

**TEXAS TECH UNIVERSITY
DEPARTMENT OF GEOSCIENCES**

FALL 2009 NEWSLETTER



Callum Hetherington presides at the Fall 2009 Earth Materials field trip to the Harding Pegmatite Mine, New Mexico



TEXAS TECH UNIVERSITY

College of Arts & Sciences™

Department of Geosciences

Dear Alumni and Friends,

It is once again my privilege to introduce the Department of Geosciences newsletter. Last year's newsletter was a major production because there was so much to catch up on. This year, the news is a bit more manageable, with only one year to report on. Nevertheless, you will see that we have been busy with teaching and research.

The new undergraduate curriculum is nearly fully in place. Beginning in the Spring, 2010 semester, we will teach a 2-hour field course in strat/sed methods, and then will teach a 3-hour field mapping class during the summer. Along with a 1-hour field class in structural geology, these courses will provide students with a diverse range of field experience and still leave them time for summer internships.

Our undergraduate enrollments continue to grow, with nearly 150 majors as of this writing (46 freshman majors!). In part, this increase in enrollment tracks Tech's desire to grow to 40,000 students, but our rate of growth is significantly higher than the University as a whole. Because our new curriculum has many more required field trips, the enrollment increase adds continued stress to the budget. Thanks to contributions from many of you, our Excellence Fund is able to assist in paying for these field trips.

Graduate applications and enrollments remain strong and the Department received funds for two President's Doctoral Fellowships, one in geology and one in atmospheric sciences. Our graduates remain in high demand, with most obtaining job offers long before graduation.

In April, three Geosciences faculty (Hua-Wei Zhou, Pete Holterhoff, and me) and Lawrence Schovanec (Dean of the College of Arts & Sciences) met with Geoscience alumni at the Houston Racquet Club. This reception gave us the opportunity to bring our Houston area alumni up to date on Geoscience news. The presentations focused on growth in the College and Department, new additions to the geology/geophysics faculty, and recent student and faculty accomplishments. The reception, which was sponsored by Geosciences alumni Jim Saye, Matt Williams, Ken & Imelda Johnson, Kristi White, Michael Wisda, and Joe Termina, provided a wonderful opportunity to renew old acquaintances and build new connections. Plans are to make this reception an annual Spring event.

Transitions.

We say farewell to Dr. Chia-bo Chang, who retired at the end of August. In January, 2010, Chia-bo's position will be filled by Dr. Brian Ancell (Ph.D. University of Washington). Brian's specialty is numerical weather prediction.

We also say farewell to Barbara Graham, who managed the Geosciences office for many years and four chairpersons. Barbara's new job involves gardening and fitting out the mountain hide-away in New Mexico. We welcome Patti Shelton, formerly of the Department of Physics, as the new 'big boss' in the Geosciences office.

It is with regret that we announce the passing of Professor Deskin 'Jidge' Shurbet. Jidge began his geosciences career at Woods Hole Oceanographic Institute, where he worked on development of sonar technology. He taught geophysics at Texas Tech from 1956 until his retirement in 1994. The Shurbet family has asked that memorials be sent to the Deskin H. Shurbet Endowment. This endowment was set up at the time of Jidge's retirement by several of his former students and supports graduate research in geophysics.

Finally, please keep in touch. We hope to hear from you by mail or email, and hope you can visit us in Lubbock to see the many changes in the Department. Please also watch for alumni get-togethers at national AAPG and GSA meetings.

Best wishes,

Cal Barnes

From the Editor:

I apologize for the delay in finishing the Fall 2009 newsletter. This newsletter is shorter than the previous one because we have included only events of the last academic year (Fall 2008-Summer 2009). I wish that I had news and information from our alumni to include, but this depends upon you sending us news and information about you, your work, and your families. Please send your contributions to Alison. alison.winton@ttu.edu

Remember to check the department web page often to see what is happening !
<http://www.depts.ttu.edu/gesc/>

Jim Barrick

NEW SCHOLARSHIP FUNDS

Ann and Dennis Bell Geology Scholarship

We are very pleased to announce endowment of the Ann and Dennis Bell Geology Scholarship. Income from the endowment will be used to support the costs of geology field camp for students who work part-time prior to the field camp semester and have overall and Geosciences GPAs of 2.5 and 2.8, respectively.

