

Department of Geology

U N I V E R S I T Y O F I L L I N O I S A T U R B A N A - C H A M P A I G N

Student explore classic Carboniferous basin, County Clare, Ireland



Students from the Geology 415/515 field class pose in front of County Clare's oldest traditional Irish pub

The coastal outcrops and stunning vistas of County Clare, Ireland were the site of this year's field trip for the Geology 415/515 class. Funded in part by Shell Oil, the trip represented the practical application of classroom concepts in the real world and was the capstone to a series of lectures and laboratory preparations on campus.

Twenty-two undergraduate and graduate students accompanied Professor Jim Best to the famously beautiful cliffs of Eire this past May and spent a little over two weeks in the small village of Kilfenora, located in the World-heritage area of the Burren in northern County Clare. The course specifically focused on Carboniferous geology and Best explains that the area is an outstanding karstic region with a rich flora and history.

"The superb coastal outcrops of County Clare offer a fantastic opportunity to examine the opening, sedimentary infill and closure of a Carboniferous sedimentary basin, allowing the group an opportunity to examine a wide range of ancient depositional sedimentary environments - from carbonate platform, to deep-sea tur-



Students examine the coastal outcrops of County Clare, Ireland

bidites and submarine fans, to fluvio-deltaic sediments and Carboniferous forests," says Best.

The spring weather was favorable and the group was able to examine an incredible range of deformation features, from sedimentary submarine slides, slumps and mud diapirs to folding and brittle fracture associated with end-Carboniferous tectonic compression. The region has also been extensively used over the past two decades by the hydrocarbons industry, which has sought to examine the sedimentology of the deep-sea sediments in detail for use as subsurface reservoir analogues, and also apply sequence stratigraphic principles in the broad interpretation of these basinal sediments.

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Plans for the Natural History Building

Plans for a major renovation to the Natural History Building are formally underway. Campus officials have approved a \$70 million project that would completely revamp and restore NHB, which will eventually house the Departments of Geology, Atmospheric Sciences, and Geography (i.e., the School of Earth, Society and Environment) and part of the School of Integrative Biology.

Nearly half of the building has been closed since the summer of 2010 after engineers determined some of the floors were structurally insufficient, due to a century-old architectural error. The university has since been working with architects on plans to demolish and rebuild the defective floors, then renovate all of the building's classrooms, laboratories and offices and update the mechanical, electrical and plumbing systems.

"We're really looking to make this building a state-of-the-art facility that is designed with the goals of 21st century teaching and research in mind," says Steve Marshak, Geology professor and Director of the School of Earth, Society, and Environment (SESE), "It has the potential to be a real gem on campus and within the earth sciences world."

Highlights of the conceptual plans include a SESE student hub occupying a dramatic vaulted room that once housed most of the Natural History Museum; a Museum of the Earth with geological displays utilizing some of SESE's existing fossil and mineral collections; a rock garden just outside of the south wall to be used for teaching purposes; and new research labs, teaching spaces, and offices for faculty and staff.

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LETTER FROM THE HEAD

In my ten months as the new head of the department, I have often recalled a comment that Bill Soderman (MS '60, PhD '62) made about the busiest times of his career. He suggested the best way to operate is like a duck, "calm on the surface, but paddling like mad underneath." I believe I can speak for myself and for the whole department in saying that we are all paddling like mad. As you will see throughout this newsletter, we have an unusual number of opportunities to build and define this department for the next few decades, and this motivates and challenges us. But at the same time, many aspects of life around the department continue as they always have in the academic rhythm. Graduation provided a wonderful climax to the academic year, field camp students piled into field vehicles during summer break, and grad students are busy collecting data and writing.

In many ways, this is a good time to take over the reins. I thank Wang-Ping Chen and Scott Morris (head of the SESE business office) for getting us through the toughest years we've ever seen, budget-wise. Things are now looking somewhat better. And after the trauma of reconfiguring the department when the south half of the Natural History Building was closed two years ago, things are more stable and we are now excitedly working toward a reborn NHB (see a separate article below). A few years from now, we will be settled back into our home on the quad, with modern teaching and lab spaces that will help draw in the best students and faculty,

We have an unusual number of opportunities to build and define this department for the next few decades.

and reflect the central importance of energy, earth, and environment in the modern world.

This upgrade comes just in time to help us respond to enormous changes in the geoscience job market. The American Geological Institute projects that half of the current geoscience workforce is within ten years of retirement, and more than 145,000 geoscience jobs would go unfilled if the rate at which college and universities produce new geoscience graduates stays constant! But of course it won't; we look forward to expanding and developing our programs to help meet this need. Jim Granath (BS '71, MS '73) uses the phrase "The Great Crew Change" to describe this generational shift. Many of our MS recipients over the past several years have found excellent careers in the oil and gas industry; recruiting on campus has ramped up to levels not seen for many years. Students have been recruited by mining companies at our summer field camp and in some cases hired on the spot. I hear from my friends at the ISGS that a wave of retirements is imminent there, and we expect hiring will follow.

We are experiencing our own crew change in the department. The group of faculty who began their careers about 30 years ago is taking retirement, with Wang-Ping leading the way in 2011, Craig Bethke and Chu-Yung Chen following in summer, 2012, and others not too far behind. My generation is stepping up to lead the department into its next phase. At the same, we are hiring new faculty, with Dr. Lijun Liu arriving in fall, 2012 to help maintain our strong Geophysics group, and

requests approved for two additional faculty searches in 2012-13.

We are also evolving along with big changes happening in higher education nationwide. The department has been one of the leaders on campus in creating online versions of select courses, mostly at the general education level. These have been quite successful, with due attention paid to maintain the educational quality we all expect at the U of I. But as always, the more things change, the more they stay the same. We hear from recruiters that the most valuable asset a student can develop is a talent for solving complex problems creatively. Such talent doesn't come from textbook learning and is better developed by our field trips and field courses. Helped by generous support from Shell, our GEOL 415/515 field course is thriving and is able to travel to world-class locations (see article below). The Wasatch-Uinta summer field camp is also healthy, with generous alumni support and major teaching contributions from faculty member Michael Stewart and alum Kurt Burmeister (PhD '05). And of course Geology majors still drive to Baraboo, Duluth, the St. Francis mountains and various other regional destinations each year.

I've enjoyed seeing a number of our alumni at our receptions at the GSA and AAPG meetings, and at other occasions. Especially in this time of great change in the job market, we are eager to hear from our network about job opportunities for our graduates and about ways we can better prepare our students for those opportunities. Please stop in if you're in the area or send us a quick message to give us an update.

All the best to you and yours,

Tom Johnson

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

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Students explore shear cliffs, County Clare

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The field class was preceded by weekly lectures in the spring semester, and students were assigned an intensive study of the current scholarly literature regarding trends in the field, specifically focusing on the studies of Carboniferous geology. During the trip itself, students were expected to translate theory into practice as they spent the majority of their time working in groups to collect, analyze, and present data, eventually using their research and what they learned in the lectures to create a picture of the geological history of the region.

Several guest speakers, including Dr. Drew Phillips from the Illinois State Geological Survey, Dr. Jeffrey Nittrouer from the University of Illinois, and Dr. Kurt Burmeister (Ph.D., Illinois '05; faculty at the University of the Pacific and a summer field camp organizer for the Geology department) joined the group. In addition, Shell geoscientist Michael Fortwengler, (M.S., Illinois '02), participated in the course for the entire field trip and provided an industrial perspective on the rocks the class was studying. Students were also treated to a day with Professor Carleton Jones of the National University of Ireland Galway, who showed the group archeology from Neolithic burial chambers to the splendid medieval cathedral and high crosses of Kilfenora.

Shell Oil Company has provided a variety of forms of support to the Department and has annually offered a major subsidy to make these richly educational field trips accessible to students.

"Such field-based experience and training, linked to classroom teaching and independent research by each student in the field, remains the core way to teach geology," says Best.

Past trips have included travel to the American Southwest to study geology in Death Valley with professor Steve Marshak, the Caribbean Islands to explore coral reef formations with Professor Bruce Fouke, and the famous ophiolite complex on the island of Cyprus with Craig Lundstrom.



Plans for the Natural History Building

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One of the most important results of the renovation, according to Marshak, is the inclusion of all three departments of SESE—Geology, Geography, and Atmospheric Sciences—in one building. The offices of faculty and staff of the three departments will all be located in the renovated building.

