designed to substitute for in-class lectures to augment what online content is already available to the students.

My efforts to accomplish this goal began last fall with learning how to build videos, film-edit, design motion-graphics, and record & edit voiceover tracks. I regularly incorporate still images and video clips from my own travel, as well as my own drawings and illustrations. This is now an ongoing, intense and very rewarding project that I will eventually extend to material I cover in my other classes. To date, I have twenty-six episodes live on my YouTube channel, which I call EarthParts. I’ve attracted enough subscribers to be granted by Google a custom URL: http://youtube.com/c/earthparts.

Each video I make currently focuses on a particular subject (or sub-subject) pulled from the syllabus of GEOS 1000, but could work equally well in any introductory geology course. EarthParts episodes currently focus on subjects relating to plate tectonics, deep time, scientific skepticism, Earth’s origins, the carbon cycle, and minerals. Many more episodes are currently in production, including upcoming episodes on basic rock types and their formation. I am encouraged by departmental colleagues who have told me they have already assigned some of these videos, and I invite others to do the same where they see fit.

All of these videos I publish under a Creative Commons non-commercial, attribution, share-alike license. They are all family-friendly and are all freely available so that anyone anywhere can use them to learn about geology and the earth sciences. I am grateful for the Department’s support in this ongoing endeavor to build educational online content that helps to improve public understanding of science and our planet.
Rood Hall, home of the Department of Geosciences, was constructed in 1970.
The 30th year of the Hydrogeology Field Course (HFC) went well due in large part to the efforts of our instructors – Mr. Howe, Stegink and Yordy and Drs. Kneeshaw, Reeves and Werkema – and teaching assistants. These instructors went above and beyond this year as Geosciences has made a commitment to offer HFC Summer I and II sessions each year. We’d also like to extend our gratitude to our dedicated group of industry experts, friends, and alumni (too many to list here) who took time out of their busy schedules to contribute to each of the six modules. Through their tireless support of time, money and in-kind donations, our students get the skills they need to either continue in graduate school or hit the job market as qualified and well-rounded hydrogeologists. As always, Tom Howe was diligent with his planning and ensured that each module ran smoothly; he also went above and beyond by extending his hospitality to some of the students who were displaced from the dorms during the last week of the Summer II session.

Our target enrollment of 25 students per session was achieved for both sessions, and each session was comprised of a distinctly unique group of students – it’s the students and their commitment to the field of Hydrogeology who make this nationally-recognized field course a success! Roughly two-thirds of the students came from other universities from around the nation, with many students coming from universities that had students attend in previous years. It is very satisfying to know that past HFC graduates enjoyed their experiences here at WMU and provided a positive recommendation to their peers. Two outstanding students, Douglas Keto and Olga Tarasev, were nominated for the USGS-NAGT internship and we hope they will received this prestigious honor. Last year’s HFC student nominee Aaron Kosobucki took full advantage of his nomination and spent this summer student geochemical processes related to resource extraction in Pennsylvania.

Mr. Brock Yordy, new to the HFC this year, unselfishly provided his expertise during both drilling modules, and even had the time and motivation to highlight our drilling module in the National Driller—http://www.nationaldriller.com/articles/90928-college-program-can-address-drilling-jobs-pipeline and https://www.youtube.com/watch?v=0Y-HkIUWA6I&feature=youtube.

The article has been highlighted as a plaque that will be displayed after the remodel in Rood 1144. This article has generated positive recognition for the HFC and we have been contacted by Cascade Drilling who is interested in participating in the Drilling module, and plans on recruiting HFC graduates. The U.S. EPA, with the help of Dr. Werkema, is donating a Geoprobe drilling and coring system to the HFC to provide additional support for our drilling module. These are all positive developments as we continue to improve the quality and visibility of the HFC.
NEW!
New certificate courses coming soon!

HYDROGEOLOGY
CERTIFICATE PROGRAM

Last but not least, we’d like to mention our new Graduate and Undergraduate Certificate Programs in Applied Hydrogeology. The Graduate Certificate has been active for about a year now, and the Undergraduate Certificate will be available in fall 2018. The Certificate program is an outgrowth of the HFC that involves the completion of all six modules of the HFC and three, 3-credit upper-division/graduate courses in hydrogeology related courses – many of which are online. Interested students can first read this link: https://wmich.edu/geology/academics/hydrogeology-certificate and FAQ section and then contact Dr. Matt Reeves.

Are you an alumni of the WMU HFC? We would love to hear from you! You can reach Tom Howe by email: thomas.r.howe@wmich.edu or by phone (269) 387-5492 or follow us on Facebook “WMU Hydrogeology Field Camp”.

Drone photo is courtesy of Tim Seuss
NOTES FROM

FIELD MAPPING

COURSE

FOG ROLLING
INTO THE
DUNES
Several years ago I worked as a teaching assistant with Ron Chase at the Marquette mapping field camp. I had the opportunity to work with him during four summers, teaching about 40 students each year. With great memories of that work, I was very excited when Mohamed asked me to teach field camp this summer. After Ron’s retirement, the field camp continued to be well led by Robb Gillespie and JT Thakurta. With their help I was able to quickly step in and teach the course. I also had an incredibly competent teaching assistant of my own – Nick Moleski. We took 13 students this year.

The first couple of days we traveled up the coast of Lake Michigan looking at coastal and glacial geology. The first night we stayed in Orchard Lake State Park – an incredibly nice location. On the second day, we stopped at Crystal Lake and the Sleeping Bear Dunes. Unfortunately, fog rolled in just as we arrived at the Lake Michigan overlook. In the afternoon, we drove through the drumlins of northern Leelanau County, stopping to look at several road cuts where we examined their internal structures and composition. We then stayed in Traverse City for a night before heading to the Upper Peninsula. In nearby St. Ignace we looked at the Mackinac Breccia at St. Anthony’s rock, a Nippissing age sea stack. Students collected samples of the breccia at a road cut north of town. We then drove to Paradise, MI where we stayed at the Tahquamenon Rivermouth Campground and spent a day working at Tahquamenon Falls, Pictured Rocks, and Munising Falls.

After that journey, we finally made it to Marquette. We stayed at Northern Michigan University’s campus for nine days. In that time, the students learned about the local stratigraphy, looked at ancient pillow basalts and stromatolites, and practiced field methods and mapping. Highlights of the trip included looking at the banded iron formations at Jasper Knob and examining the Lake McClure tsunamite deposits – 1.8-billion-year-old deposits related to the Sudbury impact! We finished with two days of mapping Marquette Mountain.
CoreKids

K-12 Outreach Program

Directed by Dr. Peter Voice

CoreKids, the K-12 Outreach Program for the Survey, MGRRE and the Department, had another very successful year—we conducted fewer events, but worked with more than 14,000 students, teachers and parents. During the four years that I have run this program, we have worked with a total of more than 64,000 people. Due to limited funding this year, we had to reduce the number of in-school events to just a handful. We focused on reaching as many people as we could by providing educational content at mineral shows and science/STEM career days. Here are the schools we visited in the last four years.

