



GEOSCIENCES COMMUNITY 2014

NEWSLETTER

WMU GEOSCIENCES



FALL 2014



Dr. Mohamed Sultan

Dear Friends and Alumni,

This has been a good year for Geosciences and we have a lot to celebrate. Over the past two years, we worried about replacing our distinguished faculty members who retired (Dr. Ron Chase) and others who left us for other positions on campus (Dr. Carla Koretsky: Dean Lee Honors College) or off campus (Dr. Mike Grammer: Oklahoma State University). Dr. Joyashish Thakurta was hired to replace Dr. Ron Chase and to spearhead the Michigan Geological Survey research and mapping programs in the Upper Peninsula. We were fortunate to hire Dr. Joyashish, a distinguished scientist, an active researcher, and an experienced

igneous petrologist, mineralogist, and economic geologist. Research interests for Joyashish include, but are not limited to, origin and distribution of metallic sulfide mineral deposits in the Upper Peninsula, the Penokean orogeny (1.8 Ga), magmatic events associated with the formation of the Mid-continent Rift system (1.1 Ga), and the applications of stable isotope geochemistry in high temperature geological processes.

Joyashish delivered on his promises. He initiated an aggressive research project in the Upper Peninsula and all his students, six of them, are currently engaged in research projects in the UP. He teamed up with Dr. Alan Kehew and together they secured federal funding to pursue their research in SW Michigan (Alan) and in the Upper Peninsula (Joyashish). Joyashish is getting the attention of the mining industry as well. Aquila Resources Inc. is providing Joyashish with additional funds to pursue his research activities in the UP, geochemical data, and field support as well. Thanks to Dr. Thakurta we now have a sulfur isotope lab in Haenicke Hall.

A few months ago, President Dunn announced an initiative to attract to

Western Michigan University distinguished world renowned, researchers to enhance the education and research missions of the University. Geosciences were quick to respond. We were the first unit in the University to take advantage of this wonderful opportunity and our efforts culminated with the hire of Dr. Essam Heggy effective fall of 2015. Essam is a planetary geophysicist on the Radar Science Group in the Jet Propulsion Laboratory, a Visiting Associate in the California Institute of Technology, and an Associate Professor of Geophysics in the Institut de Physique du Globe de Paris, France. His main science interests in space and planetary geophysics covers Earth arid regions, Mars, the Moon, icy satellites and Near Earth Objects. His research efforts involve the characterization of ice and water dynamic on Mars, the Moon, Jovian Icy satellites as well as Earth hyper-arid regions. He addresses this objective through comparative studies of the evolution of hydrogeological systems on Earth Hyper-arid regions and on Mars and other planetary bodies.



New faculty member Dr. Essam Heggy

At JPL, Dr. Heggy used radar imaging, sounding techniques, and measurements of electromagnetic properties of rocks in radar frequencies to investigate structural, hydrological and volcanic elements in terrestrial and planetary environments. Essam has his hands full. He is a member of the science team of the MARSIS instrument aboard the Mars Express orbiter (2003-present), the Mini-SAR experiment aboard Chandrayaan-1, the Mini-RF experiment on board the Lunar Reconnaissance Orbiter (2008-present) and the CONSERT radar experiment on board the Rosetta mission (2004-present). Essam is the Principal Investigator of the NASA Earth Venture Mission Concept OASIS (167 M\$) that will, if funded, map for the first time the spatial distribution of shallow aquifers in the arid desert regions on Earth.

Essam says Geosciences and Western is where he wants to be. He wants to team up with our research group (Earth Science Remote Sensing group working in arid areas world-wide) to enhance his chances to respond to several NASA calls that are oriented toward exploring hyper-arid environments as is the case for the next Earth Venture Mission call planned for late 2015. Western's strong aviation school will help him test and calibrate airborne geophysical instruments prior to sending these

sensors on planetary missions. Western is close to several large-scale dunes that are optimal sites for testing his low frequency sounding radar systems and is close to the University of Michigan-Ann Arbor, Radiation Lab, where collaborations on building some of the experiment subsystems are possible.

We have an ongoing search for a tenure track position in sedimentary petrology. The search is going well and we expect to invite the short listed applicants on campus in the next few weeks. We are excited about this particular hire. The oil and gas industry is currently experiencing severe shortages of professionals - particularly in geosciences. Over the years, Geosciences provided the training that enabled many of our graduates to pursue successful careers in this industry. The new hire will add to the existing strong research team headed by Drs. Barnes, Harrison, and Gillespie and will enable us to continue providing the adequate education and training in this vital and growing field.

We are committed to improve the work space environment for our students. Rood is one of the oldest buildings on campus. With no exceptions, all our labs are outdated, do not serve our students well, and need a face lift. Every year we pool our resources to renovate one of our six labs. The computer lab, the one used the most by our students, was the first to be renovated. This year we completed the renovation of the paleontology lab, and the mineralogy lab is scheduled for renovation in 2015. Geosciences led the efforts of four departments (Geosciences, physics, statistics, and mathematics) to establish a rock garden south of Rood. Our students now have a close by location where they can enjoy the outdoors. Moreover, the garden can potentially serve as a recruitment tool as it has been recently listed as one of the stops in summer orientation campus tours.



All of these ongoing activities and many others that I am not listing here are bringing more and more talented students our way. Our research revenues over the past five years averaged over a million dollars per year. Considering that we are a small department, a department of 12 faculty members, we generate one of the highest, if not the highest, research dollars/faculty in the College of Arts and Sciences. Our gifts and endowments over the past five years were the second highest (\$750,000) in the College of Arts and Sciences despite the fact we are one of the smallest departments. Our graduate student population is 65 students this year compared to 53 last year and twice what it was five years ago. We launched our Integrated Science program two weeks before the beginning of the fall semester of 2014 and to our surprise five students enrolled.

I want to take this opportunity to thank all of the personnel who generated this success story. I mean our faculty, our staff, our students, and loyal Advisory Council members. They all worked hard under difficult conditions to make this department the flagship of the College of Arts and Sciences. Last but not least we will have our 50th year anniversary on homecoming next fall. Please mark your calendars and COME. We want to celebrate your achievements throughout the years, and we want to connect with all of you. We want to show you what we did with your department, how it evolved through time, and discuss with you our plans for the upcoming years. We want your input and insights. It is an opportunity for you to meet your colleagues, instructors, and staff. We want you to tell our students the challenges you faced, the obstacles

you conquered, and more importantly share with them your success stories. Nothing will please us more than seeing you here with us during homecoming 2015.



Dr. David Barnes

Greetings from Kalamazoo

I hope that all is well with the friends and alumni of WMU Geosciences. I am pleased to report that I am on sabbatical this year working on some excellent student papers and I can't wait to see you all at the alumni boondoggle fall of 2015.

Dr. Robb Gillespie

Greetings to all friends and alumni,

This year I find myself with all my "old" graduate students graduated, and a whole new group of fresh students to help mentor. Andrew Sasso is busy mapping and trying to explain Precambrian (Archean) peridotites in the Marquette area, Nick Panyard is studying the Devonian Antrim Shale, and Sarah VanderMeer is mapping Quaternary tunnel valleys and moraine systems in the Pictured Rocks area of Michigan's Upper Peninsula. I never thought I'd be on graduate committees covering such a broad range of geo-

topics, but here I am, proving that a solid, basic background in fundamental geology really is important.

Teaching assignments have been shifting as we adjust to faculty retirements, while still trying to offer a well-rounded slate of geo-courses. GEOS 1500 "Natural Disasters and Hazards" has been shifted to the spring semester, and I've handed off teaching GEOS 2500 "Planetary Geology" to Johnson Haas. This has given me more time to continue developing the GEOS 1000 "Dynamic Earth" course and to concentrate on GEOS 3220 "Ocean Systems." I taught during the Summer II semester for the first time. Although I was presenting my old standby "Ocean Systems" it was my first time to do so on-line. Who says you can't teach old professors new tricks?

