Student Accomplishments

Stephania Zneimer earned multiple awards for her research, including first place in the Undergraduate Creative Activities and Research Forum at Southern, first place in the student poster competition at the AIPG meeting, and an honorable mention at the 2016 North Central Section of GSA.

Two students attending our Summer Field Course received NAGT/USGS 2016 cooperative summer field training program internships; Charlene Rogers from the University of Wisconsin Milwaukee and Emma McConville from the University of Maryland.

Jessica Whitaker was awarded a Minority Student Scholarship by the GSA. In addition to a cash award, she also received a complimentary GSA student membership and registration for the National GSA meeting.

Two graduate students in the Department of Geology, Caitlyn Koren and Joseph Wnukowski, were awarded Geological Society of America Graduate Student Research Grants. These grants provide support of master’s or doctoral research. Each student received $1500 towards their research projects.

Severin Presswood was awarded the Antoinette Lierman Medlin Award from the Geological Society of America Coal Division and Amberly Tobin was awarded the Spackman Award from The Society for Organic Petrology. Both of these awards provide financial support for their research projects.

One of our graduate students, Jason Williams, was awarded the Lunar and Planetary Institute Early Career Development award as well as earning a NASA Astrobiology Institute scholarship to attend the International...
Environmental and isotope geochemistry projects in the Department of Geology

By Dr. Liliana Lefticariu, Associate Professor

As I start writing this report I realize that, for both me and my students, the past nine years have been an exciting and productive time in the Department of Geology at SIUC. My journey started as a new faculty member in January 2007. From the first day on campus, I have been fortunate to receive full and sincere support from my colleagues and collaborators at SIUC, especially from the Geology Department and the College of Science. This was critical and helped my transition from a NASA postdoctoral researcher at Indiana University to a successful faculty member in the Geology Department at SIUC. Over the past years, I also had the privilege to collaborate with outstanding students, among them Evan Walters, Paul Behum, Kerry McLeran, Yosief T. Segid, Rajesh Singh, William Cherry, Ross Hintz, William Kipp, and Minka Bentley, on a wide range of projects. Last but not least, I have been fortunate to receive financial support for my research projects from different sources, including SIU start-up funds, National Science Foundation (NSF), Illinois Clean Coal Institute (ICCI) and Department of Interior (USDI).

Research in my group focuses on studying processes that change the Earth’s surface, with a strong emphasis on the chemical elements and their isotopes that play key roles in biogeochemical processes. Since coming to
SIU I’ve been working on a wide range of projects and some examples are provided in the following sections.

**Isotope Geochemistry/Analytical Techniques**

One of my important achievements here at SIUC was the establishment of a new state-of-the-art isotope ratio mass spectrometer (IRMS) facility and a program in isotope geochemistry. This was not easy and it required sustained effort and collaboration with Dr. Gary Kinsel (Chemistry), Dr. Greg Whittle (Zoology), Dr. Mary Kinsel, and Dr. Mihai Lefticariu (Mass Spectrometry Facility) and other faculty and researchers from departments and research centers across campus. U.S. National Science Foundation (EAR 0821646) and the SIU Office of the Vice Chancellor for Research provided funding for this project. Having the IRMS facility on the SIUC campus has allowed us to expand the training opportunity for both graduate and undergraduate students and involve our students directly in isotope analyses that previously would have been performed off-campus at other institutions. After the successful installation of the IRMS, additional effort was needed to develop and optimize analytical techniques used for stable isotope analysis of a wide range of sample types, such as carbonates, coal, sediments, aqueous solutions and gases, tree rings, teeth and hair, feathers, and animal tissue. Now, SIU students, including those from the Geology Department, can explore highly relevant scientific topics with the use of stable isotope analysis.

