

GEOLOGY

Summer Field Course 2020: Teaching field methods in the time of COVID

2020 could have been the year without a summer field course.

The normal Wasatch-Uinta Field Camp (WUFC) program was simply not feasible, given the close personal contact, the hours spent packed into vehicles, and the fact that face-to-face summer courses were not allowed at Illinois. We could have thrown in the towel and somehow found our seniors a path to graduation. But Illinois faculty Michael Stewart, Max Christie, and Kurt Burmeister (adjunct), Illinois teaching assistants Nooreen Meghani and Olivia Thurston, and people from other WUFC consortium schools, accepted the challenge and created an internet-based course that served students very well. The course was certainly not the normal boots-on-the-ground experience, but students developed many of the same skills and also had opportunities to learn field-related technology skills, for example with geographical information systems (GIS).

Initially, WUFC faculty were not enthusiastic about the prospect of creating a virtual capstone field experience from scratch. Nor were they confident they could create one to rival the quality of our traditional field camp experience. But they felt a strong responsibility to students who needed to complete a required capstone course to graduate and compete for jobs. In April, they began to build the surrogate course with great urgency and knowing well that the size of the challenge and the looming deadline to start the course in June required an emergency footing. Among themselves, they referred to this project as “Dumpster Fire, 2020.”



The National Science Foundation and National Association of Geoscience Teachers (NAGT) were co-sponsoring efforts to support online field course formats during the pandemic. This community effort produced learning outcomes that guided the WUFC faculty in choosing learning objectives. From there, they began building the



Dr. Max Christie presents a virtual lecture, standing in front of a virtual outcrop. The 3D representation of the outcrop can be explored in a virtual reality scene. Try for yourself at geology.illinois.edu/virtualfieldtrip/cagles-mill.html.

course from scratch. They were deeply involved in the community effort run by NAGT, Designing Remote Field Experiences. The faculty of WUFC authored five remote-learning projects that are now available to the wider community through the NAGT “Teach the Earth” collection. It took a lot of work to construct exercises that maintain the high standards of WUFC, but the beleaguered instructors were determined to succeed and energized by the novelty and importance of their tasks.

Instruction was done through Zoom meetings. Instructor contact hours for the virtual course were as demanding as the residential WUFC camp in Park City: Individual instructors logged over 270 hours on Zoom over six weeks! A typical day began at 9:40 a.m. for a pre-day instructor meeting. Students ‘arrived’ on zoom at 10 a.m., attended lectures, then worked on related activities or ongoing project work until 1 p.m.. From 1:30 to 6 p.m., a second session debriefed earlier activities, presented more lectures and activities, and/or continued work on larger projects.

The course began with small projects and introductory-level skills using Google Earth and digital maps, and sketching 3D virtual outcrops. By the second week students were mapping remotely using Google Earth. They became very adept at calculating strike and dip from topographic / stratigraphic intersections. Instructors began to introduce cross-sections during the first week, and the complexity of the cross-sections increased as the weeks progressed. In the third week, instructors introduced ArcGIS Pro to begin projects in

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Letter from the Head

I'm writing in a hurry this year, way behind schedule, and you can all guess why: The past several months have been full of extraordinary tasks related to the COVID-19 pandemic on top of the normal business of running the department. I'll never forget Spring Break, when all classes shifted to online learning mode in one week. We got through the end of the semester and figured out how to do an inspiring graduation ceremony on Zoom. Then we worked hard all summer to develop and offer a summer field course online and to remake our fall classes—some face-to-face, some fully online, and some hybrid. About two-thirds of our classes are purely online this fall. Mineralogy, geochemistry, and isotope geochemistry are all face-to-face. In May, we were planning for three or four others to be face-to-face, but given the various constraints, we eventually opted to move them completely online.

The faculty and teaching assistants have pulled off heroic feats to keep education happening. Specifically, I'd like to mention Michael Stewart, Max Christie, and Kurt

Burmeister, and teaching assistants Nooreen Meghani and Olivia Thurston: They created an online, surrogate summer field methods course in only a few weeks—a process they referred to as “the dumpster fire” because of the burning need to create something, in a hurry, to provide this critical, required capstone experience for graduating seniors. It certainly was not a traditional field camp, but it taught an array of field-related skills that will serve the students well in their careers. The instructors survived the full-day (!) Zoom sessions and offered an excellent course under difficult circumstances.

All geology faculty and teaching assistants have put in numerous extra hours adjusting their teaching methods for the situation. Some of us record lectures, others live-stream them. Even the faculty teaching face-to-face have navigated technological challenges in order to provide online options for students who cannot come to class safely. The mineralogy lab is hands-on, with modifications for safety. In the History of Life course, 3-D images of fossils are standing in for the real items.

The Department of Geology is very fortunate to have seasoned online instruction experts who helped us manage these shifts. Associate head Steve Altaner, who always keeps the department's instructional machine

humming, did double duty over the summer, helping faculty plan and adjust their fall semester teaching. For several years, Steve and professor Cory Pettijohn have been perfecting high quality online versions of our popular general education courses, using methods that excel in building student engagement. We had expert video and sound advice from Max Christie as well. Alumni and friends of the department were part of the effort, as your donations allowed us to upgrade our video camera, buy high-quality microphones, and ensure we had enough high-quality microscopes for the mineralogy-petrology lab to function safely.

The university similarly tapped the abundant expertise and world-leading genomics facilities on campus to mount one of the world's few best coronavirus testing programs and roll out all the logistics for the fall semester. The system of sample collection centers and laboratory facilities can perform over 10,000 tests per day with about a 24-hour turnaround, several times more than any other big ten university. We had a spike of cases at the beginning of the fall semester, but because of the intensive testing, the spike was detected a few days after its start, actions were taken, the number of new cases declined, and, as of now, we are still operating according to plan.

One of the frustrations of this very unusual year is my lack of ability to visit with alumni and friends of the department face-to-face. I miss seeing you all. I look forward to the time when I can enjoy your visits to the new Natural History Building, host various alumni gatherings in your cities, and otherwise meet up with you. For the time being, though, we are hoping that some virtual events will do. I enjoyed showing off NHB via Zoom during the summer, and we are planning additional events for the coming months. We advertise these via email, so if you didn't hear about the NHB event in the summer, I invite you to send us your updated email address, check the alumni page on our web site, and/or inquire about upcoming events at geology@illinois.edu.

More than ever, we love to hear from you all, so please stay in touch and send us your news.

Stay safe,

Tom



Year in Review is published once a year by the Department of Geology, University of Illinois Urbana-Champaign, to highlight the activities and accomplishments within our department and feature news from our alumni and friends.