"This presents an opportunity for true synergy, facilitating the exchange of ideas and support among faculty and staff," says Marshak.

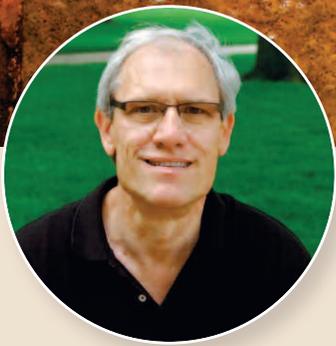
The university administration has worked extremely hard to find ways to fund the project from a variety of university institutional funds, student fees, and alumni donations. In recent months administrators have drafted a funding plan for the \$70 million renovation project: several sources, such as energy conservation funds, have been combined to get close to the total estimated cost. The College of Liberal Arts and Sciences is organizing a campaign to raise about 10% of the building cost through alumni donations in order to ensure that the complete vision can be accomplished. The campaign hopes to reach out to alumni from all three departments of SESE as well as those who have graduated from the School of Integrative Biology. As part of this campaign, there will be opportunities to name facilities within the building, particularly in the Geology department.

Geology Department Head Tom Johnson stresses the role of alumni and corporate donations in the project.

"University administrators recognized the urgency of this situation and have really gone to bat for us in scraping together funds for the NHB project. The department is pulling its weight by turning to its alumni and corporate partners that have been so generous in supporting and strengthening the department over the years. As I see it, donations will put us over the top and allow us to build teaching and research facilities that are not merely adequate, but which showcase the importance of energy, environment, and sustainability in society today and draw the best faculty and students to Geoscience at Illinois."

The building project's design is anticipated to be complete some time in 2013 and the project itself is expected to last about two years. During the transition period, NHB will be completely closed and faculty, grad students, and staff will be located in the Computer Applications Building on Springfield Avenue, while research labs and teaching facilities will also be accommodated at other locations on campus.

"The transition period will be difficult but the reward will be great when we move into the renovated building and get to work in a high-tech modern facility," says Marshak.



Bethke retires from department

After over thirty years on the University of Illinois campus, professor Craig Bethke retired in July of 2012. But don't worry; you'll probably still catch a glimpse of him around the department.

"Honestly," Craig says, "I'm going to be just as busy in retirement as I was before."

Craig will be splitting his time between Champaign and the sunny shores of the west coast, where he will be continuing research as a visiting professor at Stanford University. His professional career not only spans over three decades, but also includes three very different specializations: groundwater flow and transport, chemical hydrology, and aquifer microbiology.

"Craig has had a career like no one I know," says Steve Marshak, director of the School of Earth, Society & Environment and colleague of Craig, "He's been three different iterations of a scientist and has been successful, often becoming the preeminent expert, in all those fields."

Growing up in a suburb of Washington, D.C., Craig was pretty certain of what he wanted to do with his life at an early age – geology was in his blood, after all.

"My father was an economic geologist, so I knew about the field," he says, "I always found science to be very interesting, and while I knew I wanted to be part of the geology field, I could have never predicted the many paths I would take within it."

While pursuing his undergraduate degree in earth sciences at Dartmouth University, Craig spent time working at a flotation mill at a gold mine in Silverton, Colorado as well as a geochemistry lab at Penn State University. After graduation, Craig worked as a geologist for Exxon Research Company and ARCO Oil & Gas Company. He received a National Science Foundation fellowship to attend

graduate school and then began coursework at Penn State.

Craig's interest in groundwater hydrology eventually led him to transfer to the University of Illinois, where the leading expert in the field at the time, Pat Domenico, was conducting research and teaching classes. Shortly after Craig arrived on campus in 1982, however, Domenico left for a position in Texas and Craig was left without a mentor. Craig nonetheless continued his studies and after earning his doctorate in 1985, Craig actually assumed the position left vacant by Domenico and began working as an assistant professor for the department of geology.

Craig specializes in numerical models, i.e. setting up computer simulations of natural processes.

"There's an aspect of creativity in it that I really enjoy," he says, "Natural processes leave a lot of room for interpretation."

In his early career as a professor, Craig established an undergraduate class in groundwater hydrology in which students who came in with only the basic knowledge of calculus would be able to solve differential equations and write reactive transport models by the end of the semester.

"Plenty of people thought it was too advanced of a subject to be teaching undergraduates and many of the students themselves often say it is the hardest class they have ever taken," says Bethke, "However, the class always gets very high ratings and I often hear back from students saying that what they learned was very beneficial."

During his tenure at Illinois, Craig has successfully mentored dozens of undergraduate and graduate students and supervised many doctoral candidates who have gone onto distinguished careers in geology.

Craig's success as an educator is matched by his achievements in research as an author of groundbreaking articles

and the developer of multiple software programs that are now considered essential to the field. As a groundwater hydrologist, he co-created the Basin2 software, a numerical model designed to trace through geologic time the evolution of groundwater flow regimes within sedimentary basins. After shifting his focus to chemical hydrology in the early 1990's, Craig worked to develop The Geochemist's Workbench, a set of software tools for manipulating chemical reactions that is now used as a standard to solve problems in aqueous geochemistry by scientists in environmental protection and remediation, the petroleum industry, and economic geology.

Most recently, Craig has turned his attention to groundwater microbiology, working with his colleague Rob Sanford to explore microbiology from the point of view of a aquifer geochemist. Last year, they published their capstone paper, "The thermodynamic ladder in geomicrobiology," in the American Journal of Science.

In 2011, Craig was named the recipient of the National Ground Water Association's M. King Hubbert Award—the association's top award—for his contributions to the knowledge of groundwater.

"Professor Bethke is an outstanding hydrogeologist who has produced pure and applied research of the very highest international standard," wrote his nominator, James Best, Threet professor of geology at Illinois. Best said the "most remarkable" aspect of Craig's career is that he "reinvents his research program periodically by setting off in new intellectual directions."

Indeed, even in his retirement, Craig is looking to take on new intellectual challenges and continues to refine his software, give lectures, and conduct research. His colleagues at the department of Geology wish him nothing but the best.

Faculty and Students Earn Teaching Honors

The faculty and students in the Department of Geology continue to be rated excellent in their teaching endeavors, solidifying the reputation of the University of Illinois as a critical player in geosciences education.

Most notably, Steve Marshak, professor in geology and director of the School of Earth, Society & Environment, was named the recipient of the 2012 campus-level Undergraduate Teaching award. This award is given by the Provost's office and is the highest teaching award on the Illinois campus.

"As most of you know, Steve is an extraordinarily dedicated teacher, and has played a pivotal role in some of Geology's most important courses like Planet Earth and Structural Geology and Tectonics," says Tom Johnson, current department Head, "He has also taken leading roles in various other courses and initiatives in Geology and SESE, including Earth Resources Sustainability. He has also taught various graduate courses, and has maintained a vigorous teaching schedule while being very busy with administrative duties."

This is the second time that a faculty member from the Department of Geology has been given this campus-wide award. Professor Steve Altaner also received the award in 2004.

"I am pleased that the university is increasing its emphasis on encouraging its faculty into put strong efforts into teaching and I am proud that the department was recognized for its contributions to teaching at a campus level," says Marshak, "Teaching is an essential part of building a strong program."

Marshak was also recognized nationally for his teaching endeavors and received the Neil Miner award from the National Association of Geoscience Teachers (NAGT). Each year, the NAGT presents the Neil Miner Award to an individual for exceptional contributions to the stimulation of interest in the earth sciences.

Additionally, eighteen Department of Geology instructors were named to the University's List of Teachers Ranked as Excellent by their Students for the spring, summer, and fall 2011 semesters.

Faculty and academic professionals appearing on this list include Stephen Altaner, Alison Anders, Chu-Yung Chen, Bruce Fouke, Craig Lundstrom, Ann Long, Steve Marshak, Michael Stewart, and Xiaodong Song.

Graduate students Alex Bryk, Brooke Eickhoff, Carly Hill, Jessica Hinton, Stephanie Mager, Eric Obrock, Mauricio Perillo, Sam Slaven, and Doug Torbeck were named to the list for their work as teaching assistants in the department.

Six instructors received the highest ranking of "outstanding." Jessica Hinton and Ann Long took top honors in the spring semester while Craig Lundstrom, Steve Marshak, and Eric Obrock earned this ranking in the fall semester. Stephanie Mager received this ranking for her work in both the spring and summer semesters.

