UNIVERSITY OF ARKANSAS
December 2010

Department of Geosciences
Geology, Geography, Earth Science

Faculty and alums enjoy the barbecue after the SGE Ice Breaker Field Trip in October, 2010.

Message From Our Geosciences External Advisory Board

Pending PhD Program in Geosciences

The Geosciences Department and the Fulbright College of Arts and Sciences recognized the need to better connect with alumni and industry to strengthen the department. This resulted in the creation of the Department of Geosciences External Advisory Board in May 2006. The Board consists mainly of alumni holding positions of leadership within the oil and gas industry, the environmental industry, geoinformatics, and state and Federal government. (http://geosciences.uark.edu/4402.php) It is tasked with providing advice in support of the Department and to work with the University of Arkansas administration to grow external funding for the Department.

The Board meets twice yearly with the Department Chair, the faculty and Fulbright College representatives. It is pleased to report that the department is well; healthy and growing even in these difficult financial times of reduced university budgets and funding. However, it also recognizes that our department is at a crucial time in its advancement. Scholarly activity, research expenditures, and graduate enrollment have steadily increased in the department throughout the past decade. The rapid growth of area natural resource sectors prompted by the Fayetteville shale play, when coupled with the explosion of the geospatial industry, requires highly-trained professionals with the knowledge-base, skills, and experience of geoscientists.

Dr. Zachry at Ice Breaker Field Trip

At the forefront of our department's development is establishing a doctoral program in Geosciences. The objective of the PhD program is to provide doctoral-level training for students in areas of strength unique to the University of Arkansas and to build areas of graduate research and instruction currently not available in the surrounding region. Our areas of strength and faculty expertise include:

- basin evolution and analysis, including sedimentation, structural geology, stratigraphy and geophysics
- Neotectonics and dynamic geomorphology
- geoinformatics, including GIS, remote sensing, GPS geodesy, and geospatial analysis
- groundwater dynamics, karst hydrology and limnology; and paleoclimatology

Students with doctoral-level expertise in these areas will contribute to the economic and environmental well being of the region.

PhD Program in Geosciences

The time is right to build on the foundation of our rich history of undergraduate and master's programs, and enhance course offerings, research opportunities, and industry engagement through the establishment of a PhD program in geosciences. This initiative is supported by the university's academic leadership at the highest level. The volunteer industry leaders who serve as members of the Geosciences External Advisory Board also fully support this initiative and have made and pledged significant resources.

During the remainder of the 2010 calendar year, we will meet as a group and design the PhD program. Department chair Ralph Davis and Provost Sharon Gaber will work in concert to ensure that the program meets nationally-competitive academic and research standards. It is foreseeable that this process will continue through spring of 2011.

Before presenting the PhD proposal to the Arkansas Higher Education Coordinating Board for approval, however, funding must be committed. Private funds of $1 million in endowed program support and $1.5 million for an endowed chair in petroleum geology will be required to establish the PhD program.

The university will cause private funds that are conditionally committed to be at least $700,000 designated in its annual budget for expanded, long term PhD faculty and student support. This will support the following:

- four new faculty hires (two in geology and two in geography/geoinformatics);
- ten new hard-funded PhD students; and, programmatic support (library, laboratory, computers, etc.)

With funding in place, the state should look favorably upon the university's proposal. When all is approved, search committees will be assembled and the hiring process will begin.

Endowed Faculty Chair in Petroleum Geology

Through the influence of our Geosciences External Advisory Board, we have become keenly aware that we could accomplish long-term relationships with industry through an endowed chair in petroleum geology. The minimum investment for an endowed faculty chair is $1.5 million. An endowment of this size will generate approximately $60,000 annually for the holder's benefit in its initial years. Endowed chairs are among the most prestigious posts in the academic world and provide the best way for us to continue to recruit and retain world-class faculty. Outstanding teachers attract exceptional students. Endowed support will allow these exceptional scholars to focus on teaching as well as research. A commitment at this level will endow a faculty position within the department of geosciences dedicated to petroleum-related research and training. The holder would be a new hire. We would hope to hire a strong industry leader and scholar whose experience, when combined with that of our existing faculty, will stimulate new ideas and creative solutions to the development of a premier program that integrates academic excellence with real world needs and expectations.

