



# Glacial Deposits

**Volume 43**  
 November 2018



**Greetings from the Department**

## A Message from the Chair



Greetings from Geography and Geology Redbirds! I hope this message finds you in good health and spirit. This year was another outstanding year for us. Dr. David Malone was named Distinguished Professor and Eric W. Peterson University Professor, the two highest forms of recognition for scholarly, teaching, and professional service accomplishments that can be bestowed on a faculty member at Illinois State University. Dr. Lisa Tranel received tenure and was promoted to Associate Professor of Geology. In August, we welcomed Dr. Alec Foster as our new Geography faculty member and the first faculty member dedicated to the new Environmental major program. Mr. Jack Wang joined us this summer as the new coordinator of the Laboratory for Environmental Analysis (LEA). Joseph Syzdek, a geology major, received the highest student honor from Illinois State for his academic and personal accomplishments when he was named one of 2018's Bone Student Scholars.

We are also proud to recognize Glenn (Skip) Zwanzig, Jr., (MS Geography 1980 and 2017 Distinguished Geography Alum) and Jamie Esler (BS ESSE 2007), both of whom were named Teacher of the Year in their home states, Kentucky in 2002 for Glenn and Idaho in 2014 for Jamie. The Department continues its mission to provide individualized student attention through faculty-led research activities. We are proud to feature here our recently dedicated LEA. LEA is quickly gaining stature in and outside our Department offering important research and outreach partnerships as well as applied training in laboratory science to our students from across the campus. Its presence is helping diversify our geology and environmental offerings and student body in multitude of important ways.

I am thrilled to report that the Illinois Board of Higher Education approved our application to offer a new major program called Environmental Systems Science and Sustainability (ESSS) beginning fall 2019. Given our collective talent in the environmental arena, it is no surprise that this multi-disciplinary program will be housed in our Department. Its diverse curriculum incorporates faculty expertise from multiple disciplines on campus including geography, geology, biological sciences, philosophy, political science, sociology, and economics.

I invite you to leaf through this volume of *Glacial Deposits* and read more about these and other faculty, student, and alumni activities and accomplishments over the past year. I am sure you will appreciate the importance of the valuable support that we continue to receive from generous donors and friends like yourself. Your willingness to share your time, expertise, experiences, and monies, means the world to us. These gifts shape our successes and continue to help propel us to new directions and heights of excellence.

*Dagmar Budikova*

Dagmar Budikova, Chair



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# Geography Club Grows

By: Kasey Mitzit



Geography Club members in Tennessee.

Over the last two semesters, Geography Club has been more active than ever. After our former president, Brook Schumacher, built such an excellent foundation for the club, I was determined to keep that momentum going. In order to do so, I focused on creating and executing goals that would continue developing the club and inspiring new Geographers. Our main objectives were to continue and improve our previous traditions, recruit new club members, and create new traditions for Geography Club.

One of my favorite traditions in Geography Club is Geography Games, an activity where students get to compete in Geography related games against their professors. It's a really great way for students to get to know their teachers and form stronger bonds with their peers, so we were sure to continue this activity this year as well. Another activity we participated in this year was our annual Geography-Geology bowling competition, where we got to know the other students in our department a little better.

Additionally, Geography Club was able to go on another club sponsored field trip this year! After our weekend trip to Shawnee National Forest last year, we were determined to improve our trip this year by making it a full week of fun. We all had a blast on this trip, and if you'd like to read more about our experience, I suggest checking out the article about it from our future Geography Club board member, Yael Uziel, on page 4.

Another focus we had this year was recruiting new club members and Geography majors. In order to do this, we participated in many club recruitment events such as Festival ISU and Winterfest ISU. We also ran a booth at the Pre-Veterinarian club's Earth ay event at

the Horticulture Center. We also had a lot of help from our outreach coordinator, Megan Maher, to organize a new video about the Geography major for our website. After participating in all of these events, we have at least doubled the amount of club members we had last year, and we are very excited to see where the club will grow from here.

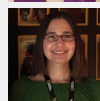
Our final goal for this year was to create new traditions for the club, and I think this is where we had our most success. First, we made a point to begin fundraising in a way that would help get out the word about Geography Club at ISU. To do this we hosted a GIS workshop, ran bake sales on the quad, and continued promoting our Papa John's pizza coupon to raise money that help raise money for club activities and our end of year trip. Next, we started to reach out and form connections within our community. We did this by coordinating local volunteering opportunities (which you can read about on page 10 written by Madison Myers) and by attending activities hosted by Illinois Central College. In addition, we also started to plan group activities here at ISU such as local hiking/camping and club potlucks. Overall, I am extremely happy with all of the new traditions we have started within Geography Club.

Having the honor of being president of Geography Club this year is something I take deep pride in. Not only did we accomplish our goals, but we also went above and beyond our expectations in so many ways. I believe that the future of Geography Club is in great hands and I am certain that our members will keep our current momentum going into next year. Thank you to everyone who has helped make our club and Department such a special place to be.

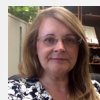
## Current Faculty



**Dr. Tenley Banik**  
Assistant Professor of Geology;  
Petrology, Volcanology, Geochemistry



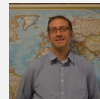
**Dr. Amy Bloom**  
Instructional Assistant Professor of  
Geography;  
IGA Co-Coordinator



**Dr. Dagmar Budikova**  
Professor of Geography & Chair,  
Climatology, GIS



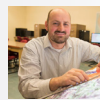
**Dr. James Day**  
Professor of Geology;  
Paleontology, Paleoecology,  
Paleogeography



**Dr. Alec Foster**  
Assistant Professor of Geography;  
Urban Environmental Change, Urban  
Sustainability, Environmental Justice



**Dr. Matt Himley**  
Associate Professor of Geography;  
Nature-Society, Political Ecology,  
Latin America



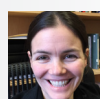
**Dr. John Kostelnick**  
Professor of Geography; GIScience,  
Cartography, GEOMAP  
Director, IGA Coordinator



**Dr. David Malone**  
Distinguished Professor of Geology;  
Structure, Stratigraphy, 3-D  
Mapping



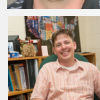
**Dr. Catherine O'Reilly**  
Associate Professor of Geology;  
Biogeochemistry, Water Quality,  
Hydrogeology



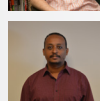
**Dr. Reecia Orzeck**  
Assistant Professor of Geography;  
Political Economy, Historical and  
Social Geography, Middle East



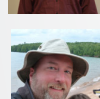
**Dr. Eric Peterson**  
University Professor of Geology;  
Hydrogeology, Karst Hydrology



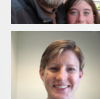
**Dr. RJ Rowley**  
Associate Professor of Geography;  
Sense of Place, Cultural Geography,  
Internship Coordinator



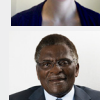
**Dr. Wondwosen Seyoum**  
Assistant Professor of Geology;  
Hydrogeology, Remote Sensing,  
Hydrologic Modeling



**Dr. Jonathan Thayne**  
Associate Professor of Geography;  
Landscape Ecosystem Function  
Modeling, Remote Sensing, Latin  
America



**Dr. Lisa Tranel**  
Associate Professor of Geology;  
Geomorphology, GIS Applications



**Dr. Henry Zintambila**  
Assistant Professor of Geography;  
Precipitation Geochemistry,  
Climatology, Africa



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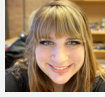
# Current Staff



