



TEXAS TECH UNIVERSITY
Department of Geosciences™

Caprock Connections

Fall 2016



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**WE BUILD
INNOVATORS**

www.artsandsciences.ttu.edu

From The Chair

Jeff Lee

Professor & Department Chair



Welcome to our first (in many years, at least) Department of Geosciences Alumni Newsletter! We're delighted to update you on what's happening in our programs. Our enrollment is strong, with roughly 300 undergraduate Geology/Geophysics majors and 50 in Geography. At the Master's level, we have 16 in Atmospheric Sciences, 31 in Geology/Geophysics, and 10 in Geography, with 27 in the PhD program (from all three programs). The graduates in all of our programs continue to get good jobs, at least in part due to our reputation for educating and mentoring high quality students and our invaluable alumni networks. Our research programs are expanding. We're publishing in the leading journals and, just to brag a bit, we brought in more research money this past year than any other department in the College of Arts and Sciences.

Our alumni play an invaluable role in our success, both now and in the future. We are considering the establishment of a Department Advisory Board. If have you thoughts on the function of the Board or an interest in serving, please contact me at jeff.lee@ttu.edu or (806) 834-8228.

Best wishes,
Jeff Lee



Dean's Circle Report

by Heather Anderson, BS Geology (2006), MS Geology (2009)

As students, many Geoscience Alumni were active in the Geoscience Society, the Student Chapter of AAPG, SGE and various other Geoscience Department and University organizations. Despite having graduated, there are still many ways in which to be active and engaged in the University. One way in which the College of Arts and Sciences (CAS) is both supporting the various departments in the College, including the Geosciences Department, and bolstering alumni participation in the University is through the newly created CAS Dean's Circle Advisory Board.

Created in 2015 by CAS Dean, Dr. Brent Lindquist, the Dean's Circle is composed of representatives from across the 15 Departments that make up the College, including Geosciences. Three members currently represent the Geosciences Department: Matt Williams (BS Geology '81) an independent oil and gas Geologist; Kristie White (BS Geophysics '97), Senior Processing Geophysicist at TGS; and Heather Anderson (BS Geology '06, MS Geology '09), Reserves Advisor at ExxonMobil. The mission of the Dean's Circle is "to assist the Dean and the College in creating innovative opportunities through professional expertise and financial assistance to support the scholarly vision of the College".

The Dean's Circle Events Subcommittee seeks to bolster alumni engagement through annual Alumni Receptions and a newly created young alumni group. Alumni receptions connect fellow alumni and current CAS faculty and students, and provide an opportunity for alumni to learn about current activities and the financial needs of the College. In 2016, the Dean's Circle created the Young Innovators Alumni Group, targeting CAS alumni who have graduated from TTU in the last 10 years. The first meeting of the group was held in Houston in the Spring of 2016 and was attended by several Geosciences Department alumni. The group is currently being developed in metropolitan areas across the state.

In 2016, the Dean's Circle also created the "Dean's Circle Student Scholarship Fund" to financially support current CAS students. In the future, the Board is looking to grow its giving base so that more student scholarships and programs can be financially supported within the College and the Geosciences Department.

The Geoscience members of the Dean's Circle are proud to represent the Geosciences Department and hope that fellow alumni will also engage in these activities and financial giving. By joining forces with other CAS alumni, we can all increase the prestige of the College and the Geosciences Department, grow the student population, and support College and Departmental programs.