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2019 Alumni Achievement Award: Dr. Jim Baroffio



On October 10, 2019, the department welcomed Dr. James R. Baroffio (PhD, '64) to campus, and presented to him the Department of Geology Alumni Achievement Award. Jim was born and raised in a coal mining town in Pennsylvania and was the only person in his family to attend college. He received his bachelor's degree at the College of Wooster in 1954 and his master's at Ohio State University in 1958. After three years with Standard Oil in the Permian Basin of West Texas, he came to Illinois to work with professor Harold Wanless for his PhD, which he

completed in 1964. He returned to Standard Oil, which eventually became Chevron, and before long he held important management positions, including chief geologist for Chevron's Gulf of Mexico operations, and eventually president of Chevron Oil Field Research Company, a world-class research and development organization in La Habra, California, for several years. He then became vice president of

Exploration for Chevron USA in San Francisco and then president and CEO for Chevron Canada. In this role, he worked with the deputy prime minister of Canada and a consortium of oil companies overseeing the construction of the Hibernia project--the largest offshore platform in the world at the time.

This series of important positions indicates Jim had a magic touch in management. He attributes this success to the ways he helped to foster an environment conducive to providing opportunities to succeed for the industry's most valuable asset—its people. He retired from Chevron in 1994. Not one to put his feet up, he became a member of the board of Pioneer Natural Resources for 12 years and stayed on as a geosciences advisor after that. All told, Jim spent nearly 60 years in the petroleum industry.

Jim has always been a big fan of professor Harold Wanless and was an important member of the department's Geo Thrust committee. This group of alumni completed, in 2005, a \$3 million endowment campaign which generated the endowments that support most of the department's graduate student fellowships and named professorships. Jim created the Wanless Fellowship, which provides a graduate research stipend to a top student each year.

The department is proud to count Jim among the ranks of its illustrious alumni and is happy to recognize his impressive achievements with the 2019 Geology Alumni Achievement Award. Congratulations Jim!!! *

Alumni Spotlight – Melinda Higley (PhD, '18)



We caught up with recent PhD recipient Melinda Higley, who recently took a faculty job at Calvin University:

Since graduation, where has your career taken you?

From 2018 to 2019, I worked at the Ohio Geological Survey. In 2019 I started as an assistant professor of geology at Calvin University in Grand Rapids, Michigan, my alma mater.

I teach introductory geology, historical geology, sedimentation and stratigraphy, oceanography, and I will teach hydrogeology next semester.

How did your time at Illinois prepare you for this career?

The teaching and mentoring experiences at Illinois were a very important part of my preparation. My current position has a heavy teaching load, and I can't imagine trying to fulfill my teaching obligations without several semesters of practice as a teaching assistant. I realize now that working with several different professors as a teaching assistant was helpful in developing my teaching philosophy and style.

My training as geoscientist and researcher at Illinois was very special and thorough. I think the primary source of preparation came from feeling valued by my department and by the university. This was in part because faculty and staff always took the time to engage with me, train me, discuss science with me, and in general be collegial. Dr. Conroy and her group helped me prepare for my career in many ways, but it boils down to excellent field and lab resources, numerous opportunities to present science at conferences, and an omnipresent challenge for personal development.

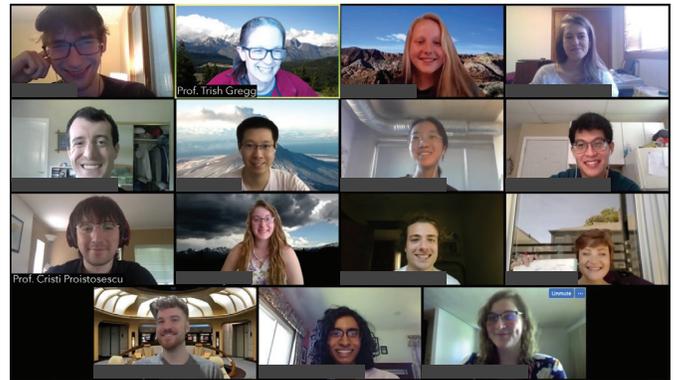
What is your favorite memory of working in the field while at UIUC?

While the Conroy group was conducting a second field expedition to Kiritimati Island, in the central tropical Pacific, we had traveled by boat to collect a sediment core far away from home base. We were deep within a network of tidal channels when the boat broke down. While waiting for rescue, we disembarked and explored. The landscape was so beautiful, and the seabirds were nesting. It was a very remote location, and we knew it was a special place that we might not see ever again. The broken boat gave us an opportunity to be a part of that place for a quiet moment in an otherwise busy field work agenda. *

SUMMER 2020 UNDERGRADUATE RESEARCH PROGRAM

When the COVID-19 pandemic struck the campus community in the spring, summer plans were dashed for many of our geology undergraduate students as internships and summer research experiences were cancelled. Our undergrads rely on summer months to gain important career development and hands-on training. Unfortunately, the typical summer opportunities were not available this year due to the global COVID shutdown. As the situation began to unfold during the spring, the Department of Geology started to look for alternatives for our undergrads—ways that they could gain critical skills and employment for the summer months. Given the excellent faculty and resources in our department, we wondered whether a summer research program could be developed for our students and delivered completely online. With this motivation, professors Trish Gregg and Cristi Proistosescu developed the online Summer Undergraduate Research Opportunities Program (SUROP). The goal of SUROP was to provide critical research and professional development that our undergraduate students would not have gained this summer due to the COVID-19 shutdown. Geology faculty and graduate students quickly jumped on board, providing excellent project ideas and volunteering to serve as mentors to our SUROP fellows. Thanks to generous gifts from Department of Geology alumni, SUROP was able to provide a \$2,500 stipend for

each of the SUROP Fellows. These outstanding undergrads ranged from rising sophomores to rising seniors. Over the course of the six-week SUROP, the Fellows conducted a variety of research projects and participated in career building activities with the SUROP mentors. SUROP culminated in a public, virtual symposium on Friday, July 10, and the SUROP 2020 Abstract Volume, both of which can be viewed on the department webpage. ✨



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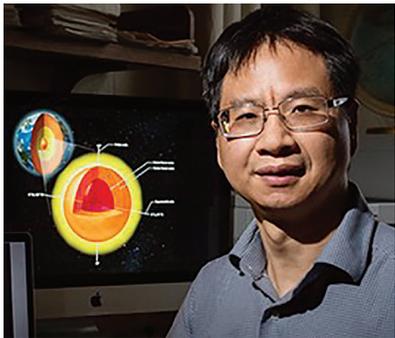
Quaternary Geology. These included a field site from our face-to-face field camp - Bell's Canyon on the Wasatch Front (interaction of glacial moraines, lake terraces and basin-range faulting). A second GIS project involved assessing the risk of landslides in Seattle. The geologic complexity of the virtual field areas became increasingly more complex as the weeks progressed; the final project involved a plunging anticline intruded by a pluton and the entire area cut by faults. Each project had a written component and involved group work.