Rankings are released every semester and are based on student evaluations maintained by the Center for Teaching Excellence on the Illinois Campus.



Q & A with Dr. Lijun Liu, new faculty member

The department is very excited to welcome Dr. Lijun Liu as a new assistant professor at the start of the fall semester of 2012. Lijun was selected via a lengthy and rigorous national search, from a pool of more than fifty applicants. He rose to the top in part because of his stellar

record and the natural charisma he showed in delivering a guest lecture to Alison Anders' Geology 107 class. Lijun's main interests lie in Geophysics and Geodynamics, and his first teaching assignment will be GEOL 450: Physics of the Earth. He has broad interests in Geoscience that will help the department meet students' needs in the coming years.

What degrees do you hold and where you are joining us from?

I earned my PhD in 2010 from the California Institute of Technology (Caltech). Since summer 2010, I have been a John Miles Postdoctoral Fellow at the Scripps Institution of Oceanography at the University of California, San Diego.

What are your research interests?

I have a broad interest in doing Earth Sciences. My main research experiences have involved using high performance computers to study the dynamic evolution of Earth's lithosphere and mantle, during which I merge together a vast amount of data from geophysics and geology to construct a model. On the other hand, I also use computer models to understand the fast decrease of the geomagnetic field strength during the past 150 years, as well as using seismic waves generated from earthquakes to look at deep structures of the mantle.

What drew you to the Illinois campus?

The University of Illinois has one of the nation's most powerful computational facilities for academics, with the National Center for Supercomputing Applications (NCSA) situated right on the campus. In a time like now when multi-disciplinary research becomes the trend for doing natural sciences with an increasing dependence on high performance computing, I find U of I be to the ideal place for me to carry on with my dream of scientific discovery. During the interview, I found both faculty and students are nice, collegial and down-to-earth, and I really love to work with them in future.

Pinder Honored with 2011 Alumni Achievement Award

Dr. George F. Pinder (PhD, '68) was selected by faculty members to receive the 2011 Alumni Achievement Award, highlighting his lifetime accomplishments as a renowned hydrogeologist. His impressive career spans over five decades and exemplifies the Department of Geology's core missions of research, education, and public engagement.

Born and raised in Windsor, Ontario, Canada, Dr. Pinder received his undergraduate degree in geology at the University of Western Ontario. He came to Illinois to pursue his doctorate in geology, with an emphasis in hydrogeology. Dr. Pinder and his advisor John Bredehoeft (also a recipient of our Alumni Award in 1998) were both involved in groundbreaking work that was being conducted in groundwater hydrology and computing on the Illinois campus at the time.

After working as a research hydrologist with the U.S. Geological Society in Washington, he joined the Civil Engineering Department at Princeton University as an associate professor. He was promoted to full professor five years later and served as the Chairman of the Department of Civil Engineering and Operations Research from 1980 to 1989. He served as the dean of the College of Engineering and Mathematics at the University of Vermont from 1989 to 1996, and is currently head of the Research Center for Groundwater Remediation Design at the University of Vermont.

Dr. Pinder has also garnered numerous awards, including the Horton award from the American Geophysical Union and the O.E. Meinzer Award from the Geological Society of America for his outstanding contributions to the field of hydrology. Additionally, Dr. Pinder has served as president of the Hydrology Section of American Geophysical Union, president of the International Society for Computational Methods in Engineering, and has acted as chairman for the Groundwater Management Committee, American Society of Civil Engineers, and chairman for the Groundwater Council, Environmental and Water Resources Institute, American Society of Civil Engineers.

Dr. Pinder is a preeminent scholar in the application of computational methods to problems of fluid flow in the subsurface. In addition to his over two hundred published papers and reports in the area of quantitative groundwater models, Dr. Pinder is the author of eight books and the founding editor of the journals *Advances in Water Resources* and *Numerical Methods for Partial Differential Equations*. His expertise has been requested in various notable environmental cases that have garnered national media attention.

Among his other accomplishments, Dr. Pinder has also been a dedicated educator, mentoring over thirty doctoral students and many more graduate students who have gone on to become distinguished scholars and leaders. He is currently a professor of civil and environmental engineering with a secondary appointment in mathematics and statistics at the University of Vermont.

The launch of the satellite Sputnik into Earth's orbit in 1957 marked not only the beginning of the "Space Race," but it also ignited one young girl's interest in astronomy and planetary sciences and set her on a path that would eventually have her teaching geology at the University of Illinois.

"By the time John F. Kennedy said that we'd send a man to the moon, I'd already been dreaming of being there for 5 years," says Dr. Susan Kieffer, Walgreen Professor of Geology. "I didn't take it seriously that he really did mean a "man", but that part of the space program basically came and went by the time I was out of grad school."

Still, Kieffer wanted to fulfill her childhood dream of being an astronaut, so, after completing her undergraduate degree as a physics/math major at Allegheny College, she applied to astronomy graduate programs around the country. How then did she end up pursuing a path in the geological sciences?

"A stroke of luck," Kieffer says, "I really hadn't heard of geology as an undergrad physics/math major. At that time, the Geological Sciences Division at Caltech had a planetary sciences program, and their chairman was raiding the application files from their physics/astronomy division to get quantitative students. Most of us who went into their planetary program had no geology, and so we were required to audit a semester of Geology 1, and take a field geology course that took us out for a couple of weekends into the southern California desert. I fell in love with geology then."

At Last! Employment in geosciences on the rise

After many years of lackluster industry demand for geoscientists, demographics and rising global demand for resources have finally swung around. The hiring frenzy of the 1970's has turned into a rising wave of retirements forty years later. The recent graduating class of geology students has plenty to look forward to in job prospects, according to a recent American Geosciences Institute workforce evaluation. The AGI report, released in 2011, indicates that by 2021, some 150,000 to 220,000 geoscience jobs will need to be filled and many of them will be offering compensation in the range of six figures.

In the last decade, employment in the geosciences field has increased despite the severe downturn in the global economy. In fact, according to the U.S. Bureau of Labor Statistics there were a total of 262,627 U.S. geoscientist jobs in 2008, and in 2018, the projected number of U.S. geoscientist jobs will be 322,683, a 23 percent increase. With half of the current geoscience workforce retiring in the next ten years, and less than 5,000 geoscience degrees awarded per year, the supply of newly trained geoscientists will most likely fall short of geo-

SUE KIEFFER

Kieffer continued her studies in planetary sciences and eventually earned her doctorate in the field from the California Institute of Technology, but geology has always played an important role in her research and studies.

"I've spent my career looking at processes on planets and their moons using terrestrial geology as the framework," says Kieffer, "I'm interested in processes that involve motion, preferably fast motion (scherzo instead of adagio, as one colleague described me), such as meteorite impacts, volcanic eruptions, and river hydraulics. I call myself a geological fluid dynamicist."

Kieffer's career spans over four decades, during which she has utilized her knowledge of planetary sciences to study geological happenings here on Earth, including meteorite impact sites throughout the U.S. and Mexico, the blast dynamics of Mt. St. Helens, the impact of the 1983 Colorado River flood, and the recent Japanese earthquake and tsunami. Perhaps, however, her greatest interest lies in the Old Faithful geyser in Yellowstone. In a 2010 interview with the American Geophysical Union (AGU), Kieffer refers to Old Faithful as her "field home."

"My fluid dynamics interests are rooted in trying to understand that geyser and then to bring the fundamentals that I learn there to more complicated settings on the earth and other planets," Kieffer says, "I had started studying Old Faithful geyser as a volcanic analog in the 1970's and that has been, and continues



to be, my favorite passion since I still don't understand that big pot of boiling water!"

Kieffer has been teaching at the U. of I. for the last decade, an experience she has found both very fulfilling and at

times challenging. She developed and taught a course in sustainability, which is now part of the new SESE major, and last year she taught a course on geological fluid dynamics, during which her students worked on a term project on the Tohoku tsunami that they later presented as a poster at the International Geological Congress in Melbourne, Australia.

Most recently, Kieffer was awarded a Distinguished Senior Research Fellowship of the European Union to spend three months working at Durham University, England. She was hosted by, and worked with, Professor David Petley, a prominent world expert in landslides. One goal was to extend Kieffer's theories for river hydraulics to the flow of landslides. The University lies in the World Heritage Site of the city of Durham, near the 900 year old Durham Castle.