This past summer was the seventh time for me to co-teach the GEOS 4380/90 field course. Dr. Chase came back from his official retirement one last time to teach. It was bitter-sweet to be in the field with Dr. Chase knowing it would be the last time. I can honestly say that I always learned something new every-time I was in the field with him. It was always a great experience, but now it's at an end. Well done, but bitter-sweet none the less.....yeah.

Dr. Duane Hampton

Hello. I hope your life is going well. Last year I was busy. I was the seminar coordinator, and taught for the first time the seminar class on making public scientific presentations. I taught GEOS 1000 in two revised formats, (a) emphasizing the 9 big ideas of the earth sciences, and (b) a hybrid online format that met in Battle Creek for labs. I also taught surface water hydrology and groundwater modeling. I served on arguably too many university committees (General Education revision; common read; curriculum committee; Asylum Lake management board; WMU climate working group; new secondary integrated earth sciences teaching major). I start learning the ropes as the AAUP point person on health care issues. We had a family reunion in Kalamazoo with all four of our children and their spouses, and our nine (soon to be 11)

grandkids. And several students spent time with me working on their research projects, including an undergraduate.

Here are updates on students working with me. Hussain Alfaifi and I installed wells in my back yard for slug testing. We tested them further this year, and Hussain presented the results at national GSA in Denver. We wrote an article, which we are revising for submission to Groundwater Monitoring and Remediation. I talked with Jim Butler (the world expert on slug testing) recently, who has a different slant on the effects of slug size on slug testing results. Hussain and I did testing to look at a hypothesis that Jim and I discussed. Rachel Salim is writing her thesis based on many long lab tests she did on capillary rise of water and kerosene in silts and fine sands. One of the current tests was started over a year ago. Courtney Wright helped Rachel with her lab work. Seth Kuiper is writing his thesis on interactions of groundwater and a creek downstream of a dam. Zack Spotts is writing his thesis on the background concentrations of 25 metals in Michigan soils. Chris Roth is simulating CO₂ sequestration in the Putty Gut gas field using a multiphase flow simulator. All five of these grad students expect to finish this year. Chans Ford just started on groundwater-surface water interactions.

Dr. Alan Kehew

Hi Folks, For the past year I have continued with the geologic mapping of Calhoun County through the USGS STATEMAP and Great Lakes Geologic Mapping Coalition. We completed a composite map of Barry County and have two more years left to finish Calhoun, depending on the funding level. I also had two grad students finish during the year, Derrick Lingle and Ivan Guzman.

Dr. Michelle Kominz

In the fall, spring and summer 1 I taught of Ocean Systems. In the Fall I tried several teaching-and-learning ideas suggested by the Education gurus. By the Spring I had added some "reading homework" on eLearning. Finally, in summer 1 I was the instructor of record for the on-line version of the class, which I modified substantially. Finally during Summer 2 I was able to put significant time into work on analysis of the IODP Expedition 313 New Jersey Sea Level results. I updated my results and manuscript.

Now I just need to respond to my co-authors and get it submitted. Science is a process. Kirk Wagenvelt is working on his MS studying Michigan Basin hydrocarbon maturation and implications for geodynamic models of basin formation. His work is going great.

Dr. Carla Koretsky

Hello, friends and alumni! As most of you know, I am currently the Dean of the Lee Honors College. I do still have several wonderful Geosciences students working on research projects with me. Allie Wyman graduated with her MS Geosciences this past summer, having completed an excellent study of the impact of road salt on the geochemistry of Asylum Lake. She is now working as an environmental consultant. Denisha Griffey is continuing to pursue dissertation research focused on the influence of road salts on trace metal speciation in shallow, organic-rich sediments. Krishna Stephen is working on a study of metal adsorption on nanomagnetite, a collaborative project with Dr. Michael Komarek, a faculty member at the Czech University of Life Sciences in Prague and Dr. Daniel Alessi, a faculty member at the University of Alberta. Three excellent undergraduate students, Shelby Hurst, Jake Tholen and Danielle Dupuis are also working with Krishna and Denisha. I was humbled and touched to receive the Geochemical Society's Distinguished Service Award this year, which was presented at the Goldschmidt Conference in San Diego. Take care and please feel free to drop me a line to tell me what you've been up to!

Dr. R.V. Krishnamurthy

Last year I have been able to set up the Triple Isotope Liquid Water Analyzer, the only one of its kind in Michigan. Several students have taken advantage of this instrument and are conducting research in isotope hydrology. The lab is also set up to provide service to external agencies who may want rapid oxygen

and hydrogen isotope analysis of water samples.

Richard Dudek, working with me, received a Graduate College Research Grant and also the Geological Society of America On to The Future (OTF) scholarship. This scholarship will fully cover his attendance at the annual meeting in Vancouver where he is presenting a paper, the first one from the new laboratory.

Dr. Heather Petcovic

I am excited to take the place of Bill Sauck as the department's Graduate Advisor, and thank Bill (and Carla before him) for all of their work in making Geosciences such a strong and vibrant program. I look forward to working with our current and incoming graduate students. I also recently transitioned to the Editor for Curriculum & Instruction of the Journal of Geoscience Education, and was elected President of the Teacher Education Division (TED) of the National Association of Geoscience Teachers (NAGT). Both of these roles are important in building the geoscience education research and practice communities to which I belong. I am wrapping up a research study on field-based education with our recently published article in GSA Today plus several other papers currently in review, and have two new projects starting up in January. One focuses on development of a middle school integrated science curriculum, and the other on identifying barriers and opportunities for teaching geosciences in currently underserved institutions. Two of my students graduated last year: Dr. Caitlin Callahan is now a post-doc in Julie Libarkin's geocognition research laboratory at Michigan State, and Steve Barone is teaching middle school science in the Detroit area.

Dr. William Sauck

Dear Friends and Alums. The past academic year was eventful, as they always seem to be. Fall semester of 2013 provided an Intro Geophysics class

of 24, up from 20 the previous year. This meant opening another Lab section and more work for our very capable TA, Hachemi Bouali. I also taught a small class in Electrical Methods. During spring term I was kept busy with the Graduate Advisor duties, as well as an advanced class in Ground Penetrating Radar.

Kelly and I spent time at our Brazil house in Dec and again in April. As I have gone to half-time status as of Sept., 2014, we will be able to spend more of the MI winter season in the warmth of the S Atlantic shoreline. My half-time status will consist of full-time during the Fall term and zero-time during the winter term!

In late June, 2014, Kelly and I took a van of geophysical gear to the UP and spent a few days helping Sarah VanderMeer in her dissertation area, the Picture Rocks National Lakeshore. We found the GPR most useful, with excellent penetration, and towed the 100 MHz antenna along more than 20 km of dirt road transects. Now she has an enormous data set to process.

Our later summer travel was a large oval starting and ending at Las Vegas, and covering most of the Parks and Monuments of the West, as far N as Glacier Park, NW to the Olympic peninsula and down the Pacific coast. A great 3-week tour, 4600 miles on the odometer, and we saw where some of the photos in geology textbooks were taken.

A summary publication came out on results from 4 field seasons of work in the SW Sinai:

Ahmed, Mohamed., William Sauck, Mohamed Sultan, Eugene Yan, Farouk Soliman, Mohamed Rashed, 2013, Geophysical Constrains on the Hydrogeologic and Structural Settings of the Gulf of Suez Rift-Related Basins: Case Study from the El Qaa Plain, Sinai, Egypt. Surveys in Geophysics, 1-16.

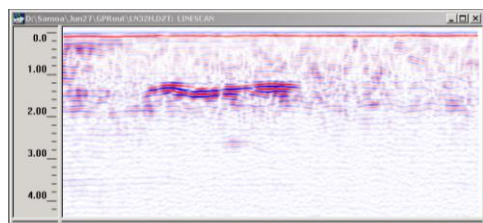
This primarily gravity study revealed the size of an enormous aquifer contained in a rift basin parallel to the E coast of the Gulf of Suez.

