DEPARTMENT OF PHYSICS AND GEOSCIENCES

Geosciences Newsletter

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Program News

Eight Undergraduate Students Graduate During Spring 2014 Ceremonies

Justin Mauck, Brent Winborne, Andrew M. Hancock, Zachary Hull, Jacob Gomez, Juan Cavazos, Devon Cuevas, and William Sundland received their Bachelor of Science degree in Geology. The May 9, 2014 TAMUK Commencement was held in Steinke Physical Education Center. Graduating students met at 11:30 in Manning Hall for a group photo with faculty. We are very pleased to supply graduate schools and industry with these graduates.

Justin Vaughn Mauck graduated this spring with a Bachelor of Science degree in Geology. Justin graduated Summa Cum Laude and was a member of the Honors College. His honors project entailed field work with Dr. Ford in Big Bend National Park using the pXRF to differentiate Eocene volcanic rocks. His HC project is entitled "Using pXRF to Map and Correlate Tuffs in the Big Bend National Park". He was president of the American Association of Petroleum Geologists Kingsville student chapter and helped organize a trip to the AAPG annual meeting that was held in Houston, TX. He was the teaching assistant for both Field Geology and Field Mapping and Cartography. Justin has received scholarships from the Corpus Christi Geological Society, American Institute of Petroleum Geologists, and American Institute of Professional Geologists. In the fall, he will continue his education while pursuing a graduate degree at the University of Texas. He is appreciative that he signed up for the all-important physical geology course and found his passion for the science.

Brent Winborne graduated with his Bachelor of Science degree in Geology. Brent Winborne was a teaching assistant in the Sedimentology/Stratigraphy course for Spring of 2013. He was a teaching assistant in Mineralogy (Fall, 2013) and Petrology (Spring, 2014). He was also the Spring 2013 and 2014 teaching assistant at the Big Bend Field Camps. Brent Winborne and Justin Mauck assisted Dr. Mark Ford in an undergraduate Geochemical study of the volcanic in Big Bend National Park. Brent has received scholarships from the Corpus Christi Geological Society. He is currently working as a geologist at Nye Exploration with Patrick Nye and Austin Nye.

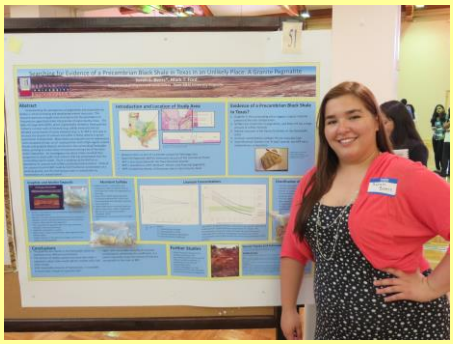
Andrew Hancock graduated with his Bachelor of Science degree in Geology. Andrew Hancock entered the Geosciences Program as a post-baccalaureate in geography from Texas State University-San Marcos. Andrew Hancock has applied to UTSA for the Fall semester. **Zachary Hull** graduated with his Bachelor of Science degree in Geology. Zach taught a number of undergraduate labs for the Department. **Jacob Gomez**, **J.R. Cavazos**, **Devon Cuevas**, and **William Sundland** graduated with their Bachelor of Science degree in Geology. Zachary Hull, Jacob Gomez, and Devon Cuevas accepted jobs with Gisler Brothers Mud-Logging Company. William Sundland accepted a job with ALS Empirica. We are thankful for all of their contributions to the success of this program.

Eleven TAMUK Students Received GIS Certificates

On May 1, eleven students received their GIS Certification. Ten undergraduate geology majors **Daniella Herrera**, **Robert Najera**, **Gloria Salinas**, **Robert Schoen**, **William Sundland**, **Charles Winn**, **Devon Cuevas**, **Jacob Gomez**, **Justin Mauck** and **Brent Winborne** completed all four courses (Introductory GIS, Field Mapping and Cartography, Advanced GIS, and Remote Sensing). One graduate student, **Armando Barrera** completed the three required classes (Introductory GIS, Advanced GIS, and Remote Sensing). Congratulations to the students and GIS faculty for all your efforts.

