



2009 Newsletter



**Department of
Earth & Planetary Sciences**

University of Tennessee



2009 Newsletter
Department of Earth and Planetary Sciences
University of Tennessee, Knoxville

Editor: Linda Kah

Cover photo:

View of the Belt Supergroup, Glacier National Park, from the base of Apejuni Falls. Photo courtesy of Linda Kah.

Sedimentary rocks of the Mesoproterozoic Belt Supergroup are spectacularly exposed in Glacier National Park. White rocks in the foreground consist of the Altyn Limestone, which is the stratigraphically lowest unit exposed over the Lewis thrust at the eastern side of the park. The Lewis thrust emplaced Mesoproterozoic strata of the Belt Supergroup over the Cretaceous Two Medicine Formation. The Two Medicine Formation is better known for its dinosaur fossil finds but also, in regions near the Lewis thrust, contains some spectacular fluvial gravel deposits composed entirely of Belt clasts. The one-mile hike up to Apekuni Falls is worth the time for anyone. At the base of the falls, you can see the best exposure of the Altyn Limestone – a bright white, mimetically dolomitized limestone that contains quartz grit horizons, an abundance of small-scale symmetrical ripples, mudcracks, and the Altyn’s infamous “sinusoidal stromatolites” (see later in the newsletter). From there, you can navigate to the top of the falls, where you enter green siltstones of the Apekuni Formation (which contains trace fossils of probably brown alga), and mudcracked red shale of the Grinnel Formation. The view is spectacular!

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Department Head's Letter – by Larry McKay

I'm pleased to introduce the 2009 edition of the Department of Earth & Planetary Science Newsletter. There has been a lot happening in EPS recently—some it very good and some of it rather challenging. First, I should announce that I've been appointed as Head of the department. It's an honor to serve and I look forward to working closely with faculty, staff, students, and alumni over the next 5 years. I'd also like to thank Hap McSween for the inspired leadership that he's provided during the past 2-years while serving as Interim Head. Hap played a significant role in much of the good news that you'll see on this page and throughout the newsletter.

Our department is going to face many challenges over the next few years, partly because of the economic problems facing the state, but we're in excellent shape going into this period of limited resources. As a result, I think we have the opportunity to improve and grow as a department, despite these economic challenges. The reasons for my optimism are many, but are condensed below.

EPS currently has perhaps the strongest and most productive faculty ever. Almost everyone is involved in funded research, publication in prestigious journals, and supervision of student research. Since publication of the 2008 newsletter, faculty brought in approximately \$3.1 million in external research funding, which is nearly double that received in the previous year! We continue to garner research and teaching awards from the College, the University, the Geological Society of America, and other professional organizations. Very importantly, we've achieved this while maintaining a strong commitment to teaching, as indicated by having over 80% of our student credit hours taught by tenured/tenure-track faculty, which is more than twice the College average.

The quality of our students at both the graduate and undergraduate level has improved steadily over the last few years. The proportion of Ph.D. students has increased substantially and they now represent approximately 62% of our graduate students. Many of our graduate students come from highly ranked undergraduate programs and we even have a new student, Keshia Koehn, who is bringing with her a very prestigious National Science Foundation Graduate Fellowship. Our undergraduate students also continue to impress us all. We are clearly seeing an impact from the Hope Scholarship Program, which is funded by the state lottery and has helped encourage many of the best Tennessee high school graduates to attend UT. Our undergrads are increasingly involved in research, and we are proud to see several going on to graduate school, including Steven Jaret who is starting his Ph.D. at Harvard University this fall.

We continue to enjoy strong support from our alumni. In just the short time since I started as Head, I've had discussions with a number of our alumni and have enjoyed hearing their stories and seeing their dedication to the department. This is crucial, because we're going to need their support over the next few years as we face the challenge of planning for a successful future against a backdrop of fiscal uncertainty. One of my objectives is to expand alumni input, starting with an All-Alumni Advisory Board meeting in Spring of 2010. Current, former, and future (we're looking for volunteers) Advisory Board members will be invited to UT to discuss the development our long-term Strategic Plan, which includes plans for substantial expansion and renovation of the Earth & Planetary Sciences Building. This has moved up and down the UT priority list for decades, but we're now working with the College of Arts & Sciences to start a capital campaign that will provide the leverage to get the renovations started and provide the extra funding needed to turn EPS into an "academic destination building," with interactive geological displays for the public and students, as well as state of the art classrooms and laboratories. We're also planning to put approximately half of each building fund donation into an endowment that will provide money for periodic upgrading of the displays and teaching/research facilities, so that we can maintain the quality of our building and our programs for decades to come.

The ambitious plans for our building can only be realized with the support of our alumni and the continued strong performance of our faculty and students. We need to show the Dean and the Administration that Earth & Planetary Sciences is a department with strong traditions and a bright future. We need to reevaluate our undergraduate curriculum to attract more students and ensure that we're preparing them for success in an increasingly diverse and competitive job market. We need to decide where to focus our resources, especially future faculty hires, so that our department can grow in size and reputation. We have great hopes and dreams for our department. Dolly Parton, the UT commencement

speaker this spring, said the difference between hopes and dreams is that hope can be realized through hard work. This means the EPS family of faculty, staff, students, and alumni has a lot of hard work ahead of us if our hopes are to be realized, rather than just fade away as forgotten dreams.

The Generosity of our Dedicated Alumni – News of Major Awards



Bill Ross (B.S. 1960) enjoying his “retirement”

Bill Ross (B.S. 1960), of Woodbridge, Virginia, is a dedicated supporter of UT Earth & Planetary Sciences who, in 2007, endowed the William O. Ross Field Camp Scholarship with a sizeable donation derived from his brother's estate. His brother, Charles H. Ross, Jr., had been a Chemistry major at UT and a long-time employee of Alcoa, but finally succumbed to cancer at the age of 71.

The William O. Ross Field Camp Scholarship provides substantial funds each year to help our undergraduate students attend field camp, which Bill considers a critical part of a geological education. Bill enjoys receiving letters from the students who have received these scholarships and he looks forward to many more letters in the future.

In a recent chat with John Dinkens (College of Arts & Sciences Development Office) and EPS Head **Larry McKay**, Bill reminisced about his geological experiences and interests. We would like to relate some of these details here.

Bill worked at Alcoa in the early 1950s and never expected to go to university. He was drafted into the army in 1953 and after boot camp worked as a cartographic draftsman. This was Bill's first exposure to geology and served as the impetus for him to enter UT on the GI Bill in 1955. He fell in love with geology, especially paleontology, and would have gone into the graduate program if his funding support had not run out. Bill has fond memories of UT, including hanging out in the labs with students like **Don Byerly (M.S., 1957; Ph.D. 1966)**—his lab GTA and now Professor Emeritus, **Bob Milici (M.S. 1955; Ph.D. 1960)**—a 2nd year Geology Ph.D. student and Bill's freshman GTA, **Jim Marie (B.S. 1961; M.S. 1963)**, **Sam McDougal (B.S. 1959)** and **Hunter “Gus” Harrell (B.S. 1960)**. While in these labs Bill and his friends discussed topics ranging from Geology to Huckleberry Hound. Bill's favorite professors in the Department included **Otto Kopp**, **George Swingle**, **Harry Klepser**, and **Robert McLaughlin**.



Bill Ross (right) and the late Norm Sohl (left), USGS, with Titanosarcholites fossil from Jamaica.

Bill's education at UT provided him with the opportunity for a diverse and successful career in geology. His first career was with the United States Geological Survey, Paleontology and Stratigraphy Branch, in Washington, D.C. Bill's office was in the main Smithsonian Building, which he greatly enjoyed. The only problem was the 30-mile daily commute up I-

95 from his home in Woodbridge, Va. Bill worked with a number of prominent USGS paleontologists, including Norm Sohl, who specialized in gastropods, and Ralph Imlay, who specialized in ammonites. His work with the USGS took Bill all along the Atlantic and Gulf coasts, as well as to Puerto Rico and Jamaica. On one of the trips to Puerto Rico, Bill brought back nearly six tons of partially silicified limestone. It took him two years and enormous volumes of acid to etch out all the fossils from this material!! Bill also worked in the mountainous western states with Ralph Imlay, then a Ph.D. student from the University of Michigan, where they focused on Jurassic ammonites. Bill retired from the USGS in 1986 (just before the USGS moved to Reston, Va) to care for his mother in Maryville, Tennessee, following his father's death. After her passing a few months later, Bill returned to Virginia and joined the Virginia Department of Transportation, where he worked on soils and bridge foundations for another 15 years. After yet another retirement, he spent a couple of more years working for a local engineering firm doing consulting work for Virginia DOT.



Bill Ross (far right) and colleagues doing field work along the Alabama River in the 1970s.

In more recent years, Bill has spent his time cooking (he enjoys making desserts), woodworking, and gardening...and is very much enjoying his relatively "simple" life of retirement—Bill does not own a computer and, until recently, he literally had "rabbit ears" attached to his television and could only view the local channels. He finally broke down and purchased two new LCD TVs and subscribed to satellite television in June 2009.

Recently, Bill signed a second major gift agreement with the department, which brings his total giving into

the seven-figure range. This generous bequest is split among the William O. Ross Field Camp Scholarship, the Professor's Honors Fund, a new Graduate Fellowship Fund, and the EPS Building Renovation Fund, which is managed by the Dean of the College of Arts & Sciences. Bill Ross' gift will impact each of the major needs of the department: support for undergraduate students, increased discretionary funds for student education and research, graduate student support, and building renovation. Many decades from now, our students and faculty will still be enjoying the benefits of Bill Ross's generous gifts, and we send him our best wishes and most grateful thanks.

In the meantime, Bill is planning to visit UT this fall ("when the leaves turn") to meet with the department and the college development office. We look forward to his visit and hope that he gets to spend some quality time with both faculty and students here at UT....a warm welcome is already in the planning!



\$25K donation to George Swingle Memorial Fellowship Fund

A donation of \$25K was made in August, 2009, by James C. Bruner, local successful oil company owner, long-time Knoxville resident, and UTK graduate (history major, geology minor), to the George Swingle Memorial Fellowship Fund. Mr. Bruner is owner of New River Energy Company, a successful oil and gas company, which had had numerous successes in drilling in the Plateau northwest of Knoxville, including participation with CNX Gas in Tennessee's first horizontal well. He founded a new company in 2004, Planet Energy, LLC, of which he is Chief Manager. He was named Oil Man of the Year in 2008 by the Tennessee Oil and Gas Association. The contribution was facilitated by UTK M.S. alumnus and former George Swingle student Chuck Hagegeorge, and received by Bob Hatcher.



This year, our new faces are already familiar to some. Nonetheless, we are delighted to introduce our newest research faculty **Zhenghua Li** and **Robert Riding**. Zhenghua, a fixture in the department since 1999 as technician in our mass spectrometry facilities since 1999, was promoted to Research Associate Professor in spring 2009. Robert Riding moved to UT in 2007 and, upon retirement from Cardiff University, Wales, has been appointed as Research Professor in EPS.



Zhenghua Li collecting water samples and examining speleothem from Racoon Mountain Cave.

Robert Riding.

Zhenghua Li: My current research focusses on high-resolution paleoclimate variability and seasonality, in the southeastern United States and elsewhere, using complementary paleoclimate proxies from various terrestrial archives including C-, O-, and H-isotopes from speleothems and tree rings, soil organic matter, and organic molecular compounds.

In particular, I focus on climate reconstruction of specific time windows (e.g., the middle Holocene warm period and the transition from glacial to Holocene climates), and abrupt climate events. This research has provided an unprecedented glimpse into climatic patterns associated with changes in seasonality and regional precipitation, and is allowing us to define the past history of atmospheric events, such as El Nino, and to examine the regional impact of climate events, such as the agricultural and societal impact of drastically reduced glacier volume and stream discharge in the Wind River Range of Wyoming.

Another major research area of mine is conducting isotopic and trace elemental studies of modern human bone, teeth, and hair (from the UT Body Farm, as well as other forensic collections) in order to generate a national database that will help forensic anthropologists and criminal investigators trace individuals and aid in the identification of human remains.