Eddie David endowment

On Monday, September 14, Mr. Edward (Eddie) K. David announced the establishment of the Eddie David Named Grant endowment. This endowment will support the Texas Tech George B. Asquith Scholarship for Excellence in Petroleum Geology, and will be administered by AAPG. Contributions to the endowment will be matched by Eddie, up to a cap of \$100,000. We are still seeking funds to match the full \$100,000 – contact AAPG for details.

The dinner at which the endowment was announced was attended by Ann and George Asquith, Hwa-wei and Wendy Zhou, Cal and Melanie Barnes, and Peter Holterhoff.



Richard D, “Rick” Fritz, (Executive Director, AAPG), George Asquith, Cal Barnes , and Eddie David at the announcement of the Eddie David Named Endowment.

CONTRIBUTORS TO THE DEPARTMENT

Mr. Jason W. Currie	Geosciences Fund for Excellence
Mr. & Mrs. Albert Erxleben, Jr.	Geosciences Fund for Excellence
Captain and Mrs. Douglas S Finch	Geosciences Fund for Excellence
Mr. and Mrs. Bill D. Jackson, III	Geosciences Fund for Excellence
Dr. and Mrs. Walter Kessinger, Jr.	Geosciences Fund for Excellence
Mr. & Mrs. Brian Musgrave	Geosciences Fund for Excellence
Mr. Robert T. McNaughton	Geosciences Fund for Excellence
Mr. and Mrs. J. Lockert Sleeper, Jr.	Geosciences Fund for Excellence
Mr. and Mrs. Aaron B. Wilson, Jr.	Geosciences Fund for Excellence
Mr. and Mrs. Leonard W. Wood	Geosciences Fund for Excellence
El Paso Corp.	Geosciences Fund for Excellence
LNSS & Associates	Geosciences Fund for Excellence
Mr. Jason W. Currie	Geology Scholarship Fund
Marathon Oil Company	Geology Scholarship Fund
Mewbourne Oil Company	Geology Scholarship Fund
Mr. Paul & Mrs. Susan Hene	Frank M. Hall Scholarship Endowment
Mr. Sam Hene	Frank M. Hall Scholarship Endowment
GALLA-2, LTD	Frank M. Hall Scholarship Endowment
Brent & Susan May	Alonzo Jacka Scholarship
Mrs. Donna Hedgpeth-Jurica	Dr. Jerry Jurica Atmospheric Sciences Schol. Fund
Mr. Michael Portnoy & Ms. Vicki Cooper	Michael B. Portnoy Liquidus Scholarship End.
Mr. Paul & Mrs. Rowena Hilburn, Jr.	Deskin Shurbet Scholarship Endowment
Mr. William & Mrs. Joyce Miller	Deskin Shurbet Scholarship Endowment
Mrs. Ruth M. Trice	Deskin Shurbet Scholarship Endowment
Ms. Mary E. Watkins	Deskin Shurbet Scholarship Endowment
Ms. Deborah J. Caskey	Lewis G. Weeks Geosciences Endowment
Olin & Muriel Prather	Lewis G. Weeks Geosciences Endowment
American Assoc. of Petroleum Geologists	Lewis G. Weeks Geosciences Endowment
Dr. & Mrs. George Asquith	Vestal and Ouida Yeats Scholarship Endowment
Dr. and Mrs. James E. Barrick	Vestal and Ouida Yeats Scholarship Endowment

CORPORATIONS INTERVIEWING AT THE DEPARTMENT OF GEOSCIENCES

Citation Oil & Gas
Concho Resources
Energy Future Holdings
Hess
High Mount
Mewbourne Oil
Questar

GEOSCIENCES GRADUATES

B.S. GEOSCIENCES

FALL 2008

Kyle Engstrom – Senior Project: *Possibilities in redefining the Devonian/Carboniferous boundary using species of PROTOGNATHODUS.* (Barrick).

Brett Hamby – Senior Project: *3D models of faults of the Corsair Trend, offshore Texas* (Nagihara).

Ayobami Oyedeji – Senior Project: *Lithofacies, stratal architecture, and depositional model of an inner platform rudist complex, basal Edwards Formation, west-central Texas* (Holterhoff).