**Rare Earth Elements Mineralization in Fluorite**

One of the first projects that included the use of isotope analysis was the deciphering of magmatic & hydrothermal activity in the Illinois-Kentucky Fluoride District (IKFD). William Kipp (Geology Department), an undergraduate research assistant in my laboratory, conducted a project sponsored by SIUC’s REACH program to evaluate the use of stable isotope composition and REE concentrations in host rocks and veins as an indicator of past hydrothermal events that concentrate REE. Rare earth elements (REE) are a group of 17 precious metals that are vital to the technology industry. While they are relatively common throughout the crust of the earth, the ore deposits are exceedingly rare. Although previous research has shown unusually high concentrations of REE within breccia rocks underneath the surface of the Hicks’ Dome, there is a distinct lack of knowledge

Rajesh Singh in the Environmental Geochemistry Laboratory

William Kipp working in the fluorite region of southern Illinois
on the distributions of REE in samples from old fluorite mines in the IKFD. Based on work done by our group and others, fluoride mineralization in the IKFD may prove to be a future source of REEs.

**Paleoclimate and the tree rings**

Exploring paleoclimate and environmental questions through analysis of stable isotopes is a rapidly developing area of investigation. Graduate student Kerry E. McLeran (Environmental Resources and Policy Program (ER&P)) is currently assessing the utility of using the oxygen isotope ratios of alpha-cellulose extracted from tree rings as tracers of climate. The climate is usually highly variable with large fluctuations in precipitation on both temporal and spatial scales, which leaves many regions prone to severe droughts and floods. Kerry's study has been designed to identify the relationships between climate parameters, such as precipitation and temperature, and oxygen isotope values of tree ring alpha-cellulose extracted from exactly dated tree rings of Pterocarpus angolensis growing in the arid to semiarid Mzola region of western Zimbabwe, South Africa. Recently we extended the study to include trees growing in the flooded areas of Mississippi River in Missouri and Southern Illinois. This research will provide a foundation for future applications of tree ring chemistry as natural indicators of paleoclimate in Africa, U.S. and beyond.

**Connectivity of the Tisza and Mississippi River Systems: a geochemical perspective**

River water chemistry is primarily a function of both natural and anthropogenic processes occurring within the river’s watershed area. As a result, the chemical composition of river water is intimately related to changes on land and the health of any watershed can be assessed by monitoring river water chemistry. In 2012, I was invited to participate in an interdisciplinary project in watershed science and management of the Tisza River Basin. The Tisza River is the longest tributary of the Danube River and drains much of the Carpathian Mountains in Central Europe. This complex multi-disciplinary project is an international collaboration between researchers from the SIU IGERT program lead by Dr. Nicholas Pinter and researchers from Hungary, Serbia, Ukraine, and Romania. The main goal of this project is to create a sustainable water resources management plan for the transnational Tisa River Basin. In the summer of 2013, a team of researchers from SIU including graduate student Bo Cherry and I travelled to Romania and together with Dr. Ferenc Forray from Babes-Bolyai University did extensive field work collecting water samples from the Tisza River and tributaries. A complex geologic history in the region resulted in a variety of rock types (e.g., sedimentary, metamorphic, and mafic and alkaline igneous rocks) that are exposed throughout the drainage basin. Each of these rock types is characterized by unique chemical compositions and waters interacting with these rocks produce specific chemical signatures. These signatures allowed us to trace back the origin of some chemical elements and better understand how the watershed geology is impacting river chemistry. To produce a more detailed picture that includes the northern part of the Tisza Basin, we are actively applying for funding to collect and analyze additional river water samples.
Predicting how local water and chemical cycles will change in the future

Stable isotopes are also used for understanding the hydrological cycle at local, regional, and global scales. World-wide interest and demand for a detailed isotopic database of rain and surface waters has risen significantly in recent years as these data are more and more used in diverse research areas such as climate, hydrology, ecology, limnology, agriculture, and forensics. Southern Illinois is a unique region with significant water resources, including major rivers such as the Mississippi and Ohio, their tributaries, and a plethora of lakes. Therefore it is important to understand different components of the local hydrological cycle and how it will change in the future. Scientists from SIUC have joined with partners from around the world under the leadership of the IAEA Isotope Hydrology Section to collect and analyse rain water (Global Network of Isotopes in Precipitation, GNIP) and river water (Global Network of Isotopes in Rivers, GNIR). The data collected will constitute a compilation of isotopic assays of rain and river water. Minka Bentley, a recent undergraduate student in Geology, was one of the first students involved in the SIUC-GNIP project. Minka analyzed the stable isotope composition of precipitation from Southern Illinois and presented the results at the REACH Undergraduate Research Forum. With funding provided by SIUC’s REACH program, over the next year additional river water samples will be collected from the Mississippi, Ohio, and lower Illinois Rivers, their tributaries, and floodplain lakes. This research will provide a foundation for future applications of stable isotopes to understand the hydrological cycle and changes in freshwater systems in Southern Illinois.