We began a new partnership with MiCareerquest Southwest, which hosts an annual experiential career investigation event. We provided a booth for that event that focused on careers in the Earth sciences with a variety of hands-on activities exploring rocks, minerals, fossils, and groundwater. Over 5,000 high school students attended the three-day event! We have already registered to participate in their next event in the fall. The Michigan Earth Science Teachers Association (MESTA) also hosted a STEM Career day for students in southeastern Michigan at which WMU Geosciences hosted a CoreKids booth and a groundwater booth. Duane Hampton graciously helped us with the event, by showing off the groundwater model. Over 400 students attended the MESTA STEM Career Day.

I continued to generate resources for teachers—this year focused on Michigan's natural resources. I gave presentations at both the annual MESTA meeting and Grand Valley State's Fall Science Update meetings. At those meetings, I provided the teachers with workbooks showing graphs of mineral production from Michigan. We discussed everyday products that are made from Michigan resources. I also had the opportunity to run a field trip for the annual meeting of the Michigan Alliance for Environmental and Outdoor Educators in the fall. I took a group of 10 teachers to MGRRE and showed them our premiere core facility.

As I write this document, I am getting ready for a teachers' workshop to be held here at MGRRE in August. This workshop, presented in partnership with Steve Kaczmarek, myself, and MGRRE staff and students, will provide teachers with resources about the chemistry of earth materials. One of the big pushes in science education lately has been interdisciplinary approaches—and Steve's new handheld XRF provides a very useful way to show the tie between chemistry and geology.
CoreKids Reaching Out

Help the CoreKids program by donating to the CoreKids endowment. For more information, visit mywmu.com/givetogeosciences

Distribution of Scheduled School Visits and MGRRE Tours

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[Map showing distribution of school visits and MGRRE tours across various locations in Michigan.]
Greetings Alumni and friends from the Director of the Michigan Geological Survey (http://wmich.edu/geologysurvey), John A. Yellich (John.a.yellich@wmich.edu)

Mission Statement

The mission of the Michigan Geological Survey is to facilitate basic and applied geological research to promote the best use of Michigan’s geological resources for their social and economic benefits, while protecting associated resource values and the environment.

The Michigan Geological Survey (MGS) has taken the one-time funding allocation received in June 2016 to assess the natural resources of Michigan, and MGS has initiated a select number of demonstration projects that will validate the science and services of a functioning geological survey, both to support that natural resource assessment and present the case to fund the MGS. In addition, MGS continues to support the ongoing research programs of geologic mapping, MGRRE, Outreach-Core Kids and student research. The following is a summary of this past year’s accomplishments and goals in pursuit of annual funding from the Michigan Legislature and Governor’s office.

Michigan has not conducted broad, natural resource research projects for more than 30 years. This grant has allowed the MGS to initiate demonstration studies and programs that would be provided by a functioning survey that would support the societal and economic benefits and sustainable environmental protection of our natural resources for local, county and state initiatives. MGS believes it is demonstrating the justification for annual funding through the Legislature and Governor’s office. This research will bring geological science to the public and to the 21st Century users. Included are individuals, industry, city and county planning departments and commissioners, and the Michigan Departments of Environmental Quality (DEQ), Natural Resources (DNR), Agriculture and Resource Development (MDARD), and Transportation (MDOT).

The initial research projects will utilize current standard, scientific methods to provide the unbiased geologic, scientific, environmental and socially responsive documentation to support the appropriate, sustainable management of these resources. The basis for these initial demonstration programs were identified as beneficial for the people of Michigan through the MGS question survey and stakeholder meetings held at multiple venues in the Upper Peninsula (UP) and Lower Peninsula (LP) during 2016. In addition, the MGS will continue to work with, and continue to provide the factual, scientific and technical information to all the state department supporters of the MGS through our professional staff, academic resource centers, laboratories, and the MGRRE core repository.
Michigan Geological Survey—Initial demonstration projects:

1. **Portage, Michigan** – MGS completed a subsurface bedrock valley mapping program utilizing a Tromino Passive Seismic instrument for data collection. MGS conducted a review of factual geologic data which when combined with Tromino data has successfully shown the detailed locations of bedrock valleys, a geologic resource for additional groundwater resources. This research provided partial support to Benjamin Seideman for his Master’s Thesis project.

2. **GRACE Data review**- The Gravity Recovery and Climate Experiment (GRACE) database is a NASA satellite program that will be used to demonstrate terrestrial water storage in localized areas within Cass - St. Joseph and Ottawa - Kent Counties. The project will utilize the last 12 years of GRACE data. Calibrating the GRACE data with factual water storage values can demonstrate an estimate of Terrestrial Water Storage over this period of time. This assessment will provide incremental, validated data for Michigan to project possible water quantity changes when calibrated with current water use. This project will support a Doctoral candidate, Hossein Sahour. Once initial results are determined, MGS will present a plan demonstrating how GRACE assessments can track and support management of water storage for the entire state.

3. **Ottawa County subsurface geology and water quantity and quality assessment** - MGS has completed a detailed review of the Ottawa County subsurface geology with documented quantitative changes in water quantity and quality over time using real time factual data from the water well drilling community. This data summary of groundwater resources has been combined with county projections for current and future growth. MGS and the drilling community have now prepared an outline of strategic groundwater conservation objectives for Ottawa County to consider for meeting the growth of the second fastest growing county in Michigan, next to Kent County. This collaborative research will be discussed with the county planning department, and is expected to result in short and long term plans for water conservation and use for the county.

4. **Ottawa County Aggregate assessment** - MGS has initiated an assessment of the aggregate resources of Ottawa County to support population growth and development. This assessment will outline those aggregate locations, so County zoning can be appropriately assigned for potential approval of extractive functions going forward. This is to minimize the statements of not knowing there was an extraction potential for aggregates in my “backyard”.

5. **Geo-hazards and bluff failure research project** – Geo-hazards along the Lake Michigan shoreline with data compilation of bluff and shoreline movement using available historical WMU/USACE data and acquired remote sensing research data. USGS funding is projected as initial support for the proposed basic USGS FEDMAP geologic program. MGS will be conducting data collection utilizing mapping budgets from USGS matching funds. This study will provide a means to assess the bluff and shoreline impacts caused by population changes, and by changing anthropogenic and natural conditions with time.
The primary functions mandated by the 2011 Legislation that created the MGS at WMU includes the investigation of the geological resources of the state, the collection and archival of samples, cores, cuttings and records of State of Michigan. In addition, MGS continues to operate on “soft” money from Federal and State grants, and until there is an annual budget, MGS cannot hire permanent staff to meet mandated geological investigation requirements, or to receive an increase in matching Federal funds for mapping programs.

In the period between January 2016 to June 2017, MGS and MGRRE have generated total Michigan related grants and awards of $1,090,007, plus continuing grants of $304,062. These figures include the $500,000 Special Appropriation funding for the MGS. A summary of each award is appended to this newsletter.

