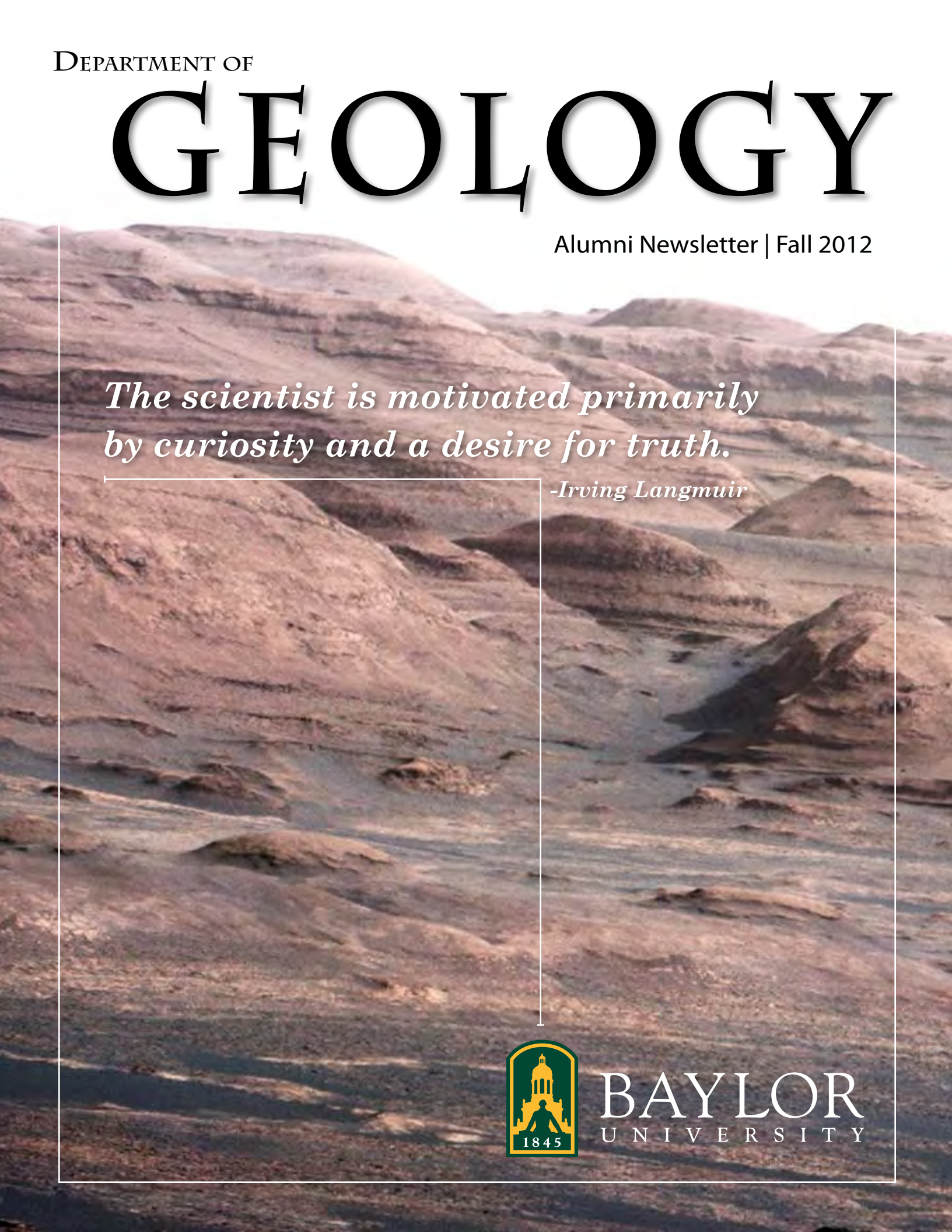
Department of

# GEOLOGY

Alumni Newsletter | Fall 2012



*The scientist is motivated primarily by curiosity and a desire for truth.*

*-Irving Langmuir*

BAYLOR UNIVERSITY

BAYLOR UNIVERSITY
DEPARTMENT OF GEOLOGY

August 2012

Dear Alumni and Friends of Baylor Geology:

There is an old Chinese proverb "we live in interesting times", and that has certainly been the case. We now have a new Strategic Plan for Baylor University termed ***Pro Futuris*** (http://www.baylor.edu/profuturis/) that has been intentionally written with rather vague language so that Departments, Colleges, Schools and Centers can respond more specifically in order to flesh out the "Aspirational Statements". Having been involved early in the strategic planning process as both Chair and a member of the Geology Department, I can honestly say that the administration seriously considered all input receiving in the information gathering process, which is apparent in the final document that was adopted. It seems clear to me that in the new plan Baylor sees growth and improvement in the STEM fields (Science, Technology, Engineering, and Mathematics) as vital to its future aspirations of becoming a major research university, but at the same time is not stepping back from its commitment to excellence in undergraduate education.

The fall semester of 2011 saw the Department start searches for tenure-track Assistant Professors in Applied Geophysics and Mineralogy-Petrology, but unfortunately both resulted in failure to secure hires. The Applied Geophysics search was resumed this fall, and a search for a Senior-level Paleoclimatologist is also underway. Two additional faculty hires requested for next year are in water-related research and in Petrology. Bill Hockaday's new "Paul Marchand Nuclear Magnetic Resonance Laboratory" was finally completed, the NMR installed, and a formal dedication is planned. Don Parker is back from retirement as a temporary lecturer.

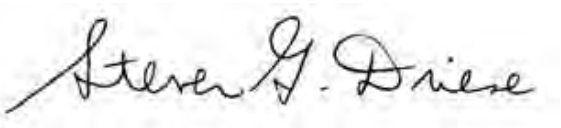
Our undergraduate program continues to show cyclical fluctuations in the numbers of majors but generally varying between 40-60 students, the majority of which are in the B.S. Geology track, with a small but increasing B.S. Geophysics group. The graduate program has grown to close to 30 students in residence, about equally divided between Ph.D. and M.S. students. We are under increasing pressure from the administration to increase both our Ph.D. student recruiting as well as our Ph.D. graduation rate, because these are important metrics to improving the University's national rankings to *Carnegie Very High Research Activity*. However, because our M.S. students continue to be highly sought after for employment in the energy industry, as well as in environmental and engineering geology, and in hydrogeology, and because M.S. graduates are such generous donors to our Department, we will strive to maintain a healthy balance between the two competing interests.

The Baylor Geology Advisory Board, chaired by Josh Talbert, with Ed Jakubowski as Vice Chair, and Victor Carrillo as Secretary, have been seeking ways in which Board members can work with the Department and the Baylor Development Office to identify specific needs and to initiate and conduct special fund-raising projects. In the accompanying letter Board Chair Talbert highlights their current activities.

Finally, I will conclude by saying that it has been both a rewarding and (at times) a tiring experience serving as Department Chair the past 8 years. It will soon be time to pass the baton to the next Chair.

Please be sure to attend our Baylor Geology Homecoming Events on Friday, November 2, 2012 (and described in more detail in this newsletter) – we hope to see you all there!

Best wishes,



Dr. Steven G. Driese
Chairman

***Front cover photo:*** *Geology is becoming other-worldly as NASA's Curiosity rover captures the layered geological history of Mars. The image shows the base of Mount Sharp, the rover's eventual science destination. Image credit: NASA/JPL-Caltech/MSSS*

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## Points of Interest



***Back cover photo****: A computer-generated view of Mars and its Gale Crater at the boundary between darkness and daylight. Image Credit: NASA/JPL-Caltech*

# FROM THE PROFESSORS

## Dr. Peter Allen

Within the confines of this past year, the calendar has been filled with a combination of travel and research as well as the usual teaching duties. I continue to teach the freshman course and the advanced hydrology course. Joseph Sang, my Ph.D. student has just finished his fourth year and is returning to his duties at Jumo Kenyatta University in Kenya where he will be putting the final touches on his research. John and I are scheduled to visit his University in December to work on a US AID project in which we will be demonstrating reservoir survey techniques to determine sedimentation rates and water volumes behind reservoirs as input to watershed models (SWAT USDA/ARS) for future planning of water supplies in the region.

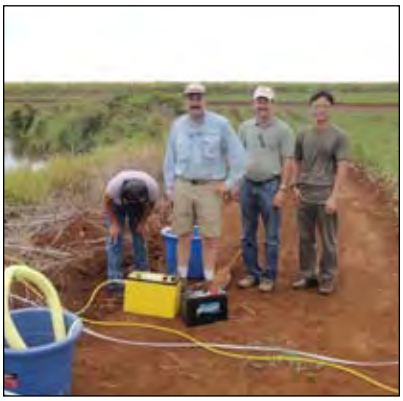
This last summer I attended the International SWAT Model Conference in Toledo, Spain (site pictured below) where I presented a coauthored paper on sediment and erosion subroutines in the model. Peggy and Maggie accompanied me as we traveled from Lisbon, Portugal to Madrid, Spain and then on to Toledo on the bullet train for the conference.

Following the conference, John and I piled in the Baylor Van, hitched up the boat, and headed for Glacier National Park where we joined Dr. Joseph White (Biology) and his son and shot sub-bottom acoustical profiles of the glacial lake while staying at the USGS research station. Aside from the deep lake's unforgiving bottom that resisted our efforts for deep cores, we did retrieve very interesting evidence of recent faulting within the lake. The trip was short, the scenery beautiful, and aside from the boat's motor problems and a trip to the emergency room for, let's say, stomach problems of monumental proportions (up to several 55 gallon drums, well it seemed that way) things went exceedingly well.

To end the festive travel schedule, we accompanied Jeff Arnold and others from the ARS/USDA to Maui where we are jointly working on a project for the US Navy on the largest sugar plantation left in the islands– 37,000 acres of sugar cane. The project will evaluate the potential of the site for biofuel production. Our portion of the project will look at water supply and potential water loss through seepage through existing canals and reservoirs. While past agricultural practices applied up to one ton of water to produce one pound of sugar, more recent and judicious drip irrigation has reduced this to 800-2600 gallons of water per ton of sugar. Even with these reductions, there are problems with water loss through the 75 miles of canals which bring the water from the wet side of the island to the dryer isthmus where the sugar cane is grown and through the 40 reservoirs which help regulate the flow within the canals.

The island relies on groundwater as its sole source of public water supply. The groundwater is pumped from a lense that underlies the entire island, perched on the saltier ocean water. This precarious balance of recharge to water use is of concern throughout the islands and is being studied on this project as well as by the USGS and the University of Hawaii Water Center. As recharge is affected by land use, as well as climate trends, any change within this vast portion of the island will impact the entire water budget and determine the potential for such proposals.

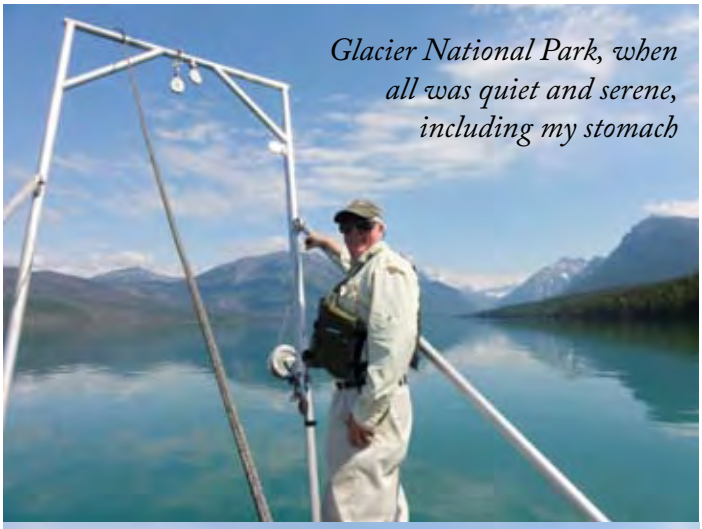
*John Dunbar, Dr. Jeff Arnold, Dr. Jaehak Jeong, and Mae Nakahata of HC&S Sugar Company at survey site on storage reservoir, Maui, HI*



John and I will be working on this project over the next year and hopefully provide some answers to a small portion of these issues for the government.

On the local scene, we are working on projects from the Trinity River and potential channel stability concerns for a pump/wetlands project, on a channel reconstruction in Fort Worth, and on smaller floodwater sedimentation projects. I continue to work closely with Dr. Jeff Arnold of the USDA, and we have jointly worked on papers with Nadia Bonuma in Brazil on new surface erosion techniques, and with Dr. Luo, China on baseflow and glacial meltwater relationships with climate change.

On the home scene, Peggy and Maggie accompanied me on the Toledo, Spain trip and also to Maui. Maggie is now in the process of moving from her job at Santa Clara College in Berkeley, California where she worked in the health center as an NP nurse to Ann Arbor, Michigan where she will accompany her fiancée as he begins his MBA this fall. Annabel starts her MBA this fall at the University of Denver. Sarah and the grandchildren are doing great up in Dallas and the grandkids, Oliver and Dulany, are growing up quickly.



*Glacier National Park, when all was quiet and serene, including my stomach*

*Early morning launch, Lake MacDonald, Montana*

*John Dunbar, Jospeh White, and his son cruising Lake MacDonald, Glacier National Park*

*Maui, HI– Hand dug well in basalt about 125 feet down under the ground surface. This well produces up to 40,000,000 gallons a day from two pumps. Note the ferns on the wall due to seepage. You are looking at the water table from which they "skim" the freshwater off the underlying salt water.*

# FROM THE PROFESSORS

## Dr. Stacy Atchley

2011-2012 was quite a year for myself, family and students. The personal highlight of the year was summiting Mt. Kilimanjaro with my daughter, Dallas. At age 13 Dallas requested for me to someday hike with her to the summit of Kilimanjaro, and I, thinking that she'd eventually direct her ambitions elsewhere, agreed. Each year Dallas would remind me of our upcoming adventure. I ultimately came through as we traveled to Tanzania in July of 2012 to make our summit bid. I've done a great deal of hiking, but mostly in the range of 7000-9000' above sea level. Kilimanjaro, at +19,000', is a totally different experience. Although neither Dallas nor I experienced altitude sickness (as almost all of our other party members did), we did lose our appetite and struggled to catch our breath once above ~13,000'. Thanks to the support of our guides and porters from Thomson Treks, we ultimately did reach the summit. It was quite the father-daughter experience... No question the most significant activity that we've shared to date. I'm so glad that I overcommitted back when Dallas was age 13. Now that the "big trip" precedent has been set, younger daughter, Audra (age 14) is weighing her options. Audra aspires to do something "different," and her most recurring suggestion is a scuba trip somewhere in the tropics. Wife Janelle was very understanding of the trip I took with Dallas, inasmuch as it excluded both her and Audra's participation. As pay-back, we took a family trip to the Mediterranean during summer 2012.