In addition to my own research, I continue to train students and faculty in the use of our Stable Isotope Facilities, and am active in outreach training of students and teachers from local middle and high schools.

Robert Riding: I was enticed to Tennessee by my wife, who is a researcher at ORNL. She assured me that there would be no less rain hereabouts than there is in Wales. Not that I'm Welsh—English born and bred, actually—but I was based at Cardiff University for most of my career. It's a great pleasure to be in Tennessee and to be welcomed into EPS; and it is a privilege to be able to interact with so many friendly and active scientists on a daily basis.

What do I do? My research focusses on algal and microbial carbonates. The exciting thing about these organisms and their associated deposits is that their calcification is often strongly environmentally influenced by global, not just local, conditions. This provides a wonderful opportunity to interpret past changes in ocean carbonate saturation state and atmospheric carbon dioxide levels, which have been fundamental, yet poorly understood, controls on carbonate sedimentation throughout Earth history.

These deposits also provide the great opportunity for travel: in 2009, I went west to talk about stromatolites at Stanford University, then recrossed the continent to join a research cruise diving to modern 'giant' (2 meter high) stromatolites in the Bahamas, then kept going east to teach a short course on microbial carbonates at the University of Calabria, in the toe of Italy, and ended up at a conference on fossil algae in Milan.

If you are interested in my research please feel free to drop me a line or stop by for a chat. My open door policy really is 'you open my door, we go for coffee.'



Departmental Administration

We would like to welcome **Jan McQuire** as our new administrative assistant. Jan has worked for UT for 24 years, starting out in the Temporary Pool. She has worked in several offices on campus, most recently in the African Studies program, and has enjoyed getting to know the campus staff and students. As a child, and then again as an adult, she has moved around and has lived in several states from Florida to Nebraska to North Carolina to Tennessee (Oak Ridge and finally to Knox County, where she has lived for 26 years). She has four children and four grandchildren, which she and her husband enjoy spoiling "rotten," and one dog and two cats.

Welcome to Our New Graduate Class!



Our new graduate students. Back row (from left to right): Ankur Roy, Chris Howard, Sarah Drummond, Troy Fadiga, Kaitlin Singer, and Keisha Koehn; Front row (from left to right): Megan Smith, and Caitlyn Williams.

We would like to officially welcome all of our new graduate students

Name:	From:	Advisor:
(1) Sarah Drummond (Ph.D.)	University of Virginia	Devon Burr (Planetary)
(2) Troy Fadiga (Ph.D.)	University of Iowa	Colin Sumrall (Paleontology)
(3) Keisha Koehn (Ph.D.)	University of Arkansas	Larry McKay (Hydrogeology)
(4) Kaitlin Singer (Ph.D.)	North Carolina State University	Larry Taylor (Planetary)
(5) Ankur Roy (Ph.D.)	University of Tennessee	Ed Perfect (Hydrogeology)
(6) Gordon "Donnie" Hicks (M.S.)	University of Minnesota	Micah Jessup (Structure-Tectonics)
(7) Christopher Howard (M.S.)	University of Tennessee-Chattanooga	Bob Hatcher (Structure-Tectonics)
(8) Megan Smith (M.S.)	University of Tennessee	Greg Baker (Geophysics)
(9) Caitlyn Williams (M.S.)	University of Wyoming	Greg Baker (Geophysics)



Larry Taylor Publishes a Gem of a Book

Larry Taylor is proud to announce the recent publication of his book on the mineralogy and petrology of Siberian diamonds and diamondiferous eclogites. Coauthored by Larry and his Russian colleague, Vdislav Spetsius, “Diamonds of Siberia: Photographic Evidence for their Origins” contains 300 color plates of natural diamonds and sells for \$92.50 (Tranquility Base Press). Larry is, however, generously offering a FREE copy of the book with any donation to the Professor’s Honors Fund in excess of \$199.



Mike McKinney Receives Teaching Award

Mike McKinney received an award for excellence in teaching at the College’s Fall 2008 convocation. Mike, who directs the Interdisciplinary Environmental Studies degree program in addition to his EPS responsibilities, has long been considered an engaging teacher with a special talent for stimulating student discussions, even in relatively large introductory courses. We have long recognized Mike’s contribution to teaching in the department, and congratulate him on an award long overdue!



Bob Hatcher and Students Profiled in PBS Special “Appalachia”

Bob Hatcher and his group were fortunate this year to have appeared in the 4-part PBS documentary “Appalachia: A History of Mountains and People,” which was narrated by Sissy Spacek. The production contained a segment featuring geology students on a field trip to the Grandfather Mountain window area led by Bob Hatcher (with **Jenny Cook, M.S. 2005**). Bob and a USGS geologist, Scott Southworth, were also featured in the explanation of the geologic history of the Appalachians.



Hap McSween Honored for his Department Contributions

This year, faculty voted unanimously to award the George Martin Hall departmental service award to **Hap McSween**, for his longstanding and steadfast contribution to the department. With this distinction, Hap was also awarded a new, slightly altered photograph to be placed in the Misra Reading Room with the rest of our illustrious heads....the “dual heads” signifying Hap’s willingness to step up, once again, as Head during these last few years. Thank you, Hap!

Faculty News and Notes

Greg Baker – Under the supervision of Dr. Greg Baker, the EPS geophysics group (a.k.a. the Bakery) has had a stand-out year. In addition to 12 presentations at major research conferences and three refereed journal articles, other good things were garnered by the team. **Kevin Burns (M.S. 2008)** graduated with his M.S. degree and was hired by Halliburton to analyze the microseismic response of hydrofracing; Ray Vaughan and Laura Gilcrist (both of whom remained at SUNY Buffalo when Dr. Baker was hired at UT) obtained their Ph.D. degrees with Dr. Baker as their primary advisor, and both are now working for the New York State Attorney General's Office; Ph.D. student **David Gaines** received a prestigious ExxonMobil grant-in-aid of research award (that included a trip to Houston to present his work) and a KGEMS grad student award; and Ph.D. student **Megan Carr** was invited to Houston by ExxonMobil for a geophysical recruitment workshop. In addition, the Bakery took an extended trip (during the Fall American Geophysical Union meeting) and toured the geology (and wine) of Northern California as well as Yosemite.



Baker's geophysics group toured the geology of Yellowstone on the way to the Fall AGU meeting.

Devon Burr – Devon Burr has kept herself busy in her first year learning how to balance research and teaching. On the research side, Devon has experienced great funding success this year. This funding will allow her to begin to build a group of students, and has led to a summer of research at the NASA Ames Planetary Aeolian Laboratory beginning the first ever wind tunnel experiments to simulate aeolian transport on Titan. She also (finally!) finished edits on the galley proofs of a compiled scientific volume, *Megaflooding on Earth and Mars*, of which she has been lead editor. On the teaching side, after teaching Geology 101 (Physical

Geology) in her first year, Devon has taken the lead in developing a new 100-level course entitled Geology 104 (Exploring the Planets), which will cover many of the same physical geological processes, but from a planetary perspective.

Bill Dunne – While continuing as a member of the department, Bill's administrative responsibilities shifted from the College of Arts & Sciences to the College of Engineering over the summer. The admin work is still focused on growing UTK's research success, graduate program, undergraduate research involvement, and the leviathan known as facilities. UTK is experiencing much success with faculty-related research and is making a series of new hires and hires of Governor's Chairs, including one possibly in EPS that should continue this success even in the face of difficulties from decreasing state support and the inability of the State to move beyond the "pay as you go" model for new facilities. Bill still is able to be a geologist on occasion, partially through the support of his colleagues, particularly **Ed Perfect** and **Micah Jessup**, with involvement in two manuscripts and supporting advising of one to two graduate students, plus teaching a small slice of Planetary Geology. Finally, Bill feels very fortunate to learn that he will become a Fellow of the Geological Society of America at the October meeting in Portland.

Josh Emery – I have enjoyed my first year in EPS, getting settled in and beginning to fold my astronomy perspective into the vibrant research community in EPS. The main focus of my research remains telescopic observations of asteroids and icy moons. This past year, I started a new project to analyze images and spectra from the New Horizons spacecraft of three of the large moons of Jupiter. I was also awarded a large amount of time on the Spitzer Space telescope to observe and try to determine the surface composition of Kuiper Belt objects. Travel included a trip to the Canary Islands, where Spanish astronomers are building a new 10.4 meter telescope (which will be larger than any single telescope we have in the US) that I hope to have the opportunity to use when construction is finished. I was pleased this year to welcome a new graduate student, **Driss Takir**, who will be working on a joint project with Hap observing asteroids and analyzing meteorites.

Chris Fedo – Chris Fedo and his students continue to focus on surface processes and products in Precambrian systems supported by work using Holocene analogs

where appropriate and applicable. We are continuing research on the geochemistry and Fe-isotope geochemistry of banded iron formation (BIF) from the earliest Archean and into the Proterozoic, which is aimed at establishing surface conditions during seminal events in the emergence and early evolution of life. In part, this work has parallel implications for understanding environments and conditions on early Mars, another focus of my group's research. We are also working on determining the significance of the base of the Sauk Supersequence contact through sequence stratigraphy and sedimentary petrology using well exposed, craton-margin rocks in the Death Valley region of California. While it would seem unlikely that more data could be extracted from the basic composition of sand and mud, and their lithified equivalents, much still remains to be gleaned about the process of how sediments acquire their composition through the weathering process. We are focused on "first-principles" field and laboratory studies of modern sediments to assess how well they resemble their provenance compositions by isolating the effects of critical formational processes.

Dave Finkelstein – With research labs finally set up and instruments starting to run, aqueous and organic biogeochemistry results are starting to churn out. My first Ph.D. student **Daniel Lewis** is working on multi-proxy analysis of tropical cyclones and climate variability from longleaf pine, Texas, and will complete his degree by December 2009; another student, **Jim Kocis**, is starting isotopic analyses of southeastern U.S. Holocene floodplain sediments; and a third, **Zack Taylor** (co-advised with Sally Horn of Geography) is working on cores from Lake Zoncho, Costa Rica, to examine organic carbon and molecular markers in a tropical lake. My own research on the aqueous and organic geochemistry of evaporative lakes in Oregon continues, and we hope to determine how microbial mats survive desiccation in the sedimentary environment. Recent work focuses on the biosynthesis of wax esters and their role as possible energy stores and waterproofing agents for microbes. Can wax esters be used as a climate proxy for deciphering the evapo-concentration of paleo lake waters? Stay tuned...

With the labs now running, both introductory and graduate level students are learning a quite a bit about how to analyze water as well as the local water quality issues and the potential role that droughts may play in the sustainability of drinking water. At least some of this work is interfaced with current courses, with the help of **Mike McKinney, Larry McKay, and Ed**

Perfect, the Geology 103 course materials are being revised. New lecture and lab materials focus the students on their surroundings and their impact on the environment and role in environmental change. This year I also taught a University Honors course on global climate change, which introduced students to how geologists and climatologists utilize ice cores to decipher climate signals from gas chemistry and stable isotopes. We ended the semester with a lively debate as to whether we have it within our technological abilities to dampen the impact of climate change. Graduate teaching has focused on revamping upper-level Geochemistry and Stable Isotope Geochemistry courses...using lakes as beakers for understanding and applying aqueous and environmental geochemistry, and having students run and interpret their own analyses. All turned out well and hopefully brought our students to another educational level.



Papery form of desiccated microbial mats, Oregon.

Bob Hatcher – Bob and his students continued their research to better understand the southern Appalachians for comparison with other mountain chains on Earth. **Heather Byars, William Gilliam, Matt Huebner, and Brittany Davis** worked in the Inner Piedmont in North Carolina and Georgia, respectively, while **Shawna Cyphers, Arthur Merschat, and Mary Varnell** completed projects in the eastern Blue Ridge. Research was supported by grants from the EDMAP component of the National Cooperative Geologic Mapping Program (administered by USGS); and **Arthur Merschat** was supported by the Federal Student Career Experience Program (via USGS). **Ching Tu** completed a research project on part of the Brevard fault zone in South Carolina. **Ching Tu, Shawna Cyphers, Heather Byars, Mary Varnell, and Brittany Davis** either have or will complete their M.S. degrees in 2009,

and **Arthur Merschat** has completed his Ph.D., and has moved to the USGS in Reston, Virginia.