**Karen Dunton**  
Administrative Clerk



**Barbara Fiest**  
Civil Service Extra Help



**Megan Maher**  
Assistant Director of GEOMAP,  
Public Outreach Coordinator, GIS  
Technician



**Paul Meister**  
Coordinator of Academic Services in  
Geology, GEO 102 Instructor



**Jill Thomas**  
Geography Advisor, Teacher  
Education Specialist, Geography  
Lecturer



**Mujen (Jack) Wang**  
LEA Laboratory Coordinator



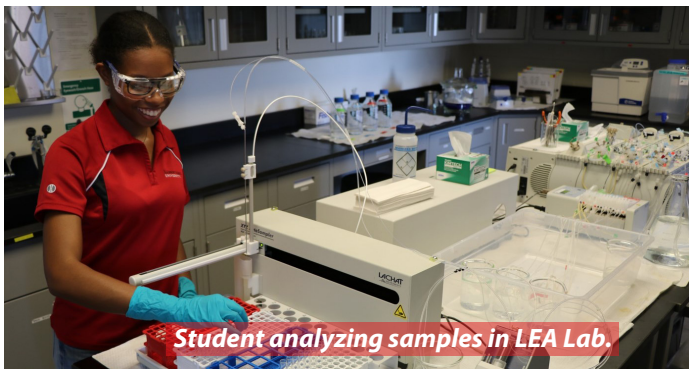
*Student testing water samples in LEA Lab.*

# LEA moves to Felmley Hall By: Mujen (Jack) Wang

In 2017, Illinois State University's Laboratory for Environmental Analyses (LEA) opened its doors for the first time in its new location at Felmley Science Annex. Directors Bill Perry (professor of Biological Sciences) and Catherine O'Reilly (associate professor of Geology) manage the lab while Research Coordinator Jack Wang oversees the lab's day to day activities. The laboratory serves as a valuable asset to the University and its community by providing soil and water quality analyses in support of various research efforts. It also offers valuable co-curricular opportunities for undergraduate and graduate students from our Department and across our campus; students gain valuable experiences in a laboratory environment and related skills that they can bring to a future career. LEA is also proud of its association and recruitment efforts from the ISU chapter of Louis Stokes Alliances for Minority Participation (LSAMP) program to promote STEM opportunities for underrepresented minority student populations.

measures anion concentration in surface water/groundwater samples and a spectrophotometer that performs colorimetric analysis of selected water samples. LEA is also currently in the process of acquiring a Scanning Electron Microscope (SEM), which will be used to scan solid state samples and give researchers high resolution digital images of the sample surface and provide insight into its morphological and compositional make-ups.

LEA operations are supported by funds generated through a multitude of grant and contracts; thus far LEA has garnered over \$2.5 million through research and important outreach partnerships with the Illinois Environmental Protection Agency, the City of Bloomington, Illinois Corn Growers, Illinois Nutrient Research and Education Council, the Nature Conservancy, and Purdue University. Most recently, the lab has been monitoring the effects of agricultural runoff in the streams entering Evergreen Lake and Lake Bloomington.



*Student analyzing samples in LEA Lab.*

The research conducted at LEA is enhanced by the state of the art instruments used in the lab. One such instrument is the Flow Injection Analyzer (FIA), which automates the analysis of water quality and soil nutrient samples four times the speed as the same tests done by hand. The FIA instrument is also capable of performing multiple nutrient quality analyses simultaneously for one selected sample. In addition to the FIA, LEA also houses an Ion Chromatograph (IC) that



*Students analyzing samples together in LEA Lab.*



# An End of the Year Adventure

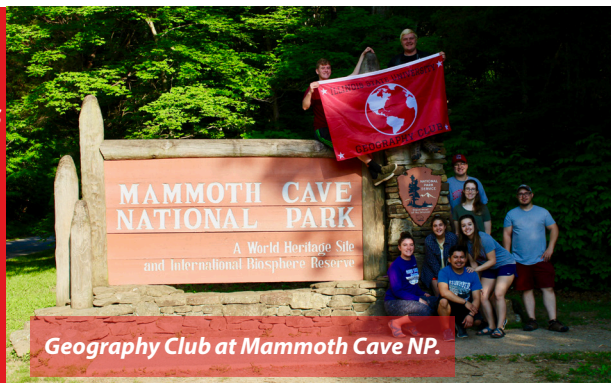
By: Yael Uziel

Eight geography students, an incoming student, and their Geography Club advisor went on an end of the year adventure hitting national parks, the world's largest cave system, and the lively city of Nashville.

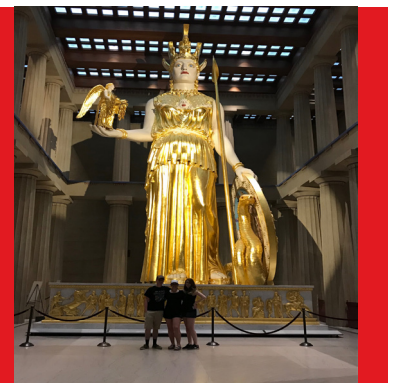
This trip came as a reward to the students for putting in hard work into funding their final hoorah with some students who had just graduated the night before. During this trip, students camped for two nights in Mammoth Cave National Park, staying three nights in a beautiful cabin in The Great Smoky Mountains, and two nights sightseeing in Nashville. The trip was exciting and adventurous. Spending the first two nights camping quickly bonded the group as they went on a range of guided cave tours, seeing the natural formation formed by years and years of water erosion and limestone sedimentation, and explored the trails above the cave. Students

area and listening to all the live music. While enjoying the amazing city, students also enjoyed seeing famous sites like The Parthenon, Music Row, historic sit-in locations, and much more. Some were even brought to tears by the capital building where women first received the right to vote. The goal of this trip was to experience both cultural and physical geography and celebrate the school year that had just passed, but it comes as no surprise that students experienced a whole lot more than that. As days pass students are consistently saying they wish they could go back to this great adventure and students who were not on this year's trip are already coming up with ideas for next year and planning future fundraising activities. This trip bonded students within the department, aided in their learning about the vastness of Geography, and most of all reminded every student how

*"I cannot express how grateful I am to have participated in this trip and how proud I am of our members who made it possible. I love Geography Club and I am so thankful to be a part of it".*  
~Kasey Mitzit



Geography Club at Mammoth Cave NP.



found a site to go swimming in the river that runs throughout the park, got to see the breath taking natural entrance of the park, learn the cave's ecological and cultural history, and experience the varying formations and levels formed throughout this vast cave system. As if these sites were not beautiful and breathtaking enough students, with their advisor, then began their journey down to The Great Smoky Mountains National Park. After a couple days of camping students felt lucky to be sleeping in a beautiful cabin. Three days of hiking different paths within in the Smokies led to the students falling in love with this national landscape. Students hiked through waterfalls, historic Native American sites, and the beautiful forest that the Smokies offers. The students were excited to go to the highest point in Tennessee, Clingmans Dome, and to set foot on the Appalachian Trail. As the trip continued students were thrilled to check activities and places off their bucket list. Some of these included Gatlinburg, Ripley's Aquarium of the Smokies, eating at southern barbeque joints, and much more. The final days were spent in the energetic city of Nashville. Students enjoyed the Nashville nightlife by eating at famous restaurants in the

lucky we are to be ISU Geography Majors. This year's President of Geography Club and trip participant, Kasey Mitzit, reflected "I cannot



express how grateful I am to have participated in this trip and how proud I am of our members who made it possible. I love Geography Club and I am so thankful to be a part of it". This trip went so amazingly well and could not have been done without the

generous support of the department's funding, the hard work of the Geography Club board, and our advisor Megan Maher.

# Geology Student, Joseph Syzdek, Named a Robert G. Bone Scholar

By: Joseph Syzdek



Joseph Syzdek holding his Bone Scholar award.

I joined the Geology major in my 4th semester at Illinois State University. I was searching for my passion and that is exactly what I have found. The Geology major has given me a rewarding college career through the challenging classes and the adventure of going out into the field. I have trekked over 250 miles in Yellowstone National Park, completed Field Camp in Wyoming and South Dakota, and have gone on numerous field trips to New Mexico, Texas, Missouri, Iowa, and Wisconsin. Joining the major has opened many doors for me. For example, I work with various professors on research. I look forward to these opportunities every morning when I wake.