Acid-mine drainage: Prevention and Treatment options

Freshwater quality can be negatively affected by anthropogenic activity. One possible source of
pollution to both surface and groundwater is coal-generated acid mine drainage (AMD). Coal has been the main source of energy for many centuries, offering a cheap, reliable source of energy. However, negligent mining practices have led to abandoned mine lands and in some cases long-term natural water contamination.

Many of my students have been involved in different aspects of coal-generated AMD. My Ph.D. student Paul T. Behum (ER&P Program) has been studying the acid forming processes from coal and coal waste products at mine sites. In collaboration with Dr. Yoginder Chugh (Department of Mining and Mineral Engineering), Paul is also testing different field methods for alternate coal processing waste disposal technologies with the ultimate goal to minimize the discharge of pollutants into the environment. The most important source of acidity in AMD is the oxidation of pyrite, an iron sulfide mineral, omnipresent in coal. Rajesh Singh, a recent M.S. student in Geology, worked at establishing a sequential extraction method for quantifying sulfur fractions in coals, including pyrite, from the Illinois Basin. Additionally, my group is also interested in designing efficient AMD treatment systems. One such project was undertaken by Yosief T. Segid, a recent M.S. student in Geology, who studied the water chemistry, performance and treatment processes at a polluted site in Southern Illinois. The results of this study were encouraging showing that passive treatment systems could offer a low-cost approach to AMD remediation.

Following Yosief’s work, Evan R. Walters, another recent M.S. student in Geology, explored the use of microbes and natural substances to break down and stabilize pollutants. Remarkably, Evan’s research found that by using leaves and herbaceous materials, such as grass clippings, and microbes naturally found in the environment that the activity of sulfate reducing microorganisms was greatly enhanced and significant amounts of pollutants were taken out of the contaminated water. This finding helped state officials design better methods to mitigate AMD pollution. This research has been important not only for advancing the fundamental understanding of the biogeochemical processes associated with AMD remediation but also helping solve local problems because, reducing the pollution in the AMD water can impact the local community in such a positive way. Evan’s thesis won the outstanding Master Thesis Award for the University.

As always, if you are interested in stable isotope analyses or in any of the research projects please feel free to stop by my office, give me a call, or just sent me an email. My students and I are always happy to show the labs and the projects we are doing. For up-to-date news you can also visit my research group’s webpage at http://lilianalefticariu.weebly.com/. Until then, regards and best wishes.
Faculty and Staff
We have had a number of changes to our faculty and staff since the last newsletter. Richard and Katheryn Fifarek have retired and have since moved away from southern Illinois, now residing in Vancouver, Washington. Rich continues his research and consulting in ore deposits. Nicholas Pinter accepted the Roy J. Shlemon Chair in Applied Geosciences at the University of California, Davis. Susann Pinter is an Academic Coordinator/Lecturer in the Mathematics and Science Teaching Program (MAST) at UC Davis. Paul Giesting, Lea Gilbertson, and Laura O’Connell, three instructors in the Department, covered Rich, Nicholas and Susann’s courses after they left. Paul taught Mineralogy and Ore Deposits for a couple of years right after Rich retired. Lea taught Mineralogy and Ore Deposits the last two years. Laura taught Geomorphology in place of Nicholas last year. All of them helped with our introductory courses for non-majors.