Thirty-six students from nine universities were enrolled. Despite the inevitable issues with unstable internet connections and the long hours on Zoom, the course met its objectives. A top goal for field camp is enabling students to make their own observations of the real world, interpret those observations, and create maps and written reports to convey their interpretations. One student wrote in the course evaluations, "It's one thing to make interpretations but it's another to back them up with evidence. I do not think I was very good at this before this course. But this camp helped me build confidence in my own judgements and work." Another student wrote

about teamwork: "This camp helped me become a better team player and scientist overall. Working as part of a team is critical in any job. I think this class went above and beyond in teaching us how to utilize team members." Another goal was to help students grapple with the messy real world. One wrote that they learned about "being okay with uncertainty. It used to feel like there needed to be an answer for everything, now I know there only needs to be a reasonable interpretation that can be qualified with uncertainty." One student summed it all up, saying the course was effective in "connecting multiple courses I learned throughout college in usable skills."

Congratulations, WUFC 2020 instructors and students for succeeding with a big challenge in difficult times!!! ✨

PROF. XIAODONG SONG RETIRES



Professor Xiaodong Song, the department's internationally prominent seismologist, has moved to Beijing to take a prestigious Peking University Chair Professorship. Peking University is often ranked at the top of Chinese Universities and is one of the premier institutions of

higher education worldwide. Becoming a Chair Professor is a great honor. While the Department of Geology here at Illinois will miss him greatly, we wish him all the best and look forward to his continued association with Illinois as professor emeritus.

Song arrived at Illinois in 1999, after completing his PhD in the renowned geophysics program at Caltech and working as a Storke-Doherty Lecturer at Columbia University. He had already distinguished himself internationally by discovering, in carefully selected seismic records, evidence that the earth's inner core rotates at a slightly greater rate than the mantle and crust. Song says that this led to his favorite area of research over his 20 years at Illinois: "I started this line of research before joining the department, but in my tenure at Illinois we really nailed it by constant pursuit of this challenging issue. We have confirmed the temporal changes of the inner core and have established inner core hyper-rotation as the most likely interpretation. We are not there yet on the precise mode and speed of rotation, but I believe we are very close."

Song's research at Illinois also focused on East Asia imaging and tectonics. His group employed the cutting-edge "ambient noise"

technique, which, amazingly, extracts detailed information about the earth's interior from small seismic signals generated by various "noise" sources at all times. His group created the first model of ambient noise tomography of China and east Asia. They also proposed a uniform mechanism of lithospheric tearing to explain Tibetan deformation. Song says his success relied in part on careful strategic planning: "My shifting from deep earth studies to regional tectonics and back and forth allowed sustained innovation and funding. In fact, the research directions were mutually beneficial." The group also benefitted from international collaborations: "Deep earth studies require global sampling. The Asian tectonics studies wouldn't have been possible without the collaborations with many of my Chinese colleagues. My research also benefited from some excellent international students and visiting scholars."

The Song group has graduated a steady stream of PhD students who have gone on to a range of careers. Some have university faculty positions: Xinlei Sun at the Chinese Academy of Sciences; Chuntao Liang is at the Chengdu Institute of Technology; and Jiangtao Li at Wuhan University. Xuewei Bao, Tao Wang, and Yi Yang have post-doctoral positions at Zhejiang University, Nanjing University, and Peking University, respectively. Zhen "James" Xu is at Schlumberger in Houston.

In his new role at Peking University, Song is in the process of building a large research group with many more PhD students and postdocs than he had in his Illinois years. He is looking forward to more collaborative efforts with large team projects and international collaborations.

Song's work continues at Illinois with a graduate student co-advised by Steve Marshak on imaging the lithosphere of the central Mid-Continent and relating the results to cratonic evolution. ✨

GAME NIGHT AND PUMPKIN CARVING EVENTS



The 2019-2020 annual newsletter was published later than usual due to COVID-19. We will return to our normal schedule for the 2020-2021 annual newsletter.

FACULTY SPOTLIGHT Jenny Druhan



Assistant professor Jenny Druhan joined the Illinois geology faculty in 2015, after completing her PhD at Berkeley and a post-doctoral fellowship at Stanford. She is a hydrogeochemist who pursues a wide variety of topics ranging from weathering in soils to carbon sequestration. Her research

work involves computer modeling of chemical and microbial reactions that occur in water flowing through soils, aquifers, and other porous media. One major effort involves “Critical Zone Observatories,” field sites where multiple research groups study the many processes involving soils, weathering rock, water, and biology that ultimately sustain life on earth. She teaches the Introduction to Hydrogeology course, and graduate courses in aqueous geochemistry and contaminant fate and transport. Here is a description of Jenny’s research, in her own words.

What are your main interests in research?

My primary research emphasizes the balance between the pathways and rates that water flows through the subsurface, and how quickly geochemical reactions occur that impact the quality of that water. This basic relationship between timescales of transport and chemistry is a powerful lens through which we can understand the chemical composition of groundwater and rivers, the functioning of ecosystems and the potential for contamination. These principles have been around for a long time, but we are still learning to use them in new ways. For example, my group is always working to enhance the software packages we use to create computer models for these systems, including adding new types of chemical reactions, applying the models to new systems, and building experiments to test our results.

Tell us about your work with the Critical Zone Observatories.

I have been working across several of the U.S. and international Critical Zone Observatories with collaborators from UC-Berkeley, UT-Austin, and the Institut de Physique du Globe in Paris. Together, we are learning to use the unique signatures of stable isotope ratios to understand how water converts rock to soil, and how the solubilization of these materials sustains vegetation. In particular I’m working at the Eel River Critical Zone Observatory where we’ve installed a very unique new type of sampling system, sort of a mixture between a groundwater well and a soil water sampler, that lets us pull the water out of rocks above the water table. This has given us unprecedented insight into the hydrogeochemistry taking place at the active site of rock weathering. We are learning that the deep roots of mature trees in this forest are playing a much bigger role than we thought! They impact the cycling of water and reactive gases that facilitate geochemical reactions.

What laboratory methods and facilities play a role in your work?