Bob also received a grant from the Nuclear Regulatory Commission to study the paleoseismicity of the East Tennessee seismic zone, with co-PIs Steve Obermeier (USGS Emeritus), James Vaughn (MO Geological Survey, retired), Hugh Mills (TN Tech), and **Chris Whisner (Ph.D. 2005)**. Finally, a new geologic map of part of the Blue Ridge in the Carolinas, Georgia, and Tennessee by former students **Ryan Thigpen (B.S. 2002; M.S. 2005)** and **Mark Carter (M.S. 1994)**, and Bob was published in 2009 by GSA.

Micah Jessup – Micah Jessup’s research group is currently involved with projects based in Colorado, Tibet and India. We are generally interested in all things mid-crustal, but also move into brittle processes in the upper crust. M.S. student **Jackie Langille** spent a month in India for her research project; Ph.D. student **Liz Lee** will spend a month in India and another month in Colorado for her research; and our newest group member, **Donnie Hicks**, will spend the summer in New Mexico and Colorado before moving to Knoxville. I look forward to meeting Liz and Donnie in Leadville, Colorado, for a bit of mapping and working out of the 10th Mountain Division hut. I think I will rack up a few frequent flyer miles this year....in August I also headed to Beijing to present a talk at the Himalayan-Karakoram-Tibet workshop.



Micah Jessup’s students Liz and Jackie on a neotectonics field trip to the Sierra Nevada and Death Valley.



Linda Kah – Linda’s research group has been extraordinarily busy this year, with projects spanning the breadth of time and space. We are looking at microbialite mineralization during the evolution of Ca-Cl brines in evaporative lakes of the high Andes (post-

doc **Fernando Gomez**); examining the C- and S-isotope record of Ordovician carbonates in Argentina and Newfoundland (Ph.D. student **Cara Thompson**), as well as in China; investigating potential tsunami deposits in the Mesoproterozoic of Mauritania (Ph.D. student **Geoff Gilleaudeau**—if the State Department lets us do our field work this year, otherwise we will continue *in situ* carbonate precipitation experiments in the lab); exploring the taphonomy and biogeochemical signature of the Earth’s earliest multicellular(?) algae (M.S. student **Miles Henderson**); modeling stratal packaging of layered deposits on Mars (M.S. student **Sarah Cadieux**); and exploring petrographic shock features in feldspars from the Tenoumer impact crater, Mauritania (B.S. student **Steven Jaret**). Whew!



Linda and her lab group (and son Douglas) on a trip to the Belt Supergroup, northern Montana.

The only sign of relief for Linda this year came when the 2009 Mars Science Laboratory mission had its launch delayed until 2011. Of course, Linda then proceeded to fill this “spare” time by spearheading a multi-institutional collaborative project (sed-strat-geochem-geochron-paleomag) on Mesoproterozoic strata of the Chhattisgarh Basin, India; by accepting Blackwell Publishing’s request to compile and edit a book on the Mesoproterozoic; and by taking her entire lab group out to Montana to explore depositional environments of the Mesoproterozoic Belt Supergroup.

Ted Labotka – Ted is continuing his work with Dave Cole (Oak Ridge National Laboratory) on diffusion of C and O in carbonate minerals, coupled Na–K and O-isotope exchange in alkali feldspar, and hydration of olivine. Dave, **Hap McSween**, and he are also spearheading organization and preparation for the 2010 Goldschmidt Conference to be held in Knoxville, June 14–18. We hope that some of you can join us at the meeting!

Larry McKay – The Hydrogeology group had a busy year in 2008-2009. Professor McKay finished his GSA Birdsall-Dreiss Lecture tour with a visit to Australia and New Zealand, where he gave talks at the University of New South Wales, Flinders, and Canterbury, as well as setting up a new research collaboration on hydrology of fractured clay soils. Ph.D. student **Peter Knappett** has continued his field work in Bangladesh with several month-long visits, and earned the EPS Interdisciplinary Research Award in 2009. **Terri Brown** finished her M.S. thesis on fluorescence in karst aquifers and **Beth Lavoie** started her M.S. research on explosives residues in soils. This is part of a project co-supervised by McKay and ORNL staff scientist **Melanie Mayes (Ph.D., 2006)**. We also welcome a new Ph.D. student, **Keshia Koehn**, who met Larry when he gave a seminar at the University of Arkansas.



Grad students **Beth Lavoie** and **Keshia Koehn** excavating soil columns with **Melanie Mayes (Ph.D., 2006)**.

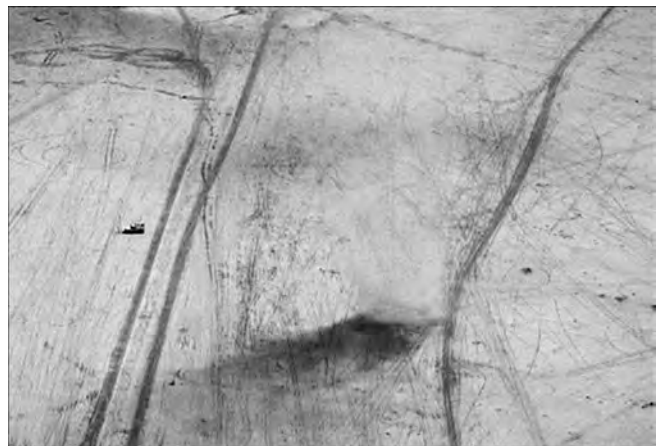
Mike McKinney – Mike McKinney has been busy as Director of the Environmental Studies degree, which enrolls over 30 students each year. In terms of research, he has been working on edriasteroids with Colin Sumrall, looking at allometric patterns such as surface-volume relationships. Mike attended the North American Paleontological Convention in Cincinnati and the national meeting of the Ecological Society of America. He has also been working on an echinoid paper based on work by his former student **Craig Oyen** who recently passed away.

Hap McSween – Hap and several of his students have been focused on HED meteorites – igneous samples from asteroid Vesta. Hap is a co-investigator for the Dawn spacecraft mission, now en route to Vesta, and they are using the compositions of these meteorites to

calibrate the instruments on the spacecraft and to improve the interpretation of the data that they will generate. He continues to participate in operations of the Mars rovers, and has published a number of papers dealing with those data. Finally, he is putting the finishing touches on a new cosmochemistry textbook that should be published next year.

Jeff Moersch – In 2008 and 2009, members of Jeff Moersch's research group continued their work with operations of the Mars Exploration Rovers, Spirit and Opportunity, as well as the Mars Odyssey THEMIS experiment. They also carried out field campaigns in terrestrial locations, studying the thermophysical properties of alluvial fans in Death Valley and Owens Valley, CA, and of dust devils on a dry lake bed near Las Vegas. Moersch and his Ph.D. student, **Craig Hardgrove**, are part of an international consortium studying these Nevada dust devils as analogs for dust devils on Mars. Martian dust devils frequently scour the surface of the planet, clean dust off of solar panels that provide power to our rovers, and may also be the trigger for initiation of regional and global-scale dust storms. A television program about the Nevada project will air on the National Geographic Channel in 2010.

In January, the National Academy of Sciences appointed Moersch to its Committee on the Origin and Evolution of Life, a 16-member standing panel of experts that advises the Federal Government on all research programs related to those subject areas. In December, Moersch and his wife Sarah became proud, first-time parents with the birth of their son Maxwell.

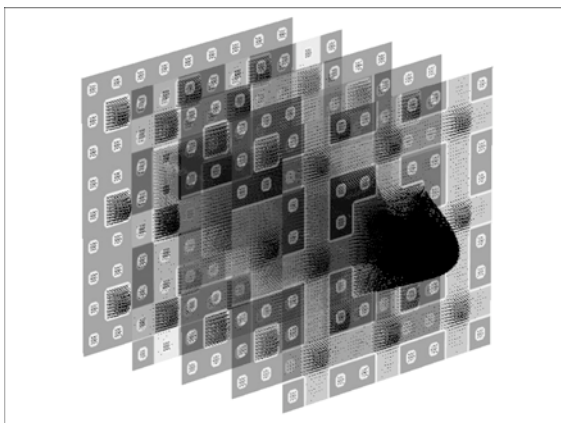


Aerial image of a dust devil and associated tracks at Eldorado Playa, Nevada (truck for scale).

Kula Misra – My focus over the year has been on the completion of the textbook on geochemistry to be published by Wiley/Blackwell. The book covers a wide

spectrum of topics: crystal chemistry, equilibrium thermodynamics, kinetics, aqueous geochemistry, radiogenic and stable isotopes, geochemical evolution of the Earth, etc., and is intended to serve as a textbook for an introductory course on geochemistry. The first draft of the book has been completed and is now undergoing peer review. I expect the book to be ready for printing by the end of the year.

Ed Perfect – Ed Perfect became our Associate Head in August 2009. He will be retiring as Chair of Graduate Admissions in Spring 2010 after serving 4.5 years in that role. On the research front, Ed and his students continue to focus on quantitative methods to describe and understand fluid flow through fractured or porous media. Ed recently edited a special issue of the *Vadose Zone Journal* on fractal models applied to soil and rock materials. Ed is also using centrifuges to measure petrophysical properties such as relative permeability.

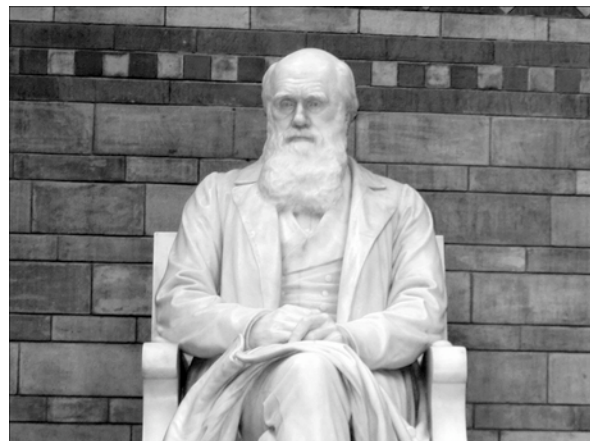


Fractal modeling of flow through a porous medium.

Colin Sumrall – This year my research group, along with Michael McKinney, has been expanding the understanding of Paleozoic fossil echinoderms (relatives of starfish and crinoids) in two ways.

Graduate students René Shroat-Lewis, Michael Latham, and I have been examining the paleoecology, growth patterns, and evolution of hard substrate encrusting edrioasteroids by placing them into an evolutionary, developmental, and ecological framework. Graduate student Will Atwood and incoming graduate student Troy Fadiga will be investigating the evolution and environmental variation of form (blastoids and rhombiferans, respectively) using a newly acquired 3-D laser scanner. This laser scanner can take photographs of the external morphology of fossils at 50 micron intervals for reconstruction and analysis of shape. These projects are

all instrumental in expanding our understanding of the shape evolution beyond traditional two-dimensional morphometrics. Otherwise, I spent some time this year working with colleagues in Spain and England.



Charles Darwin's statue at the British Museum, London.

Larry Taylor – Larry Taylor is still going strong into his 70's, fat and sassy, and into even more research activities than ever—good thing that there also seems to be an endless stream of Ph.D. students and postdoctoral research associates to provide input and mental calories into these activities! On a more “traditional” path, my group continues to investigate lunar rocks and soils, including new lunar meteorites, to interpret the origin and evolution of the Moon, and the potential of the Moon as the paradigm for the terrestrial planets. We are also continuing our detailed studies of Russian diamonds, diamondiferous eclogites and peridotites, and have recently published a book on mineralogy/petrology of Siberian diamonds. Additionally, with the race to return human to space, my group has discovered a new breadth of research topics, including working with the European Space Agency and the Moon Mineralogy Mapper on India's Chandrayaan lunar orbiter; exploring the potential for in situ resource utilization on the moon (e.g., microwave paver; oxygen production; mineral beneficiation), the toxicity of lunar dust on humans, and the radiation protection of lunar soil; and developing a mini-SEM for use on the Moon. I have also been able to use my long history of lunar work in development of a new course aimed for 15 Chancellor's Scholar freshman, as their intro to university life. This course is focused on all things lunar, including a visit by old friend and Apollo 17 astronaut, Jack Schmitt, who was the last man to step on the Moon and the only scientist/geologist to do fieldwork outside of this world.

