

Department of Earth and Planetary Sciences

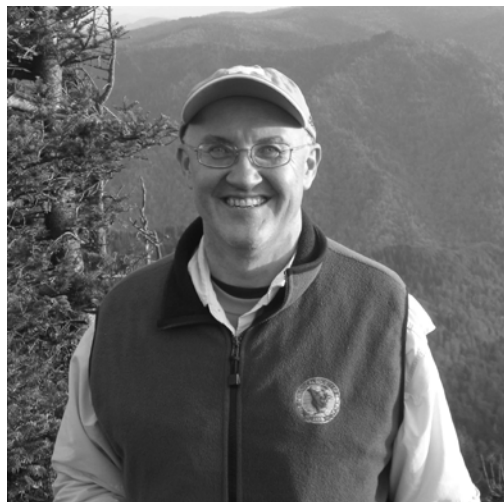
 University of Tennessee, Knoxville



2011 Annual Newsletter

LETTER FROM THE HEAD – Larry McKay

The department of Earth and Planetary Sciences has had a great year! Our biggest achievement was the hiring of 3 outstanding new tenured or tenure-track faculty members. This shows that UT recognizes the strength of our research program and appreciates the growth that we've experienced in our undergraduate (now 78 students in Geology and 40 in Environmental Studies) and graduate programs (now over 50 students). The new hires are: **Annette Engel** (aqueous geochemistry, geomicrobiology & karst), **Michael Hren** (stable isotope geochemistry, compound specific isotopes & climate change)



and **Josh Emery** (asteroids, icy bodies & carbon compounds in the solar system). These are all very productive researchers who chose UT over offers (or counter-offers, in Annette's case) from programs like Purdue, Virginia Tech, LSU and Illinois. I'm very excited about these new hires and feel that they will complement an already strong faculty, capable of building a great future for our department.

This was also a big year for Alumni engagement. One of my main goals this year was to seek alumni funding to create a series of Faculty Achievement Awards to help support and retain our most critical faculty members. In a 6-month period, we raised over \$300K in alumni gifts or gift agreements, for this purpose. Alumni events this past year included a fund-raising dinner in Houston in March, an Alumni Re-connect BBQ at **Tom McWhorter's** ranch near Houston in October (with bass fishing, 4-wheeling, horseback riding and other activities), receptions at GSA and AAPG conferences, and a Board of Advisors meeting/Tailgate party at UT in late October.

One of the outcomes of our visits and meetings with alumni was a renewed commitment to preparing our students for careers in the oil and gas industry. The surge in shale gas development in Appalachia is creating research and employment opportunities in this area, but retirements in major companies are also leading to increased opportunities for our graduates in conventional oil and gas development. To help meet this need, Bob Hatcher taught a course in geophysical well logging and is developing a new course on the geology of hydrocarbons. We're also looking at ways of incorporating relevant seismic interpretation technologies in existing classes. We are committed to providing our students with an education that will prepare them for a diverse range of career opportunities, in fields such as academia, environmental, K-12 teaching, government, mining (yes, a lead zinc mine reopened near Knoxville), as well as oil & gas.

Finally, I'd like to thank alumni for their support. Your generous gifts, especially to the Professor's Honors Fund and various Graduate Fellowships funds, are critical in helping us provide a high-quality educational experience for our students.

UT/EPS – RUSSIAN ACADEMY OF SCIENCES FACULTY / SCHOLAR EXCHANGE PROGRAM

Larry Taylor, at the instigation of his Russian Colleagues, has brokered an agreement between UT, through the Planetary Geosciences Institute in EPS, the Novosibirsk State University and the Siberian Branch of the Russian Academy of Science. The subject of the research will be “The Origin of Yakutian Diamonds”, a locale in northern Siberia wherein occur some of the largest diamond deposits in the world. Taylor has already sent his Ph.D. student, **Kevin Thaisen**, and Postdoc, **Cara Donnelly**, over there for 6 weeks of research.



Pictured in the Photo are (R to L): Akad. **Nikolai P. Pokhilenko**, Head of the Institute of Geology and Mineralogy and Presidium Member of the Russian Academy of Sciences; **Larry Taylor**, recovering from a stomach operation 8 days prior; Akad. **Vladimir A. Sobyenin**, Chancellor of the Novosibirsk State University; and Akad. **Vladimir S. Shatsky**, Dean of Geosciences at NSU.

LARRY TAYLOR’S LATEST RUSSIAN ADVENTURE

To set the scene for my latest Russian adventure, we start in Novosibirsk, central Siberia. My first night in Novosibirsk (8/19/11), I had a severe gut ache and then had severe diarrhea with beaucoup blood. The pain got worse such that at 2 A.M., Akad. Nick Sobolev had his family M.D. come to the hotel and examine me. Then off I went to the hospital in a “less-than-modern” ambulance. Akad. Nick Pokhilenko took over, my rich and successful diamond explorationist friend (largest diamond find in NW Canada), and governor of this portion of Siberia. He got me the best care possible with the best surgeon. But the hospital was another thing. Although the “hospital” was very old, in great need of refurbishment, etc., the surgeon was very competent. But off I went never to see anyone I knew or spoke English for three days. Lack of any anesthetics was a very real problem, until they finally gave me some ether drip. To put things into perspective, there were strings of fly paper rolls to keep the flying creatures down, and only a few lights worked in the operating room with the others having been cut down around where the ceiling was collapsing and peeling. But after they got a “Wagenstein” inserted

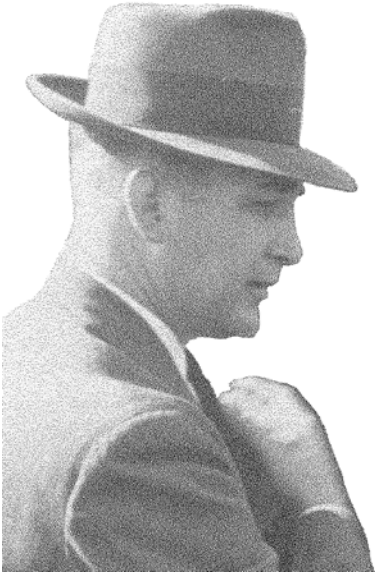
through my nose to drain my stomach and a “Foley catheter” inserted (I think they used a garden hose –ugh!) to drain my bladder, all with no pain killer at all; they finally put me to sleep with ether. No consultation with Dawn or anyone, even me, about what they were going to do. I now realize how it must feel to have a Caesarean section with an 8 inch cut into the middle of my abdomen. But, apparently this major cut into my gut allowed them to fixed (I hope) a severely torn portion of my intestine. They kept me in “intensive care” for three days, until at last, Dawn, Nick S, and Nick P were permitted in. Dawn was given a bed next to mine and she stayed until I was finally released after a week. Each day, they covered my head with a blanket for 10 minutes and turned on a 40 watt UV fluorescent light on the wall in order to “sterilize” the room. And surprisingly, they gave me NO antibiotics, pain pills, or anything as I left, only a girdle to wear. Probably to my benefit, this hospital was not so sophisticated and advanced such that I had to worry of any unusual ‘staph’ infection. The surgeon spoke Russlish, saying simply, “Take it easy.” Luckily for us, Nick P made arrangements for most of the monstrous cost, with the “token” charge to me of ~\$1500. With the extensive documentation they provided, all in Russian, I am sure that Blue Cross-Blue Shield will entirely understand – Ha! They will probably inform me that I will receive no payment for I should have received pre-authorization from them. Ha! Ha! But most importantly to this entire episode, My Major Caregiver – Dawn – was there for all the love and support possible. The Russians delayed my keynote address to the diamond meeting until the closing ceremony, which was the only time I was able to attend. It was good to have had so many close Russian friends to aid me in this time of need. And naturally, on the last night in Novosibirsk, we were back to toasting to “Health and Friendship and Beautiful Women” many times awith “medicinal Vodka.” After this ordeal, we flew to Beijing and then on to Seoul, where I gave some talks at Seoul National University, and Dawn and I attended our nephew’s wedding. I am still a bit weak and mad at myself for not recuperating faster. BUT, we were very glad to get home, where my M.D.s are still trying to figure what lies beneath this huge scare. I hereby end the tale of my latest adventure in Russia, having been thrown off planes, placed in jail, etc., in prior adventures. Only the good and loving Lord knows why I still survive at 73 years of age.

PLANETARIUM! – Larry Taylor

Larry Taylor, Director of the Tennessee Space Grant Consortium at UTK, has initiated and helped broker the financing and construction of a fully equipped PLANETARIUM in the Dept. of Physics and Astronomy next door in the Nielsen Physics Bldg. A dream of UT for many years that has come true through the combined assistance of the College, the Dept, of Physics, and the Planetary Geosciences Institute of the EPS Department, and Physics/Astronomy. **Paul Lewis**, above right, our UT space outreach guru, will be the director and major instructor of this new facility. This collaborative effort will become a fact with the Spring Semester of 2012, and will be used for classroom instruction for UT, the K-12grades of east Tennessee schools, and the general public. This is a proud moment for UTK and all our collective space outreach efforts over the many years.



SOME MEMORIES OF GEORGE SWINGLE **- Ernest E. Russell**



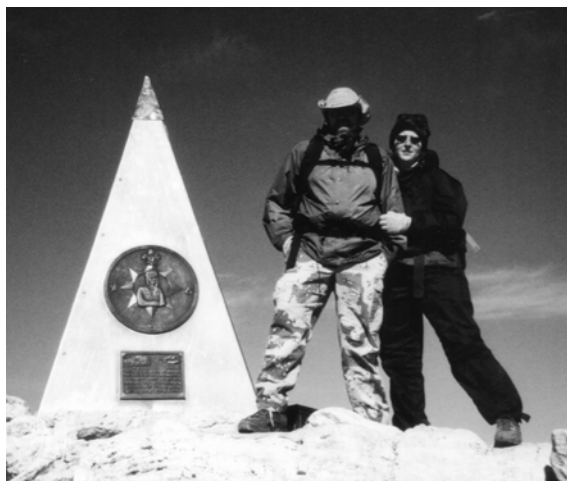
In the early 1950s while a graduate student at UT I was very fortunate to have Dr. George Swingle teach me field mapping in the Valley and Ridge as I worked under him for the Tenn. Division of Geology for two summers—with a handsome stipend of twelve hundred dollars a year as a graduate assistantship that didn't take a family of three very far even then. George was a dedicated field geologist in the Appalachians, and, over the years, taught a large number of students who, if I might use the expression, idolized him then, and now his memory—I'm one of them. George's own training had been formidable, he had been taught geologic field mapping by the master himself, Dr. Phil King, and in that most complicated of geologic regions, the Valley and Ridge and the Blue Ridge provinces in eastern Tennessee. As a person, George was quiet and reserved, and when spoken to would answer

almost inaudibly, but always to the point; he seldom raised his voice, and had a dry wit that was often served with a little twinkle in his eye that could be interpreted as you pleased.