In the Natural History Building, I maintain the hydrogeochemistry laboratory. Here, we have a suite of instrumentation, pumps, and samplers that allow us to build analogs of natural aquifers to study how flow rates and chemical reactions pace one another. We maintain equipment to measure the solute concentrations in water, the CO₂ in soil, and even maintain an oxygen-free chamber where we can design experiments analogous to those that occur deep underground where oxygen is unavailable. We also use a lot of instrumentation and resources across campus. Within NHB, we work in the third floor isotope geochemistry lab complex, and across campus we’ve been collaborating with the Beckman Institute to apply medical imaging techniques to study flow through porous media. ✨

More faculty, staff, and student awards!

Graduate student Mingfei Chen received an Outstanding Student Presentation Award at AGU.

Clinical associate professor Michael Stewart was selected to receive the Campus Award for Excellence in Undergraduate Teaching.

Lana Holben, administrative aide for the Department of Geology and SESE, was selected to receive the Chancellor’s Distinguished Staff Award, which recognizes civil service staff employees for exceptional accomplishments and service to the university.

Associate professor **Jess Conroy** received a Distinguished Promotion Award. She was one of only four individuals being promoted to associate professor who were selected by the Campus Committee on Promotion and Tenure for this award.

Associate professor Trish Gregg was named a Helen Corley Petit Scholar by the College of LAS. This is awarded annually to early career faculty with extraordinary records in research and teaching.

Professor Bruce Fouke was awarded the 2020 Whitman Fellowship at the Marine Biological Laboratory and the 2020 Yellowstone Superintendent’s International Award. ✨

UNDERGRADUATE STUDENT PROFILE **Marjie Cone**



Tell us a little bit about your research.

For the past three years I have been doing research with Dr. Max Christie on 3D geometric morphometrics of brachiopod fossils from the late Ordovician time period (that's roughly 440 million years ago!). We want to see how the morphologies (shapes) of the brachiopods from this time period change across an invasion event. With 3D geometric morphometrics we can use structure-from-motion methods to capture images of the brachiopod specimens to create models. This enables us to quantify the morphological changes

of these brachiopods through space and time. Our results have been exciting! They show that for the genus *Rafinesquina*, their shape becomes more similar to each other across a depth gradient after the invasion event. I am continuing this research with a different genus of brachiopod; *Cincinnatia*.

Why did you choose Illinois?

At first, I didn't think to look at Illinois for geology... I thought I needed to be out in Arizona or Utah to get a good undergraduate experience. However, when I visited Illinois there was something different. The resources, support, and opportunities to experience geology in the field at Illinois was a priority and I hadn't seen that with other schools. I chose Illinois because I found the ability to be involved with research, amazing field opportunities, and because this department is a family.

How has Illinois geology helped prepare you for your career goal?

Illinois geology has opened many doors and allowed me to network with so many people. I am especially grateful for Max Christie, who has helped me through classes, given me education outreach opportunities, and has been a phenomenal research advisor. The amazing support from all of the staff in the Department of Geology has helped me to stay excited and engaged in working towards my dream career of being a paleontologist. I also had the privilege to be a 2020 SUROP Fellow and work on a petrology project with Dr. Craig Lundstrom. All of these opportunities and constant support from Lana and Tom Johnson have prepared me for graduate school and a future career in the geosciences and I cannot wait to see where I will go next.

What was your favorite field trip and why?

My favorite field trip so far has been with professor Stewart's 208 class to Missouri where we went to the St. Francois Mountains! ✨

Give to the Department of Geology!

Your gifts to the department help support students, sustain excellence, and allow us to pursue new initiatives.

WAYS TO GIVE:

- 1) Visit <https://geology.illinois.edu> and navigate to the alumni page or the **Give Now** page.
- 2) **By Mail:** The newsletter does not have a reply envelope this year; please call us at **(217) 333-3540** if you would like us to send one to you. Please make gifts by check or money order payable to the **"University of Illinois Foundation."** Please also include a short note stating the designation of your gift (including fund number if possible).

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- 3) **By Phone:** Please call the LAS Office of Advancement at **(217) 333-7108**, and indicate that you wish to make a gift to the Department of Geology.



Around the Department



Alison Anders was included on the list of teachers ranked as excellent and was funded by NSF to continue work on critical zone science in the agricultural landscapes of the Midwest. She's been elected to the management board of the Geological Society of America's quaternary geology and geomorphology division and has been developing a new course on GIS for geology to be included in the new online MS program.

Jay Bass continues to work hard in the laboratory, as professor emeritus. He has two graduate students working to finish their PhD degrees in the coming year or two.

Jenny Druhan was included on the list of teachers ranked as excellent, she became a theme leader in a Department of Energy-funded Energy Frontier Research Center, and received funding for a new National Science Foundation Research Coordination Network. She gave invited talks at the annual V.M. Goldschmidt Conference, the AGU fall meeting, and multiple universities. Druhan and her research group published six articles in the 2019 calendar year and have thus far published another four in 2020. Graduate students Nicole Fernandez and Yuchen Liu completed their PhDs. Dr. Liu will be joining Dr. Kaiyu Guan's research team for a postdoc at UIUC. Dr. Fernandez will be starting as a tenure track assistant professor at Cornell University in the fall of 2020.

Bruce Fouke received a Yellowstone National Park career award, a Whitman Fellowship at the Woods Hole Marine Biological Laboratory, a Top 100 Award from Scientific Reports, and cover image awards from Nature Reviews Urology and Astrobiology. He continued to serve as director of the Roy J. Carver Biotechnology Center and secured funding to build a \$2.65 million microscopy-to-omics instrumentation facility. He spoke at 12 universities

and companies and provided four campus-wide events. He also contributed to COVID-19 response efforts to build testing centers. The Fouke Lab Group included Jessica Saw, a Mayo Clinic MD student, who completed her PhD and is now completing her residency. The lab published nine manuscripts, two book chapters, and seven meeting abstracts. Outreach included the National Academies of Science, the Coursera Emergence of Life MOOC, a Mayo Clinic Heritage Film documentary, the Osher Life Long Learning Institute, and coverage on NPR's People's Pharmacy.

Willy Guenther's group continues to work on projects in the western U.S. Cordillera, thermal history of the Great Unconformity, and zircon (U-Th)/He systematics. PhD students Oliva Thurston and Jenna Kaempfer are closing in on their first publications on these topics. Willy gave an invited lecture at Lehigh University as part of the Donnel Foster Hewett Lecture Series. He also received the 2020 Charles and Nancy Naeser Prize from the International Standing Committee on Thermochronology. Last July, Willy and his wife, Jess Conroy, welcomed their daughter, Louise Margaret Guenther, to the world.