Faculty Research Awards

This year has been extraordinary in terms of faculty success in receiving external awards for their research. In addition to continuing awards, we were able to bring in 30 new awards, representing the efforts of 14 academic and research faculty, which totaled nearly \$3.1 million dollars! The success marks the hard work of our faculty, their postdocs, and their colleagues at other institutions; as well as increases in available funding via government stimulus programs. Such success keeps our research program at the cutting edge and provides critical support to our graduate and undergraduate students.

New Awards (August 2008-July 2009)

Greg Baker, Claudia Mora, & Larry McKay – NSF
OEDG Track I: Enhancing diversity via targeted education and outreach through the East Tennessee Geosciences Program (ETGP)

Greg Baker – ORNL
Multiscale investigations on the rates and mechanisms of targeted immobilization and natural attenuation

Devon Burr – NASA
(1) Mapping, Characterization, and Analysis of Channel/Valley Features on Titan; (2) Aeolian sediment movement under Titan conditions: wind tunnel experiments and modeling; (3) Raised Curvilinear Features in the Western MFF

Michael Clark – TN Department of Education
First Tennessee Tennmaps Earth & Environmental Sciences Partnership

Joshua Emery – NASA
(1) Near-Infrared spectroscopy and photometry of primitive asteroids; (2) Surface characteristics of Icy Galilean satellites; (3) IRAC Reflectance of Cold Classical KBOs and Centaurs; (4) Thermal Emission Analysis of Extinct comet candidates and My-type Asteroids

Josh Emery – NASA/JPL/Caltech
(1) IRS spectra of basaltic asteroids: Vestoids, 1459 Magnya, other non-vestoid basaltic asteroids; (2) The warm Spitzer NEO survey: Exploring the history of the inner solar system and near-Earth objects

Chris Fedo – NASA
Geochemical and iron isotopic investigation of Precambrian banded iron formation (3.8-1.9 Ga)

Bob Hatcher – USGS
Detailed Geologic Mapping, Central Georgia Inner Piedmont and Tennessee Valley and Ridge

Bob Hatcher – US Nuclear Regulatory Commission
Large earthquake seismology in the East Tennessee seismic zone

Linda Kah – NSF
Laterally Extensive breccias in the Mesoproterozoic Atar Group, Mauritania: Tsunami deposition resulting from a marine extraterrestrial impact

Zhenghua Li – National Institute of Justice
Isotopic Analysis of the William Bass Donated Skeletal Collection and other modern donated collections

Larry McKay – ORNL
(1) Toxic metal bioaccessibility and carbon sequestration; (2) Mobility of particulate and dissolved nutrients in the vadose zone at operational ranges

Larry McKay – Columbia University
EID Collaborative Research: Does arsenic mitigation in Bangladesh raise exposure to bacterial and viral pathogens?

Hap McSween – NASA
Meteorite petrogenesis

Hap McSween – NASA-affiliated Universities
(1) Mars Surveyor Participation; (2) THEMIS science team member for Mars Odyssey spacecraft; (3) Participation in DAWN science team

Jeff Moersch – NASA/JPL/Caltech
(1) Modeling and characterization studies of a rover-based neutron detector with applications to Mars; (2) Search for aqueous minerals with Mars Exploration Rover Mini-TES experiment.

Ed Perfect – ORNL
Upscaling the saturated and unsaturated transport of U(VI) in heterogeneous mixtures

Larry Taylor & Hap McSween – NASA
Evolution of planetary crusts and mantles: Moon and Mars

Larry Taylor – NASA
(1) Miniaturization of an Environmental Scanning Electron Microscope (ESEM) for remote planetary studies; (2) Lunar Aerosol Dust Toxicology Advisory Group: Lunar dust characterization

Larry Taylor – NASA-affiliated Universities
(1) Tennessee Space Grant Consortium; (2) Moon Mineralogy Mapper: Science Advisory Team; (3) The Moon as a cornerstone to the terrestrial planets: the formative years

Working with Teachers – Continuation of the TENNMAPS Program



Participating teachers in the TENNMAPS program, which provides teaching materials and intensive training to teachers in some of the poorest counties in East Tennessee.

TENNMAPS for the Future: First Tennessee Field service Center's Earth and Environmental Sciences Partnership between our Department of Earth & Planetary Sciences and 17 East Tennessee school districts held a two-week science and mathematics teacher workshop in Greeneville, Tennessee, in June 2009. Almost 50 teachers from the region's schools attended, received lectures on a variety of topics within Earth sciences and evolution, and were supplied with a variety of teaching materials with which to augment their own courses. The highlight of the workshop was a full-day fieldtrip across the Valley and Ridge province. Professional participants in the TENNMAPS project include **Mike Clark**, **Bill Deane**, and **Colin Sumrall** from UT-Knoxville; **Michael Gibson (Ph.D. 1988)** from UT-Martin, Hugh Mills from Tennessee Tech, and Martin Kohl and Barry Miller from the Tennessee Division of Geology.

Working with Teachers and Students



Many of our faculty give their time and expertise to the greater East Tennessee region. These outreach events are sometimes supported by research grants (as these pictures of Zhenghua Li leading a group of teachers to Raccoon Mountain Cave to sample cave waters), but also include a variety of events to discuss aspects of geology with local schoolchildren.

Influencing the Next Generation at the McClung Museum



EPS graduate students Matt Chojnacki (left) and Mike DeAngelis (right) leading students through an exploration of Tennessee geology at UT’s McClung Museum.

UT’s Frank H. McClung Museum includes a permanent exhibition called *Geology and Fossil History of Tennessee*. Each year, 18-20 students from the Department of Earth & Planetary Sciences volunteer to lead programs for more than 3800 pre-K and K-12 students through this exhibit. Our students receive an outline from the Museum’s Educator regarding age and grade-appropriate topics (including plate tectonics, rocks types and the rock cycle, processes of fossilization, stratigraphy and dating, mineral tests, and Tennessee’s climate and geologic history). Students then create their own presentations using the exhibit’s displays, hands-on samples, and audiovisual components. Teachers repeatedly give our graduate presenters high marks not only for their knowledge, but also for their personable delivery and enthusiasm for the subject. The Museum’s hope is that such contact will encourage even the youngest of students to develop an interest in science, in higher education, and of course, in the breadth of experiences that museums can offer.

Getting Students Involved – 20th Annual River Rescue



Clean-up of Third Creek during the 20th Annual River Rescue involved nearly 80 volunteers, including EPS graduate students and a variety of UT undergrads.

The geology club-sponsored *Third Creek Clean-Up* at the 20th Annual River Rescue was a huge success! Gorgeous weather and over 80 volunteers (largely undergraduates from Geology 103) resulted in the collection of more than 200 bags of trash. To emphasize the extent to which trash affects our environment, the students also created a display of “interesting treasures,” which included the normal bottles and cans, a fencing trophy, discarded clothing, broken plastic toys, car parts, etc. Many thanks to **Christina Viviano, Lizzie Johnson, Beth Lavoie**, and the other student organizers!

A Word from the UT Geoclub President

The Department of Earth & Planetary Sciences Geoclub had an exciting and eventful year! At our yearly awards day ceremony, Geoclub recognized **Colin Sumrall** as best teacher in the Department, and presented **Heather Byars (M.S. 2009)** with the Gordon Award, which acknowledges the Graduate student with the most professional promise. Heather has now finished her M.S. thesis and has just moved to Houston, Texas, to begin her new job with Southwestern Energy Company, where she will be working on exploration and drilling in the Fayetteville Shale in Arkansas. Geoclub also recognized **Steven Jaret (B.S. 2009)** and graduate **Mike DeAngelis** for excellence in a service to the department, and awarded undergraduate **Casee Lemons** and graduate **Daniel Lewis** for their extensive volunteer work and public outreach. These awards highlight the dedication to excellence and service the students in Earth & Planetary Sciences continue to show both in and outside of the department.



Trash from the 20th Annual River Rescue event.

The Geoclub also supported many activities for our students this year. Graduate student, **Beth Lavoie**, organized and led a successful River Rescue Cleanup event on parts of Third Creek and Lake Loudon, which was co-sponsored by the Ijams Nature Center. Over 80 undergraduate, graduate, and faculty volunteers spent their day picking up over 200 bags of waste! Interesting items found in the river included: a shopping carts, 3 car tires, a gas tank, an oil barrel, and a mattress. Needless to say, we made quite a difference!

In sports news, the department softball team, the “Bad News Bolides,” made it to the finals for a second year in a row, making it to the second round in the UT intramural playoffs. We also enjoyed a graduate student bowling night, where we took an evening to relax and participate in some competitive cosmic bowling.

Several of us also took a camping trip to the Liberty Hill pluton in South Carolina in May 2009. We investigated granite plutons and Mesozoic diabase dikes, and explored the Fairfield County Granite Quarry. We also enjoyed hanging around the campfire and making “s’mores”. Finally, as always, Spaghetti Supper was a successful and entertaining event, filled with delicious goodies and plenty of laughs. All in all, Geoclub had an action-packed year!

The GeoClub continues to maintains a department website, so feel free to check out what we are up to at <http://web.utk.edu/~geoclub/default.html>.

Outgoing Geoclub Officers

President: Christina Viviano
 Vice President: Peter Knappet
 Secretary/Treasurer: David Gaines
 GSS Representative: Andrew Beck
 Undergrad President: Morgan Braxton-Sears
 Undergraduate Vice President: John Roelofs

Incoming Geoclub Officers

President: Liz Lee
 Vice President: Sarah Cadieux
 Secretary/Treasurer: Jackie Langille
 GSS Representative: Megan Carr
 Undergraduate President: Emily Worsham
 Undergraduate Vice-President: Beth Storey

The Success of our Students

In recent years, we have seen increases in both the number of undergraduate students participating in undergraduate research and continuing on to graduate school. We have also seen an increase in the number of our Ph.D. students, and in the number of our students who are successful in their chosen careers.

We are very proud of our students’ excellence and we congratulate each and every one of you!

Undergraduate Degrees Awarded

Matt Alexander (B.S. 2009)
 Morgan Braxton-Sears (B.S. 2009)
 Andy Foy (B.S. 2009)
 Steven Jaret (B.S. 2009)
 James Pratt (B.S. 2009)
 John Roelofs (B.S. 2009)
 Tyler Roy (B.S. 2009)
 Laura Stair (B.S. 2009)
 Adrian Thompson (B.S. 2009)
 Chris Ware (B.S. 2009)

2009 Undergraduate Award Winner

In 2009, the 13th Annual Exhibition of Undergraduate Research and Creative Achievement (EUR̄CA) showcased research and creative activities by undergraduates. This competition aims to encourage, support, and reward undergraduate participation in the campus research enterprise, and to aid in the development of faculty mentoring relationships. Entries are judged by a combination of UT faculty members and community professionals, and awards are provided by the Chancellor's Office and the Phi Kappa Phi National Honor Society.

The Department of Earth & Planetary Sciences is proud to announce that our own **Steven Jaret (B.S. 2009)** won a Phi Kappa Phi award, a Natural Sciences divisional award, as well as the highest honors of the EUR̄CA competition (chosen from the divisional winners). Steven's project, completed in collaboration with **Linda Kah** was titled: *Petrographic Investigation of Ejecta from the Tenoumer Impact Crater, Mauritania*. This fall, Steven will relocate from Tennessee to Massachusetts to attend graduate school at Harvard University.



Steven Jaret receiving an undergraduate research award from Office of Research director, Greg Reed.

2008-2009 Undergraduate Research Projects

Our undergraduate students continue to do great research in collaboration with faculty and graduate students. We strongly encourage all undergrads to get involved in independent research, and with the help of alumni-donated funds, we try to send as many of these students as possible to professional conferences to present their research.

