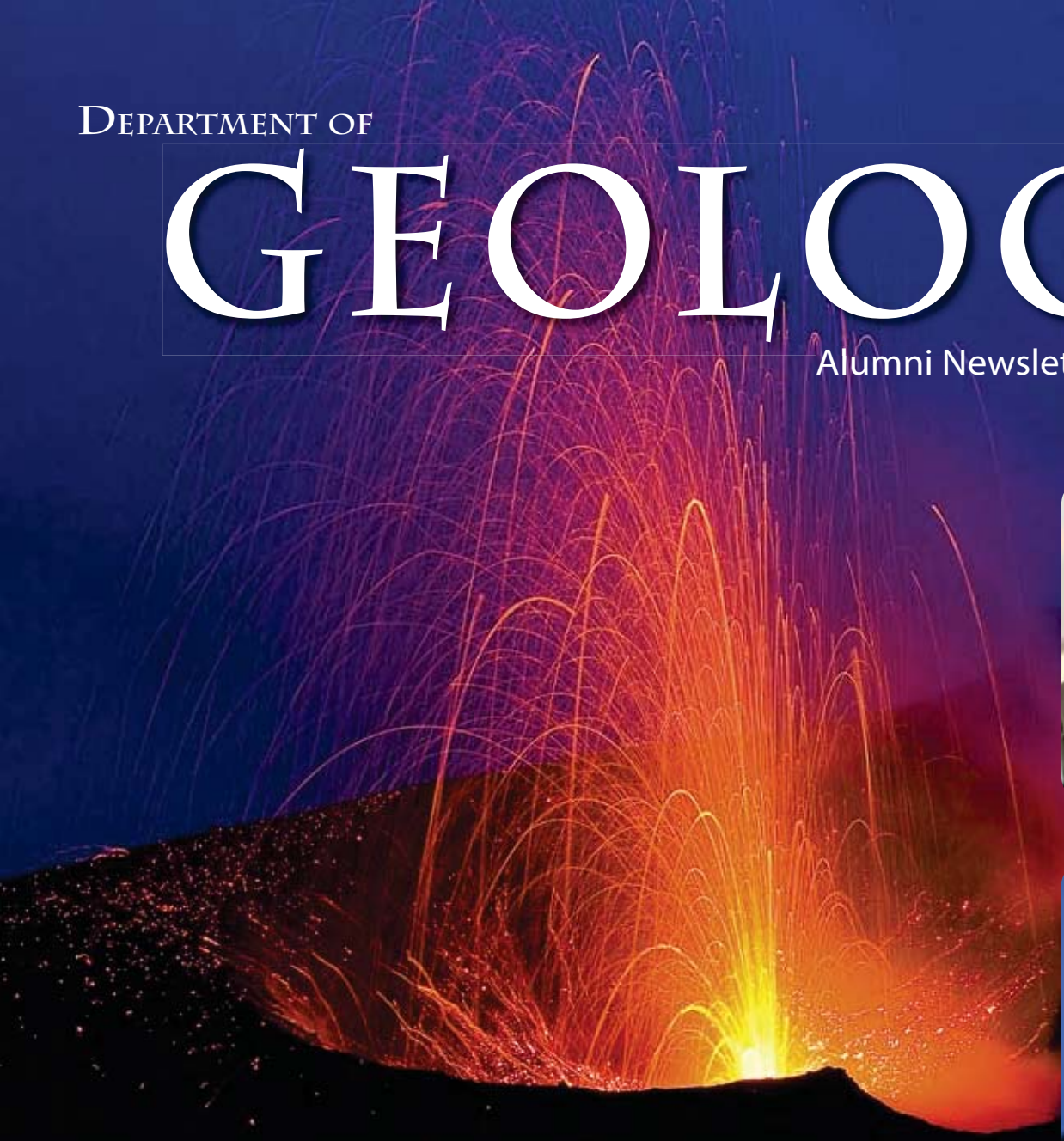
Department of

GEOLOGY

Alumni Newsletter | Fall 2014



Dr. Steve Forman

Dr. Scott James

Liliana Marin

New Faculty EXPLODING on the Scene

BAYLOR UNIVERSITY

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DEPARTMENT OF GEOLOGY

August 2014

Dear Alumni and Friends of Baylor Geology:

This is my inaugural letter as the new Department Chair. Dr. Steve Driese's service over the previous 9 years was exemplary, and will be a difficult act to follow. I learned a great deal from Steve's example during the times I served alongside him as both Graduate Program Director and Associate Chair. Steve worked tirelessly and with great patience and compassion for students, staff and faculty alike. I will try to do likewise and hope to carry Steve's vision for departmental excellence into the future.

Through the persistent efforts Dr. Joe Yelderman, The Department completed a successful faculty search during the spring of 2014 that resulted in hiring Dr. Scott James as an Assistant Professor hydrogeological modeler. Dr. James received his B.S and M.S. degrees from the University of California, San Diego and his Ph.D. from the University of California, Irvine. Dr. James has most recently been employed by an environmental engineering consulting firm, and through his career has been involved in a broad range of research projects that include both surface-water and subsurface hydrology, as well as thermal enhanced oil recovery modeling of "heavy-oil" unconventional reservoirs. This latter interest overlaps directly with a new project involving a Devonian heavy oil reservoir in eastern Alberta that I will be kicking-off with Ph.D. students Caitlin Leslie and Hunter Harlow during the fall 2014 semester. Dr. James hopes to collaborate with us on this project. In addition to Dr. James, we welcomed the arrival of Dr. Steve Forman and his wife Liliana Marin early this past summer. You may recall from last year's newsletter that Dr. Forman specializes in geomorphology and geochronology, and is moving his highly successful OSL (optically-stimulated luminescence) laboratory from the University of Illinois at Chicago to Baylor. Both Drs. James and Forman are highly accomplished, and our students will benefit greatly as they participate in their classroom and research offerings.

We are saying farewell to two faculty members. Dr. Don Parker will be joining the faculty at Wayland Baptist University in Lubbock, Texas. Following a brief retirement, Don has recently served as a Temporary Lecturer where he taught our introductory courses in Mineralogy and Petrology, and along with Dr. Steve Dworkin, our undergraduate summer field course. In addition to Don, Dr. Boris Lau departed Baylor and joined the faculty at the University of Massachusetts in Amherst.

Our undergraduate program has an enrollment of approximately 60 students, and the majority of these are majoring in Geology (46), with smaller numbers in both Geophysics (9) and Earth Science (5). Our graduate program continues to grow, and now has a total enrollment of 38 students (21 Ph.D. and 17 M.S.). We graduated 4 Ph.D. and 3 M.S. students following the Spring 2014 semester, and with our current enrollment, anticipate a sustained graduation rate of approximately 5 Ph.D. and 8 M.S. students in the upcoming years.

We welcome for Fall 2014 what is one of our largest incoming classes of graduate students to date (4 Ph.D. and 9 M.S. students). Our graduate program has been generously supported by the Baylor Graduate School. In addition, our M.S. student enrollment has been significantly expanded through financial support provided by Anadarko Petroleum Company, Ken and Celia Carlile, Husky Energy, Nadel-Gussman, Pioneer Natural Resources, and Dr. Martin Shields (Angel Resources). We owe a great deal of gratitude to the generosity of these organizations and/or individuals.

To conclude, we plan to alter the schedule for our Homecoming reception this year. Rather than Friday evening, October 31, we will host our alumni reception at 10am on Saturday, November 1 in the BSB E-wing atrium and clock tower area, i.e., same place as usual over the past 10 years. This rescheduling will hopefully avoid a conflict with those participating in Halloween festivities. Thanks for your loyalty, and we hope to see you at Homecoming.

Sincerely,
Stacy Atchley
Chairman

"Each volcano is an independent machine—nay, each vent and monticule is for the time being engaged in its own peculiar business, cooking as it were its special dish, which in due time is to be separately served. We have instances of vents within hailing distance of each other pouring out totally different kinds of lava, neither sympathizing with the other in any discernible manner nor influencing other in any appreciable degree."

-Clarence Edward Dutton, *Report on the Geology of the High Plateaus of Utah*

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Points of Interest

FROM THE PROFESSORS

Dr. Peter Allen

Last summer, I attended an International SWAT conference at the University of Toulouse, in Toulouse, France. We had a model developers meeting before the regular meeting and covered new aspects of the model and visited with many of our international collaborators. Maggie joined me for a week and after the conference and we traveled to southern France.

The fall went well teaching Physical Geology, then we went to Cabo, Mexico at Thanksgiving for a celebration with the family for Peggy's birthday. We had fun on the beach and everything was wonderful until the attack of the dolphins. I was swimming with the dolphins with Peggy and the grandchildren … you know, holding the fins, etc. The last act was to let the dolphins (2) come up behind you and lift you out of the water like at Sea World. Well, everyone performed well and my wife and the grandchildren all looked like seasoned professionals. It was my turn and the left leg achieved liftoff but the right leg had a flat tire so to speak and I hyper-extended the knee as the dolphins applied thrust. This little event in turn wiped me out of the last trip to Maui with the USDA ARS research crew (John Dunbar, Tian Xu, Joseph White, and June Wolfe) who made it over to finalize our work on the recharge estimates on the 37,000 acre HC&S plantation. I corresponded to the group as I sat on the couch, icing the extremity over the Christmas season. We finished the Maui work and are writing up papers and reports on the conclusion of our work which involved the use of resistivity, shallow aquifer testing, radon assessment of shallow flow systems, as well as use of new SONEK-IQ water level and flow sensors in the canals. The results are to be used in real time modeling on a daily time step of water use and sugar cane growth by each of the 183 farms on the plantation by the USDA, ARS project headed by Dr. Jeff Arnold. In summary, the plantation is in a long term process of evaluating where the water is being used on the plantation, the efficiency of operations, and the recharge to the island aquifer. This is in a period of increasing island population and decreasing rainfall (15% less in the last 20 years), and statewide debate how the water should be used. The forces come from the need to maintain biologic communities in island streams, many of which have been diverted over time to supply the sugar cane industry, as well as growing population on the island.

Jeff Arnold, Mike White (USDA/ARS) and I went to Fort Collins to Colorado State to visit Dr. Mazdak Arabi and Dr. Brian Bledsoe (Dept. of Civil Engineering) on the future use of the SWAT-DEG model to assess channel degradation. The model was put on the ERAMS web site of Colorado State for ease of use. I was on the thesis committee of Jeff Ditty who is finalizing his MS thesis on the incorporation of this model on the web.

In the Spring I taught the usual Hydrology and Physical geology courses. We had a great time. I took the class up to Fort Worth to a highly eroding stream in the spring and had them analyze the channel in terms of bed load and cross sections and level of entrenchment. I went with Drs. Jeff Arnold and Mike White of the USDA ARS, and Dr. Jaehak Jeong Texas A&M to Vicksburg to meet with the US Army Corps of Engineers to assess their using the SWAT model for US watershed erosion and sedimentations studies. The USACE wanted to combine the highly used hydraulic model HEC-RAS with the SWAT watershed model. We had a great tour of the Vicksburg lab with the large scale models of dams and rivers as well as a tour of the battlegrounds.

Dr. Dave Bosch (USDA ARS, Georgia) and Dr. Martin Volk (Helmholtz Institute, Germany) touring Toulousse, France at SWAT Model International Conference

Later on in the spring, John Dunbar, Tian Xu his graduate student and I, towed our sediment-coring boat to Tifton, Georgia for a research project assessing recharge at the Tifton USDA, ARS watershed. This is one of the most highly monitored watersheds in the United States and is an area where new versions of the SWAT watershed model are tested. Dr. Dave Bosch met us there along with Dr. Martin Volk from Germany and we discussed how the model would be formulated. While they discussed detailed programming issues, John, Tian and I worked in the field doing resistivity transects across the channel and into the uplands to look at recharge pathways. Tian is working this data up for a publication this summer.

In the lab, Andrew Watson, a senior major and I are testing a new version of the submerged jet on samples to assess erosion rates of cohesive sediment. The new jet extrudes the samples up into the jet much as in a regular flume. This version tries to minimize the erosion hole created by the original jet. Andrew is working on this as part of his senior thesis.

We have also been busy on the research front: Dr. Balaji Narasimhan, Jeff Arnold, Stephanie Coffman (former MS graduate) and I submitted a paper on channel erosion modeling; Drs. Katrin Bieger, Jeff Arnold, Hendrik Rathjens and I submitted a paper on bank full channel dimensions for streams in the US.; Ram Neupane, Joseph White and I submitted a paper on our work with radon and recharge for our work last year in Glacier National Park. Joseph and I bought the radon meter which seemed to work very well under these conditions. Joe Yelderman is using the radon detector for work with his PhD. students. Joseph Sang reports he is waiting on an editor's decision on one paper and revising a second and working on a third while teaching at Jomo Kenyatta University in Kenya.

Finally, on the home front Maggie is in Ann Arbor, working as a pediatric nurse practitioner, waiting for her husband to finish up at the business school in December. Annabel, completed her MBA at the University of Denver and has taken a job with the Advisory Board in Chicago, Peggy and I are working on a new house in Waco and are both tired of moving… hoping this is the last time for a while. Best to all and hope to hear from you whenever.

One of the 1/80 scale models of the USACE at Vicksburg, Mississippi. Many such models are being replaced with computer models at the lab. It takes about a year to construct a model. This one assesses the effects of changing the outflow of the dam to protect downstream habitat.

Ram Neupane (Baylor University) taking a radon sample from Glacier National Park.

Dr. Joseph White (Baylor Biology) attempting to sample a floodplain pond for radon at Glacier National Park

FROM THE PROFESSORS

Dr. Stacy Atchley

I find it strange writing to you as the new Chair of the Department of Geology. A year ago I had no plans to serve in such a capacity. As circumstances change, so do plans I suppose. So here I sit, in the Chair's office, pondering the events of the past year that may be of interest to our alumni and friends. Clearly the most significant thing that happened to me this past year was my appointment as Chair. I've tried hard to come up to speed on all that the job entails. Thankfully, the former Chair Steve Driese has been a willing and reliable source of guidance. Perhaps even more thankfully, Paulette Penney (the real leader of the department) has her office just outside mine. Paulette is thee engine behind the department and we are fortunate to have her. I told her last week that she needs to bubble-wrap herself… Without her the good ship Geology would take on water fast. How fortunate we are to draw from Paulette's many years of experience, and tireless positive energy!

On the research front I continue to live a split life between the Applied Petroleum Studies program and the Terrestrial Paleoclimatology research group. M.S. student Kim Kuijper successfully defended her thesis that involved an EOR (enhanced oil recovery) study of a Mississippian reservoir in central Alberta. Kim departed Waco for Houston during the summer of 2014 and is now a new-hire geologist with Noble Energy. My other two 2nd-year M.S. students are Brian Crass and Kieron Prince. Brian and Kieron are working for Nadel Gussman, Permian, on an exploration-scale study of the Cline Shale (Pennsylvanian) in the Midland Basin. They will each turn aspects of this study into their respective thesis projects. Ph.D. student Adam Davis is making progress on his dissertation project on the Cretaceous-Paleocene transition in the San Juan Basin, New Mexico. Adam also worked as a summer intern for Anadarko Petroleum during summer 2014. My remaining two Ph.D. students, Caitlin Leslie and Hunter Harlow, worked during the first half of summer 2014 on their respective projects in the Cretaceous-Paleocene succession of Big Bend National Park, and the Late Triassic in north-central Arizona. During the second half of the summer, both Caitlin and Hunter worked with me on a heavy oil project sponsored by GLJ Petroleum Consultants that involved the Devonian Grosmont Formation of eastern Alberta.

On the classroom front, I still regularly teach Historical Geology ("The Earth Through Time"), undergraduate Sedimentology/Stratigraphy, and my battery of graduate courses, i.e., Petroleum Geology, Depositional Systems, and the flagship Graduate Field Sequence Stratigraphy. In fact, I taught my "10th Anniversary" section of Graduate Field Sequence Stratigraphy in May of this year to the largest class to date (13 total students). We visited many of the same locations that my former students will remember. (See pictures below and right.)

Dr. Stacy Atchley (cont.)

On the home front my little girls are growing up. Dallas (21 in July 2014) is a senior at Texas A&M studying Anthropology, and Audra (16) is a junior at Vanguard College Prep. Dallas is beginning to consider the next chapter of her life… Teaching? Graduate studies in the geosciences? Graduate studies in Anthropology? Audra continues to enjoy athletics in high school and during this past year was a starter on both the volleyball and basketball teams, and was a member of the repeat state championship golf team. Janelle still works as the accountant within the Department of Geology and has her office next to mine and Paulette's (Paulette is our chaperone!).

We miss all of our former students and hope that you will stop by for a visit sometime.

FROM THE PROFESSORS

Dr. Rena Bonem

This has been an extremely busy year. Undergraduate enrollments continue to climb. We had about 60 students last year, but if the University Advisement system is correct, we currently have 92 majors that have indicated they will be on campus in the fall. Our sophomore classes are still about 20-25 so we will see how many of these students end up in Geology, Geophysics, and Earth Science. Rocks and Rock-Forming Minerals set a record for the post 80's at 32 last Fall Semester.