My current students include Ph.D. student Aislyn Trendell (B.S. McMaster University), and M.S. students Curtis Barclay (B.S. Grand Valley State University), Garrett Felda (B.S. University of Wisconsin, Oshkosh), and Kelly Jones (B.S. University of South Alabama). Aislyn is close to satisfying her dissertation requirement (dealing with various aspects of the Late Triassic Chinle Formation at Petrified Forest National Park, Arizona). Aislyn's first dissertation paper was published in the *AAPG Bulletin*, her second is currently in revision for publication within the *Journal of Sedimentary Research*, and her third was submitted in early June to *Palaios*. Aislyn is anticipated to graduate in December of 2012, and has accepted a full-time position with Anadarko. Curtis and Kelly both completed applied stratigraphic theses that investigated Devonian carbonate natural gas reservoirs in northeastern British Columbia sponsored by Husky Energy of Calgary, Alberta. Curtis successfully defended his thesis in May, and Kelly planned to defend hers before the end of summer 2012. Curtis has accepted a full-time job with Oxy in Houston, and Kelly an internship with ConocoPhillips in Houston as well. Garrett is still plugging away on his sedimentological/stratigraphic thesis on the latest Triassic Owl Rock Member of the Chinle Formation at Petrified Forest National Park. If all proceeds as expected, Garrett should also graduate by December 2012.

I added a new course to my graduate rotation this year titled "Advanced Sequence Stratigraphic Concepts". Pulling together a new course requires that significant inertia be overcome; however, the effort is definitely worth it. The course provides a platform within which students (and I for that matter) critically evaluate the ever-evolving concepts and terminology related to sequence stratigraphy. My old standby courses are also still in rotation, including the always popular Graduate Stratigraphy field course. I ran my 9th edition of "Grad. Strat." during May of 2012. (See accompanying photos.) The students were fantastic, as was the weather, i.e., excluding the 1-day deluge experienced in the Guadalupe Mountains.

I'd love to hear from my former students.
I have fond memories of all of you.

*Graduate Stratigraphy field course Summer 2012: Justin Von Bargen, Ken Boling, and Curtis Barclay measuring a section through the Late Cretaceous Castlegate Sandstone at Thompson Canyon, Utah. ~photo courtesy of Jon Tasso*

*Class photo at Thompson Canyon, Utah*
*~photo courtesy of Jon Tasso*

*Yours truly pointing out flaser bedding to Justin Von Bargen and Curtis Barclay within the Late Cretaceous Castlegate Sandstone at Thompson Canyon, Utah*
*~photo courtesy of Jon Tasso*


*Yours truly and daughter, Dallas, on the trail at Mt. Kilimanjaro, Tanzania*

# GEOLOGY EVENTS
## Stratigraphy Field Course (cont.)

*Dune jumping at White Sands National Monument after learning about modern day eolian processes*


*First group shot of the trip*

*Curtis Barclay in Arches National Park*

*Justin Von Bargen taking a break on top of Slaughter Canyon at the Guadalupe Mountains*

*Justin Von Bargen explaining an exercise to Ken Boling*

*Emily Beverly, Kelly Jones and Kim Kuijper underneath an arch*

*Ken Boling looking at convolute bedding of the Kayenta Formation*

*Curtis and Amos Culbertson at the Chaco Ruins*

*Emily and Kelly climbing at Arches*

*Dr. Atchley and Dr. Gary Stinchcomb grilling Twinkies at Green River State Park*

*Garret Felda measuring section at Honaker Trail*

*Amos looking at paleosols at Petrified Forest*

*Group shot on the last day at Petrified Forest*

# FROM THE PROFESSORS

## Dr. Rena Bonem

This has been a busy year in the department with a search for a new geophysicist and a replacement for Dr. Parker. At this point, I think we have decided that Dr. Parker is too essential to the program to find a replacement!

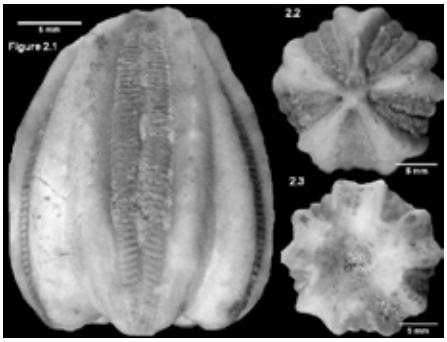
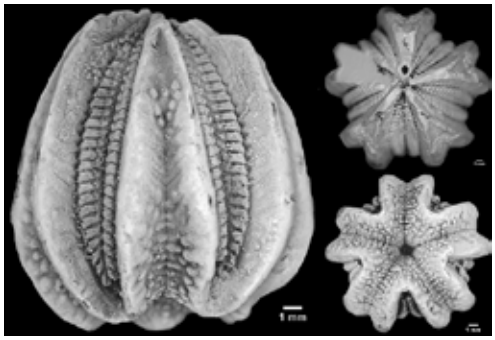
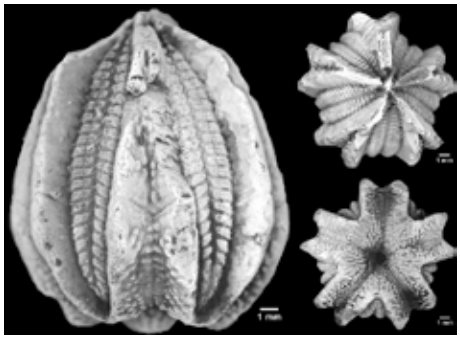
The spring count of undergraduate Geology, Geophysics, Geography, and Earth Science majors was about 76 students, but 4 should graduate in the next several months which will give us the largest undergraduate class since the early 1980s. This is an increase of about 20 students compared to last spring, largely due to incoming freshmen and transfer students who have declared majors in Geology or Geophysics. Major courses in paleontology and rocks and rock-forming minerals have 16-17 students each this fall which is up from 10-13 last year. Field camp had 13 students out with Don Parker this summer.

Unfortunately, I did not go to the GSA meeting in Minneapolis this year because I was swamped with advisees for the spring. I will be headed to Charlotte, NC, this fall if any of you are out that way. Adam Damman, who completed his thesis on a comparison of Edwards patch reefs with Bermuda reefs last year, is now working on the Edwards for Pioneer in north Texas. Ryan Morgan, a Ph. D. candidate from Michigan, has been working hard on Dr. Beaver's blastoid collections and submitted his first paper this spring. He now needs to go to the British Museum in London to examine their collections for the revision of his first paper. He also made a trip to the Morrowan blastoid locality in NE Oklahoma this spring for his second paper, and we made a brief, very hot trip this summer to look at some of the Upper Pennsylvanian units in North Central Texas where a single blastoid had been collected from the Finis Shale.

My knee is still bothering me and that limits my diving and fieldwork, but I am still doing agility with Brady (the 3 year-old dachshund-yorkie mix) who now has 5 titles and is working on his Novice Versatility award. As if that were not enough to keep me running, I got another puppy last summer. Lady Bug is not exactly a dachshund (they told me that she was a dachshund mix). She looks like a border collie-schnauzer-wire dachshund mix, if there is any dachshund in there. She is definitely fast and too smart for her own good. Her hobbies are: collecting rocks from my rock garden and bringing them in and collecting living critters to bring in the house. She has wiped out the land snails and slugs, two types of June bugs, the snake population (so far she has brought in 9 non-venomous snakes from the yard… three of which were still alive), plus miscellaneous other bugs. The squirrels and birds are staying away thanks to her careful patrolling of the yard.

As always, I look forward to seeing those who have not been around Baylor lately and hope that all of you will be able to come and visit us soon.

*Lady Bug (left) and Brady (middle) keep things interesting at Dr. Bonem's!*

*Figures from graduate student Ryan Morgan's research on deltoblastus as referenced in Dr. Bonem's article (page left)*

# FROM THE PROFESSORS

## Sharon Browning

My focus this year has been on recruitment from our freshman lab courses and ramping up community outreach. We are in our 3rd year of the two citizen science programs that our freshmen participate in, Globe at night and the Great Worldwide Star Count. Students continue to enjoy the opportunity to learn about the night sky at our star parties, augmented by the availability of the department's telescope. The lessons we have learned from these activities over the last three years were presented at last fall's AGU meeting in San Francisco. The addition of field trips to Cameron Park has also been very well received. Students who attended had the opportunity to see some of our local outcrops first hand, combining field identification with learning the local geologic history.

I have also continued to reach out to local elementary and middle schools about the wonders of earth science and future opportunities for students in the STEM disciplines. In October, I took several of our physical models to North Waco Elementary School in conjunction with Earth Science Week. Approximately 100 5th graders enjoyed making observations about seismic wave propagation and some of the hazards associated with earthquakes. This is now the 2nd year we have been able to reach out to this small neighborhood school, which sadly has been slated to close at the end of this school year. I also had the opportunity in April of this year to speak to 5th grade students at Rappaport Academy about geology as part of their annual career day. These students indicated a specific interest in the earth sciences and had prepared a number of questions about geology as a career, ranging from degree requirements to how I personally became interested in the field to what a normal day was like as a scientist. They seemed appreciative of the opportunity and enthusiastic over the mineral samples I had taken to them as keepsakes.

The best outreach opportunity we have had this year was this May, as a local elementary school was able to come to campus, allowing us to demonstrate and utilize some of our models that aren't portable. Fifty K–4 students from Mountainview Elementary had a "disasters day," guided by myself, Bill Hockaday, and five of our graduate students, Hallie Meighan, David Ju, Ryan Morgan, Dominic Evanzia, and Mark Speckien. Activities included a brief video and discussion of last year's Japanese earthquake and tsunami, the effects of shear motion on two different types of building construction, simulating a tsunami, observing the propagation of seismic waves through two different mediums, and finding and identifying basic rocks and local fossils. The younger students seemed to especially enjoy identifying pumice by seeing if any of their rock samples floated and watching the reaction of limestone to hydrochloric acid. The teachers and students expressed their thanks for this opportunity, which I hope can be repeated annually.

*(See pictures on next page.)*

*Elementary school students enjoy "disasters day" in our lab as referenced in Professor Browning's article on previous page.*

*Graduate student Ryan Morgan listens to a budding paleontologist*

*Graduate student Hallie Meighan helps students investigate seismic waves*

*Students use trusses to strengthen a building to better withstand an earthquake*

*Watching the generation of a tsunami*

# FROM THE PROFESSORS

## Dr. Vince Cronin

As I write this message, I am in a small Honda SUV full of books, computer components, and clothes, helping my daughter, Kelly, get back to South Bend for the beginning of her summer semester. She is pursuing double majors in economics and vocal performance. So the drive to Notre Dame is an 18-hour personal concert, with her singing continuously to an eclectic mix of pop songs, Irish music, and stage tunes. Kelly has retired from being one of the student managers of the ND football team, recognizing that it is a little bit nuts trying to balance a full course load, football games and practices, and vocal rehearsals and performances. Her mom, Cindy, kid brother Connor, and I flew up to ND in April to see her in a wonderful performance of Sondheim's *Sweeney Todd, The Demon Barber of Fleet Street.*

## Dr. Vince Cronin (cont.)

Connor is now ~6'3" tall and will be a junior in high school in the fall. He is looking forward to his third season as starting goalie on his high school soccer team. In his last two games last season, he had 47 "touches" while surrendering just one goal. (The other players were off-sides.) I know this because one of my side jobs is working as the soccer-team videographer. This summer Connor participated in two elite soccer camps at Notre Dame and Santa Clara. He also competed in tennis again this year, going from being a member of one of the doubles teams at the beginning of the season to being the #1 men's singles player on his team at the end. (There is more to this than I am divulging, but why spoil a good story...)

In calendar year 2011, I helped three M.S. students complete and defend their M.S. theses: Dan Lancaster (now with Pioneer Oil & Gas), Stephen Secrest (now with Samson Resources) and Ryan Lindsay (also now with Samson). Stephen's thesis is available online via http://hdl.handle.net/2014/8243, and Dan's is available via http://hdl.handle.net/2104/8228. All three theses generated some really interesting results, and Ryan's has been held back from online publication for awhile so that additional work can be done on his topic (more about this in the next paragraph). I described all three theses in last year's newsletter, available at http://www.baylor.edu/content/services/document.php/154384.pdf. Tyler Reed arrived in January 2012 and has begun research to extend the research that Ryan Lindsay initiated. Ryan's work indicated that a newly discovered fault near Truckee, California, might have generated earthquakes recorded since 1980, and that two other trends in the North Tahoe area might contain previously unmapped seismogenic faults. We are working with relocated earthquakes, recomputed focal mechanism solutions, a higher resolution digital elevation model (DEM), and focused field work to evaluate the potentially seismogenic character of these three trends in the North Tahoe-Truckee area. We have to be extraordinarily careful about the development of this research, because when we draw a line on a map and assert that it is the surface trace of a new fault or a previously recognized fault that we think is currently seismogenic, that line inevitably crosses someone's property. Imagine yourself a property owner who is told that your real estate investment might have an active fault crossing it. We have a pronounced responsibility to do this work with great care, so that our results are reasonable and defensible in light of available data.

I presented a poster on the work done to date by Ryan and Tyler at the Seismological Society of America meeting in San Diego last April, along with Keith Sverdrup of the University of Wisconsin. We are slated to present this work at the Association of Environmental and Engineering Geologists meeting in Salt Lake City in the fall. (We will probably also hit AGU ± GSA for good measure.)