George was very finicky regards maps and field techniques—he wasn't above telling how when once Dr. Phillip King was checking his field mapping near Cleveland, TN that he, George, found that he had forgotten his pencils. He said that Phil King didn't offer the use of his pencils, but suggested that George could cut a branch off a tree, sharpen it, and mark his map with it well enough to decipher it that night—George said it was a long day, but he never forgot his pencils again.

Being an 'old' fighter pilot (WWII) I had a healthy respect (and still do) for fuel levels, especially when I was in the 'boon-docks' far from a gas pump, so I was particularly aware of the fuel gauge in our field car, an old, beat-up, State, pickup truck. That was especially true when the gas gauge rocked on empty for a while. Somewhere in that process, after 'biting my tongue' as long as I could stand it, I would mention to George that we might need gas. Seemingly unconcerned about such mundane things he would answer laconically in a 'Wel-l-l-l' that seemed to drag on, and end in a "Don't worry about that". Obviously undaunted, far from human habitation, George would proceed to drive on for another twenty or more miles. My agonized thoughts were about how many miles I would have to walk to where we could borrow enough fuel to get back to a gas pump (then, in rural Tennessee, most gas pumps in the hill country were on a dirt road in front of a country store). Finally, when the gauge had been resting on empty for the Lord knows how long, George would stop at the gas pump at a rural store. Then I couldn't believe my eyes when he put more than 17 gallons in a 17 gallon tank. George never seemed concerned, but then we never had to walk, so he must have known something that I didn't.

MEET ANNETTEE SUMMERS ENGEL



I joined UT for the fall 2011 semester as the Jones Associate Professor of Aqueous Geochemistry. I was formerly at Louisiana State University where I had a joint appointment in the departments of Geology & Geophysics and Biological Sciences. My research interests include understanding the nature and extent of microbial activities in low-temperature geochemical reactions through time, determining the extent to which microbes affect biogeochemical cycles and ecosystem-level processes, including in symbiotic associations, and evaluating the mechanisms by which microorganisms have come to colonize so many different environments on Earth. I plan to teach courses at the 100-level, but also undergraduate and graduate courses in aqueous geochemistry, biogeochemistry, geomicrobiology, and speleology.

Some of my research projects, which span from the field and laboratory, to experimental and theoretical areas of low-temperature geochemistry and geomicrobiology, involve:

- Understanding the inorganic and organic geochemical and geologic consequences of cave and karst aquifer microbial communities
- Defining sulfur gas cycling in the subsurface by biotic and abiotic mechanisms, and the effects of low-temperature diagenetic processes in overprinting biogeochemical signatures in the geologic record
- Evaluating the molecular diversity, biogeography, and biogeochemical contributions of bacterial symbiotic associations in insects, lucinid bivalves (clams), and even the American alligator
- Studying microbial controls in arsenic speciation from hot springs and sediments
- Assessing microbial hydrocarbon degradation in coastal environments (e.g., beach sand, marsh grass, oyster beds, open water) affected by the *Deepwater Horizon* oil spill in 2010

Since moving to Knoxville, I began learning all the new university policies, unpacked boxes at home and in the department, and started to organize the new laboratory. I have had considerable assistance from everyone in the department, especially the office staff (thank you!), as well as from the four students that transferred from LSU with me - **Brendan Headd, Sarah Keenan, Kathleen Brannen, and Terri Brown (a 2010 UT alumnus who graduated with a M.S. degree)**. These students are pursuing their Ph.Ds and are all superstars. Each of them will present their research this fall at several conferences, including the Symposium for Subsurface Microbiology in Munich, Germany, the Symposium for Environmental Biogeochemistry in Istanbul, Turkey, and the Geological Society of America meeting in Minneapolis. There is little doubt you will read about their research escapades and findings in the coming years!

My husband, **Scott Engel**, is a professional geologist and works for CH2M Hill. He has over 15 years of experience providing project management and geologic and hydrogeologic services for environmental and geotechnical projects in the United States, including preliminary assessments/site investigations, remedial/feasibility studies, as well as directing and overseeing site remediation systems installation and operation.

In our spare time, we volunteer for the Karst Waters Institute (KWI), a non-profit organization whose mission is to promote understanding of karst water systems through interdisciplinary action. I am currently the Vice President of Communications. Scott helps KWI with publications, and we have co-edited publications for the organization in the past couple of years. In August, I was a co-organizer for the KWI “Carbonate Geochemistry: Reactions and Processes in Aquifers and Reservoirs” conference in Billings, Montana, and helped with the post-conference field trip to the Bighorn Basin in Wyoming. I’m not sure that I’ll volunteer to organize a conference anytime soon, as it was a tremendous amount of work. But the feedback was positive, and in the end, it was a rewarding experience.

Scott and I are happy to now call Rocky Top our new home, and are looking forward to a busy, productive year!

MEET MIKE HREN

The primary goal of my research is to understand how the earth system responds to perturbations in global climate and tectonics. By understanding Earth’s recent and geologic past, we can understand the underlying controls of global geochemical systems and generate more informed predictions of future change. As a stable isotope biogeochemist, I utilize isotopes of modern and ancient plant and microbial biomarkers and authigenic minerals to reconstruct past environmental or tectonic change. I continually strive to incorporate



new technologies and approaches in my research and look forward to building an active research group in the Department of Earth and Planetary Sciences.

Recently, I have started a number of new research projects to understand the evolution of past global climate and topography. One of these projects is focused on understanding the transition from the “greenhouse” climate of the late Eocene period to the “icehouse” conditions of the early Oligocene. As part of this research, I am working at a number of sites in western North America and Europe to develop multi-proxy isotopic records that will provide new insight into how changing climate impacts regional and global hydrology.

I recently returned from fieldwork along the upper reaches of the Yangtze and Mekong Rivers in China, where I am utilizing stable isotopes of plant biomarkers to understand the timing and magnitude of surface uplift of the eastern edge of the Tibetan Plateau, the “third pole” of the globe. This high elevation plateau has a major impact on atmospheric circulation and global climate and shapes the lives of more than one third of the global population, yet there is still considerable debate over when this landscape achieved its



high elevation. Through my research I hope to reconstruct the paleoelevation history of this region. This will not only inform us of the fundamental mechanisms of mountain-building, but provide new constraints on the development and intensification of the East Asian monsoon. The stable isotopic tools I use in my work have broad crossover applications in the studies of hydrology, geobiology, sedimentology, and geochemistry. I’m very excited to join the Department of Earth and Planetary Sciences, and I look forward to a whole host of new collaborations in the department and at the university in the coming years

GREGORY S. BAKER

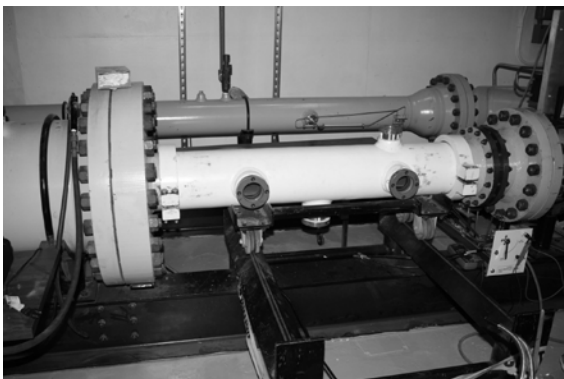
The 2010-2011 academic year was again an exciting one in near-surface geophysics at UT (a.k.a., “The Bakery”), full of international travel, important research discoveries, and student successes. First and foremost The Bakery is proud to announce the “intellectual birth” of two more graduate students: **Dr. David Gaines (Ph.D. 2011)** and **Caitlyn Williams (M.S. 2011)**, both of whom have headed to Houston (for ExxonMobile and Schlumberger, respectively). They will join several other geophysical graduates from the Baker lineage, also in the Houston area: **Kevin Burns (M.S. 2008)**, **Kristin Sturtevant (M.S. 2006, SUNY Buffalo)**, and **Jonathan Evenick (M.S. 2003 SUNY Buffalo, Ph.D. 2006 UT)**. Perhaps the most significant event of the past year was the group’s involvement in the annual international



Symposium on the Application of Geophysics to Environmental & Engineering Problems (SAGEEP). The conference was held in Spring 2011 at Charleston, SC. Dr. Baker was the technical program chair (an onerous task, indeed!) and is proud to have had a hand in developing the largest SAGEEP (both in terms of attendance and in number of papers presented) since the inception of the annual conference in the mid '80s. Kudos also go to the geophysics group (**Carr, Gregg, Hunkus, McDougall, Storniolo, Williams, Yeluru**) for giving four oral presentations and three poster presentations at the conference. We certainly had a noteworthy presence! The upcoming year will be a "closure" year, with the expectation that two Ph.D.s (**Carr** and **Yeluru**) and two M.S. students (**Edmunds** and **Storniolo**) will be graduating; therefore, 2012 looks to be an even better year!