Science Report

by Dustin Sweet, Assistant Professor (Geology)

Dr. Dustin Sweet, and MSc. student David Brannan recently published results in the [Journal of Sedimentary Research](#) assessing the fluvial overprint of glacially modified grains. Dr. Sweet and Mr. Brannan flew from the thriving metropolis of McCarthy, Alaska (population 28), at the foot of the Wrangell Mountains, and landed on a bar in the braided Chitina River (Fig. 1). Here they met up with local guides and proceeded to spend the next six days floating down the river sampling active river sediment on bar surfaces every 5-7 km along the 188 km stretch of river. The research goal was to assess the relative ratio of fluvially to glacially induced microtextures on quartz grain surfaces (Fig. 2). Dr. Sweet and Mr. Brannan found that 1) the fluvial microtextures do generally increase with distance downstream; and 2) the fluvial-to-glacial ratio increased downstream of river tributaries, but decreased downstream of glacial tributaries. The researchers expected that fluvial microtextures would generally increase downstream, but did not anticipate that the results would be able to decipher river or glacial confluences in the data. These data are the first of its kind. Another MS Student working with Dr. Sweet, Matthew Pippin, just completed his thesis on another river. The results of Mr. Pippin's thesis largely corroborate with the Chitina River data set. Dr. Sweet's long-term research objectives for this subject are to extrapolate the modern data into ancient glacial deposits and see if microtextures on quartz grains could serve as a proxy for proglacial deposition, the extent of paleo-ice fronts and/or paleo-river hydraulics. Stay Tuned!

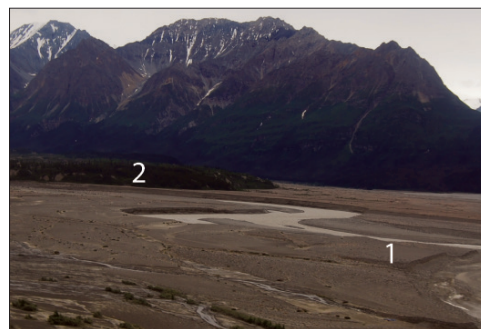


Figure 1

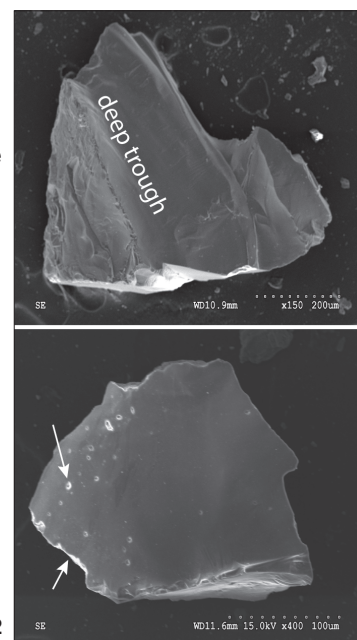


Figure 2

Figure 1: Aerial Photo of the upper Chitina River. Distally, the coast range mountains rise above the braid plain of the Chitina River. Horizontal lineaments at the upper limits of the vegetation are lateral moraines from previous glacial maxima. 1) Denotes the bar that our plane landed on. 2) Denotes the current terminal moraine of the Chitina Glacier. Distance between points 1 and 2 is about 1.5 km.

Figure 2: Scanning Electron Micrographs of quartz grain microtextures. (Upper) Glacial transport can create stylus features on quartz grains. This micrograph demonstrates a deep trough where one grain gouged a deep and linear abrasion into another grain. (Lower) Fluvial transport produces percussion marks. White arrows point to two different types of percussion features, v-shaped cracks and edge rounding, that are attributed to fluvial transport in this study.



Geoscience Society

by Audrey Pattat, Geoscience Society President

The Geoscience Society promotes fellowship through research and service. In Spring 2015, the Geoscience Society helped put on Student Research Day in the department, where 33 students presented research posters to faculty and peers. Last February, society volunteers partnered with the American Association of University Women to hold Tech Savvy—a one day camp for middle school girls to learn about opportunities in STEM careers. Arbor Day (pictured above) was celebrated by the whole university in April, with several of our members helping plant flowers to beautify the campus that we love. This fall the GSS continued to promote representation of the Texas Tech Department of Geosciences beyond its borders by sponsoring both undergraduate and graduate students to attend the GSA Annual Meeting in Denver, CO. The society looks forward to subsidizing student-selected guest speakers for the department's Friday Colloquia to broaden the knowledge of both faculty and students. The Geoscience Society will also continue our tradition of community service by volunteering at the Museum of Texas Tech, as well as with the Friends of the Library, and hopefully many more!