Tyler spent the summer as an intern with Devon Energy Corporation, an opportunity facilitated by my former M.S. student Brian Bayliss. Tyler hopes to complete his M.S. thesis in time for graduation in August, 2013. Information about all of my former graduate students is available at http://bearspace.baylor.edu/Vince_Cronin/www/GradStudents.html.

I offered a course in the kinematics of the lithosphere and continental crust this past spring semester. Half a lifetime ago, I wrote a dissertation on plate kinematics that included a solution to the classic 3-plate problem (described by Allan Cox in 1973) and developed the simplest kinematically admissible model for the finite relative motion of plates. It is good nerdy fun to return to this subject after all this time. In the intervening years, the entire field of GPS geodesy was born and grew in a manner that allows us to define the instantaneous motion of areas of lithosphere with a precision that was only dreamed of in the mid-1980s.

Development of my kinematics course was undertaken in support of the department's geophysics program and is meant as a complement to a geodynamics course taught by John Dunbar. In addition to teaching about instantaneous and finite lithospheric kinematics and GPS-defined instantaneous motions of crustal blocks, my

goals were to teach students a bit of useful mathematics as well as some programming skills using *Mathematica*. In fact, I wrote something like 17 chapters of material in the form of *Mathematica* notebooks, which means that in addition to explaining the mathematics of plate/crustal kinematics, the chapters were executable code that is able to perform the calculations. These draft resources are posted on the web at http://bearspace.baylor.edu/Vince_Cronin/www/GradStruct/GradStructHome12.html, and are already being used by folks at Colorado State. The initial draft chapters will also be available through the Science Education Resource Center (SERC) at Carleton College as part of their structure-tectonics-geophysics collection. The initial presentation of the kinematics course seems to have been successful, given that 7 graduate students and 2 senior undergraduates were each present at virtually all of the 8 AM class sessions on Thursdays and Fridays.

One interesting by-product of this effort is a new explanation of why some ridge-ridge-ridge triple junctions feature a tiny triangular microplate, which turns out to be a consequence of the non-circular (i.e., cycloidal) finite relative motion of plates.

I have been working with the folks in UNAVCO (a university consortium and NSF-supported facility for GPS geodesy) to develop my understanding of how GPS velocity data can be used to characterize crustal strain. I accelerated my study of GPS geodesy in the latter half of 2011 so that I could include it in my kinematics course. (See chapter 17 of my online kinematics resource.) The folks who work on education and outreach at UNAVCO heard about my project and are providing funds and logistical support for a workshop I have organized with Shelley Olds and Beth Pratt-Sitaula. As I wrote this in mid-June in a Honda whose air conditioning plainly needs some servicing, the workshop is slated to begin in 11 days at the University of Nevada-Reno. The participants will be helping to produce or refine curricular resources about crustal strain as measured using GPS velocity data. These resources will be accessible for free on the web and are intended for use in the core courses in structural geology or geophysics that are usually required by geoscience majors throughout the country. These web resources will be hosted by UNAVCO and will be part of the "On The Cutting Edge" structure-tectonics-geophysics collection at SERC.

The UNAVCO curricular resources are focused on a problem I call "triangle strain," in which velocity data from three non-colinear GPS sites are used to characterize the instantaneous horizontal strain in the area between the sites. GPS velocity data for the Plate Boundary Observatory (a major part of the EarthScope project) are managed by UNAVCO and are available online for free. The initial resources I have put together to date include a theoretical introduction to the problem, an algorithm with a worked example of the solution, an Excel spreadsheet and a *Mathematica* notebook that perform necessary computations, and various graphics, PowerPoint files and sample datasets. You can access the resources I have authored via http://bearspace.baylor.edu/Vince_Cronin/www/PBO_ed. When this project is published online through SERC and UNAVCO, I plan to work on a similar project using focal mechanism solutions to characterize horizontal instantaneous strain axes, in coordination with the E&O folks at the Incorporated Research Institutions for Seismology (IRIS), in which I will incorporate the latest revision of my focal-mechanism primer (http://serc.carleton.edu/files/NAGTWorkshops/structure04/Focal_mechanism_primer.pdf).

Last summer, John Dunbar recognized evidence of recent displacement along a previously unmapped fault that crosses the bottom of Lake McDonald in Glacier National Park, northern Montana. The evidence was contained in a single line of seismic data that he collected with Pete Allen and Joseph White, so John was not able to resolve the strike of the fault. John and I presented a poster of preliminary results from this study at the AGU meeting in December, 2011. With help from Tyler Reed, I pulled down the 10-meter DEM of the area around Lake McDonald and began looking for suspicious geomorphic lineaments that cross the lake. I mentioned to my son, Connor, that I had a little work

to do in Glacier National Park and that he might be interested in being my field assistant. What Connor apparently heard had nothing to do with geology, but rather that he and I are going to Montana so that he can do some fly fishing. So in mid-July between soccer camps, we (Cindy, Connor and I) wandered around the northern Rockies looking for an active fault, good trout streams, and a couple of potential colleges for Connor to consider.

The research that my students and I conduct has been funded by small grants that the students pursue, from groups such as the Geological Society of America, Sigma Xi, AAPG, GCAGS, SIPES Foundation, Fort Worth Geological Society, Desk and Derrick Club, various oil companies and other sources I list at http://bearspace.baylor.edu/Vince_Cronin/www/funding.html. I have always considered the process of writing small grant proposals to be part of my students' education. Otherwise, I have largely funded my own research. Benefactors who would like to contribute funds for use by my students may do so by contacting the Geology Department and speaking with Paulette Penney and explicitly directing the tax-deductible donation to the account set aside for the benefit of Vince Cronin's students.

Friends and former students can contact me at Vince_Cronin@baylor.edu or (254) 710-2174 to chat. I would like to hear what you are up to. My home page is http://bearspace.baylor.edu/Vince_Cronin/www/. Information for folks interested in pursuing an M.S. degree in structural geology with me at Baylor is available at http://bearspace.baylor. edu/Vince_Cronin/www/Structure/index.html, including my basic admission requirements listed at http://bearspace.baylor.edu/Vince_Cronin/www/MS_StructureGradStandards.html.

# FROM THE PROFESSORS

## Dr. Steve Driese

In the fall semester of 2011 I taught the graduate GEO 5342 "Micromorphology of Soils and Paleosols" course and the graduate 5V90 course "Seminar on Grant Proposal-Writing". In the spring semester of 2012 I taught the GEO 5339 "Sandstone Petrology" course; Bill Hockaday taught the 43C1 Senior Capstone Colloquium course in the spring, which I normally teach, which allowed me more time for administrative tasks.

During the summer of 2011 I visited Ph.D. student Lauren Michel's research site at Rusinga Island in Kenya, where she is examining paleosols in Miocene strata containing the oldest stem primates; Lauren is co-advised by Dan Peppe. Ph.D. student Gary Stinchcomb's dissertation research in the upper Delaware Water Gap region in PA and NJ, integrating paleosol, geomorphic, and stable isotopic approaches to reconstruct latest Pleistocene to Holocene climate change in this region is nearing completion, and he defended in June, 2012; Gary is co-advised by Lee Nordt. Gary had his first paper published in *Geology* and his second in *Geomorphology*. Gary plans to complete a 1-year post-doc at Baylor University. Ph.D. student Deb Jennings published her first paper in *Sedimentary Geology* on Upper Jurassic Morrison Formation paleosols in Utah and Colorado. B.S. thesis student Kim Kuijper completed her Senior Thesis testing a geochemical index for paleoprecipitation on the soil order Alfisols; her research was co-directed by Gary Stinchcomb.

New M.S. student Amos Culbertson joined the research group from Ft. Lewis College in Durango, CO, and he is working on Upper Pennsylvanian paleosols cropping out at the Lake Brownwood spillway; he will test multiple paleoclimate proxies using geochemistry and minerals present. Emily Beverly is a new Ph.D. student from Rutgers

*Dr. Driese and Baylor student examine Upper Pennsylvanian Cisco Group deposits along roadcut north of Brownwood, TX during Paleopedology course field trip.*

University whose research involves late Pleistocene paleosols in Kirungu, Kenya, and modern analog Mercedes series Vertisols in Cameron County, south Texas; she is co-advised with Dan Peppe. Finally, Lyndsay DiPietro, a B.S. graduate of Baylor University with a double major in Geology and Anthropology, is a new Ph.D. student working in central Alaska on latest Pleistocene-Holocene deposits that record an early wave of human migrations through the region.

My own research continues to focus on interdisciplinary paleoclimate and paleolandscape reconstructions using fossil soils, or paleosols, as well as conducting studies of modern soil systems (especially Vertisols) to develop climate proxies and analogs of ancient soils. In 2011 I published 8 refereed journal articles (2 as first author) and have 11 peer-reviewed journal articles published, accepted or in press for 2012. In 2010-2011 I gave 4 first-authored professional presentations and was co-author on an additional 11 presentations. I am currently nearing completion of my co-editing (with Lee Nordt) of an SEPM Special Publications Volume entitled "New Frontiers in Paleopedology and Terrestrial Paleoclimatology", which is an outgrowth of papers presented at the SEPM-NSF Paleosols Workshop held in September, 2010 at Petrified Forest National Park. Also I continue to serve my profession by reviewing submitted manuscripts for many of the sedimentary geology and soils journals, for grant agencies, serving on peer-review panels for NSF, and am still an Associate Editor for the journal *PALAIOS*. I was appointed to serving a 3-year term as Geological Society of America (GSA) liaison to U.S. National Committee for Soil Science (USNC/SS) from 1 July 2012 to 30 June 2015.

My wife, Marylaine, and I, with our 3 (grown) children enjoyed a fabulous family vacation last summer to Yellowstone National Park - I was last there while enrolled in Southern Illinois University's summer field camp in 1976, and it was fun revisiting many of the famous sites, but as a tourist instead of a geologist. Marylaine continues her part-time job as archivist for McLennan Community College – gardening continues to be one of her passions, as well as home improvements. Mary Catherine had an excellent year as a sophomore-junior at UT-Austin, majoring in Latin American studies and playing on the women's water polo club; she moved to an apartment just off campus, and also taught swimming at the UT Aquatic Center. Our oldest son Nathan received his Ph.D. in Philosophy from the University of Kansas, and is still in Lawrence seeking a tenure-track academic appointment while teaching part-time for KU as well as for several colleges in the Kansas City area. Our other son, Trevor, still lives in Knoxville and works for a mortgage company; he got married in September in Knoxville, the first of the children to marry. Marylaine and I continue make frequent trips back to the southeast (Tennessee and Georgia) to visit family and friends. This summer (2012) we planned a working vacation to the International Goldschmidt Conference in Montreal, Québec, followed by a real vacation to Québec City and to Halifax, Nova Scotia.

## Peer-Reviewed Journal Publications:


Driese, S.G., Jirsa, M.A., Ren, M., Brantley, S.L., Sheldon, N.D., Parker, D., and Schmitz, M., 2011, Neoarchean paleoweathering of tonalite and metabasalt: implications for reconstructions of 2.69 Ga early terrestrial ecosystems and paleoatmospheric chemistry: Precambrian Research: v. 189, p. 1-17.

Driese, S.G., Schultz, B.S., and McKay, L.D., 2011, Genesis of clay-rich soils from carbonate bedrock on upland surfaces in the Valley and Ridge Province, eastern Tennessee, USA: Southeastern Geology, v. 48, p. 1-22.

Driese, S.G., Nordt, L.C., Waters, M.R., and Keene, J.L., accepted, Analysis of site formation history and potential disturbance of stratigraphic context at the Debra L. Friedkin archaeological site in central Texas, USA: Geoarchaeology.

Dyar, M.D., Carmosino, M.L., Tucker, J.M. Brown, E.A., Clegg, S.M., Wiens, R.C., Barefield, J.E., Delaney, J.S., Ashley, G.M., and Driese, S.G., 2012, Remote laser-induced breakdown spectroscopy analysis of East African Rift sedimentary samples under Mars conditions: Chemical Geology, v. 294-295, p. 135-151.

Jennings, D.S., Lovelace, D.M., and Driese, S.G., 2011, Differentiating paleowetland subenvironments using a multi-disciplinary approach: an example from the Morrison Formation, south-central Wyoming, USA: Sedimentary Geology, v. 238, p. 23-47.

Li, Z.-H., Labbé, N., Driese, S.G., and Grissino-Mayer, H.D., 2011, Micro-scale analysis of tree-ring $\delta^{13}C$ and $\delta^{18}O$ on α-cellulose spline reveals high-resolution intra-annual climate variability and tropical cyclone activity: Chemical Geology, v. 284, p. 138-147.

Mintz, J.S., Driese, S.G., Ludvigson, G.A., and Breecker, D.O., 2011, Seasonal influence of changing hydrology on pedogenic calcite precipitation in Vertisols, Dance Bayou, Brazoria County, TX: Implications for estimating paleoatmospheric $pCO_2$: Journal of Sedimentary Research, v. 81, p. 394-400.

Nordt, L.C., Hallmark, C.T., Driese, S.G., and Dworkin, S.I., 2012, Biogeochemistry of an ancient Critical Zone: Geochimica et Cosmochimica Acta, v. 87, p. 267-282.

Southard, R.J., Driese, S.G., and Nordt, L.C., 2011, Vertisols: Chapter 33.7, in *Handbook of Soil Science, 2nd Edition*, Huang, P.M., Li, Y, and Sumner, M.E. (eds.): CRC Press, Boca Raton, Florida, p. 33-82 to 33-97.

Stinchcomb, G.E., Driese, S.G., Nordt, L.C., and Allen, P.A., 2012, A mid to late Holocene history of floodplain and terrace reworking along the middle Delaware River valley, USA: Geomorphology: v. 169-170, p. 123-141.

Stinchcomb, G.E., Messner, T.C., Driese, S.G., Nordt, L.C., and Stewart, R.M., 2011, Pre-colonial (A.D. 1,100-1,600) sedimentation related to prehistoric maize agriculture and climate change in eastern North America: Geology, v. 39, p. 363-366.