DEVON BURR

Having completed my third year at UT, I'm beginning to feel like an old hand! I got to teach the 100-level course that I developed for the department -- Exploring the Planets: an introduction to planetary geology -- both semesters this year, and I quite enjoy it. The students are great, of course, and I tried out a different textbook and switched up my lecture. I also get to work with some terrific TAs, and update -- hopefully improve! -- the labs each semester. It's a lot of fun! My research activity produced results that were decided not what was expected. I travel out to the Planetary Aeolian Laboratory at the NASA Ames Wind Tunnel in Mountain View, CA, each summer to for my wind tunnel studies. My team and I have been refurbishing the old Venus Wind Tunnel for simulating conditions on Titan, the largest moon of Saturn, of which 20% is covered by aeolian dunes. The wind tunnel refurbishment has been a challenge, and we've never achieved the desired pressure ...until this summer! For the first time, we were able to run experiments at 12 bar, which is 12 times Earth's atmospheric pressure at the surface. The adjacent photo shows the wind tunnel test section and viewing ports, which are only a few centimeters in diameter, so it makes data collection somewhat tricky. But we were able to see saltation threshold and the resultant bedforms ... which looked nothing like we'd expected! For example, the streamlined shape appeared inverted. Something to investigate on my next trip out west. As another example, I went with 2 colleagues to Barrow, Alaska to investigate the meandering rivers there. Meandering river require bank cohesion, which on Earth is canonically attributed to vegetation. However, we see meandering paleo-channels on Mars, so hypothesized the permafrost might supply cohesion as well. We saw some beautiful meanders as shown in the adjacent photos, but



couldn't find any permafrost within 1.8 meters of the channel banks. Maybe the meandering planform is relict, or perhaps we have to go back during the spring floods, when bank erosion may expose the

(Left) Titan Wind Tunnel test section ready for action

BILL DEANE

I continue to enjoy teaching Geology 101 and 103. I will have to admit, that I am becoming more and more interested in teaching environmental geology. Everybody is intrigued by environmental issues and I have observed that 103 attracts a wider cross-section of students, especially those in non-science. I am very interested in reaching out to students with little or no scientific background. One sad note is that after 10 years of hosting the Earth Science Fair during fall break, we were forced to cancel due to plummeting attendance. In today's economy fewer and fewer schools are permitting field trips. On the brighter side, we are now participating in the "Job Fair" held each spring for middle- and high school students in Knox County. We use this venue to recruit future geology majors.



BILL DUNNE



The last year has been a progression with continued service as associate dean for research and facilities in the College of Engineering. At the same time, I was tapped to co-chair the campus's master planning committee, which amongst its responsibilities has the job of setting the priorities for the purpose, sequence and sizes of the future new and renovated buildings on campus. This planning process was, as you might expect, quite complex as it concerned campus green space, campus heritage, serving pedestrians, bicycles and vehicles, while advancing the instructional and research mission of UTK. On the geological front, I continue to teach the planetary tectonics section of the undergraduate planetary geology course, serve on the committees of students for Ed and Devon, and serve as an editor for the *Journal of Structural Geology*. The most fun geo/tech event of the year happened when I was sat on a historic steam train traveling from Durango to Silverton, Colorado with an iPad that linked me in real-time with location on a geological map of Colorado. It was great to examine the landscape with the aid of knowing my position on the

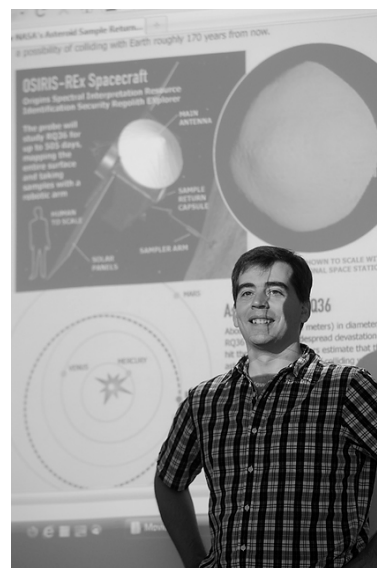
geologic map (I am good at that on foot, but on an unfamiliar railroad line without a topographic map in a place that I had not been before, it is more challenging!). Simply, cool! Also, the picture is from one of the cliff dwellings at Mesa Verde, where geology was clearly used to frame ancient habitation.

JOSH EMERY

I am very pleased to be joining the ranks of tenure track faculty in EPS. Over the past three years, I have enjoyed and benefited greatly from the vibrant research environment in the department, and now I am similarly invigorated to work with students in a class setting. In my first semester of teaching, I am co-teaching a graduate course on the geology of the outer Solar System. Halfway through the semester, I am impressed with the students' curiosity and insight, and I'm already looking forward to reading their reports of their course projects. Next semester, I will be teaching our introductory planetary geology course (Exploring the Planets), which will be a great opportunity to work with our freshmen and other non-science majors. The overarching theme that motivates my research in planetary science is discovering how our Solar System formed and evolved to its present state. My particular niche in this broad theme is determining surface compositions of planetary bodies and interpreting them in terms of surface alteration mechanisms and, ultimately, formation conditions. Of particular interest is investigating the distribution of organic material in the Solar System. As an observational planetary astronomer, the main techniques that I apply are reflection and emission spectroscopy and spectrophotometry using ground-based telescopes, space-based telescopes, and interplanetary spacecraft. Targets of my research have spanned the Solar System, from the innermost terrestrial planet (Mercury) to the farthest reaches of the Kuiper Belt (Sedna).

The past year has brought a number of exciting developments in my research. In May, NASA announced that it will fund the OSIRIS-REx robotic mission to return a sample from a near-Earth asteroid. I am a co-investigator on this mission, which will launch in 2016, orbit the asteroid (1999 RQ₃₆) for about 9 months in 2020 while we select a sample site, then the spacecraft will collect the sample and return it to Earth in 2023. I am also working with a different group of scientists and engineers to develop a concept for a robotic spacecraft mission to the Trojan asteroids, which share Jupiter's orbit around the sun. In June, I was fortunate enough to be in the right place at the right time to get the first spectrum of a star passing through the very thin atmosphere of the former-planet Pluto. These spectra reveal information about the composition and temperature of Pluto's atmosphere.

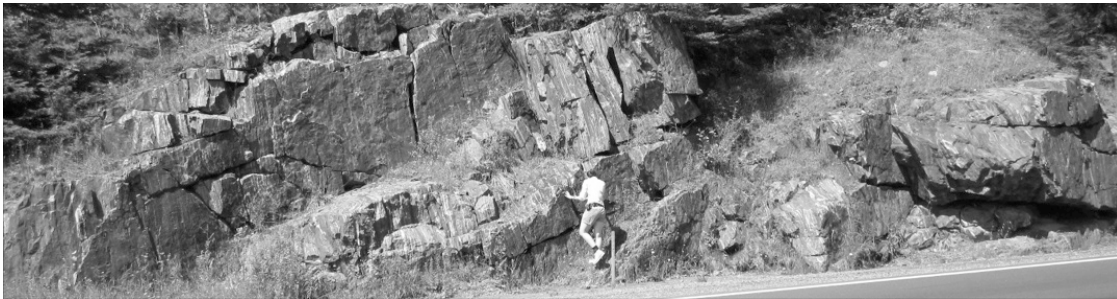
Ph.D. student **Driss Takir** has discovered, through telescopic observations, a fascinating trend in the form of water on asteroids, and he has undertaken laboratory measurements of meteorites to better understand the implications of this trend. He has presented this research at several scientific meetings in the US, England, and France. Master's student **Daine Wright**, is searching the edge of our Solar System (the Kuiper Belt) for signs of ices that will hopefully reveal clues to the past movements of Neptune and Uranus. I'm also very pleased to be working with geology majors **Kelsey Crane** on incorporating shape models into analysis of thermal emission from asteroids, **Kathy Moore** on



processing data of Kuiper Belt objects from the Spitzer Space telescope, and **Richie Ness** on spectroscopy (mineralogy) of asteroids. I'm also excited to be joined by a new Ph.D. student, **Mike Lucas**, who also plans to investigate asteroid mineralogy. I've been honored this year to be invited to several workshops to discuss with other scientists the implications of our discoveries of ices and organics on asteroids. All this research and the associated meetings have required a fair bit of travel this year, including two trips to Chile and two trips to Hawaii (Mauna Kea Observatories) for observing, trips to Denver and Tucson for the OSIRIS-REx mission, meetings in Paris and Nantes (France), Winthrop (WA), and Houston, as well as invitations to speak at Northern Arizona University in Flagstaff and at StarFest, a gathering of amateur astronomers in northeast Tennessee.

CHRIS FEDO

The past year has been very productive, with the graduation of two M.S. students, **Eric Hogan** and **Aubrey Modi**; two Ph.D. students, **Ian McGlynn** and **Melissa Hage**, will be finished soon. Eric, now working at ExxonMobil, did an excellent job working out the sequence stratigraphy across the Precambrian – Cambrian boundary in the Death Valley area. Having been working there since my senior thesis and it was great to see an eager student find new discoveries, and make an important contribution to the understanding of the base of the Sauk Sequence along a craton margin. Results of this work are coming out shortly in the *Journal of Geology*. Aubrey developed a neat petrology project that focused on what appeared to be a very simple problem, namely, reconstructing the provenance of first-cycle sediments in a desert where the sediments sit on the basement



from which they were derived. Well, it turns out that the sediments only marginally resemble the parent source rock. We are writing this up presently. Melissa has been sorting out the geochemistry and iron isotopes of the infamous Gunflint banded iron formation in Minnesota and Ontario. Using the “soil” geochemistry and textures from one of the Mars rover landing sites, Ian has really begun to demonstrate in two *Journal of Geophysical Research* papers how physical processes alone are capable of generating considerable compositional change in soils, which calls into question the role of water in their formation. Lastly, my newest Ph.D. student, **Latisha Brengman**, has also decided to tackle the difficult story associated with making and preserving BIF. She and I made the 3000-mile drive up to the Temagami and Abitibi Greenstone Belts in Canada this past summer (see pictures) to collect samples in order to develop exciting, rapidly evolving hypotheses as to their origin...more on this next year!

BOB HATCHER

2010-11 has been a productive year for Bob and his graduate student colleagues. We continued our geologic mapping and geochemical-geochronologic work on large faults and terrane accretion in the Georgia Inner Piedmont south of Atlanta. Part of this work, spearheaded by Ph.D. student **Matt Huebner**, has been investigation of the character of Mesozoic reactivation/inversion of the late Paleozoic Towaliga fault, and is one of the surprises that frequently appear in our research. This fault originally formed as a dextral strike-slip fault and shear zone deep in the crust where biotite and garnet are stable. It was reactivated as a sinistral strike-slip fault during the breakup of Pangea under shallower crustal conditions (~350° C) that produced both plastic (producing mylonite) and brittle (producing cataclasite) behavior along different but connected segments of the fault. Abundant water was also present during reactivation that dissolved and reprecipitated quartz in veins in low-pressure zones that were broken and again permeated by fluids to precipitate more quartz, a process that was duplicated many times as the fault moved repeatedly. Matt and an M.S. student, **Chris Howard**, led the 2011 Georgia Geological Society field trip in late October (~120 participants) to examine their results and those of previous students (**Brittany Davis**, M.S. 2010; **Robert Hooper**, M.S. and Ph.D. Univ. South Carolina), a current M.S. student, **Justin Rehrer**, and Bob in this area. Field trips of this kind are commonly led by seasoned professionals, rather than graduate students. Our SHRIMP U–Pb geochronologic work has also revealed a diverse assemblage of middle to late Paleozoic granites, middle Paleozoic gabbros, and (surprisingly) late Paleozoic metamorphism. Most of this research has been supported by the UT Science Alliance and the USGS EDMAP program.