Rich Black, our office manager, has retired. Mona Martin initially replaced Katheryn Fifarek as an office support specialist, but she now has taken Rich’s place as our office manager.

Amanda Damptz and Beth Ellison were GIS specialists in the department since the last newsletter, but both have now left. Tamara Broadnax now holds that position in the Department.

Joe Devera and Brett Denny are from the Illinois State Geological Survey, but are assigned to the southern Illinois region. They both serve on graduate student committees in the Department and Joe continues to teach our introduction to field geology course each spring as an adjunct instructor. They mentor many of our students and provide internship and employment opportunities as well. We are most grateful for all of their efforts.

Visiting Scholars, Post-Doctoral Researchers, and Graduate Students
The Department hosts many visitors from across the country and around the world to collaborate with our faculty and use our research facilities:

Eric Ferre worked with post-doctoral students Andy Parson from the University of Liverpool and You-Min Chou from the National Taiwan University. Others visiting his research group include Jed Day, Illinois State University; Brett Kenning, Illinois State University; Kyle Schuster, Illinois State University; Cameron Stewart, University of Illinois Urbana-Champaign; and Ruo-Lin Kuo, National Taiwan University.

Justin Filiberto collaborated with post-doctoral student Paul Giesting from The University of Notre Dame.

Liliana Lefticariu collaborated with Yin Huiyong, Associate Professor, College of Earth Science and Engineering, Shandong University of Science and Technology, Qingdao, China.

Sue Rimmer hosted Vicky Hudspith, a post-doctoral student from the University of Illinois. She also worked with PhD candidates Munira Raji from Durham University, England and Qiang Wei from China University of Mining and Technology, Beijing.
New Faculty

Sally Potter-McIntyre

Hi! I am Sally Potter-McIntyre and I joined the department in the fall of 2013. I did my Ph.D. at the University of Utah in Sedimentology. My research focuses on water-rock interactions that occur in the subsurface as well as understanding development of sedimentary basins over time. My research group, The Sedimentology Research Group at SIU, is pursuing exciting new research directions including interpreting the landscape evolution of Laurentia during the Middle Jurassic as well as provocative new astrobiology research on how biosignatures are preserved throughout geologic time so we can recognize potential signs of life on Mars.

We have some notable students in our group. Jason Williams has recently been awarded the Lunar and Planetary Institute Early Career Development award as well as a NASA Astrobiology Institute scholarship to attend the International Astrobiology summer school in Santander, Spain this summer. Also, we had a team participate in the Imperial Barrel Award (an AAPG-sponsored petroleum geology competition) this spring. Our 2016 team consisted of Andrea Meado, Eric Heuneman, Jason Williams, Jessica Whiteaker, and Chijoke Idoko.

This is the second year for our AAPG SIU student chapter and the students have been very active. The chapter has sponsored a department speaker and they intend to bring in more speakers next year. If anyone is interested in presenting a talk, contact siuaapg@gmail.com. The chapter has also subsidized student travel to GSA 2015 where Jason Williams and John Ejembi presented papers. The chapter is planning to attend the Houston AAPG student job expo early next fall. We would like to thank alumnus, Tony Kolodziej, for his generous contribution to the student chapter!

Daniel Hummer

My name is Daniel Hummer, and I just joined the Department of Geology here at SIU this fall. I am a broad-based geochemist specializing in mineralogy and crystallography. Specifically, my work focuses on the mechanisms of mineral crystallization, particularly reactions between minerals and fluids, and the factors that lead to the stability of different crystalline materials in different geologic environments. I did BS degrees in both Geology and Chemistry at Iowa State University, and then a Ph.D. at Penn State University. After completing graduate school, I did postdoctoral work at the Carnegie Institution for Science and UCLA, which took me to both the East and West coasts before returning to the Midwest.

I am currently teaching the Mineralogy and Ore Deposits courses this fall, and have enjoyed being back in the classroom and getting to know the students. Although I haven’t been here long, I have a lot of exciting projects in the works. I am serving as PI for a unique, worldwide research effort called the “Carbon Mineral Challenge”, which uses statistical methods to predict undiscovered carbon-bearing minerals and then seeks them out in the appropriate natural environments.