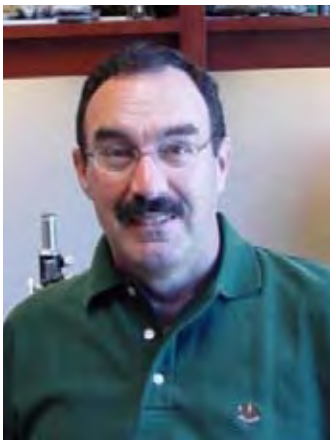
Vulava, V.M., McKay, L.D., Broholm, M.M., McCarthy, J.F., Driese, S.G., and Sayler, G.S., 2012, Dissolution and transport of coal tar compounds in fractured clay-rich residuum: Journal of Hazardous Materials, v. 203-204, p. 283-289.

Waters, M.R., Forman, S.L., Jennings, T.A., Nordt, L.C., Driese, S.G., Feinberg, J.M., Keene, J.L., Halligan, J., Lindquist, A., Pierson, J., Hallmark, C.T., Collins, M.B., and Wiederhold, J.E., 2011, The Debra L. Friedkin Site, Texas and the origins of Clovis: Science, v. 331, p. 1599-1603.


*Group photo taken at shore of Lake Victoria at Rusinga Island, Kenya, a multi-institution research effort during the summer of 2011. Driese is crouching, 2nd from right.*

# FROM THE PROFESSORS

## Dr. John Dunbar

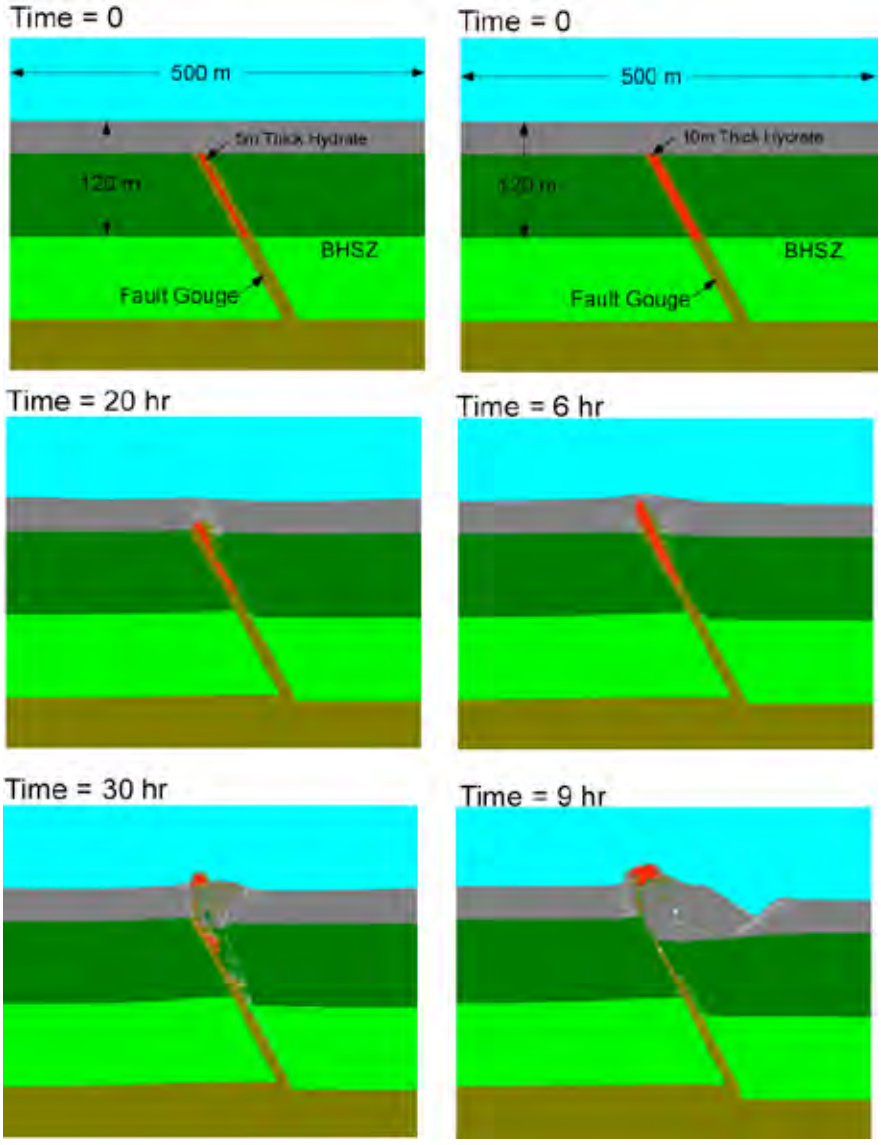


In fall 2011 John Dunbar developed a new class in geodynamics, which is one of his long-time favorite fields. In this class students used a newly revised finite element modeling program of John's design to simulate processes such as mantle convection, plume generation, seafloor spreading, and subduction. Common desktop computers have finally gotten to the point that these types of simulations are possible in the classroom. In spring 2012, undergraduate Christopher Mehta used the program to model the formation of coronae features on Venus for his undergraduate thesis. Although the geodynamic modeling program was designed primarily with deep-Earth processes in mind, John found that it works equally well for simulating the dynamics of shallow methane hydrate systems on the deep seafloor. He used the program to simulate the extrusion of hydrate slabs up fault zones and onto the seafloor as part of his ongoing work for the U.S. Department of Energy (*see figure to right*).

In related work, John and new graduate student Tian Xu planned to go on a third research cruise to Mississippi Canyon Block 118, Gulf of Mexico in July 2012 to collect a 3D resistivity data set over a seafloor mound. John's earlier work at this site showed that hydrate was concentrated along the traces of deep-seated normal faults. The goal of the new survey was to define the 3D distribution of the hydrate in the first 100 m below the seafloor. In June, John submitted a new joint proposal to DOE along with researchers at University of Mississippi to deploy his seafloor instruments for long-term monitoring of shallow hydrate systems at two similar sites in the Gulf of Mexico. In this work, John hopes to catch one of these hydrate slabs in that act of moving up a fault zone.

John also continued his work on hydrogeophysics in 2012. In the spring, undergraduate Jon Brown finished his thesis on monitoring shallow, down-slope moisture movement using the resistivity method. John also made three trips to Maui, working with Peter Allen on shallow water flow in the Hawaiian Commercial & Sugar Company's (HC&S) sugar cane plantation (*pictured right*).

On the home front, John's daughter Tamura is 19 years old and has just finished her first year at Trinity University in San Antonio. So far she loves it. Other than it being a good school, her main selection criteria seem to have been that it was not too close to home and not too far. Going to a school where her dad teaches was not an option. John's wife, Anna, who is a 1978 Baylor Graduate, retired this year from her job as the Regional Director of the Waco office of the Texas Commission on Environmental Quality. She enjoyed retired life for a full three months and then began pursuing employment. She now works as a tour guide at the Waco Mammoth site. The mammoth site is in the Brazos River floodplain and contains remains of a nursery herd of Columbian mammoths from the last Ice Age. Study by Baylor Geology indicates that the demise of the herd was caused by a flood 68,000 years ago. She has enjoyed the work immensely and finds the mammoth remains much easier to manage than state employees!




*Geodynamic models of seafloor methane hydrate emplacement. With density near that of water ice, methane hydrate moves in response to buoyancy forces.*

*John Dunbar and local field assistant Justin Lau preparing seepage meters for deployment in and HC&S reservoir on Maui*

# FROM THE PROFESSORS

## Dr. Steve Dworkin

I write this fresh on my return from an epic summer sabbatical field trip. Sandy and I, with the two dogs in the back seat, pulled our fifth wheel trailer 9800 miles across North America, sampling paleosols as we careened down the highway. We started by looking at rocks in New Mexico and then met up with Stacy Atchley and Lee Nordt for field work in the Petrified Forest and then the Grand Canyon. Leaving Stacy and Lee, we proceeded north to the Uinta Mountains in Utah where I sampled paleosols from the Dakota, Morrison and Moenkopi Formations. We then headed east to Minnesota to sample some Precambrian exposure surfaces and then it was on to Montreal where we met up with Steve and Marylaine Driese. Steve and I presented talks at the Goldschmidt Conference and then we all travelled to Nova Scotia to look at Carboniferous rocks full of coal, standing trees, and lots of paleosols. The return trip took us through New Jersey for a family reunion and then to South Carolina to visit Sandy's sister. I dread making up a 63 day travel expense report, but that is my next task.

*Looking at the rocks in the Petrified Forest*

This past year saw the graduation of Stephanie LeBlanc who worked on a senior thesis that investigated the environmental significance of mineral assemblages in paleosols using X-ray diffraction. I am also mentoring a Master's student, Ken Boling, who has just completed his summer field work on Eagle Ford mudrocks in central Texas.

I have been serving as the Graduate Program Director for several years now, and I am excited by our incoming graduate class who will consist of 6 new Ph.D. students and 2 Master's students. Best regards and don't forget to visit us if you get anywhere near central Texas.

*Taking a break from field work at the Grand Canyon*

# FROM THE PROFESSORS

## Dr. Don Greene

Getting older sneaks up on you. It doesn't happen all at once, but gradually with little reminders that time never holds still. One little reminder recently arrived for Don Greene at the Estes Park entrance to Rocky Mountain National Park. Noting Greene's date of birth, the Park Ranger told him that he is now a "senior," which entitles him to certain privileges. For this reason, Don is a proud owner of a "Senior Pass" to the National Parks and Federal Recreational lands. Yes, for a one-time-only purchase price of $10 dollars, Don has obtained free admission to all federal lands until the end of time. And as an added bonus, Texas State Parks reduce camping fees by 50%!

The passage of time has also brought an end to one of our courses that had been taught for 70 consecutive years. As part of the Earth Science curriculum, Meteorology began and ended its reign as an Aviation Meteorology course. According to an oral history given to Don Greene by Dr. Jim Dixon (the first chairman of the Geology Department) Aviation Meteorology was first added to the curriculum in 1942 in response to World War II. Pilot training was conducted at a new airfield constructed six miles north of Waco, Texas. Known as Waco Army Air Field, it became the headquarters for the Army Air Force Central Instructors School for the duration of the war. Later renamed Connally Air Force Base, the facility became the headquarters of the Twelfth Air Force. Although Aviation Meteorology is still taught at Baylor University, the course was transferred to the Aviation Sciences Institute in the spring of 2012 as a result of the hiring of a new Director in Aviation Sciences. Dr. William Cade specializes in aviation meteorology, and Greene assisted in the reassignment of this venerable course to its new home.


A third reminder of the passage of time can always be found by simply observing the constant changes and accomplishments of Don and Alison's grandchildren. The twin granddaughters (Macey and Hannah) are nearly six years old, and are exceeding expectations in both intellectual and physical prowess. They were already accomplished in swimming and gymnastics, but have recently added skiing and surfing to their repertoire. The family on our ski trip during Spring Break pictured above includes from left to right: Adriel, Don, Alison, Charlie (son-in-law), Hannah, Macey, and Meredith. In June, Hannah and Macey were up and away on their first attempt at surfing.

# FROM THE PROFESSORS

## Dr. William (Bill) Hockaday

It has been another exciting year for the Hockadays. This is our second year in Waco, and it is starting to feel more like home. The academic success of the Baylor 2012 initiative and the outstanding accomplishments of the Baylor athletic programs have made it an exciting time to be a Baylor Bear! Mary and I have attended many Baylor athletic events this year, and Mary continues to enjoy the recreation and camaraderie of her women's soccer team. Last fall we were blessed to host Mary's parents, brothers, sisters, niece, and nephew for their first Thanksgiving holiday in Texas. The weather was very pleasant and we spent a memorable week together as a family. Despite the mild winter, we managed to find some snow in Pagosa Springs, Colorado, enough for a terrific weekend of skiing with friends. This spring our friends showed us how to enjoy the outdoor sports that central Texas has to offer by taking us sailing on Lake Whitney and mountain biking in Cameron Park. During the spring break, Mary and I spent three days backpacking in the Ouachita Mountains—a much needed respite from the demands of the academic semester *(pictured below)*.

Professionally it has been a productive year for my research group. We published 3 research papers with collaborators at Rice University and UCLA since I wrote the last newsletter. With my colleagues at Baylor and beyond, we have submitted 6 research proposals to federal and private funding agencies—to provide resources for graduate student research. My proudest accomplishments of this year are the research accomplishments of students working in the Organic Geochemistry Lab. The lab has grown tremendously over the last year with the addition of 4 new students and a post-doctoral scientist. This year's letter highlights the Organic Geochemistry lab and the students' activities.

### Lab Construction is Complete

The Organic Geochemistry Lab construction has been completed *(pictured above)*. The lab is comprised of 3 separate areas: a spacious student office, a chemistry lab, and a spectroscopy facility. The chemistry lab provides ~600 square feet of space used for the physical and chemical extraction and isolation of organic matter from soil, sediment, and water samples. The most unique and exciting part of the lab is the Paul Marchand nuclear magnetic resonance spectroscopy facility *(pictured below)*. The spectroscopy facility opened in April, 2012 and has already attracted several collaborators from other universities and the petroleum industry.

## Organic Geochemistry Research Group

**Zack Valdez** completed his first year as a graduate (Ph.D.) student in the Ecological, Earth, and Environmental Science program at Baylor. Zack is spearheading an ambitious USDA-funded project to study the effect of switchgrass farming practices (fertilization rates and harvesting frequency) on soil carbon storage and greenhouse gas emissions. The project is being conducted with collaborators at Rice University, and will also evaluate the effects of farming practices on the quality of the switchgrass as a source of bio-fuel. In recognition of his role in this project, and his prior research accomplishments during his bachelor's degree at St. Mary's University, Zack was awarded the prestigious NSF graduate research fellowship in the Geosciences. The NSF fellowship is extremely competitive. Zack was one of only 2 geosciences students in the state of Texas (90 nationwide) to be selected. The fellowship provides tuition and a stipend of $30,000 per year for 3 years. He will present the preliminary results of his research at the Soil Science Society of America meeting in October.