Dr. Patricia Kelley, Paleontological Society Distinguished Lecturer visited in the Fall Semester and gave presentations to the Paleo class and to a packed room for 5050. She also went on a field trip with the Paleo class that weekend and sent Baylor some North Carolina fossils for our collections. In December the long awaited stratigraphic monograph on the Dinosaur Valley State Park area came out. I was pleased to be one of the coauthors.

In the Spring Semester, undergraduates Kristina Raley and Nancy Ha started work on the new sauropod trackway near Gatesville. Dr. James Farlow came out in April to look at the trackway and assist in the documentation. I have asked Robert Scott to visit this Fall to give a 5050 talk and work with us on the stratigraphic position of the new trackway. Another undergraduate, Kolin Beam has been working with Ryan Morgan on the fauna associated with *Gyrolithes* trace fossils in the Austin Chalk. Ryan has expanded his dissertation interests in Permian Blastoids in Timor to crinoids in the Austin Chalk and associated trace fossils. He is ABD and has accepted a position at Tarleton State beginning in the fall.

Dr. Rena Bonem (cont.)

Undergraduate Brian Diehl went out to Cameron this spring to explore a thesis on the Midway Wills Point crab-bearing units. This unit appears to have original shell material preserved in the mollusks as well as the crabs. Also, Daniel Gaskell is working on an honors thesis in microfossils at Scripps under me.

This July, I was contacted by AAAS's lead science writer for their website asking me to be featured in their member spotlight that will appear later in the year. We will see how it turns out!

On a person note, I am taking a break from dog agility because I had total knee replacement of my right knee on May 19. I plan to teach both World Oceans and Historical this July and August, so we will see how well I hold up! Added to the challenges of life, a late June storm took out the top of my sycamore trees, electric meter, siding, and guttering from the back of my garage. I am not sure that outpatient rehab will be necessary! I hope that you all will stop by the department if you are in Waco or that you can visit the department booth at GSA in Vancouver in October.

Above: Kristina Raley and Nancy Ha at a sauropod trackway near Gatesville

Left: Patricia Kelley and the paleo class on their field trip at Edwards Reefs, Lake Whitney

FROM THE PROFESSORS

Sharon Browning

I can't believe another school year is gone! I am now completing my 7th year at Baylor, and continuing to watch my daughter grow faster than I think she should be allowed. She will be a senior in high school this fall, and is making plans for college and beyond. Isn't there a rewind button when our children grow too fast?

I continue to focus on our freshman labs and community outreach. We have now completed 4 semesters of The Math You Need, an online tutoring program in our disasters course. This program gives students the opportunity to review basic math skills prior to using them in lab, and facilitates efficient use of class time and TA instruction. Student feedback has been positive, with consistent increases in quantitative skills. Results were also presented at the national Geological Society of America meeting in Denver last fall.

Our spring star party was attended by close to 30 students, more than half of the GEO 1408 class. The continued goal of this event is to introduce students to the basics of observational astronomy and citizen science. Students had the opportunity to view Mars, Jupiter, the Orion Nebula, the Pleiades, and the waxing crescent moon through our departmental telescope, and determine the limiting magnitude of our viewing site at Woodway Park. Limiting magnitude is determined by comparing star charts of a designated constellation (Cygnus the Swan in this case), and identifying which star chart most closely resembles their observations. Those observations are collected globally as part of the Windows to the Universe Project sponsored by the National Earth Science Teachers Association in order to study light pollution, with a goal of increasing participation each year.

Our outreach continues as well. We have had the opportunity to work with a variety of students this past year, including hosting approximately 30 students from the Ann Richards School for Young Women Leaders last summer. These young women were given the opportunity to tour our department and learn about careers in the geological sciences. We have also been able to host a group of 7th graders from Live Oak Academy, a local private Christian school, and visit Mountain View Elementary students for a 2nd year with our seismology activities, which have been very well-received. We are in our 4th year of visiting Rappaport Academy during their career day, and welcome the continuing opportunity to talk to middle school students about their expressed interests in earth science.

Observations from the Great World Wide Star Count. Baylor's observation is one of a few made from Texas (from http://www.windows2universe.org/citizen_science/starcount/results.html).

Undergraduate Student Kristina Raley assists Live Oak students in demonstrating floor and column construction.

Students watch the propagation of a model tsunami in the tsunami tank

Live Oak Students examine a model of what an earthquake can do to unreinforced masonry.

FROM THE PROFESSORS

Dr. Vince Cronin

My twin vocations are in university-level geoscience education, and in geoscience research. I find it significant that the first clause of Baylor's mission statement is "The mission of Baylor University is to educate...," and the first of the goals expressed in *Pro Futuris* is "transformational education." I served on a couple of NSF review panels in the past year, evaluating proposals related to improvement of STEM education. I received notice that two of my peer-reviewed contributions to *On The Cutting Edge* at SERC have been selected for inclusion in their "exemplary teaching activity" collection: "Where is that chunk of crust going?" and "Finding the Moho Under Milwaukee" (http://serc.carleton.edu/NAGTWorkshops/index.html).

I was invited to present two posters related to geodesy/geoscience education at the 2014 UNAVCO Science Workshop, and demonstrated a suite of physical models that were very well received. (UNAVCO is the NSF facility for GPS geodesy, InSAR, LiDAR, and other emerging geophysical technologies, as well as being a university consortium for geodetic research that Bruce Byars and I made Baylor a member of.) I gave several workshops for UNAVCO in the last 10 months related to the GPS-strain module that we developed for the benefit of undergraduate geoscience students during the summer of 2012. We hope to develop another educational module this year, utilizing the global GPS dataset that Corne Kreemer at the University of Nevada-Reno has developed. At the NSF-funded *Structural Geology & Tectonics Forum* at the Colorado School of Mines in June, I offered the GPS-strain short course and demonstrated a set of physical models, as well as presenting a research poster with Jordan Dickinson. At that meeting, Dave Pollard and Steve Martel asked that I help review successive drafts of their upcoming introductory textbook on structural geology that emphasizes mechanical analysis of structures. Their textbook will likely include our GPS-strain analysis. As Monty Python would say, this textbook will be "something completely different."

My primary research activity that involves students continues to be the further development and application of the Seismo-Lineament Analysis Method (SLAM), which allows us to spatially correlate an earthquake with the ground-surface trace of the fault that generated it. I have developed the SLAM procedure and the open-source *Mathematica* code I have written to define the boundaries of seismo-lineaments at my own expense, using my personal computers and applications software, on my own time. During the Christmas break, my daughter Kelly and I had good nerdy fun by solving the optimization problem that allows me to use triaxial uncertainty ellipsoids in the now-revised SLAM code. We presented this enhancement of SLAM at the Seismological Society of America meeting in Anchorage this past May (http://www.seismosoc.org/meetings/2014/).

In mid-spring of this past year, Jim McCalpin (a very prominent paleoseismologist) invited me to give an overview of SLAM during the *5th International INQUA Meeting on Paleoseismology, Active Tectonics and Archaeoseismology* meeting 21-27 September 2014 in Busan, South Korea, at which he will be giving a keynote address. I was also contacted this past spring by the seismotectonics group at the U.S. Bureau of Reclamation, who expressed interest in SLAM as a way to recognize earthquake hazards that might compromise the safety of the hundreds of dams they operate throughout the western United States. They invited me to come speak to them at their office in Denver, and during that meeting we found many common interests. We plan to work together, starting in the north Tahoe area where Ryan Lindsay, Tyler Reed, and Jeremy Ashburn have been working and expanding to other dam sites where the state of fault mapping is currently incomplete. I am also planning to give USBR a

"quick-look" capability that will allow them to determine mean crustal strain between three GPS sites surrounding any of their reservoirs in the western US, using velocity data from the EarthScope Plate Boundary Observatory (PBO) network.

Of particular interest to the USBR scientists was a BS thesis project by Jeremy Ashburn that I am supervising, in which we are going to try to locate the ground-surface trace of the Dog Valley Fault that produced the M6 Truckee earthquake of 1966 and another M6 event two decades earlier. The current mapped trace of the fault is entirely based on geomorphology, but trench studies based on that supposed "trace" did not reveal any faulting. We think that SLAM has helped us to develop another hypothesis for the location of that fault, which passes through Prosser Creek Reservoir and under the dam structure at Stampede Reservoir. Failure of either reservoir would be catastrophic, causing flood waters to race down the Truckee River and into downtown Reno and Carson City.

I am also working on using SLAM to locate faults in the Alaska Range north of Anchorage, in association with Corey Burkett and Sean Bemis at the University of Kentucky. The Oklahoma Geological Survey is interested in using SLAM to find previously unrecognized faults that might have been triggered by oil field operations. And Charles Langston at CERI in Memphis is interested in applying SLAM in tracking down a seismogenic fault in Tennessee.

My interest in professional ethics as applied to geology began while I was working for Dr. Jim Slosson (a former State Geologist of California) in the late 1970s. In the late 1990s, I was an appointed member of GSA's committee on ethics, having been invited to participate in a GSA Presidential Workshop on professional ethics. After Jim passed away in 2007, I inherited the bulk of his office library, which I brought to Waco in ~180 banker boxes last summer. More recently, I was appointed curator of materials related to professional ethics in *The Geoscience Library of Applied Technology* (http://www.geoscilibrary.org) -- a project of the *Association of Environmental and Engineering Geologists Foundation.*

This past spring, I was invited to participate in a workshop called "Teaching GeoEthics across the geosciences curriculum," funded by the NSF Ethics Education in Science and Engineering program. One result of that workshop is that I will be leading a group of other geoscientists from the US and Canada in the development of a modular course on geoscience ethics, possibly with support from the NSF-funded InTeGrate program (http://serc.carleton.edu/integrate/). Another is that Cindy Palinkas of the University of Maryland Center for Environmental Science and I were chosen to be the founding Chairpersons of the Canadian/US section of the *International Association for Promoting Geoethics* (IAPG, http://www.iapg.geoethics.org). The IAPG is an organization affiliated with the *International Union of Geological Sciences*, and a new associated society of the GSA. We plan to sponsor GeoEthics symposia at the annual meetings of the GSA and AEG in the coming years, and to solicit case studies in geoscience ethics that can serve to promote discussion.

I have been working with undergraduates on research projects since the beginning of my career in teaching. In addition to my work with Jeremy Ashburn that was described above, Nicky Arellano has been helping me improve and describe physical models that are useful in teaching basic concepts in structural geology. The model descriptions will be published as part of the "On The Cutting Edge" structural geology collection by the Science Education Resource Center (SERC) at Carleton College. Luke Pajer and I have been working on understanding basic landslide processes. As with Nicky, Luke and I are building physical models of different types of landslides (translational, rotational, complex) for classroom use, and those descriptions will also be contributed to SERC. Jordan Dickinson presented a poster at the *Structural Geology and Tectonics Forum* at the Colorado School of Mines in June, and will be conducting field work in the Raton Basin west of Trinidad, Colorado, this July. Jordan applied for and was awarded a field

Dr. Vince Cronin (cont.)

research grant by the Colorado Scientific Society. She and her field assistant, Rebecca Davis, will be using SLAM to look for the fault(s) responsible for three moderate (M4.9, 5.0 and 5.3) earthquakes recorded just west of Trinidad within the past decade. No faults appear on published geologic maps of the area. All of these projects will likely result in poster presentations at the GSA meeting in Toronto, where these students will be looking for good graduate school opportunities.

Tyler Reed defended his MS thesis research in December, 2013 (http://hdl.handle.net/2104/9097), and is now working for Samson Resources in Oklahoma. His was the first implementation of SLAM that incorporated uncertainties in the orientation of nodal planes. Tyler's work extended the prior thesis research of Ryan Lindsay (http://hdl.handle.net/2104/8441), focusing on the Polaris and Dog Valley fault zones as well as the Prosser Creek and Martis Creek trends. I will be welcoming new graduate students Victorial Worrell (Middle Tennessee State University) and Brandon Rasaka (BYU Idaho) to pursue MS research projects involving structural geology. Both will be working as research associates, with funding by energy companies.

Cindy and I celebrated our 26th wedding anniversary in 2014. Our daughter Kelly sang the principal role of Ottavia in Monteverdi's opera *The Coronation of Poppea* at the University of Notre Dame in April. This summer, she is working at Maryhouse on the east side of Manhattan. Maryhouse was founded in the 1970s by Dorothy Day, and is a shelter for women and children who have nowhere else to go. Kelly will graduate from Notre Dame with dual degrees in Economics and Music/Vocal Performance next June. Connor completed his Eagle Scout rank this spring. He also made his first foray into ice climbing, at the ice park in Ouray, Colorado. When a hip flexor injury kept Connor from being the soccer goalie for his high school team for the fourth year in a row, he switched sports to basketball (a sport that does not require "big kicks.") He became the first Reicher Catholic High School player in at least 15 years (if ever) to dunk a basketball in a game -- a feat that he performed at every opportunity. Connor is also the first Reicher student to wear kilts to his senior prom. He's now just shy of 6 feet 4 inches tall, and has a 6'9" armspan. That helped him to win the "dyno" competition at an intercollegiate meet held at the Baylor Climbing Tower this spring. (A "dyno" is a dynamic move in which you have to jump to a new position on the climbing wall without falling.) Apparently, nobody was concerned that he wasn't actually a full-time college student at the time. He now regularly climbs 5.12 routes on the Baylor wall, and has increasingly started moving to climbing on real rock. In the fall of 2014, Connor will be pursuing an engineering degree at the University of Portland in Oregon. As I write this in late June, we are looking forward to a family trip to Scotland in August.

FROM THE PROFESSORS

Dr. Steve Driese

It has been another very busy year for me with teaching, research, and professional service, but with far less administration now that I am no longer Department Chair. In the fall semester of 2013 I taught the graduate GEO 5342 "Soil and Paleosol Micromorphology" course and the graduate GEO 5V90 "Seminar on Grant Proposal-Writing". In the spring semester of 2014 I taught GEO 5339 "Sandstone Petrology" and the GEO 43C1 "Senior Capstone Colloquium". I am excited about developing a new graduate course on "Speleothem Paleoclimatology" that I plan to introduce in the spring semester of 2015, which will diversify our curriculum in Terrestrial Paleoclimatology. I traveled to Albuquerque, NM, in June of 2013 as an invited participant for an NSF-sponsored "On the Cutting Edge" teaching workshop on teaching soils, hydrology, low-temperature geochemistry and geomicrobiology in the 21st century, which was a rewarding experience.

Dr. Steve Driese (cont.)

This was the year of completed Ph.D. dissertations. Ph.D. student Lauren Michel (co-advised by Dan Peppe) completed her work on paleosols in Miocene strata in Kenya containing the oldest stem primates, published her second dissertation paper in *Nature Communications*, and graduated in the spring semester of 2014. Joining her in the spring 2014 graduation group was Ph.D. student Deb Jennings, who completed her Ph.D. involving Upper Jurassic Morrison Formation paleosols in Utah and Colorado and modern barite-bearing modern analog soils in Texas, with a second paper published in *Sedimentary Geology* and a third paper accepted in *Sedimentology.* Holly Meier, a student mentored by Lee Nordt (with whom I have worked closely), also defended her Ph.D. in the spring of 2014 on the geomorphic history of the last 130,000 years recorded by fluvial strata and paleosols at a site on the Ft. Hood Military Base, with publications in *Quaternary International and Catena.* Former Ph.D. student Dr. Gary Stinchcomb completed a one-year post-doc position at Penn State University and has now accepted a tenure-track Assistant Professor position at Murray State University in Kentucky, starting in August of 2014. Current Ph.D. student Emily Beverly (co-advised with Dan Peppe) spent the summer of 2013 engaged in research involving late Pleistocene paleosols and associated freshwater carbonates in Karungu, Kenya; she published her M.S. Thesis (completed at Rutgers) in Quaternary International. Current Ph.D. student Lyndsay DiPietro spent her summer in 2013 working in central Alaska on latest Pleistocene-Holocene deposits that include important archaeological and paleoclimate sites, and was a co-author of a paper on the Serpentine-Hot Springs site in *Journal of Archaeological Sciences.* B.S. thesis student Alex Boggess completed his Senior Thesis on the micromorphology and stable isotope geochemistry of a Quaternary flowstone from Crystal Cave in Pennsylvania. I recruited two new Ph.D. students who are starting dissertation projects during the summer of 2014. Continuing in the tradition of Temple University students, Bill Lukens is working on late Miocene Ogallala Fm. fluvio-lacustrine deposits in the Canadian River region of the Texas Panhandle. Yohan Letourmy joined our program from the Université Paul Sabatier, in Toulouse, France, and will be working at the UNESCO World Heritage site at Joggins, Nova Scotia with Dalhousie University colleague Professor Martin Gibling; this site is famous for very large Pennsylvanian fossil trees that were buried in growth position by fluvial sandstone deposits.