Please go to the website (wmich.edu/geologysurvey) for a summary of the resource centers to see our capabilities, and a list of those faculty scientists who are partnering their support to the MGS, as Michigan has mapped or assessed less than 10% of the surface and subsurface geology of the state. All the while significant Federal matching funds have been available for more than 24 years. Michigan is the only Great Lakes state that has not committed to annual funding either by allocation, or by fees for specific or combined multiple scientific research projects including geologic mapping, resource assessments, selective airborne or ground geophysical data collection or data preservation.

Light Detection and Ranging (LiDAR) programs have been a strategic benefit to the MGS mapping projects, which until the last five years, Michigan has been lagging the adjoining states. MGS lobbied with the DEQ, MDARD and DTMB and through these collaborative efforts more of the critical areas of Michigan in need of LiDAR data will be collected in the next two to three years. LiDAR data can be used by every regulatory, and research department and business development opportunity in Michigan, including the MGS.

The Great Lakes shorelines are being impacted by residential and business development and by changes in lake levels over the last few years. Federal agencies were not committed to a programed study of Great Lakes shorelines. Michigan alone, more than any other state, has in excess of 3,126 miles of Great Lakes shoreline, which has had limited research done outside of that which had been documented on beach, shorelines and dunes by WMU researchers such as Dr. Richard “Skip” Davis, Dr. Ron Chase, Dr. Alan Kelew, Dr. David Barnes, Dr. William Sauck and Dr. Thomas Straw over the last 40+ years. Clearly, there is a history of interest and research of our beach resources by WMU researchers. April 2017, the USGS, NOAA and USACE initiated a collaborative meeting to discuss Great Lakes beaches and shorelines with the adjoining shoreline states. MGS presented a case for Lake Michigan studies in collaboration with the Illinois State Geological Survey and the Indiana Geological Survey to the USGS, NOAA and the US Corps of Engineers. A result of the meeting is that a collaborative research program is being outlined with the USGS, NOAA, USACE, MGS, the Illinois, Indiana, Wisconsin and Minnesota Geological Surveys to initiate an evaluation of the shorelines being impacted by population growth and by changing lake levels. All parties are soliciting some form of Federal or State funding support for their respective research effort.

MGS has supported the USGS funding of a demonstration airborne aeromagnetic geophysical survey in a portion of the UP which was contracted for the summer, 2016. The airborne survey has been initiated and will hopefully be completed in 2017-2018. Scientific data will be compiled by both the USGS with support from MGS to present validated subsurface geological data in an area not previously published. This is in an area north of Menominee, Michigan.

MGS appreciates the continued support from the members of the Michigan Oil and Gas Association, the Michigan Aggregates Association, the Michigan Manufacturers Association and its sub-committees of Environment and Mining, Michigan Groundwater Association, the Michigan Association of Professional Landmen, the Ottawa County Road Commission, the Southwest Michigan Water Resource Council, the American Institute of Professional Geologists and other agencies and organizations not named here, plus all the individuals who signed the letter of funding support for the MGS.

Michigan Geological Repository for Research and Education - MGRRE continues to be the geologic research foundation of the Michigan Geologic Survey through workshops and research conducted in collaboration with USGS, DOE, industry, faculty and students. Specifics of the 2016-2017 accomplishments are summarized in the MGRRE section of this newsletter. State funding for MGS is coupled with the ability to maintain the core repository, and the research it offers, that has directly resulted in economic benefits to the State of Michigan. Michigan has received tens of millions of dollars in energy related tax and royalty revenues averaged over the last 30 years, that is a direct result of MGRRE research and programs, yet Michigan has not provided any annual funding for this sample storage facility. Nearly 30% of the samples at MGRRE are from Michigan State lands, which has also resulted in specific state revenues. Lastly, since 2011, when MGS was assigned to WMU, more than half of the MGRRE cores have been received. This is Michigan core, and no state funding has been allocated. Local citizens and professionals are requested to contact your legislators to both remind and request annual funding for MGS/MGRRE, a resource for assessing and sustainably managing our natural resources.

The USGS this past year has recognized MGRRE as the national “poster repository” for the USGS National Geologic and Geophysical Data Preservation Program (NGGDPP), when the USGS highlighted the NGGDPP funded MGS/MGRRE data preservation program. MGS/MGRRE was used to present the benefits of 2008 core and data retrieval, storage and cataloging that benefitted from NGGDPP funding. This archived data resource then resulted in the 2013 re-discovery of the potash in Osceola and Mecosta Counties. This natural resource asset has an estimated in place value of $65 billion dollars, and is currently in the pre-development and permitting process. Below is the USGS article/link, January 2017. https://www.usgs.gov/center-
news/mineral-discovery-could-mean-billions-michigan

MGRRE has hosted or provided the research venue in 2016 and 2017 for multiple workshops related to natural resource, environmental and energy related projects that represent Michigan tax and royalty revenues, as well as employment opportunities for Michigan. These programs included a gas storage workshop, the Brock Gas Storage workshop, Petroleum Technology Transfer Council (PTTC) - Dundee formation workshop, and the Midwest Regional Carbon Sequestration Partnership (MRCSP) workshop for industry and researchers to share and collaborate on benefits of Michigan geology for future, environmental and industry projects. Multiple workshops associated with teachers and local researchers have also been provided.

WMU and MGRRE have a number of professional presentations and publications associated with this facility, staff and student research, and they are listed in this Newsletter for 2016-17.

**Economic Minerals** – Dr. Joyashish Thakurta is researching favorable geologic provinces in the Upper Peninsula that may host economic minerals. Dr. Thakurta is personally involved in research studies in areas of geologic interest and importance, and has found industry support for student research projects focused on the geology and mineral potential.

**Surface Mapping and Groundwater** – The USGS National Cooperative Geologic Mapping Program (NCGMP) has been actively funding state geologic mapping for over 24 years, which in all the US states has been focused on critical-need areas. Michigan has little to no knowledge of the potential natural resources that may exist within its borders. Michigan has lapsed in applying for available Federal funding which has resulted in a limited amount of research that can be done. This USGS program requires a dollar for dollar match of funds to make the maps and reports that are so valuable. The adjoining states of Illinois, Indiana and Ohio, which have similar geologic environments, have prioritized areas to be studied, and have committed millions of dollars to these projects using matching federal and state funds to map natural resources, geologic phenomena and geo-hazards. These three states have completed mapping 30%, 40% and 80% of their states, respectively, in high priority areas, whereas Michigan has not even mapped 10%.