Javelina Research Symposium

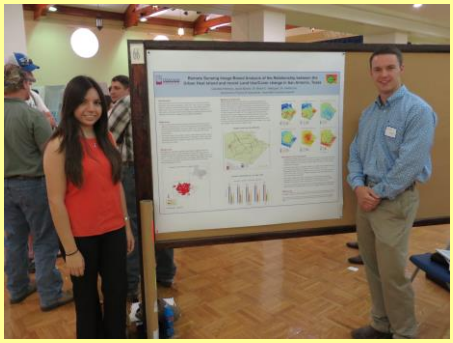
The 2nd Annual Javelina Regional Research Symposium was held on Tuesday, April 29 for TAMUK undergraduate and graduate research students to present their research. Three of our majors presented their research to judges in an in house competition. This is a great venue to share research progress with faculty and students from across the campus.



Searching for Evidence of a Precambrian Black Shale in Texas in an Unlikely Place: A Granite Pegmatite

Authors: Sarah Beers, Mark T. Ford

Abstract: Understanding the petrogenesis of pegmatites and associated ore bodies is critical to finding and developing mineral resources. This research examines multiple lines of evidence for the assimilation of Precambrian-aged black shale into granites of Llano County, Texas. The Badu Hill pegmatite (BHP), which is genetically related to these granites, contains a unique suite of minerals (e.g. sulfide minerals) and has elevated concentration of some elements (e.g. U, Zr, REE's). One way to increase the amount of uranium and sulfur in these systems is by the assimilation of black shale. Black shales are typically marine sedimentary rocks composed of clay- to silt- sized particles with a high organic content. Marble and graphite deposits are found in the surrounding Packsaddle Schist, pointing to a near-shore environment during time of the black shale's deposition. An investigation into black shales revealed their propensity to retain sulfur and uranium that has precipitated from the surrounding marine water. There is evidence at the BHP for an abundance of uranium and sulfide-containing mineral phases. Some of the uranium found at BHP could be from fractional crystallization of a parental granite, but the total amount seen is unattainable by fractionation of a closed system.



Remote Sensing Image-Based Analysis of the Relationship between the Urban Heat Island and recent Land Use/Cover change in San Antonio, Texas

Authors: Daniella Herrera, Jacob Byerly, Brent C. Hedquist, and Haibin Su

Abstract: Recent growth in the San Antonio Metropolitan Area has led to urban expansion and sprawl. This project identified the relationship between the urban heat island (UHI) effect and recent land use/cover changes, particularly urbanization, in San Antonio utilizing remote sensing (Landsat & MODIS sensors). The primary objective of the study was to detect recent urbanization effects on land use/cover and surface temperatures (UHI) within the San Antonio Metropolitan Area from 2006-2013. The initial analyses focused on the land surface temperature (LST) patterns, including the magnitude of the UHI using GIS and remote sensing tools. The second part of the project included identification of urban versus non-urban landscape change detection utilizing the USGS Land Cover Databases (NLCD) and change in impervious surfaces from 2006 and 2011. Preliminary results confirm the strong relationship between higher temperatures and urban (impervious) surfaces, with the greatest change in the UHI occurring along and near the outer edge of the city, particularly along the 1604 North Loop Highway. Results from this project are expected to aid city policy makers in San Antonio to determine where heat mitigation techniques could be implemented to lower impacts from the UHI.

John S. Buckley Geosciences Field Station

We have had a wonderful fieldtrip and field camp staging site for most of our geology field work. Dr. John Buckley has provided us with the location and resources to make this a first class field station. I know students and faculty join me in thanking Dr. Buckley. It is about time that we formally acknowledge this support with the name "John S. Buckley Geosciences Field Station."

Previously, our camp sites in Central Texas were limited to State Parks that provided a place to pitch a tent, cook meals, and take showers. The costs ranged from $20 - $40 each night and locations were rarely close to our outcrops of interest. Also, we were worried about leaving our equipment in the camp grounds. Dr. Buckley volunteered his land along the Pedernales River at no costs to our Program.