Arthur Merschat (M.S. 2003, Ph.D. 2009, currently USGS) received word early in 2011 that a paper published in 2005 in the *Journal of Structural Geology* on the structure of the Appalachian Inner Piedmont based on Arthur's M.S. thesis, **Tim Davis'** Ph.D. dissertation (1993), and additional work by Bob was the paper in the journal most cited by others from 2005 through 2010.

Bob and a group of scientists from other institutions (USGS, Missouri Geological Survey, University of Memphis, and Kentucky Geological Survey) have received a 3-year \$450K grant from the Nuclear Regulatory Commission to study the paleoseismology in the East Tennessee seismic zone—the second most active seismic zone in the eastern U.S. This work follows a very successful 1.5-year NRC-sponsored pilot study in which small faults (some involving bedrock) and numerous water-bleached fractures were discovered that indicate East Tennessee has had earthquakes of at least magnitude 6.5 in the recent geologic past. A major research goal is to determine the recurrence interval of large earthquakes. A new M.S. student, **Kathleen Warrell** (B.S., Georgia Tech), is interested in working on this project.

A group of some 15 former graduate and undergraduate students led by **Doug Curl (M.S. 1998)** and **Mark Carter (M.S. 1994)**, along with six long-term (non-UT) professional colleagues/friends, “conspired” to nominate Bob for the 2011 Eastern Section of AAPG Outstanding Educator Award. He received the award in late September at their annual meeting in Crystal City, VA. Bob was both surprised and humbled by the call indicating he would receive this award. **Phillip Derryberry** completed his M.S. in 2011 on the Pulaski fault in northeastern Tennessee, and is working in the local oil industry with Planet Energy, based in Knoxville.

MICAH JESSUP



My group had an eventful and exciting year pursuing field-and lab-based research projects that integrate structural and metamorphic geology with geochronology to constrain the tectonic evolution of orogenic systems. **Ty Conner (B.S.)** finished his research project on samples from Leo Pargil dome, NW India and is now a graduate student in the M.S. program at the Colorado School of Mines. **Nick Costello (B.S. 2010)** published his undergraduate research project in *Pursuit – The Journal of Undergraduate Research at the University of Tennessee*. **Remy Leger (M.S.)** conducted four weeks of field research in the Great Smokey Mountain National Park to begin his project on the structural and metamorphic history of the Bryson City window. **Jackie Langille (Ph.D.)** received research grants from ExxonMobil and Sigma Xi. Jackie presented at the Himalaya-Karakoram-Tibet workshop in Canmore, CA and then traveled to NW India for three weeks of field research. **Liz Lee (M.S. 2011)** defended her thesis on the kinematic history of the Slide Lake shear zone, CO and began a job with ExxonMobil in the spring after submitting a manuscript to the *Journal of Structural Geology*. **Donnie Hicks (M.S.)** continues to work on emplacement mechanisms of mid-crustal granites in the Black Canyon of the Gunnison, CO. Our newest student, **Tim Diedesch (Ph.D.)**, joined me for a four-week research trip to a gneiss dome in Tibet. Tim managed to get a good start on his project despite having to spend many days waiting for the rain to stop. I presented invited talks at the European Geosciences Union meeting in Austria, the Geological Society of America Penrose conference in Spain and the Himalaya-Karakoram-Tibet workshop in Canmore. After the workshop I participated in a fascinating field trip across the southern Canadian Cordillera that began in Canmore and ended in the Coast Range near Vancouver. I also conducted three weeks of field research in Peru to initiate a new project. Finally, I had three awards over the past year: Donald Sickafoose and Kim Dinh Faculty Achievement Award, University of Tennessee Scholar of the Week (May 2011) and a University of Tennessee Professional Development Award.

LINDA KAH



I am incredibly proud of the successes of my lab group this year! In March, **Sarah Cadieux** successfully defended her M.S. thesis, looking at stratal patterns in intracrater layered deposits on Mars. Sarah is now hard at work on her Ph.D. at Indiana University. One month later, **Cara Thompson** successfully completed her Ph.D. dissertation on oceanic redox changes in the Ordovician, and then immediately left for Stonybrook University in New

York to start a new project investigating boron isotopes as potential proxies for changing oceanic pH. Cara's new work is being funded by an NSF Postgraduate Fellowship, which she received in December. Congratulations!!! Finally, back here at UT, Ph.D. student **Geoff Gilleaudeau** remains incredibly busy with his work on the carbon-sulfur-iron chemistry of black shale deposits from the Mesoproterozoic of Mauritania. Access to core materials from two different oil-gas companies is allowing Geoff to really take a look at the behavior of traditional geochemical proxies under a range of unusual oceanic conditions.

In the meantime, I have mostly been trying to keep my head above water. Now that we have a landing site (Gale Crater, with hundreds of rover-accessible meters of mixed phyllosilicate, sulfate, and as of yet undetermined sedimentary lithologies), and a launch date (November 25, 2011) for NASA's Mars Science Laboratory mission, training for the mission has kicked into high gear. Imagine taking a bunch of traditionally trained, hard-core field geologists and getting them to think about doing fieldwork through the lens of a rover that can only move meters per day—it really forces a new way of thinking about how you make science decisions in the field! I am also incredibly enthusiastic about being able to work again with my former undergraduate advisor (project lead John Grotzinger) who, by the way, is this year's winner of GSA and Sedimentary Geology Division's Laurence L. Sloss Award for lifetime achievement in sedimentology.

In addition to revving up for the MSL mission, I have also been working on several new projects that have me very excited. One project is looking at rapid strontium-isotope shifts in the early Paleozoic ocean as possible evidence of ocean-overturn events; a second project, being helped along by undergrads **Peter Robertson (B.A. 2011)** and **Jenny Dabbs**, is investigating the incorporation of a wide range of divalent ions (including REEs) into carbonate polymorphs as a potential mechanism for identifying original mineralogies of Proterozoic carbonate phases. I also am continuing to work on long-term projects involving the origin of Proterozoic carbonate fabrics and the diagenesis of some Mesoproterozoic calcitized evaporite deposits.

TED LABOTKA

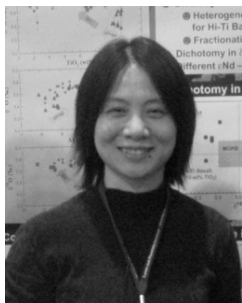
Ted was busy this year helping **Mike DeAngelis** finish his Ph.D. degree. Mike successfully defended his dissertation in August and has just started his position as visiting assistant professor at the University of Arkansas, Little Rock. Mike has gotten a couple chapters of his dissertation in press and is working on a couple more. Congratulations!

Ted also purchased a new Rigaku powder x-ray diffractometer. The instrument is sweet! It can analyze standard powdered samples as well as bulk, irregular samples, thanks to its dual-beam optics. The mineralogy class will now have some brand-new data to work with in their laboratory exercises.

Ted continues to conduct experiments in mineral–fluid systems. He finished studying the calcite–H₂O–CO₂ isotope-exchange system and is starting the other carbonates dolomite and magnesite. He is interested in the rates and mechanisms of C and O intracrystalline diffusion. The results apply to isotope-exchange in carbonate rocks in the crust and the preservation of stable-isotope compositions. He is finishing the study of coupled isotope and cation exchange in alkali feldspar. This is a process that involves dissolution and reprecipitation of feldspar. It is the process that results in hydrothermal alteration of volcanic and plutonic rock. He is also determining the rate and mechanism of reactions in metamorphosed carbonate rock, both in the laboratory and in the field. Graduate students **Annie Walker** and **Carissa Snyder** are beginning a study of the contact-metamorphosed carbonate rock in southwestern New Mexico. They will be going to some of the same localities visited by Poncho Villa about a hundred years ago. Of course, they're interested in the rocks!



YANG LIU



I was promoted to research assistant professor in February 2010, after spending my former years at UT as a post-doc researcher working with **Prof. Larry Taylor**. I obtained my Ph.D. in geology from the University of Michigan. My graduate research focused on experimental investigations and numerical modeling of volatiles (H₂O and CO₂) in magmas and their contribution to explosive volcanic eruptions. These research experiences became handy for my work on super-eruptions of caldera volcanoes, while I worked as a post-doc associate at the University of Chicago. Then, I decided to switch gear after reading an enticing advertisement in EOS by **Prof. Taylor** of the possibility to work closely with lunar soils and rocks, and other planetary samples. It turned out I did not diverge far from my background. Last year, together with **Prof. Taylor** and colleagues at Caltech, I published a nature paper reporting the discovery of “water” in lunar apatite in 2010. With two independent reports by other research groups, we established that the

Moon is “wetter” than previously though. This now becomes an intensely researched area. In addition to continuing the research of OH in lunar samples, I am also working on the geochemistry of mantle rocks, lunar rocks, and Martian meteorites, in order to understand the processes that formed and altered their geochemical compositions. In the last 12 months, I have traveled often between collaborator’s laboratories and used the state-of-art instruments to pursue these research projects.

LARRY MCKAY



Most of my time this year was devoted to departmental administration. Many people view this as a dreary task, but fortunately I found that I really enjoy it. The energy that I used to put into competing for external research funds now goes into competing for new faculty positions and other resources for our department. I still teach every term and my research program has continued to be successful, largely due to the efforts of my long-time collaborator, **Alice Layton** (in microbiology) and a couple of self-motivated M.S. students, **Bob Hunter** and **Kati Ayres**. Bob and

Kati are working, respectively, on the impact of dairy operations on groundwater quality and the occurrence of pathogens in aquifers in Bangladesh. Undergraduate students, **Erik Heider** and **Jonathon Moskal**, also worked with our group this summer, mainly on the dairy waste project. In my spare time, I did some fishing and finally got to hike up Mt. LeConte with my wife, Anna, and daughter, Sarah.