My lab in Parkinson will be devoted to studying crystallization and related mineral reactions. I plan to lead students in dual field and laboratory projects to study mineral transformations in dynamic, low temperature environments such as the acid mine drainage sites here in southern Illinois. I look forward to collaborating on these projects with Liliana Lefticariu and Sally Potter-McIntyre. I also plan to study mineral-fluid reactions in higher temperature environments such as subduction zones. Pending funding, in the spring I will be joining a diverse group of scientists to study carbon cycling through the Costa Rica subduction zone, and I will be collaborating with Justin Filiberto to study the dechlorination of mafic minerals during subduction. I’m very exciting to be starting the next chapter of my career, and look forward to meeting more of the SIU community in the months ahead.
Justin Filiberto

Justin Filiberto won the **University Early Career Faculty Excellence Award**. This award recognizes faculty within their first five years for excellence in scholarship, teaching, and other professional activities. The faculty in the Department of Geology voted unanimously to support his nomination. Justin joined the faculty in August, 2011. He completed his Ph.D. from Stony Brook University, one of the premier institutions in his field of planetary geology. He then acquired considerable post-doctoral experience, first as a Research Fellow and Visiting Scientist with the Lunar and Planetary Institute and later as a Research Associate at Rice University. While evaluating the applicants for our open position in petrology in 2011, it soon became clear that Justin was the most outstanding candidate and probably the most outstanding person seeking an academic position in the broad field of petrology that year. Our original assessment of his potential was spot on. He has amazed us with his productivity, rapidly establishing an internationally recognized research program, remarkably performing as a teacher, and admirably serving the Department, his profession, and the community. Justin was also promoted to Associate Professor this year.

Jack Crelling

Jack Crelling was awarded the **John Castano Honorary Membership Award**, the Society of Organic Petrology's highest honor, to acknowledge his outstanding research in organic petrology, his dedication and impact as a teacher, and his leadership to the Society. Jack has received all of the career awards targeted to those working in coal geology and coal petrology.

Alumni News

President Obama honored one of our graduates, **Jeffrey Pigati**, naming him a recipient of the Presidential Early Career Award for Scientists and Engineers, the highest honor bestowed by the government for individuals in the early stages of their research careers. Jeff works with the United States Geological Survey. The awards were established by President Clinton in 1996. Awardees are selected for their pursuit of innovative research and their commitment to scientific leadership, public education, and community outreach.

**John and Judith Washburn** were selected as the 2012 Honorary Award recipients from the Midwest Federation of Mineralogical Societies (MWF) for the American Federation of Mineralogical Societies (AFMS) Scholarship Foundation. This award allows John and Judith to help select two graduate students at a university to receive $4,000 fellowships for the fall, 2012 from the AFMS. John received his undergraduate geology degree from Southern, and remembered his alma mater by helping us choose two students for this award. He holds a Master's in Environment Studies from the University of Illinois Springfield. John is now retired. He worked for the Illinois Department of Transportation and had a successful career as a professional geologist, receiving awards from the Illinois State Geological Survey for his contributions to Illinois geology and by the Illinois Environmental Protection Agency for his work on protecting groundwater. Judith taught Language Arts for 18 years in middle school. She earned her undergraduate in education with a minor in earth science from Greenville College, her masters in curriculum at Northern Illinois University and her post masters at Illinois State University. She taught teacher preparation at the University of Illinois-Springfield until she began a job at the Illinois State Museum. She and John also served as judges of the geology projects at the State Fair doing conference judging for many years. John continues to do rock, mineral and fossil identification as a volunteer for the Illinois State Museum. Both John and Judith have served with different rock and mineral clubs in Illinois, as officers and organizing events. They conducted workshops on mineral identification, with one still going on each year at the State fairgrounds. The Lincoln Orbit Earth Science Society (LOESS) has grown from less than 40 to nearly 300 members under their leadership. John and Judith have long served the MWF and the AFMS. This is the second time that students from Southern were selected for these fellowships. Back in 2007, **Joe and Nellie Claxton** from Mt Vernon received this honor from the AFMS and helped choose fellowship recipients here.
In Memoriam