Jeffrey Wood

Daniel Wright - *Solubility of iron and potassium in jarosite with respect to pH and time* (Ridley)

SPRING 2009

Jeffrey Gonzales

Brendan Hargrove - *Syn depositional deformation of Permian strata in the Sacramento Mountains, Otero County, New Mexico* (Yoshinobu)

Sergio Ojeda – Senior Project: *Integrating three-dimensional laser-scanning and DGPS technologies for precise outcrop mapping: Hayes Sanstone, Guadalupe Mountains* (Nagihara & Holterhoff).

Ryan Sonntag – Senior Project: *Mapping of syn depositional structures, Sacramento Mountains, New Mexico.* (Yoshinobu).

SUMMER 2009

Sandra Caldron – Senior Project: *GIS-based reconstruction of the Canadian High Arctic at 8500 14Cyr B. P.* (Leverington)

Joshua Hopper – Senior Project: *Possible volcanic origin of the Martian outflow channel, Hrad Vallis* (Leverington).

M.S. GEOSCIENCES

FALL 2008

Timothy Anderson

Inferring bedrock uplift in the Klamath Mountains Province from river profile analysis and digital topography. Dr. Aaron Yoshinobu, chair

Christopher Lindsey

A 3D receiver function study of the western United States.

Dr. Harold Gurrola, chair

Alexander Schell

Geologic framework of core to log petrofacies for the Lower Triassic Montney Formation of west-central Alberta Dr. Peter Holterhoff, chair

SPRING 2009

Heather Anderson

Complex magma-emplacement processes, xenolith incorporation, and polyphase host rock deformation of the 442 Ma Andalshatten Pluton, Norwegian Caledonides.

Dr. Aaron Yoshinobu, chair

M.S. ATMOSPHERIC SCIENCE

FALL 2008

Jennifer Huckabee

A survey of gravity waves in West Texas. Dr. Colleen Leary, chair

SPRING 2009

Suraj Harshan

Modeling of Antarctic boundary layer. Dr. Sukanta Basu, chair

Ph.D. GEOSCIENCES

FALL 2008

Arquimedes Ruiz-Columbie

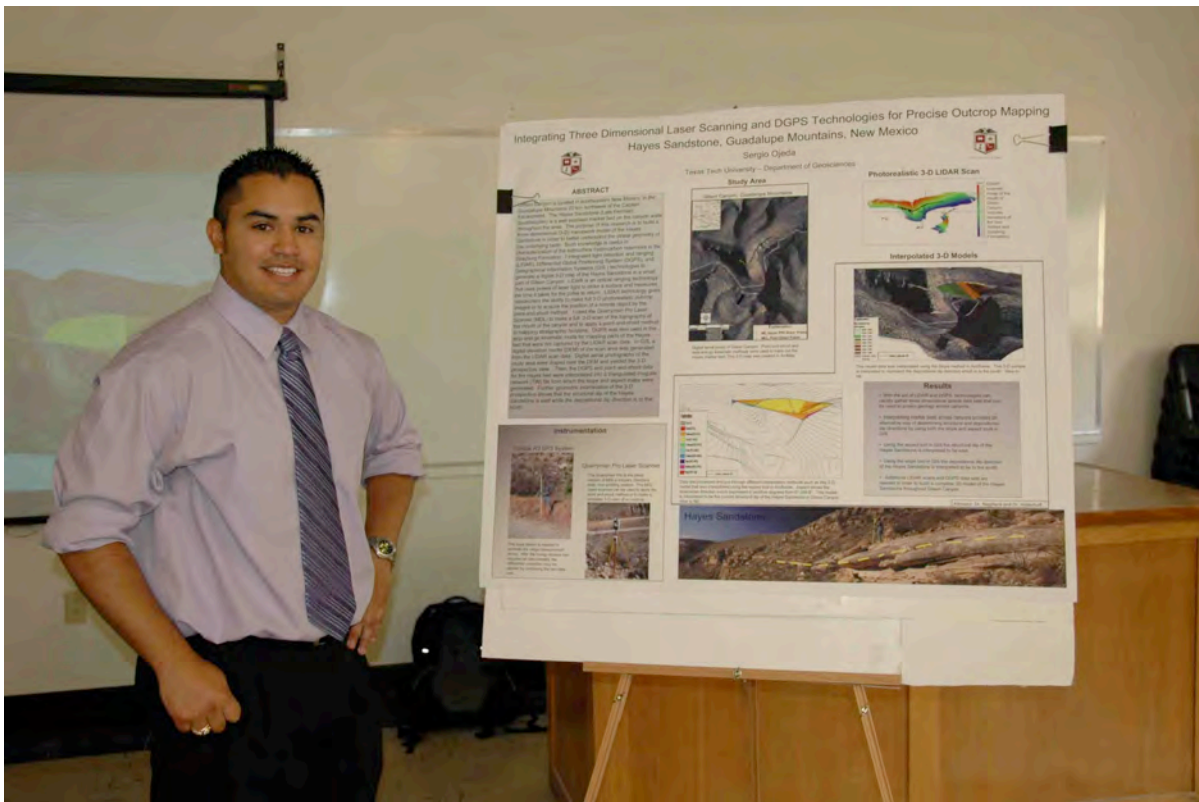
Atmospheric boundary layer evening transitions over West Texas.