I am currently working with Dr. Jed Day in the Paleontology Lab as well as in the Laboratory for Environmental Analysis. Working for Dr. Day has given me insight into the wonderful world of microfossils (e.g., conodonts) and the information that they offer us about the evolution of earth's history. I have also gained valuable knowledge through chemical runoff research while working with the Laboratory for Environmental Analysis. We are testing the levels of nitrate and phosphorous runoff into local streams from the fertilization of the farm fields and working on ways of lowering such levels. I am also involved with Dr. David Malone with my individual research project that focuses on provenance reconstruction of the Jurassic time in present day Wyoming. I am preparing to present my findings at the annual GSA meeting in November and aspire to publish them in the Rocky Mountain Journal of Geology.

Being named a Robert G. Bone Scholar is one of my highest achievements and has shown me that I can do great things if I put my mind to it. I have so many people to thank for helping me get to where I am today, but joining the geology family at ISU has been the greatest decision I have ever made. Thank you.

## Welcome to the Department!



### Dr. Alec Foster

Alec joins the faculty as Assistant Professor of Geography. He holds an M.A. (2010) in Geography from the University of South Florida and a Ph.D. (2016) in Geography and Urban Studies from Temple University. Most recently, he was a Postdoctoral Research Fellow in the School for Environment and Sustainability at the University of Michigan. Alec's research interests include urban environmental change, urban sustainability, and environmental justice. Alec will teach classes in human and environmental geography.



### Mujen (Jack) Wang

Jack graduated from University of Maryland, College Park in 2013 with a B.S. in Natural Resource Management. He started working for the department in June 2018 as the Coordinator of Laboratory for Environmental Analysis (LEA). The LEA lab provide services to both University and external clients on water quality and soil nutrient analysis. Jack ensures the timely and quality controlled analysis of samples from clients and assists graduate and undergraduate students who utilize LEA lab instruments for their thesis or research. Prior to coming to Illinois State, Jack worked for the Northern Plains Agricultural Research Laboratory of USDA-ARS in Eastern Montana as a Physical Science Technician doing research in sustainable agricultural production in Irrigated Cropping Systems.

# Faculty Spotlight

*In this section, we would like to shine a spotlight on the accomplishments, research, and publications of a few of the Department's faculty members. This year's spotlight is on ...*

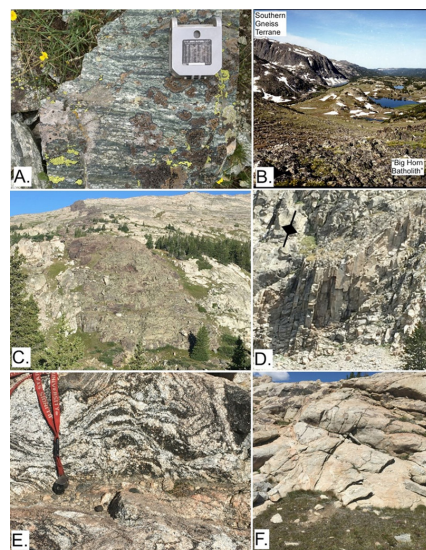


## Dr. Dave Malone

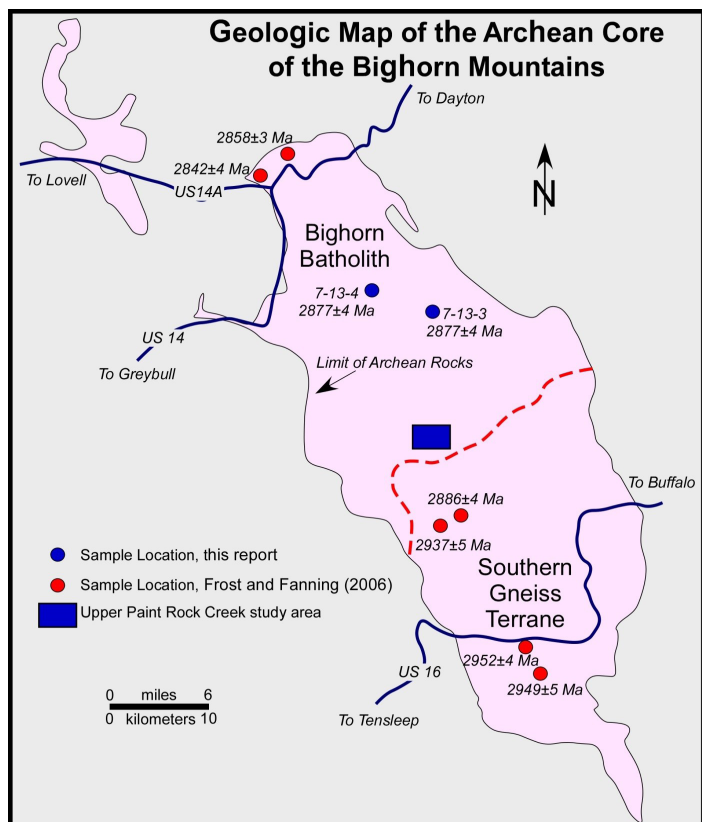
### New Research Reveals Revised Interpretations for Field Camp Teaching Localities

One of the developments from Field Camp that I am pleased to report that we have invested significant monies, including the \$10,000 associated with last year's Geological Society of America/ExxonMobil FieldCampExcellenceAward, in gaining a better scientific understanding of the places we visit at field camp through student-based research projects. Many of you will remember me telling you that the Archean core of the Bighorn Mountains has a great many these "crying to

be done." At field camp 2016, one of our students asked me an embarrassing question: "Why haven't you done any research yourself there?". An excellent question to be sure. I had no answer, and thus compelled me to lead by example and follow my erstwhile advice to get better every day. Later that summer after the snowpack waned and the quality of fishing increased, I returned to headwaters of Paint Rock Creek and began mapping. This area, although remote, seemed to be the critical place to start as the statewide geologic map listed a contact between an undeformed batholith to the north and a complexly deformed gneiss terrane to the south. After two summers of research, we just submitted manuscript for review



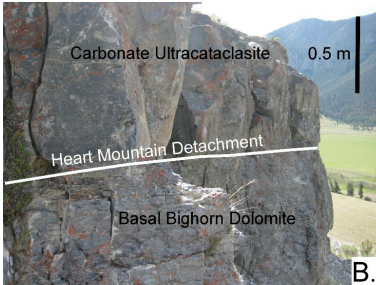
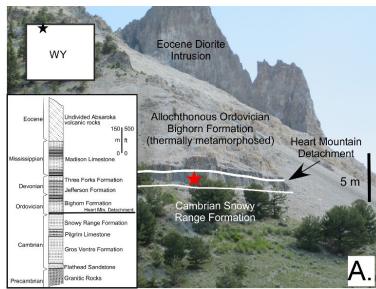
**Photo mosaic of field relations near Geneva Pass. A. Mylonite at the west end of Rainbow Lake. B. Lineament within the Bighorn Batholith along Paint Rock Creek and Cliff Lake. C. Amphibolite dike exposed west of Robin Lake. D. Gneiss south of Cliff Lake with steeply inclined fabric. E. Migmatite exposed south of Robin Lake. F. Massive granodiorite exposed north of Shepherd Lake.**



**Generalized geologic map of the Archean core of the Bighorn Mountains. The area in pink indicates exposures of Archean rocks. Grey areas are Paleozoic-Tertiary strata, undivided. The study areas for this project are indicated in blue. The sampling localities of Frost and Fanning are indicated in red. The red dashed line indicates the terrane boundary between the Bighorn Batholith and the Southern Gneiss terrane, proposed by Love and Christianson (1985). Map is modified from Love and Christianson (1985).**

that includes a detailed geologic map of a ~15 km<sup>2</sup> area in the Cloud Peak Wilderness and 14 new U-Pb ages (~340 single zircons analyzed total) for rocks present along the southern margin of the Bighorn Batholith.