MIKE MCKINNEY

It’s been a busy year, as usual. My job as Director of Environmental Studies has been growing as the number of students in the major increases. I also helped start a new major, a B.A. in Sustainability which I will direct. My research efforts have also been growing, thanks to three great graduate students. **Grant Mincey** is working on impacts of coal mining on some creeks near Frozen Head State Park. **Hannah Johnson** is working on the impacts of the invasive freshwater mussel *Corbicula* on fish populations. My new student **Ryan Roney** is working on fossil echinoids in Brazil and other parts of the Caribbean. This is exciting because so little is known about the fossils



in those areas. My textbook *Environmental Science* is coming out soon (5th Edition) and I was the 2011 recipient of the Geology Department's **Bill Ross** Achievement Award (outstanding research, teaching & mentoring). I hear from **Jim Heller (M.S. 1995)** once in a while and he is doing well at his job with the state of Alabama, as is **Jon Bryan (Ph.D. 1991)** at Okaloosa-Walton Community College and **Dan Frederick (Ph.D. 1994)** at Austin Peay State University. I'm working with **Mike Gibson (Ph.D. 1988)** at UT Martin on a book on TN Paleontology.

HAP MCSWEEN



Hap is serving as Interim Dean of the College of Arts & Sciences from January through December 2011. This is the second (and he hopes the last) time he will have this exhausting job. He also continues his active involvement as Co-Investigator on spacecraft missions (the Mars Odyssey orbiter and the lone surviving Opportunity Mars rover, plus the Dawn asteroid orbiter) and as Principal Investigator for meteorite studies. Dawn reached Vesta, a large differentiated asteroid, in mid-July, and interpreting the images and mineral/chemical data from this mission is taking a lot of Hap's time. Several of Hap's Ph.D. students – **Andrew Beck** (studying olivine-bearing meteorites from Vesta) and **Ian McGlynn** (working on the textures and mineralogy of Mars soils) – just completed their degree requirements. Other on-going students'

projects include several petrologic studies of Martian meteorites and alteration scales for carbonaceous chondrites. Hap will also complete a three-year term as a Principal Editor for the journal *Elements* in December 2011. He expects to get back into geology full time in the spring.

JEFF MOERSCH

In 2010-2011, Prof. **Jeff Moersch** continued his work studying the surface of Mars using data from orbiters, rovers, and terrestrial analog field work. Together with his (now former) Ph.D. student, **Craig Hardgrove**, he developed new techniques for using rover-borne neutron remote sensing to probe the shallow subsurface of Mars for geochemical anomalies.

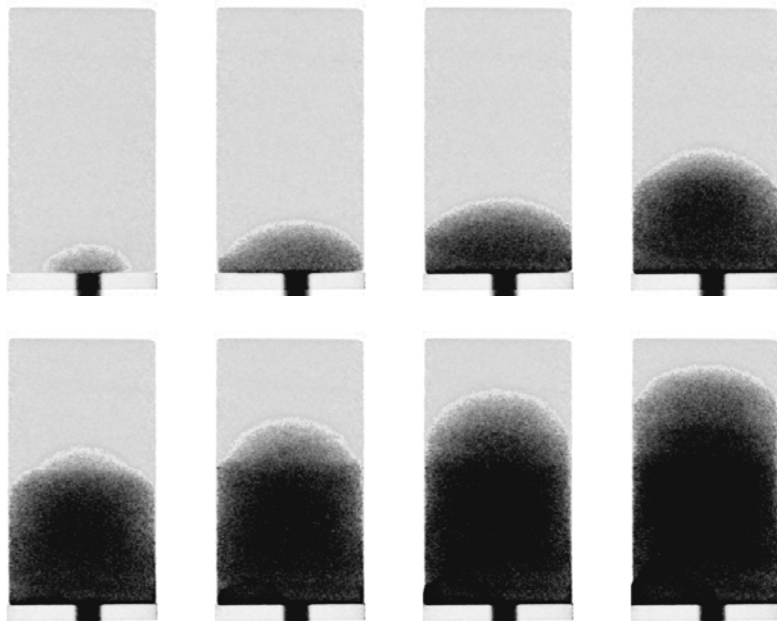


He and another Ph.D. student, **Christina Viviano**, finished developing a new way of mapping clays on the Martian surface using orbital thermal infrared data. Ph.D. student **Matt Chojnacki**, Prof. **Devon Burr**, and Moersch published one of the first accounts of active sand dunes on Mars, in an impact crater that is now being explored by the rover Opportunity. Moersch and Burr are also working together with M.S. student **Andrea Hughes** to document evidence that fan-shaped deposits in certain Martian craters formed as deltas in ancient lakes. In May, NASA selected two proposals Moersch helped write for large terrestrial analog field work projects that will be carried out over the next three years. One will feature a Mars rover simulation in the Atacama Desert of Chile, and the other will develop a “planetary lake lander” autonomous robotic buoy that will be tested in a lake in the Chilean Andes, as a precursor for a mission to the lakes of Titan. In August, Moersch traveled to Alaska to perform a pilot study on thermal infrared remote sensing of rock glaciers in the Alaska Range using a light aircraft platform (see photo).

ED PERFECT

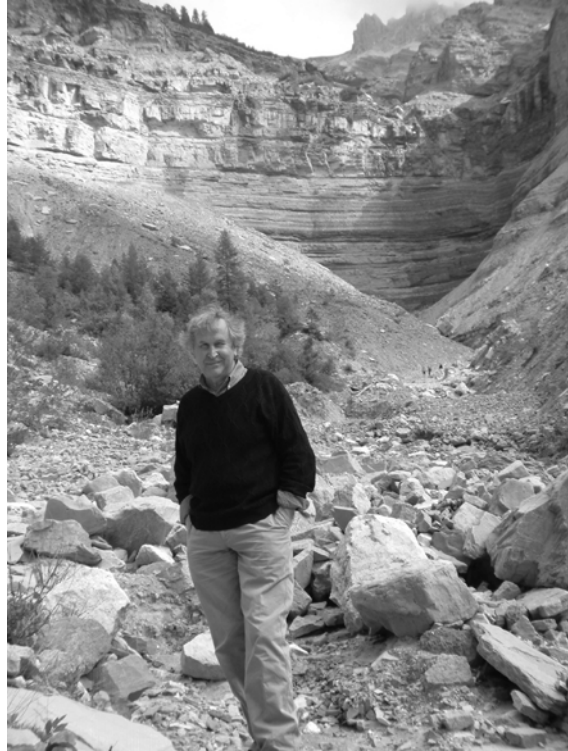
Ed Perfect continues to be active in research, teaching and service. Ed’s research focuses on multiphase flow and transport in variably-saturated porous media, a topic which has practical implications for soil remediation, enhanced oil and gas recovery, hydrothermal energy, and geologic carbon sequestration. Ed, along with his graduate students and Post-doc, are currently working on the quantification of clustering in rock fracture networks, estimating the porosity of rock units for subsurface sequestration of carbon dioxide and, in collaboration with colleagues at Oak Ridge National Laboratory, using neutron radiography to measure the hydraulic properties of rocks and soils (see figure below). Ed teaches a large introductory class on environmental geology as well as upper level courses in hydrogeology and geostatistics. On the service front, Ed is our Associate Head with administrative responsibilities for academic scheduling and space. Ed also serves on the Promotion and Tenure Committee for the College of Arts and Sciences.

Neutron radiography images of brine moving upwards into a dry sandstone core by capillarity



ROBERT RIDING

This year started with fieldwork in the Dolomite Mountains of northern Italy (that's me at the Permian-Triassic boundary) followed by a series of conference keynote talks at sedimentology and paleobiology meetings in Argentina, Spain, and Romania, as well as a talk at AGU's fall meeting in San Francisco. The Permian Mass Extinction is thought to have triggered an Early Triassic resurgence of microbial carbonates. In the spring I gave a talk at Cincinnati's storied geology department, and I also spent time researching in Granada, Spain with a side-visit to the French oil company TOTAL at its research center at Pau, within sight of the Pyrenees. A high point of the year was a visit to EPS by Ph.D. student **Pablo Suárez González** from Madrid's Complutense University in Spain. Pablo used his UT visit to research Cretaceous



stromatolites. He gave an excellent presentation of the results at the IAS sedimentological conference at Zaragoza in July, 2011. All this activity has focused on my research into microbial carbonates. Current projects range from seriously old rocks in Canada (2800 Ma) that contain the first really big stromatolites, to Quaternary crusts on reef corals in Tahiti and the Great Barrier Reef. The long history of microbial carbonates is one of their characteristic features and also one of the things that makes them so interesting. The bacteria that form microbial carbonates are tiny, but the structures they create can be very conspicuous, as these Canadian examples show.

Robert Riding is Research Professor in EPS; for more details about his research see his website: <http://robertriding.com/>

COLIN SUMRALL

This year, the NSF Assembling the Echinoderm Tree-of-Life project that I am a co-investigator on was funded. This three million dollar, five-year project combines an international team of biologists and paleontologists to place fossil and living echinoderms (starfish, sand dollars, crinoids and related taxa) into a single evolutionary statement. My work unraveling the identity and fate of individual skeletal elements is central to this project and shows great promise. I am in the process of finishing up work on the Ordovician echinoderm fauna from Morocco along with colleagues from Spain, France and England. These faunas show the high echinoderm diversity noted for shallow,

tropical, carbonate shelves characteristic of the North American Ordovician is a sampling artifact. Similar diversity is found in Morocco, where echinoderms occur in siliclastic environments at polar latitudes. My work on Perigondwanian faunas has also been expanded to France, Spain, and the Czech Republic where I have begun several new and profitable collaborations.



My students have also been very successful this year. **René Shroat-Lewis** completed her Ph.D. and has taken a temporary lectureship at Eastern Connecticut State University. **Will Atwood** and **Troy Fadiga** continue to make great progress on their Ph.D. projects centering on understanding early echinoderms from a 3-D morphological perspective. Two of my undergraduate researchers, **Paul Brooks** and **Emily Napier** presented their senior research projects at both the Southeastern Geological Society meeting and the UT EURECA competition where Emily won best in show!

LARRY TAYLOR

This last year has been very eventful, funded liberally by various NASA grants. Several talks and meetings in 3 cities in China; visits and talks to the European Space Agency in the Netherlands; visits to Sydney, Canberra, and Melbourne, Australia, to see if the water in the toilets really drains clockwise; a trip to Rome to advise the ESA on how to make pizzas; and two weeks of an emergency stomach operation and other fun and games in Siberia; followed by lectures in Seoul, Korea. Keeping two worlds going – planetary geosciences and diamonds and their inclusions – is proving a bit more difficult, but continues at a rapid pace.