Meet Our New Faculty



Dr. Zhe Zhu
Assistant Professor

Professor Zhu received his BE (2006) in Remote Sensing Information Engineering from Wuhan University, China and his Ph.D. (2013) in Geography from Boston University, USA. He was a Post-Doctoral Associate in Department of Earth and Environment from Boston University (2013-2014), and then a research scientist in ASRC Federal InuTeq at USGS Earth Resources Observation and Science Center (2014-2016) for land change studies. Dr. Zhu now joins the faculty as an assistant professor of Geography. His research interests include remote sensing (particularly of forests, urban, and clouds), land cover and land cover change, digital image processing, time series analysis, and climate change.



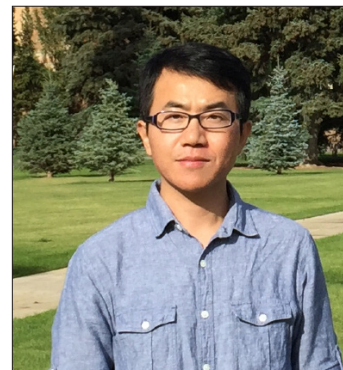
Dr. Kate Souders
Research Assistant Professor

Dr. Kate Souders is working with Professor Paul Sylvester to establish the Mineral Isotope Laser Laboratory (MILL). She received her B.S. (honors, Geology) from Clemson University, M.S. (Geology) from the University of Wyoming, and Ph.D. in Geochemistry from Memorial University (Canada). Kate was an NSERC-CREATE Postdoctoral Fellow (2012-2014) at Memorial University and then held research positions at Arizona State University and the University of California, Davis. Kate's research interests include development and application of in-situ micro-analytical techniques (LA-(MC)-ICPMS, SEM, EPMA) to determine the elemental and isotopic compositions of minerals. She applies the information to understand the origin and evolution of the Earth's crust and differentiation of the mantle, and the provenance of detrital heavy minerals.



Dr. Shuo Wang
Research Assistant Professor

Shuo Wang joins the Atmospheric Science Group of Dr. Brian Ancell, currently working on a postdoc at the U. of Regina. Shuo has a background in hydrometeorology and statistics, and plans to use these skills to apply new statistical techniques to the postprocessing of real time atmospheric forecasts to improve prediction of high impact events such as severe convection and flooding. He also plans on coupling the real time atmospheric forecasts to hydrologic models for flood prediction.



Dr. Yonggang Wang
Research Assistant Professor

Dr. Yonggang Wang was hired to work with Eric Bruning, Chris Weiss, and John Schroder. He has a background in cloud physics and precipitation. His research history is very diverse, with focus on entrainment and detrainment processes in cumulus clouds, Arctic boundary layer convection and precipitation, and the regional impacts of climate change on precipitation patterns. He has worked with ground-based and airborne radar and in-situ observations of clouds, and has also employed numerical weather prediction and cloud simulation simulations in his studies, including at the large eddy scale.

2016 Field Camp

by Hannah Cunningham, BS Geosciences (Geology; 2016)

The original plan for 2016's Field Camp was to travel to Glacier National Park in Montana. Everyone was excited for the opportunity to see a glacial landscape and new sedimentary features so different from those near Lubbock where the shorter field trips occur. There was some disappointment when we learned that our plans had changed and we were to spend the time in the Manzano Mountains instead. Looking back, I believe our trip to the Manzanos was more helpful in preparing us as scientists and professional geologists than the trip to Montana would have been. We were in an area where Dr. Yoshinobu and his graduate students are still piecing together how the area evolved, so instead of sightseeing in well understood surroundings, we were forced to think for ourselves about what we saw, and were able to contribute to the first definitive geologic interpretation of the area. On previous field trips we were mapping in areas where the geology was generally well understood, but in field camp our interactions with the faculty and graduate assistants was more peer-like. The days were long, the hikes steep and blocked by shrubs and thorns. We were swarmed by ladybugs on a few occasions. That is all part of fieldwork. We'll soon forget about those things, but the data we gathered, the way we learned to think, and the beautiful views made it a worthwhile trip full of happy memories. Thank you to Dr. Yoshinobu, and our awesome TAs, Matt, Vinny and Travis!