During the summer of 2013, I conducted several weeks of field work in western Kenya with my colleague Dan Peppe and Ph.D. student Emily Beverly, and we discovered both Pleistocene freshwater stromatolites as well as Miocene paleosols that include an Oxisol formed after a Vertisol. 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. I have also developed an interest in using speleothems (cave deposits) as high-resolution archives of late Pleistocene to Holocene climate (see photo). In 2013 I published 13 refereed journal articles (2 first-authored) and have 6 peer-reviewed journal articles published, accepted or in press for 2014. In 2013 I gave 6 first-authored professional presentations and was co-author on an additional 9 presentations. In April of 2014 I was elected for Honorary Membership in SEPM (The Society for Sedimentary Geology) and will receive that award at the AAPG/SEPM Annual Meeting in Denver in June of 2015.

During the summer of 2013 my wife Marylaine and all of the family had a terrific vacation in a beach house in Rodanthe in the Outer Banks of North Carolina, where we used to go for vacation when we lived in Knoxville. On the Waco home front, Marylaine and I made a major change and sold our house in the "boonies" in January of 2014 and moved to a smaller downtown condominium – we are easy to locate above Jimmie Johns sandwich shop. We are really enjoying being close to everything, and I especially enjoy being able to bicycle to work. Marylaine continues her part-time job as archivist for McLennan Community College, now with a much shorter commute. Mary Catherine had an excellent year as

Dr. Steve Driese (cont.)

a graduating senior at UT-Austin, majoring in Latin American studies, and is now headed (in August of 2014) to graduate school at Arizona State University to study medical anthropology. Our oldest son, Nathan, is now in Waco seeking a tenure-track academic appointment in early modern Philosophy, and he is returning to Knoxville at the end of the summer to resume teaching there. Our other son, Trevor, still lives in Knoxville and works for a mortgage company, but has sold his house and is moving to St. Louis this summer or early fall with his wife, Lindsay, where they will be closer to her family. Marylaine and I continue make frequent trips back to the southeast (Tennessee and Georgia) to visit family and friends. Marylaine is vacationing this summer with the Baylor in Great Britain program and in addition to staying in London, will travel to Cornwall and Barcelona, Spain. During the summer of 2014, I am squeezing in a trip to Nova Scotia for research with Yohan to start his project, a trip to central Alaska with Lyndsay to examine some of her field areas, a trip to the Texas Panhandle with Bill to visit his research sites, and a trip to the International Goldschmidt Conference in Sacramento, CA to present a poster on speleothem research.

Peer-Reviewed Journal Publications (2013-2014)

Driese, S.G., Nordt, L.C., Waters, M.R., and Keene, J.L., 2013, Analysis of site formation history and potential disturbance of stratigraphic context at the Debra L. Friedkin archaeological site in central Texas, USA: Geoarchaeology, v. 28, p. 221-248.

Driese, S.G., and Nordt, L.C., 2013, New frontiers in paleopedology and terrestrial paleoclimatology: paleosols and soil surface analog systems: In *New Frontiers in Paleopedology and Terrestrial Paleoclimatology* (S.G. Driese and L.C. Nordt, eds.): SEPM Special Publication Volume No. 104, p. 1-3.

Ashley, G.R., Deocampo, D.M., *Kahmann*-Robinson, J.A., and Driese, S.G., 2013, Groundwater-fed wetland sediments and paleosols: It's all about water table: In *New Frontiers in Paleopedology and Terrestrial Paleoclimatology* (S.G. Driese and L.C. Nordt, eds.): SEPM Special Publication Volume No. 104, p. 47-61.

Ashley, G.M., Beverly, E.J., Sikes, N.E., and Driese, S.G., 2014, Paleosol diversity in the Olduvai Basin, Tanzania: effects of geomorphology, parent material, depositional environment, and groundwater: Quaternary International, v. 322-323, p. 66-77.

Beverly, E.J., Ashley, G,.M., and Driese, S.G., 2014, Reconstruction of a Pleistocene paleocatena using micromorphology and geochemistry of lake margin paleo-Vertisols, Olduvai Gorge, Tanzania: Quaternary International, v. 322-323, p. 78-94.

Breecker, D.O., Yoon, J., Michel, L.A., Dinka, T.M., Driese, S.G., Mintz, J.S., Nordt, L.C., Romanak, K.D., and Morgan, C.L.S., 2013, CO2 concentrations in Vertisols: variability and shrink-swell: In *New Frontiers in Paleopedology and Terrestrial Paleoclimatology* (S.G. Driese and L.C. Nordt, eds.): SEPM Special Publication Volume No. 104, p. 35-45.

Goebel, T., Smith, H.L., DiPietro, L.M., Waters, M.R., Hockett, B., Graf, K.E., Gal, R., Slobodin, S.B., Speakman, R.J., Driese, S.G., and Rhode, D., 2013, Serpentine Hot Springs, Alaska: Results of excavations and implications for the age and significance of Northern fluted points: Journal of Archaeological Sciences, v. 40, p. 4222-4233.

Jennings, D.S., and Driese, S.G., 2014, Understanding barite and gypsum precipitation in upland acid-sulfate soils: an example from the Lufkin Series toposequence, south- central Texas, USA: Sedimentary Geology, v. 299, p. 106-118.

Jennings, D.S., Driese, S.G., and Dworkin, S.I., accepted, Comparison of modern and ancient barite-bearing acid-sulfate soils using micromorphology, geochemistry, and field relationships: Sedimentology.

Li, Z.-H., Driese, S.G., and Cheng, H., 2014, A multiple cave deposit assessment of suitability of speleothem isotopes for reconstructing paleo-vegetation and paleo-temperature: A case study in Raccoon Mountain Cave, USA: Sedimentology, v. 61, p. 749-766.

Ludvigson, G.A., González, L.A., Fowle, D.A., Roberts, J.A., Driese, S.G., Villarreal, M.A., Smith, J.J., and Suarez, M.B., 2013, Paleoclimatic implications and modern process studies of pedogenic siderite: In *New Frontiers in Paleopedology and Terrestrial Paleoclimatology* (S.G. Driese and L.C. Nordt, eds.): SEPM Special Publication Volume No. 104, p. 79-87.

Meier, H.A., Nordt, L.C., Forman, S.L., and Driese, S.G., 2013, Late Quaternary alluvial history of the middle Owl Creek drainage basin in central Texas, USA: A record of geomorphic response to environmental change: Quaternary International, v. 306, 24-41.

Meier, H.A., Driese, S.G., Nordt, L.C., Forman, S.L., and Dworkin, S.I., 2013, Interpretation of Late Quaternary climate and landscape variability based upon buried soil macro- and micromorphology, geochemistry, and stable isotopes of soil organic matter, Owl Creek, central Texas, USA: Catena, v. 114, p. 157-168.

Michel, L.A., Driese, S.G., Nordt, L.C., Breecker, D.O., Labotka, D.M., and Dworkin, S.I., 2013, Stable carbon isotope geochemistry of Vertisols formed on marine carbonates and implications for deep-time paleoenvironmental reconstructions: Journal of Sedimentary Research, v. 83, p. 300-308.

Michel, L.A., Peppe, D.J., Lutz, J.A., Driese, S.G., Dunsworth, H.M., Harcourt-Smith, W.E.H., Horner, W.H., Lehmann, T., Nightingale, S., and McNulty, K.P., 2014, Remnants of an ancient forest provide ecological context for Early Miocene fossil apes: Nature Communications: doi: 10.1038/ncomms4236.

Nordt, L.C., and Driese, S.G., 2013, Application of the Critical Zone concept to the deep-time sedimentary record: Sedimentary Record, v. 11, no. 3, p. 4-9: doi: 10.2110/sedred.2013.3.

Nordt, L.C., Hallmark, C.T., Driese, S.G., and Dworkin, S.I., 2013, Multi-analytical pedosystem approach to characterizing and interpreting the fossil record of soils: In *New Frontiers in Paleopedology and Terrestrial Paleoclimatology* (S.G. Driese and L.C. Nordt, eds.): SEPM Special Publication Volume No. 104, p. 89-107.

Stinchcomb, G.E., Messner, T.C., Williamson, F.C., Driese, S.G., and Nordt, L.C., 2013, Climatic and human controls on Holocene floodplain vegetation changes in eastern Pennsylvania based on the isotopic composition of soil organic matter: Quaternary Research, v. 79, p. 377-390.

Stinchcomb, G.E., Messner, T.C., Driese, S.G., Nordt, L.C., and Allen, P.M., 2013, Using event stratigraphy to map the Anthropocene – An example from the historic coal mining region in eastern Pennsylvania, USA: Anthropocene, v. 2, p. 42-50.

Tryon, C.A., Faith, J.T., Peppe, D.J., Keegan, W.F., Keegan, K.N., Jenkins, K.H., Nightingale, S., Patterson, D., Van Plantinga, A., Driese, S.G., Johnson, C.R., and Beverly, E.J., 2014, Sites on the landscape: Paleoenvironmental reconstruction of late Pleistocene archaeological sites from the Lake Victoria Basin, equatorial East Africa: Quaternary International, v. 331, p. 20-30.

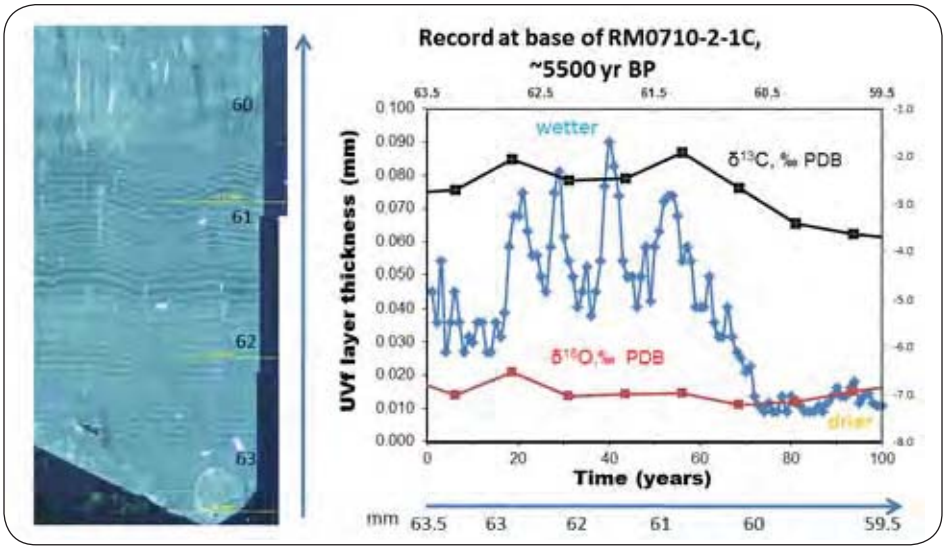


Image of polished thin-section of a speleothem (stalagmite) from Raccoon Mountain Cave, near Chattanooga, TN showing UV fluorescent annual layers of deposition used for high-resolution paleoclimate reconstruction, along with corresponding stable isotope measurements (Driese et al., in review).

FROM THE PROFESSORS

Dr. John Dunbar

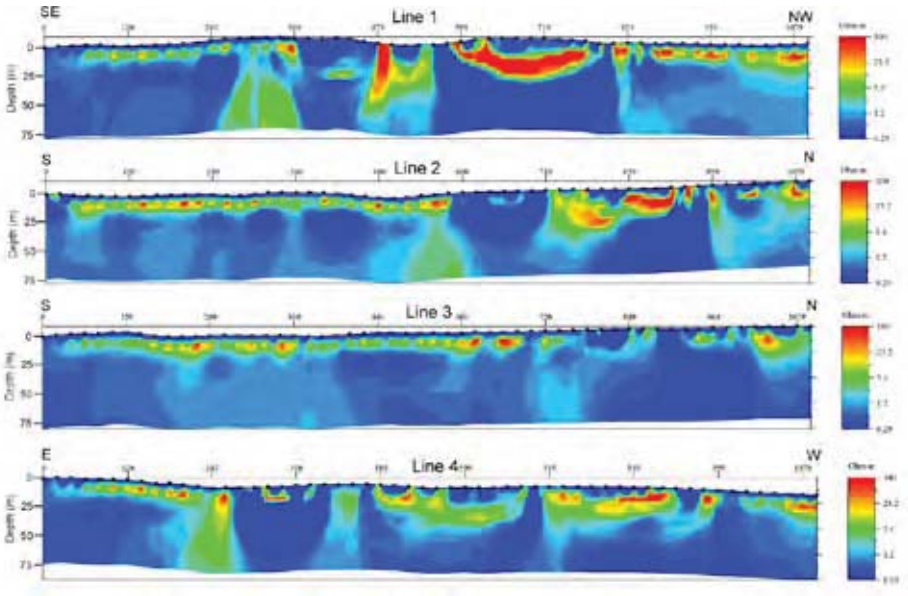
In 2014 John Dunbar and PhD student Tian Xu continued their research on methane hydrate beneath seafloor mounds. In April John and Tian went on a cruise back to Mississippi Canyon Block 118, Gulf of Mexico, which was the site of John's 2009 resistivity survey. The goal of the 2014 cruse was to determine if the hydrate deposits detected as high-resistivity anomalies beneath the mound in 2009 had changed over time. John and Tian collected four new resistivity lines by towing the resistivity instrument and attached a 1.1 km long electrode array along the seafloor at water depths of 1 km. The lines show small high-resistivity anomalies concentrated in shallow fault zones, similar to those see in the 2009 resistivity survey (see figure opposite page). In addition, Line 1 shows a 200 m long 20 m thick high resistivity anomaly beneath a slight bulge in the seafloor that may be a so-called hydrate pingo. If so, it will be the largest such structure found in the Gulf of Mexico to date. John and Tian left the resistivity instrument on the bottom with the electrode array positioned over the mound to monitor change in the hydrate deposits over time. They plan to return to the site in Fall 2014 to recover the instrument and the data it hopefully contains.

Two new MS students also began their studies with John in the 2013-2014 academic year. Adam Collard is using the variation of reflection amplitude with angle (AVA) of high-frequency acoustic signals to estimate the shear modulus of the water bottom for geotechnical applications. Adam's thesis will involve both finite element modeling and field measurements of the AVA water bottom response. Jeffrey Jex is doing a modeling study of the geodynamics of continental lithospheric delamination, which is one of the least well understood of the major tectonic processes of Earth. Both Adam and Jeffrey plan to complete their degrees in spring 2015 and then work in the petroleum industry.

The Dunbars had a mostly wonderful year. The exception was saying good-bye to their 12 year old lab, Jessie. She had been having health struggles and it reached a critical point. It was a sad time for the family but for the best. Her ashes were spread at her favorite place, Inks Lake State Park. We will think of her every time we visit our favorite park. Daughter Tamura has just completed her junior year at Trinity University and discovered that she loves geology (?). She attended a Trinity environmental/biology/geology field camp in Colorado in the summer of 2014 and will take Historical Geology in the fall, completing her degree in Biology in the Spring. Then, it's off to graduate school! Anna is continuing as the Recycling and Public Outreach Administrator for Solid Waste in Waco. She loves her job and they had a record-breaking year in recycling in 2013. She also is a docent at the Waco Mammoth site and serves as a tour guide on Saturdays about once or twice a month. It is a great site and questions from kids keep you on your toes!

John Dunbar (left) and PhD student Tian Xu (right) posing in front of their seafloor resistivity instrument on their April 2014 cruise to Mississippi Canyon, Block 118.

Dr. John Dunbar (cont.)



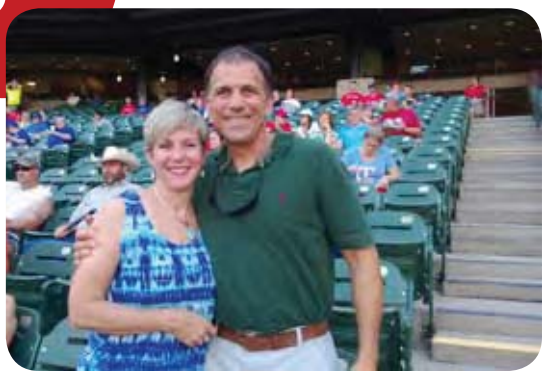
Four 1 km long, seafloor resistivity profiles collected by John Dunbar and Tian Xu during their April, 2014 research cruise to Mississippi Canyon, Block 118. The high-resistivity anomalies (red) are believed to be indicative of massive methane hydrate beneath the seafloor.

FROM THE PROFESSORS

Dr. Steve Dworkin

This year I took on three new graduate students. Tanner Mills and Erin Idleman are both Master's students who are in the Applied Petroleum Studies Program. Tanner is studying the geochemistry of black laminated shales in the Hermosa Formation which outcrop at Honaker trail in Utah and Erin is looking at the geochemistry of organic rich Haynesville mudrocks from Louisiana. My third student is Cong Jin. Cong is pursuing a Ph.D. and he will be investigating the petrology and geochemistry of Chinle mudrocks and sandstones from PEFO. My Master's student, Ken Boling graduated in December and now works for Weatherford as a geochemist.

Above: Steve teaching field camp
Below: Sandy and Steve at Texas Rangers baseball game



I continue to teach classes in isotope geochemistry, aqueous geochemistry, sedimentary petrology and earthquakes and natural disasters. This coming year I will teach mineralogy (and perhaps petrology) to the undergraduates while we search for a new hard rocker to replace Don Parker. Don tells me that although he is moving to Lubbock to continue his teaching career, he will still be close enough that we won't forget him. Don and I split teaching duties for field camp this past summer and we had a great group of students.