Another publication of some older work (2006) with my archaeologist colleague

from Texas A&M was finally published late in the summer of 2014:

Pearl, F. B., and W. A. Sauck, 2014, Geophysical and Geoarchaeological Investigations at Aganoa Beach, American Samoa: an Early Archaeological Site in Western Polynesia. *Geoarchaeology*; doi 10.1002/gea.21491.

Using GPR, I was able to locate a house floor beneath nearly 2 meters of sand, which provided datable artifacts showing that this occupation was nearly a millennium earlier (570 B.C.) than conventional wisdom had indicated for this island.



GPR transect (12.5 m long) with 500 MHz antennae showing crushed and compacted basalt/coral house floor, surrounded by carbonate sand, Aganoa Beach, American Samoa.



Dr. Chris Schmidt

Well there are a few notable things to report that I can share. Professionally, Chris Whisner, Jen Whisner (class of 1994-98) and I published 2 papers, out this fall, in the *Journal of Structural Geology*. Our photo (from Montana) is also "picture of the month" in the issue. I'm currently working with several colleagues at the Montana Bureau of Mines and Geology to publish geological quadrangle maps that I have worked on for many summers. Son Gene (class of 2011) is finishing an MS degree at Brock University in Ontario with thesis on a feature of the Martian surface

Amongst other thesis committees I am still currently sitting on, Jess Szkody is currently working on a thesis studying earthquake mechanisms in SW Montana trying to locate them on known faults and seeing how the T (tension) axes change northward of Yellowstone.

I have announced my retirement effective Spring 2015. I will be retiring in April after 36 years here (and 43 total years of teaching), so, with this short note I'll just say ADIOS. The best to all of you.

Chris



Dr. Joyashish Thakurta

Holding a piece of the Chelyabinsk meteorite which impacted the Earth on February 15th, 2013 in Chelyabinsk, Russia

I have conducted new field trips in western UP with my three graduate students during May and June, 2014. My graduate student Jonathan Haynes received a student research award of \$2650 from the Society of Economic Geologists, and \$1000 from the Graduate College at WMU. In August 2014, I visited Yekaterinburg, Russia as an invited speaker for the International Platinum Symposium.

In September 2014, two MS students: Nicholas Panyard and Benjamin Hinks and one PhD student: Katherine Dvorak joined my research group. Katherine is interested to work on magmatic activity in subduction zone environments and the origin of associated mineral deposits. Her work is supported by a special program from the

Graduate College, called the Graduate College Doctoral Scholar Associateship.

The new Isotope ratio mass-spectrometer got installed at the new stable isotope geochemistry lab at Haenicke 3415. The new economic geology lab is now operational at Haenicke 3421.

Dr. Peter Voice

I have continued to run the CoreKids program through the Survey. This past year, we ran 60 events with schools and our allied partners, accounting for 16,000 contacts. We received a funding boost in the early Fall through the generous financial support of a grant from the Michigan section of the American Petroleum Institute.

As part of the classroom activities, I assigned cores from the Devonian units of the Michigan Basin to my graduate students in the Carbonate and Evaporite Depositional Systems class. The students worked in small groups to develop core profiles and summaries of facies and depositional environments for each of the Devonian carbonate units. This work was presented as a Core Workshop at the March, 2014 Michigan Petroleum Technology Institute Meeting in Mt. Pleasant. Seven students presented six posters with cores at the meeting. We received many positive comments about our students at the meeting.

I am keeping busy with teaching classes as well – I will add two new classes to my list of courses taught this academic year – Sedimentation and Stratigraphy and Physical Geology.

Over the summer, I prepared a guidebook and field trip for the Michigan Basin Geological Society. The trip went through with only minor hitches (including some weather-related reshuffling of stops) to the central portion of the Upper Peninsula. I was quite proud of the guidebook that Bill Harrison and I put together as represents the most recent compilation of data for the Paleozoic section of the Upper Peninsula (a topic that has seen little light over the past 30 years!). The guidebook will be available for sale through both the Michigan Basin Geological Society and the Michigan Geological Survey.



MICHIGAN GEOLOGICAL SURVEY:

Greetings Alumni and friends from the Director of the Michigan Geological Survey, John A. Yellich (john.a.yellich@wmich.edu):

The Michigan Geological Survey (MGS) has been functioning in its new structure at Western Michigan University, Geosciences Department for just over three years. The functions of the Survey include investigation of the geological resources of the state and collection and archival of samples, cores, cuttings, and records of geological investigations in the state. The MGS function is to serve the people of the State and the governmental entities, the Client.

The MGS is continuing to operate primarily on university soft money, utilizing the expertise of the faculty members within the Geosciences Department until formalized funding can be provided. I have focused on presenting the Survey as the "Go To" resource for geologic information in the State. To meet this requirement, the Survey established a more formalized structure of nine Resource Centers, MGRRE- Sample and Data Repository, Surface Mapping, Hydrogeology/Environmental, Energy, Economic Minerals, Geologic Hazards, GIS/Data Management, Outreach and Remote Sensing to provide the scientific information to the public and the state legislative body, and their respective recent accomplishments are summarized below. Recent announcements were made in Michigan on the significance of maintaining core and data in a recoverable condition at the MGRRE facility.

I have had over 90 occasions during the past year to continue the MGS road show to introduce the "Re-invented" survey to the client, and to meet the critical stakeholders in the State. This includes meetings with the Directors in the Governor's office and with local and regional economic development managers, business associations and a presentation to a State Senate committee.

All these meetings and presentations over the last year were to confirm and specify the geological issues currently facing the State of Michigan in all aspects of agriculture, industry and rural growth, which includes water, resource development and data management and the need for funding for the Survey. This outreach has included formal presentations and formal and informal meetings, discussions and workshops. For example, MGS initiated a series of research workshops with well drillers to standardize and elevate the quality of sample descriptions of glacial material input to the well drilling records of the State to enhance the quality of data for water assessments. This has included validation of standardizing glacial lithology with the geologists from the Department of Environmental Quality. This sample description program is supported by the Michigan Groundwater Association. MGS is also advocating a standardized geologic data base for existing data held in various department data files throughout the State.

MGS has met with numerous stakeholders in a number of geographic areas to develop a plan to maximize the "Re-invented" MGS's ability to support the State as the "go to" for geological science information going forward in the changing economy. As a result of these meetings and discussions, the Directors of the Michigan Departments of: Environmental Quality (MDEQ), Natural Resources (MDNR), Office of Great Lakes (MOGL) and Agriculture and Rural Development (MDARD), Governor's Quality of life Council, established a funding partnership with MGS to support the USGS Federal mapping program and this partnership is the first State funding for mapping in over 30 years, which will support the USGS matching funds programs.

Michigan Geological Repository for Research and Education: The Michigan Geological Repository for Research and Education (MGRRE), which has functioned for over 30 years under the direction of Dr. William Harrison III (william.harrison_iii@wmich.edu) and Linda Harrison (linda.harrison@wmich.edu), continues to be the strength of the MGS. Many requests for data review have occurred over the last 30 years at MGRRE. Specifically, requests for review of geologic core and data were incorporated into a collaborative carbon sequestration program, the Midwest Regional Carbon Sequestration Partnership (MRCSP) with Battelle National Labs, the Department of Energy (DOE), MGRRE with Dr. David Barnes (dave.barnes@wmich.edu) and our industry

partner Core Energy, LLC. This technical review and field validation progressed significantly in developing Enhanced Oil Recovery (EOR) with the capture and injection of CO₂. The EOR program is one of the economic benefits of carbon capture and injection and this has resulted in the secondary recovery of more than seven (7) million barrels of entrained oil, providing millions of dollars in additional revenue for the Michigan economy over the last seven years. To entice additional industry initiatives in this CO₂ capture and injection, Michigan modified and reduced the oil severance tax to stimulate support for expending the additional costs for this type of EOR program. That legislation was signed at MGRRE, by Lieutenant Governor Brian Calley on April 1, 2014, in recognition of the MGRRE data and technical support.