Dr. Buckley has made steady improvements on the property to further enhance our experiences. We will be honoring John with a plaque to thank him for all he provides us in support of our field training program.

We Led Two Fieldtrips to Central Texas This Spring

Mark Ford, Thomas McGehee, Dan Jackson, Brent Hedquist, John Buckley, and Vernon Kramer led the Coal Creek Serpentine Ophiolite three day March 20-22 fieldtrip. Twenty-two TAMUK students from our Petrology and Field Geology classes and eight Del Mar College students in Field Methods worked in teams to study igneous and metamorphic rock outcrops in Central Texas.

The Geosciences Program is introducing a new writing intensive component in our fieldtrips to encourage a writing culture in the program. Our students read professional publications and write an introduction to the fieldtrip that includes the pertinent information from the publications. This year the faculty was so impressed with the papers submitted we are awarding a polished sphere for the top paper. **Matthew Dabney**'s paper entitled "A Field Trip Guide to the Central Texas Precambrian Ophiolite and surrounding granite bodies" won the first award (polished Brazilian agate sphere) which can be viewed on Professor Jackson's website at http://www.jacksongeology.com/common_files/Llano_Area/Dabney_Coal-Creek_introduction.pdf.

Frank Roberts acquired permissions for access to the Coal Creek Serpentine Quarry and attended this part of the fieldtrip. Joy Smith gave us permission to conduct field exercises on the well-exposed ophiolite. Jim Chude provided instructional support to students on both days of the fieldtrip.

Dan Jackson, John Buckley, Haibin Su, and Thomas McGehee led the Pedernales Creek area mapping project three day (April 3-5) fieldtrip. Eleven TAMUK students from our Field Geology, Field Mapping Cartography, and Geomorphology classes mapped an unconformity contact between the Paleozoic Marble Falls Formation and the overlying Hammett and Cow Creek Cretaceous Formations on the Mike Maples property. Matthew Dabney also won the second award (polished Brazilian agate sphere) after turning in the best literature review on the second fieldtrip to Central Texas. Matthew is a very good technical science writer with ability to develop and organize the literature review into a thematic presentation. Great job Matthew Dabney!

Summer Field Camp at Big Bend National Park

Sarah Beers, Matthew Dabney, Adrian Dancer, Jeff Elsworth, Antonio Hernandez, Dakota Kubiak, Emilio Martinez, Gloria Salinas, Evan Taylor, and Charles Winn attended our third annual field camp to Big Bend National Park. We held our base camp at the Terlingua Ranch Lodge in the Christmas Mountains. This is a wonderful location in the western edge of the Christmas Mountains Quadrangle. Jim Chude owns a piece of property on the boundary of the Texas State School Property in the Christmas Mountains.

We are presenting three new awards this year to honor our best field students in a special category. The Best Overall Field Performer in project work, Best Field Observations Notebook, and Best Final Field Report are key performance areas in professional development measured by faculty. **Jeff Elsworth** is the winner of the **Best Overall Field Performer** award. Jeff is ranked within the top two students in each performance area measured in individual projects, field notebook, and final report. **Dakota Kubiak** is the winner of the **Best Field Observations Notebook**. His field notebook is one of the best notebooks turned into our program. **Matthew Dabney** turned in the **Best Final Field Report** this year. Mr. Dabney won his third writing award this semester.

Mark Ford, Thomas McGehee, and Dan Jackson organized, supervised, and evaluated the field activities and projects performed by our majors. We are very impressed by the individual performances of each of our majors. Mr. Brent Winborne and Veronica Nieto were Field Teaching Assistants this camp. This is Brent Winborne's second assignment as a field Teaching Assistant. Both performed like high-level graduate assistants. Jim Chude and Brent Winborne also scouted a future field exercise in the Christmas Mountains adjacent to our new field camp at Terlingua Ranch. We are excited to announce that we have a perfect location for this project.