I am staying busy managing many of the analytical labs in the department. I have also been occupied with studying the petrography and geochemistry of silicified organic matter (also known as petrified wood). Field work has also kept me busy – I went to the Petrified Forest over spring break and then visited Stacy Atchley's graduate stratigraphy field course out in Utah.

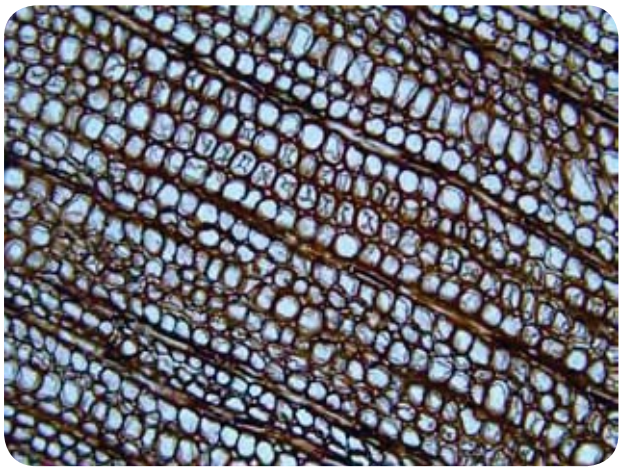
Dr. Steve Dworkin (cont.)

Sandy and I are doing great. We hauled our trailer out to PEFO over spring break, but Sandy said it didn't feel like much of a vacation so we are heading off to Colorado with the dogs this summer to escape the heat. We will be in Pagosa Springs and Durango and we plan to hike, bike, and walk the dogs.

Left: Tanner Mills and Erin Idleman on Stacy's Grad Strat trip (notice Stacy's head for scale)

Below: Silicified wood from PEFO showing remarkable cell wall preservation

Left: Cong Jin at Petrified National Forest



FROM THE PROFESSORS

Dr. Steve Forman

I am a recent hire in the Department starting on April 1 from cold Chicago to warm Texas! I am fortunate to join this department with a bevy of faculty and student collaborations within the Paleoclimate, Hydrology and Geophysics groups. The approach that I pursue is centered on gaining new understanding of the progression and mechanisms of environmental, hydrologic, tectonic and climate change in the past 2 million years of Earth's history. Investigations are often collaborative, bridge multiple disciplines, and combine field interpretations and analytical measurements, with geophysical modeling.

This approach underscores the importance of translating site-specific geomorphic, stratigraphic observations and associated analytical measurements to regional and global contexts on various time scales. I see an endless horizon of exciting and significant science, much, if not all collaborative with students and colleagues from many continents.

I have a long-standing collaboration with Dr. Alfonsina Tripaldi of the University of Buenos Aries in which we are investigating extreme climatic and hydrologic variability

Near Lake Turkana

in the past 20,000 years in western Argentina. We study with students significant archives of climate change like the unheralded eolian depositional record in the western Pampas and impressive flights of fluvial terraces for rivers draining the eastern side of the Andes. This area is currently undergoing epic hydrologic changes with new rivers and lakes forming in the past decade or less and massive, annual headward erosion of streams. Deconvoluting the chronology and geomorphic and hydrologic process associated with these massive landscape-scale changes is the topic for entering Ph.D. student, Natalie Kubik. This research is collaborative with Prof. Peter Allen and Natalie will be among the first to parameterize the SWAT hydrologic model for South America. This research will also provide new insights on how the model can be modified to better understand processes on centennial to millennial timescales.

Also, a persistent research interest is better understanding the record and associated landscape and hydrologic changes with megadroughts that occurred on the Great Plains of North America in the past 2000 years. Understanding the climate-landscape scale mechanisms of these natural droughts is critical to put in context the changes in water resources with human-induced global climate change in the 21st century. To this end, we are starting the Texas Drought Project, with entering Ph.D. student, Kasey Bolles. She will study the landscape-scale response to severe droughts in the 1930s and the 1950s using archived aerial photography in a GIS and hopefully ascertain the balance of natural and human-induced processes in land surface disturbance. In turn, Kasey will study the eolian-fluvial system response to past historic and prehistoric droughts, like the 16th century mega-drought in the Pan Handle area, near Corpus Christi and along the Brazos River. This research will provide new insights on the impacts of multi-decadal scale droughts in Texas; a common forecast with future climate change.

An exciting area of research is unraveling the water level history of Lake Turkana in Kenya from the study of relict beaches that occur up to 100 m above present lake level and are a proxy for monsoon variability in the past 15,000 years. Our research has discovered that lake level oscillated repeatedly by over 60 m between 15 and 5 ka related to varying strength and penetration of the west and east African monsoons, underscoring the challenge of modeling a highly variable climatology. Field research in 2012 discovered very high relict beaches, at 125-160 m above current lake level with a preliminary age of 100-200,000 years and would have been prime water front property for early *Homo Sapiens*. This research dovetails well with on-going projects of Prof. Dan Peppe and Prof. Steve Driese

I began my association with the Geology Department over a decade ago working with Prof. Lee Nordt on deciphering the world-class Waco Mammoth Site. Now we have two new graduate students, Don Esker supervised by Dr. Nordt for a Ph.D. and Filip Petrevski a M.Sc. student I will supervise. This dynamic duo will be involved in placing this site into a better paleontological and regional geologic context and broadly interpret this site with the global record on Mammoth biocoenosis.

A clear advantage of the Geology Department is the excellent facilities for lab-based analyses. To this end, we are establishing a Geoluminescence Dating Research Laboratory on the 4th floor of BSB. This physics-based dating technique has led to a revolution in the geosciences, in which quartz and feldspar grains from eolian, fluvial, colluvial, lacustrine and volcanic deposits are directly dated for the past 1 million years. We can literally date the sediment directly if individual mineral grains have received light exposure prior to deposition and burial and remain undisturbed during the burial period. Ms. Liliana Marin will direct the daily operation of the Laboratory and help students' to gain firm

Dr. Steve Forman (cont.)

analytical footing. The analytical, computational and field-based approaches we have developed is of interest to other geologists with a steady flow of visitors from North and South America, Europe and China, who we enjoy interacting with. Alumnae and current students are welcome anytime.

Recent Publications:

Tripaldi, A. Zárate, M.A., Forman, S.L., Badger, T. and Doyle. M.E., 2013. Drought episode in the western Pampas (Argentina, South America) during the early-mid 20th century: geological evidence, climatic pattern and paleoclimatic inferences. *Holocene* 23, 1729-1744.

Meier, H. A., Driese, S. G., Nordt, L. C., Forman, S.L. and Dworkin, S. I. 2014. Interpretation of Lake Quaternary climate and landscape variability based upon paleosol macro-and micromorphology, and stable isotopes of soil organic matter, Owl Creek, central Texas, *Catena* 114, 157-168.

Hoffecker, J. F., Holliday V. T., Stepanchuk, V. N., Brugère, A., Forman, S.L., Goldberg, P., Tubolzev, O., and Pisarev, I., 2014. Geoarchaeological and bioarchaeological studies at Mira, an early Upper Paleolithic site in the Lower Dnepr Valley, Ukraine. *Geoarchaeology* 29, 61-77.

Schaetzl, R. L., Forman, S.L., Attig, J., 2014. Optical ages on loess derived from outwash surfaces constrain Chippewa Lobe glacial history, Wisconsin, USA. *Quaternary Research* 81(2), 318-329.

Yang, S., Forman, S.L., Song, Y. Pierson, J., and Mazzocco J., Shi, Z. and Fang, X. 2014. Evaluating OSL-SAR protocols for dating quartz grains from the loess in Ili Basin, Central Asia. *Quaternary Geochronology* 20, 78-88.

Wright, D.K., Thompson, J., Mackay, A. Welling, M. Forman, S. L., Price, G. Cohen, A. Greaves, A. and Gomani-Chindebvu, E., 2014. Renewed geoarchaeological investigations of Mwanganda's Village (Elephant Site), Karongo, Malawi. *Geoarchaeology* 29(2), 98-120.

Waitukaitus, S., Lee, V. Pierson, J. Forman, S.L., and Jaeger, H. M., 2014. Size-dependent, same-material tribicharging in insulating grains. *Physical Review Letters*.

Forman, S.L., Tripaldi, A. Ciccioli, P.L. 2014. Sand sheet deposition in the San Luis paleodune field, western Argentina as an indicator of a semi-arid environment through the Holocene. *Paleogeography, Paleoclimatology, Paleoecology.*

Forman, S.L., Wright, D.W and Blozsies, C., 2014. Variations in Lake Turkana water levels in the past 9000 years near Mt. Porr, Kenya and potential linkages to variability in the East African Monsoon. *Quaternary Science Reviews*.

Bloszies, C., Forman, S.L., (in press) Potential controls of equatorial sea surface temperatures on historic water level variability for Lake Turkana, Kenya. *Journal of Hydrology.*

FROM THE PROFESSORS

Dr. Jamey Fulton

My family and I enjoyed our first year at Baylor, getting settled into our home in Hewitt and building new friendships and connecting with family in Texas. We loved our first Texas winter—who would have guessed you can have dinner outside on the patio in February? I did not miss shoveling snow, bundling up to go outside (but still feeling cold), and scraping frost off the windshield every morning. Deirdre had a successful year as Assistant Professor in the Religion Department, where she taught Christian Scriptures and Hebrew language courses, continued research on archaeological sites in Israel and Tunisia, and secured a publishing contract to write a book about settlement in Israel following the Babylonian exile. Jada (5) had a great year in kindergarten and Dane (2) loves Montessori School.

My first year in the Geology Department was a whirlwind; it's hard to believe that year two has already started. I was mostly focused on research and grant writing, and I also had the opportunity to teach GEO 1403: Environmental Geology in the spring. I conducted field work for two weeks in Utah, presented a paper at the Geological Society of America annual meeting in October 2013 and a poster at the Gordon Conference on Organic Geochemistry in August 2014. I also took part in an algal ecology and virus infection workshop in January 2014 at Woods Hole Oceanographic Institution (WHOI). In June/July, I returned to WHOI for five weeks to analyze lipids in samples from Utah using four mass spectrometers that are configured specifically for intact polar lipids and branched alkanes.

Research

Since coming to Baylor, I have been working mostly in Dr. Bill Hockaday's organic geochemistry lab as well as the Baylor Mass Spectrometry Center and Dr. Owen Lind's biology lab. Dr. Lauren Michel, who graduated with her Ph.D. from the Geology Department in May, joined me in the spring conducting postdoctoral research related to detecting organic molecular paleo-aridity indicators (biomarkers) in soils and sediments.

Marine Viruses

Viruses infect all organisms, and in the marine environment algae are susceptible to infections that terminate blooms, causing cells to burst, thus producing pulses of dissolved organic matter (cell contents) to marine ecosystems. I am interested in how this sudden increase in "food" for marine microbes impacts the marine carbon cycle. Virus infection may also affect the flux of sinking organic carbon, through both positive and negative feedback mechanisms that are not yet well understood, impacting the global carbon cycle and climate change. I began research on marine virus infection as a postdoc at WHOI in the Department of Marine Chemistry and Geochemistry and have continued my collaboration with researchers at WHOI, Rutgers University, Weizmann Institute (Israel) and College of Charleston. I had two articles published in 2014 in *Environmental Microbiology* and two others submitted to *Geochimica et Cosmochimica Acta* and *PLOS One.*

Deirdre, Jada, and Dane having dinner on the patio in February and enjoying a mild Texas winter.

Fulton, J. M., Fredricks, H. F., Bidle, K. D., Vardi, A., Kendrick, B. J., DiTullio, G. R., and Van Mooy, B. A. S., 2014a, Novel molecular determinants of viral susceptibility and resistance in the lipidome of *Emiliania huxleyi*: Environmental Microbiology, v. 16, no. 4, p. 1137-1149.

Rose, S. L., Fulton, J. M., Brown, C. M., Natale, F., Van Mooy, B. A. S., and Bidle, K. D., 2014, Isolation and characterization of lipid rafts in *Emiliania huxleyi*: a role for membrane microdomains in host-virus interactions: Environmental Microbiology, v. 16, no. 4, p. 1150-1166.

Fulton, J. M., Fredricks, H. F., Longnecker, K., and Van Mooy, B. A. S., 2014b, Intact polar lipid export from the epipelagic zone of the Sargasso Sea and temperate western North Atlantic: Submitted to Geochimica et Cosmochimica Acta.

Kendrick, B. J., Ditullio, G. R., Cyronak, T. J., Lee, P. A., Fulton, J. M., Van Mooy, B. A. S., and Bidle, K. D., 2014, Temperature-induced viral resistance in *Emiliania huxleyi* (Prymnesiophyceae): submitted to PLOS One.

Paleo-Aridity Research

The UV-screening pigment scytonemin and the probable energy storage molecule 7-methylheptadecane are produced by cyanobacteria under conditions of UV stress and desiccation. Both have sedimentary records, with 7-methylheptadecane a common biomarker through much of geological history, and I have found scytonemin in Pleistocene and Holocene sediments. Through this project I aim to connect the production of these biomarkers in desert soils and microbial mats to their preservation

Dr. Jamey Fulton (cont.)

in lake and ocean sediments. I am conducting lab and field-based desiccation and rehydration experiments to better understand their co-production by soil microbial consortia.

Last fall, in the first year of this three year project, I traveled to Utah with my collaborator Ben Van Mooy from WHOI. We collected shoreline and surface sediment samples from Great Salt Lake and microbial soil crusts from throughout the Great Salt Lake Desert. We also conducted field rehydration experiments to examine the production of pigments and lipids during desiccation. We worked with the Bureau of Land Management, Utah Division of Wildlife Resources and the Great Salt Lake Institute for access to field sites on land and on Great Salt Lake. Advice from the BLM to bring along tire repair supplies was especially helpful, as we managed to get three flat tires while driving on rail access roads. I am presenting preliminary results from this field work at the Gordon Conference on Organic Geochemistry and the GSA annual meeting.

Teaching

I taught Environmental Geology in spring 2014 and am scheduled to teach it again in 2015. I am also teaching Natural Disasters in fall 2014. This has been a great opportunity for me, and I have enjoyed interacting with undergrads and developing instruction methods. I enjoyed working with Dr. Joe Yelderman as a mentor and look forward to continue developing GEO 1403 with him.

Collecting microbial samples from the shoreline of Great Salt Lake.

Below: We collaborated with the Utah Division of Wildlife Resources to collect water and sediment samples using their boat that was specifically designed for use in the hypersaline Great Salt Lake.

Dr. Jamey Fulton (cont.)

Field site in the Newfoundland Range

Above: Sampling microbial growth experiments in the tire repair center parking lot.

Left: Replacing the first flat tire along the railroad tracks.

FROM THE PROFESSORS

Dr. Don Greene

Don Greene has been selected to participate in a pilot project intended to "test the waters" for summer on-line courses in the College of Arts and Sciences. A niche for on-line courses may exist in the summer when 73% of Baylor students are away from campus. During the 2014-2015 academic year a select faculty will develop on-line courses with support from the Online Teaching and Learning Unit of the Electronic Library (OTLS). The pilot program will test the viability of online classes during three consecutive summers, starting in 2015 and continuing through summer 2017. Initially, Don will be offering an online version of GEOG 1300 World Geography with the intention of adding GEO 1408 Earth Science.

Don and Alison Greene recently moved to Sun City in Georgetown, and have found the transition both difficult and joyful. The difficult part was the loss of storage previously provided by an equipment barn, and an 1800 square foot shop. They also down sized their house from 3700 square feet to 2500 square feet (see photos). Essentially the Greene's sold or gave away most of their worldly belongings in their move; resulting in a much simpler lifestyle. The two-story farm house (pictured above) needed renovation, and the new owners

Dr. Don Greene (cont.)

accomplished this makeover on Home and Garden Television (HGTV). Already in reruns, the Greene's country home was recently featured in an hour-long episode in a new series entitled "Fixer Upper", broadcast locally on Thursday nights. http://www.hgtv.com/fixer-upper/show/index.html The series concept documents the process of home improvement before, during, and after renovation. The home buyer is not allowed to see the completed home until the reveal at the end of the show. In episode 10, the Greene home is purchased by Rebecca and Joel Mahan; a pair of very busy Family Physicians with three young children.

New house overlooking the fairway

As Don Greene noted, living on acreage required a labor of love and a considerable investment of time. Accordingly, he found considerable satisfaction in not only improving the land, but also seeing an end to 23 years of manual labor. As part of the move, Don also down sized his equipment, trading in his John Deere for a golf cart (see photos). In many ways living in an "active adult community" is the very opposite of the privacy of farm life. Alison enjoys not only the variety of recreational activities in Sun City, but also a treasure trove of new found friends.