The rocks here range from strongly foliated to massive but are difficult to subdivide into mappable units in the field because of their lithologic and structural similarities. Several mylonite zones (<10-meter-wide) that trend ~N70°E and dip steeply are present in the study area. Three distinct age populations are evident: ~2935 Ma, 2905 Ma, and 2880 Ma. Five samples contain xenocrystic zircons >3000 Ma, ranging to 3500 Ma, which indicates assimilation of older crust. Each of the three age



**White Mountain in Sunlight Basin, which is the epicenter of the Heart Mountain Slide.**

populations reported here are older than the previously reported age of ~2850 Ma age for the northern Bighorn Batholith. Our new ages align better with 2890 Ma, 2940 Ma, and 2950 Ma reported for the southern gneiss terrane. Three conclusions can be drawn from these data. First, the Bighorn Batholith, at least along the southern margin, contains phases at least 80 million years older than the northern phase of the body, and emplacement was protracted and occurred over a ~100 Ma period. Second, episodes of both intrusion and shearing took place in this area as the Bighorn Batholith was emplaced. Thus the concept

that the Bighorn Batholith is undeformed is overstated. The existence of inherited zircons within the Bighorn Batholith in the age range of ~3.0 Ga to 3.5 Ga indicates that the Bighorn Batholith intruded through older crust.

Another discovery that we made pertains to our old friend the Granite

Mafic Dike (AKA the serpentinized harzburgite intrusion that occurs in the Steerhead mapping project. We managed to separate some zircons from this rock, and now have an age of 2919 Ma. We also have conducted a paleomagnetic analysis of this rock, which has revealed rotation during the Laramide Orogeny, and crystallization at a polar latitude.

Finally, the Heart Mountain problem is solved, yet again. Since 1991, when I began my Heart Mountain Research, I have contributed 25 peer reviewed papers. My work there is complete. My mind is no longer fertile with ideas as to where to take this research next. It is time for someone else to take it to the next level. Through the results of my efforts, we now understand that the Heart Mountain slide was catastrophic, with the upper plate traveling as fast as 100 m/sec, and involved a complex combination of slide and flow. The event occurred at 49.19 Ma, and was triggered by the eruption of a kimberlite diatreme. The upper plate, which prior to collapse included an area of 1200 km<sup>2</sup>, initially covered an area of more than 5000 km<sup>2</sup> and included an a volume of more than 100 km<sup>3</sup>. Major stream systems, which headed in the Sevier Highlands several 100 km to the west developed a paleotopography in the Absaroka Range with significant relief that created the gravitational instability that led to the collapse. The mechanism of emplacement on to this Eocene land surface remains poorly constrained. Our final paper on Heart Mountain is: Malone, D.H., Craddock, J.P., Schmitz, M.D., Kenderes, S., Kraushaar, B., Murphy, C.J., Nielson, S., and Mitchell, T.M., 2017, Volcanic initiation of the Eocene Heart Mountain slide, Wyoming, USA: Journal of Geology, v. 125, p. 439-457.

# Powell Items Return Home By: Paul Meister

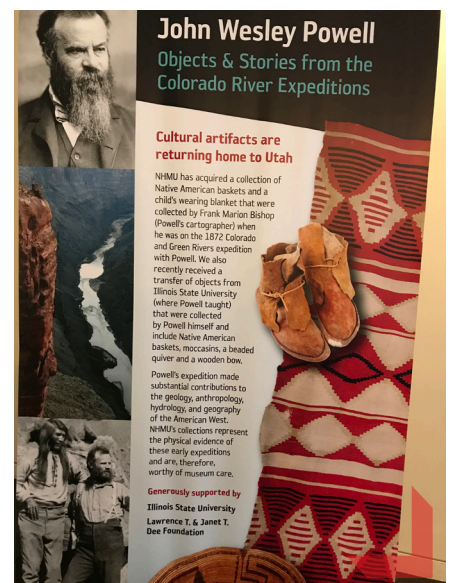


John Wesley Powell, perhaps the most famous face associated with Illinois State Geology, was an exceptional explorer, scientist, and ethnologist. During many of his expeditions exploring the West, Powell would trade for and collect Native American artifacts. Many times, he would bring large amounts of

items back to Illinois to display in the Museum of the Illinois Natural History Society of which he was named curator in 1867 and remained until 1872 when he resigned from both the museum and the University. Upon Powell's resignation, many items remained on display until the museum at the Illinois State University closed in the late 1980s. At that time, many of the collections were transferred elsewhere in the state while a small collection remained in the department's possession, some of which was put on display in Williams Hall until the early 1990s. At that time, the current Resource Center in Felmley Hall was established with Powell items placed on display and some being housed in a departmental closet.

Call it fate, luck or perhaps sheer happenstance that Dr. Marjorie Chan was invited to do a colloquium at Illinois State University on Powell's birthday (March 24th) 2017. During her visit, she mentioned to Dr. David Malone that she was interested in Native American culture. Dr. Malone proceeded to show her the items that were on display in the

Felmley Hall 203 as well as the items in the closet. The items stored in the closet included leather moccasins, several baskets, and even a bow that was still strung! Upon viewing the items, Dr. Chan noted that they may be from the Ute tribes and recommended we repatriate the items to the Utah Natural History Museum (UNH). After several conversations with the curators of the UNH, the items were repatriated with the stipulation that they be properly curated as well as utilized for research. UNH has already discovered that one of the baskets was used to harvest wild sunflowers as seeds were found within the baskets threads! The Utah Natural History museum held a public showing of the items on September 22nd that included talks by several Powell experts as well as a talk by Dr. Malone concerning Powell's impact on Geology as a science. The showing was a great success with several hundred people in attendance and further showings of the items are planned for November 21st and 22nd.



# Students' Poster Wins First Place at ILGISA

By: Yael Uziel



*Emily Eichholzer and Bradley Brewer standing next to their poster at the 2017 ILGISA Conference.*

In the spring of 2017 a group of fourteen students, including myself, and Dr. Kostelnick spent the semester and our spring break researching Chicago's green spaces. I spent my semester focusing on rooftop gardens in the city. Rooftop gardens are green spaces on the topmost level of urban structures, which create an environment suitable for growing plants. These green roofs can provide space for public recreation, food production, energy efficiency, heat island relief, storm water management, as well as simply provide beauty and visual aesthetic. According to WindyCity Chicago, up to 7 million square feet on around 500 rooftops are recognized as green spaces. In 2004, Chicago implemented the Sustainable Development Policy, requiring private developers who receive city assistance to include sustainable designs in their projects. These new requirements gave birth to a boom of green roof installation. One of the first green roofs

and probably the city's most famous is City Hall. Started in 2000, City Hall's roof began as a demonstration as part of the City's Urban Heat Island Initiative.

While visiting and researching different rooftop gardens throughout the city, I became aware of the lack of rooftop gardens in the food deserts within south Chicago. It is apparent that the majority are concentrated around the loop and decrease towards the city's west and south side. These are the regions with the lowest incomes in the city and the ones that would benefit the most from a community vegetable gardens. The biggest issue is that while walking through areas in the south side we saw a lot of open space and areas capable of gardens but were left untouched and abandoned.

This is obvious evidence that Chicago's priorities are not including the south side of the city, where many of these resources are needed to support the growing population. The few rooftop gardens that the city claims are in the area are private gardens only for the residents of those apartments, which still leaves a majority of residents in a food desert and a desperate situation.

Editor's note: Yael and her classmates, Bradley Brewer, Bryce Conrad, Tamera Fields, Kyle Sullivan, Emily Eichholzer, Madison Myers, Andres Arrez, Taliyah Herron, Joseph Hill, Nathaline Pheteau, Joel Schmidt, John Sinclair, Alex Suo, and their professor Dr. John Kostelnick won first place for their poster at the 2017 ILGISA Conference.