Tom Johnson's research group has continued to develop new isotope ratio measurements to be applied to environmental applications and various other geochemical studies. Recent PhD recipient Naomi Wasserman worked to develop stable isotope variations in both tellurium and antimony as geochemical indicators. Work continues on developing chromium stable isotopes as indicators of chromium contamination sources and reduction reactions that render the contamination harmless.

Craig Lundstrom spent the spring 2019 semester on sabbatical at the Universidad de Chile in Santiago. During his stay, he published a paper in Journal of Geophysical Research which suggests igneous processes in the ocean crust continue to much lower temperatures than previously thought, implying an important role for mid ocean ridges in Earth's climate control. Back in Illinois now, Craig is kept busy with four (soon five) graduate students working on mantle to crust research.

Wendy Yang and her research group had a productive year, with 11 articles published and many more in the publication pipeline. In addition, her 2017 article describing a new conceptual model for controls on terrestrial methane dynamics was recognized as one of the top 20 downloaded papers in Global Biogeochemical Cycles in 2017-2018. Yang gave invited talks at the American Geophysical Union fall meeting, the Ecological Society of America annual meeting, and at other universities. She was also included on the list of teachers ranked as excellent for teaching Ecosystem Ecology. *

Join us for virtual Geology alumni events!

The department has conducted two virtual Geology alumni gatherings on Zoom, and plans to do a few more in the coming months. We advertise them via email, so if you have not received invitations, please contact the department at geology@illinois.edu to update your email address.

Alumni News

1950's

Jim McCollum (BS, '56) toured the newly renovated Natural History Building and introduced himself a while back. Recently he wrote, "I'm 85 and still taking college classes at Southern Arkansas University in my retirement. I was taking a course in oceanography this semester, taught by a geologist who is heading our oceanography program here at Southern Arkansas University. Interestingly, the first part of the course was basic geology!"

1960's

John Tubb (PhD, '63) has retired after 55 years as a geologist in the petroleum industry. He received a BS degree in geology (1959) from Southern Louisiana University (ULL), and an MS (1961) and PhD (1963) degree from this department. In June he received a Lifetime Membership Award from the Houston Geological Society (HGS). He is a past president of HGS and has previously received a Distinguished Service Award, Presidents Award and the Gerald Cooley Award, HGS's highest award.



Paul Fullagar (PhD, '63), professor emeritus at the University of North Carolina, Chapel Hill, got in touch to comment on our Zoom virtual tour of the new Natural History Building. He wrote, "Based on what I saw, and what I remember from about 60 years ago (1960-1963), you folks did a very nice job of retaining desirable characteristics of the old building."

Debbie Baldwin (BS, '69) also watched the video tour of the renovated/restored NHB. As one of the students who helped repaint the relief map of the Grand Canyon, Debbie was pleased to see that it is still on display in the Department of Geology. She has had a long career working for a number of coal, oil and gas, and environmental companies. In 2012 she retired from the Colorado Oil and Gas Conservation Commission, where she served as the environmental manager for 16 years. Since then Debbie has had the opportunity to work for a couple of Australian coal seam gas companies but intends *really* to retire this year.

1970's

Sharon Mosher (BS, '73; PhD, '78) has stepped down as dean of the Jackson School of Geosciences at UT Austin, after 11 years in that role. Sharon has been very active as a leader in the geoscience community. See her web site for a list of honors that is too long to repeat here, but the most recent one is the Marcus Milling Legendary Geoscientist Medal from the American Geoscience Institute. Congratulations, Sharon!

John Mitchler (BS, '78; MBA, '87) toured Natural History Building with his wife Kathy in February. John lives in the Denver area working for Wood, an international energy services company. He also coordinates international adventure travel as a side business. He is the author of "Hiking Colorado's Summits" and other travel guidebooks.

1980's

Tom Covington (BS, '82) got in touch to send his reminiscences about a few of the former geology faculty who have passed away recently. He wrote, "it wasn't a particularly harmonious group... but

by God they taught us, and taught us pretty well. Tom currently works for Exxon Mobil strategic planning in the Dallas area.

Jim Cobb (PhD, '81) has retired from the Kentucky Geological Survey. Jim spent 34 years at the Kentucky Geological Survey as geologist, assistant state geologist, director and state geologist. He recently sent us a copy of his book, "Big Green Circles in the Desert" about his first job in geology, finding water for the Kufrah-Sarir agricultural project in Libya.

Conrad Brooks (BS, '83) pursued a career outside geoscience, but he reports that he nevertheless has very fond memories of his time in the department, and has no doubt that the education and critical thinking skills were of great value during his career as a naval officer and, later, in law school and in his current work as an attorney. He enjoys exhausting his family with rock identification and explanations of formations during vacations in the west.

2000's

Matt Kirk (MS, '04) and **Qusheng Jin** (PhD, '03) are collaborating on an NSF-funded project that explores the interspecies electron transfer (IET) from iron reducing microbes to methanogens. The project combines laboratory experiments with numerical modeling to improve prediction of methane generation. Matt and Qusheng have been working together ever since they were graduate students mentored by Craig Bethke and Rob Sanford.

Amanda Raddatz Bopp (MS, '09) and **Charles Bopp** (PhD, '11) welcomed their second child, Colin, as a buddy for older brother Chase. Amanda is working at Oxy and Charles is with Shell, both in Houston. Congratulations Amanda and Charles!

2010's

Jenna Shelton (BS, '11) is an associate science center director (acting) with the USGS Eastern Energy Resources Science Center and the Eastern Mineral & Environmental Resources Science Center in Reston. She has been involved with projects aimed at enhancing methanogenesis in shale gas reservoirs and reuse and treatment of high-salinity produced waters.

Julia Waldsmith (BS, '11) has been with the National Oceanic & Atmospheric Administration as a NOAA corps ensign in Norfolk for about two years. The NOAA Commissioned Officer Corps (NOAA Corps) is one of the nation's eight uniformed services. Among other things, her ship, the Thomas Jefferson, does multibeam surveys of bathymetry. She is expecting to do remote sensing work as well.

Rebecca Alberts (BS, '13) is an enologist/assistant winemaker and laboratory manager at Fidelitas Wines in Richland, WA where she lives with **Nicholas Huggett** (BS, '12; MS, '15). Nicholas is an Isotope & Chemical Analysis Chemist at Pacific Northwest National Laboratory. They became engaged in January, 2020 and plan to be married June, 2021.