Above: Working on the tractor

Left: Playtime with the grandkids

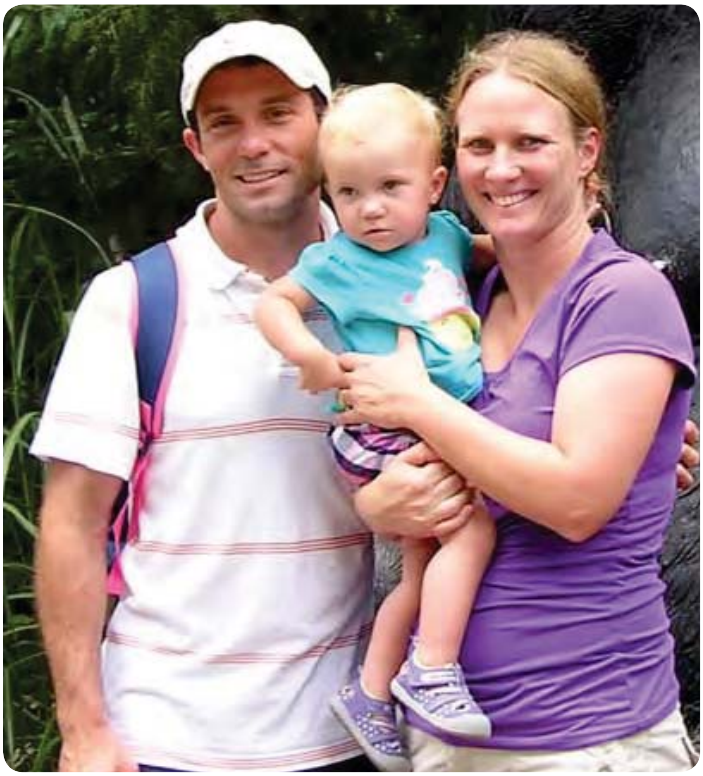
FROM THE PROFESSORS

Dr. William (Bill) Hockaday

The Hockaday Family

This year has been an exciting and eventful year for the Hockaday family. Abigail Noel, who arrived on December 17, 2012, hit several childhood milestones this year, including, walking and talking. Those who are parents will recognize that most walking occurs at a sprinter's pace and most conversation a negotiation of some sort. While our parents are far away (Ohio and Pennsylvania) we are blessed with wonderful friends and church family in Waco who share these moments with us. Mary continues to work as a teacher at Mountainview Elementary school in the Waco school district. She has started in a new role as the 3rd grade team leader this year. When she's not busy playing teacher, mother, and wife, Mary is busy playing soccer. She plays year-round in Waco's indoor and outdoor adult soccer leagues.

Bill and Mary Hockaday with daughter Abigail (18 months old) at the Columbus Zoo, June, 2014.



The Organic Geochemistry Research Team

It was another action-filled year for the organic geochemistry group. We are currently a team of 7, with 3 doctoral and 3 bachelor's students, and hope to hire a postdoctoral scientist in the near future. Our research continues to be published and we are fortunate to receive continued financial support from the National Science Foundation (NSF). The Paul Marchand Nuclear Magnetic Resonance facility, dedicated in 2012, has been the centerpiece and the workhorse of the research lab for the last 2 years. During this time, the facility has attracted 6 visiting scientists from other universities in the US and China. Thanks to NSF support, the instrument also got an upgrade this year, in the form a new sample probe. This piece of equipment (pictured here) makes the lab more versatile by allowing us to do some new kinds of experiments and analyses that we previously could not do (or do well).

Left: The new sample probe purchased with a grant from National Science Foundation, for Paul Marchand Nuclear Magnetic Resonance Spectroscopy Lab. This probe allows us to manipulate the nucleus of atoms using an electromagnetic field. It may not look like much, but for an organic geochemistry lab, this is a Cadillac (with a Mercedes-Benz price tag).

Graduations and Promotions

Dr. Rixiang Huang (postdoc) earned a doctoral degree in December 2013, under the advisement of Dr. Boris Lau, and continued working until May 2014, as a postdoctoral researcher for Dr. Lau and I. During these 5 months, Rixiang worked on an NSF-funded research project, investigating the physical and chemical interactions of natural organic matter with engineered silver nanoparticles. Rixiang and his wife, Xiaowei, have now moved to Atlanta, where Rixiang works as a postdoctoral scientists at Georgia Tech.

Dr. Nelson van der Velde (postdoc) completed a one-year postdoctoral fellowship in the organic geochemistry lab. His work entailed a very careful molecular-level analysis of the bio-oils generated from the pyrolysis of biomass. Dr. van der Velde left Baylor in February, 2014, to start a career with Buckman Laboratories. Buckman is a leading manufacturer of specialty chemicals for industrial wastewater treatment. On a personal note, Nelson was married on May 2, 2014. He and his wife, Katie, now reside in Houston, TX. Katie is a student at Baylor College of Medicine.

Creighton Meyers (B.S.) has worked as an undergraduate research assistant in the organic geochemistry lab for 3 years. He graduated in August, 2014. He completed an outstanding bachelor's thesis research project which evaluated high-volume sampling techniques for collecting suspended particulate matter from aquatic systems. He generated a rather extensive sample archive and geochemical database on the Brazos River. We plan to submit his thesis manuscript for publication in the journal Limnology and Oceanography: Methods. Creighton will start graduate work in the Fall under Dr. Judy Haschenburger at the University of Texas, San Antonio.

Dr. Bill Hockaday (cont.)

Rebecca Davis (B.S.) was invaluable as a research assistant to Zack Valdez and I during her junior and senior years at Baylor. Rebecca graduated in August, 2014. Her research thesis used nuclear magnetic resonance spectroscopy and radiocarbon dating to investigate the geochemical origin of charcoal stability in boreal forest soils.

Charlie Keracik (B.S.) graduated in August, 2014. His senior thesis made use of the Eagleford mudrock samples collected by graduate students Ken Boling and Todd Longbottom. Charlie used a statistical approach to identify the organic (molecular structure) attributes of the sedimentary organic matter (kerogen) that give rise to the Rock-Eval® parameters. The latter are widely-used to infer the oil and gas potential of source rocks. Charlie will begin an M.S. degree program at Texas Tech in the Fall, studying geochemistry under Dr. Juske Horita.

Current Graduate Students

Zack Valdez completed his PhD candidacy exam and defended his dissertation research proposal this year. Zack is studying soil carbon storage in biomass energy cropping systems. Zack's graduate work is currently being supported (for the second year) by a prestigious graduate fellowship from National Science Foundation. Zack also had the good fortune to be selected as a student delegate to the soil carbon sequestration conference held in Reykjavik, Iceland.

Todd Longbottom (PhD candidate) Todd's interest in molecular fossils has extended our group's expertise into new and exciting areas. These molecular fossils (also known as biomarkers) provide information about plant communities in deep time, for soil and sedimentary environments where there are no macrofossils preserved. Todd is currently using nuclear magnetic resonance and gas chromatography-mass spectrometry to study biomarkers in the Eagleford of central Texas. He is finding well-preserved molecular information on both terrestrial and marine ecosystems of the late Cretaceous. Todd was awarded a research grant from the Gulf Coast Association of Geological Societies in support of his work on the Eagleford.

Michael Nguyen (PhD candidate) is studying the effects of temperature changes (warming) on the rates and mechanisms by which soil organic matter is adsorbed to ferrous minerals. Mike has had a very productive and exciting year. His presentation at the International Union of Soil Sciences conference was published as a chapter in a book entitled, Soil Carbon: Progress in Soil Science. He has submitted a second manuscript to the journal Nature Education, whose target audience is high school and college students (and teachers). Michael also received an outstanding teacher award for his service as a teaching assistant in the "World Oceans" course at Baylor. Perhaps the most significant honor bestowed on Michael this year was the prestigious Graduate Research Fellowship from the National Science Foundation. This fellowship provides salary and tuition for three years. Mike is co-advised by Dr. Boris Lau, and recently moved with Dr. Lau to the University of Massachusetts, Amherst, where he will complete the remainder of his doctorate. Happily, I will continue to serve as an advisor on Michael's dissertation committee.

Presentations and Publications

The organic geochemistry group has have been actively disseminating our research by publishing papers and giving scientific presentations at national and international conferences.

Publications (since the last newsletter, underlining denotes student authors):

A. D. Olaitan,Behrooz Zekavat, Birendra Dhungana, **William C. Hockaday**, C. Kevin Chambliss, Touradj Solouki, Analysis of Volatile Organic Compound Mixtures Using Radiofrequency Ionization/Mass Spectrometry, *Chemical Analysis*, 6, 4982-4987, 2014.

M.A. Kleber, **W.C., Hockaday**, P.S. Nico, Characteristics of biochar Macromolecular Properties, IN: Biochar for Environmental Management: Science and Technology, Ed. J. Lehmann, Earthscan publishers, London, 2014 (in press).

Michael Nguyen, **W. Hockaday**, B.L.T. Lau, Probing Temperature-Dependent Organo-Mineral Interactions with molecular spectroscopy and Quartz Crystal Microgravimetry, pp. 189-195, in Soil Carbon, Progress in Soil Science series XXVI, Hartemink, A.E., McSweeney, K. (Eds.), Springer, 2014.

M.P.W. Schneider, L.A. Pyle, K.L. Clark, **W. Hockaday**, C. Masiello, M. Schmidt, Toward a "molecular thermometer" to estimate the charring temperature of wildland charcoals derived from different biomass sources, *Environmental Science & Technology,* 47, 11490-11495, 2013.

Student Presentations since last year's newsletter, Graduate and Postdoctoral Students:

Michael L Nguyen, W.C. Hockaday, B.L.T. Lau, Probing Temperature-Dependent Organo-FeOx Interactions Using Quartz Crystal Microgravimetry, NMR Spectroscopy, and Thermal Analyses, American Geophysical Union Chapman Conference, Tucson, AR, October 21-24, 2013. poster

Huang, Rixiang, Hockaday, W.C., Von Bargen, J. M., and Lau, B.L.T., Toward and Evaluation of Biochar Recalcitrance, 125th Geological Society of America, Denver, CO, Oct. 27-30, 2013, poster 334-16.

Todd L. Longbottom, W. C. Hockaday, Kenneth S. Boling, Organic geochemistry of the Eagleford shale (Woodway, TX, USA); organic matter sources, paleoenvironmental conditions, and biotic/abiotic alteration. American Chemical Society Southwest Regional Meeting, Waco, TX, Nov. 9-11, 2013. Poster

Zachary P. Valdez; William C. Hockaday; Morgan E. Gallagher; Caroline A. Masiello; Xiaodong Gao, Effects of Nitrogen Fertilizer and Harvesting Frequency on Soil Organic Matter Pools Under Switchgrass Agriculture, American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 11, 2013. Poster B31C-0416

Michael Nguyen, W.C. Hockaday, B.L.T. Lau, Probing Temperature-Dependent Organo-Mineral Interactions Using Quartz Crystal Microgravimetry: Examining changes in adsorption/desorption 247th ACS National Meeting, Dallas, Texas, March 16-20, 2014. Talk 23079

Todd Longbottom, W.C. Hockaday, Assessing the role of organo-mineral association in molecular biomarker analysis of a Late Cretaceous shale, 247th ACS National Meeting, Dallas, Texas, March 16-20, 2014. Poster 14965

Rixiang Huang, J.M. Von Bargen, W.C. Hockaday, B.L.T. Lau, D.A. Jack, E.S. Kane, Biochar stability evaluation: Application of thermal analysis and solid state NMR, 247th ACS National Meeting, Dallas, Texas, March 16-20, 2014. Talk 14648

Nelson A. van der Velde, W.C. Hockaday, Characterization of slow-pyrolysis bio-oils obtained from different biomass feed-stocks, 247th ACS National Meeting, Dallas, Texas, March 16-20, 2014. talk

Todd Longbottom, W.C. Hockaday, K.S. Boling, S.I. Dworkin, Evaluating the effects of redox conditions on kerogen composition of the Eagleford formation of Central Texas by 13C Nuclear Magnetic Resonance Spectroscopy, Goldschmidt Conference, Sacramento, CA, June 8-13, 2014. poster

Undergraduate Students:

Creighton Meyers, W.C. Hockaday, T. Longbottom, Sampling methods for particulate organic matter: A study of the Brazos River, American Chemical Society Southwest Regional Meeting, Waco, TX, Nov. 9-11, 2013. Poster

Rebecca M. Davis, Valdez, Z. P.; Hockaday, W.C., Impact of Farming Practices on Root Biochemistry Using 13C NMR, American Chemical Society Southwest Regional Meeting, Waco, TX, Nov. 9-11, 2013. Poster

Charles Keracik, W.C. Hockaday, T.L. Longbottom, Assessing Source Rock Potential of the Eagle Ford Shale Using Solid-State NMR, Baylor University Undergraduate Research Symposium, Waco, TX, April 2-3, 2014, 3rd Place Award (geology dept.)

Creighton Meyers, W.C. Hockaday, Sampling methods for aquatic particulate matter: A case study on the Brazos River, TX, Joint Aquatic Sciences Meeting, Portland, OR. May 18-12, 2014. poster #571

For more news about our research, visit our website: http://hockadaylab.wikispaces.com/

FROM THE PROFESSORS

Dr. Scott James

The Geology Department's most recent hire, Dr. Scott James, comes to us by way of Exponent Inc's Civil Engineering practice where he was a Managing Engineer. Dr. James specializes in environmental fluid dynamics including reactive flow and transport in surface water and groundwater systems. He has 15+ years of experience simulating reactive fluid flows in various environmental and manmade systems. He has particular expertise in radionuclide and chlorinated solvent flow and transport in groundwater and fractured rock systems. This expertise has recently extended into multiphase, multi-component, non-isothermal, non-isobaric enhanced oil recovery optimization simulations. In addition, he has extensive experience in sediment dynamics and water-quality simulations for surface water systems including lakes, rivers, estuaries, and coastal shores. His proficiency with surface water systems has extended into marine renewable energy and modeling and optimizing algae growth in open-channel raceways for biofuels production. He is also an experienced reactive/thermal/fluids modeler (e.g., hydrogen fuel cell development).

Dr. James received his B.S. and M.S. in Mechanical Engineering from UC San Diego, with emphases in fluid mechanics and numerical methods. In 2001, he graduated from UC Irvine with a Ph.D. in engineering, with emphasis on solving environmental flow and transport problems. Shortly thereafter, he joined Sandia National Laboratories' Performance/Risk Assessment and Decision Analysis Department in Carlsbad, New Mexico, in charge of certifying the Waste Isolation Pilot Plant, the only operating transuranic nuclear waste repository in the world. He also contributed significantly to the Yucca Mountain Project and International Radioactive Waste Programs (Japan, Switzerland, and Sweden). Dr. James has served as Acting Manager of the Thermal/Fluid Science & Engineering Department at Sandia Labs in Livermore, California, where he worked on a wide variety of reactive flow and transport modeling problems including hydrogen fuel cell research. Moreover, he has focused on (1) environmental impacts of hydrokinetic energy device emplacement in coastal regions, (2) modeling open-channel flow systems to optimize algae growth for biofuel production, (3) modeling advanced enhanced oil recovery techniques, (4) simulating colloid and contaminant co-transport in fractured porous media, and (5) simulating isotope exchange kinetics on metal hydrides. Dr. James has published over 45 peer-reviewed manuscripts and serves as Associate Editor to the journal Ground Water.

FROM THE PROFESSORS

Liliana Marin

I am eager to be starting in the new Laboratory Manager position in the Department of Geology. Steve and I moved a month ago from Chicago and immediately started conditioning the Geoluminescence Research Lab. Well, you know all about Steve… so I better introduce myself. I have a Masters in Earth and Environmental Sciences from the University of Illinois at Chicago. Before arriving to Baylor, I held a tenure track position at Physical Science Department in Harold Washington College, one of the seven Community Colleges of Chicago.

From Chicago to Waco

There, I developed a certificate program in GIS for undergraduates and taught GIS and Geology using a smart classroom, ideal for teaching complex 3D geospatial concepts. I also mentored research projects for the honor students pursuing Associate in Science Degrees. Since I received two certifications in Leadership in Teaching

Liliana Marin (cont.)

in Roosevelt University, I was heavily involved with curriculum improvement, student assessment and enhancement of teaching and learning strategies in higher education. After eight years in this instruction settings, I moved to Baylor to join the Paleoclimatic Group in Geology and contribute to the research, teaching and service mission through the Geoluminescence Research Lab.

The past six months have been a very steep learning curve about Optical Stimulated Luminescence techniques and concepts. It has been fascinated to recall and improve knowledge about theories and models learned in Physics, Chemistry and Engineering Geology at the National University in Colombia were I got my undergraduate degree.

At Baylor, my immediate goal is to organize a world-class lab and have it fully functional to support the numerous research directions in paleoclimatology, paleohydrology, paleoseismology, paleoanthropology and solid state physics. Currently, I am working to streamline calculation and lab and data analysis, to maintain the geodatabase of past and current projects, and to support the field research activities.

My own research will focus on implementing new OSL approaches to date sediments that have proved to be a challenge. I am especially interested in date successfully sediments from the Andes provenance, Malawi and certain localities in Mongolia. I am also interested in teaching GIS at Baylor and work on GIS-based projects in collaboration with the Center for Spatial Research.

Next week Steve, Natalie Kubik (New PhD student) and I will be heading to Argentina to continue a collaborative research with the University of Buenos Aires. As a bonus, I am involved with the logistics, since I am fluent in both English and Spanish. I am excited to be in the Pampas for three weeks and why not enjoy the famous Argentinian asado.

I look forward to working with all of you and be an involved member of the Geology Department. My office doors are always open, but the lab doors must remain shut and blacked-out from any light.