MGRRE continues to receive funding for this core and data storage facility from industry donations and greatly appreciates this support. Dr. David Barnes also received a four (4) year extension in DOE grant funds to continue the MGRRE and other research support for staff and students to the MRCSP sequestration studies being done in Michigan by the partnership.

Dave Barnes, Bill Harrison, Matt Rine attended an annual meeting of the MRCSP partnership in Columbus, Ohio in November. That meeting had all the technical members, plus a local industry partner, Core Energy and State regulatory members from Michigan, plus the other partnership states in attendance. Matt Rine presented his current graduate studies on the Niagaran reefs and their importance to the EOR and CO₂ studies.

MGRRE received a grant from the National Geological and Geophysical Data Preservation Program (NGGDPP). This year the project archived 234 oil and gas wells from 5000 core boxes representing 15,000 feet of core and shallow bedrock data storage from 125 shallow bedrock wells and boreholes from about 770 core boxes representing 2,310 feet of core. Also included in the data preservation is approximately 7,300 oil well scout tickets that were handwritten and they were scanned and digitized.

The US House of Representatives held hearings on September 17, 2014 on bill H.R. 5066 and representatives of the Association of American State Geologists (AASG) and industry made presentations in support of that legislation for continued funding of NGGDPP, the data and sample preservation

act. MGS submitted formal written testimony on that date in support of H.R. 5066 to continue funding for NGGDPP. The MGS testimony documented hundreds of millions of dollars in associated oil, gas and mineral revenues and associated taxes to Michigan, as a result of the MGRRE facility, also documenting the successful student theses and industry research studies and programs over the last 30 years.

MGRRE is also supporting the State Geothermal Data project, organized by the AASG with funding from the Department of Energy, which brings data from all 50 States into the National Geothermal Data System (NGDS). MGS digitized at-risk, legacy geothermal-relevant data and submitted same to the U.S. Geosciences Information Network (USGIN) data base.

Oil and Gas: The MGS through the Resource Center at MGRRE continues to be associated with the Petroleum Technology Transfer Council (PTTC) which conducts day and multi day workshops on oil and gas production technologies in Michigan. The Conferences in 2014 had over 200 attendees at multi session lecture conferences and technical sessions held in the State. These workshops focus on relevant topics in the petroleum industry.

Geologic Mapping: MGS participates in both the USGS STATEMAP and Great Lakes Geologic Mapping Coalition projects are under the direction of Dr. Alan Kehew (alan.kehew@wmich.edu). MGS did participate in presentations in February to all the Michigan delegates in Washington D.C. requesting their continued support for funding the Great Lakes Geologic Mapping Coalition, which was successful. Emphasis in the two USGS mapping programs is now concentrated in areas of mineral resources in the Upper Peninsula and water resources and the need for accurate geologic data and aquifer characteristics in the Lower Peninsula (LP). The LP studies are being done with a refined 3-D approach which includes a combination of surface geologic mapping, a limited rotonomic and geoprobe drilling program, down hole geophysical logs, with support from Dr. William Sauck, and incorporating the validated geologic logs from water well drillers. All these components result in a more accurate geologic depiction of the stratigraphic section and increase the quality of the data set in assessing the water bearing strata and resource availability for high production users, primarily the agricultural community. An expanded mapping program is being

proposed to the State in sensitive high water use areas.

Groundwater Resources & Environmental Quality and Energy: The MGS has been asked to sit on the Governors' select water advisory group, Water Use Advisory Council, which is supporting the adoption of the Great Lakes compact requiring permitting of large capacity water withdrawal wells and to quantifying their impact on stream flows. Local requests are being made to MGS for information on the quality of the groundwater in certain areas of the State, but many of the requests do not have funding associated with any proposed study at this time.

Economic Minerals: The Western Michigan University (WMU) hard rock economic mineral geologist/petrologist, Dr. Joyashish Thakurta (joyashish.thakurta@wmich.edu), has focused on the rock suites of the Upper Peninsula of Michigan. His efforts will be integrated into the MGS's role as a mapping and sample collector and analyzer of specific geologic data in little known exploration areas. He has written proposals to conduct studies with mining companies which will utilize students to sample and analyze the data for their respective thesis, the educational component of the MGS/University synergy. His contacts have also stimulated the potential for conducting an aerial geophysical survey of the Upper Peninsula to benefit the assessment of hidden mineral targets in the hardrock terrain which would enhance the State and Private leasing potential for any buried mineralization targets.

GIS Data Management and MGS Store: Sita Karki (sita.karki@wmich.edu) has been preparing and inputting many new and historic maps and documents that meet Arc-GIS standards to the MGS data management systems. The new functioning role of the MGS has been initiated and it includes preparing documents and maps for distribution and sale through the MGS website. The MGS believes that there are many other older Michigan publications and paper resources that can be input to the document archives and made available to the scientific community and general public.

Outreach and K-12 program: The K-12 program at MGS-MGRRE has had increasing interest by the Michigan education community under the direction of and coordination by Dr. Peter Voice (peter.voice@wmich.edu). This emphasis is the importance of earth science education of our middle and high school students. Many

teachers are now turning to the educational resource at the MGS- MGRRE facility. The number of contacts being made with students or general public at presentations or sessions has increased in the last year. The coordinator and staff have made over 16,000 contacts within this budget year and current expectations are that we will exceed last year's contact numbers in the next year. Teachers are seeing the benefits of this program and the MGS hopes to incorporate this into the State K-12 program going forward.

Dr. Peter Voice and Dr. William Harrison led a Michigan Basin Geological Society (MBGS) field trip on August 22-24 of this year to the lower Paleozoic outcrops in the eastern Upper Peninsula. The trip was fully subscribed and an excellent field guidebook for this trip is available on either the MGS or MBGS web sites.

Remote Sensing: MGS and the Remote Sensing laboratory under the direction of Dr. Mohamed Sultan (mohamed.sultan@wmich.edu) is preparing proposals to support satellite imaging and airborne geophysical surveys for mapping water resources and geologic structures.

I look forward to the coming year and invite any of my old and new friends and associates to come and visit the Campus and the Survey to say hello. I look forward to meeting with you and presenting additional successes of the Survey.



NOTE: Pictures of drillers core/sample description workshops in June at MGRRE and in Alpena in September with over 50 attendees.





News from MGRRE -

We hope you have had a rewarding year since you last heard from us. At MGRRE we continue to work with members of industry to help them explore for oil, gas, mineral and water resources. We enjoyed seeing 200 people at the spring PTTC workshop where we had several speakers from industry and our graduate students presented poster papers, accompanied by a truckload of core.

MGRRE welcomed Lt. Gov. Brian Calley on April 1st to sign a new law offering incentives for enhanced oil recovery by CO₂ injection. Calley commented, "The process is more expensive than traditional methods, but is considered the most cost-efficient method of carbon capture and sequestration." At the meeting, WMU President Dunn called MGRRE "an amazing resource for Michigan's citizens" and said that MGRRE had "played a critical role in the legislation being signed today."



The role MGRRE plays in this work is the on-going research conducted by Dave Barnes, Bill Harrison, our students, and our industry partner, Core Energy, LLC. We are all members of the Midwest Region Carbon Sequestration Partnership (MRCSP) funded by the DOE and directed by Battelle Memorial Institute. Funding will continue for three more years for Phase III, designed to inject and monitor at least one million metric tons of CO₂ into a series of oil fields that are in different stages of their production life cycles. MGRRE hosted a three-day core

workshop in February for Battelle research staff and Core Energy geologists. Cores from several northern Niagaran reef trend wells were examined because they might serve as models for the project currently underway in Otsego County.