Kieffer is also an active blogger, posting regularly on her site, *Geology in Motion* (<http://www.geologyinmotion.com/>), where she provides commentary on interesting geological events occurring around the world in the context of her own research work. Additionally, she will be completing a book for Norton Press on "The Dynamics of Disasters" that she hopes will be out later this year.

science workforce demand, meaning that for every graduate, there will be multiple jobs available to them.

Additionally, the mean annual salaries for all geoscience occupations are well above the national average for the life, physical and social sciences, and current figures indicate that salaries for entry level positions can range from \$50,000 to as high as \$150,000, depending on career specialization.

According to Tom Johnson, department head, many of the department's graduating M.S. students readily find jobs in the oil and gas industry, largely through increasingly present on-campus recruiting. The industry-academic network is hard at work, and students often benefit from the department's longstanding relationships with major geoscience employers. Recruitment through job expos, both at Illinois and on other campuses, as well as on field camps, is common.

Eric Obrock graduated with his Master's degree in geology from Illinois in 2008 and is currently working as a senior geologist at ExxonMobil in Houston, supporting and driving the development of software applications that geoscientists and engineers use in the business. His job search consisted of eight interviews with top ranked companies, an experience shared by many of his fellow graduates.

Tom Schickle, former recruiter for Shell and Illinois liaison, expects the job growth to continue. "Two things will continue the current hiring trend in the petroleum industry: the world still leans heavily on fossil fuels and an aging workforce," he says, "Shell is still actively hiring geology graduates worldwide. I know we have several Illinois alumni working for Shell we and have hired many summer interns in the last decade."

While this is certainly reassuring news to geology students currently entering the professional arena, the AGI report also indicates an acute need to ramp up the number of well-trained, well-educated geoscience graduates entering the geoscience workforce. Tom Johnson says the department is eager to do its part. "We have been happy to establish a pipeline of master's degree recipients to industry in the past several years, and to have those employers coming back for more of our talent. But this is just the beginning of the wave. We look forward to a new influx of talented, motivated students as word gets out about the good jobs with big salaries at all degree levels. Our programs will grow, and we will continue reaching out to our contacts to find ways to better train our students for the jobs of 2020 and beyond."

Ralph Early Grim; Scaling the Ten Angstrom Peak

by Ralph L. Langenheim

Editor's Note: "Windows into the Past" is a regular feature of the Year in Review contributed by Professor Emeritus Ralph L. Langenheim. Ralph's writing represents a long-serving faculty member's recollections and his perspectives of the Department's past.

Ralph Early Grim's first contact with the Geology Department was in 1925 as Harold Wanless' field assistant mapping the Aledo Quadrangle. Wanless, who had just visited his bride-to-be, picked up Grim at his home in Reading, Pennsylvania and drove him to Illinois in a Model T Ford. The trip took four days! After slogging up and down bramble-filled Illinois Creek beds with Wanless, Grim reportedly was delighted with field work and decided to become a geologist.

After six years at Yale, Grim needed a job in 1929 and was lucky enough to be offered a position as Assistant State Geologist of Mississippi and Assistant Professor of Geology at Ole Miss. At that time the entire staff of both organizations consisted of State Geologist and Professor Dr. E. N. Lowe, Grim and a single secretary, Grim had studied igneous and metamorphic geology at Yale, but no such rocks were exposed in Mississippi. Thus he began his work for the State Geological Survey with a state-wide examination of the Mississippi Eocene. This included the beginning of his life-time work on clays. Also, it was at Oxford, that he acquired, on a sand-green course, his life time addiction to golf—his memoir is full of critical evaluations of golf courses all over the world. In 1930, however, Governor Theodore Bilbo took control of the University Board of Trustees and fired about fifty faculty members, including Grim who was replaced by a shoe salesman. Bilbo, incidentally, was a rough-and-tumble politician who became famous as a southern segregationist senator. Grim got the news in the field by reading a newspaper.

Late in the summer, it was impossible to get financial support to return to Yale, but,

fortunately, Grim had been exchanging ideas with A. C. Trowbridge of the State University of Iowa, who was working on a similar project in Texas. Responding to Grim's appeal, Trow, as he was known, arranged for Grim to complete his doctoral thesis under his supervision at Iowa in 1931. Finally, Trow, a legendary figure in Iowa Geology, arranged, with his longtime friend, Illinois State Geological Survey Chief Morris M. Leighton, for Grim's appointment as the Illinois State Geological Survey's first petrographer.

Leighton gave Grim essentially a free hand as to his research, and Grim proceeded to master new techniques for studying clay minerals, chiefly differential thermal analysis and x-ray diffraction. Thus he began an almost sixty year career dedicated to determining the character of clay minerals and applying that knowledge to their beneficial use.

After joining Victor Allen, a faculty member at St. Louis University, in an optical petrographic study of Illinois "under-clay", Grim progressed to a systematic study of Illinois' clay products industry and, also, soon assembled a comprehensive collection of Illinois clays. He also found the University of Illinois to be fertile ground for his work, as the Chemistry Department included George L. Clark, a pioneer in X-ray diffraction. Grim became associated with Clark's research group and began his own collaboration with Bill Bradley, one of Clark's students, for whom he arranged appointment to the Survey. For thirty years, he and Bradley worked together studying Illinois clays and their utilization.

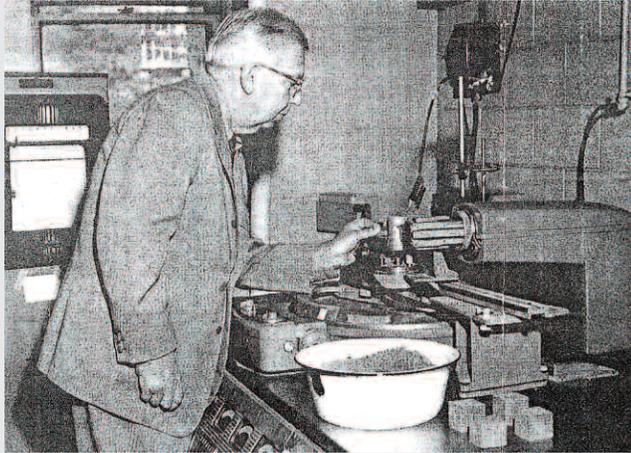
Early in his Survey career, Grim discovered that a useless, insufficiently refractory, clay being discarded by the Illinois Clay Products Company had properties fitting it for use as a bonding agent for foundry sands. Thus a previous waste product became an important resource for the company. This led to a long, profitable association between Otis Jones of the company, Grim, the

Survey and the U. of I. Geology Department. Grim also helped Jones' company replace its periodic kilns with the first, or one of the first, continuous kilns. In the process he constructed one of the first, if not the first, differential thermal analysis units in order to control and reduce the length of the kiln's firing cycle. Grim continued consulting with Jones and the Illinois Clay Products company for ten years making many trips to Joliet and Goose Lake.

Another notable event in Grim's Survey work was his discovery and description of Illite—a clay mineral similar in composition and structure to mica. Illite is, of course, named for Illinois, with its type locality being outcrops of Pennsylvanian rock in Champaign County. Grim published his work establishing the properties of the mineral in a 1937 article in the *American Mineralogist*, "The Mica In Argillaceous Sediments" with Bradley as a co-author.

In 1935, Charles Deiss, state geologist of Indiana and head of the Indiana University Department of Geology, offered Grim a job establishing clay mineralogy programs in both the Department and the Indiana State Geological Survey. Grim was receptive, as he wanted more freedom to travel and consult, and also needed time to write a book on clay mineralogy. When he mentioned this to George White, the Illinois Geology Department Head at the time, George immediately arranged an appointment as a Research Professor, teaching only graduate students and courses in clay mineralogy. Grim accepted and remained until his death as a Professor Emeritus in 1989. He taught clay mineralogy, applied clay mineralogy and a seminar in clay mineralogy. He also supervised one honors thesis, eight masters theses, and 28 doctorates.

In his memoir, Grim referred to his students thusly: "These are my children and I get much pleasure from keeping up with their activities." Notable students include: Hayden Murray, who became Vice President of the Georgia Clay Company and head of



Ralph Grim placing a sample in an oven fitted on an x-ray spectrometer diffraction unit. This posed picture is from the Illinois Alumni News of June, 1959. Although it doesn't show Grim actually conducting research, it is the nearest thing to a picture of Grim in action that I was able to find in the University Archives.

the Geology Department at Indiana, established that university's clay mineralogy program; William Arthur White, a long-serving clay mineralogist in the Illinois State Geological Survey; John Droste, a prominent faculty member at Indiana University; Paul Witherspoon, a petroleum geologist in the Illinois Survey and the University of California at Berkeley where he attempted to solve the problem of radioactive waste disposal; Floyd Michael Wahl, an eventual colleague of Grim's at Illinois, Provost at the University of Florida and Executive Director of the Geological Society of America; James Lynwood Eades, also of Illinois, and eventually head of the Geology Department at the University of Florida.