We want to thank all the staff of the Terlingua Ranch that provided a top facility for this summer's field camp. The faculty expresses our special thanks to both of our Teaching Assistants that drove vehicles, provided field instructional assistance, and provided daily logistical support. We are very thankful that Jim Chude provides his time and a considerable amount of field support for our majors. We are fortunate to have Amber Conner on our staff to assist in correcting the final reports.

Progress Accomplished on Undergraduate Research Projects

Using pXRF to Map and Correlate Tuffs in the Big Bend National Park

Brent Windborne and Justin Mauck spent 8 days over spring break with Dr. Mark Ford hiking and collecting samples (with a special research permit) in Big Bend. The field work was physically challenging at times and included a 16 mile round-trip hike into the highest peaks in the heart of the park. As is often the case with research, more questions were raised then answered with this trip. One of the existing geologic maps that the trio used as a guide turned out to be more misleading than useful and there are certainly some volcanic units that need to be better defined and mapped. Despite the minor setbacks, this ambitious work laid the foundation for future, more directed studies on smaller areas within the park. Mr. Mauck presented his work to around 35 people at an honors seminar in early May. Additionally, Mr. Mauck and Mr. Winborne became published authors when their abstract was accepted by the Geological Society of America (GSA) for presentation at the Rocky Mountain and Cordilleran sections joint meeting that was held in Bozeman, MT in May. Unfortunately, we could not secure the financial resources required to get Mr. Mauck and Mr. Winborne to Montana to present this interesting work.

Chemostratigraphy of the Eagle Ford Shale

David Wood, Matthew Dabney, and Jake Ewing have made excellent progress in this project. Matthew Dabney and Jake Ewing join David Wood as Certified Operators of the pXRF in our Geochemical Research Group. Both were certified after taking classes in Radiation Safety and pXRF operation. They completed their analysis of cuttings from three wells in the Eagle Ford Shale. Matthew Dabney (40 hours), David Wood (31 hours) and Jake Ewing (30 hours) collected chemical data on each sample and compared the chemical analyses to data collected from Pioneer Oil and Gas. They are currently analyzing the data to construct the chemostratigraphy of the Eagle Ford Shale at these three locations. They have prepared an introduction to a potential publication that includes a literature review. We hope to have this published and presented in the 2015 GCAGS conference.

Searching for the Oldest Black Shale in Texas

Sarah Beers continued her research in this area with Dr. Mark Ford and presented at the Javelina Research Symposium in April. Ms. Beers has begun geochemical modeling of the concentrations of uranium and other elements and we hope she will be able to present her findings at a national conference in the fall or a regional conference in the spring of 2015.

Remote sensing image-based analysis of the relationship between urban heat island and land use/cover changes in San Antonio, Texas

During the spring semester, Daniella Herrera and Jacob Byerly did a great job compiling and analyzing a large dataset of remotely-sensed images of land cover and surface temperature in San Antonio. They presented preliminary research results in April at the Javelina Research Symposium and Daniella plans to do additional work on the project this summer. Preliminary results from this initial phase of the project will be used in formulating an externally-funded grant proposal later this year in order to expand the project and produce further findings.

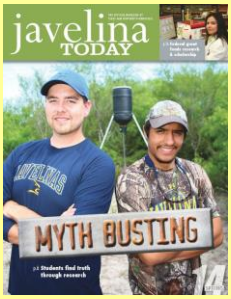
Mineral Chemistry of the Badu Hill Pegmatite

Katelyn Wallace made progress with Dr. Mark Ford on producing a SOP (standard operating procedure) for the pXRF during the spring as we look to improve our rock processing abilities so that we can analyze powdered minerals and rocks with the instrument. Jonathan Tuck and Dr. Mark Ford, with the help of Casey Mibb, collected nine different granite and rhyolite samples from the Llano region for a petrology honors project which aims to petrographically examine the specimens. Mr. Tuck is fine tuning the thin section making process at TAMUK and continues to work on the project over the summer.

Using Kingdom 3D Seismic Software in Oil and Gas Exploration

Casey Mibb has been working with Frank Cornish during the Spring semester. Learning the software requires a large time commitment and Casey is getting some tutorial time with Frank. We think it will require 1-2 years which is usual with learning high-end software. Casey does like what she has learned thus far.