Bill finished his assessment of Michigan's subsurface rocks' capacity for geothermal energy. This was part of the AASG State Geothermal Energy project to collect temperature data from subsurface sources. You can find Bill's data on line at <http://repository.stategeothermaldata.org/repository/collection/fd62bbde5b68ce93e4ba348bc7046611>.

We continue to rescue data, archive it here at MGRRE, and convert paper to digital data as part of our on-going work with the National Geological and Geophysical Data Preservation Program (NGGDP), funded by the USGS. This past year we scanned and inventoried 7,300 unique historic scout tickets.

WELL RECORD CARD										
County	Kalamazoo	Twp.	Clearwater	Permit No.	10251					
Quarter	C 2	Sec.	9	Twp.	22N	Rgn.	6W	<div><div>10</div><div>16"</div><div>10' 2 1/2'</div><div>8"</div><div>8"</div><div>8"</div><div>8"</div></div>		
Well No.	660	EL.	350	Wt.						
Owner	The Ohio Oil Company									
Form.	Roy E. Lawrence									
Elevation	594.4	Cont.	Two States Drilling Co.							
Formation						Clinton	Member	Pay	Depth	8-3-10 Comp. 8-13-10
Revs							Pay		Depth	Drilling
Mar.							Pay		Depth	See section below
R. R.							T. D.	23.6	P. R.	2
Co. R.							N. S. P.	and P. A.		1
Co. R. R.										1
Revs							Acid	Clear		See section below
Acid							A. L. P.			1
Acid							Remarks			
Tr. Fr.						12.6	-27			1
Tr. La.						13.7	-13			2
Tr. La.						20.6	-20.6			3
Tr. La.						20.6	-20.6			4
Tr. La.						20.6	-20.6			5
Tr. La.						20.6	-20.6			6
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Tr. La.						20.6	-20.6			95
Tr. La.						20.6	-20.6			96
Tr. La.						20.6	-20.6			97
Tr. La.						20.6	-20.6			98
Tr. La.						20.6	-20.6			99
Tr. La.						20.6	-20.6			100

We also determined for the first time what the accurate core footages are for samples from 234 wells that had been donated to MGRRE by industry. Only the well name and the core and box numbers were shown on the boxes. By examining each core and comparing it to public well records and in-house core analyses, we were able to ascertain exact footages for these cores, making them usable now for industry work and research. Lolita Krievs massaged all this data and uploaded it to the National Catalog at <http://ndc.sciencebase.gov>.



Potash continues to fascinate Bill and he gave a paper about this Michigan resource in September at the Eastern Section AAPG in London, Ontario. He and Dave co-authored a paper about CO₂EOR that Bill delivered at the same meeting. Bill co-authored two other papers at that meeting, so his presence didn't go unnoticed.

Jenny Trout continued to help visiting industry members who came to examine core and asked us to cut samples for their analyses. We had a particularly large request that temporarily put our trim saw out of commission. But Jenny rallied, fixed the saw, and shipped the samples in short order.

We are grateful for industry donations of maps, gravity measurement surveys, dip meter logs and data, well and prospect files, and core thin section slides. Jenny, Lolita Krievs, and the students have been working on inventorying all these.

Our new work-study students are enthusiastic and learning quickly. In addition to inventorying donated materials, they have been scanning well logs and gas chromatographic analyses.

Jenny and the students started a new project recently. They are rebooking some very thin core slabs. As donated to us, they were in 3' long boxes with 5 to 7 internal layers of very thin core slabs with only cardboard strips separating the layers. As you can imagine, those thin pieces of core tended to get out of order by sliding around in the box. And it was next to impossible to lay them out for examination.

We designed some thin cardboard trays and had them manufactured locally. Now we are placing all the slab pieces in these trays where they stay in order. We can put 18 to 20 feet of core in one core box by stacking 2 to 3 layers of trays. The samples are now easily displayed for examination, and we actually save pallet space.



Original multi-layered boxes

Thin slabs from one box



Slabs marked in new trays

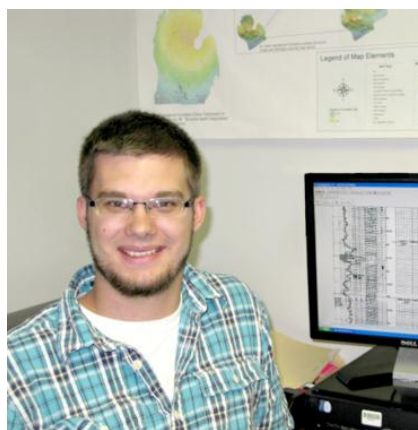
Result: Cores in new boxes

Jenny is also working to photograph cores as we lay them out. And she has been making Petra maps of oil and gas fields by formation names so we can enter all the data in an atlas. The resulting maps will help to show the fields and formations for which we have cores. This is a major project that will not soon be finished, but it's certainly worth doing.

We are honored that several students have worked here at MGRRE through all their undergraduate years. Two of those students recently graduated and are now starting their professional careers. Jeff Halleck and Ray Enbody made lasting contributions to our IT infrastructure and mudlog database and we feel very fortunate to have known and worked with them. We miss them already and wish them well.



Jeff Halleck



Ray Enbody

WMU Geosciences Advisory Council

Greetings to alumni, friends, faculty, and students:

Members of the Geosciences Advisory Council met at the WMU Michigan Geological Repository for Research and Education (MGRRE) center in April 2014, and again in October 2014. The Advisory Council calls upon all alumni and friends who have prospered from their relationship with the Geosciences Department to return in part the benefits they have received. Some examples are by offering support as a volunteer at local or out of town University functions, as an "Ambassador of Geosciences" at professional meetings where students and faculty are presenting papers, as an unofficial recruiter for the WMU Geosciences Department, or by offering financial

assistance to the Department with its continuing initiatives and endowments. Information on the department's endowments can be found on the Geosciences Web site:

<http://www.geology.wmich.edu/how-to-donate.html> (see "Giving").

The Council continues to be available to provide guidance to both undergraduate and graduate students through informal meetings and other events. It has provided support for the continuation of the geosciences field programs, and has assisted the department in securing funds for both on-going and future projects and endowments.

The Council encourages you to come to WMU during Homecoming or at any other time in order to visit the department, to re-ignite old friendships, and to re-establish contact with the faculty and the university. Hope to see you all at the Alumni Boondoggle Fall 2015!

Council members

The council includes the chair, vice chair, active members, honorary members and emeritus members.

- **Jeff Hawkins, Chair**
Phone: (269) 342-1100
Email: jhawkins@envirollogic.com



- **Richard Laton, Ph.D., Vice Chair**
Phone: (657) 278-7514
Email: wlaton@fullerton.edu

Jerry Aiken
Phone: 520-297-9832
Email: j.l.aiken@att.net

Christopher Amore

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Kim Steinmann

Email: klfwks@chartermi.net

Kevin Wilson, Ph.D.

Phone: (218) 728-8386

Email: kwilson@bluewater-cap.com

Emeritus members

- **Lloyd Schmaltz, Ph.D**
Phone: (269) 375-2346
- **Thomas Straw, Ph.D**
Email: tstraw@evansville.net
- **John A. Yellich**
Phone: 303-901-2886
Email: John.a.yellich@wmich.edu

Honorary members

- **Ibrahim A. Al-Jallah**
- **Ahmed Murad, Ph.D**

Provisional members

- **Jim Farnsworth**
- **Mike Wireman**



A hearty congratulation to vice-chair W. Richard Laton, Ph.D., has received two major 2014 awards from the National Ground Water Association. Rich received the Ross L. Oliver Award for outstanding contributions to the groundwater industry and the Keith E. Anderson Award for outstanding contributions to NGWA. At WMU, Laton is actively involved with training of future hydrogeologists, through years of dedication to teaching and championing our hydrogeology field course.