FROM THE PROFESSORS

Dr. Lee Nordt

Holly Meier completed her Ph.D. for the May, 2014 graduation ceremonies. She has been a fixture in the department as others can attest to, and will be missed. Julia Kahmann-Robinson, a former doctoral graduate in the department, has worked with me during the past year as a post-doctoral fellow continuing Gary Stinchcomb's work on the geochemical data base that Steve Driese and I oversee. The culmination of Julia's work will be indispensable for future research for faculty and students alike. Don Esker is moving forward with his Ph.D. work on the Waco Mammoth site and will defend his dissertation proposal in the fall.

This past summer we vacationed in Blue Ridge, Georgia and the high point of that trip was a wild ride down the Ocoee River (see photo above).

Garrison is now working as first assistant pro at Lochinvar Golf Club in Houston. He is fortunate to have landed so early in his career at such a prestigious club. Working with the rich and famous has been an eye opener. He is making progress on his PGA card, and as always, enjoys playing in golf tournaments. Garrison has made a lot of friends quickly in the Houston area.

Dr. Lee Nordt (cont.)

Kaylee has completed her junior year at Baylor as an Apparel Merchandising major. She enjoys her Kappa Alpha Theta sorority activities and is still working at the Roots Boutique store in downtown Waco. Kaylee and Jeff Landon, her long-time sweetheart, became engaged in May. They will wed shortly after both graduate (Jeff is a civil engineering major at TAMU) in the summer of 2015. Kaylee also received an internship at the Wacoan Magazine as the stylist for the coming year.

Kathy is still working part-time as outpatient surgery admitting nurse at Providence Hospital. She has been able to travel some with me to conferences, especially enjoying Denver at GSA this past year. She still likes planning family vacations for us and this summer we are headed to Durango, Colorado.

I look forward to seeing you all during homecoming weekend!

Publications:

Nordt, L.C., and Driese, S.G. 2013. Application of the Critical Zone Concept to the Deep-Time Sedimentary Record. *The Sedimentary Record* 11:4-9.

Trendell, A.M., **Nordt**, L.C., Atchley, S.C., LeBlanc, S.L. and Dworkin, S.I. 2013. Determining Floodplain Plant Distributions and Populations using Paleopedology and Fossil Root Traces: Upper Triassic Sonsela Member of the Chinle Formation at Petrified Forest National Park, Arizona: *Palaios* 28:471-490.

Meier, H.A., **Nordt**, L.C., Forman, S.L., and Driese, S.G. 2013. Late Quaternary alluvial history of the middle Owl Creek drainage basin in central Texas: A record of geomorphic response to environmental change. Quaternary International 306:24-41.

Atchley, S.C., **Nordt**, L.C., Dworkin, S.I., Ramezani, J., Parker, W.C., Ash, S.R., and Bowering, S.A., 2013. A linkage among Pangean tectonism, cyclic alluviation, climate change, and biologic turnover in the Late Triassic: The record from the Chinle Formation, Southwestern United States. *Journal of Sedimentary Research* 83:1147-1161.

Trendell, A.M., Atchley, S. C., and **Nordt**, L.C. 2013. Facies analysis of a probable large fluvial fan depositional system: the Upper Triassic Chinle Formation at Petrified Forest National Park, Arizona: *Journal of Sedimentary Research*: 83:873-895.

Presentations:

Nordt, L.C. 2013. Geochemical thresholds bracket pH stability fields in Vertisols, GSA, Denver, CO. November.

Driese, S.G., **Nordt**, L.C., Breecker, D., Beverly, E., Michel, L., Okafor, B. 2013. Micromorphology of type Trinity Series at Richland Creek Wildlife Management Area. South-Central GSA, Austin, TX. April.

Driese, S.G., **Nordt**, L.C., Culbertson, A., Beverly, E. 2013. Multi-Proxy approaches to interpreting climate and soil duration in the deep-time geologic record using Vertisols. South-Central GSA, Austin, TX. April.

Breecker, D., Driese, S., **Nordt**, L., Beverly, E., Huntington, K. 2013. Seasonal variations in the carbon isotope composition of soil-respired CO2 and the dominance of root/rhizsophere respiration in desert soils, American Geophysical Union, San Francisco, CA. December.

Okafor, B., Breecker, D., Driese, S., **Nordt**, L., Warden, J. 2013. Investigation evaporation and soil water movement by measuring the isotopic composition of water in Vertisols, GSA, Denver, CO. November.

Grants:

Peppe, D., Atchley, S., **Nordt**, L.: EAR #1325552 ($211,392): Collaborative Research: testing the link between climate and mammalian faunal dynamics in the early Paleocene record of the San Juan Basin, New Mexico. (Awarded)

FROM THE PROFESSORS

Dr. Daniel Peppe

This past year was a busy and productive one. Over the past year, I spent a fair amount of time traveling to various places in the USA and Kenya to conduct fieldwork. As I write this, I just returned from a week in the field in New Mexico focused on collecting fossil leaves from Paleocene strata in the San Juan Basin with my MS student Andrew Flynn. I continue to conduct research on Pleistocene and Miocene sites new Lake Victoria, Kenya, on Paleocene sites in New Mexico, and recently began work in collaboration with Stacy Atchley, Lee Nordt, and PhD student Caitlin Leslie to refine the timescale of Cretaceous and Paleocene rocks in the Big Bend area. In addition to existing funding from the National Science Foundation (NSF) for work on Miocene sites in Kenya and from the American Chemical Society, Petroleum Research Fund to conduct research on alluvial stacking patterns in Cretaceous-Paleocene strata in the San Juan Basin, I was awarded another grant from NSF with Stacy Atchley, Lee Nordt, and collaborators from the University of Nebraska and the New Mexico Museum of Natural History focused on reconstructing Paleocene environments following the Cretaceous-Tertiary extinctions in the San Juan Basin.

In the fall semester I taught a graduate seminar, "Topics in paleoclimatology: climate change: past, present, and future", that was focused on reading about and discussing climate change events in earth history from the Precambrian to the present. I had a great group of students in the class and we had lively discussion on each topic. In the spring semester I taught two lecture and lab courses: "Evolutionary history of plants" and "Field methods in stratigraphy and sedimentology". As a result, my spring was full of mostly teaching, but I really enjoy teaching both classes. It was a lot of fun to take the stratigraphy class out each week to various outcrops across Central Texas from Marble Falls to Glen Rose and many places in between! This is the second times that I've taught stratigraphy and I feel like I'm finally getting a pretty good handle on the local geology, which makes the weekly field excursions that much more interesting.

In addition to teaching, my research program continues to expand. My ongoing research projects in Kenya continue to be very productive. Steve Driese and I received a 5-year grant from NSF last year to conduct research at several different early Miocene fossil sites in Kenya and Uganda. We will be working to reconstruct the paleoenvironment and paleoclimate at several early Miocene research sites across East Africa. This work will allow us to test how regional temporal and spatial environmental variability in the Miocene influenced the evolution of early hominids. Last summer we conducted fieldwork at Karungu, which is one of the major fossil sites, and Steve will be presenting the results of that work at GSA in the fall. I also did some preliminary fieldwork at another site, Songhor, and plan to return next summer for additional analyses.

This new project builds on my previous research on Rusinga Island in Kenya, which was focused on testing how paleoenvironmental changes may have influenced the composition of the fauna and adaptive morphologies of early apes in the early Miocene in the Lake Victoria region of Kenya. One of the most exciting results of this work was the discovery of a fossil forest habitat in direct association with early primate fossils, which demonstrated for the first time that early fossil apes lived in closed canopy forests. This work was led by recent PhD graduate Lauren Michel, who was co-advised by me and Steve Driese, and was published in *Nature Communications*. Steve Driese and Baylor Geology alumni Will Horner were also co-authors on the paper. The paper was well received and Lauren and I were interviewed by a few media outlets including our local NPR station. Lauren also has a paper in review about the fossil forest in *Palaios.* She defended her dissertation and graduated this spring and has recently taken a job at the Perot Museum of Nature and Science in Dallas, TX.

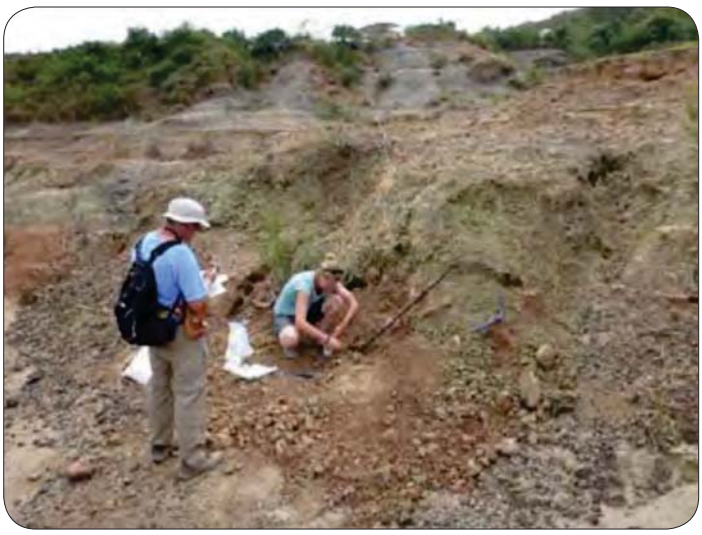
Dr. Daniel Peppe (cont.)

I also continue to work in Kenya on a collaborative project with researchers from Harvard, University of Minnesota, and the University of Queensland to investigate the paleoenvironment of equatorial East Africa during the Pleistocene and its impact on the behavioral evolution of early *Homo sapiens* in the Lake Victoria region in Kenya. The results of our work thus far indicate that the Lake Victoria region was significantly more arid than at present during the late Pleistocene causing a major expansion of C4 grassland communities across equatorial Africa. Steve Driese and I are co-advising PhD student Emily Beverly, who is examining paleosols in the Karungu area in Kenya to reconstruct the paleoenvironment of the Pleistocene in the Lake Victoria region, and we joined Emily in the field last summer. Her work is going very well and she is in the process of writing up some of her research on fresh water springs in the area.

In addition to my work in Kenya, I have continued to develop a research project in the San Juan Basin in New Mexico. The overarching goal of the research project is to explore changes in plant and mammal communities and the relationship between those changes to climate. In this project we are using fossil leaves and geochemical proxies to reconstruct paleoclimate and magnetostratigraphy and ash dates to date the deposits. This project is funded by the American Chemical Society, Petroleum Research Fund and NSF. Stacy Atchley and I are co-advising PhD student Adam Davis on his project focused on reconstructing the paleoenvironment of the earliest Paleocene in the San Juan Basin using sedimentology and stratigraphy. I am also advising MS student Andrew Flynn who is focusing his research on early Paleocene fossil plants from the San Juan Basin. His research has already generated some very interesting results and he's planning to present some preliminary results at GSA this fall.

PhD student Caitlin Leslie, who is co-advised by me and Stacy Atchley, will also be working in the San Juan Basin for part of her dissertation. However, first she is working to refine the age model for Cretaceous and Paleocene rocks in the Big Bend area using magnetostratigraphy. We went to Big Bend over spring break to collect

Andrew Flynn and Brittany Abbuhl collecting fossil leaves from the Paleocene Ojo Alamo Sandstone, San Juan Basin, New Mexico.



Steve Driese and Emily Beverly describing and sampling Miocene paleosols at the Ngira site near Karungu, Kenya.

Nicky Arellano and Emily Beverly sampling paleosols from the Pleistocene Wasiriya Beds at Rusinga Island, Kenya.

Caitlin Leslie collecting paleomagnetism samples in Big Bend National Park.

some samples and her preliminary data is very promising. Caitlin just got back from the field and will be prepping and analyzing her samples this summer and fall. I expect we'll have some interesting results to tell you about in the next newsletter!

This past year I also advised one undergraduate, Will Fenley, on his senior thesis. Will conducted a magnetostratigraphy study of the latest Cretaceous and earliest Paleocene rocks in the San Juan Basin. His thesis was an excellent piece of work and will be incorporated into an upcoming publication. Will plans to attend graduate school to become a professional geologist after taking some time off next year.

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

Publications:

Peppe, D.J. and Hickey, L.J., *in press*, Fort Union Formation fossil leaves (Paleocene, Williston Basin, North Dakota, USA) indicate evolutionary relationships between Paleocene and Eocene plant species: *Peabody Museum of Natural History Bulletin*.

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Presentations:

Blegen, N., Tryon, C.A., Faith, J.T., **Peppe, D.J.,** *†Beverly, E., 2014. Tephrostratigraphy and the archaeology of the Late Pleistocene, eastern Lake Victoria Basin, Kenya: a refined stratigraphic context for Late Pleistocene human evolution in East Africa: *PaleoAnthropology Society Meeting Abstracts.*

Dr. Daniel Peppe (cont.)

Zaarur, S., Affek, H.P., Tryon, C.A., **Peppe, D.J.**, Faith, J.T., 2013, Causes of Late Pleistocene water level change in Lake Victoria, Equatorial Africa, derived from clumped isotopes of land snails and fresh water mollusks: *EOS Transactions AGU*.

Garrett, N., Fox, D.L., Tryon, C.A., Faith, J.T., **Peppe, D.J.,** 2013, Stable isotopic paleoenvironmental reconstructions of the late Pleistocene sites on Rusinga and Mfangano Islands, Lake Victoria, Kenya: *Journal of Vertebrate Paleontology, Program and Abstracts*, 2013, 132.

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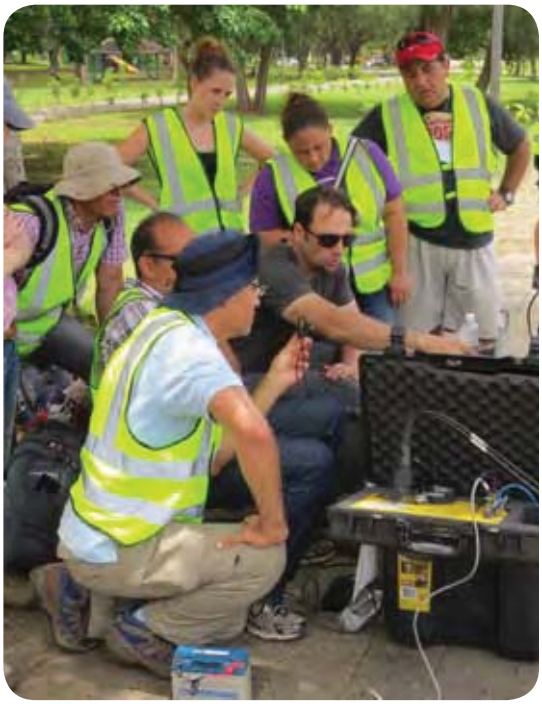
McCollum, M.S., **Peppe, D.J.**, McNulty, K.P., Dunsworth, H.M., Harcourt-Smith, W.E.H., Andrews, A.L., 2013, Magnetostratigraphy of the early Miocene Hiwegi Formation (Rusinga Island, Lake Victoria, Kenya): Geological Society of America, Abstracts with Programs: 45(3): 12.

FROM THE PROFESSORS

Dr. Jay Pulliam

My research group published the first two papers from our broadband seismic transect across the Gulf Coastal Plain (Evanzia et al., EPSL, 2014 and Ainsworth et al., EPSL, 2014). Dominic Evanzia performed P- and S-wave tomography in an effort to infer the history of rifting that created the Gulf of Mexico and the Texas coastal plain. Ryan Ainsworth conducted "receiver function" imaging, which is analogous to reflection seismic profiling although with converted waves rather than with reflected waves. The deep pile of sediments that covers the plain has made it difficult to understand the Gulf Coastal Plain's structure and history, but we now have data recorded at an unprecedented scale—both in terms of data volume and station density—so we are making interesting discoveries.

Dr. Jay Pulliam (cont.)



Baylor PhD student Mohit Agrawal is developing and applying techniques for jointly modeling receiver functions, surface wave dispersion, and waveforms to constrain lithospheric structure. His first manuscript, an application to the Middle East, was submitted to *Geophysical Journal International* this year. His second paper is an application to the densely-spaced set of broadband across the Texas margin that was the subject of Dominic and Ryan's theses.

I led an NSF-sponsored Pan-American Advanced Studies Institute (PASI), entitled "New frontiers in geophysical research: Bringing new tools and techniques to bear on earthquake hazard analysis and mitigation," in Santo Domingo in July 2013 (see pictures). We had 40 "early career" scientists join us for two weeks' of lectures, data acquisition, and analysis. Two Baylor graduate students, Martin Schwed and Frank Sepulveda, attended the PASI. Martin used the data we acquired in Santo Domingo for his M.S. thesis research, and he recently submitted a paper for publication in *Geophysics.* Frank is developing hardware and software that will conduct seismic "site characterization" surveys semi-autonomously, which will be the subject of his PhD thesis.

I was able to keep the broadband seismographs we used in the PASI (borrowed from the IRIS PASSCAL Instrument Center) for two years, which allows us to deploy the stations around the Dominican Republic for two years in an effort to study the region's tectonics. We will complete the station installations this summer and two incoming graduate students will work on those, and other, data in studies of the northeast Caribbean's seismicity and tectonics.