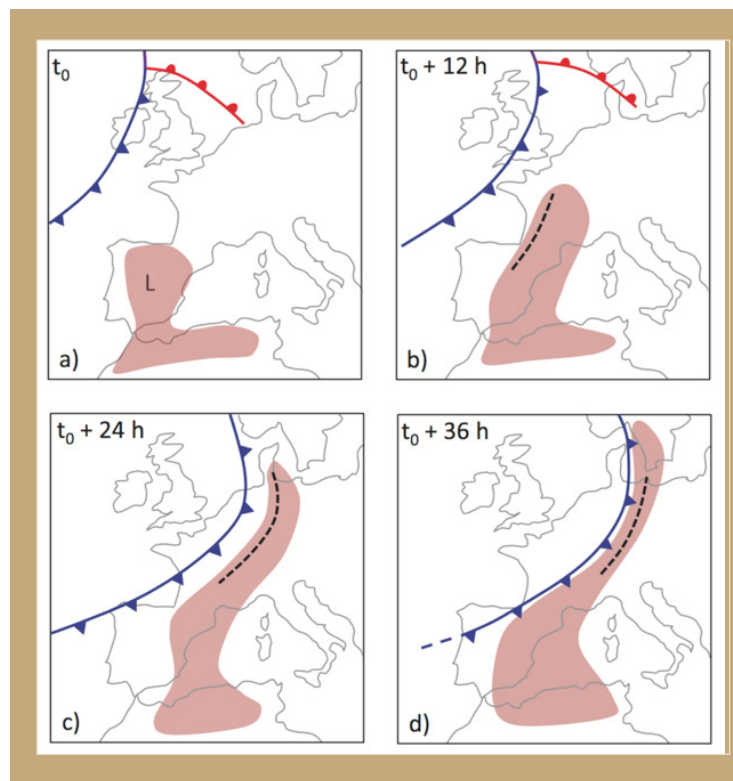


Science Report

by Johannes Dahl, Assistant Professor (Atmospheric Science)

Why do western European thunderstorms often occur ahead of a cold front?

Normally, low-pressure systems are associated with warm and cold fronts. In the image at right, a cold front is shown as a blue line with triangles and a warm front as a red line with half-circles. Between these boundaries lies the warm sector, which in the summer is typically associated with hot and fair weather. As is well known, the location where thunderstorms typically develop is the cold front. However, in the summer months, thunderstorms often develop several 100 miles ahead of the cold front. Storm development in these cases is tied to a third boundary referred to as “prefrontal convergence line.” While this has been known for some time, [new research](#) led by Dr. Johannes Dahl in Texas Tech’s Geosciences Department has now identified the cause of this convergence line. Using numerical simulations as well as observations, the ATMO scientists showed that the culprit is hot, unstable air (called “elevated mixed layer” or EML), which is transported northward off of the Iberian plateau east of the cold front. At the western edge of this plume of hot air, rising motion occurs, which results in the convergence line and the frequent occurrence of cloudiness and thunderstorms ahead of the cold front. The figure to the right shows the typical progression over 36 hours, revealing how the EML air (pink shaded region) is infiltrating the warm sector ahead of the cold front.



Stay Connected!

We Want To Hear From You!