Meet our Students

Kirk Wagenvelt – MS candidate (under advisor Michelle Kominz)

Over the summer months of 2014 I worked for one of the largest energy companies in the world, ExxonMobil. During my time there I was challenged to demonstrate my capacity to work as a team member in the Production Company. My role within the team of geoscientist and production engineers was to utilize Petrel Exploration and Production Software to better understand the subsurface geology in Equatorial Guinea and Chad. I presented the benefits of my work to company managers, high ranking supervisors, and other company branches. It was a great way for me to see what it is like to work for a large corporation. I have accepted an offer with ExxonMobil and plan to start in the summer of 2015.

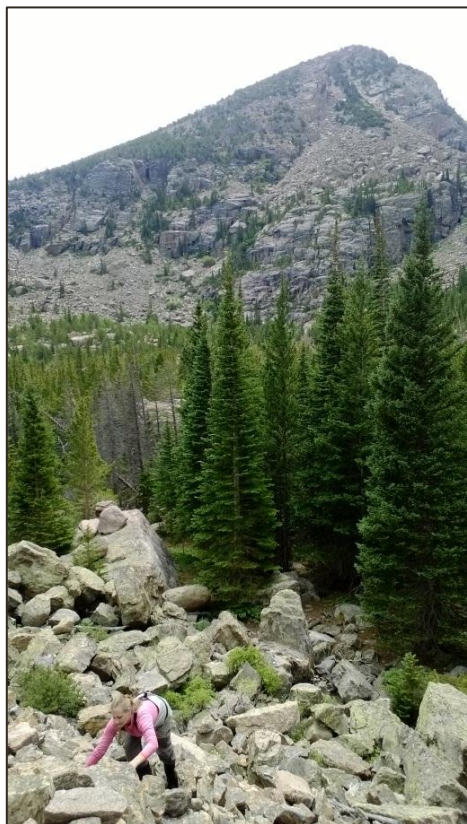


Congratulations to **Krishna Stephen** – PhD candidate (under advisor Carla Koretsky) on winning the women's

doubles event at the West Hills Fall Classic tennis tournament this October!



Congratulations to Geosciences graduate students **Frank Sattler** and **Jose Soares** on taking home the hardware in the 1st annual departmental ping pong tournament at the campus rec center this fall!



Erica Bays – (MS candidate) spent her summer in and around Fort Collins, Colorado with an internship at the NAGT-USGS Cooperative Summer Field Training Program. Erica worked with mentor David Walters collecting data for his research on nutrient retention and productivity in Rocky Mountain streams under alternative stable states. She says it was one of the best experiences of her life!

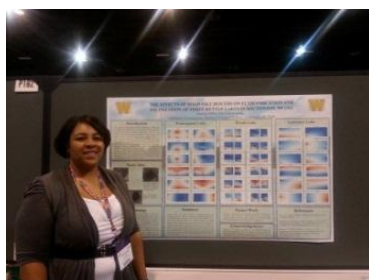
Congratulations to our students who earned **Graduate Research Awards**:



Richard Dudek – stable isotopes (*Rich also received the GSA on to the future (OTF) scholarship*).



Jonathan Haynes – economic geology



Denisha Griffey - geochemistry



Jessica Szkody - tectonics



Abdel Mohamed receiving the precious Farouk El-Baz international award at GSA in Vancouver, Canada

More Student Awards

Department of Geosciences

Presidential Scholar

Raneem Binismail

The Graduate College Dissertation Completion Fellowship

Racha El Kadiri

The Graduate College's Graduate Student Research and Travel Award (fall 2013)

Abotalib Farag (Research Grant)

Racha El Kadiri (Research Grant)

The Graduate College's Graduate Student Research and Travel Award (spring 2014)



Lamees Mohamed (Research Grant)

Michigan Basin Geological Society Scholarship

Kyle Cox

Matt Rine

Frank Sattler

Kirk Wagnvelt

AAPG Grants-in-aid AWARD**Kyle Cox****Kirk Wagnvelt**(IMAGIN) JIM LIVING SCHOLARSHIPAWARD AGU (Travel Award)**Racha El Kadiri**Kalamazoo Geological and Mineral
Society Scholarship**Lamees Mohamed****Neal Turluck**Lloyd and Marilyn Schmaltz
Undergraduate Scholarship in Geology
or Earth Science Awards**Danielle Dupuis****Callie Mahan****Jake Tholen**John and Kelly Grace Endowment
Scholarship**Keith Sulen**Lloyd and Marilyn Schmaltz MGRRE
Scholarship**Frank Sattler**William and Linda Harrison Graduate
Scholarship**Matt Rine**Envirologic Technologies Scholarship
Awards**Dawn Caldwell****Denisha Griffey****Krishna Stephen**Douglas Daniels Endowed Scholarship
and Award**Sarah VanderMeer**Randall Kerhin Graduate Scholarship**Abdel Mawgoud Mohammed****Jessica Szkody**Advisory CouncilField Camp Scholarship**Kathryn Hillenbrand**Mohamed I. Sultan Endowment Award**Racha El Kadiri****Abotalib Farag**Distinguished Student Service Award**Denisha Griffey****Jessica Szkody****Zachary Waber****Sara Wild**Senior Honor Awards:Geology**Raneem Binismail****Nicholas Moleski**Hydrogeology**Kathryn Hillenbrand**Geophysics**Derek Patterson**Earth Science**Sara Wild**Earth Science Education**Shannan Wilson**

GEOLOGY CLUB:

We are all Western Michigan University students, interested in learning more and sharing our knowledge of Geology with each other and our community. We use our background not only from the classroom, but from the field and from our many field trips across the country and around the world.

Arkansas/Oklahoma

During spring break 2014, members of the geology club under the supervision of Dr. Peter Voice explored the geology of Arkansas and Oklahoma. Places the club visited included Onondaga State Park in Missouri, where the club spent time hiking on Whitaker Point Trail. The club went canoeing on the Buffalo River (geo-float) at Buffalo National River in Arkansas and made their way to Hot Springs National Park in Arkansas where they investigated the Magnet Cove Intrusive complex.

The group then ventured into the Ouachita Mountains, Lake Ouachita and the Arbuckle Mountains. They camped at Turner Falls State Park and eventually made it to the Sam Noble Oklahoma Museum of Natural History (Univ. of Oklahoma). Other subsequent stops included the Alabaster Caverns State Park, Black Mesa State Park, the Wichita Mountains and the Great Salt Plains, OK. The group finished up their adventure with a visit to the Oklahoma Geological Observatory and spending time exploring the Ozark Mountains before they finally returned home to Kalamazoo.

Tales from the Journey - Neal Turluck

"Jason and I needed firewood and we went to a few gas stations in search of a bundle or two but couldn't find any. Out of nowhere a pickup pulled up with a truck bed brimming with cut and aged firewood followed closely behind by a small dump truck full of cut and aged firewood, they wouldn't sell us a single piece, saying that they had already sold what they were delivering but knew someone who could hook us up. They told us to go to a gas station down the road and ask about a guy named "Whitey" who would be able to sell us some wood so we took up and beat on down the trail to get to the gas station as it was getting late and we were in rural Oklahoma with no other possible leads (there are very few large trees in Oklahoma). When we get to the gas station we ask the attendant