In February 2017, Dr. Alan Kehew and the MGS gained recognition and support for the continued mapping in critical areas of need through the USGS NCGMP program. The NCGMP program is required to be administered and managed by the Michigan Geological Survey. The recent publication of the Jones and Vandalia 7.5 Minute Quadrangles, Cass County, have been recognized by the Michigan DEQ Water Division as a significant contribution to understanding and managing the water resources of Cass County. This recent mapping project has validated

**CoreKids** – Geology outreach is the foundation for education of what natural resources mean to our society, and how they relate to our geologic setting in Michigan. The Core Kids program is the outreach component of the MGS, MGRRE and WMU Geosciences Department. Dr. Peter Voice has been the coordinator of this program for the last four of the over 15 year recognized program. Funding for Core-Kids has thankfully been through generous donations and grants. Noting that this program is now expanding to involve the mineral, gem, geologic and teacher associations, we now have a more diverse contact audience, not only K-12 schools. This now includes all levels of interested parties in the earth sciences, and the Core-Kids events have been expanded to include some functions in the east side of the state extending north to Mecosta and Bay Counties. Attached in this newsletter is a map showing the various events and geographic reach of this educational outreach, as well as the 4-year summary for the contact events. Dr. Peter Voice shares these outreach experiences with other educators and with industry. Presentations have been made of successes and hands-on-training modules to national organizations. Dr. Voice has increased both the numbers and composition of contacts. His contacts are now focused on events that are most effective, and have resulted in Core-Kids donations with specific benefits to WMU students, i.e., scholarships. The following is a summary table of the last four years.

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<th>Academic Year</th>
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<th>Number of Conferences/Teachers Workshops</th>
<th>Number of Events (school visits and allied partner programming)</th>
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Dr. Peter Voice, Outreach at the Kalamazoo Air Zoo, Scouting badge program on Geology. Spring 2017.

Continued on page 29
geologic data in the two quadrangles showing additional glacial sediments (over 240 feet below existing data), that can support water resources in Cass County. This regional data has never been published or presented prior to this mapping project. Investigation and mapping today is of much greater value because classic “boots on the ground” is still required to confirm the validity of all mapping information and this also includes remote sensing data. The geologic data available today includes, but is not limited to, the following: subsurface drilling (wireline core, rotosonic core and Geoprobe), historic drill hole and water well verification and analysis, and most recently, quality LiDAR data, all integral data subsets that were not previously available to prepare more comprehensive surface and subsurface map products. Maps produced by the combination of remote technology and field derived data can provide “derivative” data to better understand the geologic natural resources of aggregates and groundwater, as well as providing mapping details to document groundwater pathways, the needed information in the event of a major spill or release resulting in an environmental disaster. MGS research has further confirmed that mapping the stratigraphy of the glacial sediments is critical in determining the current and future potential of the water resources.

MGS has received a grant from the Groundwater Research and Education Foundation of the National Groundwater Association for the funding of an unsolicited research project in the amount of $74,521. This grant will be used to validate a geologic and geophysical methods approach to identifying and mapping buried glacial bedrock valleys. It is proposed for Calhoun County, where bedrock depths are projected from water wells, oil wells and some research holes drilled by MGS, where the bedrock depth is projected to range between 50 to 200 feet. This project will utilize a combination of geologic mapping, donated seismic data from the energy industry, surface geophysical surveys (Passive Seismic, resistivity, etc.) and ultimately drill hole confirmation in Calhoun County to test viable methods of finding buried bedrock valleys. Buried bedrock valleys could potentially contain high quantities of fresh groundwater for use by communities, future business development and agriculture. The Calhoun County project will expand a research project initiated in Portage which only covered one quadrangle (~55 sq. mi.) to Calhoun, a county wide area having 706 sq. miles.

MGS has presented the case to multiple Michigan associations and departments that all subsurface geologic information needs to be standardized. The benefits of standardization are in the use of geologic data to support a greater understanding of the subsurface, and in managing all of our geologic resources. For example, Michigan does not have a training program for logging water well drill cuttings by licensed well drillers. Water well data represents over 600,000 data points that must be validated by geologic information near the driller’s well log(s). This program is long term, but the Michigan Groundwater Association’s licensed well drillers want to see this type of program initiated to train new and existing well drillers in data collection and data input to Wellogic, a standard database.

**Remote Sensing and Airborne surveys** – Dr. Mohamed Sultan and his research colleagues in the Remote Sensing Laboratory provide the foundation for understanding of using satellite and other indirect mapping methods. The MGS/WMU laboratory proposed an Interferometry test program in 2015 to study sinkholes in the State of Qatar. MGS has been notified that the funding grant in the amount of $135,000 has received Qatar government approval. The study will use satellite radar data known as Interferometry, a scientific data set that can be used for managing active land development in Qatar. The program will demonstrate the use of Interferometry in mapping subtle subsidence (mm per year) in surface features, a key to active sinkholes.

Michigan has the greatest amount of shoreline on the largest fresh water bodies in the world, totaling 3,126 miles. That is more than the entire East Coast of the US at 2,165 miles for eight states. Mapping of Michigan’s shorelines will greatly enhance our understanding of existing conditions, and allow for the monitoring of changes in shore and bluff configurations as they respond to population impacts and changes in lake levels. Remote Sensing technologies will be an integral component to a collaborative USGS, NOAA and USACE research program currently being planned. The use of Unmanned Aerial Systems (UAS) will also be a component of this research program. UAS information will also be invaluable in real time data collection, when integrating the management of surface water resources and runoff during major storm events that can cause extensive structural or environmental damage.

The Gravity Recovery and Climate Experiment (GRACE) was outlined above and represents another research component of the MGS/WMU that can support the management of the natural resources of the State of Michigan.

MGS continues to seek funding for a permanent office, core repository and teaching facility.

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John Yellich providing an overview to the Ottowa County Health Department, Water Task Force and Planning Department of the water quantity and quality data collected from eight drilling companies in Ottowa County.
Promoting the wise use of natural resources while serving the general public through quality research, invaluable expertise and a historic data repository.

Dr. William Sauck and Benjamin Seiderman taking measurement using the Tromino Passive seismic tool.

2017, STATEMAP drilling program, Cass County. John Yellich and Dr. Alan Kehew utilizing the Illinois State Geological Survey wireline core drilling rig.
We hope this newsletter finds you in good health and enjoying life. We are always grateful as we think back through the past 35 years of life here at the Core Lab (now MGRRE). We have had the privilege of working with some very talented students whose enthusiasm and fresh insights have kept life interesting here. And we are grateful for financial support from alumni, industry members and Michigan foundations—you keep us running.

This was a busy year for us. In September we welcomed about 30 people for the Brock Gas Storage Workshop. That month we also held a core workshop and update for member partners of the Midwest Regional Carbon Sequestration Partnership (MRCSP). As part of that project, Bill Harrison, Andrew Caruthers, and several graduate students are developing Niagaran reef reservoir models. They are correlating facies interpreted from core descriptions, thin sections, and wireline logs archived here.

In March we held a PTTC workshop here at MGRRE for 90 people. This was a Dundee core workshop focusing on facies distribution, lithology and reservoir types, and production history. Registrants viewed core from 25 wells, most of which were selected by Michigan companies. Speakers included Bill Harrison, Peter Voice, Steve Kaczmarek from MGRRE and industry speakers Doug Elenbaas, Timothy Brock, and Curt Crumrine.