Ted Grimm (MS, '14) changed jobs again, and now has the title associate scientist, analytical research at 6K in the Boston Area. 6K develops plasma technology for high volume synthesis of nano-powders, micro-powders, and advanced coatings.

Armando Hermosillo (MS, '14) is currently a geologist with Arcadis, working out of the Dallas, Texas, office. He is happily married, currently living in Plano, Texas, and recently studied to take the Fundamentals of Geology exam.

Alumni News continued

Hanna Cohen (BS, '15) decided to pursue high school teaching! While working on her MS in geosciences, she was a teaching assistant and noticed her love for teaching. She moved back to Chicago and was hired as a geology and chemistry teacher at a charter school on the West Side of Chicago. She took a year off to complete her MA in Teaching at National Louis University for certification in teaching both science and special education! She did her student teaching at the high school she attended, and in the exact Earth science honors class that helped her make the decision to pursue geology at Illinois!

Sean Griffin (BS, '17) started a second bachelor's degree in computer science in May 2020 from the University of Colorado at Boulder while continuing to work full time at Citizen Energy. Sean is coming up on the one-year mark of adopting two shelter cats he simply adores.

Andrew Birkey (BS, '17) is in grad school, working with professor Heather Ford at the University of California, Riverside. In fall 2019, he advanced to PhD candidacy and participated in the recently finished CIELO Seismic Experiment in eastern Wyoming and western South Dakota, investigating the eastern margin of the Wyoming Craton.

Bailey Mosher (BS, '19) left his position with an environmental consulting firm in Indianapolis and has taken a new job as exploration geologist at Nevada Gold Mines.

John Luchok (BS, '18) reported that the startup company he

was working for in San Francisco went bankrupt. But he landed on his feet, doing similar work for Genpact, a technology consulting company in Atlanta. Even though he isn't strictly in geology these days, he gets out into the Appalachians frequently to do some recreational geology.

Quan Zhou (PhD, '18) started a new position as software engineer II at Granular, an agricultural software development company in San Francisco. We hear he is now a proud father!

Alex Bryk (MS, '18) has been, during his time conducting his PhD research at UC-Berkeley, a member of the Mars Science Laboratory science team, serving in two roles: first as a geomorphologist/sedimentologist/stratigrapher working on daily mission operations to acquire and interpret data collected by the Curiosity rover, and second as a campaign lead participating in the strategic planning and execution of Curiosity's scientific investigations.

Miguel Castillo (BS, '19) works as a volunteer at the Chicago Field Museum, where he is responsible for the research, cataloging and organization of fossil specimens. Recently he was allowed to conduct his own research, writing a series of comparative physical descriptions for non-mammalian synapsids from the Permian. Currently, working remotely, he has been assigned to inspect, modify, and merge 3D models of fossils. ✨

Remembering former professor and department head Jim Kirkpatrick



Photo credit: Harley J. Seeley

Prof. R. James Kirkpatrick (PhD, '72), former professor and head of the Department of Geology, passed away on January 7, 2020. Jim was well-known to many current and former members of the department, as he earned his PhD at Illinois and served the University for nearly 30 years as a faculty member, department head (nine years), R.E. Grim Professor of Geology, and executive associate dean of the College of LAS (10 years). He left to become dean of the College of Natural Sciences at Michigan State University and served in that role until 2017. He was highly respected as an administrator, and simultaneously maintained a remarkable level of activity in research.

Jim's research career began in igneous petrology, and he soon developed a very fruitful collaboration with professor Eric Oldfield in the Department of Chemistry here at Illinois, applying rapidly developing nuclear magnetic resonance (NMR) methods to explore the structure of silicate liquids quenched to glass. The NMR work eventually expanded to studies probing the ways that ions in water interact with minerals surfaces and the interlayer spaces of clay minerals. This work was then complemented by computer modeling to yield important new insights into the dynamics of the ions. Jim was an author on over 250 peer-reviewed publications.

He received several prestigious awards and honors for his research contributions, including: The 2015 Marilyn and Sturges W. Bailey Award, the highest honor of The Clay Minerals Society; The 2004 Dana Medal by the Mineralogical Society of America; The Brunauer Award for the best refereed paper on cements in 2000; and election as a Fellow of the Geological Society of America, the Mineralogical Society of America, the American Ceramic Society, and the American Association for the Advancement of Science.

Jim received the department's Alumni Achievement Award in 2017. He was a generous supporter of the department and remained well connected to many of us since his move to Michigan. He touched a very large number of department alumni, faculty, and friends, many of whom have expressed their sadness at his passing and their appreciation for his many contributions. ✨



Alumni Obituaries

Warren L. Taylor (MS, '45) died Oct. 5, 2019. After serving in the Navy during World War II and completing his bachelor's degree at Kansas State, he worked for Phillips Petroleum, then came to Illinois. After graduating, he joined El Paso Natural Gas Company in Jal, New Mexico, was soon named Rocky Mountain division manager and eventually served as the company's exploration manager.

Ruth Ellen Dettinger (BS, '49) died Sept. 18, 2019, in Madison, Wisconsin. She worked in both school and public libraries, and after retirement she enjoyed service with the local Good News Project and traveling with Elderhostel (Road Scholar).

Clyde Fisher (BS, '53) passed away Aug. 1, 2019. He grew up in the shadow of Wrigley Field. After graduating from the U of I, he went on to earn a PhD at Southern Illinois University. Clyde had a 21-year military career with the Army, including a tour in Vietnam and three tours to Germany. He served as a helicopter and airplane pilot, a tank commander, was assigned to the Pentagon, and retired as a lieutenant colonel.

Dick Howard (MS, '55) of Champaign died July 8, 2019. After graduating, Dick served in the U.S. Army for two years, worked for Phillips Petroleum briefly, then returned to work at the Illinois State Geological Survey in 1958. He served as head of the Oil and Gas Section from 1977 to 1984 and retired with emeritus status in 1992.

Ward S. Motts (PhD, '57) passed away in March 2020. He earned his bachelor's degree at Columbia and his MS from Minnesota in 1951. He worked for the Bureau of Reclamation and then the USGS in New Mexico, came to Illinois for his PhD, then returned to the USGS. He moved into academia and was eventually hired by UMASS Amherst. During his 34-year tenure there he pioneered the hydrogeology program, directly supervised 35 graduate theses, and brought in almost \$1.8 million in research grants.