Having been on the team of scientists that discovered *the first water on the Moon* (Science, 8/09), I was interviewed by the New York Times. They asked me what I had to say about this discovery, being the major person to shoot down all previous claims to water on the Moon since back in Apollo. I told them I would say the same thing that my Dad would say when he had lost money betting on the horses, “I had to eat my shorts!” NASA gave Larry an award of sorts for the “Quote-of-the-Year.

WEDDINGS & BABIES



Joshua was born on Friday, May 20, 2011 to **Kati** and **Tyler Ayers**. Kati is currently a second year graduate student in our department. Mommy and baby took the summer off. It had been six years since we had an expectant mom in the department.



Cara Thompson (Ph.D. 2011) and **Craig Hardgrove (Ph.D. 2011)** were married in a private ceremony on December 18, 2010. Both Cara and Craig are currently postdocing at Stony Brook and reside in Corum, New York. Cara is working on Boron isotopes in the Paleozoic. She is self-funded with a prestigious NSF Graduate Fellowship. Craig is researching the thermal infrared properties of microcrystalline sedimentary rocks to help understand depositional environments on Mars.



Julie Mathis (B.S. 2009) and **Gifford Waters** were married on Saturday, September 24, 2011.

Karen Stockstill-Cahill (Ph.D. 2005) and **Josh Cahill (M.S. 2004)** added **Emma Rose** to their family last May. Their first, **Maggie June** is now three. Karen is a Postdoctoral Fellow at the Smithsonian Institution and Josh is conducting research at Johns Hopkins.



ALUMNI NEWS

The oil & gas alumni in Texas and Louisiana have always been very active, but this year was exceptional. **Larry McKay**, **Hap McSween** and **John Dinkens** (Development Office) made a fund raising trip to Louisiana and Texas this spring. We had a gourmet Cajun dinner with **Don (B.A. 1950) & Flo Jones** and **Roger (B.S./M.S. 1972/75) & Bev Bohanon** in LaFayette, followed by several days of events in Houston. We had drinks with some of the recent UT graduates and a great Italian dinner with long time alumni supporters, including **Wesley Diehl**, **Mike Maitland**, **Kim Sickafoose**, **Mike Allison**, **Brent Couzens-Schultz** and **Brendan and Katy Bream**, as well as their spouses or partners. It was such a success, that **Tom McWhorters (M.S. late 1970s)** and his wife, **Mary**, decided to host an alumni BBQ and family fun day on October 1st at his 2300 acre ranch, located on the Trinity River just northeast of the city. This overnight event was attended by faculty members **Larry McKay** and **Micah Jessup** and included a pig roast, bass fishing, 4-wheeling, horseback riding and deer hunting. The weather was perfect (sunny & a high of 80°) and everyone had a good time. Alumni guests included **David McDonald (M.S. 1986)**, **Mike Kozar (M.S. 1986)**, **Joe Paul (M.S. 1986)**, **Tom Roberts (M.S. 1978)**, **Randal Kissling (B.S./M.S. 1969/81)**, **Chris Vandewater (M.S. 2003)**, **Brendan Bream (M.S. 1999/Ph.D. 2003)**, **Tom Cronin (B.A./M.S. 1980/83)**, **Gale McKinley (M.S. 1978)**, **Eric Hogan (M.S. 2011)**, **Mike Allison (M.S. 1984)**, **Wesley Diehl (M.S. 1982)**, **Kim Sickafoose (M.S. 1979)** and **Mike Maitland (B.S./M.S. 1977/79)**.



Dave Remley (M.S. 1999) and his wife visited UT this summer and discussed with **Larry Taylor** about all the “fun and games” he was having as an “Environmental Inspector” for the state of Kentucky. Dave and his lovely wife are enjoying life at their

home up Cincinnati way. I gave them a copy of our Diamonds of Siberia book, where he had made a good contribution with his M.S. thesis on Obnazhennaya eclogites.

Hanna Clark, the charming daughter of **Steve Clark (M.S. 1980)**, dropped in on **Hap McSween** at the beginning of the semester. Steve was Hap's first graduate student, and Hanna is a freshman at UT. After a career at Exxon, Steve is now a financial planner in Tennessee.

Chris Vyhnal (M.S. 1989) is chair of the science department at the Thacher School in Ojai, CA, teaching chemistry and astronomy to very bright high school kids. He and his wife have 4 children ranging from 5 to 11 years old. He is now working to acquire a new telescope for the school's observatory.

Dietrich Roeder, former UT professor of structural geology (before **Bob Hatcher**), became an American citizen in 2010 - about 40 years too late and right in an era of political disorder that is hard to understand, as he reports. He is completing a book on "American and Tethyan Fold-Trust Belts" and living in Lakewood, CO.

Tracey Pollock (nee Campbell) (M.S. 2003) writes **Mark Pollock (M.S. 2003)** and I have spent the past year in Portland, Oregon where I worked for the Oregon Department of Geology and Mineral Industries as a cartographer. This October we will be packing our bags and moving to Denver where I just accepted a position as a cartographer with National Geographic's Trails Illustrated department. Mark continues to work with Amec and has been with them for over eight years.

Brent Midyett (B.S. 1995) dropped by the department during the summer and chatted with Larry McKay. Brent took a hydrogeology course from Larry McKay in his senior year and said it was very helpful in his subsequent work in engineering and geophysics, which included surveys of military ranges for unexploded ordinance. Brent is now working in the audiovisual field for DFA Solutions in Knoxville.

David E. Jackson (M.S. 1982) is working as a consulting geologist with BDY Natural Sciences Consultants in Nashville. David specializations in environmental litigation and has visited the department several times this year to discuss a planned giving agreement and to participate in the Alumni Board of Advisors meeting in October.

Larry McKay met **Mark Mills (B.S. 1980)** at the Tennessee Water Resources Symposium last April. Mark gave a talk on storm water treatment technology for low impact urban development. He is working for AquaShields. They also talked about his former classmate, **Tom Cronin (B.S./M.S. 1980/83)**, who Larry had recently visited in Houston, Texas.

At a recent Bearden High School band concert, **Steve Jones (M.S. 1995)** reminisced with **Larry McKay** about his master's research looking at springs and seeps at the UT Arboretum in Oak Ridge. Steve is at Y-12, and both his son and Larry's son are in the Bearden band.

This year, **Clark Cropper (M.S. 1998)** was granted tenure as an Associate Professor of Geology at Volunteer State Community College. Volunteer State is a public, two-year, college located in Gallatin, Tennessee, which is 30 miles northeast of Nashville.

Greg Carlson (B.S. 2011) now works for SpecPro Environmental Services, based out of Oak Ridge. Greg worked with **Larry McKay** and **Chris Fedo** on a study of shale weathering at the new UT Little River Dairy Farm.

Stephanie Droste-Packham, who graduated with an Environmental Studies degree in May 2010 writes, “I took a fellowship position with Environmental America. I knew I wanted to fight for clean air and water, our mountains and oceans ... Now, as a fellow, I live in California and work in the downtown Sacramento office running a campaign to get one million electric vehicles on the road in California by 2025.”

Livio Tornabene (Ph.D. 2007) completed a postdoc at the Smithsonian Air and Space Museum and is now in a tenure track faculty position at Eastern Ontario in Canada.

Melissa Hage (current grad student) and **Zack Taylor (Ph.D. 2010 in Geography)**, who was a TA in our Geology department, are both Visiting Assistant Professors in Geology at Willamette University and reside near each other in Salem, Oregon.

Paul Baldauf (B.S. 1985) is chair of the GSA Geoscience Education Division and also Chair of the Environmental Science/Studies program at Nova Southeastern University in Ft. Lauderdale.

Lee Goad (B.S. 2008) has been working in the realm of carbon sequestration and is considering going back to grad school for either a M.S. in geology or combining Geology with her other love in the earth sciences, meteorology.

Adam Johnson (B.S. 2006) and his fiancée, **Katie**, have returned to the U.S. after another after another round of foreign travel and teaching (in Taiwan, this time). They are currently looking at employment opportunities as Adam applies to graduate schools. He is hoping to get into a program looking at water resource use and management in desert regions – it is very clear that the time he spent with the Peace Corps in Senegal has really focused his interest on water-stressed regions of the world.

As the British say, **Rhiannon Rose (nee Mayne) (Ph.D. 2008)** is “preggie” with a due date around Christmas. Rhi was surprised by her many friends with a “virtual” baby shower. Shower gifts were selected from several online registries and were all shipped to arrive the same week. The baby’s name has been selected, but the parents-to-be are keeping it a secret. (Your co-editor only can hope that they were wise enough to select Bill).





Several UT geology grads meet up in New York City in October 2010. Sharing Champagne atop a NYC watering hole at sunset are: (left to right) **Sara and Michael Quinn (M.S. 1991)**, **Kelly and Chris Olson (M.S. 1993)**, **Bobby van Lenten and Brent Couzens-Schultz (M.S. 1992)**.

Mike DeAngelis (Ph.D. 2011) is a Visiting Assistant Professor at University of Arkansas at Little Rock and **Rene Shroat-Lewis (Ph.D. 2011)** is a Visiting Assistant Professor at Eastern Connecticut State University.

Three cheers to **Gessika Guerra (B.S. 2011)** who joined the U.S. Navy.

Tyler Roy (B.S. 2009) informed **Linda Kah** that he is continues to work with PM Environmental, Inc., based in Cookeville, and all is going well in his life.

Bill Deane had a pleasant conversation with **Laura Stair (B.S. 2009)** at the Knoxville Gem and Mineral Show. Laura joined MACTEC Engineering and Consulting in November 2009 as a Staff Geologist. MACTEC was absorbed by AMEC earlier this year. She recently worked on the fly ash spill at Kingston, Tennessee and will spend the rest of the year at the Bellefonte Nuclear Plant Unit 1 in Hollywood, Alabama.

Matthew Massey (B.S. 2000) [Ph.D. from U Kentucky] is the 2011 recipient of the Journal of Structural Geology Student Author of the Year Award for his paper with colleagues David Moecher and David Prior: "*Matthew A. Massey, David J. Prior, David P. Moecher, 2011, Microstructure and crystallographic preferred orientation of polycrystalline microgarnet aggregates developed during progressive creep, recovery, and grain boundary sliding. Journal of Structural Geology 33, 713-730.*"

In October 2010, **Kelli Harrelson (B.S. 2010)** started as an environmental scientist/lab technician for Brown and Caldwell in Nashville. She expects to be doing some travelling to different areas in the southeast and collecting groundwater samples and then working processing the samples in the company's water treatment lab.