FROM THE PROFESSORS

Dr. Joe Yelderman

The most significant happening for hydrogeology (and hydrology) at Baylor University in 2014 was the addition to the faculty in the person of Dr. Scott James. Dr. James fulfills the Geology component of the Center for Reservoir and Aquatic Systems Research (CRASR) strategic plan. Dr. Joe served as chair of the search committee along with committee members Dr. Peter Allen and Dr. Joseph White, who both served admirably, and along with Geology Department Chairman Dr. Stacy Atchley, were critical to the search success.

The hydrogeology program at Baylor continues to produce quality students who are active and successful in their field. Dr. Joe graduated another MS student, David Ju, who has accepted a position with Anadarko in Houston (I guess water and oil can mix). Dr. Joe welcomes a new graduate student in the fall of 2014; Jim Tucker, who comes to Baylor from the University of Delaware. Jim will be joining MS candidate Josh Kirby who is working on an arsenic study in the deep Trinity aquifer, Josh Brownlow who is working on his PhD in hydrogeology answering tough questions related to hydrofracking and groundwater in South Texas, and PhD student Stephanie Wong who is studying the Northern Segment of the Balcones Fault Zone Edwards aquifer and impacts to a threatened salamander species. Student Andrew Worsley is finishing his MS degree in Environmental Science under Dr. Joe this year where he worked in the Brazos Alluvium aquifer as an intern with the Southern Trinity Groundwater Conservation District.

Dr. Joe Yelderman (cont.)

Dr. Joe had a strong contingent of students presenting research results this past year. Stephanie Wong and Joshua Brownlow both presented work at the Geological Society of America annual meeting in Denver. Stephanie, Andrew, and Dr. Joe presented at the National Groundwater Summit and although no one won a Farvolden award this year, Stephanie was chosen to represent the NGWA as a student member in the July-August Ground Water Journal. Josh Brownlow presented his MS thesis work at the Soil Survey and Work Planning Conference at Texas A&M.

Dr. Joe continues to teach hydrogeology and water management classes at Baylor and this past year the water management class worked with The Retreat near Cleburne on their water master plan. The hydrogeology class continued to use the Northern Edwards aquifer as their study area. Dr. Joe advised incoming freshmen again this past summer and continued to help Dr. Bonem advise undergraduate geology majors. Dr. Joe also is serving as Director for The Institute of Ecological, Earth and Environmental Sciences (TIEES).

With the help of Bruce Byars, Dr. Joe has entered into a MOU with MCC using the Highlander Ranch property as a teaching/research field lab for students at both schools and is working with the city of Waco and the National Weather Service on an urban hydrology research agenda for the Central Texas Area. The first official training for COCORAHS volunteers in McLennan County was held this past June at the BRIC facility.

There were two big events in the Yelderman family life this year as Diane retired after 19 years of teaching Kindergarten and the family added the first grandchild with the last name of Yelderman. Bryce Jackson Yelderman was born May 31st 2014 to the proud parents of Logan and Rachel Yelderman, who live in Carson City, Nevada, where Logan (youngest child) recently received his Masters Degree and is now working on his Ph.D. in interdisciplinary social psychology at the University of Nevada – Reno. Cal (middle child) lives in Austin where he is a business analyst for MitreTech. Abbi (oldest child) and husband, Jared, have a beautiful daughter, Madison (5) and a handsome son, Hamilton (2). Dr. Joe continues to teach Sunday School at Columbus Avenue Baptist Church with Diane, his loving wife of 39 years. The Yeldermans still live at 706 Woodland West, Woodway, Texas and visitors are always welcome.

Recent publications

Bowen Du, Amy E. Price, W. Casan Scott, Lauren A. Kristofco, Alejandro J. Ramirez, C. Kevin Chambliss, Joe C. Yelderman, and Bryan W. Brooks, 2014, Comparison of contaminant of emerging concern removal, discharge, and water quality hazards among centralized and on-site wastewater treatment system effluents receiving common wastewater influent, *Science of the Total Environment*, 466-467, p.976-984.

Garcia SN, Clubbs RL, Stanley JK, Scheffe B, Yelderman JC, Brooks BW., 2013, Comparative analysis of effluent water quality from a municipal treatment plant and two on-site wastewater treatment systems, Chemosphere, 92, 38-44.

Wong, Stephanie S., Yelderman, Joe C., Jr., and Byars, Bruce, 2012, Developing a Geospatial Model for Analysis of a Dynamic, Heterogeneous Aquifer: The Brazos River Alluvium Aquifer, Central Texas, *Transactions of the Gulf Coast Association of Geological Societies and the Gulf Coast Section of the SEPM*, 62nd Annual convention, Austin, Texas, p. 653-660.

Recent Grants

Internship with the Southern Trinity Groundwater Conservation District, January-December, 2014, $22,020.

An Investigation into the Recharge Pathways and Mechanisms in the Northern Segment of the Edwards Aquifer, Bell County, Tx., January-September, 2014, $31,618 funded by the Clearwater Underground Water Conservation District.

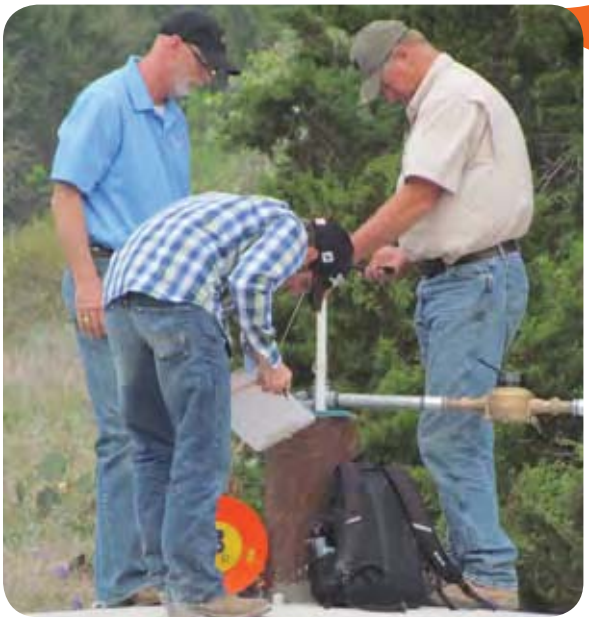
Dr. Joe Yelderman (cont.)

Stephanie Wong sampling cave well for radon gas

Josh Kirby and Josh Brownlow conducting conductivity cross-sections in Salado Creek

Stephanie Wong conducting a dye tracer test in Big Boiling Spring, Salado, TX

Hydrogeology fracture field trip



Andrew Worsley measuring water levels during a pumping test in the middle Trinity aquifer

In the hydrogeology lab

FROM THE PROFESSORS

Dr. Ren Zhang

Last year was my fourth year at Baylor and was more exciting than previous years. Again, I have spent most of my time on instrument maintenance and isotopic analyses. In order to provide high-quality stable isotope analytical services to internal and external users, I had to try my best to maintain a smooth and efficient operation of the Isotope Ratio Mass Spectrometer (IRMS) and its peripherals through routine maintenance, troubleshooting, inventory control and lab safety. Before analyzing real samples, the instruments must be tuned and calibrated on a daily basis to ensure good performance. Regular maintenance such as annual vacuum pump oil change and baking out the IRMS can avoid instrument malfunction and extend its lifespan. Troubleshooting is very important for solving various operation problems and keeping instruments in good working condition. As the instruments get older each year, more and more mechanic and electronic problems show up. I fixed a lot of problems last year, such as misreading parameters, acid pump failure, incomplete combustion of solid samples on Costech EA, vacuum failure, vacuum pump failure, involuntary shutdown of the IRMS, peak center failure, high mass 46 background, early arrived or narrowed sample peaks, flush fill button failure, delta data computing software failure, Gas Bench reference open split valve failure, etc. When a problem occurs, the first thing I need to do is to identify the source, then figure out a way to solve it. For example, misreading parameter problems were sometimes related to computer software malfunction or miscommunication among different components, but could also be caused by air leak somewhere within the system.

For serious problems, I had to seek help from Dr. Steve Dworkin and other outside experts. The problem occurred most frequently was the acid pump failure, and I had to fix it every time when I switched from EA to Gas Bench carbonate analyses. This is because the acid pump is not originally designed for viscous H3PO4, which can easily get clogged at the pump base. Inventory control ensures that this laboratory has enough consumable materials for normal analytical services. Lab safety can reduce potential risks associated with daily operations at this lab and create a safer work environment.

I have to admit that the whole stable isotope analytical process is really time-consuming and requires only patience. For example, to complete a batch of carbonate analyses on Gas Bench II, I first need to clean glass vials with warm diluted acid, then rinse the vials with DI water a few times, and eventually put the vials in an oven to dry up. The second step is to use the clean vials to load samples and reference materials, and there is a minimum mass requirement for producing good CO2 peaks for computing trustable isotopic ratios. As a result, depending on carbonate content in geological samples, sample sizes may vary from around 200 μg up to a few hundred milligrams. The third step is to flush the loaded vials with pure helium gas. The fourth step is to tune and calibrate the IRMS, and I need to run a number of sequences such as auto focus, zero test, and linearity test to ensure that the IRMS is ready for isotopic analyses. The fifth step is to edit sample table and select the correct methods for different samples. The next step is to run the samples on the IRMS, and I have to sit at a computer monitoring the entire analytical process and solve operation problems. The final step is to evaluate the analytical results, normalize raw delta data, and file formal analytical report. Therefore, I need a few days not a few hours to finish a batch of carbonate C/O isotope analyses. Anyway, I have made over 3285 isotopic analyses with a satisfactory precision for the past year, and I am very happy to be able to make my own contribution to many ongoing teaching and research programs that involve Baylor Geology, Biology, Environmental Sciences, the CRASR, the TIE3S, and other Universities.

Although not much time was left for my own.

BAYLOR UNIVERSITY

DEPARTMENT OF GEOLOGY

Dear Alumni and Friends,

In the past school year, the Baylor Geological Society/AAPG Student Chapter continued their efforts to increase activity. The group was lead under President Kimberley Kuijper (M.S.), Vice-President Martin Schwed (M.S.), Secretary Nathan Benton (Sophomore), Treasurer Garrett Fletcher (Senior), Undergraduate Liaison Charlie Keracik (Senior) and Historian Drew Futcher (Junior). We had 45 members amongst the graduate and undergraduate students.

In the fall of 2013 the BGS/AAPG was officially accepted by Baylor University and Student Activities as a chartered student organization on campus. The BGS/AAPG hosted various academic, social and service events that included hosting Baylor alumnus Dr. Cleavy McKnight (ExxonMobil) and Chris Goss (Jones Energy) for brown bags. We sent 7 members to AAPG/SEG Student Expo in Houston, TX where members presented posters and were selected for interviews with sponsoring petroleum companies. Partnering with Spades Activation we were able to fundraise close to $400 for the group by assisting parking at Baylor Football games and selling programs at Lady Bear's Basketball Games. Both Kimberley and Martin attended the AAPG SLCS leadership days hosted by Chesapeake Energy in Oklahoma City in November.

Above: First annual BGS bowling tournament

In the spring of 2014 the BGS/AAPG continued the hard work by providing more opportunities for members to contribute to the Waco community with gardening at a local church on MLK day and volunteering for Habitat for Humanity. Academic opportunities included a webinar from the AAPG on a tour of the Grand Canyon, Bryce Canyon and Zion National Park. We were recipients of the AAPG Student Chapter Grant awarded $650.00 to run a field trip to the Late Pennsylvanian Strawn Group in Mineral Wells, TX. We also submitted a video for the AAPG Student Chapter YouTube competition. We sent 4 members to AAPG ACE in Houston, TX where members volunteered for the general store and raised around $340 for the student chapter.

Below: Spring 2014 BGS Field Trip

In close, the BGS/AAPG had another successful year and the tradition will continue with this year's incoming leadership (2014-2015): President Hunter Harlow (Ph.D candidate), Vice Presidents Caitlin Leslie (Ph.D candidate) and Adam Collard (M.S.), Secretary Jordan Dickinson (Senior), Treasurer Kolin Beam (Junior), Undergraduate Liaison Jeremy Ashburn (Senior) and Historian Brittany Abbuhl (Junior).

SPECIAL FEATURES
BGS and Girl Scouts

Right: Martin Schwed demonstrating the dangers of liquefaction to Girl Scouts.

On Saturday March 29th, the BGS/AAPG volunteered at the Girl Genius STEM Conference hosted by the Girl Scouts of Central Texas at Texas State Technical College (TSTC). The Girl Genius STEM Conference is a full-day workshop for girls across central Texas in grades 4-12 and the BGS/AAPG put together 3 sessions called "Kristal's Crystals" with the goal of introducing geoscience. Four interactive booths were created with the focus on earthquakes, gems and minerals, fossils, and geology. Each session was approximately an hour where the girls had the opportunity to understand the hazards of earthquakes, learn how to identify common minerals, learn about geologic time and fossils, and the opportunities available in the geoscience sector. We had four members volunteer; Lyndsay DiPietro, Rebecca Davis, Kimberley Kuijper and Martin Schwed. This incredible opportunity would not have been possible without the collaboration and recommendation from Melissa Mullins (Environmental Education and Outreach Coordinator) of the CRASR department at Baylor University.

SPECIAL FEATURES
AAAS Member Spotlight

Right: Dr. Bonem diving in the Maldives, photo taken by Joseph G. Strykowski

On July 29, 2014, Dr. Rena Bonem was featured as AAAS Fellow Member Spotlight in a write-up by Summer Allen. In an interview-style feature, here are some interesting facts about our very own Dr. Bonem!

Why did you become a scientist?
I needed to find a project for our local science fair when I was in the 7th grade. My brother suggested hamsters and genetics, but I loved collecting fossils. I was fascinated with trying to interpret ancient environments from the fossils I found in the local area. I continued working on science fair projects until I attended the International Science Fair my senior year. When I attended college, I had already decided to be an invertebrate paleontologist/paleoecologist.

What are you most proud of in your work?
While working on my Ph.D. dissertation, I expanded my interests into comparisons between living and ancient reef systems. I became a scuba instructor and instructor-trainer to share my interest in reefs with my students and others because in the early '70s I noticed that coral reefs were rapidly degrading. I wanted to help stop the decline. I wrote the book "Palaces Under the Sea," with Joe Strykowski, as an attempt to share that knowledge with the general public. I also developed a Coral Reef Specialty Program for scuba divers and was elected to the Women Diver's Hall of Fame for that work.

What fuels your passion for your work?
Working with students, especially undergraduates, and sharing my love for science. As undergraduate director, I provide course advisement, curricular advice and help students deal with problems. As a research mentor, I enable students to solve problems and answer questions. I am proud of all my students, whether they became college professors, government administrators or stay at home with their children.

Why you chose your particular field of study? Why did it grab your interest and fuel your curiosity?
Finding solutions to problems and encouraging others to do the same.

Tell us about a hobby or passion outside of work.
[The sport of] dog agility. I have a house full of rescue dogs. I find that agility enables them to develop confidence and reach their full potential. We compete in AKC and NADAC, and hopefully you will see us at the National Agility Championships someday.

GEOLOGY EVENTS
Field Camp 2014

Left: *Kristina Raley making camp*

Right: *Jonathan Weiss and Creighton Meyers measuring strike and dip in Ogden Canyon*

Left: *Graduate student Lindsey DePietro*

Right: *Nicky Arellano and Samantha Nicole sit on cross beds of the Navajo Formation.*

Left: *We had great food this year and no one went hungry.*

Right: *Taking a break from a long drive*

Left: *Getting up close and personal with eolian sandstones at Zion*

Right: *A positive attitude at Field Camp always helps.*

Field Camp 2014 (cont.)

Left: The students measured and described about 4000 feet of section in the Grand Canyon.

Right: Climbing back out of the Grand Canyon is the hard part.

Left: Looking at an unconformity in the Grand Canyon

Right: Brian Diehl and Kolin Bean hiking along the rim of the Grand Canyon

Left: We had great weather while mapping near Las Vegas.

Right: Lunch break while mapping Red Rock Canyon

Left: Friends for life after enduring field camp

Right: Lyndsay DePietro did a great job as the teaching assistant.

Left: *Measuring section at Petrified Forest National Park*

Right: *Happy field campers doing laundry*

Left: *Samantha, Joy, and Rebecca making lunch*

Right: *Grocery shopping is always a welcome break from mapping.*

The 2014 field campers before descending into the Grand Canyon

Field Camp 2014 (cont.)

Left: *Field camp students debating rock names while measuring section*

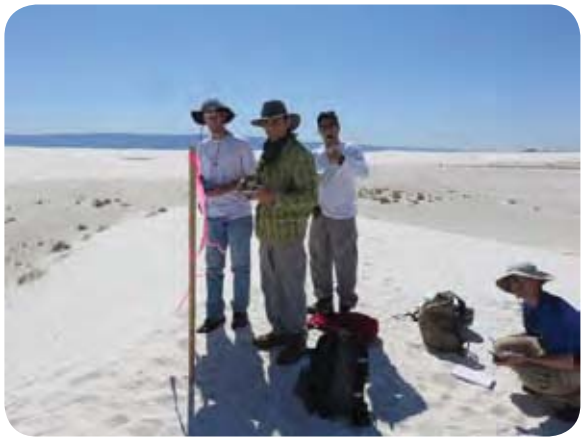
Right: *Measuring and describing section near Alamogordo, New Mexico*

Left: *Donovan Lewis measuring section in the Holder Formation*

Right: *Getting old, but still trying to keep up with the students!*

Left: *Observing modern dunes helped the students understand big bedforms in the rock record.*

Right: *Nicky Arellano and Joy McNeil discuss sand dunes.*



Left: *Mapping at White Sands National Monument*

Right: *Nick Castillo, Hunter Haston, and Patrik Wagstaff work on their pace and compass map.*

Left: Kolin Beam, Christina Jeane, and Samantha Buerger working on their maps.