Endowment Management

Endowed funds are designed to provide perpetual financial support. The University of Arkansas Foundation, Inc. invests the gift value with the intention of earning a competitive rate of interest over the long term. The managing program would be allocated only a portion (about four percent) of the interest income generated by the investment. The remaining interest income will be reinvested into the endowment so the investment grows over time and is protected against inflation.

Ozark Hall Renovation

In May, 2011, the Department of Geosciences will be moving out of Ozark Hall for two years while it undergoes massive renovation of $28 million. Our temporary offices will likely be in the Stone House building on Arkansas Avenue for about 2 years. Labs and class-rooms will be relocated as well.

The plans for Ozark Hall include an extension of the west wing, to house the Honors College. Upgrades will be made to the mechanical systesm, including electrical and heating and air conditioning. Welcome to the 21st century! We will be excited to be returning to the modern teaching and research facility sometime in 2013.

Research Highlight

Jason Tullis, Associate Professor of Geosciences and space center faculty member, and a father again (Louisa, born August 29, 2010), is a Co-I on a recently awarded NASA grant "Settlement Systems and Environmental Change in the Northern Fertile Crescent", 1 Jul 2010 to 30 Jun 2013, $310,976. The team also includes J Casana (PI) and Jack Cothren (also geosciences). Jason will be working with a graduate student from 2011-2013 to analyze surface phenology in the Fertile Crescent using historical AVHRR (Advanced Very High Resolution Radiometry instrument) and Landsat data, and to assist in the development of an archaeological site search system based on declassified CORONA imagery.

Van Brahana receives award

Professor J. Van Brahana received the Award for Distinguished Service in Hydrogeology from the hydrogeology division of the Geological Society of America on November 2, in Denver, Colorado. The award is given annually for distinguished service and contributions to the field of hydrogeology.

Brahana considers himself remarkably fortunate to have discovered his passion for geology early in life, and for the opportunity to work at this profession for almost 50 years. His fourth-grade teacher ignited the initial geologic spark, and a succession of outstanding mentors fueled his passion for understanding processes and controls of ground water flow and transport in fractured-carbonate rocks. Stanley N. Davis served as his adviser for both his master's and doctoral degrees at the University of Missouri, and Bill Back provided insight and encouragement as a U.S. Geological Survey mentor; both were excellent role models by which Brahana guided his own career.

Brahana's professional career includes more than 28 years with the USGS as a research hydrologist (now emeritus), and currently, 20 years as a Professor at the University of Arkansas. In addition to these two major jobs, he has served as an adjunct professor at three universities, as a consultant and expert witness, and as a lab and field assistant for the Illinois Geological Survey. The focus of his professional research included regional hydrogeologic studies in the midcontinent utilizing flow tracing, aqueous geochemistry, and numerical simulation for hypothesis testing. He has contributed more than 70 peer-reviewed papers to the literature. As a professor, he has supervised more than 20 master's and doctoral students in hydrogeology, 10 REUs and Honors students, and has served on more than 100 graduate research committees. With Tom Sauer, USDA-ARS, he established the Savoy Experimental Watershed for long-term karst research.

Brahana's service record has been exemplary, including numerous committee assignments and leadership positions in which he has directed or served as chair of regional, national, and international meetings. He is a Fellow of GSA, chair of Fulbright College Cabinet at the University of Arkansas and a member of Aquifer Science Advisory Panel of the Edwards Aquifer Authority. He typically provides about 10 reviews for hydro-journals each year. He is most proud of the success of the large number of students with whom he has had the opportunity to work.

Over the past four decades, Brahana has served the geological profession in the academic and government arenas. His cheerleading of the hydrogeologic profession is famous, bringing many students and professionals to appreciate the varied aspects of the discipline.

After starting his career at the Illinois State Geological Survey while studying at the University of Illinois, Brahana consulted prior to gaining his master's and Ph.D. at the University of Missouri-Columbia. Brahana then went to the USGS and served for over 25 years publishing on a range of topics. For the past 20 years he has been associated with the University of Arkansas providing an understanding of how structural geology and soil processes affect the area's flow and transport in karst aquifers.

Brahana's service to the profession and to GSA, specifically the hydrogeology division, illustrates his strong commitment to the discipline. He has served on the hydrogeology volume committee of the decade of North American Geology series, on the GSA joint technical program committee, and on the South Central GSA board of directors. He has also served as program chairman and the secretary-treasurer of the hydrogeology division, as the technical program chair for the South-Central GSA, and as a convener and chair for numerous theme sessions at GSA meetings.