James (Dee) Donithan (BS, '59) passed away Sept. 14, 2019. He served in the army during the Korean War, and after graduating from Illinois he worked in the oil and gas industry for a few years. In 1968 he moved his family to Las Vegas and worked for Lawrence Livermore Laboratory at the Nevada test site. In 1990, he joined Desert Research Institute (University of Nevada) as a geological engineer analyzing the effects of past nuclear testing on water.

Bruce F. Bohor (PhD, '59) died Nov. 17, 2019. After receiving his bachelor's degree from Beloit College and master's degree from Indiana, he earned his PhD at Illinois. He began his career at Conoco but returned to the Illinois State Survey in the Clay Mineral Section. He later moved to the USGS in Lakewood, Colorado, in the Coal Resources branch.

The department lost close friend **Paul Potter** (MS, statistics, '59) on July 4, 2020. Paul served in the U.S. Army in the Philippines during World War II. He earned his PhD at the University of Chicago and spent nine years with the ISGS. Though his UIUC degree was a master's degree in statistics, the department liked to claim him as a geology alumnus. He had a long academic career at the University of Cincinnati, retired in 1992 to teach in Brazil for seven years, and returned as a research professor in 2001. He was well known not only in North America but widely abroad, and was awarded AAPG's highest honor, the Sidney Powers Memorial Award.

Richard "Dick" Yund (PhD, '60) passed away May 17, 2020. Although he began life as a farm boy and his education started in a one-room schoolhouse, he went on to obtain his PhD at Illinois. After a post-doc at the Carnegie Institution in Washington, he joined the faculty at Brown University. At Brown he taught geology and mineralogy, trained graduate students and post-docs, and conducted research in mineral kinetics (publishing more than 70 peer-reviewed journal articles).

James D. Carl (PhD, '61) passed away April 10, 2020. Jim earned a bachelor's degree in geology in 1957 from Missouri School of Mines and got his master's and PhD at Illinois. Jim taught for five years in Normal before joining the geology faculty at SUNY Potsdam in 1968.

Andrew de Naray (BS, '65) died Jan. 3, 2020. Andy entered the U.S. Army in 1965 and served in the Medical Service Corps until 1977. He was a recipient of the Army Commendation Medal and the Viet Nam Service Medal with two Bronze Service Stars. He worked in the regional office of the Environmental Protection Agency in Chicago and later served the Department of Defense as an Environmental Planner. He loved to travel, and he was an avid, award-winning photographer who spent many weekends hiking and climbing in the mountains.

Andy Merritt (PhD, '68) died Nov. 2, 2019. He graduated from Earlham College and came to Illinois to pursue graduate work with Don Deere, who taught in both civil engineering and geology. He started his career working on large hydroelectric projects in chilly northern remote Labrador and in the tropical jungle rain forest in the northern Andes Mountains. He then joined Dr. Deere in Gainesville, Florida, to form a two-man international consulting firm in 1973. For the next 35 years dams and tunnels became his life. In 1981 he founded Andrew H. Merritt Inc. and continued to work for The World Bank, The Inter-American Development Bank, the Asian Development Bank, and numerous international contractors.

Steve Ruppel (BS, '69) passed away on Oct. 21, 2019. Steve was a senior research scientist at the Texas Bureau of Economic Geology at UT-Austin. He received his PhD from the University of Tennessee, Knoxville, in 1979, and joined the Bureau in 1981 where, until 2009, his research centered on Paleozoic carbonate systems. In 2009, he formed the Bureau's Mudrock Systems Research Laboratory as principal Investigator and program leader and conducted research in many North American mudrock systems. He wrote more than 170 papers and reports, and received numerous awards, including the 2010 Jackson School of Geosciences Outstanding Research Award. *



Steve Ruppel (BS, '69). Photo courtesy of University of Texas, Austin

Degrees and Student Awards

Estwing Award

Cameron Desilva

R. James Kirkpatrick Award for Outstanding Graduate Research in Geology

Allie Wyman

Harriet Wallace Outstanding Woman Graduate Student Award

Haley Cabaniss

Harriet Wallace Outstanding Woman Undergraduate Student Award

Jinyu Wang

Harriet Wallace Geology Graduate Student Service Award

Julia Cisneros

Harriet Wallace Geology Undergraduate Student Service Award

Katie Mandera

Outstanding Graduate Teaching Assistant Award

Nooreen Meghani

Nicole Murray

Outstanding Senior Award

Claire Williams

Morris Leighton Research Grants

Jack Albright

Karoline Bruckel

Zebin Cao

Ching Chang

Julia Cisneros

Robert Goldman

Jingtao Lai

Xiaobao Lin

Yaoyi Wang

Yi Yang

Yan Zhan

Jackson Geology Graduate Student Research Awards

Jack Albright

Haley Cabaniss

Mingfei Chen

Julia Cisneros

Michael DeLucia

Robert Goldman

Shaelynn Kaufman

Nicole Murray

Jeff Xiao

Diandian Peng

Winslow Research Grants

Jon Golla

Midwest Alumni Undergraduate Research Grants

Jack Brown

Marjie Cone

Cameron Desilva

Brooke Dykstra

Lily Tripp

Claire Williams

Sohl Award for Research

Shaelynn Kaufman

Nicole Murray

DEGREES CONFERRED IN 2019-2020

Bachelor of Science Degrees

August 2019

Alexandra A. DiMonte

Dani M. Keller

Monika L. O'Brien

Alex J. Schwarz

December 2019

Jake I. Bean

Jack D. Brown

Christopher E. Campe

Miguel A. Castillo

Ty D. Chong

Cyrus M. Fried

Nicole L. Nussel

May 2020

Katie M. Mandera

E. Charles Newman-Johnson

McKailey M. Sabaj

Nicole F. Tank

Master of Science Degrees

August 2019

Cecilia Cullen, "*Numerical Modeling of Groundwater-driven Stream Network Evolution in Low-relief Areas*"

Jia J. Wang, "*Linkages between Fluid Flow Paths, Reactive Gases, and Chemical Weathering across a Shale Bedrock Hillslope*"

May 2020

Nicole K. Murray, "*Holocene Guano Influences on Eutrophication and Lacustrine Ecology at Kettle Lake, North Dakota*"

Doctoral Degrees

May 2020

Haley E. Cabaniss, "*Volcanic Deformation as an Indicator of Mechanical Stability and Eruption Susceptibility*"

Nicole M. Fernandez-Franzan, "*Stable Isotope and Trace Element Fractionation and Implications for Chemical Weathering Rates*"

Yuchen Liu, "*Linking Soil Respiration to Hydrologic Conditions and Climate Change*"

Yi Yang, "*New Insights into the Differential Rotation of the Inner Core*" *

Faculty and staff directory 2019-2020

Stephen Altaner (associate professor and associate head)