# Students Learn about the Cultural Landscapes of the West over Spring Break

By: Scott Diveley

Ten geography students spent their 2018 spring break in the southwest states of Texas and New Mexico as part of the Regional and Area Studies course field trip. With the intent to learn about the cultural landscapes of the West, the students spent nine days studying in several cities and famous sites across the two states, such as Roswell, Carlsbad, and the Trinity Site at White Sands. The students learned how to interpret cultural landscapes and gained a better understanding of the locations they visited and life in the West. After visiting, they led discussions about the interpretable use and experience of living out West. The students also discussed how the location and landscapes affected the development, past, and future of the city, the people, and their culture. The students also had to learn about 10 different features of the American West so that they could lead discussions about the features with the group while travelling the road. Their goal was to be able to summarize the importance and themes of these features and communicate their effect on the landscapes and local culture in 10 words or less. The trip was a big hit with the students and they all wish they could go back. The Department offers The Geography of the West course every other spring semester and is made possible through the generous support of the Patterson Fund.



*Students Scott Diveley, Sara Chamberlin, Emily Eichholzer, Adrian Ramirez, Yael Uziel, Rebecca Ringo, Madison Myers, Kasey Mitzi, and Colin Ringle, and Dr. RJ Rowley pose for a group photo just outside the Guadalupe Mountains National Park in Salt Flat, Texas*



# New Study Abroad Program By: Dr. Jonathan Thayn

From January 5, 2018, to July 6, 2018, professor Jonathan Thayn and his family lived in La Paz, Mexico, a town of about 200,000 people located an hour and a half north of the very bottom of the Baja Peninsula. One goal of Dr. Thayn's sabbatical there was to build relationships with marine biologists at the Center for Interdisciplinary Marine Sciences (CICIMAR), a governmental marine research station and graduate school, and with other environmental groups working in the area. The marine biologists were interested in learning how satellite image analysis, Dr. Thayn's research specialty, might be used to study changes occurring the Sea of Cortez, also called the Gulf of California. The second goal was to explore the possibility of creating a regular study abroad experience for students as part of a class on the

environmental geography of Baja California Sur. This class has been approved by the university and students will make the inaugural trip in January of 2019, just as the gray whales are calving. In addition to his work activities, Dr. Thayn frequently served as a tour guide for visiting family members. What follows is an excerpt from his journal when his family visited a whale-watching camp in San Ignacio Bay, about one-third of the way up the peninsula on the Pacific Ocean. San Ignacio bay is a recognized gray whale nursery and boats can only enter with special governmental approval. Tour agencies have to demonstrate expertise in and commitment to the health the gray whale population. All of the tour guides had degrees in marine mammalogy or ecological tourism.



*We found a cow/calf pair very quickly. The mother dove under us and you could see her gracefully gliding under our boat. She was at least three times longer than our little open-air fishing boat.*



*We saw dozens of sea lions while in the water. Many of them came very close to us. Several times I thought a young adolescent would come within touching distance but then they would dart away. I think they were teasing me.*



*The calf came right up to us and tapped the side of the boat. She was very friendly and gregarious. She loved to be touched, especially around her mouth. She would float sideways so that we had easy access to her lips. Everyone was able to rub her face or chin. Grandpa even kissed her nose. The kids said the whales felt like unshelled hard-boiled eggs, which is exactly right. They were firm yet squishy.*

# Reflections of the 50th ESSE Graduate

By: Jessica Tolmie



of my college experience doing. Once I finished my associate's degree at Rock Valley College, I found the Earth and Space Science Education major at ISU. Not really knowing all that the major encompassed, I dove right in. Honestly, I was horrified by the class names like geomorphology and mineralogy, but little did I know that these would come to be my favorite courses. Regardless of the rigor of both these courses, Dr. Tranel and Dr. Banik made our time in the lab meaningful and exciting. I learned so much from both courses, and I will always miss those long nights in the lab struggling with my classmates while waiting for our Chinese food delivery. As most geology or ESSE majors know, the field trips were what really solidified all the content we covered, and allowed us to explore and engage with the world around us.

After graduation, I plan to continue teaching in Chicago Public Schools where I am currently student teaching. I hope to find myself teaching Earth or Environmental Science, but I also really enjoy teaching chemistry and physics. I also hope to begin graduate studies in either educational psychology, or some field of science (it is hard to choose, I love them all). Shoutout to all the GeoBabies, you know who you are! I could not have done it without you!

Looking back to when I transferred to Illinois State during the fall 2016 semester, I did not realize how important and fulfilling these past years would be. From finding my passion in a career, finding new hobbies, and most importantly finding my forever friends, the Geology Program has become a home for me at ISU. Like most of us, I had no idea what I wanted to do after graduating high school. I thought about going into criminology or psychology before finding my love for science and seeing all the paths I could take in a science major. My final semester at community college I took two courses in geology and one in chemistry, and this is when I knew what I wanted to spend the last two years

## Congratulations, Graduates!

### Geography

Jeremy Babin  
Courtney Ballard  
Chase Braack  
Sam Bybee  
Brad Brewer  
Patrick Carroll  
Bradley Christin  
Stephanie Dwyer  
Emily Eichholzer  
Giosue Floyd  
Parker Gold  
Mitchell Halter  
Christopher Hong  
Samuel Kitz  
Alexander Martin  
Jacob Milton  
Kasey Mitzit  
Nicholas Moore  
Yenifer Mora  
Madison Myers  
Jeremy Neundorff  
Daniel O'Leary  
Nathaline Pheteau  
Kyle Sullivan  
Justin Wolter  
Marc Zidek

### Geology

Ian Anderson  
Meagan Boatright  
Alison Dahl  
Tamera Fields  
Michael Genard  
Jonathan Ignarski  
Kyle Johnson  
Alan Morales  
Emily Nagorski  
Indy Nenn  
John Sinclair  
Veronica Taylor  
Alexandra Wallenberg  
Zachary Werber

### Hydrogeology

Claire Harris  
Joseph Honings  
Andrew Jennings  
Joseph Miller  
Erin Newman  
Monique Rutte



## Geography Club Volunteers

By: Madison Myers



Geography Club has recently taken a special interest in volunteerism to encourage positive and creative problem solving within club members while giving back to the community. One mission of the club is to help students think on a deeper level about the impacts that individuals can have on their environment and community, and how that can transition to a

many people. The club decided to have a Volunteer Weekend at Wildlife Prairie Park in Peoria, Illinois. The park focuses on the conservation and education of native species in a fun environment. The club focused on the restoration and maintenance of the river otter enclosure. The bulk of the project was the removal of invasive plant species in preparation for repopulating the area with native species. This project taught the club a lot about the ecology of Illinois, and the contributions that each species provides to the whole environment. The relationship that the club now has with Wildlife Prairie Park contributed to several of the students in the department obtaining internships from the park.

The club also offered other opportunities for volunteering at Open Houses, Transfer Days, and on campus recruiting events. The Geography Bee, Research Symposium, and Earth Day Event created the opportunities for volunteering and outreach outside of the university.

global scale. Volunteering gave the club members a unique opportunity to apply their ideas to a local project that will have a positive impact on



*Jamie Esler in central Iceland. Photo courtesy of the National Science Foundation and PolarTREC.*

# From Glacier to Classroom

By: Tommy Navickas (Originally published on news.illinoisstate.edu)

*Jamie Esler '07 admits that one of his favorite units to teach is climate change. That's because the high school science teacher can share photos and geospatial data collected from a glacier he studied himself.*

In 2013 the Redbird was selected among 14 teachers to participate in PolarTREC, an annual expedition where international scientists team with educators to conduct original research in the Arctic and Antarctic. His group examined glacial mechanics and landforms created by receding glaciers.

Using a webcam and other remote technologies, Esler connected his students to his field training in Fairbanks, Alaska, the glacial research site in central Iceland, and inside the scientists' lab in Milwaukee.

"I can safely say that it was the best professional development I have ever completed," he said. "It's given me a much more well-rounded perspective on guiding my students through the scientific process."

The Alaskan part of the trip was somewhat familiar to Esler. He spent summers in "The Last Frontier" while working toward his bachelor's in earth and space science teacher education at Illinois State.

"I went ice climbing and backpacking with my brother, picked up jobs around town, and even tutored a middle school student on Alaskan wildlife biology," he said.

Esler was paid in store credit by the girl's mother, the owner of the small town's mercantile.

"I tutored in exchange for fresh veggies. It was awesome."