We held a core workshop and research update for the MRCSP group in June as part of the kick-off for the most recently awarded grant. The group discussed project goals, scope, timeline, and major tasks. Bill leads the geological research team here on these CO2EOR research projects.

As part of our outreach activities we welcomed visiting geology classes from CMU, MSU, GVSU, and Calvin College who examined and described cores as part of their coursework. Bill taught a 3-week course for the Osher Lifelong Learning Institute in October, focusing on Michigan’s geology and its economic deposits. Bill also made three presentations about the geologic history and petroleum systems of the Michigan Basin at the May meeting of the Ontario Petroleum Institute.
We are so proud of our WMU geology student team that placed second among eleven teams in the 2017 Eastern Section AAPG Imperial Barrel Award Competition (IBA). All team members made formal presentations of their data analysis of an oil and gas prospect. Judged by a panel of energy professionals, winners were selected on the basis of technical quality, clarity and originality of presentation. Our graduate students were guided by Dr. Robb Gillespie, faculty advisor, and Kyle Patterson, a petroleum geologist with Miller Energy Company, and a WMU Geoscience alum.

Bill Harrison, Dave Barnes, Peter Voice, Jenny Trout and several students have submitted their final papers to be included in a Geological Society of America Special Paper. This special publication focuses on the geology and economic resources of the Michigan Basin and highlights the research they conducted during the past ten years. The publication is slated for publication later this year.

Peter Voice continues to lead CoreKids, the K-12 outreach program. We are excited that Peter is now a full-time faculty member, so in addition to reading about his CoreKids work, you can read his faculty page for a full update of his teaching activities.

Steve Kaczmarek is working with a team of graduate and undergraduate students collecting high-resolution bulk elemental data from drill cores at MGRRE with his new X-ray fluorescence analyzer. The team is assessing these data to determine if geochemical trends can be used to help provide additional stratigraphic constraint within a number of important reservoir units in the Michigan Basin. The data are also being used to make inferences about the paleoenvironmental conditions during deposition and diagenesis of these reservoir rocks.

Andrew Caruthers is working with several graduate students to analyze carbon isotopes in cores at MGRRE to assess paleoclimate change in the geological record.

In the archival area, we are also working to consolidate four large collections of paper wireline logs in preparation for scanning those that are now available only in paper copies. Jenny Trout supervises several students in this work.
As part of our on-going data preservation program, we received 150 pallets of cores and cuttings from another Michigan university. Many of the cores are from gas storage fields and will be used in our research here. Before coming here, that collection had suffered extensive damage from water and poor storage conditions. Our group of nine students, Jenny Trout and Linda Harrison worked at that University for several days to rebox 1500 core boxes that were in danger of coming apart during the move. We also worked with the professional moving crew to make sure the cores were carefully loaded onto pallets to make the move to MGRRE.

Partially funded by our current grant from the National Geological and Geophysical Data Preservation Program (NGGDPP), we are now inventorying that huge collection and reboxing many more cores. We plan to have the complete inventory on line before the end of this year.

We also received a core collection from Michigan State University that was part of a shallow ground water research project. MSU also gave us the racking used to store the core. These cores were kept in very good condition, so all we had to do was bring them here. A team of faculty, staff and students and rental trucks got the job done. Smaller collections of cores were donated to us by MDEQ and MDOT. We are grateful to Tyler Supply Company for installing our new racking by donating their labor.

Industry members also donated cores, well records, and generous financial support. We are grateful for all these donations because they keep us running on a very limited budget.

Once again we ask for your help in contacting your legislators to ask for their support for on-going funding of our work at MGGRE and the Survey. More than half the cores, samples and data that we archive here were acquired since we became part of the Michigan Geological Survey—so those materials actually belong to the State and benefit all its citizens. We need funding from all our citizens to keep these irreplaceable geological records for use by this generation and more to come.

To you, our extended geology family, we send our wishes for all good things in the coming year.
This year’s Distinguished Alumni award winner is Prof. Ahmed Ali Murad who is currently the Dean of College of Sciences at the United Emirates University in Al-Ain, United Arab Emirates. Ahmed came to Western in 1997 and completed his M.S. in 2000 under the supervision of Dr. Daniel Cassidy. After that he decided to enroll in our Ph.D. program and worked with Prof. RV Krishnamurthy applying chemical and stable isotope techniques to address some serious questions related to ground water resources in the UAE. He graduated in near record time which earned him an award from his parent university for completing the doctoral program in “record time”. Upon return to Al-Ain, Ahmed took up a faculty position in the Department of Geology and his rise in career has been truly meteoric. He has served as the Chair, Assistant Dean, Associate Dean and now is the permanent Dean of the College. Ahmed has more than fifty publications in peer reviewed journals, several conference presentations and is a member of numerous societies. Ahmed is the recipient of many awards, notably the Rashid Award for Scientific Achievement (1997, 2001 and 2005), Departmental Graduate Research and Creative Scholar Award, Western Michigan University, Merit Award, UAE University (2006 and 2007) and Merit Award, UAE University.

Professor Ahmed is a leader in Emirates science serving the nation in many capacities. To name a few—

- National Correspondent of International Association of Hydrological Sciences (IAHS) in the United Arab Emirates
- Member of UAE International Hydrological Programme (IHP) National Committee.
- Official correspondent of UAE IHP National Committee with IHP intergovernmental Council.
- Head of Scientific Committee and Member of National Committee of Combat Desertification Member of the Advisory Board of the International Center for Integrated Water Resources Management (ICIWaRM), Virginia, USA
- Member of the Arabic Alliance for Environmental Sciences, University of Qatar.
- Vice President, Arabian Peninsula Environmental Advisors Network (APEAN),
- Board Vice Chairman of the Geological Society of Emirates
- Member of the Technical Committee of the UAE Program for Rain Enhancement Science, National Center of Meteorology & Seismology (NCMS)- Ministry of Presidential Affairs, Abu Dhabi – UAE
- Emirates Scientists Council

Dr. Mohamed Sultan, Dr. RV Krishnamurthy, Dr. Carla Koretsky, Dr. Ahmed Murad
Greetings from the Geosciences Advisory Council:

The Council continues to actively meet twice per year bringing enthusiasm, insights and advocacy to the Department, College and University. This year, 2017, represents a year of change for the University welcoming a new president, Dr. Edward Montgomery. The Council looks forward to working with the President as he takes on many new challenges in higher education. We also want to extend our gratitude to Dr. John Dunn for his unwavering support of the Department of Geosciences. As his “Jewel” of the University, the Department of Geosciences was continuously recognized as a powerhouse for the University. We wish Dr. Dunn and his lovely wife Linda a wonderful retirement.