about Whitey and his firewood for sale, it turns out he contracts through the gas station to sell his firewood there but they were out. A gentleman sitting at a table nearby enjoying a delicious burrito from the taqueria in the gas station, that is commonplace in most gas stations down south, spoke up and said he knew Whitey and that he would call him for us. He got him on the phone and in some very rapidly spoken, and somewhat angry, Spanish, they came to terms and the burrito eating gentlemen hung up the phone to give us the good news. He told us Whitey would be more than glad to sell us as much firewood as we needed and to go directly to his house. After getting directions to an alley on an unlit street behind a garage and a burned down house, we got on our way. When we pulled up to Whitey's house it wasn't more than a tin shack with lean to and a yard full of chickens with stacks of firewood up and down his property line. Just as we were about to turn off the car and step out to approach the side door, someone knocked on the window and as Jason rolled it down they told us to follow them. They walked to the end of the drive and at the corner of the property next to one of the piles of neatly stacked cut to length and split firewood they stopped, it was a woman and she introduced herself as Yolanda. She said we could have as much as we wanted from that pile and it would cost \$0.35 a log and we were to keep track of what we took and were to pay her accordingly. We got twenty pieces, enough for a nice roaring campfire that evening to enjoy under the clear Oklahoma sky and to cook our delicious dinner with. There was a pleasant visitor who came brushing across our legs and as I was about leap out of my skin I realized it was Whitey's and Yolanda's cat that had come to say "Hi." After petting what was a very dirty, yet pleasant cat, we paid Yolanda and went on our way. We never got to meet the ambiguous and mysterious Whitey, the supposed firewood kingpin of central Oklahoma, but Yolanda was very nice. When we got back to the campsite several of us unloaded the car of firewood, split some wood into tinder and started up the fire. It turns out the firewood they had sold us was unseasoned meaning it was very wet and did not burn well, hence the cheap price. A lesson learned is that it just goes to show who you can and cannot trust in this world, maybe we should all think

twice about driving down back alleys in small towns trying to purchase reasonably priced firewood, it may just end up to be a bad deal. And for us that bad deal left us all cold."

IMAGES FROM THE VOYAGE



Ozark Mountains

Members of the Geology Club at WMU enjoyed a beautiful afternoon looking at sandstone formations including arches during the trip.



Buffalo River

Geology Club members (canoed down the Buffalo River with a few of the canoes tipping over including Dr. Peter Voice and Sara Wild, Neal Turluck and Jose Soares.

Want to get in touch with the Geology Club at WMU? Email: wmugeologyclub@gmail.com

Officers for the Geology Club 2014-15 are as follows :

PRESIDENT – Jake Tholen

VICE PRESIDENT – Sara Wild

SECRETARY – Jason Bell

TREASURER – David Gold

IN REMEMBRANCE

Dr. J. Philip McLaren



Dr. J. Philip McLaren, "Doc", age 72, passed away in Hawaii Wednesday, Feb. 12, 2014 after a brief illness. Originally from Los Angeles, Phil was the son of a science educator who instilled in him a curiosity for the natural world. In 1964, Phil graduated from Bethel College in Indiana and went on to receive his PhD from Western Michigan University in 1968 during which time he and wife Lynne started a family. Doc moved to Quincy with his family in 1976 to become a Professor of Biology at Eastern Nazarene College.

Over the course of 35 years at the College, he inspired curiosity and shared his passion for teaching and science with students, colleagues and family alike. Doc is most remembered as an educational adventurer and world traveler always with a ready story or a lesson to share. Docs favorite travel advice to his students was to "sleep when you can, eat what's in front of you, and if you like it, buy it, as you may never see it again". Docs interests included becoming a private pilot, scuba diving, sailing, celebrating his Scottish heritage as a member of the Royal Scottish Dance Society and his long time membership in the Scots' Charitable Society. He always took an active role in his church. Bethel College honored Phil as Alumnus of the Year in 1999 and he served as President of Massachusetts Marine Educators, (MME) from 1985-1987.

Stephen Layne Armstrong

Stephen Armstrong, 64, of Flint Township, passed away Monday, December 2, 2013 from pancreatic cancer. He was born in Victoria, Texas on September 19, 1949 and was raised in East Grand Rapids, MI. Steve graduated from Western Michigan University Geosciences in 1972 where he was a proud member of Sigma Chi Fraternity. Steve later created his own business, AMS Direct, which he operated independently for 33 years.

Throughout his life, Steve enjoyed softball, golf, and camping, coaching, dog training and was heavily involved in various wildlife philanthropies. Steve was extremely passionate about fly fishing, fly tying, waterfowl hunting, decoy making, upland bird and wild turkey hunting. He pursued these passions every year throughout the U.S. and Canada with close friends and family.

John Hudson Crane, Jr.

John Hudson Crane, Jr., age 67, passed away gracefully at his home on January 4, 2012. He attended Western Michigan University, earning a Bachelor of Science degree in earth science and psychology and a master's degree in earth science. Teaching was his avocation and

passion. The next 28 years were spent teaching middle school science and physical education at Lakewood Public Schools, Lake Odessa. He continued on at Lakewood as a para professional for 14 years after retiring from full-time teaching. During his entire career he also taught many after school enrichment classes, particularly chess, which was another passion. John had many interests and hobbies, including water skiing, in which he excelled, bicycling, body building, canoeing, camping, cross country skiing, and hiking. His other hobbies included astronomy, birding, photography, and celestial navigation.

Maria Ann Cervantes Roth

Maria Cervantes Roth, age 46, passed away on Nov. 17, 2013 after a battle with cancer. Maria is the wife of alumni and Geosciences advisory council member Chris Roth (BS 1994).

Marie worked as a fitness coordinator and trainer at the YMCA for many years. Among many tasks, she coached volleyball and volunteered at Relay For Life. Through her work in fitness, personal training, and coaching volleyball, her caring personality and selflessness has touched many people.

In lieu of flower or mass Marie's last wishes were to have an Educational Trust Fund set up on behalf of her daughter, Gabrielle and her son, Cody. Educational Trust Fund, Gabrielle Roth and Cody Cervantes.

You may send your donation to:
Beverly & Julio Cervantes
2276 Brookhaven
Canton, MI 48188

HYDROGEOLOGY FIELD CAMP 2014

This summer marked the 26th anniversary of the Hydrogeology Field Course (HFC) at WMU and my third as director of the program. Enrollment was once again exceeding capacity and nearly 2/3 of the 30+ participants came from other universities from around the nation and the world. One student came from as far as Japan to participate in our course.

We had a great group of students, faculty and teacher's assistants here and a great time was had by all (so they say!). Of course, not everything went as planned, but we expected that! Running the HFC has been a very rewarding experience for me. We would not be able to do it without the support of our friends and alumni, who truly make this field course what it is today – a top-rated program nationally.

Our students get the skills they need to carry on with high-level research aspirations into graduate school, or simply to hit the job market as qualified and well-rounded geologists. I am already receiving inquiries about next year's course, which is sure to be as much fun as this year's was.

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



Enrollment for 2015 begins February 1st

Graduate Student enrollment is near an all-time high in the Geosciences. The students here are very dedicated to their research and teaching activities. The department has always maintained a high-level of research standards for our students and an emphasis on applied science broadly in energy and the environment.

Geosciences offers programs intended as professional degrees for students continuing in a geosciences career:

Doctor of Philosophy in Geosciences

Master of Science in Geosciences

For students who plan careers outside the geosciences, but whose work or specialty would benefit from an in-depth education in the geologic sciences:

Master of Arts in Earth Sciences

There are currently 65 graduate students at the department studying and conducting research in a broad range of interdisciplinary topics including:

- Carbon sequestration
- Carbonate systems
- Earth science education
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- Geomorphology
- Hydrogeology
- Isotope geochemistry
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- Ground water modeling
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CoreKids: our K-12 Outreach Program



Peter Voice continues to direct CoreKids, our K-12 outreach program. The Program conducts visits to classrooms in a large area including Kalamazoo, Grand Rapids, Lansing and Detroit metro areas. Peter carries out this work with help from many student colleagues. Together they present interactive classroom modules explaining aspects of Michigan's geologic history, water and other resources.



During the 2013-2014 school year, CoreKids interacted with 16,100 children at their schools and at events sponsored by the Cranbrook Institute and the Kalamazoo Geological and Mineral Society. We had 60 events with schools and our allied partners. We are expanding our network of contacts and recently added the Michigan Department of Environmental Quality.