His trips to Alaska were also where he met and married his wife. They are now raising their child

in Coeur d'Alene, Idaho, near her immediate family in Montana.

"We love to ski, hunt, and hike. North Idaho had a bunch of job openings, so we started doing some research and found it to be this happy medium of being close to family, but still have a small mountain town lifestyle," he said.

The terrain and industry of the area are a boon to his science curriculum. He regularly seeks out career scientists to chat with students face-to-face about their work, and how they utilize concepts from Esler's lessons. His students have interacted with experts from a variety of areas, from water quality to avalanches.



*Jamie Esler assists scientist Lucas Zoet, who is gathering ground-penetrating radar data on a drumlin. Photo courtesy of the National Science Foundation and PolarTREC.*

"That element brings so much more depth than what I can provide to students on my own. At the end of the day, they still see me as a teacher.

(Continued on page 15).

## Scholarships and Awards

### Robert G. Bone Scholar:

Joseph Syzdek

### Louis Miglio Scholarship:

Stephanie Dwyer  
John Sinclair

### Harry Lathrop & Arthur Waterson Memorial Award:

Victoria Edelman  
Yael Uziel

### George R. Means Geography Scholarship:

Jordan Hawks  
Hailey Machnikowski  
Madison Myers  
John Richard  
Brooklynn Scharwark

### Margaret Means Endowment Stipend:

Emily Eichholzer  
Michael Genard

### Eunice Blackburn Scholarship:

Katherine Barrett  
Noah Bond

### John Wesley Powell:

Jacqueline Epperson

### Academic Excellence:

Kasey Mitzit  
Abigail Shaver

### Gamma Theta Upsilon:

Emily Eichholzer  
Yael Uziel  
Rebecca Ringo  
Madison Myers  
Kasey Mitzit  
Jacob Southerd  
Brooklynn Scharwark  
Matthew Rahman  
John Richard  
Kylie Tunk



# Student Research Contributions

- Francis, A.**, Peterson, E. W., and Dogwiler, T. J., 2018, Lithology as an erosional control on the Cave Branch and Horn Hollow fluviokarst watersheds in Carter County, Kentucky, in Sasowsky, I. D., Byle, M. J., and Land, L., eds., 15th Multidisciplinary Conference on Sinkholes and the *Engineering and Environmental Impacts of Karst and the 3rd Appalachian Karst Symposium, Volume 6*: Shepherdstown, West Virginia, National Cave and Karst Research Institute, p. 279-288.
- Francis, A.F.**, Peterson, E.W., and Dogwiler, T., (2018) Lithology as an erosional control on the Cave Branch and Horn Hollow fluviokarst watersheds in Carter County, Kentucky, *15th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst* - National Cave and Karst Research Institute, April 5, 2018
- Garber, K.L.**, Malone, D.H., Craddock, J.P. and Zahm, C., 2018, Detrital Zircon U-Pb Geochronology and Provenance of the basal Amsden Formation, Bighorn Mountains: *Wyoming Geological Association 72<sup>nd</sup> Annual Field Conference Guidebook*: p. 120-129.
- Harris, F.C.**, and Peterson, E.W., (2017) Trends in vertical pore water flux in the hyporheic zone of a low gradient third order stream, *Abstract with Programs - Geological Society of America*, October 2017, Vol. 49, No. 6, doi: 10.1130/abs/2017AM-304086
- Johnson, L.L.**, O'Reilly, C.M., Peterson, E.W., Heath, V.E., **Miller, J.J.**, **Gregorich, H.G.**, and Twait, R., (2017) Field drain tile diversion into a riparian buffer zone effects on spatial dispersion of nitrate in groundwater, *Abstract with Programs - Geological Society of America*, October 2017, Vol. 49, No. 6, doi: 10.1130/abs/2017AM-308134
- Kissock, J.K.**, Finzel, E.S., Malone, D.H., and Craddock, J.P., 2018, Lower-Middle Pennsylvanian strata in the North American midcontinent record the interplay between erosional unroofing of the Appalachians and eustatic sea-level rise: *Geosphere*, v. 14, p. 141-161. DOI:10.1130/GES01512.1.
- Ludwikowski, J.**, and Peterson, E.W., 2018, Transport and fate of chloride from road salt within a mixed urban and agricultural watershed in Illinois (USA): assessing the influence of chloride application rates: *Hydrogeology Journal*, doi:10.1007/s10040-018-1732-3.
- Malone, D.H., Craddock, J.P., Banik, T.J., **Deck, E.A.** and Hampton, B., 2017, Detrital Zircon Geochronology of Quartzite Clasts in the Permian Abo Formation, Sacramento Mountains, New Mexico: *The Mountain Geologist*, v. 54, p. 53-68.
- Malone D.H., Craddock, J.P., **Garber, K.L.** and **Trela, J.**, 2017, Detrital zircon geochronology of the Aycross Formation (Eocene) near Togwotee Pass, western Wind River Basin: *The Mountain Geologist*, v. 54, p. 69-85.
- Malone D.H., Craddock, J.P., and **Kenderes, S.**, 2017, Detrital Zircon Geochronology of the Cambrian Flathead Sandstone, Park County, WY: *Mountain Geologist*, v. 54, p. 86-103.
- Malone, D.H., Craddock, J.P., McLaughlin, P.I., Konstantinou, A., and **McGillivray, K.**, 2017, Detrital Zircon Geochronology of the Bighorn Dolomite, Wyoming, USA: Evidence for Trans-Hudson Dust Deposition on the Western Laurentian Carbonate Platform: *Journal of Geology*, v. 125, p. 261-269. DOI:10.1086/690213.
- Malone, D.H., Craddock, J.P., Schmitz, M.D., **Kenderes, S.**, **Kraushaar, B.**, **Murphy, C.J.**, Nielson, S., and Mitchell, T.M., 2017, Volcanic initiation of the Eocene Heart Mountain slide, Wyoming, USA: *Journal of Geology*, v. 125, p. 439-457. DOI: 10.1086/692328.
- Malone, D.H., Craddock, J.P. **Welch, J.L.**, and Foreman, B.Z., 2017, Detrital Zircon U-Pb Geochronology and Provenance of the Eocene Willwood Formation, Northern Absaroka Basin, Wyoming: *Mountain Geologist*, v. 54, p. 104-124.
- Malone, D.H., Stein, C.A., Craddock, J.P., Kley, J., Stein, S., and **Malone, J.E.**, 2018, Maximum depositional age of the Neoproterozoic Jacobsville Sandstone, Michigan: Implications for the evolution of the Midcontinent Rift: REPLY: *Geosphere*, v. 14, p. 1-3, DOI:10.1130/GES01632.1.
- Miller, J.**, and Peterson, E.W., (2018) Diurnal and seasonal variation in groundwater nitrate-N concentration in a saturated buffer zone, *Illinois Lake Management Association, 33<sup>rd</sup> Annual Conference*, March 22, 2018
- Miller, J.**, and Peterson, E.W., (2017) Diurnal and seasonal variation in groundwater nitrate-N concentration in a saturated buffer zone, *Illinois Groundwater Association*, October 27, 2017
- Miller, J.**, Peterson, E.W., and Twait, R., (2017) Diurnal and seasonal variation in groundwater nitrate-N concentration in a saturated buffer zone, *Abstract with Programs - Geological Society of America*, October 2017, Vol. 49, No. 6, doi: 10.1130/abs/2017AM-305004
- Ohls, K.** and Tranel, L.M. (2018), Lichen Growth in Matthiessen State Park and Starved Rock State Park, *Illinois State University Research Symposium*, Normal, IL, April 6, 2018.
- Oware, P.**, Maas, B., Peterson, E.W., **Honings, J.**, **Oberhelman, A.**, **Watson, A.**, and **Rusthoven, I.**, (2018) Karst susceptibility to anthropogenic influences in the driftless area of northwest Illinois, *Geological Society of America Abstracts with Programs*. Ames, Iowa, Vol. 50, No. 4, doi: 10.1130/abs/2018NC-312988
- Peterson, E.W., **Ludwikowski, J.**, and **Chabela, L.**, (2018) Transport and fate of chloride within the groundwater of a mixed urban and agricultural watershed, *Illinois Lake Management Association, 33<sup>rd</sup> Annual Conference*, March 22, 2018
- Piske, J.**, **Harris, F.C.**, **Rutte, M.**, **Sheffield, N.**, and Peterson, E.W., (2018) Correlation of crop cover and nitrate in two agricultural watersheds, a preliminary investigation, *Geological Society of America Abstracts with Programs*. Ames, Iowa, Vol. 50, No. 4, doi: 10.1130/abs/2018NC-311587
- Potter-McIntire, S.L., **Breeden, J.R.**, and Malone, D.H., 2018, A Maastrichtian birth of the Mississippi River: *Cretaceous Research*, v. 91, p. 71-78. DOI:10.1016/j.cretres.2018.05.010
- Rhoads, M.** and Malone, D.H., 2018, Pre-glacial paleotopography at the eastern terminus of the Plum River Fault Zone, Ogle County, IL: *Environmental Geosciences*, v. 25, p. 1-19. DOI: 10.1306/eg.06181817016
- Rickels, E. S.**, Stumpf, A.J., Malone, D.H., and Shields, W.E., 2017, Surficial Geologic Map of the Saybrook, IL, Quadrangle, McLean County, Illinois, USA: *Journal of Maps*, v. 13, p. 191-195. DOI:10.1080/17445647.2017.1291369
- Rutte, M.** and Tranel, L.M., (2017), Photogrammetric and schmidt hammer analyses to understand erosion of the St. Peter Sandstone in La Salle County, Illinois, *Abstracts with Programs-Geological Society of America*, v. 49.
- Wirth, H.**, Peterson, E. W., & Malone, D. H. (2018). Surficial geology of the 7.5 Minute Gibson City West Quadrangle, Champaign, Ford, and McLean Counties, Illinois, Illinois Geologic Mapping Advisory Committee, Champaign, IL, September 6, 2018.