Geoscience Alumni, Keep Up Your Connections With Us! We would like to hear from you! If you would like us to include a profile of your career or some recent news in a future newsletter, or just update your contact information, please drop us an email or letter or visit the [‘Texas Tech Geosciences Alumni’](#) page on Facebook.

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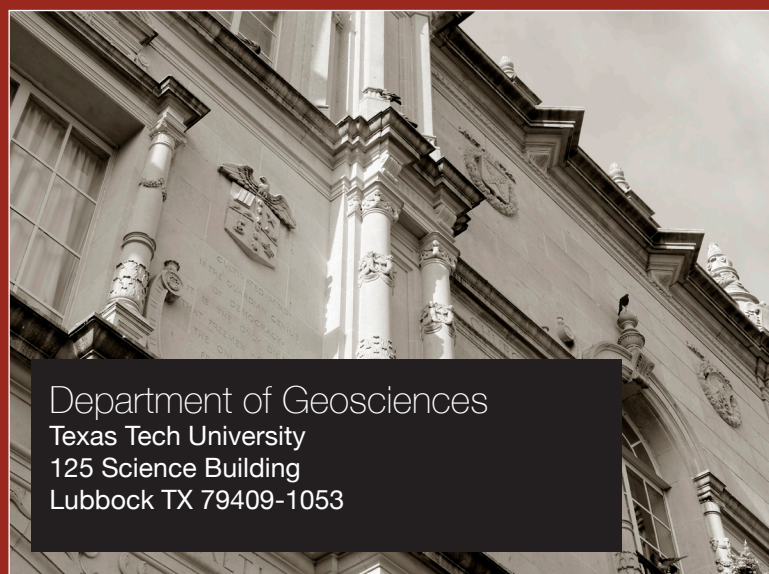
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AAPG Student Chapter

by Jared Olafsson, AAPG Student Chapter President



TTU's AAPG chapter has grown drastically in the past few years thanks in large part to successful leadership and active members. We continue to support students academically and socially in their pursuits to achieve employment in the oil and gas industry by sponsoring networking events and providing the opportunity to volunteer in the Lubbock community.

The TTU AAPG student chapter was proud to send 10 of our members to this year's AAPG Student Expo in Houston on September 7, 2016. Given that registration was capped at 400 students this year, we were excited to have so many Red Raiders make the trip. At the Expo, students had the opportunity to share their research and network with industry experts. It was an excellent experience for all participants.

Members of the TTU AAPG student chapter also had the opportunity to present their research and meet with industry recruiters at the AAPG Rocky Mountain Rendezvous (RMR), in Laramie, Wyoming. The RMR is similar to the Houston Student Expo but on a smaller scale, with only ~150 students in attendance. The RMR was an great opportunity for TTU students to get more face time with leading oil and gas companies such as Shell and Exxon Mobil. The RMR was a successful trip for all involved!

In Texas Tech's 2nd ever competition in the AAPG Imperial Barrel Award (IBA), we are proud to announce that our team placed 3rd at the Southwest regional competition in Dallas, TX and brought home a check for \$500! Preparation has begun for this year's team and we are confident they will be more experienced and prepared than ever before.

Our AAPG chapter also continues to remain active in our community by cleaning up our strip of highway near Wolfforth, cleaning up the baseball stadium on campus after games, and assisting the Geoscience Society in various events like the Friends of the Library Book Sale and Dino-Day at the museum. Our annual chili-cookoff tailgate will be held at the TTU vs Texas game on Nov. 5th. We look forward to seeing everyone there!

This year's officers are looking forward to an exciting and successful school year representing Texas Tech University to the fullest! Wreck 'em!



TTU AAPG members attending the 2015 AAPG/SEG Student Expo. Members from left to right: Tyler Goodell, Jared Olafsson, Jenna Kohn, Eric Friedman, Daniel Pike

Geoscience Society Football Tailgates

Come meet fellow Geosciences Department folks, enjoy some food, and cheer on the Red Raiders!