Dr. Chia-bo Chang, chair

SPRING 2009

David Schmidt

Stable isotope geochemistry of Upper cretaceous and Paleocene strata in Big Bend National Park, Texas Dr. Thomas Lehman, chair



Research Day in the Geosciences Department took place on 29 April in the Science Building. See department web page for more photos.

Sergio Ojeda won "Best Undergraduate Poster, 2009" for his poster, "*Integrating Three Dimensional Laser Scanning and DGPS Technologies for Precise Outcrop Mapping: Hayes Sandstone, Guadalupe Mountains*".

SCHOLARSHIPS AWARDED Fall 2008-Spring 2009

Lubbock Gem and Mineral Society Scholarship

Gregory Duncan

Alonzo D. Jacka Scholarship

Chloe Beddingfield

Ryan Lellis

E. A. McCullough Scholarship

Fan Jiang

Dr. Grover Murray Scholarship

Monika Leopold

Skyler Smith

Lauren Woolfolk

Joseph Yoklavich

Ramsusson Family Geophysics Scholarship

Maeghan Brundrett

Rogers & Rosen Scholarship

Charles Blair

Deskin Shurbet Geophysics Scholarship

Chloe Beddingfield

Gregory Duncan

Vestal and Ouida Yeats Scholarship

Austin Dover

Kevin Werts

Geosciences Scholarship Fund

Jeffrey Beck

Chloe Beddingfield

Alyson Brink

Maeghan Brundrett

Nolwenn Coint

Jeremy Deans

Gregory Duncan

Jacob Gray

Thomas Harrington

Megan Jares

Geosciences Tuition Scholarship

Weijun Zhu

Jeffrey Beck

CURRENT GEOSCIENCE GRADUATE STUDENTS – FALL 2008

ATMO

Jeff Beck (Ph.D.)	B.S. Penn State; M.S. Texas Tech
Trevor Boucher (M.S.)	B.S. Texas Tech
Felecia Bowser (M.S.)	B.S. Penn State; MS Texas Tech
Chris Burling (M.S.)	B.S. Central Michigan State
Charboneau, Bradley R. (M.S.)	B. S. University of Michigan
Candace Cyrek (M.S.)	B.S. Texas Tech
Sarah Dillingham (M.S.)	B.S. Georgia
Joel Dreessen (M.S.)	B.S. Valparaiso
Scott Gunter (M.S.)	B.S. Mississippi State
Brian Hirth (Ph.D.)	B.S. Valparaiso; M.S. Texas Tech
Kate Horgan (M.S.)	B.S. North Carolina State
Jameson, Dale A. (M.S.)	B. S. Central Michigan University
Metzger, Ryan S. (M.S.)	B. S. Ohio State University
Reinhart, Anthony E. (Ph.D.)	B. S. Purdue; M. S. Nebraska
Matt Schmidt (M.S.)	B.S. Pennsylvania State
Pat Skinner (M.S.)	B.S. Northern Colorado
Amanda Thibault (M.S.)	B.S. Creighton