Grim summarizes, "In my active years, I always had six to ten graduate students working under me, with an average of three receiving the Ph.D. each year." This produced a steady diet of graduate student seminars featuring clay mineralogy. Most of these displayed x-ray diffraction curves, and most of them involved repeated references to the "ten angstrom peak". This, of course, referred to the basal spacing of the illite group clays, though such details were often incomprehensible to neophytes. I well remember Grim's protective wrath when a presumptuous junior professor in the department (yours truly) had the nerve to grill one of his students after one such presentation.

Grim published more than 125 bulletins and technical reports and three books: two editions of *Clay Mineralogy* (1953; 1968); *Applied Clay Mineralogy* (1962) and with Necip Guven, *Bentonites, Geology, Mineralogy, Properties, and Use* (1958).

Grim also did consulting of a broader nature, with the Development and Resource Corporation, which provided regional economic development services to governments throughout the world, often on behalf of USAID with a focus on the development of water resources and the construction of dams. When the company was organized, about 1957, Grim was employed as their chief consulting geologist. Their first large project was in the Iranian province of Khuzestan where their principal job was supervising construction of a large hydroelectric and irrigation dam at Pez. Grim supervised the geologic portion of the dam project, including setting up a cement manufacturing and irrigation works and evaluated the mineral resources of Khuzestan. Industrial minerals were found, including those needed for the dam.

Grim also investigated present and probable needs of electricity generated by the proposed Yukon River Ramparts Dam project on the Klondike River. The project, however, was abandoned because of limited need for the electricity and environmentalist opposition to damming the river.

Grim's most extensive consulting program began when Houphouet de Boigny, the soon-to-be president of a newly-independent Ivory Coast met David Lilienthal, of the Development and Resources Corporation, and engaged him to investigate the mineral resources of the Ivory Coast. As a result, Grim spent about fifteen years, aided by Albert Carozzi, organizing and guiding mineral development in the Ivory Coast. Efforts ranged from introducing fired-bricks, to replace the universal adobe in West Africa, to manganese and diamond mining, to the development of potable water supplies, and to production of sand, gravel and cement for modern construction.

Grim also did consulting of a broader nature, with the Development and Resource Corporation, which

To facilitate the operation, a state development corporation, SODEMI, independent of the existing geological survey, was set up with its own charter and budget. A technical council, consisting of Grim, Carozzi, two French geologists, and, eventually, two Ivorian geologists, was established to supervise and guide SODEMI activities. In the absence of trained Ivorian geologists, engineers and technically-trained workmen, European and Americans, were employed to lead the geological field parties and staff the supporting laboratories. At the same time, the government was encouraged to open schools, universities and technical training schools to train local personnel to take over the new responsibilities of SODEMI.

Houphouet de Boigny's pragmatic decision to import foreign personnel, and seek foreign capital in developing Ivorian industrial development, gave the Republic of the Ivory Coast several decades of solid economic and social growth and expanding mineral and industrial development under a stable regime. Recognizing Grim for his service in 1973, the Ivory Coast made him a Chevalier of the Ordre Nationale of the Republic of the Cote de Ivoire and gave him the Medal of the Ordre Nationale.

The remaining half of the Ralph Grim Saga is planned for the next in this series of historical accounts.

Ralph Grim left an 889 page, unpublished manuscript, "Memoirs of Ralph Early Grim" that was rescued after his death by his wife, Frances E. Grim, who had it typed verbatim, bound and distributed to the Department of Geology, the University Archives, and selected associates. This memoir, Grim's papers in the University Archives, Departmental records, and my memories are the principal sources for this essay.

We enjoyed having the chance to visit with our alumni at the 2011 Geological Society of America Annual Meeting in October and the 2012 American Association of Petroleum Geologists Annual Convention in April. Please be sure to join us for our alumni receptions at the 2012 GSA Annual Meeting on November 5th at the Charlotte Convention Center in Charlotte, North Carolina, and the 2013 AAPG Annual Convention on May 20th at the David L. Lawrence Convention Center in Pittsburgh, Pennsylvania.

1990s

Robert H. Lander (PhD '91) and **Linda M. Bonnell** (PhD '90) received AAPG's Wallace E. Pratt Memorial Award for publishing the best technical paper in the AAPG Bulletin in 2010. The award was presented at the 2012 AAPG Annual Meeting in Long Beach, CA.

2000s

Marynia Kolak (BS '06) recently completed her MFA program in Nonfiction Writing at Roosevelt University and received an Ostrowsky Nomination, a faculty nominated honor, for her thesis. She was hired full-time as a program assistant at the Feinberg School of Medicine at Northwestern, within the Department of Family and Community Medicine, where she will work with databases, data analysis, and GIS integration. Her son will be turning two in August.

Jennie Jackson (BS '99, PhD '05) has been promoted with tenure to professor at the Division of Geological and Planetary Sciences at the California Institute of Technology.

Kelly Voigt (BS '08) is working toward a master's degree in teaching at the University of Wisconsin - Milwaukee.

Zhaohui Yang (PhD '09) carried out an innovative seismic imaging project around the Big Horn mountains in Wyoming where the UIUC geology field camp was located for many decades before moving to Park City, Utah.

2010s

Ashley Howell (BS '11) is a graduate student at Louisiana State University and earned an internship with ExxonMobil for the summer of 2012.

In Memorium

Peter J. Farrelly (BS '52, MS '53) died on November 22, 2011, at the age of 80. Pete worked for Continental & Gas Company and several independent companies. He founded Carrick Resources Corporation in 1968, a privately owned oil and gas firm. Pete was a member of Rocky Mountain Petroleum Pioneers, RMAG, AAPG, and the Society of Petroleum Engineers for 40 years.

Max Creighton Firebaugh (BS '47) died on December 31, 2011, at the age of 90. During his career as a geologist, Max worked for Illinois State Geological Survey, Sohio Pipeline Co., and for Collins Brothers Oil Company from 1948 through 1966. He served as president of Illinois Geological Society in 1956-1957. In 1966, Max became manager of the Mt. Vernon Outland Airport in Southern Illinois. For the next 23 years, he worked aggressively to turn Mt. Vernon Outland Airport into a regional facility that provides excellent commercial services to individuals and industries in the area.

Glen M. Ford (BS '40, MS '41) died on August 3, 2011, at the age of 93. Glen worked as a geologist with Texaco until his retirement in the late 1970's.

Stefan Gartner (MS '62, PhD '65) died on July 12, 2011, at the age of 74. Steve was a professor of Geology and Oceanography at Texas A & M University. During his time there he created a core curriculum oceanography course and the associated laboratory, teaching the course many times before he retired in 2003. Part of Dr. Gartner's professional work involved nanofossils and their use in the development of productive oil fields. He was honored to serve as an NSF fellow in 1981-82.

Charles R. "Chuck" Haworth (BS '47) died on June 29, 2011, at the age of 87. During his professional career, Chuck was employed by Phillips Petroleum for 4 years, the Superior Oil Company for 30 years, HNG Oil Company for 3 years and additional time as a consulting geologist. He was a member of the American Association of Petroleum Geologists.

Elaine Vladimirovna Zworykin Knudsen (BS '47) died on February 8, 2011, at the age of 84. She worked for the U.S. Geological Survey in Washington, D.C. until she married in 1949.

R. Michael Lloyd (BS '52, MS '54) died on February 23, 2011, at the age of 80. After receiving his PhD from Cal Tech in geobiochemistry, he worked for the Shell Research Lab, retiring after 20 years as a respected scientist and then working as an independent geological consultant.

Wade Lowery McCormick (MS '53) died on September 11, 2011, at the age of 83.

Paul K. Sims (BS '40, MS '42) died on October 29, 2011, at the age of 93. His illustrious career with the US Geological Survey included contributions to knowledge of the Precambrian rocks of North America, especially the regional geology and metallogeny of the Lake Superior and Rocky Mountain regions.

Donald B. Snodgrass (MS '52) died on December 1, 2011, at the age of 83. He was a retired manager of quality assurance at the Reynolds Electrical and Engineering Company.