Adam Backus: Searching for the late Cambrian SPICE excursion in Argentina (Kah, with Ph.D. student Cara Thompson); **Ty Conner:** Isotope analysis of tree ring cellulose for climate analysis (Finkelstein); **Andy Foy:**

Characterizing Alteration Zones within ultramafic bodies (Labotka); **Kelli Harrelson:** Lower Ordovician C-isotopes of Argentina (Kah, with Ph.D. student Cara Thompson); **Steven Jaret:** Petrographic Investigation of ejecta from the Tenoumer Impact Crater, Mauritania (Kah); **Andrew Meyer:** Silicified sponges of eastern Tennessee (Sumrall); **James Pratt and Jesse Stephens:** Isotopes of the Yangtze Platform, China (Kah).



Ty Conner preparing tree ring cellulose for isotopic analysis.

2008-2009 Graduate Degrees Awarded

Terri Brown (M.S. 2009) – Fluorescence characterization of karst aquifers in east Tennessee (McKay).

Heather Byars (M.S. 2009) – Relationships between the Cat Square and Tugaloo terranes from structural and geochronologic studies at the west end of the Newton window, North Carolina (Hatcher).

Shawna Cyphers (M.S. 2009) – Detailed mapping of a terrane boundary; and structure and origin of block-in-matrix structures, central and eastern Blue Ridge, Jackson County, North Carolina (Hatcher).

Tairone Leao (Ph.D. 2008) – Effects of water content and salinity on soil electrical properties at 50 MHz: structural and textural implications (Perfect).

Arthur Merschat (Ph.D. 2009) – Assembling the Blue Ridge and Inner Piedmont: Insights into the nature and timing of terrane accretion in the southern Appalachian orogen (Hatcher).

Whitney Nelson (Ph.D. 2008) – Assessing the tree-ring, oxygen isotope hurricane proxy along the Atlantic and Gulf Coastal seaboards, USA (Mora-Finkelstein)

Ching Tu (M.S. 2009) – Mean kinematic vorticity of retrograde mylonite in the Brevard fault zone, South Carolina (Hatcher-Jessup).

The Success of Our Students

Our students' success is also revealed in the large number of presentations given at professional meetings, in the increasing number of peer-reviewed publications, and in the wide variety of external awards for research and research-related travel. In sum, this year our students have made 69 presentations at a variety of regional, national, and international meetings; have authored or coauthored (along with recent graduates) 10 peer-reviewed publications; and have been awarded 29 external awards totaling over \$140 K – simply astounding, and a superb achievement for our students!

Student Presentations

Andrew Beck (Ph.D. student) – 2 presentations
 Terri Brown (M.S. student) – 1 presentation
 Heather Byars (M.S. student) – 3 presentations
 Megan Carr (M.S. student) – 1 presentation
 Matt Chojnacki (M.S. student) – 2 presentations
 Brittany Davis (M.S. student) – 1 presentation
 Mike DeAngelis (Ph.D. student) – 1 presentation
 David Gaines (Ph.D. student) – 5 presentations
 Geoff Gilleaudeau (Ph.D. student) – 2 presentations
 William Gilliam (M.S. student) – 2 presentations
 Craig Hargrove (Ph.D. student) – 5 presentations
 Miles Henderson (M.S. student) – 2 presentations
 Eric Hogan (M.S. student) – 2 presentations
 Matt Huebner (M.S. student) – 1 presentation
 Steven Jaret (B.S. student) – 1 presentation
 Peter Knappett (Ph.D. student) – 2 presentations
 Michael Latham (M.S. student) – 1 presentation
 Daniel Lewis (Ph.D. student) – 1 presentation
 Ian McGlynn (Ph.D. student) – 1 presentation
 Arthur Merschat (Ph.D. student) – 7 presentations
 Aubrey Modi (M.S. student) – 4 presentations
 Rene Shroat-Lewis (Ph.D. student) – 4 presentations
 Don Stahr (M.S. student) – 1 presentation
 Kevin Thaiszen (Ph.D. student) – 10 presentations
 Cara Thompson (Ph.D. student) – 1 presentation
 Ching Tu (M.S. student) – 1 presentation
 Mary Varnell (M.S. student) – 1 presentation
 Christina Viviano (Ph.D. student) – 2 presentations
 Presanta Yeluru (M.S. student) – 2 presentations

Student Peer-Reviewed Publications

Alyssa Bell – Journal of Environmental Quality
 Heather Byars – GSA Meeting Field Trip Guide
 Matt Chojnacki – Journal of Geophysical Research
 Troy Dexter – Lethaia
 William Gilliam – GSA Meeting Field Trip Guide

Craig Hardgrove – Earth & Planetary Science Letters
 Peter Knappett – Water Research, Applied and Environmental Microbiology, Vadose Zone Journal
 Rhiannon Mayne – Geochimica et Cosmochimica Acta
 Arthur Merschat – GSA Meeting Field Trip Guide
 Kevin Thaiszen – Meteoritics & Planetary Science

Student Research Awards – Graduates

Andrew Beck – Mayo Foundation Award
 Terri Brown – AGU Travel Award
 Sarah Cadieux – Southeastern Section, Geological Society of America Student Research Award; Society for Sedimentary Geology (SEPM) Student Research Award
 Mike DeAngelis – Southeastern Section, Geological Society of America Student Research Award
 Megan Ennis – Lunar & Planetary Institute Summer Internship
 David Gaines – ExxonMobil Travel Grant
 Geoff Gilleaudeau – Barringer Foundation for Meteorite Research Award
 Craig Hargrove – NASA Graduate Student Research Program Award
 Melissa Hage – Precambrian Research Center Award
 Miles Henderson – Southeastern Section, Geological Society of America Student Research Award; Sigma Xi Student Research Award, Society for Sedimentary Geology (SEPM) Student Research Award; Belt Association Research Award
 Eric Hogan – Geological Society of America Student Research Award; GSA Sedimentology Division Outstanding Student Research Award
 Peter Knappett – GSA Travel Award
 Liz Lee – Southeastern Section, Geological Society of America Student Research Award
 Daniel Lewis – National Science Foundation Doctoral Dissertation Improvement Grant
 Aubrey Modi – AGU Travel Award
 Rene Shroat-Lewis – Cincinnati Dry Dredgers Research Grant; Royal Ontario Museum Fritz Travel Grant
 Kevin Thaiszen – NASA International Year of Astronomy Student Ambassador; Lunar & Planetary Institute Summer Internship; LPI Travel Award

Student Research Awards – Undergraduates

Steven Jaret – Mayo Foundation Award; Tennessee Space Grant Consortium Award; Exhibition for Undergraduate Research
 Emily Worsham – Lunar & Planetary Institute Summer Internship

Awards Day 2008



Hap McSween with our undergraduate (left, top), introductory (left, bottom) and graduate (right) award winners. Thanks to the generous support from our alumni and friends, the Knoxville Gem & Mineral Society, and the Planetary Geosciences Institute, we were able to provide more than \$24,000 in monetary support for our students!

Undergraduate Awards

- Outstanding Senior Award:** Steven Jaret
- Coffee Cup Award for highest GPA:** Emily Worsham
- Geology Club “Rock Solid” Award:** Steven Jaret
- Geology Club Outreach Award:** Casee Lemons
- Alumni Undergraduate promise Awards:** Beth Storey, Karen Buchanan, Ty Conner, Noah McDougall, Andrew McNair, Blake McFerrin
- Walls Award for outstanding performance in introductory geology courses:** Kelsey Crane, Adam Denton, Steve Dikic, Caycee Ellis, Deborah Lowther, Cliff Mauroner, Sean McCarrall, Andrew Vial, Garrett Welch, Allison Yiling
- Knoxville Gem & Mineral Society Awards:** Casee Lemons, David Reeves, John Roelofs
- Kopp Undergraduate Research Scholarships:** Nick Costello (Mapping the Tibetan detachment), Andy Foy (ultramafic alteration), James Pratt (C-S isotopes of the Ordovician of China), Jesse Stephens (C-S isotopes of the Ordovician of China)
- Ross Field Camp Scholarships:** Casee Lemons, David Reeves, Laura Stair, Matt Alexander, Jesse Stephens, Jesse Sexton, Adrian Thompson, Driss Takir (grad)
- Byerly Field Camp Scholarships:** Darrin Brager, Steven Jaret, John Roelof, Tyler Roy, Driss Takir (grad)
- Knoxville Gem & Mineral Society Field Camp Award:** Tyler Roy, Adrian Thompson

Graduate Awards

- Gordon Award for Professional Promise:** Heather Byars
- Coffee Cup Award for highest GPA:** Aubrey Modi
- Geology Club “Rock Solid” Award:** Mike DeAngelis
- Geology Club Outreach Award:** Daniel Lewis
- ETSG Best Student Research Presentation:** Christina Viviano, Steven Jaret (undergraduate), Brittany Davis (honorable mention)
- Knoxville Gem & Mineral Society Graduate Scholarships:** Christina Viviano, David Gaines
- Excellence in Teaching by a Graduate Teaching Assistant:** Phillip Derryberry, Melissa Hage
- Excellence in Outreach and Departmental Service:** Daniel Lewis, Christina Viviano
- Alumni Award for Professional Promise:** Andrew Beck, Terri brown, Megan Carr, Geoff Gilleaudeau, Cara Thompson, Rene Shroat-Lewis
- Planetary Geoscience Institute Awards:** Andrew Beck, Kevin Thaisse, Aicheng Zhang
- Swingle Graduate Fellowships:** Brittany Davis, Matt Huebner
- Interdisciplinary Research Award:** Peter Knappet

Congratulations to All!

Students in the Field – Undergraduates



Paleo students examining trace fossils at Thorn Hill.



Tyler Roy at Lavender Canyon, Utah.



Jesse Stevens and Bill Honea discussing faulting.



Taking a mapping break in the Red Hills.



Steven Jaret peeling moss from Archean basement.



Matt Alexander and Laura Stair during a mapping exercise.

"I would like to thank the alumni for their generous donations which allow for field camp scholarships. I used part of the money to cover the last part of tuition and the remainder for camping supplies to face the harsh condition (snow, rain, etc.) during this years camp. This part of our educational experience is invaluable in terms of our knowledge and experience, yet is also expensive and increases every year with added costs. So thank you for helping all of the students and myself to accomplish this important endeavor."

– Matt Alexander

Students in the Field – Graduates



Grads and undergrads visiting Flynn Creek Crater.



Melissa Hage at Thunder Bay to sample BIFs.



Aubry Modi investigating a vein in granite.



Students examining Belt Supergroup stromatolites.



Geoff Gilleaudeau determined to understand "sinusoidal" stromatolites.



Eric Hogan in the basin and range.

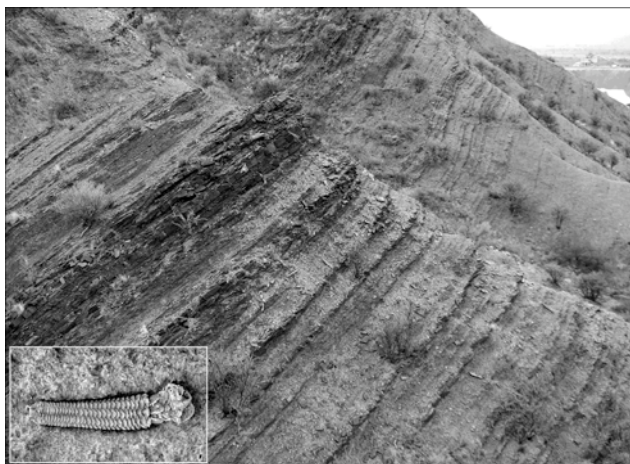
UT Around the World

In 2008, the University of Tennessee embarked on a “Ready for the World” campaign to increase cultural diversity and awareness on campus, and to enhance international opportunities for students. Here we continue our new “tradition” of highlighting the international adventures of current faculty, postdocs, students, and alumni. We would like to encourage alumni to contribute pictures and stories of their own international activities for future newsletters.



Micah Jessup (2nd from left), students, and colleagues on top of the world in the Himachal Pradesh, Indian Himalayas.