**Justin Von Bargen** completed his first year as graduate (M.S.) student in Geology. Justin successfully defended his thesis research proposal this spring. He plans to develop a novel chemical proxy for the thermal maturity (i.e. pyrolysis temperature) of organic matter in soils and sediments. Justin is currently working with charcoal samples from central Texas and kerogen samples from the North Atlantic ocean. His research has led him into a collaboration with professor Joseph White (Baylor deptartment of Biology) who conducts controlled grassland fires in conjunction with the US forest service. Justin's research involves the measurement of fire temperatures and the collection and chemical analysis of charcoal samples as means to calibrate and validate his chemical proxy. The ultimate application of the proxy will be to the reconstruction of paleofire temperature and the thermal maturity of coals and kerogens. Justin spent the summer taking a field course in stratigraphy with professor Atchley and then performing an internship with Pioneer Natural Resources in Irving, TX.

**Nick Cestari** completed the junior year of his bachelor's degree in geology. Nick has been an invaluable member of our research group as an assistant to Zack Valdez 3 days per week and a field assistant to Dr. Hockaday one day per week. Nick has become an expert in the physical (size and density-based) separation of soil and sediment particles. Nick spent the first half of his summer attending Geology field camp, and the second half of his summer working in the organic geochemistry lab at Baylor.

**Creighton Meyers** completed his sophomore year as a geology major. Creighton has developed a strong interest in research while working beside Nick and Zack. Creighton has been a been a real help in processing soil samples from the switchgrass plots and collecting and archiving weekly samples of suspended sediment from the Brazos River. Creighton also worked in the lab this summer while taking courses part-time at McLennan County Community College.

**Dr. K. Jugeshwar Singh** came to Baylor University in June 2012 as a post-doctoral research scientist after completing a Ph.D. in the department of physics at the Indian Science Institute in Bangladesh, India and a post-doc at CNRS in Orleans, France. Dr. Singh has extensive experience in the research and development of nuclear magnetic resonance spectroscopy. Dr. Singh will oversee the Geology department's Paul Marchand nuclear magnetic resonance spectroscopy facility. Dr. Singh holds a joint appointment in the departments of Geology and Chemistry, and he will also be the leader of an interdepartmental collaboration in bio-energy. His co-advisor in the chemistry department is Dr. Sung-Joon Kim, who's research focuses on the biosynthesis of lipids in algae as a source of fuels.

**Michael Nguyen** came to Baylor in June 2012 to pursue a Ph.D. in geology after completing a B.Sc. at Juniata College in Pennsylvania. Michael will be co-advised by Dr. Lau and Dr. Hockaday. Michael's research interests are in the interactions of organic matter with minerals of nanometer (1x10-9 m) dimensions.

## Dr. Bill Hockaday (cont.)

**Todd Longbottom** joined the Baylor geology department in August 2012 to pursue a Ph.D. with the terrestrial paleoclimate research group. Todd recently completed an M.S. Degree at the University of Cincinnati in Ohio, where he studied soil carbon storage and cycling along a climate and elevation gradient in the Himalayas. Todd has expressed an interest in the organic geochemistry of paleosol organic matter.

### Teaching

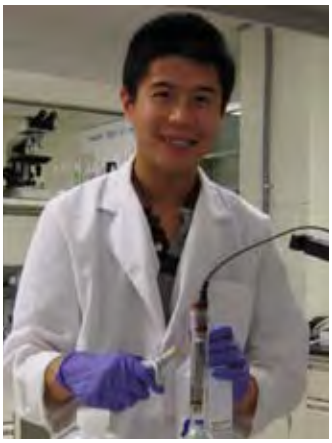
This fall I taught a new course that introduces graduate students to a rapidly growing subdiscipline called "Biogeochemistry." True to its name, the course explored the role of plants and microorganisms in shaping the chemical composition of the earth and its atmosphere. The course was a great deal of fun for me to teach, as it attracted graduate students with diverse academic backgrounds (geology, biology, and environmental science), making for lively in-class discussions based upon these different perspectives. In the spring I taught a second section of Rena Bonem's popular "World Oceans" course, as well as the Capstone Colloquium for senior Geology majors. The capstone course provides students the opportunity to read about "hot topics" in the geosciences literature, write a research paper, and present their research at the University-wide undergraduate research symposium. This year we had 6 seniors enrolled in the course.

### Outreach

In May, my wife, Mary Hockaday—who teaches 4th grade at Mountainview Elementary— brought 47 students to the geology department for a field trip. Sharon Browning and I organized an educational event around the theme of earthquakes and tsunamis. The students viewed video footage from the March 11, 2011 earthquake and tsunami in Japan. Hands-on demonstrations and activities allowed the kids to learn about the geologic principles of earthquakes and tsunamis with our graduate students. Graduate students Hallie Meighan, Ryan Morgan, Mark Speckien, Dominic Evanzia, and David Ju volunteered their time to do science with the children (*see pictures below*).

# FROM THE PROFESSORS

## Dr. Boris Lau



Since our lab is too young to have graduated any alum, my first reaction to the theme of our newsletter is – I don't have anyone to write about! On second thought, I think this is an excellent opportunity to share with you about how great our new members are!

Michael Nguyen is the "new kid on the block." He is a Ph.D. student that I am co-advising with Bill Hockaday. Mike graduated from Juniata College (PA) in 2012 with a B.S. in geology (with distinction). He just joined Baylor after some successful undergraduate years at Juniata. Michael was a member of Sigma Gamma Epsilon (national geology honor society, elected 2011), Omicron Delta Kappa (national leadership honor society, elected 2011), and the Andrew Lawson Geology Society (President, 2010). In 2010, he received the Geology Award (top sophomore geology student) as well as a Pennsylvania State University Center for Environmental Kinetics Analysis Grant. Mike got some substantial research and teaching experiences before coming to Texas. He was an academic tutor (in organic chemistry) and a research assistant for 3 years. He presented his research findings at the joint NE/NC GSA Meeting in 2011 and at the Juniata College Liberal Arts Symposium. His undergraduate research focus was on mineralization in porphyry deposits, specifically the use and development of copper isotopes as an exploration tool. In March of 2012, he co-authored a paper titled "Modern and paleo fluid ways revealed by Cu isotope fractionation in surface waters and ores of the Pebble porphyry Cu-Au-Mo deposit, Alaska," which was accepted by *Economic Geology* and is now in press! For the coming few years at Baylor, Mike is working with us to learn more about organo-mineral interactions at the nanoscale.

Kaoru Ikuma joined us as a postdoctoral research associate after receiving her Ph.D. degree from Duke University in Civil and Environmental Engineering in 2011. Kaoru is an environmental microbiologist/ engineer. Her Ph.D. dissertation research was focused on studying the effectiveness of a novel in situ bioremediation method that utilized horizontal gene transfer between bacteria for the cleanup of contaminated soils. With her background in microbiology, biochemistry, and environmental engineering, her research interests focus on the interactions between bacteria and various contaminants in the environment. Kaoru also has a strong passion in teaching and mentoring students that she has shown throughout the years as a senior graduate student. As a Ph.D. student, she was nominated for and awarded the Duke University Graduate School Dean's Award for Excellence in Mentoring. At Baylor, Kaoru's current research focuses on the effects of physical, chemical, and biological features in the interaction between nanoparticles and surfaces coated with organic or biological materials.

The interactions of natural and engineered nanoparticles with bacterial biofilms that are ubiquitous in nature are of special interest in her research. She is also studying the impact of backwashing on the biofilm microbial community in biofiltration during drinking water treatment in collaboration with the City of Waco as well as the performance and characterization of microbial communities found in different decentralized onsite wastewater treatment systems in collaboration with Joe Yelderman.

# FROM THE PROFESSORS

## Dr. Lee Nordt

I am assisting Stacy Atchley with Aislyn Trendell's paleosol research at Petrified Forest National Park and Steve Driese with Gary Stinchcomb's late Holocene fluvial work in Pennsylvania. Both are nearing completion of the requirements for their doctorates. Gary will stay on with me as a post doctoral graduate next year working on a large geochemical data base to develop relationships between weathering indexes and climate for application to the rock record. Holly Meier and Steve Ahr continue their dissertation research efforts as well. Holly is working on the late Pleistocene alluvial history of Owl Creek in central Texas and Steve Ahr on an Alfisol climosequence. Steve is also working as a geoarchaeologist for a consulting firm in San Antonio.

I taught Global Soil Systems in the spring for the first time in four years. I forgot how hard teaching is–at least to do it well. I am always amazed at how much I learn each time, and how much I have forgotten from the previous time.

Steve Driese and I continue work on a special SEPM book volume to be published in late 2012 or early 2013. This is one of the outcomes of the paleosol conference the geology department hosted at Petrified Forest National Park in Arizona in 2010.

I completed my service, for now, serving on an NSF steering committee for the Sedimentary Geology and Paleobiology Division. We produced a publication (Transitions: The Changing Earth-Life System--Critical Information for Society from the Deep Past) that summarized the essence of 25 previous NSF "white papers". It was quite an experience and I am hopeful it will lead to new funding opportunities for our research group.

Our son, Garrison, works as the second assistant golf pro at Berry Creek Country Club in Georgetown. He was recently promoted to first assistant pro and as a consequence has taken on much more responsibilities. He also enjoys giving golf lessons, playing in regional professional tournaments, and deer hunting.

Daughter Kaylee has completed her freshman year at Baylor. She joined the Kappa Alpha Theta sorority and enjoys the camaraderie and activities very much. She is majoring in Apparel Merchandising and began working in the spring at the Rock Bottom Boutique.

Pablo Mena Medrona, the student from Spain who has adopted us as his American family, continues to play golf and study at UMHB. His Spain family spent a couple of weeks with us in November, and we hope to visit there in the future.

Wife Kathy is still working part-time as outpatient surgery admitting nurse at Providence Hospital. She keeps the household intact and assists the kids as they move in and out of dorms and apartments. She has been able to travel some with me to conferences, especially enjoying Minneapolis and Washington, DC. She still likes planning family vacations for us and this summer we headed to Kiva Village in Alabama for a little sun, beach, golf, and relaxation!!

I look forward to seeing you all during homecoming weekend!

### Publications:


**Nordt**, L., Hallmark, T., Driese, S., and Dworkin, S. (2012). Biogeochemical characterization of a lithified paleosol: Implications for the interpretation of ancient Critical Zones. *Geochimica et Cosmochimica* 87:267-282. http://dx.doi.org/10.1016/j.gca.2012.03.019

Trendell, A.M., Atchley, S.C., **Nordt**, L.C., and Dworkin, S.I. (2012). Depositional and diagenetic controls on fluvial reservoir attributes within the Late Triassic Sonsela Member, Petrified Forest National Park, Arizona. *American Association of Petroleum Geologists* 96:679-707. *DOI:10.1306/08101111025*

**Nordt**, L., Dworkin, S., Atchley, S. (2011). Ecosystem response to soil biogeochemical behavior during the Late Cretaceous and early Paleocene within the western interior of North America. *Geological Society of America Bulletin* 123:1745-1762.

**Nordt**, L.C., Collins, M., Monger, H., and Fanning, D. (2011). Entisols. 2nd Edition. In *Handbook of Soil Science*, P. Huang (ed.), pp. 33-49 to 33-63. CRC Press, Boca Raton, Florida.

Southard, R., Driese, S., and **Nordt**, L. (2011 Vertisols. 2nd Edition. In Handbook of Soil Science, P. Huang (ed.), pp. 33-82 to 33-97. CRC Press, Boca Raton, Florida.

Ramezani, J., Hoke, G.D., Fastovsky, D.E., Bowering, S., Therrien, F., Dworkin, S.I., Atchley, S.C, and **Nordt,** L.C. (2011). High-precision U-Pb zircon geochronology of the Late Triassic Chinle Formation, Petrified Forest National Park (Arizona, USA): *Geological Society of America Bulletin* 123:2142-2159. *doi:10.1130/B30433.1*

## PRESENTATIONS, LECTURES, AND OTHER SCHOLARLY/CREATIVE ACTIVITIES:

**Nordt**, L.C., Driese, S.G., and Dworkin, S.I. Terrestrial paleoclimate futures: Gambling on investments in modern analogs. Geological Society of American Meeting Abstract No. 191293, Minneapolis. October.

Driese, S.G., **Nordt**, L.C., and Stinchcomb, G.E. (2011). Applications of soil micromorphology, pedology and geochemistry to interpreting potential for disturbance of strategraphic context at geoarchaeological sites: Texas Vertisols and Alaskan Gelisols. *International Geoarchaeological Conference*, Knoxville, TN, September24-28.

Stinchcomb, G.E., Driese, S.G., Messner, T.C., and **Nordt**, L.C. (2011). Climatic and human controls on Holocene vegetation changes in eastern Pennsylvania based on the isotopic composition of soil organic carbon. *International Geoarchaeological Conference*, Knoxville, TN, September24-28.

LeBlanc, Stephanie, Dworkin, S.I., Atchley, S., and **Nordt**, L. (2011). Reconstructing late Triassic environmental conditions using paleosol mineral assemblages from the Chinle Formation, Arizona, USA. Geological Society of American Meeting Abstract No. 195645, Minneapolis. October.

Stinchcomb, Gary, Driese, Steven G., Messner, Timothy, and **Nordt**, Lee C. (2011). Climatic and human controls on Holocene vegetation changes in eastern Pennsylvania based on the isotopic composition of soil organic carbon. Geological Society of American Meeting Abstract No. 191871, Minneapolis. October.

Meier, Holly A., Driese, Steven, **Nordt**, Lee, Dworkin, Steve I., and Forman, Steven L. (2011). Interpretation of dynamic Late Quaternary climate and landscape variability based upon paleosol macro- And micromorphology and stable isotopes of soil organic matter, Owl Creek, central Texas, USA. Geological Society of American Meeting Abstract No. 195350, Minneapolis. October.

Dworkin, Steve, I., **Nordt**, Lee, and Atchley, Stacy. (2011). Carbon isotope ratios in bulk organic matter from paleosols of the late Triassic Chinle Formation, Petrified Forest National Park, Arizona, USA. Geological Society of American Meeting Abstract No. 197349, Minneapolis. October.

Driese, Steven, G., **Nordt**, Lee, C., Mintz, J.S., Robinson, Amelia, C., and Miller, Wesley, L. (2011). The overlooked soil-forming factors: Distinguishing influences of soil age and hydrology from climate influences on Vertisols, and application to interpreting paleosols. Geological Society of American Meeting Abstract No. 190196, Minneapolis. October.