GEOL/GPH

Bauman, Joseph C. (M.S.)	B.S. Iowa State University
Brink, Alyson (M.S.)	B.A. Texas A & M - College Station
Brown, Shanna (M.S.)	B.S. Texas Tech
Buck, Samatha A. (M.S.)	B.S. Univ. of Idaho
Butler, Graham (M.S.)	B.S. Texas Tech
Castille, Kristopher (M.S.)	B.S. Lamar
Calderon, Sandra C.(M.S.)	B. S. Texas Tech
Chavez, Cristina (M.S.)	B.S. Baylor
Coint, Nolwenn (Ph.D.)	Université de Brest (France)
Conway, Seth (M.S.)	B.S. Texas Tech
Deans, Jeremy (M.S.)	B.S. Cornell
Fronimos, John (M.S.)	B.S. Texas - San Antonio
Hargrove, Brendan, T. (M.S.)	B.S. Texas Tech
Hoch, Kevin R. (M.S.)	B.S. Virginia Poly Tech
Hoemberg, Jeffrey (M.S.)	B.S. Texas Tech
Hopper, Joshua P. (M.S.)	B. S. Texas Tech
Horton, Sean (M.S.)	B.S. Texas Tech
Jiang, Fan (Ph.D.)	Xidian University, China

Lellis, Ryan (M.S.)	B.S. Texas Tech
Lewis, Caleb W. (M.S.)	B.A. Univ. of New Mexico
Liu, Hui (Ph.D.)	Chengdu University, China
Lodge, Jason (M.S.)	B.S. Texas Tech
Marko, Wayne (Ph.D.)	B.S. Southern California; M.S. Texas Tech
McCoy, Zaneta (M.S.)	B.S. Texas - San Antonio
McLachlin, Brian R.	B.S. Univ. of Washington
Mueller, Billy (Ph.D.)	B.S., M.S. Sul Ross State
Muncy, Michael (M.S.)	B.S. Texas Tech
Oalman, Jeffrey (M.S.)	B.S. Kansas State
Ojeda, Sergio R. (M.S.)	B. S. Texas Tech
Oluwole, Olusola (M.S.)	B.S. Univ. Ibadan, Nigeria
Oyedemi, Ayobami M. (M.S.)	B. S. Texas Tech
Peavey, F. Nicole (Ph.D.)	B.A. Whitman College; M.S. Fort Hays State
Proske, Ann (M.S.)	B.S. Sam Houston State; M.B.A. Abilene Christian
Robinson, William (M.S.)	B.S. Texas Tech University
Roell, Jennifer L. (Ph.D.)	B.S./M.S. Indiana Univ.-Purdue Univ., Indianapolis
Schubert, Joseph A. (M.S.)	B.S. Texas - San Antonio
Shiller, Thomas A. (M.S.)	B.A. Sul Ross State University
Westerfield, Marissa K (M.S.)	B. S. Southern Methodist University
Yu, Jingxuan(M.S.)	B.S. Northwestern University of China
Zhou, Jian (Ph.D.)	B.S. Nanjing University
Zou, Zhihui (Ph.D.)	B.S. Huazhong University of Science. M.S. China University of Geosciences

SPECIAL STUDENT AWARDS

Philip O'Brien received the Subaru Minority Scholarship for the South-Central Section. The Subaru Minority Student Scholarship Program provides \$1,000 to one student at an accredited university or college in each of the six North-American GSA Regional Sections as nominated by the GSA Campus Representative. The student also receives a free registration to the GSA Annual Meeting that year. The purpose of the award is to encourage minority students to continue studies in the geosciences as a possible degree choice.

Jennifer Roell and **Anthony Reinhart** were the recipients of a AT&T Chancellor's Doctoral Fellowship and both were awarded one of the Presidents "New Doctoral Fellowship Initiative" Research Assistantships.

NEW AT THE DEPARTMENT OF GEOSCIENCES

TWSC Texas Water Science Center (TWSC- USGS) opens a new office within the Department of Geosciences at Texas Tech University

The U.S. Geological Survey (USGS) serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

As the Nation's largest water, earth, and biological science and civilian mapping agency, the USGS collects, monitors, analyzes, and provides scientific understanding about natural resource conditions, issues, and problems. The diversity of USGS scientific expertise enables the agency to carry out large-scale, multi-disciplinary investigations and provide impartial scientific information to resource managers, planners, and other customers.