Wayne E. Walcher (MS '41) died on July 13, 2011, at the age of 96. Wayne was a petroleum geologist for Gulf Oil Co., Lario Oil Co., and J. M. Huber Corp. before becoming an independent consulting geologist in Wichita in 1949. In recent years he and his son, Doug, an engineer, have worked together operating oil and gas producing leases in Kansas. Wayne served a term as vice president of the Kansas Geological Society, and was a member for over 50 years. He held membership for more than 60 years in the American Association of Petroleum Geologists. He served on the national board of the Society of Independent Professional Earth Scientists.

Adolph W. Walter III (BS '43) died on July 7, 2012 at the age of 89. He had been a successful businessman and community builder in Anna and Carbondale, Illinois as well as the agent for the Walter Oil Partnership and various land trusts. Adolph spent his life reading, reviewing and discussing the subject of earth sciences. After his retirement, he traveled the world and began painting, with his focus on the accurate representation of landforms and geological details. When he lost his sight, he listened to books for the blind from the Library of Congress— earth sciences and art being the only two subjects he requested. He was a proud alumna of the University of Illinois and student of geology to the end.

Paul Witherspoon (PhD '56) died on February 10, 2012, at the age of 93. Paul was an influential research leader in hydrogeology for over 50 years. His career included positions at Phillips Petroleum, the Illinois State Geological Survey, and University of California at Berkeley. He was the first director of the Earth Sciences Division at Lawrence Berkeley National Lab and his research included reservoir engineering, geochemical and production engineering, geophysical studies and land subsidence research, and geothermal activities and nuclear waste isolation projects.

No further information available:

Glenn O. Fulk (BS '57)

Susan H. Smart (BS '67)

Robert G. Zirkle (BS '50, MS '52)

AROUND THE DEPARTMENT

The **Annual Research Review** was held at the Alice Campbell Alumni Center on April 17, 2012, highlighting research posters from all three departments in the School of Earth, Society and the Environment. The Department of Geology awarded Anirban Basu first place for his poster, "Uranium isotope ratios as indicators of microbial uranium reduction: when bacteria breathe uranium." Mauricio Perillo's poster "Understanding Combined Flows Bedforms" earned second place, while Gideon Bartov took third place with his poster, "Mercury stable isotope geochemistry as a tool for source tracing in a contaminated river system in Tennessee"

Jim Best was the co-convenor of the conference "Coherent Flow Structures at the Earth's Surface" at Simon Fraser University in Canada, in August. He also attended the American Geophysical Union Fall Meeting in December 2011 and co-convened three sessions.

Craig M. Bethke has received the National Ground Water Association's 2011 M. King Hubbert Award for major science contributions to the knowledge of groundwater. He also retired from the department of Geology in July of 2012 (see news story).

After thirty years of service to the department of Geology, including the last four years as depart-

ment head, **Wang-Ping Chen** has accepted a new position at Zhejiang University in China as Veritas Chaired University Professor. His primary affiliation is with the Department of Ocean Science and Engineering and he will be building a new program in marine geophysics.

Bruce Fouke spent the summer of 2011 as the Samuel von Pufendorf Visiting Research Fellow in the Pufendorf Institute for Advanced Studies at Lund University in Sweden.

There, he gave lectures at the Biotechnology Center of the Swedish Royal Institute for Technology (KTH) in Stockholm and the Tycho Brahe Museum on the Isle of Ven, Oresund Sound. He also traveled for fieldwork at the Kaali Meteor Impact Field in Estonia, the Cretaceous chalks of Stevns Klint, Denmark, and the Mesozoic sediments of west central Sweden.

Susan Kieffer has been awarded a European Union Senior Research Fellowship to work at Durham University in England for three months with a world landslide expert, Dave Petley. She began her work abroad in March (see news story).

Steve Marshak traveled to China to give several lectures there and also spoke at the Geological Association of Canada, EarthScope in Austin, and GSA on the continental-interior structure. He also was named the recipient of the 2012 campus-level

Undergraduate Teaching award by the University of Illinois (see news story).

Gary Parker Gary Parker has won the British Society for Geomorphology (BSG) "Best Paper" Award for 2012 for his paper "A new framework for modeling the migration of meandering rivers" published in the BSG's Journal Earth Surface Processes and Landforms. He was also the co-author of the paper, "Upstream migration of knickpoints: geotechnical considerations," which received the best paper award at the 5th International Conference on Submarine Mass Movements and their Consequences. Gary also received the Tau Beta Pi Daniel P. Drucker Eminent Faculty Award from the College of Engineering.

Rob Sanford gave several talks, including "Monitoring the Mahomet Aquifer: Perspectives on New Monitoring Tools, Thermodynamics, and Biogeochemistry" at the Illinois State Water Survey colloquium; "Learning how to 'Think' like a Microbe; an Exploration of Subsurface Ecosystems" at the University of Tennessee and at the Pacific Northwest National Laboratory in Richland, WA; and "Fate of Uranium in Space and Time: a Microbial Perspective" at Argonne National Lab.

Faculty

Stephen Altaner (Associate Professor)
Alison Anders (Assistant Professor)
Jay Bass (Ralph E. Grim Professor of Geology)
Jim Best (Jack C. Threet and Richard L. Threet Professor of Sedimentary Geology)
Craig Bethke (Ralph E. Grim Professor of Geology)
Chu-Yung Chen (Associate Professor & Director of Educational Affairs)
Bruce Fouke (Professor)
Tom Johnson (Associate Professor and Head)
Susan Kieffer (Walgreen Professor)
Craig Lundstrom (Associate Professor)
Steve Marshak (Professor & Director of the School of Earth, Society & Environment)
Gary Parker (Johnson Professor)
Xiaodong Song (Professor)

Affiliate Faculty

Kenneth T. Christensen (Kritzer Faculty Scholar & Associate Professor, Mechanical Science and Engineering)
Marcelo Garcia (Seiss Professor, Civil and Environmental Engineering)
Feng Sheng Hu (Professor; Plant Biology)
Surangi Punyasena (Assistant Professor, Plant Biology)
Bruce Rhoads (Head, Department of Geography & Geographic Information Systems)
Charles J. Werth (Professor, Civil and Environmental Engineering)

Research Staff, Post-Docs, Visiting Staff

Wenli Bi (Post Doc Research Associate)
Geoffrey Bowers (Visiting Research Science)
Pinaki Chakraborty (Research Assistant Professor)
Todd Cole (Visiting Lecturer)
Eileen Herrstrom (Lecturer)
Stephen Hurst, (Research Programmer)
Ann Long (Teaching Specialist)
Jeffrey Nittrouer (Visiting Post Doc Research Associate)
Rob Sanford (Research Associate Professor)
Alyssa Shiel (Post Doc Research Associate)
Tapan Sabuwala (Post Doc Research Associate)
Michael Stewart (Clinical Assistant Professor)
Jonathan Tomkin (Research Assistant Professor & Associate Director, School of Earth, Society, and Environment)
Allan Welsh (Post Doc Research Associate)
Thomas Zambardi (Post Doc Research Associate)

Adjunct Faculty

Ercan Alp Hannes Leetaru
Kurtis Burmeister Thomas Phillips
Brandon Curry George Roadcap
Robert Finley William Shilts
Leon Follmer Wolfgang Sturhahn
Dennis Kolata Scott M. Wilkerson

Emeritus Faculty

Thomas F. Anderson
Daniel B. Blake
Albert V. Carozzi
Wang-Ping Chen
Donald L. Graf
Albert T. Hsui
George D. Klein
Ralph Langenheim
Morris Leighton
John C. Mann
Alberto Nieto
Lois M. Pausch
Philip Sandberg

Department Staff

Marilyn Whalen
(Administrative Aide)
Lana Holben (Office Support Specialist)

Library Staff

Lura Joseph (Geology Librarian)
Sheila McGowan

Graduate Students

Elizabeth Armstrong
Gideon Bartov
Anirban Basu
Curt Blakely
Alex Bryk
Ron Cash
Jessica Colberg
Brian Farrell
Ted Flynn
Carly Hill
Jessica Hinton
Jing Jin
Marissa Kelly
Xiaoxiao Li
Stephanie Mager
Eric Obrock
Mauricio Perillo
Eric W. Prokocki
Liqin Sang
Mary Seid
Pragnyadipta Sen
Sam Slaven
Zheng Tang
Doug Torbeck
Xiangli Wang
Zhen Xu
Guimiao Zhang
Jin Zhang

Colloquium Speakers for Fall 2011 and Spring 2012

Fall 2011

August 26

Welcome and Geology Department Update

September 2

George Roadcap, Illinois State Water Survey
"The Mahomet Aquifer – Is the Glass Half Full, Half Empty, or Getting Bigger?"