In summer 2009, **Micah Jessup**, students **Jackie Langille** and **Liz Lee**, and colleagues had a successful field season in the Himalayas (Himachal Pradesh, India). The field season was part of a larger project to map and sample a portion of the Leo Pargil Dome in order to characterize extension and dome formation in this region of the Himalayas. Pressure-temperature analysis and fabric analysis will be completed along with U(-Th)-Pb geochronology on samples from the footwall to constrain the timing of deformation, fabric development, and initiation of uplift.



Silurian strata, Argentina, containing Rhenopyrgids.



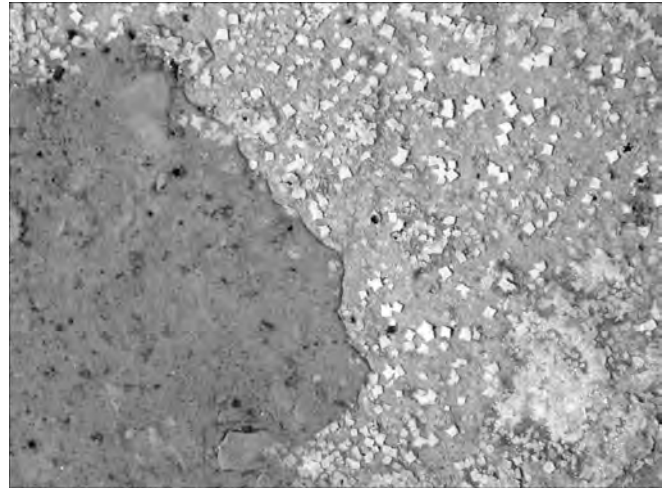
Colin Sumrall (right) and colleague in Zaragoza, Spain.

Summer 2009 saw several international visits for **Colin Sumrall**. In June, Colin traveled to San Juan Province, Argentina, for paleontological fieldwork in the Middle Silurian of the Precordillera. Here he, along with colleagues Susana Heredia and Cecilia Rodríguez, collected nearly 150 rhenopyrgid edrioasteroids from the base of a small sand channel at Lomas de los Piojos (Hills of Lice!). These fossils represent the first known growth series for rhenopyrgids and the only collection of edrioasteroids known from South America. Then, in August, Colin spent some time traveling to Zaragoza, Spain, and London, England, for work with colleagues.

UT Around the World



A lacustrine salt flat in the high Andes, Argentina.



Dehydration of the lake substrate with salt precipitation.

Linda Kah spent a week in January 2009 doing fieldwork with her postdoc, **Fernando Gomez**, in the high Andes (>4500 meters) of northwest Argentina, where they were sampling lake waters, microbial mats, and mineralized stromatolites. Ca-Cl brines of these evaporative lakes, the microbial populations they contain, and the history of lake water changes preserved in mineralized stromatolites create a set of potential analogues for understanding early martian environments. The sampling was not easy (the whole field party suffered from elevation sickness and temperatures varied daily between <math><0^{\circ}\text{C}</math> and $>30^{\circ}\text{C}$) but the remote beauty was worth it!

Where in the World are you now?
Charles “Dr. Rocks” Bartlett (Ph.D. 1974)



I am glad to say that I am right here in Abingdon, Va, where at my nearby home I can look out my window and see Mt. Rogers (named for geologist, William Barton Rogers) and White Top Mountain (not named for me as,

“Old Baldy” might be more correct). These two of the highest mountains in the Blue Ridge chain. My wife Jean and our two (now married) daughters moved here in 1967 when I came to teach geology at Emory & Henry College and, for the first two years, taught on alternate days at King College. I’ll turn 80 in October and proudly report that I have seen parts of 41 countries and have set my boots on all continents—including a swim in Antarctica!

But let’s look back a *few* years to where I grew up in Chapel Hill, North Carolina. There, my dad and mom opened the first taxi company in town, naturally named the Carolina Cab Co. My first recollection of geology was when I was 11 at a summer camp at nearby Crabtree State Park (now Umstead State Park). The nature counselor was a Carolina grad student who took some of us on hikes to an abandoned quarry and other rock and mineral collecting spots where I recall finding epidote, varieties of quartz, hornblende, etc. I was hooked then and it stuck.

I joined the local Boy Scout troop and ultimately rose to Eagle Rank – earning along the way a merit badges for rock collecting. Many weekends were spent camping in the central North Carolina area. Much of this time was

during WW II and the UNC campus was home to the U.S. Navy preflight school. This had an impact on my later life. In the summer of 1947, I made my first out-of-the-country trip as a North Carolina Boy Scout to attend the “Jamboree de la Pax” near Paris, France. After crossing the Atlantic with 4,000 scouts from the U.S. on an Army transport ship, we made a quick tour of Belgium, Holland, and Luxembourg before traveling on to the World Jamboree where we joined scouts from over 40 other countries. What an outstanding experience!



In fall of 1947, I began my college education at Carolina (just four blocks from home). Of course, you might have guessed that I majored in geology and aced the summer geology field camp directed by Dr. Roy Ingram. I met my wife-to-be, Jean, during our junior year, we graduated in 1951, and were married two weeks later. The Korean War was going on and my number was up, so I volunteered for the Navy with hopes of being a pilot. I was off to Newport, Rhode Island for Officer Candidate School in the winter of 1951-52. The discovery that I had weak vision in my right eye negated my dream of becoming a navy pilot. Fortunately however, I was accepted for air intelligence duty, partly due to my geology degree, and continued my training at Jacksonville Naval Air Station and the Naval Observatory in D.C.

From a duty assignment wish list, I chose Jacksonville, Charleston, or Norfolk. So where was I assigned? – to Fighter Squadron VF-54 in San Diego, California. Not all bad, since our first trip across the country was by way of Zion National Park, the Painted Desert, Meteor Crater, the Grand Canyon, the Rockies, and the Sierra Nevadas. I checked into Miramar Naval Air Station and was immediately assigned to attend three weeks at the Air Force Escape, Evasion, and Survival School in the Idaho mountains – great experience! I escaped through “enemy”

lines mostly using techniques from Boy Scout night games of “Capture the Flag”.



Soon, reality returned and I was off for nearly 9 months to Japan and Korea on the aircraft carrier, USS Valley Forge. I worked many 20-hour shifts briefing pilots on their assigned bombing targets in North Korea and debriefing when they safely returned. In other words, I told them where to go and, when they returned, they told me where to go! Thankfully on this action, we only lost one pilot, but that was one too many. Next, it was back to San Diego where I was reassigned to Moffett Field Naval Air Station. I finished my 3½ year commitment training jet pilots, one of whom later became Astronaut Jim Lovell (“Houston, we have a problem!”).

Now back to 100% geology: First, since entering the field of geology, I have had the good fortune to have never been fired, laid off, or unemployed. This may not be a record in this profession, but is still somewhat unusual. As my time of discharge approached, I began to send out resumes to oil exploration companies and even a junior college at Coalinga, California. At that time, jobs were plentiful for geologists, and I was hired by Superior Oil Company to work with a seismograph party in remote Fort Stockton, Texas, as part surveyor and part “computer” before those instruments came on the scene. After a month in Texas, we were “hot shot” to Ardmore, Oklahoma. Tiring of working 60-hour weeks for a 40-hour salary and not doing much geology to boot, I took a day off and visited the Tulsa office of Gulf Oil (now Chevron) where I had earlier received a friendly response. In short order, I was hired as a field geologist and, after two months training in photo geology at Denver, was part of the crew tasked to set up a new office in Fort Smith, Arkansas. Yes, I was a “field geologist,” but I spent much office time viewing stereo photo pairs of Arkansas Valley scenery and transferring surface expressed structures onto

section-gridded maps with a photo-transfer-mirror plotter.

My first project was the Washburn anticline, a 40-mile-long, 12-mile wide thrust faulted asymmetric fold in Pennsylvanian sandstones and shales. Gulf had a large holding of leases on this structure. After several months of office and fieldwork, I made a drill site recommendation on the crest of the fold. At that time, the Arkansas State geologic map noted Mississippian-age Jackfork sandstone along the crest line named Pleasant Ridge on the topographic map. No hydrocarbons had yet been found in the Jackfork. My fieldwork found no diagnostic Mississippian fossils, only non age-specific crinoid stem section imprints. However, the exposed sandstones were porous and potentially a good reservoir rock. Gulf management ran with my site recommendation and drilled the Borum #1-18 well. I became the well-site geologist on my first wildcat. At 4,900 feet, we tested a gas flow of 18,800 MCF, opening the Booneville Gas Field that now contains 250 gas wells and continues to expand 53 years later. Incidentally, the well went on down and cored Mississippian limestone at 8,950 feet. The State map missed their call by more than a mile! What an exciting way to begin a geologic career.



Ultimately, I mapped large portions of NW Arkansas, wore out two Jeeps, found or extended three more gas fields, and just barely missed being part of a staff cutback in 1959 when Gulf gave walking papers to two-thirds of the Fort Smith office! So, I stayed on until I was offered a nice promotion with the oil and gas division of J.M. Huber Corporation. I was sent to their Oklahoma City office as Manager of Geology for the NW

Arkansas/Eastern Oklahoma Arkoma Basin. Several more highly-productive gas wells resulted from my 3 ½ pleasant years with Huber. More gas was found than existing pipelines could take, so production was shut-in and I proceeded to look for greener pastures.



Huber offered me a job shift to Dallas or the opportunity to open a new office in Shreveport, Louisiana to explore for oil and gas. However, growing up in the college town of Chapel Hill had instilled in me the desire to teach in a college setting. Actually, I had been a teacher in the Navy, and there is certainly an aspect of teaching in selling drilling ideas to management in the oil companies. So, I headed back to graduate school at Carolina after a 15-year detour. At first, it was quite difficult to jump in with bright young students and pick up on new requirements like a year of calculus and French. The courses in geology were a breeze, however, and in less than a year I was writing my M.S. thesis on a 15-minute quadrangle at Southern Pines, N.C.. This was in the inner coastal plain sandhills region, and I decided on a near-coastal sand dune origin for the sand cover over upper Cretaceous fluvial deposits. The surprise discovery was several hilltop outliers of Eocene age containing some aluminum phosphate minerals at 60 miles west of the main Eocene beds near Wilmington.

Teaching began at the instructor level at Pembroke State College (now University) in south-central North Carolina. Then I discovered the opening at Emory & Henry College noted in the opening paragraph where I stayed for eleven years as head of a one-man geology program. During that stint, I explored the Valley and Ridge geology and mapped most of Washington County for the Virginia Division of Mineral Resources over 3 ½ summers. In 1971, I applied to the National Science Foundation and was one of two geologists awarded a faculty fellowship that year and began my studies at Knoxville to pursue the Ph.D. in geology. That began an intense 15 months on

campus and, somehow, I probably broke the record for completing the required coursework. During school breaks and two subsequent summers, I completed a thesis on the lower Mississippian deltaic Price Formation including 65 measured sections from Cumberland Gap to Blacksburg in Southwest Virginia.

Somehow, due in part to an innate curiosity, I have a propensity to discover unusual or unique things in the Earth—like the earlier-noted Eocene outliers in North Carolina. Shortly after beginning my stay at Emory & Henry College, I attended the Carolina Geological Society Field Conference which was a two-day excursion through the Mount Rogers area and a section of the eastern Blue Ridge. On the first day, I collected a box of rock samples to break up for lab samples from a section of exposures in Grayson County on a now-abandoned rail line transversing the basal Cambrian sandstones and upper Precambrian glacial tillites, maroon siltstones, and volcanic rhyolites, and basalts. After a month's delay being busy with starting up classes at two colleges, I began to break a collected siltstone cobble into smaller lab samples. To my amazement, when I first pounded that maroon siltstone (obtained from several hundred feet stratigraphically below the basal Cambrian quartz-pebble conglomerate), out popped a perfect, complete, black linguloid brachiopod! No. There are not any hard-shell fossils in the Precambrian rocks according to the textbooks. Ultimately, this discovery was revealed in a paper I presented at a SEGSA Annual Meeting.



Another example relates to the two summers I was a faculty fellow at Johnson Space Center in Houston. The second of which I worked with John Annexstad, an experienced Antarctic explorer, on the meteorite recovery project using satellite imagery and standard aerial photography. I researched and selected several locations where I spotted piles of accumulated, suspiciously dark

rocks for the field team to check for meteorites. One of those locations was at a nunatak group named Allan Hills where they discovered the now-famous “Mars Rock”—just lucky on that one too.