The department held an Alumni Reception at the GSA Conference in Minneapolis in October, which was attended by about 70 alumni, students, faculty and friends. Alumni attendees included **Bosiljka Glumac (Ph.D. 1997)**, **Dan Frederick (Ph.D. 1994)**, **Beth McClellan (M.S./Ph.D. 1988/93)**, **Peter Nabelek (B.S./M.S. 1977/78)**, **Steve Jarrett (B.S. 2010)**, **Arthur Merschat (M.S./Ph.D. 2003/09)**, **Doug Curl**, **Jeff Connelly**, **Bob Tolliver**, **Sara Bier**, **Patrick Wheatley (B.S. 2001)** and **Donald Stahr (M.S. 2008)**. A good time was had by all, while snacking on fancy “hor de verbs” and enjoying fine beverages.

STUDENT AND FACULTY AWARDS

Congratulations are due to **Arthur Merschat (M.S./Ph.D. 2003/09)**, **Timothy Davis (Ph.D. 1993)** and **Bob Hatcher** for receiving an award from the Journal of Structural Geology for the most cited paper in the period 2005 to 2010. The paper is entitled: “*The northern Inner Piedmont, southern Appalachians, USA: Kinematics of transportation and SW-directed mid-crustal flow.*” This speaks highly of the quality of our graduates and the quality of their research.

Andrew Beck (Ph.D. 2011) received the 2011 Pallas-Ryder Award, jointly given by the Geological Society of America and the Meteoritical Society, recognizing the best student-authored publication in planetary science. Andrew also received the 2011 Nininger Award for the best student paper on meteorites. This summer, he started as a postdoc at the Smithsonian in Washington, D.C. working with **Tim McCoy**.

Christina Viviano (Ph.D. candidate) was picked for the Dwornik Award for the best graduate student poster at the 2011 Lunar and Planetary Science Conference (LPSC). She will be honored at next year’s LPSC, and it comes with a \$500.00 prize.

Undergraduate **Emily Napier** (working with **Rene Shroat-Lewis** and **Colin Sumrall**) presented her senior research at the UT Exhibition of Undergraduate Research and Creative Achievement (EURECA) competition and won best in show. Emily’s research was then highlighted on the UT Office of Undergraduate Research webpage. Check it out, at the following link: <http://research.utk.edu/undergrad/highlights/napier.shtml>

Greg Baker received the TASC Award for his research on using geophysics to detect tunnels, which is related to homeland security and drug enforcement. **Bob Hatcher** received the Outstanding Educator Award from the Eastern Section of the American Association of Petroleum Geologists. **Chris Fedo** was elected a Fellow of the Geological Society of America in 2010.

Larry Taylor and **Noah McDougall (undergrad)** each received awards at the 2011 *UT Chancellors Honors Awards*. Dr. Taylor received the UT Alumni Association Public Service Award for his longstanding work in providing outreach activities. Noah McDougall received a Chancellor’s Undergraduate Extraordinary Professional Promise Award.

Jackie Langille (Ph.D. candidate) received a \$1000 award from Sigma Xi and a \$7500 grant from the ExxonMobil 2011 Geoscience Grant Program for her research.

Plus, **Jackie Langille (Ph.D. candidate)**, **Kelsey Crane (undergrad)** and **Chris Howard (M.S.)** each received a Mayo Award from the Southeast Federation of Mineralogical Societies. UT geology majors have won an astounding 20% of all Mayo Awards thanks to the strong support we receive from KGEMS.

Larry McKay was elected a Fellow of the American Association for the Advancement of Science (AAAS). This prestigious organization publishes the journal *Science* and plays a key roll in advocating for public support for scientific research and education. Larry joins **Bob Hatcher** and **Larry Taylor** as AAAS Fellows in our department.

Colin Sumrall gave the invited talk at the 2011 Cincinnati Fossil Fest and his student, **Will Atwood**, won the best student poster at the 2011 SE GSA.

ALUMNI BOARD OF ADVISORS

The Alumni Board of Advisors was restructured in 2011. We now have an Alumni Executive Committee that organizes activities, but the annual meeting is open to all. The Chair of the Executive Committee is **Micheal Maitland (M.S. 1979)** and he encourages alumni to contact him (mrm79vol@sbcglobal.net) with ideas for reunions, interaction with students, etc. The Board met at UT on October 28th. Alumni participants included: **Mike Allison (M.S. 1984)**, **Roger Bohanon (M.S. 1975)**, **Brendan Bream (Ph.D. 2003)**, **Larry Benson (M.S. 1960)**, **Rich Hopkins (B.S. 1976)**, **Syreeta Vaughn (M.S. 2005)**, **Janet Hopson (Ph.D. 1994)**, **Bob Hatcher (Ph.D. 1965)**, **David Riestenberg (M.S. 2001)** and **David Fugate (B.S. 1993)**. **Josh Cox (Undergrad President of Geoclub)** also participated, along with about a half dozen faculty members. The meeting addressed a number of topics, including the Chancellor's Initiative, which is aimed at helping UT reach the level of excellence of Top 25 Public Universities. Based on the 2010 National Research Council decadal report on Ph.D. granting programs, UT Earth and Planetary Sciences was between 27th and 33rd place (varies depends on rating method and criteria used). This is good, but we feel there's opportunity for improvement. A key aspect of this plan is improved Alumni engagement, which includes not only giving, but also alumni mentoring of students, career planning, local alumni reunions, etc. One conclusion of the meeting was that we need to substantially improve communications between alumni, students and faculty. The Board meeting was followed by a Tailgate Party on the Hill between the EPS Building and Ayres Hall before the UT – South Carolina football game. UT may have lost the game, but we had a great party, with about 50 people munching hot dogs or hamburgers on sunny afternoon.



ALUMNI AWARDS - Larry McKay

Our alumni are often successful and supportive of the department at every stage of their career. However, until this year, we've only had the *Distinguished Alumnus Award*, which is a lifetime achievement award. We've expanded our program to include several new awards, which are described below, along with the names of the 2011 recipients. The most important output of the department is our students and we'd like to celebrate their success and thank them for their financial support and service.

Distinguished Alumnus (existing award since 2000)

Dr. Charles Bartlett (Ph.D. 1974) received this award in April 2011 for his long record of success, which includes 11 years as a faculty member at Emory and Henry College, and over 30 years as a consultant in the oil and gas industry, engineering and environmental geology. Charlie is currently working on a major gift agreement with the department.

Accomplished Alumni (new award)

This is a mid-career award given to alumni who are leading successful careers and contributing their time and talents to the department. The 2011 recipients are:

Lawrence Benson (M.S. 1963) – see picture to right

Roger Bohanon (B.S. 1972, M.S. 1975)

Thomas P. Cronin (B.A. 1980, M.S. 1983)

Wesley W. Diehl (M.S. 1982)

David E. Jackson (B.S. 1978, M.S. 1982)

Micheal R. Maitland (B.S. 1977, M.S. 1979)

D. Kim Sickafoose (M.S. 1979)



Young Alumni Award (new award)

This award is to both recognize professional achievement and encourage participation of young alumni in supporting the department. The 2011 recipients are:

Brendan Bream (M.S. 1999, Ph.D. 2003)

Kathleen A. Bream (B.S. 1997)

Melanie A. Mayes (M.S. 1999, Ph.D. 2006)



Alumni & Friends Appreciation Award

This is an informal award, given for supporting the department. I'd like to thank the Knoxville Gem & Mineral Society for helping assemble the awards and donating many of the mineral specimens. We've given out approximately 20 of these awards in 2011.

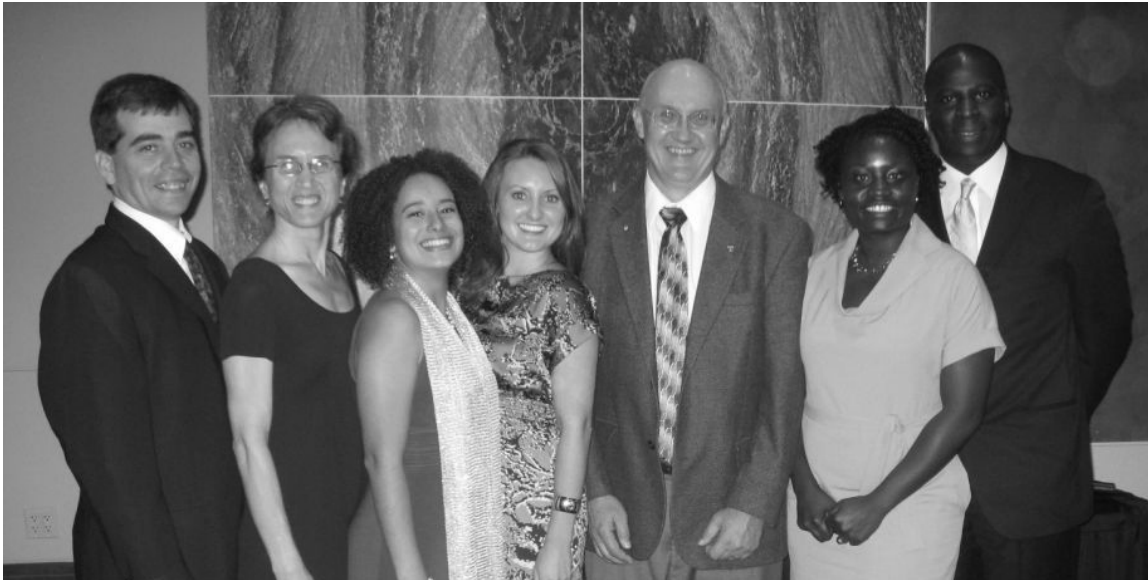
Did you know that **Berlin C. Moneymaker** (deceased) earned the department's first Masters in August 1929? The title of his thesis was *The Caves of East Tennessee* and it was also published as a book, which has become a collector's item. We will be posting a list of all students who earned their Ph.D. and Masters on the department's web site.