The USGS is organized with a Headquarters and Eastern Region facility in Reston, Virginia. Central Region and Western Region offices are located in Denver, Colorado, and Menlo Park, California, respectively. Thousands of other USGS employees are working in every State in the Nation. Statewide, the **USGS Texas Water Science Center (TWSC)** has approximately 160 employees in the cities of Austin, Corpus Christi, El Paso, Fort Worth, Houston, San Angelo, San Antonio, and Wichita Falls. Beginning in the fall of 2009, the TWSC (<http://tx.usgs.gov/>) initiated and is in the process of staffing the Lubbock Field Office within the Department of Geosciences at Texas Tech University. The mission of the Texas Water Science Center (TWSC) is to provide reliable, impartial, timely information that is needed to understand water resources in Texas and the Nation. The TWSC actively promotes the use of this information by decision makers to: Minimize loss of life and property as a result of water-related natural hazards, effectively manage ground-water and surface-water resources, and protect and enhance water resources for human health, aquatic health, and environmental quality.

The TWSC Texas Water Science Center (TWSC) partners with more than 80 Federal, State, County, local, Tribal, and public agencies in the conduct of its data acquisition programs (e.g. streamflow, <http://waterdata.usgs.gov/tx/nwis/rt/>) and scientific investigations (http://tx.usgs.gov/pubswarehouse/TX_WSC_Bibliography1898_2007.pdf).

These partnerships are in the form of shared funding and other efforts. Nonfederal cooperators in West Texas region include cities of Abilene, El Paso, Graham, Lubbock, San Angelo, Stamford, and Wichita Falls, the authorities of Canadian River Municipal Water Authority, Greenbelt Municipal and Industrial Water Authority, Brazos River Authority, Pecos River Authority, Red River Authority, Texas Commission on Environmental Quality, Texas Department of Transportation, and Texas Water Development Board, Upper Colorado River Authority, West Central Texas Municipal Water District, Wichita County Water Improvement District No. 2, and others. Many score of streamflow-gaging stations (e.g. Canadian River near Amarillo, DMF Brazos River at Justiceburg [see figure], Running Water Draw at Plainview, and many others) and reservoirs (e.g. Lakes Alan Henry, MacKenzie, Meredith, and many others) in the region surrounding Lubbock are currently operated by the TWSC.

The establishment of the Lubbock Field Office constitutes growth of an already important presence in a region and meets a goal of enhancing the TWSC mission with current and future cooperators in the region. Additionally, the establishment of the Lubbock Field Office

further cements a research relationship between Texas Tech and TWSC that dates from approximately 1999. During the next 5 years or so, TWSC plans to have three staff or more members based in the Lubbock Field Office, which currently resides in GEO213 and GEO214 of the Science Building.



Photograph looking northwest along U.S. Highway 84 showing 08079600 USGS streamflow-gaging station 08079600 Double Mountain Fork of Brazos River near Justicesburg, Texas, which is operated in cooperation with the City of Lubbock and provides real-time inflow information for Lake Alan Henry and has operated since December 1961.

The first staff member assigned to the Lubbock Field Office is **Dr. William H. Asquith, Research Hydrologist**. Dr. Asquith has been with the TWSC since 1992, and started with the TWSC prior to receiving BS in Civil Engineering from University of Texas at Austin. During his tenure of continuous full-time employment with the TWSC, he also has completed at UT-Austin a MS in Civil Engineering and a Ph.D. in Geosciences. Although he has performed many duties for the TWSC including construction, surveying, streamflow measurement, and scuba diving, and he has many interests in hydrologic instrumentation, micrometeorology, and custom data acquisition systems, his primary research interests involve hydrostatological investigations of rainfall, floods, rainfall and runoff processes, and hydraulics. These investigations have largely been in collaboration with Texas Tech and funded by the Texas Department of Transportation

Research Program. Dr. Asquith and other TWSC investigators have a long-term, peer-to-peer relationship with the TTU Department of Civil and Environmental Engineering. Dr. Asquith is a co-PI with Drs. Ken Rainwater and Theodore Cleveland (Civil and Environmental Engineering) on numerous research projects. Dr. Asquith also is a co-PI with Dr. Reynaldo Patino (Texas COOP Research Unit) and Katharine Hayhoe (Geosciences) of Texas Tech. Dr. Asquith also is currently pursuing a second Ph.D. in Civil Engineering from TTU.