Geosciences Highlighted in the Spring Javelina Today



Dr. Brent Hedquist was interviewed and featured in the "A moment with an expert" piece in the latest Spring *Javelina Today* magazine. The interview discussed the urban heat island effect and how our students have assisted the city of Kingsville in heat mitigation by recent tree planting projects across the city. He also discussed the benefits of utilizing GIS technology in research as well as the GIS capabilities in our department and across campus. In addition, Dr. Mark Ford and two of our students, Sarah Beers and Katelyn Wallace were highlighted in a section of the magazine discussing recent Title V grant awards, including the $15,000 award toward purchasing a portable x-ray fluorescence device, which was part of the $50,000 total cost for the equipment. A link to the online version of the magazine can be found here: http://viewer.zmags.com/publication/63a482a9#/63a482a9/1.

HIS, Inc Donation of Kingdom Software to Department

As part of our interest in future program development we would like to encourage our majors to take geophysics courses. In the short-term courses will be taught by local professionals, but our long-term goals include the addition of a Petrophysicist (Geophysicist) to our faculty. One of the courses we would like to add will be exploration geophysics that will include analysis of 3D seismic data. Our new acquisition of Kingdom software will be used in our current petroleum geology class and the exploration geophysics class. IHS (Information Handling Services) has supplied us with 10 licenses.

Sarah Beers and Bree Gonzalez Conduct Research with 8 High School Students

Eight students (Ariel Pena, Chris Esquivel, Yuliana Cardenas, Raelynn Mata, Roland Martinez, Jesse Rivera, Stephanie Garza, Julian Villalobos, and Brittany Hernandez) from the UBMS Program presented their research entitled "**Dinosaurs: What's for Lunch? Maybe you**." at a UBMS Banquet in the SUB Ballroom on July 2. Bree Gonzalez, Sarah Beers, and students worked on this research project for 20 days. Great job!

Brent Hedquist and Haibin Su Present Papers at AAG Conference

Drs. Hedquist and Su presented papers at the annual meeting of the Association of American Geographers in Tampa, Florida in April. The title of Dr. Hedquist's paper was, "Analyzing and mapping the urban heat island in a small, semi-arid South Texas city." Dr. Su's paper was titled, "Improving bathymetry mapping with multispectral imagery using Co-kriging interpolation method."

Mark Ford Presents at HGS

On April 9th, Dr. Mark Ford gave a presentation titled, "Using a Portable X-Ray Fluorescence (pXRF) Spectrometer for Lithogeochemistry Applications: Potential for Volcanic Stratigraphy and Shale Marker Beds," at the Houston Geological Society. The talk detailed some of the positives and drawbacks to such equipment and highlighted some of the ongoing student research at TAMUK. Dr. Ford also gave a talk on Big Bend National Park at Del Mar College in March.

Photo Gallery: Summer Field Camp

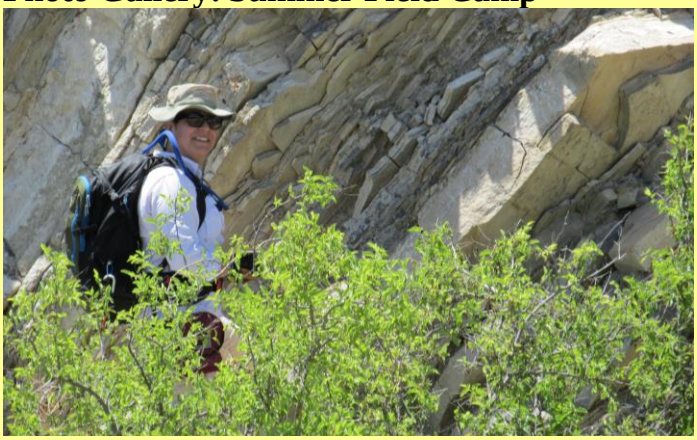



Photo Gallery: Field Trips