*2011 Annual Fall
Party at the
McKay's*



50 YEAR'S GALA

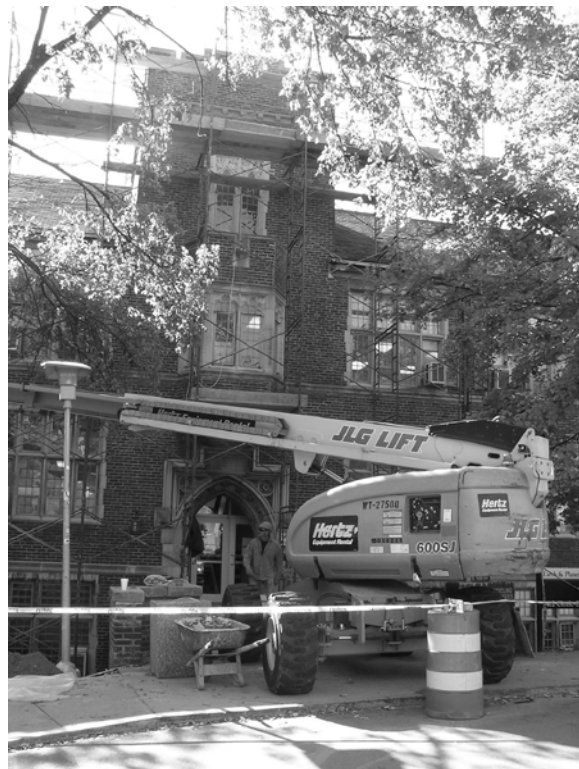
Several EPS faculty, alumni and students attended a Gala to celebrate 50 years of racial integration at UT. This was held on Friday, September 23rd. From the left, **Josh Emery**, **Devon Burr** (Andrea's co-supervisor), **Andrea Hughes** (M.S. student), **Katie Singer** (Ph.D. student), **Larry McKay** (Syreeta's thesis supervisor), **Syreeta Vaughn** (M.S. 2005) and her husband **Clarence**.



EPS BUILDING BEING REPAIRED

The brick exterior of the EPS Building is being rejuvenated during the fall 2011 semester. In addition, much of the decorative stone work is being re-cemented in place. The building is about 80 years old and should look much better after the facelift.

Yes, the work can be a bit noisy and many of the windows have been taped shut to keep out the water from high-pressure spraying, but it is very interesting to look out the windows of the Misra Reading Room and see people standing there on a lift or scaffold.



2011 GEOCONCLAVE

September 23-25, 2011, student geologists from six Tennessee universities: Austin Peay State University, Middle Tennessee State University, Tennessee Technological University, University of Tennessee – Knoxville, University of Tennessee – Martin, and Vanderbilt University convened at Fall Creek Falls State Park in Pikeville for the annual Geoconclave. Geoconclave is an undergraduate geology competition combining events to test students' knowledge, skills, and physical prowess. The technical events are rock and mineral identification, fossil identification, geologic map interpretation, pace and compass, and geocaching. Physical events include rock hammer throws and geode rolling for distance and accuracy. A special event this year was building and flying paper airplanes. The competition closes Saturday evening with the "rock bowl", a geology trivia game. Students also enjoyed an optional hike to the waterfalls Saturday afternoon.

The UTK team consisted of seven undergraduate students: **Sean Blackwell, Josh Cox, Josh Ellis, Emily Lea, Tim Paton, Max Schnuck,** and **Andrew Vial**. These students led UTK to victory for only the second time in Geoconclave history! Our students placed high in many of the events. Andrew Vial won first place in geologic map interpretation. Sean Blackwell won second place in both mineral identification and fossil identification. Emily Lea was the only lady on the team and won first place in the women's rock hammer throw for distance and geode roll for distance, and won second place for geode roll accuracy. Tim Paton won first place in the paper airplane special event. Our rock bowl team (Sean Blackwell, Josh Cox, Emily Lea and Andrew Vial) won first place in the rock bowl, which won the overall competition for us. Congratulations to all of the UTK participants; thank you for representing the school and the department well!



We owe a special thanks to **Colin Sumrall** for all the work he did to make the Geoconclave such a success!

VISIT THE EPS WEBSITE!

<http://web.eps.utk.edu/>

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YEARS OF GIVING - Larry McKay

Our department has many generous alumni and Friends. Some give every year and others give mainly on special occasions, or after they retire. We appreciate all of their gifts, but I'd like to give special recognition to those who have given for many years, in some cases, most of their adult lives. They are truly Friends of the department. This article is based on data collected over a period of many decades, so if there are errors or omissions, please contact me at: lmckay@utk.edu

30 or more years of Giving to EPS/Geological Sciences

Don Jones & Flo Jones (B.A. 1950) – 52 years of giving
Donald & Elizabeth Hathaway (M.S. 1957) – 48 years
Bill Ross (B.S. 1960) – 41 years
***Helen and Otto Kopp (Professor Emeritus) – 36 years**
Rich & Marty Hopkins (M.S. 1976) – 35 years
***Kenneth R. Walker (Professor Emeritus) – 33 years**
James H. Moore (M.S. 1948) – 33 years
Michael & Joann Maitland (M.S. 1979) – 30 years
Charles & Julie Benziger (B.A. 1948) – 30 years
***Hap McSween (Chancellor's Professor) – 30 years**

20 to 29 years of Giving (in alphabetic order)

Sally & Steve Absher (M.S. 1983 & 84)
***Richard Arnseth (former Faculty member)**
Denny & Judith Bearce (Ph.D. 1966)
James & Virginia Bibee (B.S. 1950)
***Tom & Ann Broadhead (Professor)**
***Michael & Janice Clark (Emeritus Assoc. Professor)**
Wesley & Cindy Diehl (M.S. 1982)
George Danker (B.S. 1969)
***Steve & Marylaine Driese (former Professor)**
***William Dunne & Belinda Price (Professor)**
Billy & Judith Glass (B.A. 1963)
Jeffrey Gratz (M.S. 1986)
Kenneth O. Hasson (Ph.D. 1972)
***Robert & Diana Hatcher (Ph.D. 1965 & Distinguished Scientist)**
Julie Paque Heather (B.S. 1979)
William Hill (Friend)
Virginia Klepser Jaco & Gilbert Jaco (Friends)

***Ted & Dana Labotka (Professor)**
Ed & Penny Masuoka (M.S. 1978 & 81)
Charles & Reva McAllister (B.A. 1984)
Carol Klepser McKenzie & Frank McKenzie (Friends)
Mary & Sam Mishu (B.S. 1982)
Harry L. Moore (M.S. 1974)
***Kula & Geeta Misra (Professor)**
Forrest Orr (B.S. 1976)
Samuel G. Porter (M.S. 1968)
Col. Thomas Rhen (B.S. 1958)
Adaline & Gary Rutherford (B.A. 1978)
Everett & Sherri Rutherford (Ph.D. 1985)
Charles & Dorothy Sandberg (Friends)
Abe & Isabel Shekarchi (Ph.D. 1959)
D. Kim Sickafoose (M.S. 1979)
William & Mary Sullivan (Friends)
***Larry & Dawn Taylor (Distinguished Professor)**
David J. Tieman (M.S. 1978)
Ronald Tisdale (M.S. 1974)
Mark & Diane Vaughan (B.A. 1983)
George & Beverly White (B.A. 1948)
John & Debbie White (M.S. 1975)
James & Elizabeth Zimmer (M.S. 1964)

*current or former UT Faculty Member

ALUMNI AWARDS FOR FACULTY ACHIEVEMENT

- Larry McKay

This year the department faced many challenges, not the least of which was retaining faculty members who hadn't had a raise in four years because of state budget cuts. A targeted development campaign, involving personal meetings with just a few of our alumni helped ease this problem. Our alumni responded quickly to this need and in a matter of about 6 months they helped us create six new gift funds and three endowment funds to address this problem. As a result, the department was able to give out five Alumni Faculty Achievement Awards, of \$2 to 5K per year for five years. The awards can be used for salary, travel or a variety of research expenses. Several of these gifts will be replaced by endowments at the end of the five year award period. Typically these were given to young faculty members and other key faculty members. The department is indebted to the following alumni and their spouses or partners, who made major gifts or signed gift agreements for this effort: **Mike Maitland, Mike Allison, Kim Sickafoose, Bill Ross, Wesley Diehl, Roger Bohanon, David Jackson and Tom Cronin.**

DONORS FOR CALENDAR YEAR 2010

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Jefferson Belew
Virginia Bibee
Michael Blackburn
Evelyn Blythe
Roger Bohanan
Brendan & Katy Bream
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George Danker
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William Dunne
Margaret Frazier
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Joseph Haskins
Kenneth Hasson
Robert Hatcher
Donald Hathaway
Miles Henderson
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Maria Leary-Richards
Lirong Liu
Micheal Maitland
Martha Masengill

Ed & Penny Masouka
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Larry McKay
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Edward McWilliams
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Charles Sandberg
John Schweizer
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Kim Sickafoose
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Russell Wiseman
Margaret Zimmer
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CONTRIBUTING TO THE DEPARTMENT OF EARTH & PLANETARY SCIENCES

The Department of Earth & Planetary Sciences acknowledges the generous financial support of our alumni and friends. Your contributions, no matter what size, play a critical role in supporting the academic achievement and research of students and faculty. We hope that you will continue to remember us when deciding on your benevolences. If you would like to talk to the Department Head, Larry McKay, or College Development staff, to discuss planned giving, please contact us at lmckay@utk.edu or 865-974-5498

Thank you for your continued support!

For mailed donations, please send a check payable to **The University of Tennessee** to the address shown below, with a note indicating what fund you would like the gift applied to. For online donations, visit <http://giveto.utk.edu> and be sure to designate the gift for the EPS department, with the name of the appropriate fund.

Suggested areas for contributions include:

- \$ _____ Professor's Honors Fund (unrestricted) in honor of _____
 - \$ _____ George D. Swingle Graduate Fellowship Fund
 - \$ _____ Harry J. Klepser Lecture Series
 - \$ _____ James G. Walls Fund for Excellence in Introductory Geology
 - \$ _____ Otto C. Kopp Endowment for Undergraduate Research
 - \$ _____ Don W. Byerly Field Camp Scholarship Fund
 - \$ _____ Kula C. Misra Reading Room Fund
 - \$ _____ Kenneth R. Walker Professorship
-

To contribute to the department, provide alumni news and photographs for the next newsletter, or to change your contact information, please write or e-mail:

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E-mail: eps@utk.edu

2011 Newsletter
Department of Earth and Planetary Sciences
University of Tennessee, Knoxville

Editors: Larry McKay and Bill Deane

Cover photo by Kevin Thaisen:

The iconic Devil's Tower was a must see for the 2011 GeoClub tour of the western U.S. last May. From the left: Michael McConnell, Felicia Qualls, Josh Elks, Jackson Sibley, Andrea Gregg, Matt Byrd, Caycee Ellis, Sarah Drummond, Nicole Bailey and Megan Ennis. Alumni donations helped pay for this great trip.

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