The Council would like to recognize and congratulate Dr. Ahmed Murad as the 2017 Geosciences Alumni Achievement Award recipient. As a provisional member of the Council, we appreciated his willingness to attend our October 13, 2017 meeting and look forward to his future participation. We also would like to recognize our newest Council members including Robert Garrison, Dr. Rennie Kaunda, and Angel Cuellar. Check out their Expertise Profiles on the Department Website. Additionally, we would like to recognize our new Graduate and Undergraduate Student Representatives, Cameron Manche, Graduate Representative, and Shelby Hurst, Undergraduate Representative. We would like to thank the previous representatives Jake Tholen and Matt Rine for their years of service. We look forward to hearing the concerns and issues that the students have with their educational experience at WMU. It is our mission to assist the Department in developing and graduating students that are well prepared for employment and leadership roles in the geosciences and/or success in graduate level programs. We encourage the students to reach out to the Council members with questions, internship inquiries, job opportunities, career questions, etc. We are here for you! As part of that effort, the Advisory Council Student Outreach Committee, under the leadership of Council Member Diana Morton-Thompson, has been scheduling several exciting career-oriented presentations this winter. The first being Council Member Sara Pearson from MDEQ on January 29, 2017 and the second being Council Member Brian Shaw from National Defense University on February 5, 2017. Additionally, at the Spring 2018 Advisory Council meeting in April the Council will be hosting an afternoon Career Seminar with three breakout sessions including current perspectives on the job market; the do’s and don’ts of resumes; and tips and tricks for interviewing. We look forward to a lively discussion with the students.

The Council is excited and supportive of the proposed departmental name change from the Department of Geosciences to the Department of Geological and Environmental Sciences. We recognize the need to “change with the times” in order to attract future students, yet, we are keeping our core identity. We understand that this change will take place in the spring of 2018.

The Council appreciated the opportunity to learn of all of the new initiatives, certificate programs, research and accomplishments of the Department Faculty, Graduate Students and Undergraduate Students at the October 2017 Council meeting. One new opportunity that the Council is especially excited about is the effort to rejuvenate and expand the Lloyd Schmaltz Geology Museum. The Council has created a Fundraising Committee specifically focused on this endeavor. As a first step, the Council determined that in order to send a message of unity to the University of this important project, the Department Advisory Council members, Faculty, Administration, MGRRE and the MGS would demonstrate 100% participation in this fundraising effort. Please consider this opportunity to share in the legacy and future of the Lloyd Schmaltz Geology Museum.

If there is a need for the Advisory Council to weigh in on a particular issue or if you need support, please reach out to any of us.

We hope you have a wonderful holiday season. Sincerely,

Jeff Hawkins, Chair
Tom Kamin, Secretary
American Institute of Professional Geologists
Barratt Consulting, LLC
C. John and Reva Miller Charitable Foundation
Dart Oil & Gas Corporation
Daniel R. McGuire, Inc.
Devon Energy Corporation
Envirolec Technologies
Innova Exploration
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William B. Harrison III  
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Stephen E. Kaczmarek  
Alan E. Kehew  
Carla M. Kortesky  
Heather L. Petcovic  
Mike Winkler  
Mohamed Sultan  
Joyashish Thakurta  
Jennifer Trout  
Peter J. Voice  
Kathryn A. Wright  
John A. Yellich

To make a gift, please use the enclosed envelope or visit mywmu.com/givetogeosciences

GRANTS

Andrew Caruthers—The End of Days in Tropical Panthalassa: 25 Million Years and Two Mass Extinctions (National Geographic Society, $25,000)

William Harrison III—CarbonSAFE in the Northern Michigan Basin Integrated Pre-Feasibility Project (Battelle Memorial Institute, $52,957), Preserving and Inventorying Core Collections from SE Michigan (U.S. Geological Survey, $37,289)

Stephen Kaczmarek—Aquisition of a Handheld XRF Spectrometer to Enhance Sedimentary and Paleoenvironmental Research (National Science Foundation, $76,772), Unraveling the early diagenetic history of Eocene limestones and dolostones, Qatar (ExxonMobil Research Qatar, $60,000)

Alan Kehew—Geologic Mapping of the Bronson North and Bronson South 7.5 Minute Quadrangle (U.S. Geological Survey, $15,950)

Heather Petcovic—GP-EXTRA: Fostering Interest in Earth Science Teaching Through the Reflective Practice of Science, National Science Foundation (IUSE GeoPaths, $365,883)


Mohamed Sultan—An Integrated Approach for a better understanding of the Hydrologic Setting, Longevity, and Optimum Utilization of the Nubian Sandstone Aquifer System in Egypt (The National Academy of Sciences, $70,507), Training on Natural Disasters (National Authority for Remote Sensing and Space Sciences, $40,000), Use of Grace, Remote Sensing, and Traditional Data Sets for Modeling Time-Dependent Water Partitioning on Continental Scales: a Case Study from Africa (National Aeronautics and Space Administration, $30,000), Developing Predictive Models for Algal Bloom Occurrence and Identifying Factors Controlling their Occurrence in the Charlotte County and Surroundings (Enterprise Charlotte Foundation, Inc., CAS, OVPR, EUP, $46,724)

Joyashish Thakurta—Investigation of the Echo Lake Intrusion as a Prospective Location for an Economic Cu-Ni-PGE magmatic sulfide deposit (Altius Resources Inc., $20,000)

FACULTY, STAFF AND ADVISORY COUNCIL AWARDS

◊ Advisory Council—Exceptional Services and Continuous Support of the Mission of the Department of Geosciences
  Diana Morton-Thompson
◊ Faculty Award—Exceptional Services, Excellence and Exceeding all Expectations
  Dr. Heather Petcovic
◊ Fellow of the American Association for the Advancement of Science (AAAS Fellow)
  Dr. Michelle Kominz
◊ Staff Award—Outstanding Effort Facilitating the Educational, Research and Outreach Missions of the Department of Geosciences
  Linda Harrison

DEPARTMENT SCHOLARSHIPS

◊ Advisory Council Field Camp Scholarship
  Navein Ganesan
◊ Alan E. Kehew Endowment
  Karl Backhaus
◊ Core of Four Endowment for Geosciences
  Joseph Swarz
◊ David Kuenzi Scholarship
  Hanna Cohen, Katherine Dvorak, Mustafa Emil, Esayas Gebremichael, Sita Karki, Joy Kiefer, Hannah Pankratz, Jake Tholen
◊ Douglas Daniels Endowment
  Karl Backhaus, Sita Karki, Cameron Manche, Hannah Pankratz, Brad Rizzo, Katharine Rose, Olga Tarasev, Neal Turluck
◊ Distinguished Student Service Award
  Sita Karki, Jake Tholen
◊ Envirologic Technologies Endowment
  Olga Tarasev
◊ John and Kelly Grace Endowment
  Joseph Swarz
◊ Kalamazoo Geological and Mineral Society Scholarship
  Sita Karki, Neal Turluck
◊ Richard Laton Field Camp Scholarship
  Sita Karki, Daniel Wilde
◊ Lauren D. Hughes Scholarship
  Krishna Stephen, Olga Tarasev
◊ Lloyd and Marilyn Schmaltz MGRRE Award
  Katharine Rose
◊ Lloyd and Marilyn Schmaltz Professional Activities Award
  Cameron Manche, Guzhaliayi Sataer
◊ Lloyd and Marilyn Schmaltz Undergraduate Scholarship in Geology or Earth Science Award
  Brad Rizzo
◊ Randall Kerhin Graduate Scholarship
  Hannah Pankratz
◊ Undergraduate Senior Honor Awards
  Earth Science Education—Reid Nicholson
  Earth Science—Joseph Birdsall