September 9

Frederic Moynier, Washington Univ.
"Zn Isotopic Evidence for the Origin of Volatile Elements in Terrestrial Planets"

September 16

Bruce Fouke, Univ. of Illinois at Champaign-Urbana, Dept. of Geology
"Yellowstone Hot-Spring Systems Geobiology: Quantification and Prediction of Mineral-Water-Microbe Feedback Interactions"

September 23

Geology Department Alumni Achievement Award Presentation and The Glenn and Susan Buckley Lecture in Environmental Geology
Charles Goldman (Ph.D. Illinois, 1952), Univ. of California at Davis
"Lake Tahoe: A Half Century of Change and the World Water Crisis"

September 30

The Richard L. Hay Lecture in Geology
Beatrice Magnani, Univ. of Memphis
"Assessing the Extent of the Seismogenic Area in the South Central US"

October 7

Mike Loudin, ExxonMobil (member, American Geological Institute's Workforce Committee)
"Trends in the Geoscience Workforce"

October 14

Ercan Alp, Argonne National Laboratory
"Nuclear Resonant Scattering of Synchrotron Radiation: Applications in Geology, Materials Science, and Biology"

October 21

The Glenn and Susan Buckley Lecture in Environmental Geology
Kelly Caylor, Princeton Univ.
"Prediction and Measurement of Plant Water Use in Drylands"

October 26

Lex Van Geen, Lamont Doherty Earth Observatory of Columbia Univ.
"Contamination of a Pleistocene Aquifer by the Incursion of High-arsenic Groundwater from a Holocene Aquifer in the Red River Delta, Vietnam"

November 4

Lisa Tranel, (M.S. Illinois, 2005) Illinois State Univ.
"Evaluation of Erosional Processes Controlling Topographic Evolution in the Teton Range"

November 9

Dr. Matt Kirk (M.S. Illinois, 2002) Sandia Laboratories
"Interaction Between Geological Carbon Storage and Subsurface Microbial Communities"

November 11

Walgreen Lectures
Rónadh Cox, Williams College

"Comets Cause Chaos, by Jupiter!—The Effects of Crust-penetrating Impacts on Europa"
"Boulder ideas: Wave-emplaced Megagravel on the Aran Islands, Ireland."

December 2

The R. E. Grim Lecture in Geology and Mineralogy
Alfonso Davila, NASA Ames Research Center
"Searching for the Limits of Life on Earth (and Not Being Able to Find Them)"

Spring 2012

January 27

Sue Kieffer, Univ. of Illinois at Champaign-Urbana, Dept. of Geology
"Gateways to Emergence: Natural and Stealth Disasters"

February 3

The Richard L. Hay Lecture in Geology
Anne Meltzer, Lehigh Univ.
"Signal or Noise? Significance of Lateral Variability in the Himalaya-Tibet System"

February 17

The R. E. Grim Lecture in Geology and Mineralogy
Terry Engelder, Penn State
"Shale Gas: Why are the Environmentalists Taking Such an Interest?"

March 2

The R. James Kirkpatrick Lecture in Geology
Mike Perfit, Univ. of Florida
"Chasing Mid-Ocean Ridge Eruptions: Deep Sea Forensics"

March 9

Steve Marshak, Univ. of Illinois at Champaign-Urbana, Dept. of Geology
"The OIINK! Array – An Earthscope Study in Midcontinent Tectonics"

March 30

4th Annual Jack and Richard Threet Lecture in Sedimentary Geology
Rudy Slingerland, Penn State

April 6

Andrew Leakey, Univ. of Illinois at Champaign-Urbana, Plant Biology
"Plant Interactions with the Atmospheric CO₂ Pool: A Phyto-centric View of the Global Carbon Cycle"

April 13

Claire Belcher, Univ. of Edinburgh
"Experimental Approaches to Understanding the Flammability of Ancient Ecosystems"

April 20

Craig Bethke, Univ. of Illinois at Champaign-Urbana, Dept. of Geology
"Chemical Energy and the Microbiologic Zoning of the Subsurface"

April 27

The Glenn and Susan Buckley Lecture in Environmental Geology
Ken Nealson, Univ. of Southern California
"Microbial Redox Interactions with Solid Surfaces: Implications of Extracellular Electron Transfer (EET)"

May 4

Mike McInerney, Univ. of Oklahoma
"Microbially Enhanced Oil Recovery"

Courses Taught in 2011-12

GEOL 100	Planet Earth
GEOL 103	Planet Earth QRII
GEOL 104	Geology of the National Parks
GEOL 106	Extinction: Dinosaurs to Dodos
GEOL 107	Physical Geology
GEOL 117	The Oceans
GEOL 118	Natural Disasters
GEOL 143	History of Life
GEOL 199	Undergraduate Open Seminar
GEOL 208	History of the Earth System
GEOL 333	Earth Materials and the Env
GEOL 370	Water Planet, Water Crisis
GEOL 380	Environmental Geology
GEOL 390	Individual Study
GEOL 391	Individual Honors Study
GEOL 401	Geomorphology
GEOL 411	Structural Geol and Tectonics
GEOL 415	Field Geology
GEOL 432	Mineralogy and Mineral Optics
GEOL 436	Petrology and Petrography
GEOL 440	Sedimentology and Stratigraphy
GEOL 452	Introduction to Geophysics
GEOL 460	Geochemistry
GEOL 470	Introduction to Hydrogeology
GEOL 492	Senior Thesis
GEOL 493	Honors Senior Thesis
GEOL 497	Special Topics in Geology
	AB - Geomicrobiology & Geochemistry
	SK - Geological Fluid Dynamics
GEOL 512	Geotectonics
GEOL 515	Advanced Field Geology
GEOL 531	Structural Mineralogy
GEOL 553	Chemistry of Earth's Interior
GEOL 560	Physical Geochemistry
GEOL 571	Contaminant Fate and Transport
GEOL 591	Current Research in Geoscience
GEOL 593	Advanced Studies in Geology
GEOL 599	Thesis Research



Geology field trip to Starved Rock Park-Canyon of Matthiessen State Park near the waterfalls

Research Grants Active in 2011

U.S. AIR FORCE

Xiaodong Song—Joint Inversion of Crustal and Uppermost Mantle Structure in Western China

Xiaodong Song—Surface Wave Attenuation in Tibetan Plateau from Ambient Noise

ARCADIS US

Tom Johnson—Chromium Stable Isotope Analysis

ARCHER DANIELS MIDLAND

Jim Best—Project Catfish

ARGONNE NATIONAL LABS

Jay Bass—High-Resolution Inelastic X-ray Scattering at High P&T: A New Capability for the COMPRES Community

Robert Sanford—Assessment of Anaerobic Metal Reducing Anaeromyxobacter Populations in DOE Relevant Radionuclide Impacted Scenarios

EXXON-MOBIL

Jim Best—The Sedimentology of Tidally-Influenced Fluvial Bars in High-energy River Systems: the Modern Columbia River

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Susan Kieffer—An Experimental Investigation of Conditions Conducive to Groove and Ridge Formation at Double-Layer-Ejecta (DLE) Craters on Mars

Susan Kieffer—Simulation of the Effects of Vent Geometry and Canopy Interactions on the Plumes and Deposits on Io

NATIONAL SCIENCE FOUNDATION

Alison Anders—Co-evolution of Orographic Precipitation Patterns and Topography in the Western Ghats, India

Jay Bass—Sound Velocities and Elasticity of Deep-Earth Materials at High Pressures and Temperatures

Jay Bass—Consortium for Materials Properties Research in Earth Sciences (COMPRES): National Facilities and Infrastructure Development for High-Pressure Geosciences Research

Jay Bass—Community Facilities and Infrastructure for High-Pressure Mineral Physics and Geosciences: COMPRES II

Jay Bass—Collaborative Research: High Pressure Calibration at High Temperatures

Jim Best—Collaborative Research: A Field and Numerical Study of the Morphology, Flow, Sedimentary Processes, and Stability of Sand-Bed Fluvial Bifurcations