## GRANTS, CONTRACTS, PATENTS, SOFTWARE COPYRIGHTS:

Breecker, D., Driese, S., and **Nordt**, L., Co-Principal Investigators (2009). Collaborative Research: Calibrating the paleosol carbonate CO2 barometer for vertic paleosols by monitoring soil CO2 in modern Vertisols. National Science Foundation, Geobiology and Low-Temperature Geochemistry program (**FUNDED** $292,550; Baylor $94,395)

# FROM THE PROFESSORS

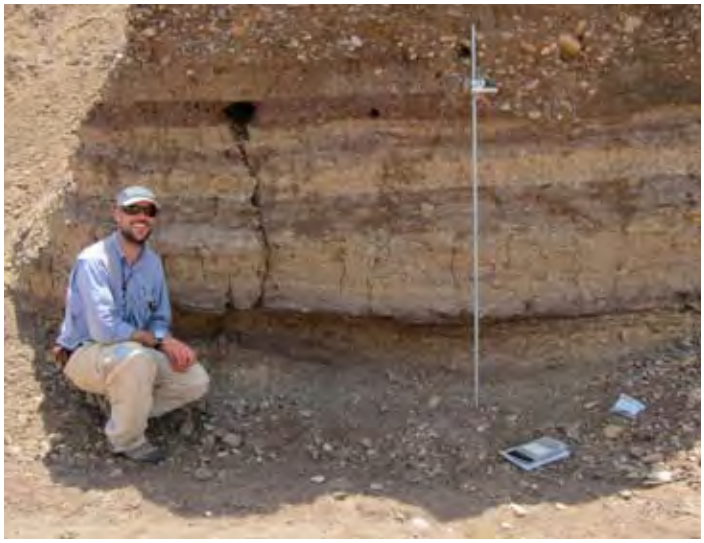
## Dr. Daniel Peppe

This summer marks my third year at Baylor. It's amazing how time flies! It feels like I arrived in Waco only yesterday. This past year was a busy and productive one. My lab was dedicated in November 2011, and we've been busily running samples for the last several months. I've spent a fair amount of time traveling to various places around the world to conduct fieldwork, I recently received funding from the Leakey Foundation to conduct research on some Miocene fossil sites in Kenya next year, and I was awarded a semester sabbatical for the spring semester. In addition to work at Baylor, I'm excited to report that my family has grown this summer. My wife, Sholly, and I recently welcomed a daughter, Anna Darlene, who was born on August 17. She was 9 pounds, 5 ounces and 21.5 inches long.

This past year I taught two courses in the fall, a graduate seminar "Paleoecology and Paleoclimate of the East African Great Lakes from the Pliocene to the Present" and a lecture and lab course, "Evolutionary History of Plants." I team-taught the graduate seminar with Pat Danley from the Biology Department, and in the course we focused on how climate change over the last ten million years has affected the East African Great Lakes (Lakes Victoria, Tanganyika, and Malawi), and in turn influenced the evolution of cichlid fish. The course was a lot of fun to teach and I also learned a lot! Additionally, Pat, the students in the course, and I used research we conducted on the topic during the semester to write a review paper on the influence of climate change on East African cichlid evolution that will be published in the International Journal of Evolutionary Biology this fall. In the spring, I taught undergraduate "Stratigraphy and Sedimentology" for the first time. From now on Stacy Atchley and I will alternate years teaching the course. I really enjoyed teaching Stratigraphy, and I took the students out into the field every week to look at various outcrops across Central Texas. Most of the geology of the region was new to me, so it was great to get to both teach the students about the concepts of stratigraphy and sedimentology while at the same time learning about the local geology. I look forward to teaching the course again in two years.

*Above: Inside the Thomas T. Goforth Paleomagnetism Laboratory: a 2G cryogenic DC-SQuID magnetometer and static alternating-field (AF) device for inline rock-magnetic devices connected to ASC IM-10 impulse magnetizer (not pictured) for measuring isothermal remanence magnetization (IRM) and a Bartington MS2B susceptibility sensor and MS2 susceptibility meter. Left: Ken Carlile, Tom Goforth, Dan Peppe next to the magnetometer after the lab dedication.*

*Dan Peppe standing next to Pliocene sedimentary deposits at Gona, Ethiopia*



In addition to teaching, my research program continues to expand. My ongoing research projects in Kenya continue to go very well. Last summer Steve Driese and our student, Lauren Michel, joined me in the field in Kenya. Lauren is working on a project focused on interpreting the paleoenvironment and paleoecology of Miocene fossil assemblage (~18-20 Ma) on two islands in Lake Victoria. Last summer Lauren made a spectacular find and discovered evidence for a dense fossil forest in the same stratigraphic horizon that many important early ape fossils were discovered. Additionally, right above the fossil forest layer we discovered fossil leaves. Lauren is working to compile all of her data and write up this spectacular and exciting find. She also plans to present her results at the GSA meeting this fall.

In addition to the Miocene project, I have been working on a project in collaboration with an archeologist from New York University and a geochemist from the University of Minnesota focused on reconstructing the paleoenvironment of the late Pleistocene in the Lake Victoria area of East Africa that was funded by NSF in 2010. We have been working to characterize the paleoenvironment and paleoecology of these fossil sites. Steve Driese and I have a new student, Emily Beverly who is currently in Kenya examining the paleosols at several new sites in mainland Kenya to reconstruct the paleoenvironment of the Pleistocene in the Lake Victoria region.

In February, I spent ten days in Ethiopia working at the Gona research site. Gona has deposits that range from the late Pliocene to the late Pleistocene and has a remarkable record of hominid fossils and stone tools. In February I collected paleomagnetism samples to help constrain the age of some important early hominid sites, and I am currently analyzing those samples in the lab. I hope that by next year we'll have some exciting news to report.

In addition to the exciting research that Lauren and Emily are currently working on, my other students have also been hard at work! Alex Van Plantinga conducted his M.S. research in Kenya on my Pleistocene project working to correlate various important fossil and artifact bearing horizons. He defended his thesis in fall 2011 and has begun working on his Ph.D. at Texas A&M. Casee Lemons worked on a project focused on exploring the relationship between leaf size and shape and climate in ferns. Last summer she conducted research in Australia and New Zealand on an NSF East Asia and Pacific Summer Institute for US graduate student fellowship to continue her research, and in the fall she worked at the Smithsonian on a Smithsonian Fellowship. She completed and defended her M.S. thesis in spring 2012, and we are working to finalize her work to submit for publication. Casee started a job at Baker Hughes this summer and reports that she's really enjoying her work.

Although students have graduated and moved on this academic year, I'm happy to report that my lab group continues to grow. In fall 2012, Adam Davis will be joining my lab as a Ph.D. student. He will be working on a project in the San Juan Basin in New Mexico focused on interpreting the sedimentology and stratigraphy of the Paleocene Nacimiento Formation. Adam will be co-advised by me and Stacy Atchley. Additionally, four undergraduates, Mark McCollum, Dillon DeGarmo, Blake Taylor, and Will Horner worked with me this summer and are developing senior thesis projects for next year. I expect they will have some great results to present at Baylor's undergraduate research fair in spring 2013.

## Dr. Daniel Peppe (cont.)

Overall, it's been a great year, and I'm excited for my fourth year at Baylor and in Waco to begin. I hope to see many of you during our upcoming alumni events!

### Publications:


Conrad, J., Jenkins, K., Lehmann, T., Manthi, F., Peppe, D.J., Nightingale, S., Cossette, A., Dunsworth, HM.., Harcourt-Smith, W.E.H., McNulty, K.P., *in revision*, New specimens of *Crocodylus pigotti* (Crocodylidae) from Rusinga Island, Kenya, and generic re-allocation of the species: ***Journal of Vertebrate Paleontology***.

Danley, P., Husemann, M., Ding, B., *DiPietro, L., *Beverly, E., Peppe, D.J., in press, The impact of the geologic history and paleoclimate on the diversification of East African cichlids: ***International Journal of Evolutionary Biology.***

Faith, J.T., Tryon, C.A., Peppe, D.J., Fox, D.L., *accepted*, Informing biodiversity conservation with paleozoological evidence: the fossil history of endangered Grevy's zebra (*Equus grevyi*), ***Journal of Biogeography***.

Peppe, D.J. and Deino, A.L., *accepted*, Dating rocks and fossils using the geologic record: ***Nature Education Knowledge***.

Peppe, D.J., Johnson, K.R., and Evans, D.A., 2011, Magnetostratigraphy of the Lebo and Tongue River Members of the Fort Union Formation (Paleocene) in the northeastern Powder River Basin, Montana: ***American Journal of Science***, v. 311, p. 813-850.

Royer, D. L., Peppe, D. J., Wheeler, E. A., and Niinemets, U., 2012, Roles of climate and functional traits in controlling toothed vs. untoothed leaf margins: ***American Journal of Botany***, v. 99, no. 5, p. 915-922.

Tryon, C.A., Peppe, D.J., Faith, J.T., *Van Plantinga, A., Nightingale, S., Ogondo, J., and Fox, D.L., 2012, Late Pleistocene artefacts and associated fauna from Rusinga and Mfangano islands, Lake Victoria, Kenya, Azania: ***Archaeological Research in East Africa***., v. 47, p. 14-38.


### Presentations:


Jenkins, K., Faith, J.T., Tryon, C.A., Peppe, D.J., Nightingale, S., Ogondo, J., Roure Johnson, C., Driese, S., 2012, New excavations of a Late Pleistocene bonebed and associated MSA artifacts, Rusinga Island, Kenya: ***PaleoAnthropology 2012***.

*Lemons, C.R., Peppe, D.J., Royer, D.L., Wright, I.J., Lusk, C.B., 2011, Are modern fern leaf economics coherent enough to use as a proxy for fossil interpretations?: ***Geological Society of America, Abstract with Programs***, 43(5): 615.

*Lemons, C.R., Peppe, D.J., Royer, D.L., Wright, I.J., Lusk, C.B., 2011, Linking ecologies past and present: fern leaf economics quantified: ***Ecological Society of America Annual Meeting***.

Maxbauer, D.P., Peppe, D.J., Bamford, M, McNulty, K., Dunsworth, H., Harcourt-Smith, W.E.H., Davis, L.E., 2011, New paleoenvironmental and paleoclimatic interpretations from fossil leaves for the Early Miocene faunas of Rusinga Island (Lake Victoria, Kenya): ***PaleoAnthropology 2011***.

*Michel, L.A., Peppe, D.J., Driese, S., McNulty, K.P., Lehmann, T., Dunsworth, H.M., Harcourt-Smith, W.E.H., 2011, Paleoenvironmental reconstruction of early Miocene catarrhine localities using fossil forest paleosols from Rusinga Island, Lake Victoria, Kenya: ***Geological Society of America, Abstract with Programs***, 43(5): 429.

Peppe, D.J., Deino A.L., McNulty, K.P., Lehmann, T., Harcourt-Smith, W.E.H., Dunsworth, H.M., Fox, D.L., 2011, New age constraints on the early Miocene faunas from Rusinga and Mfangano Islands (Lake Victoria, Kenya), ***American Journal of Physical Anthropology***, 144(S52): 237.


*Fossil roots, discovered by Lauren Michel, provide evidence for a Miocene fossil forest on Rusinga Island, Kenya.*

Peppe, D.J., Deino, A.L., Lehmann, T., Dunsworth, H.M., Harcourt-Smith, W.E.H., McNulty, K.P., 2011, New age constraints for the early Miocene faunas of Rusinga and Mfangano Islands (Lake Victoria, Kenya): ***Journal of Vertebrate Paleontology.***

Peppe, D.J., Faith, J.T., Tryon, C.A., Fox, D.L., Garrett, N., *Van Plantinga, A., Keegan, W., Nightingale, S., Ogondo, J., Zaarur, S., 2011, Terrestrial evidence for late Quaternary lake level changes from the Lake Victoria Basin, Equatorial Africa: ***Geological Society of America, Abstract with Programs***, 43(5): 335.

Peppe, D.J., *Lemons, C., Royer, D.L., 2011, Fern leaf economic quantified: ***Midcontinent Paleobotany Colloquium.***

Peppe, D.J., 2011, Late Pleistocene lake level change and the expansion of arid grasslands: evidence from the Lake Victoria region, Equatorial Africa: Texas A&M (invited talk).

Peppe, D.J., 2011, Using the size and shape of leaves to interpret ancient climates: University of Texas at Arlington (invited talk).

*Stinchcomb, G. E., Peppe, D.J., Driese, S.G., 2011, Time as an important soil-forming factor influencing modern and ancient magnetic susceptibility enhancement along the Deleware River Valley, USA: ***Eos Transactions AGU***: GP33A-1115.

Tryon, C.A., Faith, J.T., Peppe, D.J., *Van Plantinga, A., Fox, D.L., *Garrett, N., Keegan, W.F., Ogondo, J. 2011, Middle Stone Age hominin occupation of arid environments in the Lake Victoria basin: New evidence from Rusinga and Mfangano islands, Kenya: ***PaleoAnthropology 2011***.

Williamson, T.E., Peppe, D.J., Secord, R., Brusatte, S., Weil, A., 2011, A long-term terrestrial record of Early Paleocene climate and ecosystem change in the San Juan Basin, New Mexico: ***Journal of Vertebrate Paleontology.***

# FROM THE PROFESSORS

## Dr. Jay Pulliam

We are still maintaining the broadband seismic stations that we installed in 2010 for the GUMBO (Gulf of Mexico Basin Opening) study (*see Figure 1*). GUMBO, a collaboration between scientists at Baylor, UT Austin and Texas Tech, intends to elucidate the structure of the crust and upper mantle across the Texas Gulf Coastal Plain from Matagorda Island to Johnson City. We installed an additional two stations on the southern end of the array in December 2011 in order to improve the resolution of our images over a large magnetic anomaly that lies beneath and trends parallel to the coastline.

We continue to process data from the SIEDCAR (2008-10) and GUMBO (2010-12) deployments in computers in the Baylor Geophysics Lab as well as data for other projects. Data we recorded ourselves are augmented significantly by EarthScope's Transportable Array, as it rolled through Texas (http://www.earthscope.org), will keep us busy for quite some time.