With Sita Karki's assistance, we revamped the CoreKids website. We also sent CoreKids program announcements and advertisements to the MESTA newsletter, the Michigan Science Teachers Association newsletter, and the Michigan Alliance of Environmental and Outdoor Educators newsletter. This new ad campaign sparked some interest, as we are getting contacts now from schools where we have never previously visited. Through our new emphasis on building relationships, we hope to increase the number of on-site tours and classroom visits to bring our message to a much larger audience of students, teachers, and parents.



We present several classroom modules including one on Michigan's hydrogeology and another on Michigan's geologic history. The hydrogeology module discusses the hydrologic cycle, water storage in aquifers, and environmental issues. The geologic history module includes a discussion of Michigan's natural

resources in the context of Michigan stratigraphy. Concepts covered include basic relative dating, uniformitarianism, sedimentary depositional environments, and porosity and permeability.



Both modules incorporate a really neat hands-on activity, where the children can actually see which rocks are the most porous and permeable. We imbedded air valves into cores from different rock types and attached them to bicycle tire pumps. The children then try to pump air through these rocks that are submerged in water in large clear beakers. If the rocks are porous and permeable, bubbles stream out of the core—it's pretty exciting to see. In addition, we have developed modules on Natural Hazards (Volcanoes, Earth Quakes and Impact Craters), Michigan Fossils, the Climate and the Environment. Several of these modules were tailored to larger events such as the spring Environment Week at the Cranbrook Institute.

Ann Gilchrist helped us develop an amazing hydraulic fracturing model that actually simulates the process of hydraulic fracturing by injecting sand and glycerin into a gelatin called agar. We are starting to test the model in the classroom and with professional geologists.

Heather Petcovic and Peter conducted three teachers' workshops with the Multidisciplinary Research Award that we received in August, 2013. These workshops provided us with valuable feedback on what earth science content that teachers were looking for in a digital format. We used the feedback to strengthen a proposal that was resubmitted to the National Science Foundation in October of 2014.

Peter also became involved with a group of outreach specialists working for major museums, parks and geological surveys in the Midwest. The group was started by Dr. Lisa Anderson (a WMU Alumnus!), who organized a slate of talks focused on outreach at the 2014 North-Central Geological Society of America Meeting. Peter presented a talk at the session on the CoreKids program. The group agreed to continue to work together and will have a session at the upcoming 2015 North-Central GSA meeting (which Peter agreed to co-chair).

We are all grateful to the DTE Foundation for its generous past support for CoreKids.

We also are grateful to the Michigan Section of the American Petroleum Institute which provides us funding to support the Hydraulic Fracturing Module and Michigan Geologic Resources Module.

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Geosciences Publications 2013-14

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Petcovic, H.; Voice, P.; Horvitz, B.; and Bentley, A. 2014. The MGRRE Education Portal: Investigating Rocks and Fossils Under Michigan. Michigan Earth Science Teachers Association Meeting 2014 Field Conference, Alpena, MI.

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Grants

Peter Voice - American Petroleum Institute – Michigan Section Grant for the CoreKids Program - \$18,000

Joyashish Thakurta - Surficial Geological Mapping: Vulcan 7.5 Minute Quadrangle, Dickinson County, Michigan – STATEMAP program, United States Geological Survey (\$31,661)

Alan Kehew - Surficial Geological Mapping: Albion SW and Albion SE 7.5 Minute Quadrangle, Calhoun County, Michigan – STATEMAP program, United States Geological Survey (\$41,845)

William B. Harrison, III - "Michigan Geological Samples and Data Preservation Project 2013" Funded by the National Geological and Geophysical Data Preservation Program (NDDGPP) through the United States Geological Survey (USGS). Project End Date: 08/31/2014. (\$32,549)

William B. Harrison, III - "Preserving and Digitizing Paper Well Records of Petroleum Hydrocarbon Chromatographic Analyses of Drill Cuttings and Core Chips" Funded by the National Geological and Geophysical Data Preservation Program (NDDGPP) through the United States Geological Survey (USGS). Project Start Date: 09/01/2014. (\$29,141)

Sultan, M., A remote sensing – based early warning system for algal blooms in Kuwait Bay and coastal waters (Kuwait Institute for Scientific Research)(2012-2014; US\$ 155,000)

Sultan, M., Use of Grace, remote Sensing, and traditional data sets for modeling time-dependent water partitioning on continental scales: A case study from Africa, (NASA-GRACE) (2011-2015; \$457,000)

Sultan, M., Evaluating subsidence in the Nile Delta using radar interferometry, (NSF)(2011-2014; \$298,000)

Sultan, M., Detailed Studies of Landslides in Jazan Area, Saudi Arabia (Saudi Geological Survey)(2010-2014; \$300,000)

Sultan, M., Use of GRACE data to estimate temporal changes in terrestrial water storage (TWS) across the Empty Quarter and surroundings (Saudi Geological Survey)(2013; \$60,000)

Sultan, M., Towards a better understanding of the paleo-hydrologic setting of the Empty Quarter (Saudi Geological Survey)(2014; \$90,000)

Endowments

Department of Geosciences Endowment \$15,979.25

Douglas Daniels Endowed Geosciences Scholarship and Award \$13,496.59

Envirologic Technologies Endowed Scholarship \$22,221.53

Geosciences Advisory Council Quasi-Endowment \$12,317.00

Lloyd Schmaltz Quasi-Endowment \$13,257.40

Geosciences Operating Quasi-Endowment \$25,938.78

W. David Kuenzi Memorial Quasi-Endowment \$68,439.81

William and Linda Harrison Scholarship \$21,889.88

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W. Richard Laton Field Camp Scholarship Endowment \$39,166.27

Randall Kerhin Graduate Scholarship in Geosciences \$12,437.59

John and Kelly Grace Endowment of Geosciences \$11,561.52

Mohamed I. Sultan Endowment for Geosciences \$11,200.34

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Geosciences Study Abroad Endowment \$1,100.00

Peter J. Kaczor Geology Scholarship \$4,175.00

Ronald Chase Endowment \$2,547.00

Alan E. Kehew Endowment \$10,200.00

Chris Schmidt Endowment \$1,250.00

The Core of Four Endowment for Geosciences \$2,500.00

Shirley J. Aiken Geosciences Scholarship \$2,200.00

Empowering Geosciences \$2,105.00

Tom Straw Endowment \$100.00

Nicholas Bull Endowment \$492.00

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Michigan Geological Repository for Research and Education \$651,857.62

MGRRE Operations \$529,766.07

Total \$1,181,623.69

2014 Geosciences Distinguished Alumni Award Recipient:

Mike Wireman

The Department of Geosciences at WMU is extremely pleased to reconnect with and offer the distinguished alumni award for 2014 to Mr. Mike Wireman.

Michael Wireman was a hydrogeologist employed by the **U.S. EPA** in Denver, Colorado, until summer 2014, where he served as a national groundwater expert.

Wireman has a master's degree in hydrogeology from **Western Michigan University** and he has done post-master's work at the Colorado School of Mines. He has more than 30 years of experience in groundwater investigations in the western Rocky Mountains.

In his most recent position, he provided technical and scientific support to several **EPA** programs, other federal agencies, international programs, and state groundwater protection/management programs. **Wireman** managed research projects related to mine-site



hydrology/geochemistry, groundwater sensitivity/vulnerability assessment, isotope hydrology, groundwater/surface water interaction, and aquifer characterization.



In addition, he has significant experience in the legal, scientific, and programmatic aspects of groundwater resource

management; has extensive experience in groundwater-related work in the Baltic countries, Ukraine, Romania, and Georgia; and has served as an adjunct professor at Metropolitan State College in Denver where he taught a class on contaminants.

Wireman is a member of the Colorado Ground Water Association, NGWA, and Geological Society of America, and he is the current chair of the International Association of Hydrogeologists United States National Chapter.

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MORE DETAILS TO FOLLOW IN THE coming months – SAVE THE DATE TO BE IN **KALAMAZOO Fall 2015!!!**