Right: Drafting up a mapping project.

Right: Carsona Kay-Gaines and Christina Jeane look carefully at the Castille Fm. in the Permian Basin

GRADUATES

Left: Dr. Dan Peppe, Dr. Lauren Michel, and Dr. Lee Nordt

December 2013 Graduates

Master of Science in Geology

Alan Gunnell - Mapping the Distribution of Methane Hydrate Beneath Woolsey Mound, Mississippi Canyon Block 118, Gulf of Mexico

Doctor of Philosophy

Rixiang (Alex) Huang - Effects of Surface Heterogeneity on the Colloidal Stability, Protein Absorption and Bacterial Interaction of nanoparticles

May 2014 Graduates

Bachelor of Science in Geology

Alex H. Boggess

Bachelor of Arts in Earth Science

Kevin W. Wilson

Master of Science in Geology

Kimberley E. Kuijper - The Controls on Reservoir Continuity within the Late Mississippian Elkton Member at Caroline Field, Central Alberta, Canada

Tyler H. Reed - Spatial Correlation of Earthquakes with Two Known and Two Suspected Seismogenic Faults, North Tahoe-Truckee Area, California

Doctor of Philosophy

Debra S. Jennings - Paleopedology of Paleo-wetland and Barite-bearing, Hydric Paleosols in the Morrison Formation (Upper Jurassic – Lower Cretaceous), North Central Wyoming USA: A Multianalytical Approach

Holly Meier - Analysis of Deposition, Erosion, and Landscape Stability During the Late Quaternary Using Multi Proxy Evidence from Owl Creek, Central Texas, USA

Graduates (cont.)

Lauren Michel - Field, Micromorphologic, and Geochemical Study of Modern and Ancient Soils from Riesel, Texas and Rusinga Island, Lake Victoria, Kenya

August 2014 Graduates

Master of Science in Geology

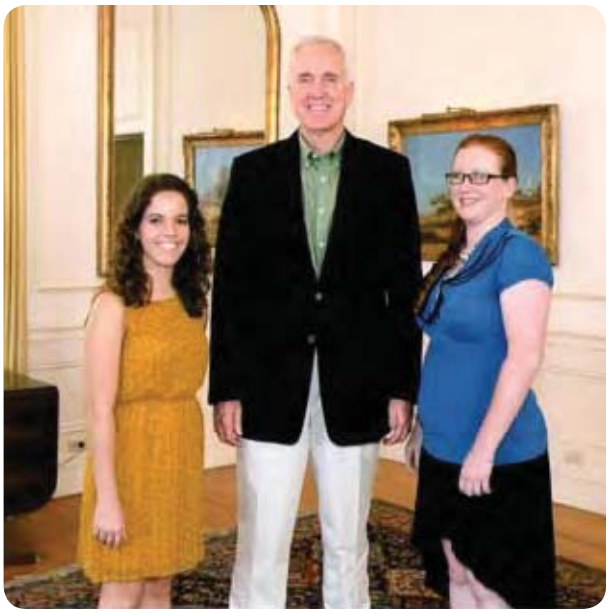
Martin Schwed - Seismic Site Characterization through Joint Modeling of Complimentary Data Functionals, with Application to Santo Domingo, Dominican Republic

Doctor of Philosophy

Daniel Wegert - Lithospheric Magmatism in Southern Colorado and Northern New Mexico

Above: *Dr. Steven Driese, Dr. Rixiang (Alex) Huang and his wife at the December 2013 Doctoral Dinner*

Below: *Samantha Buerger, Dr. Stacy Atchley, and Rebecca Davis at the Spring Honors Convocation.*



AWARDS

April M. Rider
2014 recipient of the Robert T. Hill Award for Academic Excellence in Geology

Samantha Buerger • Rebecca M. Davis
Chosen to represent the Geology Department at the 2014 College of Arts and Sciences Honors Convocation.

2014 Recipients of the Dixon Undergraduate Field Assistant Awards

- Brittany Abbuhl – working with Andrew Flynn
- Caleb Teasdale – working with Hunter Harlow
- Ashley Ramsey – working with Caitlin Leslie
- Michael Loudermilk – working with Bill Lukens

Josh Kirby Awarded Elan Allen Field Safety Scholarship

The Elan A. Allen Field Safety Scholarship was established in honor of Baylor Geology alumnus Elan A. Allen who was tragically killed in an industrial accident in 2002. The Elan A. Allen Field Safety Memorial Scholarship Fund was endowed by Marlow Anderson in 2003. The purpose of the scholarship is not only to honor Elan, but also to promote safety in field work and to hopefully prevent future accidents through planning and awareness. The scholarship is awarded each year to the geology student (or students) who demonstrates the best safety plans for their field work. The successful applicant must be recommended by at least one faculty member and then provide the scholarship committee with an example of the way they plan to incorporate safety into their field activities. A committee of three current Baylor faculty members who maintain active field programs select the winner(s) after reviewing all applications. **The scholarship was awarded this year to Joshua Kirby.** Josh is a Master's student from Oklahoma State University who working with Drs. Atchley and Yelderman.

WHERE ARE THEY NOW?

Alumni Updates

William E. Godsey (BS, 1982 & MS, 1990) is the president of Geo Logic Environmental Services, LLC in Longview, Texas, and has been spending time in Europe and Asia giving presentations on water supply and waste water management for gas shale development.

Stephen Clark (BS, 2006 & MS, 2009) writes:
Greetings to Waco from Dhahran,

I realized it's been a while and wanted to check in. I'm currently working as an exploration geologist with Saudi Aramco's new unconventional gas program and Natalie, Angelina, and I have been living in Dhahran, Saudi Arabia since September of 2012. It's been very exciting to be able to join this program in its infancy and work on projects from the ground up with exposure to virtually every exploration skillset. The people I'm working with are from all over the world and are very bright. My current mentor, Ronald Sprague, says he went to school with Dr. Cronin.

Natalie and Angelina have settled in well. Angelina, now 3 ½, is involved in the youth soccer, gymnastics, and dance programs. She will start in the international school here next year which is reported to be very good. She has friends from a wide variety of backgrounds and is learning more and more about anything and everything each day. Natalie is still working as a freelance journalist as well as writing her own young-adult fiction novels. She has finished three of them now and is working to sell them to a publisher. She has also started a dance program on camp which has become very popular (she used to dance professionally for Houston Theatrical Jazz and Ballet).

At this point, we're mostly over the culture shock. As long as we stay "on camp" Natalie can drive and wear whatever she wants to (within reason). Off camp, she covers her legs and arms and that seems to work just fine. Most of the Saudis we've met (especially the western-educated ones) are very nice, polite, and eager to make us feel welcome. Granted, we spend most of our time "on-camp" so virtually all the Saudis we do meet are western-educated. Off camp, we've found that most people are content to simply go about their day and ignore us.

I'll offer my congratulations to Dr. Driese for his great work as Department Chair for the last 9 years as well as to Dr. Dworkin for his work as Graduate Program Director. I also wish Dr. Atchley the best of luck is beginning his term and Department Chair. I'm glad to hear the MS program will still have a future at Baylor as I learned a great deal from my time as a masters student (as well as my 4 undergrad years) and completely believe in the merits of the program.

Aaron Shunk (PhD, 2009) has accepted a four-year expat in Kuala Lumpur, Malaysia with Shell. So far the industry is going great, he says. "I have developed a strong technical reputation at Shell as a regional geologist. I also volunteered at the Houston museum of natural science, and my favorite section was the human evolution. The infusion of genetics into human evolution is drastically changing the field so it has been an exciting time there with many great discussions."

Condolences to…

The family of **Kenneth O. Seewald** who passed away on December 9, 2013. Ken graduated from Baylor with a BA in Geology in 1955 and an MA in Geology in 1959.

To Dr. Bill Hockaday and family in the passing of his father, **William Hockaday**, on July 25, 2014.

The family of **Carl Kenneth "Kenny" Schwartz Jr.** who passed away on January 14, 2014.

Where Are They Now? (cont.)

Congratulations to…

Michael and Robyn (Marchand) Hillerman (MS, 2005) on the birth of their son, Michael David, on September 21, 2013.

Dave (MS, 2009) and Stephanie (Capello) Coffman (MS, 2008) on the birth of their daughter, Vivian Aileen, on October 24, 2013.

Mark and Julia (Kahmann) Robinson (MS, 2005 & PhD, 2008) on the birth of their daughter, Anne Karlin, on October 25, 2013.

Nick and Emyris (Short) Lane (BA in Earth Science, 2007) on the birth of their triplet sons, Lucian, Aiden, and Malachi, on March 20, 2014.

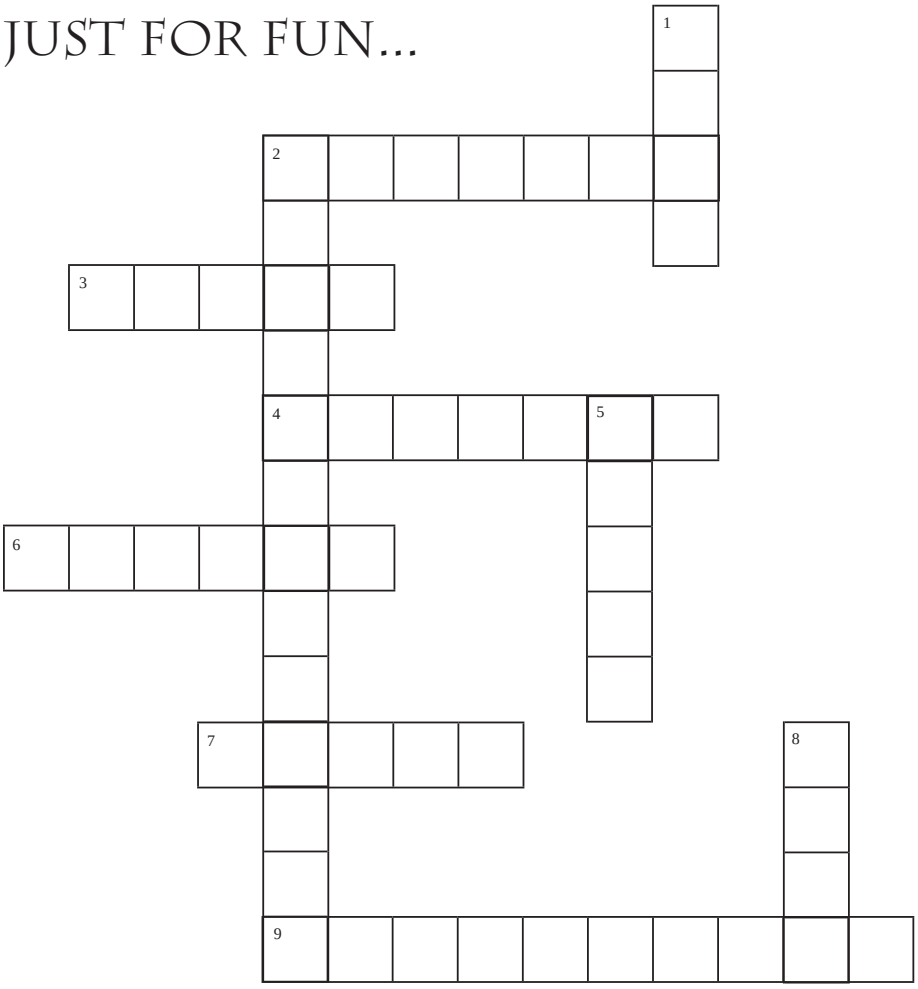
Curtis (MS, 2012) and Aislyn (Trendell) Barclay (PhD, 2012) who were married on June 24, 2014.

Emyris Lane and her triplets, photo courtesy of Holmes Photography

Michael David Hillerman

Julia Kahmann Robinson with her daughter Anne

JUST FOR FUN...



Across

2. any substance obtained by mining
3. a mass of water particles in the sky
4. a large sea wave produced by a submarine earthquake
6. a relic, remnant, or representation of an organism that existed in a past geological age that has been preserved
7. a fracture in the earth's crust
9. a sudden release of energy in the earth's crust or upper mantle

Down

1. a bend in stratified rocks that results in movement within the earth's crust
2. a natural upward projection of the earth's surface, higher and steeper than a hill and often having a rocky summit
5. hot molten rock usually formed in the earth's upper mantle
8. any hard mass of consolidated mineral matter

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: _____

_____

_____

Suggestions: _____

_____

_____

BAYLOR®
HOMECOMING 2014

Please join us!

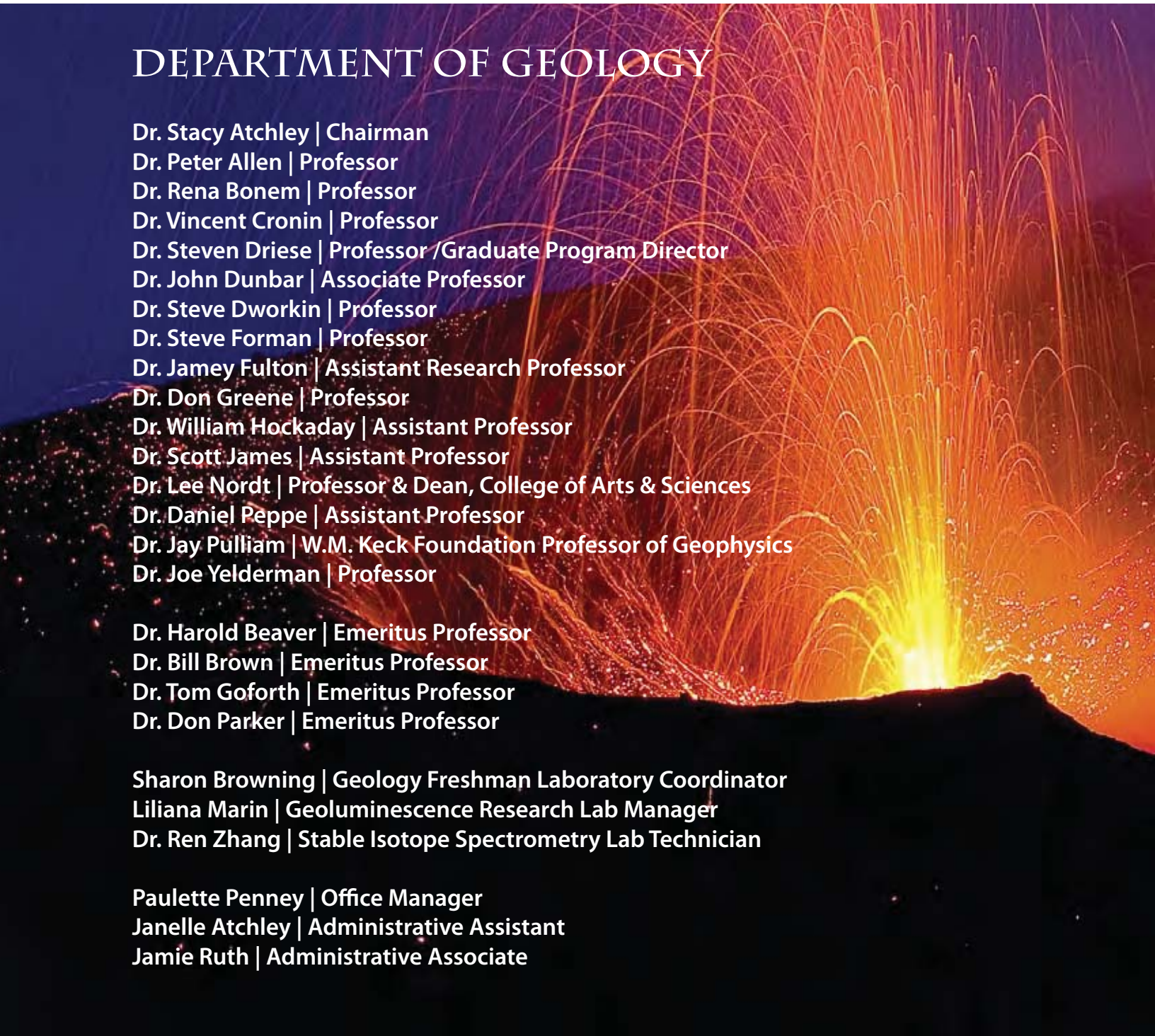
GEOLOGY OPEN HOUSE

Saturday, November 1, 2014
10:00–11:30 am*
Baylor Sciences Building, E401

*Please note date and time adjustment from our usual gathering.

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

Change Service Requested



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Dr. Peter Allen | Professor
Dr. Rena Bonem | Professor
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