Geology—Daniel Wilde, Olga Tarasev
Geophysics—Jonathan Yelton
Hydrogeology—Jake Tholen
◊ William and Linda Harrison Scholarship
  Mohammed Al-Musawi

UNIVERSITY AWARDS

◊ College of Arts and Sciences’ Climate Change Research Graduate Scholarship
  Esayas Gebremichael, Shelby Hurst
◊ College of Arts and Sciences’ Undergraduate Research and Creative Activities Award
  Jake Tholen
◊ Department Graduate Teaching Effectiveness Award
  Cameron Manche, Danielle Dupuis
◊ Department of Geosciences Presidential Scholar
  Jake Tholen
◊ The Graduate College’s All University Graduate Teaching Effectiveness Award
  Cameron Manche
◊ The Graduate College’s Department Level Graduate Research and Creative Scholars Award
  Mustafa Emil, Matthew Hemenway
◊ The Graduate College’s Graduate Student Research Award
  Danielle Dupuis, Shelby Hurst, Alexander Koerber, Ziqian Li
◊ The Graduate College’s Graduate Student Travel Award
  Mustafa Emil
◊ The Graduate College’s Research and Creative Activities Award
  Mustafa Emil, Shelby Hurst, Hannah Pankratz

NON-UNIVERSITY AWARDS

◊ Crawford Hydrology Lab Grant
  Jake Tholen
◊ GSA’s Best Student Geologic Map
  Sarah VanderMeer
◊ GSA’s Farouk El-Baz Student Research Grant
  Karem Abdelmohsen
◊ Michigan Basin Geological Society Annual Scholarship
  Mohammed Al-Musawi
◊ On to the Future Travel Grant (GSA)
  Esayas Gebremichael
◊ Society of Exploration (SEG) Grant
  Hannah Pankratz
◊ Second place—American Association of Petroleum Geologists (AAPG) Imperial Barrel Award
  Clayton Joupperi, Matthew Hemenway, Mohammed Al-Musawi, Zaid Nadhim, Jack Hybza, Kyle Patterson
◊ U.S. Geological Survey (USGS) Ed Map Award
  Karl Backhaus
◊ West Michigan-Air and Waste Management Association Scholarship
  Shelby Hurst
Summary of all the students who submitted those requests for abstracts for papers and poster sessions at meetings, June 1, 2016 to Sept. 30, 2017


Hemenway, Matthew A., Mohammed Al-Musawi, Clayton D. Joupperi, Jack H. Hybza, and Zaid Naseer Nadhim, March 2017, Hydrocarbon Potential of Penobsct, Nova Scotia, 2nd Place at AAPG Imperial Barrel Award Competition, Pittsburgh, PA

Hurst, Shelby, and R.V. Krishnamurthy, 2016, Unusual Atmospheric Processes: Implications for the Unusual Isotope Effect in Precipitation, Abstract of Presentation, AGU Annual Meeting, San Francisco, CA

Hurst, Shelby, and R.V. Krishnamurthy, 2017, Unusual Isotopic Effects Produced in Precipitation as a Byproduct of Unusual Atmospheric Processes, Abstract of Presentation, MASAL Annual Meeting, Kalamazoo, MI


Joupperi, Clayton D., Donald M. Reeves, and Jonathan D. Garret. 2017, Reservoir Characterization and Fracture Analysis of Silurian-Aged Gas Storage Reservoirs in the Michigan Basin, Rocky Mountain Rendezvous AAPG Student Expo, Laramie, WY


Manche, Cameron J. and stephen e. kaczmarek, 2016, Evaluation of Mercury Intrusion and Capillary Pressure Results: Development of a New Methodological Approach for Analyzing Carbonates, AAPG Annual Convention and Exhibition, Calgary, Alberta, Canada, June 19-22, 2016


**FACULTY AND STAFF PUBLICATIONS (IN BOLD)**


See what some of our graduate students are currently working on!

Mohamed Al-Musawi  
M.S. Student  
“Project: Sequence Stratigraphy and Depositional Facies Model of the Burnt Bluff Group, Michigan Basin, USA”

Fahad Alshehri  
M.A. to Ph.D. student  
“I am interested in using the application of remote sensing, GIS and GRACE satellite data for monitoring the temporal changes in the groundwater storage and to address other environmental disasters.”

Karl John Backhaus  
M.S. Student  
“I am currently working on my master’s thesis project in three-dimensional mapping of the Bronson South Quadrangles in Branch County. This consists of a surface, subsurface and bedrock topography mapping using hand augers, and various applications of geophysics.”

Mohammed Hashim  
M.A. to Ph.D. Student  
“I am working on the development and characterization of microporosity in carbonate reservoirs.”

Sita Karki  
Ph.D. Student  
“I am working on developing an early warning system for debris flow detection using data in Jazan province of Saudi Arabia.”

Ziquian Li  
M.A. Student  
“For now, I am working on my thesis which is about interactions between groundwater and surface water in the White River, and it is about hydrogeology basically.”

Elizabeth Palmer  
Ph.D. Student  
“Program focus: I apply remote sensing and geophysical techniques to study land deformation associated with salt domes along the Red Sea Coastline, Saudi Arabia.”

Hannah Pankratz  
Ph.D. Student  
“I am currently working on a chemostratigraphic analysis of Silurian reefs in the Michigan Basin”

Matt Rine  
Ph.D. Student  
“I am looking into the natural fracture patterns of the Antrim Shale and trying to create a flow model based upon production data and determining the change in flow rates and directions of different members of the Antrim Shale”

Neal Turluck  
M.S. Student  
“I am using orbital bistatic radar observations by the Dawn spacecraft to investigate surface roughness on Asteroid Vesta. The occurrence of smoother terrains with heightened concentrations of subsurface hydrogen suggests that melted ground-ice may have helped shape Vesta’s current surface texture.”
Welcome to our New Graduate Students

The Department of Geosciences is a growing center for geologic education and research!

Karem Abdelmohsen
Romeo Akara
Jay Cockrell
Xiang Fan

Lincoln Grevengoed
Mohammed Hashim
Brett Mclees
Tyler Norris

Ayu Nurhidayati
Jali Octariady
Kevin Rupp
Hossein Sahour
Florence Silalahi

Anita Yuliyanti
MINERAL SALES: Steve Wilson collection is being sold. Contact us if you would like to look at any specimens. We decided this year to combine our mineral sales with our bake sales to have a more appealing spread.

BAKE SALES: Trilo-"bites" shortbread cookies, BIF brownies, rock candies, and new ideas to come. Deciding to start two-day sales instead of one-day sales to increase availability and the amount of people seeing our club being active. We do a lot of recruiting for new members at these sales as well.