Graduate student Carrie Rockett submitted and defended her M.S. thesis last fall and started a new job at Samson Resources in Tulsa, OK. Carrie performed tomographic inversions of earthquake data to find P and S velocity models of west Texas and eastern New Mexico to investigate the structure and tectonics of the eastern flank of the Rio Grande Rift. Her results are terrific and will be submitted for publication soon.

Three new M.S. students joined our group in August: Ryan Ainsworth from Montana Tech, Cody Comiskey from Texas Tech, and Dominic Evanzia from Northern Arizona University. Dominic and Ryan are working on the GUMBO project, using earthquake data that we are collecting with our own equipment in conjunction with data from USArray stations during their two-year deployments (*Figure 1*). Cody is working with EarthScope broadband

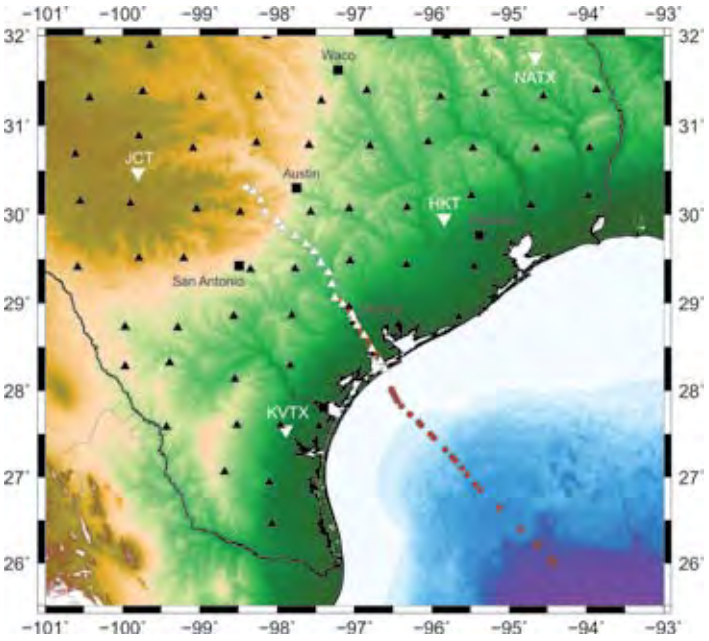
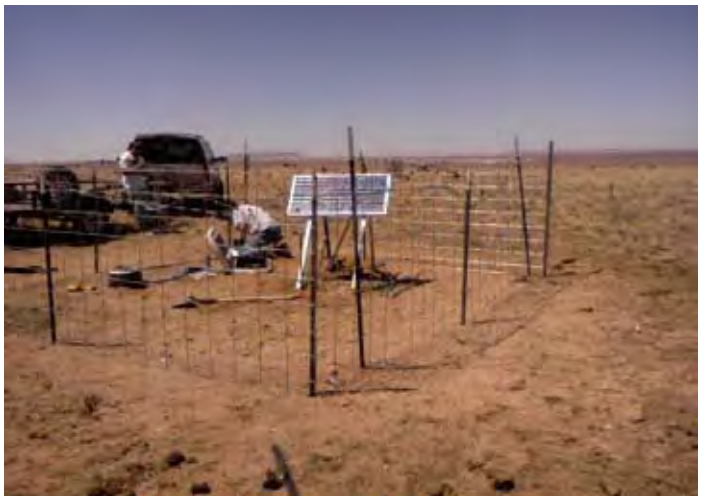



*Figure 1. Stations deployed as part of our GUMBO (Gulf of Mexico Basin Opening) study. GUMBO is a collaboration between scientists at Baylor, UT Austin, and Texas Tech, involves temporary broadband seismographs deployed by Baylor and Texas Tech students (small white triangles), USArray broadbands (black triangles), permanent broadbands (large white triangles), ocean bottom seismographs (red dots), and temporary geophone arrays (red line from the coast through Victoria). USArray stations have now left Texas, and we plan to demobilize the Baylor broadbands by the end of 2012.*

*A teacher demobilizing a SIEDCAR station in southeastern New Mexico*



*Baylor students demobilizing a SIEDCAR station in west Texas*

## Dr. Jay Pulliam (cont.)

seismic data to investigate the anisotropic structure of Texas and Oklahoma—the former southern edge of Laurentia (North America's ancient core).

Mohit Agrawal, a new Ph.D. student from the Indian School of Mines, joined us in January; he is working on a computationally intensive modeling project to understand the structure of the crust and upper mantle beneath the Middle East.

In October 2011 my Ph.D. student Hallie Meighan and I were both invited to give presentations at a symposium called "Earthquake and Tsunamis in the Northeastern Caribbean" at the University of Puerto Rico, Mayagüez. Hallie's Ph.D. work consists of a series of projects that focus on the northeast Caribbean but she had never visited the region. It's not so common to arrive in a locale for the first time as an invited expert on the region's tectonics, but she has an interesting result that sheds light on the nature of the subduction zone at the plate boundary's sharp corner (near the Virgin Islands), so her talk was well-received. Her paper on that topic was accepted for publication in early 2012 and should appear by the end of the year. She is now writing a paper that derives from a deployment of ocean bottom seismometers in 2007 to study the nature of subduction at the "sharp" corner of the Caribbean/North America Plate boundary. The six-month deployment captured two swarms of small magnitude earthquakes that consist of tens of events in a one-day period. A stress inversion she performed with focal mechanisms has revealed an unexpected pattern of compressional stresses that encircles the Puerto Rico/Virgin Islands microplate.

Hallie will argue in the paper that the stress pattern indicates "crumpling" of the subducted portion of the North America Plate at this location.

In December I was invited to present previous research and discuss future research plans in the Global Earthquake Model (GEM) session of the 6th Caribbean Conference on Comprehensive Disaster Management, Port-of-Spain, Trinidad and Tobago. This fits with my long-term goal of uniting all the individuals and institutions in the Caribbean and in Central America who do seismology research in collaborative projects, including exchanges of data and expertise. Seismology is an inherently international discipline; it is difficult to make much progress in seismological monitoring or research without combining data from numerous networks and locations. This is particularly true in this "Middle America" region, where countries tend to be small and, in the case of the Caribbean, widely distributed. In addition to common challenges to sharing data and expertise, the region faces unusually dire threats due to earthquakes. The organization we created in 2010 to facilitate collaborations and exchanges was formalized last year and named the "Alliance for Middle America Seismology" (ALMAS) or, in Spanish, "Alianza Mesoamericana de Sismologia." With broad membership in the region, as well as numerous Americans on board, we are off to a strong start. We have submitted several proposals to fund joint projects and hope to have a substantial kickoff event in 2013.

# FROM THE PROFESSORS

## Dr. Joe Yelderman

The Baylor Hydrogeology Program graduated 2 M.S. students and 1 B.S. student mentored by Dr. Joe. Ryan Danielson completed his undergraduate thesis and will be pursuing his master's degree in hydrogeology at San Diego State University. M.S. student Michelle Diehl successfully defended her thesis and also made a public presentation to the Southern Trinity Groundwater Conservation District where she served as an intern during her graduate work. She is currently working as a GIS analyst for Eagle Information Mapping Inc. where she will merge the GIS skills she developed in her M.S. program with her geologic interpretation abilities. Stephanie Wong defended her M.S. thesis and was accepted to continue as a Ph. D. student at Baylor. As one of our newest alumni she is featured elsewhere in the newsletter. Stephanie and Dr. Joe traveled to Uganda last summer where Stephanie investigated potential research projects regarding the sustainability of water resources in third world countries.

*Laura Foss downloading water level data.*

Dr. Joe took a strong contingent of students to the South Central Geological Society of America meeting in Alpine this past spring where M.S. students Laura Foss and David Ju made oral presentations on their thesis progress. David and Laura also received Elan Allen safety scholarships for their safety plans conducted during their field work. David, Laura, and Stephanie all applied and received funding from the Glasscock Excellence Fund to help in their research efforts.

The Baylor Wastewater Research Program (BWRP) is completing a grant from the Texas Onsite Wastewater Treatment Research Council (TOWTRC) where Dr. Joe is the PI studying new evaluation procedures for different dosing techniques. Graduate student Amy Price is incorporating data generated from the grant in her M.S. thesis and has been accepted to pursue her Ph.D. in geology at Texas A&M. In addition to the grant with the TOWTRC, Dr. Joe received funding from the University Research Council to

## Dr. Joe Yelderman (cont.)

work with Dr. Kaoru Ikuma (Post Doc with Dr. Boris Lau) and undergraduate student Byron Griffin regarding the effects of on-site wastewater treatment methods on bacterial populations and communities.

Dr. Joe is also working with Texas AgriLIFE on a grant studying the recharge to the Edwards Aquifer that may affect springs inhabited by the Salado Salamander which is pending listing as an endangered species.

Dr. Joe advised incoming freshmen again this past summer and continues to help Dr. Bonem advise undergraduate geology majors. Dr. Joe also is serving as graduate director for the Institute of Ecological, Earth and Environmental Sciences (TIEES).

The Yeldermans still live at 706 Woodland West, in Woodway, Texas and visitors are always welcome. Dr. Joe continues to teach Sunday School at Columbus Avenue Baptist Church with Diane, his loving wife of 37 years. Diane also continues to teach Kindergarten but will now be at Bell's Hill Elementary since

*The Yelderman clan*

North Waco Elementary school was closed this past year. Bell's Hill is the location where the first Trinity aquifer well was drilled in Waco, so all is right in the universe. Married daughter, Abigail White, lives in Plano with her husband, Jared. Abbi and Jared have a beautiful daughter, Madison (3) and a handsome son, Hamilton (1). Cal (son #1) lives in Austin where he is a business analyst for MitreTech. Logan (son #2) was married August 11, 2012. He and his bride, Rachel, live in Reno, Nevada, where Logan will be working on his Ph. D. in Psychology at the University of Nevada - Reno.

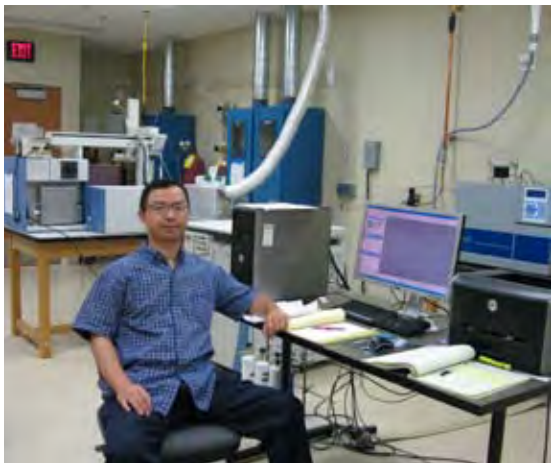
# FROM THE PROFESSORS

## Dr. Ren Zhang

The past year was my second year at Baylor and was as busy as the previous year. Again, to continue to support ongoing research programs that include Geology, Biology, Center for Reservoir and Aquatic Systems Research, and Environmental Sciences, I had to spend most of my time analyzing H/C/N/O stable isotopic compositions of various biological and geological samples. Altogether, I made 4136 isotopic analyses last year. Although analytical services for those who didn't have their own research grants were still free, I have, for the first time generated over $10,000 in annual revenue for this laboratory.

I also made new analytical service available at my lab. We could only analyze solid samples when I first got here. After spending quite a lot of time on Gas Bench II, I have successfully extended our stable isotope ratio analysis to water samples using equilibration method and have finalized SOPs for $\delta D$ and $\delta^{18}O$ analysis of water samples.

The whole process for isotopic analysis is really time-consuming, and instruments can easily go wrong. I have had many mechanic and electronic problems for the past 12 months, such as air leak, high $N_2/CO_2/Ar/H_2O$ background, broad/overshooting peaks, software failure, thermal control failure, Conflo IV dilution failure, acid pump failure, mass jump failure, incomplete combustion of samples, etc. The most serious problem I have ever had is that one of the eight dilution valves in Conflo IV was not working. As a result, I had to change the whole dilution valve block. As work space is very limited in Conflo IV,



## Dr. Ren Zhang (cont.)

this was actually a one-person job. The most difficult part was to screw the brittle capillaries of different sizes and lengths in to the eight valves through different ferrules. I couldn't screw in too tight or too loose, which would either damage the ferrule and the capillary or cause air leak. I had to spend 6 days to disassemble the old dilution block and install a new one. I hope this will never happen again in the future… Anyway, I have managed to maintain a stable and smooth performance of the IRMS and its peripherals, which is needed for providing high-quality stable isotope analysis services to both internal and external users.

In addition, I have worked closely with Dr. Steven Driese and Dr. Steve Dworkin on application for a FRIP project entitled "Hydrogen Stable Isotope Analysis of Speleothem Fluid Inclusions", which has been recently approved. This FRIP grant will be used to build up an up-to-date online speleothem fluid inclusion extraction device at our laboratory. I visited Dr. Yuri Dublyansky's lab in July to learn how to install, calibrate, and run real speleothem samples on the fluid inclusion extraction line.

*Paulette Penney and Erin Stinchcomb on their Segway adventure while attending the 2011 annual GSA meeting in Minneapolis*

***Science is fun. Science is curiosity. We all have natural curiosity. Science is a process of investigating. It's posing questions and coming up with a method. It's delving in.***

***-Sally Ride***

BAYLOR UNIVERSITY

DEPARTMENT OF GEOLOGY

Dear Baylor Geologists:

Much excitement has been generated at the University with the release of Baylor's new strategic vision, *Pro Futuris*, and the Department is actively planning how it will contribute to this new initiative. With the high quality faculty, students, and facilities currently in place, I am sure that the Geology Department is in great shape to contribute to the academic progress the University intends to accomplish. Several board members attended the BGS field trip that was run in April 2012. The students did a great job describing carbonate sedimentology and stratigraphy of multiple outcrops in the Waco area, with lunch provided at Dr. Goforth's house in rural McLennan County and the last stop taking place at Lake Whitney. I would like to encourage you to attend one of these trips in the future if your schedule permits. It could even be a fun family outing – remember, the vans are air-conditioned these days!