Jim Best, Bruce Fouke, Marcelo Garcia, Gary Parker, and Bruce Rhoads—Acquisition of a State-of-the-art, Shallow Water Multibeam Echo-sounding System at the University of Illinois at Urbana-Champaign (UIUC MBES)

Jim Best, Marcelo Garcia, and Bruce Rhoads—Morphodynamics of Complex Meander Bends on Large Rivers

Jim Best—Conference Support: Coherent Flow Structures in Geophysical Flows at the Earth's Surface

Wang-Ping Chen—Collaborative Research: A Study of Deep Subduction Integrating Broadband Seismology and Mineral Physics

Wang-Ping Chen—Collaborative Research: Imaging the Continental Lithosphere with Earthquake Sources

Tom Johnson—Collaborative Research: Chromium Isotopes as Redox Indicators—Oxidation and Isotopic Equilibration Experiments

Susan Kieffer—Multiphysics modeling and terascale simulations of volcanic blasts over complex terrains

Craig Lundstrom—Collaborative Research: Probing Mantle Plumbing Beneath Pacific Ridges through Study of the Lamont and Vance Seamount Chains

Craig Lundstrom—EAGER: Collaborative Investigations of Isotopic Fractionation by Thermal Diffusion and Thermal Migration

Craig Lundstrom—Collaborative Proposal: Integrated Investigations of Isotopic Fractionation in Magmatic Systems

Craig Lundstrom—Collaborative Research: Investigating MORB differentiation through non-traditional stable isotope analyses

Steve Marshak—NSF Pre- Earthscope Workshop Proposal: Tectonic Targets for Earthscope in the Midcontinent

Steve Marshak—Collaborative Research: Structure and Dynamics of the North American Craton—An Earthscope Swath from the Ozarks to the Grenville Front

Xiaodong Song—Collaborative Research: Joint Inversion of Crust and Upper Mantle Structure in Central and Eastern Tibetan Plateau and its Margins

OKINAWA INSTITUTE OF SCIENCE AND TECHNOLOGY

Pinaki Chakraborty—Mechanics of Turbulent Flows, Granular Consolidation, and Supervolcanic Eruptions

PACIFIC NORTHWEST NATIONAL LABORATORY

Craig Lundstrom—Rifle IFRC Uranium Isotope Characterization

RUTGERS UNIVERSITY

Tom Johnson—Microbial Oxidation of Hg(0): Its Effect on Hg Stable Isotope Fractionation and Methylmercury Production

SHELL INTERNATIONAL

Gary Parker and Marcelo Garcia—Channelization by Turbidity Currents in Submarine Fairways and On Fans

TOYOTA ENGINEERING AND MANUFACTURING NORTH AMERICA INC

Jay Bass—Phonon Dispersion Relation Characterization by Brillouin Light Scattering

U.S. DEPARTMENT OF ENERGY

Jay Bass—Aqueous Geochemistry at High Pressures and Temperature

Craig Bethke—Field-constrained Quantitative Model of the Origin of Microbial and Geochemical Zone

Bruce Fouke—Understanding the Impact of CO₂ injection on the Subsurface Microbial Community in an Illinois Basin CCS Reservoir: Integrated Student Training in Geosciences and Geomicrobiology

Bruce Fouke—Recovery Act: An Evaluation of the Carbon Sequestration Potential of the Cambro-Ordovician Strata of the Illinois and Michigan Basins

Tom Johnson—Exploratory Research: Mercury Stable Isotopes as Indicators of the Biogeochemical Cycling of Mercury

Craig Lundstrom and Tom Johnson—Development Of U Isotope Fractionation As An Indicator Of U(VI) Reduction In Uranium Plumes

Robert Sanford—Microbiological-enhanced Mixing Across Scales During in Situ Bioreduction of Metals and Radionuclides at Department of Energy Sites

Robert Sanford—MURMoT: Design and Application of Microbial Uranium Reduction Monitoring Tools

U.S. GEOLOGICAL SURVEY

Jim Best—Surficial Geology of the Wabash Island Quadrangle Gallatin County IL Posey County IN and Union County KY

Steve Marshak—Architecture of Fold-Thrust Belt Structures along the Helderberg Escarpment in the Hudson Valley, New York

UNIVERSITY OF BRIGHTON (UK) WITH UK NATURAL ENVIRONMENTAL RESEARCH COUNCIL

Jim Best—Dynamics and Deposits of Braid-Bars in the World's Largest Rivers: Morphology, Processes and Subsurface Sedimentology

UNIVERSITY OF TENNESSEE

Robert Sanford—Towards Predictive Understanding of Nitrogen Flux in Soils

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The following is a list of friends and alumni of the Department of Geology who have donated to the Department during the 2011 calendar year.

Degrees Conferred in 2011-12

Bachelor of Science Degrees

August 2011

William Budd
Samir Darras
Chelsea Davis
Michael Frothingham
Norbert Gajos
Lucas Gschwind
Christopher Leisering
Christian Ovalle
Stefan Raduha
Ryan Sullivan
Julia Waldsmith

May 2012

Elizabeth Baird
Steven Battaglia
Daniel Beach
Kevin Bruns
Carl Carman
Ethan Castongia
Armando Hermosillo
Briana Millar
Annareli Morales
Ada Morgan
Douglas Spitzer

December 2011

Blake Benso
Jarrod Cook
Xin Song

Master of Science Degrees

August 2011

Brian Farrell, *"Expression of DSR Messenger RNA by Sulfate Reducing Bacteria with Varying Substrate and Temperature"*
Eric Obrock, *"Anatomy of a Carboniferous Transgression: Upper Tullig Cyclothem, County Clare, Ireland"*

December 2011

Valerie Finlayson, *"Understanding the Evolution of Compositional Zoning in San Juan Volcanic Field Ignimbrites Using Iron Isotope Ratios"*
Christopher Majerczyk, *"Geology of the Roberts Hill Area in the Hudson Valley fold-thrust belt, Greene County, Eastern New York"*

May 2012

Marissa Kelly, *"Influence of structural variability on glacially-eroded steps, Uinta Mountains, UT"*
Douglas Torbeck, *"Imaging the Crust and Uppermost Mantle of North Central Alaska Using the Joint Inversion of Ambient Seismic Noise Correlation and Receiver Function"*

Doctor of Philosophy Degrees

December 2011

Charles Bopp, *"The Isotope Geochemistry of Uranium: Igneous Petrology, Ore Deposits, and Groundwater Contamination"*
Theodore Flynn, *"Microbial Diversity and Groundwater Chemistry in a Pristine Confined Aquifer"*

August 2011

Zhen Xu, *"Seismic Study of the Crust and Upper Mantle Structure in Eastern Asia using Ambient Noise Correlation and Earthquake Data"*

Geology Student—Special Honors

Estwing Pick Award—Stephen Picek and Serena Gountanis

Harriet Wallace Award—Jin Zhang

R. James Kirkpatrick Award—Anirban Basu

Outstanding Teaching Assistants—Stephanie Mager and Jessica Hinton

Morris Leighton Award—Brook Eickhoff

Outstanding Senior Award—Elizabeth Baird and Trevor Hines

Roscoe Jackson Award—Alexander Bryk, Norbert Gajos, and Eric Prokocki

Winslow Award—Gideon Bartov

SESE Research Review Calendar Winner:

Mauricio Perillo, photo "Up In The Air" featured for the month of December in the 2013 calendar.

Mr. Rodney J. Balazs
Ms. Debbie E. Baldwin
Mr. Douglas Bates
Dr. and Mrs. William M. Benzel
Dr. Marion E. Bickford
LTC Ronald E. Black (RET)
Dr. Linda M. Bonnell
Dr. Michael G. Bradley
Ms. Annette Brewster
Mr. David A. Brierley
Mr. Ross D. Brower
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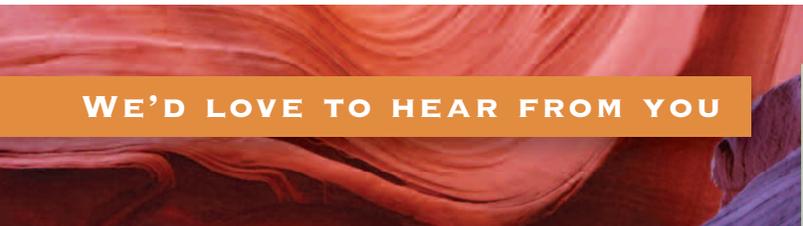
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