Alison Anders (associate professor)

Jim Best (Jack and Richard Threet Professor)

Jessica Conroy (assistant professor)

Jennifer Druhan (assistant professor)

Bruce Fouke (professor)

Patricia Gregg (assistant professor)

William Guenther (assistant professor)

Feng Sheng Hu (Ralph E. Grim Professor of Geology and former dean, LAS)

Tom Johnson (professor and head)

Lijun Liu (associate professor)

Craig Lundstrom (professor)

Gary Parker (W. Hilton Johnson Professor)

Cristian Proistosescu (assistant professor)

Xiaodong Song (professor)

Gillen Wood (professor)

Wendy Yang (associate professor)

Specialized Faculty

Max Christie (lecturer)

Ann Long (teaching lab specialist)

J. Cory Pettijohn (teaching assistant professor)

Rob Sanford (research associate professor)

Michael Stewart (clinical associate professor)

Jonathan Tomkin (research associate professor & associate director, School of Earth, Society, and Environment)

Affiliate Faculty

Stanley Ambrose (professor, anthropology)

Leonardo Chamorro (associate professor, mechanical science and engineering)

Marcelo Garcia (Yeh Endowed Chair, civil and environmental engineering)

Scott Olson (professor, civil and environmental engineering)

Surangi Punyasena (associate professor, plant biology)

Bruce Rhoads (professor, geography)

Adjunct Faculty

Ercan Alp

Kurtis Burmeister

Todd Cole

Brandon Curry

David Grimley

Sam Heads

Dennis Kolata

Hannes E. Leetaru

Andrew Phillips

George Roadcap

William Shilts

Wolfgang Sturhahn

Scott Wilkerson

Emeritus Faculty

Thomas F. Anderson

Jay Bass

Craig Bethke

Daniel B. Blake

Chu-Yung Chen

Wang-Ping Chen

Donald L. Graf

Steve Marshak

Alberto Nieto

Sue Kieffer

Department Support Staff

Lana Holben (assistant to head)

Chandré Johnson (office support associate) *

Teachers Listed as Excellent

Fall 2019

Alison Anders - 401

* Ching Chang - TA 107

Mingfei Chen - TA 143

* Max Christie - 143, 208

Jenny Druhan - 470

* Mahta Gholizadeh Ansari - TA 107

Ann Long - lab instructor 107

* Nooreen Meghani - TA 401

* Nicole Murray - TA 208

Michael Stewart - 432, 460

Spring 2020

* Daniel Abrams - 572

* Steve Altaner - 333, 380

Jim Best - 440

Chris Campe - TA 380

* Max Christie - 118, 440

Mike DeLucia - TA 411

Mahta Gholizadeh Ansari - TA 107

Willy Guenther - 411

Jingtao Lai - TA 107

Craig Lundstrom - 415

Rob Sanford - 591

Xiaodong Song - 593

Michael Stewart - 415

Yi Yang - TA 333

Summer 2020

Steve Altaner - 118

Cory Pettijohn - 117 *

T.A. - Teaching assistant

**The instructor ratings were outstanding*

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Mr. Eric P. Sprouls and Mrs. Linda S. Sprouls
Mr. Carl K. Steffensen and Mrs. Frances Steffensen
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2019-2020 Colloquium Speakers

September 5 “The Race to the Bottom: Lessons from 150 years of data collection and analysis of the Cambrian-Ordovician Aquifer System” Daniel Abrams, Illinois State Water Survey

September 13 *The Richard Hay Lecture* “Characterizing Geohazards with InSAR and Geophysical Modeling” Zhong Lu, Southern Methodist University

September 19 *The Jack Threet Lecture*: “Tectonics, Sedimentary Systems & Biodiversity in Amazonia in the Cenozoic: A Sedimentary Record Perspective” Renato Almeida, University of Sao Paulo

October 3 “What Research Tells Us About Effective Teaching (and Learning) Strategies That We (and Our Students) Will Actually Use” David McConnell, North Carolina State University

October 10 *Presentation of the Department of Geology 2019 Alumni Achievement Award* “Sixty Years in the Oil Patch” Dr. Jim Baroffio

October 24 “Reconstructing past Earth and Planetary Surface Environments with Cosmogenic Noble Gases” Marissa Tremblay, Purdue University

October 31 “Testing UV-B Radiation as a Proposed Driver of the End-Permian Mass Extinction” Cynthia Looy, UC-Berkeley

November 7 *Annual Phillips Lecture in Paleoscience* “Paleoecology, Conservation, and the Future” Cathy Whitlock, Montana State University

November 14 “Slips of glaciers over rock and sediment beds” Neal Iverson, Iowa State University

November 21 *The R. James Kirkpatrick Lecture* “Superhydrous magmas at subduction zones” Mike Krawczynski, Washington University in St. Louis

January 23 “Balancing Curiosity-Driven Research with Convergent Research at NSF-What it takes to Understand and Predict the Earth System” Dr. Bill Easterling, National Science Foundation

January 30 “New Insights into North America’s Midcontinent Rift” Carol Stein, University of Illinois Chicago

February 6 *Buckley Lecture in Environmental Geoscience* “Is subsurface plumbing responding to climate and land use changes in the Anthropocene and does it matter?” Pam Sullivan, Oregon State University

February 20 “Journey to the tallest mountains and deepest interior of the Earth” Xiaodong Song, University of Illinois Urbana-Champaign

February 27 *Kirkpatrick Lecture* “Tracking the magmatic-hydrothermal transition in magma reservoirs: From Yellowstone zircons to Namibian pegmatites” Juliana Troch, ETH Zurich and Brown University

March 5 “Leveraging Climate Research & Outreach to Improve Resiliency to Extreme Events” Trent Ford, Illinois State Climatologist

March 26 “What is happening with the world’s glacial lakes?” Dan Shugar - University of Calgary

April 2 “Composition and evolution of cratonic lithosphere: Knowns and unknowns” Lijun Liu, University of Illinois Urbana-Champaign

April 9 “The Conquest of the Wilderness and the Historic Origins of Geology Culture” Stephen K. Boss, University of Arkansas

April 16 “Imaging the reactive transport properties of shales across scale” Jenny Druhan, University of Illinois Urbana-Champaign

April 23 “Cambodia’s Great Lake the Tonlé Sap: evolution and current anthropogenic stresses in the Mekong River Basin” James Best, University of Illinois Urbana-Champaign

April 30 “The most important substance on Earth” Craig Lundstrom, University of Illinois Urbana-Champaign *