With Baylor University striving for Carnegie Very High Research Activity status, challenges have been presented to the Geology Department, and this provides an opportunity for alumni to assist the Department. Based upon national ranking-based University evaluation standards for each Department, only the number of Ph.D. graduates is counted for determination of number of graduate degrees awarded. For most departments, including the other natural sciences departments, this method of determining degree output does not present a challenge. However, as we all know, the field of geology is unique in that the Master of Science degree is the typical terminal or "working" degree, therefore a greater number of Master's degrees are pursued and earned by students in Geology than are typical in the other sciences. The Graduate School determines annual budgets for each department at least partially based upon graduate degree production, but because completed M.S. degrees are not recognized as graduate degree production by the University, this poses a potential challenge for the Geology Department.

Geology alumni can help our Department! If you graduated with an M.S. degree from Baylor, or graduated with a B.S. or B.A. from the Department and later earned an M.S. from another institution, you should take the opportunity to contact the Graduate School to let them know how valuable your Baylor Geology M.S. degree was to your career and to your life in general. And let them know that M.S. graduates represent the largest group of alumni contributors to the Department, who have been very generous over the years in their support. My hope is that if we unite in a positive approach, we can help the Graduate School better understand the need for maintaining their support for some level of M.S. degree output in our field. Currently the Department has proposed a ratio of 2:1 for Ph.D. to Master's degree students, which was a compromise that is designed to satisfy both concerns.

Additionally, we have a passionate but small group of alumni who currently serve on the Alumni Advisory Board. If you would like to serve, please contact myself or one of the other board members for more information. And don't forget to attend the Geology Homecoming Open House this November!

Samuel (Josh) Talbert
Chairman, Baylor Geology Advisory Board

# GEOLOGY EVENTS

## BGS Field Trip 2012

This past April the Baylor Geological Society led a field trip for students, faculty and alumni titled: *Facies and Significance of the Edwards Limestone and Eagle Ford Shale*. The stops on the trip provided access to representative examples of the Lower Cretaceous Walnut Clay-Comanche Peak-Edwards Limestone-Kiamichi Shale succession, as well as the Upper Cretaceous Eagle Ford Shale, and emphasized depositional systems and associated reservoir and source rock potential of organic-rich facies within the Edwards Limestone and South Bosque Formation of the Eagle Ford Shale.

Stops on the trip included the Walnut-Comanche Peak-Edwards outcrop succession near Oglesby, TX, the South Bosque Formation near Woodway, TX, an Edwards limestone road cut along State Highway 317 north of Crawford, TX, Circular Patch Reefs along Childress Creek northeast of Valley Mills, TX, and Soldier's Bluff on the South side of Lake Whitney adjacent to State Highway 22. Dr. Tom Goforth kindly provided a lunch stop for the group while they were out in his vicinity.

For more information on the next field trip please visit the Baylor Geology website.

*Curtis Barclay, Kelly Jones, and Jennifer Lowery's stop by the patch reefs of the Edward's Limestone in Childress Creek*

*Emily Beverly with Amos Culbertson introducing the field trip talking about the stratigraphy of the area*

*Ken Boling and Garrett Felda's presentation on HWY 317 by Crawford, TX*

*Amos Culbertson pointing out the different stratigraphic units at his outcrop*

*Justin Von Bargen pointing out the fissile mud layers in the outcrop behind him*

*Group photo of everyone at Dr. Thomas and Royce Goforth's house*

# GRADUATES AND AWARDS

## December 2011 Graduates

### Bachelor of Arts in Geology

**Jeremy D. Bickel • Pamela S. Kanu**

### Master of Science in Geology

**Ryan S. Dhillon**
Influence of Climate and the Expansion of C4 Grasses on Sequence-Scale Cyclicity and Landscape Development during the Late Miocene to Pleistocene of West Texas

**Carrie V. Rockett**
Seismic Tomographic Imaging Reveals Possible Lithospheric Erosion Beneath Trans-Pecos Texas and Southeastern New Mexico

**Alexander Van Plantinga**
Geology of the Late Pleistocene, Artifact-Bearing Wasiriya Beds at the Nyamita Locailty, Rusinga Island, Kenya

## May 2012 Graduates

### Bachelor of Science in Geology

**John W. Fisher • Kimberley E. Kuijper**
**Stephanie L. LeBlanc • Jennifer G. Lowery**
**Alkesta Maili • Christopher A. Mehta**

### Master of Science in Geology

**Michelle L. Diehl**
Intra-aquifer Characterization and Potential Management Impacts: Trinity Aquifer, Central, Texas

**Casee R. Lemons**
Leaf Economics and Biomechanics in Extant Ferns

**Ryan D. Lindsay**
Seismo-Lineament analysis of Selected Earthquakes in the Tahoe-Truckee area, California, and Nevada

**Stephanie S. Wong**
Developing a Geospatial Model for Analysis of a Dynamic, Hetergeneous Aquifer: The Brazos River Alluvium Aquifer, Central Texas

## August 2012 Graduates

### Master of Science in Geology

**Curtis Barclay**
Regional Reservoir Characterization and Sequence Stratigraphy of Jean Marie Member of the Redknife Formation, Northern British Columbia

### Doctor of Philosophy

**Gary Stinchcomb**
Climatic and Human Influences on the Holocene Alluvial History and Paleoenvironment of the Middle Delaware River Valley, USA

## Awards

**Clifford (Dillon) DeGarmo**
2012 recipient of the Robet T. Hill Award for Academic Excellence in Geology

**Kimberley Kuijper and Clifford (Dillon) DeGarmo**
Chosen to represent the Geology Department at the 2012 College of Arts & Sciences Honors Convocation

**William H. Horner**
2012 recipient of the Dixon Undergraduate Field Assistant Award

*Kimberley Kuijper, Dr. Steven Driese and Clifford (Dillon) DeGarmo at the College of Arts & Sciences Spring 2012 Honors Convocation*

# WHERE ARE THEY NOW?

## Alumni Updates

**Colby Wright, (B.S., 2009)** is currently earning his M.S. degree at the University of Alaska at Fairbanks and writes (March, 2012): "I wanted to send you a picture of our Imperial Barrel Award team up here in Fairbanks. We just got back from regionals in Bakersfield, CA where we placed third. I was certainly happy with the outcome since we had no help and a lot of problems along the way. The only people who beat us have been doing this for the past five years, and they have extensive support from their departments. This was UAF's first run at the competition, and I am sure we turned some heads. Hope all is well down in the Lower 48. We are thawing out quickly here, and we have tons of daylight." *(See pic right, Colby is fourth from left.)*

**Tom Fletcher, (B.S. '84 & M.S. '86)** is currently the Geology and Geophysics Manager, Mozambique Exploration, for Anadarko Petroleum. Tom and his family reside in Pinehurst, TX. His son, Thomas Garrett, is a Geology Major at Baylor. Tom visits Baylor each fall to recruit geoscientists for Anadarko, usually accompanied by other grads like John Koenig.

**Dr. Tambra L. Eifert, (M.S., 1999)** who is a Professor of Geology at Washburn University in Topeka, KS, writes that she would love to hear from fellow Master of Science in Geology graduates. Email her at tambra.eifert@washburn.edu.

**Dr. Shane Prochnow (M.S. '01 & Ph.D. '05)** is a senior geologist with the Chevron Exploration and Production Company at Midland, Texas and is working the Wolfcamp-Sprayberry unconventional tight oil play in the Permian Basin. Prochnow specializes in the application of sequence stratigraphy for prospect development and optimized well completion and hydrologic fracture design.

**Mike Hawthorne (B.S. '83 & M.S. '87) and Kay Hawthorne (B.A. '84)** are now living in the Fort Worth area with their two children, Tyler (18) and Cody (15). Tyler will be heading to Baylor to start his college career this year on an academic scholarship after a successful high school career as a student and

athlete (shooting guard on the varsity basketball team). Cody is an all-around student/athlete and runs cross-country. Mike and Kay own and work together at H2A Environmental, Ltd., a geoscientific and engineering services firm specializing in risk characterization and restoration of soil and groundwater. You can see some of their work at www.NAPL-ANSR.com or www.h2altd.com.

**David Cleveland (Ph.D. '07)** works for ExxonMobil Upstream Research Company in Houston in their Stratigraphic and Reservoir Systems Group. Recently he was assigned co-instructor of the popular ExxonMobil/SEPM short course "Sequence Stratigraphy for Graduate Students," which ExxonMobil offers to students at AAPG and GSA meetings. David is also a member of the Baylor Geology Advisory Board.

**Jason Mintz (Ph.D. '11)** currently works as a Geoscientist for Anadarko Petroleum Corporation in Houston with their Appalachian Basin Team, mainly involved in gas shale prospects.

**Julia Kahmann-Robinson (M.S. '05 & Ph.D. '08)** currently works as a post-doctoral researcher at the University of Utah in Salt Lake City on a NASA-funded research project where she coordinates outreach activities.

**Aaron Shunk (Ph.D. '09)** works as a Geologist for Shell Exploration and Production Co. in Houston with their Regional Gulf of Mexico Group.

# WHERE ARE THEY NOW?

**David Coffman (M.S. '09) and Stephanie (Capello) Coffman (M.S. '08)** *(pictured below)* studied fluvial geomorphology, hydrology, and engineering geology under Dr. Allen while attending Baylor. They were married in 2010 and currently live in Fort Worth, TX. After graduation, Stephanie accepted a position with Freese and Nichols, Inc., in Fort Worth. Stephanie hit the ground running and immediately started to work on the first instream flow study to be completed using the guidelines in the state-mandated Texas Instream Flow Program. She also applied the skills she learned at Baylor to start the Fluvial Geomorphology discipline at Freese and Nichols. Stephanie began conducting stream geomorphological assessments and scour analyses to assist in the design of sustainable stream bed and bank stabilization solutions both with Freese and Nichols engineers and other consultants.

David worked for the USGS following graduation conducting fluvial geomorphologic and sediment studies both in Texas and North Dakota until he took a position with Freese and Nichols, Inc., in 2011. David and Stephanie now work together using the skills and knowledge they learned while at Baylor to assist municipalities, water districts, and other clients in understanding urban channel dynamics, minimizing channel erosion, and identifying and quantifying reservoir sedimentation potential, thereby sustaining water supplies for consumers across the state of Texas. David and Stephanie continue to collaborate with Dr. Allen. They are currently using the submerged jet test they helped develop during their masters' studies to measure the erodibility and critical shear stress of stream bed and bank material for their projects across the state.

David and Stephanie are both active members of the Association of Environmental and Engineering Geologists (AEG). David is the Chair of the Dallas-Fort Worth Chapter of AEG. Stephanie is the Secretary of the Dallas-Fort Worth Chapter of AEG and the Treasurer of the Texas Section of AEG. David and Stephanie both serve on the national AEG Section-Chapter Support Committee.

## Congratulations to…

**Robyn Marchand Hillerman** who married Michael Hillerman on March 19, 2011. They reside in Houston, Texas with their dog, Timmy, and honeymooned in Italy.

**David and Sara Cleveland** on the birth of their second son, Everett, in October 2011.

**Dan and Lesli Lancaster** on the birth of their daughter, June Loretta, on October 20, 2011.

**John and Lili Bongino** on the birth of their daughter, Sophia Grace, in February 2012.

**Alan and Minda Gunnell** on the birth of their daughter, Heidi Clara, on March 8, 2012.

**Chris Moses** on the birth of his son, Austin, in the spring of this year.

# WHERE ARE YOU NOW?

We would love to know! Please complete the form on the back, fold in half, place a stamp, and put it in the mail. We will use this information to update our departmental files. You can also email your information to: Paulette_Penney@baylor.edu.

Also, remember we have the "Geokid" bulletin board in the office with photos of children of Alumni, so send your pictures to Paulette_Penney@baylor.edu.

PLACE
STAMP
HERE

Baylor University
Department of Geology
One Bear Place #97354
Waco, TX 76798-7354

# PERSONAL INFORMATION SHEET
# DEPARTMENT OF GEOLOGY

Name: _____ Class: _____

Degree(s): _____

Phone: _____ Email: _____

Mailing Address: _____

_____

Type of Work: _____ Location: _____

Company Name: _____

Family Information: _____

_____

Hobbies: _____

Interests: _____

Spare Time Activities: _____

_____

Would you like to share information in the Homecoming Newsletter Section, "Where Are They Now?" Yes ___ No ___ If yes, write information here: _____

_____

_____

Are you willing to speak to the Department?

Yes ___ No ___If yes, write topic here: _____

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_____

Suggestions: _____

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Please join us!

# GEOLOGY OPEN HOUSE

Friday, Nov. 2, 2012
7:00–9:00 pm
Baylor Sciences Building, E401

BAYLOR
UNIVERSITY
COLLEGE OF ARTS AND SCIENCES
Department of Geology
One Bear Place #97354
Waco, TX 76798-7354



Change Service Requested

# BAYLOR UNIVERSITY | DEPARTMENT OF GEOLOGY

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Dr. Peter Allen | Professor
Dr. Stacy Atchley | Professor
Dr. Rena Bonem | Professor
Dr. Vincent Cronin | Professor
Dr. John Dunbar | Associate Professor
Dr. Steve Dworkin | Professor
Dr. Don Greene | Professor
Dr. William Hockaday | Assistant Professor
Dr. Boris Lau | Assistant Professor
Dr. Lee Nordt | Professor & Dean, College of Arts & Sciences
Dr. Don Parker | Senior Lecturer, Emeritus Professor
Dr. Daniel Peppe | Assistant Professor
Dr. Jay Pulliam | W.M. Keck Foundation Professor of Geophysics
Dr. Joe Yelderman | Professor

Dr. Tom Goforth | Emeritus Professor
Dr. Harold Beaver | Emeritus Professor
Dr. Bill Brown | Emeritus Professor

Sharon Browning | Geology Freshman Laboratory Coordinator
Dr. Ren Zhang | Stable Isotope Spectrometry Lab Technician

Paulette Penney | Office Manager
Erin Stinchcomb | Administrative Associate
Janelle Atchley | Administrative Assistant
Jamie Ruth | Administrative Associate