Professor Dale “Dusty” Ritter passed away on June 1, 2012. Dr. Ritter earned his BS in Geology from Franklin and Marshall in 1959 and his Masters (1963) and Doctorate (1964) at Princeton University. He returned to Franklin and Marshall and began his professional career as an Associate Professor of Geology, staying there until Russell Dutcher convinced him to accept a position at Southern Illinois University in Carbondale where he served on the faculty from 1972 until 1990. At Southern, Dr. Ritter became a highly respected scientist in the field of geomorphology. He earned numerous awards and honors, including the University Outstanding Scholar Award. He also served as President of the Yellowstone Bighorn Research Association (1983-1985); Chairman of the Quaternary Geology/Geomorphology Division of the Geological Society of America; and served as US Representative to the International Association of Geomorphologists. Professor Ritter was the author of the textbook *Process Geomorphology* which has become the authoritative textbook on geomorphology in colleges and universities around the United States. The fifth edition, now co-authored by Dr. Craig Kochel and Dr. Jerry Miller, was published in March of 2011. In 1990, Dr. Ritter decided to return to research and accepted the position of Executive Director, Quaternary Sciences Center with the Desert Research Institute at the University of Nevada-Reno. There, he directed the paleoenvironmental studies program, concentrating on paleoclimate reconstruction and drought history in the Northern Sierra region. Dr. Ritter is survived by his wife Esta; children Duane, Darryl, Glen and Lisa; eight grandchildren; and two great grandchildren; sister Kay and brother Jack.

Mary Susan “Susie” (Baker) Utgaard died on October 21, 2014. She was born October 10, 1939, in Bloomington, Indiana, to Leon and Mary (Blankenship) Baker. She had a Bachelor of Arts Degree in comparative literature. She married John Edward Utgaard on August 22, 1961, in Bloomington, Indiana. John was a member of the faculty of the Department of Geology and served as its Chair for a long time. He preceded her in death September 8, 2009. Susie and John both enjoyed painting and bird watching. Alumni will remember fondly how she welcomed them into her home for Departmental social events. She is survived by her sons, Erik (Elaine) Utgaard of Sterling, Virginia, Sigurd Utgaard of Godfrey, Peter (Claire) Utgaard of San Diego, California, and John (Bentley) Utgaard of Murray, Kentucky; seven grandchildren, Maggie, Jason, Naomi, Emerson, Charlie, Jack and Edward Utgaard; and brother, David Baker of South Carolina.

Steven Stubblefield passed away on September 17, 2013. He was born on December 20, 1945 in Herrin to James and Flora L. (Armstrong) Stubblefield. Many of our alumni will remember Steve for his service to the Department of Geology for more than 33 years. He managed the vehicle fleet, the extensive department inventory, and crafted field instrumentation. Steve retired in 2003. He was a good friend to many of the faculty and students in the Department of Geology who would visit with him in his office in the basement of Parkinson.

Mr. David Almy passed away on February 9, 2015. David was born on November 21, 1939 in Fall River, Massachusetts. He was raised in Normal, Illinois. He attended the Colorado School of mines in Golden, Colorado, and graduated from Southern in 1967. He worked as a professional geologist for 34 years with the Illinois Department of Transportation. His wife Maryann Paisley survives. Other survivors include one son and daughter-in-law, David Almy Jr. and Kathy Almy of Rockford; two grandchildren, Emma Almy and Will Almy of Rockford; three sisters, Susan Riegel Harding of San Diego, California, Jane Walsh and her husband, Bill Walsh of Gales Ferry, Connecticut, and Cheryl Varella and her husband, Joe Varella of Vancouver, Washington.

Since our last newsletter: Links for grant activity for the faculty in the department, a list of our graduates, a list of our scholarship recipients, and a list of completed theses and dissertations in the department.

Note that data for each year may be accessed through the tabs on the bottom of each screen.