GROUNDWATER MODELS: These are being sold. Very few are left. Please contact us for more information.
These are winding roads deep in the Badlands of South Dakota, one of the first stops on our most recent trip for Geology Club.

—Stephanie Buglione
Undergrad

SKIT: At the end of the year we had an awards banquet. We were able to make a skit as well as a video for this banquet which both turned out great. Not only do we have knowledgeable geologists in our club, we also happen to have great thespians as well!

TRIPS: This summer we went on an incredible trip to South Dakota and Wyoming. On this trip we saw many geological sites like the Badlands, Devil’s Tower, Sioux Falls, as well as Jewel and Wind Caves. We also made smaller day trips during the school year including Cranbrook in Ann Arbor as well as Devil’s Punchbowl in Yankee Springs, Michigan.

ELECTIONS: This past spring we held elections for our new officer positions. Our new elected officials are as follows: Julia Raffenaud continues as Secretary, Stephanie Buglione as Treasurer, Shelby Hurst as Vice President, and Erin Huggett as President. We would like to thank our previous officers for all of their hard work and hope to make them proud in the coming year.

Looking to the future, we are hoping for a future scholarship to Geology Club members. Bronco Bash was held on Sept. 8th where we encouraged new students to join Geology Club. We will be voting on where our next yearly trip will be going in the fall and want to begin fundraising as soon as possible.
This year, the AAPG student chapter has experienced great success. This spring, the student chapter competed in the AAPG – Imperial Barrel Award (IBA) Competition, a highly competitive international competition that requires students to analyze a dataset consisting of geology, geophysical, land, and production data from a randomly assigned basin. Over the course of eight weeks, teams will evaluate the reservoir quality, seal integrity, source rock maturity, and timing of migration to develop an investor presentation of exploration prospects. Teams will deliver a 25-minute presentation to a panel of industry experts. The WMU – IBA team of Jack Hybza, Clay Joupperi, Zaid Nadhim, Matt Hemenway, and Mohammed Al-Musawi advised by Dr. Robb Gillespie and Kyle Patterson of Miller Energy Company had a great performance finishing in 2nd place at the Eastern Section AAPG Regional.
The Society of Exploration Geophysicists (SEG) student chapter at Western Michigan University is going into its third year as an organization on campus and its second year as a registered student organization. In a matter of three years, SEG has climbed its way through the rankings and is currently a “Ridge” chapter ranked by the SEG. This is an accomplishment as there are only ten chapters in the US out of ~70 ranked in this category.

The Society of Exploration Geophysicists is an international organization geared to benefit scholars. It is a common misconception that students must be geophysicists, however any students interested in learning geophysics are encouraged to join. Due to the corporate sponsors, it is free to become a member as a student. With the membership, students have access to The Leading Edge journal subscription, short courses, discounted books, scholarships, etc.

The chapter at WMU currently has 17 members ranging from undergraduate students to masters and doctoral students. Our recently elected board consist of a President: Austin Johnson, Vice President: Sita Karki, Secretary: Guzalay Sataer, Treasurer: Hannah Pankratz, and Event Coordinator: Tom Howe. We have been honored to have Hannah Pankratz represent our chapter at the 2016 SEG annual meeting in Dallas, TX where she received a travel grant to partake in ExxonMobil’s Student Educational Program (SEP). She also recently received a travel grant to represent the chapter again at the 2017 annual meeting in Houston, TX to attend Chevron’s Student Leadership Symposium (SLS).

The SEG chapter at WMU seeks to get involved in campus and community events. We hosted a Science Olympiad module-Dynamic Planet for Middle and High school students competing in the Regional Competition this past February. The chapter has bi-weekly meetings held to organize events and collaborate on current issues and discussions. Our first field trip of the year, we had the opportunity to tour Wolverine Gas & Oil in Grand Rapids, MI—hosted by Wolverine Geophysicist, Keith Johnson. In the spring semester, Wolverine generously invited us to observe the acquisition of 3D seismic data in Climax, Michigan (Photo 1).

The chapter hosted its second annual Ugly Sweater Ping-Pong tournament just before Christmas break. This event was organized to give students and staff an evening of socializing with a relaxed atmosphere and raised ~80 for future events. Last but not least we rounded out the school year with our first annual “Hammer-Swinging” fundraising event. This event allows for student, faculty, and alumni to relieve some stress and win some sweet prizes as well as wrapping up the school year. Individuals pay to swing the sledgehammer against a steel plate and record a certain decibel. Overall it was a great year, and we are looking forward to growing even more next year!
From the ocean to the sky
an evolutionary tale

In May 2017, geosciences alum Dr. Roger Steininger ('64) and his wife LuAnne hosted a WMU alumni social gathering in Reno at Hidden Valley Country Club.

Department of Geosciences' students gather for a photo during the GEOS 4350 field trip to Kentucky.

The lecture halls and classrooms have been completely remodeled to assist our students and faculty in creating a space that is optimal for learning.
Ph.D. student Sarah VanderMeer wins the Geological Society of America’s Best Student Geologic Map Competition at the 2017 annual meeting held in Seattle, Washington! Ph.D. student Karem Abdelmohsen took home the Farouk El-Baz Student Research Grant!

M.S. student Mohammed Al-Musawi won the 2017 Michigan Basin Geological Society annual scholarship. He is pictured next to John Yellich, Director of the Michigan Geological Survey.
The Hydrogeology Field Course students traveled to Katz Well Drilling Company in Battle Creek to witness the drilling and completion of a 60-foot water well.

Dr. Sultan and his students gather for a photo at the Almuni Reunion and Awards Ceremony.

Setting up the EM-31 in Dr. Sauck’s Electrical Methods Class.
A game of Geology Pictionary took place at the Alumni Ceremony. Contestants included Jon Andrews, John Yellich and Dr. Matt Reeves.

Members of the Advisory Council at the annual Alumni Ceremony.

Sita Karki and others at the department potluck during the annual Alumni Reunion and Awards Ceremony.

Shelby Hurst and Joy Kiefer were among the performers in the Geology Club skit at the Alumni Ceremony.
Please keep in touch!

Maintaining relationships with our alumni is important to both the faculty and staff who knew you. It is also a vital part of evaluating how our department prepares its students for life after graduation—whether you have decided to pursue a career in geosciences or not. As such, please take a moment to let us know how you are, where you are, and what you’re up to! While you’re at it, please also share where you are currently employed, what you do there, what your professional interests are, and your contact information so that we can continue sending you newsletters and updates regarding alumni events.

Send word of your adventures to:
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Attention! Do you have electronic versions of your thesis, dissertation, proposal, or conference posters? We are currently collaborating with Waldo library in order to better archive student research. We welcome any/all work, but are particularly interested in electronic files from those alumni who submitted paper manuscripts to the graduate school (most likely before 2000). For more information, or to submit your work to scholarworks (free to the public), contact us. To view the department of Geosciences’ Scholarworks page, visit http://scholarworks.wmich.edu/geology/.

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