Brahana's greatest contributions has been his mentoring of hydrogeologists. He has educated hundreds of students on the theory and application of hydrogeology, specifically in the area of Karst Hydrogeology. He encourages students to "Be the Aquifer" in order to conceptualize the processes and to better understand the physics and mechanics behind theory.

Davidson teaching in Rome

(Fiona Davidson is in Rome this semester.) I'm teaching Modern Italian Politics and Empires of the Mediterranean at the University of Arkansas Rome Center. Most of the students are U of A European Studies, Architecture and International Relations students (21), but I also teach students from the University of Philadelphia (12). They are two 4000 level lecture/seminar classes, I teach in an 18th century wing of the Palazzo Taverna on Via Orsini in the Centro Storico in Rome. I've also been on field trips with the students to Florence and Tuscany and to various sites around Rome including Ostia Antica, Hadrian's Villa and Villa D'Este.

We're living in an apartment in the Palazzo Massimo right by Piazza Navona, also in the center of Rome and we spend a lot of time walking the city, exploring churches and looking for art (especially Caravaggio paintings). Sam loves the piazzas, the pigeons and the fountains. And, of course, we eat out a lot!

Faculty Promotions

Congratulations! Steve Boss has been promoted to Professor of Geology; Jack Cothren has been promoted to Associate Professor of Geography; Jason Tullis has been promoted to Associate Professor of Geography.

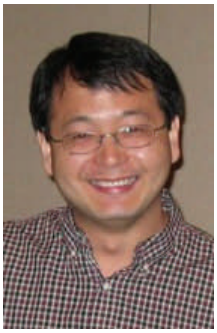
Paradise Sabbatical

Tom Paradise has been spending his Fall 2010 on sabbatical in Rome. He comes from a background in architecture, geomorphology, climatology, sediment petrology and cartography and has worked for more than 20 years across the Mediterranean examining the deterioration of stone architecture. He has been investigating the deterioration of Rome's travertine (from the quarries of nearby Tivoli), which has been widely used since the days of the Caesars, through the Papal Baroque era, and to the present.

Paradise has been conducting research on the deterioration of travertine on the Amphitheater of Castrense (built in 200AD). The Theater of Castrense was second in size to Rome's great Colosseum, and is now the garden wall of the Monastery at the church of Santa Croce in Gerusalemme (Holy Cross of Jerusalem). Attached to the Aurelian Wall in 275AD, the theater's walls have remained exposed for 1800 years. This research was conducted to establish a long-term record of travertine weathering over nearly two thousand years in the hopes of looking at 350 years of travertine deterioration at Saint Peter's Piazza and Basilica in Vatican City. At the Vatican, Paradise has been examining the deterioration on the 248 columns (4 rows of 62 columns) of the great double colonnade that 'embraces' the Piazza di San Pietro. Designed by the famous baroque architect and sculptor Gianlorenzo Bernini from 1658-1667, it also forms the grand entrance to Saint Peter's Basilica. He is investigating the effects of insolation, shadow, lithology, and aspect on the surface recession of the massive 13m (42') travertine columns. Hydrothermal carbonates like travertine can exhibit high porosity and permeability, but demonstrate remarkable compressional strength. This is why the Tivoli travertine has been used for monumental buildings like the Great Colosseum of Rome, the Church of the Sacred Heart in Paris, and the Getty Museum and Institute in Los Angeles.

Paradise's research is already yielding significant findings on the nature of travertine weathering. So, as the Vatican begins its restoration of the Great Colonnade, Paradise's research on the decay of Rome's travertine will have vital theoretical applications in its restoration estimated to cost 15-20 million euros ($22-$27 million dollars) over the next 4-5 years.

Research Highlight



Dr. Teng, Geosciences Geochemist, and his wife Jiangyang had their first child, a son, born May 31! He and his team of post-doctoral researchers have been very busy publishing. Some recent publications are below.

Teng, F.-Z., Li, W.-Y., Ke, S., Marty, B., Dauphas, N., Huang, S., Wu. F.-Y. and Pourmand, A. (2010) Magnesium isotopic composition of the Earth and chondrites. *Geochimica et Cosmochimica Acta*, 74, 4150-4166.