Moving on: In 1979 after eleven years at Emory & Henry, I had an unexpected call from Roger Planalp, an old Gulf Oil geologist friend who was exploration manager for Hawkins Oil & Gas, a small independent company in Tulsa, Oklahoma. Roger worked with me in Arkansas and had ventured to Australia, Thailand, and the Philippines and had returned to work with the Hawkins brothers who were from Arkansas. They had successfully explored in Kansas and Oklahoma, but desired to find gas in their home state. Thus, the call came from Roger whose timing was right, as I was ready to test my skills as a consultant.

Though it seems like yesterday when I hung my shingle, it has been 30 years since I became my own “boss.” When I started, I was able to stay in Abingdon working about half time for Hawkins Oil & Gas, flying monthly to Tulsa with bundles of maps of NW Arkansas and ideas of where to obtain leases and drill gas wells. First, I took another look at the Washburn anticline and found that just one lonely well had been producing for several years on the eastern half of this big structure. Within a year, Hawkins had followed my advice and the second well, Trickett #1, drilled in 1980, was a great success and opened the Chismville Gas Field. That well is still producing quite well and has now exceeded eight million dollars in revenue. The field now contains approximately 340 gas wells and is still expanding.

Back in Virginia, it was boom time and within two years, Bartlett Energy Exploration had twenty-one employees and was flooded with clients from Texas, Oklahoma, and Virginia. However, in 1986, the balloon began to leak and the oil and gas business mostly dried up, so we were forced to downsize. We had limited success in drilling oil wells in Lee County, Virginia and gas wells in other areas of SW Virginia. Fortunately, I had gradually expanded our capabilities in environmental and forensic geology. We located water wells, county and regional landfill sites, and investigated sinkhole collapse events.

I had begun occasional investigation and court testimony as an “expert witness” on water pollution from underground storage tank leaks and rock quarry blast vibration damage while still teaching at Emory & Henry. That work expanded, ultimately extending to 13 states (as far west as Wyoming) and over 500 cases, especially dealing with blast damage and underground mining subsidence. One quarry blast case in Miami involved 42 homes and a coal strip-mining case in Evansville, Indiana

that affected over 25 homes and a large church complex. My favorite case was in Federal Court in Ft. Smith, Arkansas against the Bureau of Land Management with an attorney who later became Governor of Arkansas. We won the case that changed the manner in which U.S. public lands are leased for oil and gas exploration.

For several years, I volunteered as a speaker under the auspices of the AAPG as a visiting petroleum geologist. These gratifying visits were generally two-day campus talks, seminars, and student conferences at about twenty geology departments which included University of Missouri at Rolla, Notre Dame, and Emory University, as

well as nearby Furman, U.N.C. Charlotte, U.N.C. Chapel Hill, and U.T. Knoxville.

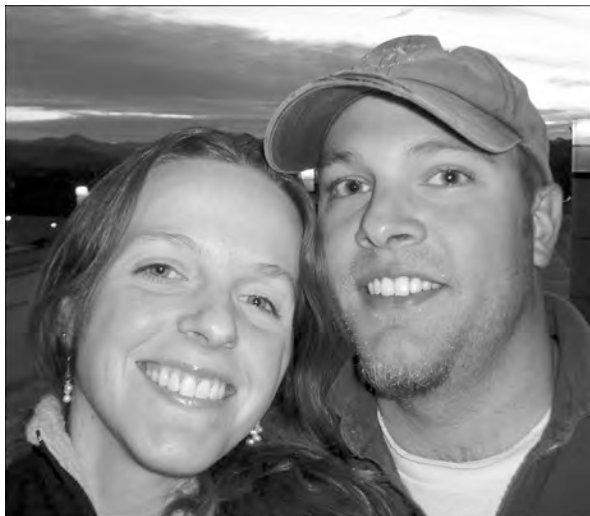
I have definitely extended my allotted space but wanted to highlight a career that has been a model of flexibility. My advice to fellow geologists is not to focus on a narrow aspect of geology, but to keep expanding their knowledge and abilities and “be prepared” (Boy Scout motto) so when one door closes another can be opened.

Best wishes and a prosperous career to all.

- Charlie “Dr. Rocks” Bartlett

How UT Geology Changed my Life Trajectory

Bryan Schultz (M.S. 2005)



As a recent graduate student at UT Department of Earth & Planetary Sciences, it is exciting to share with you the many qualities that I believe have led to the success of the UT program.

As an undergraduate student at the University of West Georgia, where I learned my structure from UT alum **Randy Kath (M.S. 1986)**, my most important goal was to be as well rounded as possible. I have always had a broad interest in the geosciences, and thus felt a multi-disciplinary path was necessary to explore my graduate studies. As I entered my senior year, now came the difficult task of finding a graduate program tailored to my mixed bag of interests.

Of the many colleges and universities across the southeast U.S., it turned out that only UT had a program that combined my geoscience interests. I remember first coming to visit the department and meeting many of the faculty and students, hoping I would leave a good impression on the professors that

would soon become my mentors. Time seemed to really fly at this point, and before I knew it, I was happily on my way to Knoxville to combine elements of soil structure, weathering, geochemistry, microscopy, hydrogeology, and mineralogy as part of my research.

For my M.S. degree, I was very fortunate to have worked under **Steven Driese** and **Larry McKay**. Their collaborative, multi-proxy approach helped provide many necessary skills for my future growth as a scientist. After graduating, I was able to apply much of what I learned to the environmental sector as a consultant for Tetra Tech. In addition to residuum morphology and fracture investigations, I was able to work in tandem with **Larry McKay** and his former post-doc **Vijay Vulava** on groundwater age-dating in the environmental assessment of the Volunteer Army Ammunition Base in Chattanooga. Based on our findings, my project manager, fellow Knoxville Frank Bogle gave me with the opportunity to develop a model that would aid in future remediation strategies.

I still felt, however, the calling of academia. I began looking at Ph.D. opportunities that utilized geochemical proxies as part of studying past environments and climates. I was soon greeted with one of the best opportunities imaginable – a National Science Foundation Fellowship position that would allow me to come back to graduate school at UT, and work with **Linda Kah** and **Dave Finkelstein**. In less than a month, I was back at UT studying enigmatic isotopic signatures of both Paleoproterozoic and Holocene systems, while performing earth science outreach to 7th and 8th graders as an NSF GK-12 Fellow for the next two years....Little did I know how much this opportunity would change my life.

Simply, my GK-12 outreach experience dramatically changed my career ambitions. I will always love the excitement of research and collaboration at the university-level, nothing compares to the feelings that accompany teaching middle school-aged students and helping them understand fundamental concepts that shape our lives and environment. I made the difficult decision to leave UT to pursue a career as an 8th grade science teacher. It was hard, but I have not looked back.

I am now entering my 2nd year teaching at Bearden Middle School, and look forward to continued growth with collaborative relationships in our East TN communities and with professors doing outreach at UT. I just received word from Lynn Champion, director of outreach at UT, that EPS professor **Micah Jessup** has been awarded an NSF tectonics-related outreach grant, of which I will play an active part. Also, as a Science

Olympiad coach at Bearden, I want to take a moment to brag about the students on my Experimental Design team who took first place at the state tournament this year! What an amazing bunch of aspiring young scientists we have here in Knox County, and I hope many of them choose to pursue advanced education in the geosciences here at UT.

It is hard to put into words how much my wife, Jayne, and I love calling East Tennessee home. The southern Appalachians have always been a special place for us, and we enjoy spending time writing music, kayaking and camping. Our favorite hobby revolves around our garden, which includes a variety of vegetables and fruits grown with organic methods of pest control and aided by our brilliant Labrador, Kayla. And wow, how that soil morphology knowledge has come in handy with our backyard experiments!

Alumni News and Information

Tracy (formerly Campbell; B.S. 2003) and **Mark (M.S. 2003) Pollock** are back in Knoxville. Mark is in his 6th year at AMEC, and Tracy just finished an internship doing cartography for the National Geographic Society. Since returning from Washington D.C., Tracy has had two maps published—you can see one of these, a map of Southeast Asia, in the July issue of National Geographic Magazine. Although Tracy's internship did not survive extensive layoffs at NGS, she is still doing freelance work with them, namely working on the 9th edition of their Atlas, which will come out next year. Tracy also tells us that **Patricia Hall (B.S. 2003)** is currently working at the CDC in Atlanta in the Department of Infectious Diseases. Between the summer's H1N1 flu virus and planning a wedding for October, Patricia is definitely keeping herself busy.

Bosiljka Glumac (Ph.D. 1997) and **Tony Caldanaro (MS. 1994)** continue to keep themselves busy. We were very happy that Bosiljka sent an undergrad, Sarah Cadieux, in our direction for graduate school. Bosiljka writes that she remains very busy and can never seem to find free time. She writes that "besides teaching, chairing the Department [Smith College] and taking care of my 2 little ones (Alex 5.5 years old and Yelena 3.5 years old), I don't get to do much else."

Miller Calloway (B.S. 1992) got to spend some time in the Department this spring. He was part of the teaching staff bringing middle school students to the Tennessee



Bearden Middle School Science Olympiad winners.

Science Olympiad competition in March. Miller, as well as UT Alumni **Bryan Schultz (M.S. 2005)**, teach science (6th grade and 8th grade, respectively) at Bearden Middle School, here in Knoxville. We extend our congratulations to Miller, Bryan, and the whole Bearden team, who were the overall winners at the Science Olympiad competition. As Bryan tells us: "Things are awesome. Life is good, and only got better when my "Experimental Design" team and Bearden won gold this weekend."

Gerry Gulley (B.S. 1978) and his daughter Blythe (age 10) ran into **Larry McKay** and his daughter Sarah (age 11) at the Ice Chalet in Knoxville. Blythe and Sarah are in the same figure skating class and were both in the Nutcracker on Ice. Gerry recognized Larry from his

picture in the department; newsletter, which he says he enjoys reading every year. Gerry recounted being a student at UT the year that Hap McSween started teaching here and has tried to keep in touch with the department over the years, including serving on the department's Board of Visitors. Gerry is a partner in the law firm of Gulley & Oldham in Knoxville. His wife, Jane, works in the UT Development Office and they also have a 9-year old son, Jack.

We can always count on the Saudi Aramco (Upstream Ventures Department) people for great pictures!

Christian Heine (M.S. 1982) sent the following photos from a recent trip to Namibia with the AAPG chapter in Cape Town, South Africa. Christian is currently serving as the Vice President of AAPG's Middle East Region. He also notes that his UT sweatshirt is getting thin...we should make a deal: you keep sending us great pictures, and we will buy you a new sweatshirt!

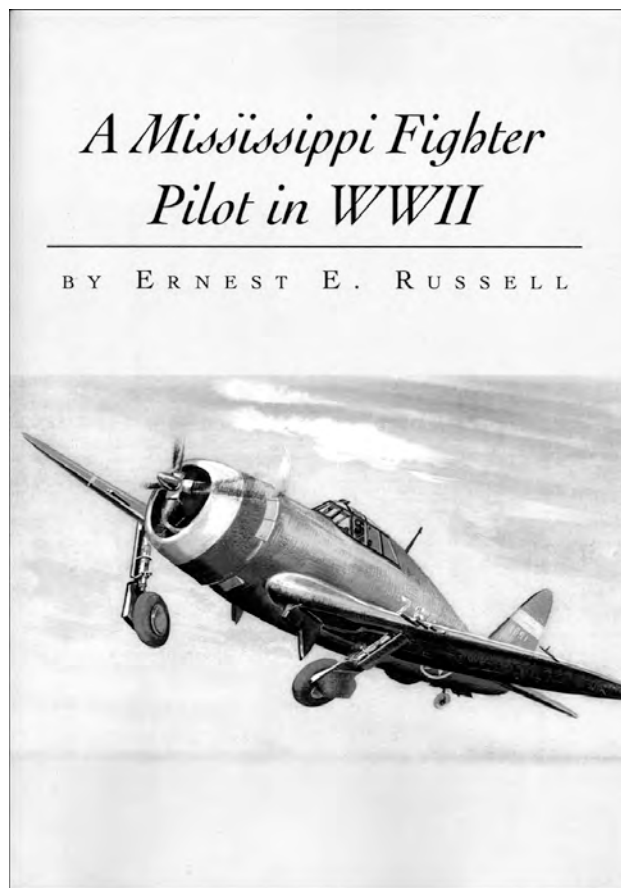


Christian Heine at Sossusvlei, Namibia.
"Where the rivers meet"



AAPG geologists at the Zerrissene Turbidites, Namibia.