15 Oct 2016

TTU vs West Virginia
Homecoming

22 Oct 2016

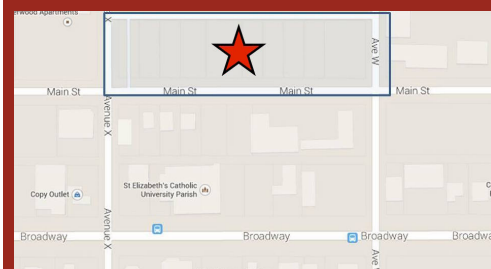
TTU vs Oklahoma
Annual AAPG Chili Cook-off

5 Nov 2016

TTU vs Texas

When: Two hours before kick-off

Where: Parking lot on Main Street across from St. Elizabeth's University Parish



Come tailgate with us!

Alumni Profiles



Ada Warren

As an undergraduate student, Ms. Ada Warren began working at the Texas Tech Center for Geospatial Technology (CGST) as a Geographic Information Systems (GIS) Analyst. This position included working on projects at the local, state and federal levels ranging from calculating aquifer volumes to enhancing parcels to improve local emergency response accuracy. This position and support from the Geography Program spurred her interest to pursue a degree in Geography and focus on GIS.

She graduated in 2007 with a bachelor's in Geography, and in 2010, with a master's in Interdisciplinary Studies with a focus on GIS. Upon graduation, Ms. Warren accepted a position as a Geospatial Analyst for the National Geospatial-Intelligence Agency (NGA) in Washington, DC. NGA leads the production of geospatial intelligence (GEOINT) for the entire federal government which is critical to the security of our nation.

In 2013, Ms. Warren accepted a position as a Human Geographer for the NGA Support Team at the United States Africa Command (USAFRICOM) headquarters in Stuttgart, Germany. In this role, Ms. Warren supported humanitarian crises and military operations including Operation UNITED ASSISTANCE where she served as the GEOINT lead for USAFRICOM's Ebola Crisis response. As of February, Ms. Warren moved back to the NGA headquarters in Springfield, VA to continue her role as a Human Geographer focused on the North Africa and Sahel regions.

Ms. Warren credits her success in the intelligence community to the encouragement from the Geography Program and the incredible opportunity of working at the CGST prior to graduation because she "entered the real world with real world experience".



Michael B. Portnoy, P.G.

Michael B. Portnoy (Mike) holds three degrees from Texas Tech: a B.S. in Geology (1983), an M.S. in Geology with an emphasis in geochemistry (1987), and an M.B.A. with an emphasis in finance (1988). Mike also has an M.S. in Hydrogeology from Western Michigan University (1990). In addition, Mike is a registered professional geologist in eight states, including Texas.

After Mike received his last degree, he went to work as a Project Hydrogeologist for Entrix, an environmental consulting firm based in Houston. In 1992, Mike joined a startup environmental consulting firm, EC-Applied, as a junior partner and held the positions of Senior Hydrogeologist and Chief Financial Officer (CFO). In 1997, EC-Applied was sold to Zephyr, an environmental consulting firm based in Austin. After three years at Zephyr, where he also served as Senior Hydrogeologist and CFO, Mike started Portnoy Environmental, Inc. (PEI), a Houston-based environmental engineering and consulting firm that provides services worldwide through offices in the U.S., Thailand, and Australia. PEI has three main focuses: Compliance & Engineering, Remediation & Field Services, and Mercury & Chemical Services.

Mike's day-to-day activities are within the Compliance & Engineering and Remediation & Field Services Groups, where he performs hydrogeologic studies, site investigations, remediation system design and oversight, environmental compliance audits, and subsurface characterization, groundwater contamination, and waste characterization studies. Mike also supports the Mercury & Chemical Services Group, which is a leader in trace metals sampling and analysis, plant-wide mercury assessments, distribution, speciation, and partitioning studies, and chemical decontamination and spent chemistry processing.