Undergraduate and graduate students are listed in bold. Student participation in research and professional travel to conferences is made possible through generous gifts made to the Powell Fund, the Geology Excellence Fund, the Patterson Fund, and the Geography Excellence Fund.

## Student Recognition

Andrew Oberhelman received a Student Research Grant from the Illinois Groundwater Association  
Gare Ambrose-Igho received a Student Research Grant from the Illinois Lake Management Association  
Christine Salinas received a Student Research Grant from the Geological Society of America  
Nicolette Sheffield received a Student Research Grant from the Geological Society of America  
Claire Harris received the Hydrogeology Program Outstanding Research Achievement Award  
Luis Martinez received the Hydrogeology Program Outstanding Research Promise Award

# Skip Zwanzig: Still Gladly Teaching After all these Years

By: Dr. Michael D. Sublett



Glenn (Skip) Zwanzig, Jr., graduated from Butler High School in Louisville, Kentucky, interested in science and environmental conservation but with little idea how to convert boyhood interests into an adult livelihood. With support from a favorite uncle, Art Zwanzig, an Illinois State Normal graduate who then lived in Illinois, and maybe because one of Skip's distant ancestors had long ago served on the ISNU governing board,

he chose to enroll at Illinois State. As it turned out, Skip and college were not a good match right out of high school; so he joined the Marine Corps. Taking into account his intelligence and aptitude for spatial awareness, the Marines made him an air traffic controller—at a time when most Marines were heading for Viet Nam. Eventually, the pressure of controlling aircraft and lives got the best of him; he went into Marine logistics and never ended up in combat. Later, after starting his teaching career, he reconnected with the military, earning a Navy commission and working for a decade as a reserve intelligence officer.

After the Marine Corps gobbled four years of his life, an older and wiser (but still career clueless) Skip Zwanzig returned to Illinois, because his parents had in the meantime relocated to Hopedale (near Peoria). From there Skip reached out to Illinois Wesleyan University and earned his bachelor's—in biology and chemistry. Still not certain what he wanted to do and freshly off a successful summer of geographical study in Alaska with Illinois State's Professor James Patterson, Skip joined the master's program in Geography at State, earning his MS in 1980. During the couple of years he spent in residence, he got a chance to serve as a teaching assistant in Earth Science labs and then as a fully responsible instructor in our Weather course. The teaching bug had bitten him—severely—so he took the advice of a girl he was dating and opted to spend another year in Normal getting himself certified to teach grades 6-12. In his words, the teaching certificate he earned gave him “the rudder” he had been missing during his college days.

Science teaching jobs quickly came his way in Louisville and briefly in Heyworth, Illinois, a few miles south of Bloomington. It was during this early teaching period that Skip attended his first National Science Teachers Association meeting. There he became more familiar with scientific inquiry as a way to structure high school classes. “What other teachers were doing with their kids really amazed me,” he said recently. He had already decided he needed to shake up the students in order to elicit the best from them; and the inquiry method, where students do a lot of their own self teaching by posing and solving scientific problems, seemed a logical answer. In his first teaching job, at Louisville's Shawnee High School, he organized the first of dozens of science fairs that

he eventually coordinated or to which he sent his students to test themselves against others. A short stint, full-time, at the Defense Mapping Agency in Louisville convinced him that teaching really was his life calling; and he went back into the public schools of Jefferson County, eventually landing in 1990 at duPont Manual High School. He retired from duPont in 2017, but he continues to direct the Regional Science Fair and mentor science students at duPont. On the side, he does substitute teaching despite the fact that some sub assignments are dangerous. At a middle school gig in May 2018, for instance, a student threatened him with bodily harm; but later in the day, they shook hands and made peace. He finds himself at loose ends as a retired teacher, and takes sub jobs in order to stay in the daily educational arena.

So many awards and other indications of recognition for the work of teacher Skip Zwanzig decorate his resume that it would be overkill to mention all. Skip has been the Jefferson County Teacher of the Year and Kentucky High School Teacher of the Year; received the Coca-Cola Educator of Distinction Award (twice); and picked up the Presidential Award in Science for Excellence in Teaching, the Kentucky Academy of Science Outstanding Science Teacher Award, plus two Presidential Distinction awards from the Academy. The Kentucky PTA gave him its Life Recognition Award. Teachers across the country compete for prestigious institutes and workshop at which they interact with other superb teachers and with academics at the university level. He spent 10 weeks at the University of Louisville in 1992 on an American Society of Cell Biologists Summer Research Appointment. In July 1994, he was at Berkeley, California, for the Global Systems Science Workshop. Two summers later, he was at Virginia Tech for their Biotechnology Workshop. Princeton University hosted him in 1998 at the Woodrow Wilson Teacher Leadership Workshop on Biodiversity. That fall he spent seven weeks in Antarctica helping conduct research on fish adaptability to cold waters and shared his experiences via the internet with students back in the States. Last fall, October of 2017, he journeyed back to Normal as Geography's Homecoming Alumni Day Guest. Then, early in 2018, he found himself at the Sundance Film Festival to participate in the screening of Science Fair, which featured four of his students along with five other similar-age students from around the world. The film won the festival's inaugural festival-wide audience award. Some of these and other Zwanzig successes produced funds that he could use to improve his duPont Manual labs and assist students with their science experiments. For Skip, however, it is not the awards or the workshops that give him the greatest pleasure as a teacher. Instead, “to see the smiles on my students when they have accomplished something because of some small thing that I did to help them get there” is his greatest reward.

I would be remiss in closing this piece if I failed to mention his asteroid. Yes, out there in the Asteroid Belt, between the orbits of Mars and Jupiter, is Minor Planet (28695) Zwanzig. The MIT Lincoln Laboratory discovered the asteroid and assigned it the Zwanzig name in 2013 after he mentored a finalist in the Intel Science Talent Search.