Bob Hatcher brought to our attention that **Ernie Russell (Ph.D. 1965)** has recently published a book about his days as a fighter pilot in WWII. He retired from the Air Force Reserve with the rank of Colonel, and ultimately completed his Ph.D. in geology at UT. Ernie became, through his dissertation and subsequent work, the living authority on the Coastal Plain sediments of the eastern part of the Mississippi Embayment in Tennessee and Mississippi, and was Professor of Geology at Mississippi State University until he retired. Congratulations, Ernie, on this post-retirement endeavor!



Ernie Russel's recently published book.

It is becoming a tradition to have an unofficial UT get-together at the Lunar and Planetary Sciences Conference in Houston each Spring. This year, LPSC participants got to chat with a number of Houston-area UT alumni, including **Mike Maitland (M.S. 1979)**, **Kim Sickafoose (M.S. 1979)**, **Patrick Schuneman (M.S. 2006)**, and **Emily Goodman (M.S. 2007)**. All are doing well—all working for ExxonMobil, and give word that another recent alum, **James Glover (B.S. 2006)** is also at ExxonMobil after finishing his M.S. degree at Washington State University.

Harry Moore (B.S. 1971; M.S. 1974) has announced his retirement from TDOT effective in June. He writes “I have worked here at TDOT for almost 37 years (the last 17 years as the office head and manager of the Geotechnical Engineering Section -Knoxville office), so I feel it is time to hand it over to someone else (especially when everything is running well). After June 30, 2009 you may reach me at my home email: Hlaamoore@aol.com.” Harry notes that he has seen a lot of East Tennessee and has learned a lot of geology over these 37 years. Some of his memorable projects include the I-26 project in Unicoi County, karst investigations for many road projects (including the Knoxville Parkway-Bypass, and the South Knoxville Blvd. extension), landslide and sinkhole investigations, his travels to research karst in China, and working with the discovery and preservation of the the Gray Fossil Site. Lastly, he writes: “I have thoroughly enjoyed and been enriched by my association with you all. Some of you were my educators and I am most grateful for that. Hopefully, we will continue our association. I wish you the best in your endeavors in research and education.”



Harry Moore on a snow-covered glacier near the base of Mt. McKinley, Alaska, in July 2009.

Quintin Overocker (M.S. 2006) and **Meg Howard (M.S. 2006)** are still living in Montana, working for Stillwater Mining Company and Tetra Tech, respectively. While they miss being near to their families in the Midwest, they continue to enjoy the myriad of activities (like planning a wedding!) that are afforded by “big sky” country.

And now for something different....**Tom Broadhead** recently found some pictures that were sent to him by Kelly Olson in late 2007. Three former UT geologists, **Chris Olson (M.S. 1993)**, **Keith Roberson (Ph.D. 1994)**, and **Greg Yanigahara (M.S. 1994)**, gathered in

Northern California over Labor Day weekend to attend the UT-Cal game in Berkeley. While attending the game, they made sure to take the time to check out the earthquake damage to the Cal stadium.



Keith Roberson, Chris Olson and his wife Kelly, and Greg Yanagahara decked out in Volunteer orange.

Linda Kah was fortunate enough to have been invited to give a talk at Colby College in January, where she had two days to visit with **Valerie Reynolds (M.S. 1998; Ph.D. 2005)**, who is the Clare Booth Luce Assistant Professor of Geology there. Between the normal pre-tenure anxieties and her two beautiful daughters, Valerie is definitely keeping busy. She enjoys being in the Maine countryside, and is reveling at the local igneous and metamorphic rocks that are perfect for teaching.

Drew Robertson (B.S. 1999) contacted **Larry McKay** earlier this year and gave us an update. After graduating from the department, Drew went into the geological workforce. He is currently a Professional Geologist in Florida working for Soils, Sediment & Subsurface, Inc.—a geotechnical engineering firm—and looking into private-sector rock and core storage facilities

We are pleased to announce that Maggie June Cahill was born on November 11, 2008. Parents **Karen Stockstill (Ph.D. 2005)** and **Josh Cahill (M.S. 2004)** are doing fine and find themselves busier than usual!

In January 2009, **Harold Webb (M.S. 1993)** visited the department. Harold is currently an Assistant Vice President of SunTrust Bank in Atlanta.

Steve Welch (M.S. 2005) writes that he has moved back to Exploration at ExxonMobil, and is currently enjoying his work in the deep-water Gulf of Mexico group. He and his wife, Amy, continue to enjoy the Houston area and time with their dogs.

What in the World?

To many of us, the most interesting thing about a life in the geological sciences is the opportunity to use the breadth of our observational and intellectual skills to try to solve the geologic mysteries that the Earth tosses in our direction. For this newsletter, we have decided to toss a few of these geologic mysteries your direction. We challenge you to test your skills and see if you can come up with a good explanation for some of the following features. If we get a strong alumni response, we will share some of your ideas in next year's newsletter. We also encourage each of you to dig through your own memories, slides, and digital photographs to send us your own geologic mysteries, which we will try to include in the next newsletter!

The Mystery of the Sinusoidal Stromatolites (submitted by Linda Kah)

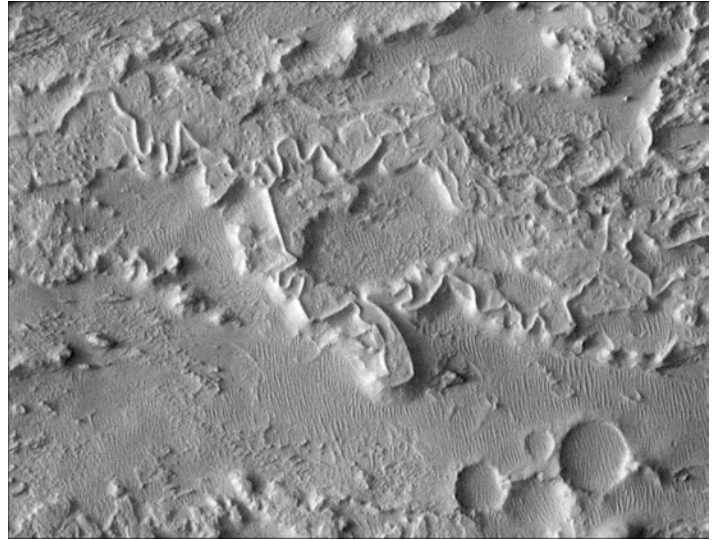


The Mesoproterozoic Altyn Formation, Belt Supergroup, Montana contains a variety of weird structures, including multiple horizons (over ~50 meters of vertical section) of “sinusoidal stromatolites” that are interbedded with tidal ripples, and quartz sand input. At their most intriguing, these “sinusoidal stromatolites” are composed of 5-15 cm wide, adjacent columns that, lamina by lamina, shift upward at a 30 to 45 degree angle from the vertical. After approximately 20-50 cm of upward growth, the growth direction abruptly shifts to the opposite sense. In the third dimension, these stromatolites are highly elongate, and show a consistent elongation perpendicular to the direction of “sinusoidal” growth. Stromatophile dogma would suggest that onshore-offshore currents are the cause of the elongated morphology, but the mechanism behind the “sinusoidal” growth (which would be perpendicular to the onshore-offshore current) has remained elusive. I am currently betting on intrabasinal changes, such as sea-level driven changes in basin shape or shoreline delta lobe switching that affected the primary direction of longshore drift. All other ideas are welcome!



The Mystery of the Refolded Folds (Chris Fedo).

The Isua, Greenland, metasediments (>3,7 Ga) have long been touted as the Earth's oldest supercrustal succession. They might be, but how comfortable are you with this interpretation? Would you like to challenge your superpositional skills with this package of intercalated 'mafic stuff' (dark), quartz veins (light), and probable metasomatic carbonate veins (recessive weathered interval near base of picture)?



The Mystery of the Inverted Channels (Devon Burr).

The sinuous ridges in this image are inverted fluvial features on Mars. They are thought to result from cementation of porous fluvial sediment followed by the aeolian erosion of finer-grained and more friable surrounding material. Time to test your skills: why are inverted channels so common on Mars, and so rare on Earth? and what is the mechanism for bank stabilization in the construction of these meandering features?



Mystery of the Cross-Bedded Gneiss (Bob Hatcher).

Here is a picture of the 1.15 Ga old Toxaway Gneiss taken at the Highway 413 overlook in South Carolina. We all learned that cross-bedding is a sedimentary structure, but what do you think of this "gneiss" example? The obvious questions that come to mind are: how did these structures form (we know the answer for this one)? and (hee hee hee) which way is up in this rock?



Mystery of the Boudins that Weren't (Bob Hatcher).

Circular structures in the Horseshoe Rock pluton, west of Brevard, North Carolina, resemble either boudins or a linear array of erosional potholes. Upon careful study by this group of geologists, including **Leonard Wiener (M.S. 1965 in profile)**, the structures appear to be neither boudins, nor features produced by weathering, although weathering has enhanced their visibility. What are they?



In recognition of the importance of alumni donations to the health of a University, the University of Tennessee launched a new Capital Campaign last year (see <http://development.tennessee.edu/>). As part of this University level campaign, each department has also re-evaluated priorities for alumni support. We are very proud of the support that our Alumni have given to the Department of Earth & Planetary Sciences over the years and, in these times of decreased state appropriations, this support has allowed us some flexibility in “weathering the storm.”

We will always welcome alumni gifts of all kinds and for all purposes – gifts will always reflect our alumni wishes – but for the next few years, we are going to try to focus on a few top priorities:

Professor’s Honors Fund

The Professor’s Honors Fund consists of unrestricted funds that are used primarily to support student enhancement activities. These activities include course field trips, participation in professional conferences or workshops, student research, materials for new courses, visits by prospective graduate students, etc. A portion of the fund is also used to cover costs of alumni events, the Departmental newsletter standing alumni activities, and to deal with unexpected emergencies or budgetary shortfalls. During periods of fiscal uncertainty this is especially important, because it provides us with the ability to cope with unexpected challenges and opportunities. We are continuously seeking gifts of all sizes for this fund.

Graduate Student Fellowships

The need for fellowships to recruit outstanding graduate students has become especially great in recent years. We already have a diverse and generous range of annual student achievement awards that are presented to currently enrolled students each spring, based on funding from our existing alumni endowments and generous annual support from the Knoxville Gem & Mineral Society and the East Tennessee Geological Society. What we are now seeking are funds to create fellowships that can be offered to outstanding incoming graduate students. A fellowship “topping” of \$5K per year over and above the standard GTA support can often make the difference between students choosing UT over better-funded competing institutions. We can create “named” fellowships for gifts of at least \$100K or can accept smaller gifts for the new *EPS Graduate Fellowship Fund*.

EPS Building Renovation Fund

Our grand old building is one of the oldest academic buildings on campus and is in serious need of a complete renovation. Current renovation plans include increasing the size of the building (through an extension at the back), while retaining the façade and the historic character of the structure, at a cost of approximately \$50 million. These renovations are #5 on the UT priority list and it will likely be 10 or more years before we rise to the top. We’ve been working with the UT Finance office and the College Arts & Sciences on a plan to move our building up the priority list for renovations and to provide the additional funds needed to make this an “academic destination building” that provides the highest quality environment for learning and research. We propose to achieve this through a \$5+ million alumni building campaign. Giving opportunities will include both gifts to the general building fund and “recognition” opportunities for substantial gifts where donors can name a teaching or research lab, classroom, museum quality exhibit or interactive learning station for visitors. A portion of the gifts will be set aside to create an endowment for long-term support of the facilities and exhibits.

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Please contact any members of our Alumni Advisory Board with questions or ideas for development activities.

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