Li, W.-Y., Teng, F.-Z., Ke, S., Rudnick, R. L., Gao, S., Wu, F.-Y. and Chappell, B. W. (2010) Heterogeneous magnesium isotopic composition of the upper continental crust, *Geochimica et Cosmochimica Acta*, in press, doi:10.1016/j.gca.2010.08.030

Liu, S.-A., Teng, F.-Z., He, Y., Ke., S. and Li, S. (2010) Investigation of magnesium isotope fractionation during granite differentiation: Implication for Mg isotopic composition of the continental crust, *Earth and Planetary Letters*, 297, 646-654.

Dauphas, N., Teng, F.-Z. and Arndt, N. T. (2010) Magnesium and iron isotopes in 2.7 Ga Alexo komatiites: Mantle signatures, no evidence for Soret diffusion, and identification of diffusive transport in zoned olivine. *Geochimica et Cosmochimica Acta*, 74, 3274-3291.

Arkansaurus Fridayi, on display in Ozark Hall room 104

Department Hiring

The Department of Geosciences is currently reviewing applicants for two positions, one in low temperature geochemistry and one in hydrogeology. These new faculty will join us in 2011 as replacements for Ron Konig (retired), and Glen Mattioli who departed in August for a position at UT-Arlington.

John Hehr's Return

After 21 years, Dr. John Hehr, an Associate Dean in the Fulbright School of Arts and Sciences, has re-joined the Department of Geosciences, and is teaching five days a week! He is adjusting to the load quite well, teaching our climate and weather classes as well as General Geology and Environmental Geology.

PAGES Floodplain Lakes Workshop

Dr. Sonja Hausmann attended the Past Global Changes (PAGES) Open science Meeting in Corvallis, Oregon in July 2009, and the idea for a new PAGES workshop was generated and put into being here at the University of Arkansas last September. It was recognized that scientists and natural resource managers around the world would find it valuable to be presented and share information regarding floodplain lake sediments and human-climate interactions on landscapes.

PAGES and the UA Office of Research generously supplied travel funding for over 20 international participants who attended and presented lectures during the day, meeting and participating at the Cosmopolitan Hotel on the square in Fayetteville, and a field trip to the White River National Wildlife Refuge in Southeastern Arkansas.

UNIVERSITY OF ARKANSAS

Faculty changes

Summer 2010 saw the retirement of Ron Konig. Dr. Konig joined the department in 1959, and became chairman in 1971. He guided it through a period of growth and expansion, including having the general geology program included in the general education requirements for Arts and Sciences. He also introduced a number of changes in the geology curriculum to strengthen the program and improve the quality of students. Under his chairmanship, the faculty rose to eight with three adjunct positions, while space and equipment also increased. Returning to teaching in 1980, he taught Structural Geology, Igneous and Metamorphic Rocks, General Geology and served on many master's thesis committees.

Gregory Dumond joined us this past August as Assistant Professor. He was swept into the stream of the department, teaching structural geology to almost 40 students in his first semester. He will be leading the spring break field trip next semester to the Rio Grande Rift in Central New Mexico. His areas of expertise are structural geology, tectonics, metamorphic petrology and geochronology.

Dumond was a National Science Foundation Earth Sciences postdoctoral fellow at the Massachusetts Institute of Technology (M.I.T.), developing new techniques for constraining the ages of deformation events and metamorphic reactions via in situ micro-sampling of monazite and zircon.

Dumond received his Bachelor of Science in geological sciences from the University of Texas at El Paso, and his Master of Science in geosciences from Texas Tech University. He received his doctoral degree in geosciences from the University of Massachusetts-Amherst.

Xiangyang Xie, or Cheyenne as he prefers to be called, joined us last August as an Assistant Professor. He has recently started a student AAPG club, which includes a team that will be competing in the AAPG Imperial Barrel contest. He will be teaching Sedimentary Rocks and Fossils next semester. His areas of expertise also include basin analysis, petroleum geology, regional tectonics and sedimentation, and reservoir characterization and modeling.

Xie did his postdoctoral research as a fellow at the Institute for Geophysics at the University of Texas at Austin, and a second at the University of Colorado-Boulder.

Xie received his Bachelor of Science in geology from Lanzhou University in Lanzhou, Gansu, China, his Master of Science in petroleum geology from Northwest University, Xian, Shaaxi, China, and his doctoral degree from the University of Wyoming.

Please contribute to the Geosciences PhD Program by giving to either the *Geosciences PhD Initiative* fund or the *Petroleum Geology Chair* fund in the envelope enclosed with this newsletter. If considering a substantial gift, please contact us and we will guide you to the appropriate office.

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