# Aspiring Hydrogeologist Offers a Fresh Take on Water Quality

By: Tommy Navickas (Originally published on [news.illinoisstate.edu](http://news.illinoisstate.edu))



In the late 1980s, a lengthy drought across Central Illinois left lake levels dangerously low. This was especially problematic for the City of Bloomington, which receives its water supply from Lakes Bloomington and Evergreen. The city was unable to dilute pollutants discharged by farms into the lakes' tributaries. One of those pollutants, nitrates, rose to concentrations above the federal Environmental Protection Agency (EPA) limit of 10 milligrams per liter, according to the Bloomington Water Department. While those levels did not

harm adults, ingestion of extremely high concentrations of nitrates by infants under 6 months old could be fatal. "The city entered into an agreement to reach EPA-approved levels within 10 years, and we've stayed in accordance since that time," said Rick Twait, superintendent of water purification for the City of Bloomington. Twait credits the change to Bloomington's decision to partner with Illinois State and the McLean County Soil and Water Conservation District. Almost 30 years later, the University's faculty and students have dedicated untold hours to helping the city enhance its water quality. In turn, the students have gained real-world experiences with state-of-the-art equipment.

Currently, Illinois State is in the second cycle of a two-year \$86,000 renewable grant through the City of Bloomington to conduct applied research at four stream sites. Under the guidance of faculty members from the School of Biological Sciences and the Department of Geography-Geology, Illinois State students monitor the streams, conducting measurements on water levels, on water haziness due to erosion, and on the nitrate and phosphorus concentrations.

One of the students working on the project is Joe Miller. The hydrogeology master's student is studying how naturally occurring processes, like plant uptake—the absorption of nutrients by plants—can affect the concentration of harmful pollutants in groundwater that escape crop fields. Nitrate, an ingredient in synthetic fertilizers, is the main focus of his research. "Previous research has shown that only 50 percent of the nitrogen in synthetic fertilizers is used by crops," Miller said. "The remaining half leaves the field and impacts surrounding areas." Problems arise once nitrates infiltrate watersheds. In the case of Bloomington, 80–90 percent of the streams feeding the city's reservoirs are surrounded by farmland. As a result, these tributaries carry fertilizer nutrients, primarily nitrates and phosphorus, to Lakes Bloomington and Evergreen, which provide drinking water to 80,000 residents.

"Illinois State's faculty and students have conducted applied research in our tributaries that our small crew never could have, and the solutions we've enacted have prevented us from needing multimillion dollar treatment facilities to remove nitrates," Twait said.

The watershed research has raised the profile of the University's hydrogeology program, one of only four in the U.S. to offer undergraduate and graduate-level degrees in the discipline, and has attracted innovative students like Miller, a native of Pennsylvania. "What appealed to me about this work was the interplay between the physical geology, hydrogeology, and the biology of the region," Miller said. "It also gave me a chance to explore water quality, a topic I'm really interested in." Miller's collection site is across a road from farmland and alongside a tributary for Lake Evergreen. Once a week, Miller sets up a 24-hour

sampler, a device that collects groundwater each hour. He then runs the samples on an ion chromatograph, an instrument that helps him identify the changes that occurred in nitrate concentrations. He also accounts for light intensity, water level, and groundwater temperature over the cycle.

"These factors help me to tease out what is really going on," Miller said. "My scientific opinion going into this was that plant uptake through photosynthesis has the largest impact on nitrogen concentration. However, there are other possibilities such as de-nitrification by microorganisms, physical processes, and even evaporation."

The Illinois Water Resources Center, a nonprofit based at the University of Illinois at Urbana-Champaign, is funding Miller's research through a \$10,000, yearlong grant. The grant is being administered by Professor Eric Peterson, a hydrogeologist in the Department of Geography-Geology. He said Miller's work is filling an important gap. "Previous lab-controlled studies have shown that nitrate concentrations in the soil change based on the daily photosynthetic cycle of plants," said Peterson. "However, when you're working in the field, there are so many variables that are uncontrollable. That's why Joe's results will be important." Miller's research is significant for another reason. While Illinois possesses some of the richest soils in the world, they do not drain effectively due to dense clay in the ground. To prevent crops from drowning in groundwater, Midwestern farmers installed ceramic drain tiles leading to waterways beginning in the late 1800s. The approach resulted in unintended consequences decades later. "Once synthetic fertilizers became common practice in the 1960s, these drains acted as freeways for nutrients to reach streams," Peterson said. "As a result, water is prevented from undergoing the natural processes that occur in soils that would normally remove nitrates and other solutes."

In an effort to re-introduce some of these processes, the city moved the drain tiles that were leading to the tributary next to Miller's collection site. The nutrient-rich water is now being returned to the soil before it reaches the stream. Better water management practices resulting from research like Miller's work are needed across the Midwest, particularly Illinois, Peterson said. The state accounts for approximately 20 percent of the harmful nutrients found in the Gulf of Mexico each year. When the runaway compounds hitch a ride south aboard the Mississippi River, they spawn algal blooms, which are blamed for the gulf's growing "dead zone." "The problem comes when algal blooms die off," Peterson said. "They require oxygen to decompose, and they take it from the water. Without oxygen, nothing else can survive, and that results in hypoxia, fish kills, and dead zones."

Reversing Illinois' contributions can by itself improve the Louisiana fishing industry, the second largest producer after Alaska, according to the National Oceanic and Atmospheric Administration (NOAA). "Research like Joe's helps to identify best management practices that can be applied to reduce the problems we're starting to see in large bodies of water and reduce costs to clean them up," Peterson said.

Miller is using his research for his thesis, which he plans to publish. He hopes it will help hydrogeologists uncover next-level questions, like which plants remove the most nitrates from groundwater. At the midpoint of his research, Miller believes this experience has already caused him to change his career aspirations. "I entered this program thinking I wanted to be an environmental consultant, where I would implement others' research," he said. "Now I'm leaning toward a government research position. I want to create the best practices."

# Glacier (Continued from page 11)

But if I can collaborate with other people who have jobs or careers in that field, it adds another layer of learning and builds a deeper appreciation amongst the students," he said.

Esler's ingenuity and effectiveness were among the traits touted when he earned the 2014 Idaho State Teacher of the Year award. The teacher was surprised with the recognition at an assembly disguised as a school safety meeting. For several weeks, he had a hard time feeling he deserved the recognition, but he found solace in the opportunity to support fellow educators.

"It was the most remarkable, awesome way for me to represent all of Idaho's hard-working teachers. And that's what I think the teacher of the year program is about. As a teacher, there is no greater honor than to represent the incredible colleagues that we have in every classroom. All teachers are really worthy of this," he said.

That year, Esler went to the White House to meet the president, participated in a wide range of workshops, and rubbed shoulders with other state teachers of the year (there were four Redbird winners that year).

"ISU is an exceptional university for teacher preparation. And I think that the many state teachers of the year coming from Illinois State really showcases that," he said.

The experience also led to Esler's involvement with the Idaho State Department of Education.

"I serve as a direct line of key communication between the Idaho Panhandle and Boise when we address new science standards, work with the state legislature when changes impact science curriculum, and I am often invited to participate in education committees as a reviewer," he said.

"There certainly is a level of leadership that



has come with accepting this award, and that's probably the most enjoyable part of this recognition."

Reflecting on life at Illinois State, Esler cannot speak highly enough of both the College of Education and the University's earth and space science education program.

"I got to take the coolest classes in the Department of Geography, Geology, and the Environment, the Department of Physics, and in the College of Education. I can't stress enough how valuable the balance was between the scientific content and teaching strategies," Esler said.

He shares his Redbird roots with a math teacher in the district, and they often reminisce about their academic experiences.

For Esler, it often comes back to his junior year. He roomed with his sister, Beth Grady '10 (now the Chicago Bulls' manager of public relations), and rode his bike down Constitution Trail to Bloomington High School for observations.

He also volunteered after school to coach the school's Science Olympiad team.

"I did not have a single poor experience in my College of Education courses," Esler said. "Not one. They were all helpful and all meaningful. When people ask about my alma mater, nothing makes me happier than to say that I graduated from Illinois State University and that it's the best teacher prep school in the Midwest."

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