The remaining two USGS staff members will likely include a Lead Hydrologic Technician and a Hydrologic Technician. Both of which will have previous USGS Water Science Center experience. These staff members primarily will be charged with maintenance and expansion of data acquisition program in the region and support of Dr. Asquith's research interests as well as other USGS research interests in the region. The Lubbock Field Office also anticipates various student employment and partnership opportunities as the Lubbock Field Office matures.

The Verification of the Origin of Rotation in Tornadoes Experiment 2 2009 Field Phase

Christopher Weiss

In the spring of 2009, nearly 100 scientists and students from sixteen universities and organizations gathered for the first field phase of the Verification of the Origin of Rotation in Tornadoes Experiment 2 (VORTEX2), a \$10 M project funded by the National Science Foundation and the National Oceanic and Atmospheric Administration [see <http://www.nssl.noaa.gov/vortex2> for more information]

The primary goals of the VORTEX2 project are to better understand the causes of tornadoes and the low-level wind field associated with them. To this end, an unprecedented array of instrumentation has been devoted to the effort. Texas Tech has two primary contributions to the VORTEX2 project. The first is an array of 24 rapidly deployable surface meteorological stations, dubbed “StickNet”, tasked with the measurement of temperature, humidity, pressure, wind and rain/hail fall in proximity to developing tornadoes. The second contribution is the newly developed TTUKa mobile Doppler radar technology, permitting the remote measurement of horizontal and vertical tornado and sub-tornado vortex structure.

Dr. Christopher Weiss led a group of 20 students, staff and faculty into the field for the five weeks of the 2009 field phase (May 10-June 13) . The team travelled approximately 11,000 miles in search of supercell thunderstorms, the storms that are responsible for the majority of violent tornado production. The weather pattern was significantly quiet for the first three weeks of the project, but yielded to a more typical pattern towards early June. In total, 221 StickNet probes were deployed over the course of approximately 20 events, one of which was an EF2 tornado that struck near Lagrange, WY. StickNet, TTUKa and the rest of the VORTEX2 armada collaborated to gather a pioneering data set on the development and dissipation of this long-lived

tornado. Preliminary results from this case and other VORTEX2 intercepts will be presented at the upcoming Lubbock Severe Weather Conference, held at the Overton Hotel in Lubbock (2/17-2/19) [for information, see lubsvrconf.org]

VORTEX2 will continue in the spring of 2010 for seven weeks (May 1 – June 15). As in 2009, The Weather Channel plans to extensively cover the StickNet effort, including live shots during many of the deployments.



TTUKa developed near a supercell thunderstorm during project VORTEX 2.

RESEARCH GRANT AWARDS FOR 2009

2009 Thermal models of lunar regolith_ NASA Goddard Space Flight Center, \$4,999.

Seiichi Nagihara

2009-2011 Collaborative Research: evaluating the tempo, size, and chemical connectivity of magma batholiths in a tilted plutonic complex. National Science Foundation, \$292,000.

Cal Barnes and Aaron Yoshinobu.

2009-2011 Developing regionally downscaled probabilistic climate change projections. U.S. Geological Survey, \$328,000. Katharine Hayhoe.

2009 –2011 Analysis and Archiving of Missing Apollo Heat Flow Data. NASA Goddard Space Flight Center, \$45,171. Seiichi Nagihara

2009-2012 Development and Dissemination of High-Resolution National Climate Change Dataset. U.S. Geological Survey, \$120,000. Katharine Hayhoe

2009-2012 Modeling and predicting the influence of climate change on Texas surface waters and their aquatic biotic communities. U.S. Geological Survey, \$458,000. William Asquith, Katharine Hayhoe, and Reynlido Patino.

2009-2012 Collaborative Research: Ion adsorption on nanocrystalline mineral surfaces: Towards a fundamental understanding of nanoparticles in the environment. National Science Foundation, \$366,275. Moira Ridley

2009-2014 Mineralogy and petrology of Ogallala Formation sand and gravel. U.S. Geological Survey, \$150,000 Tom Lehman.

2010-2013 Modeling of the hydrochemical response of high elevation watersheds to climate change and atmospheric deposition. Environmental Protection Agency, \$800,000. Katharine Hayhoe.



StickNet probe being deployed by Tanya Brown (Ph.D. candidate) on the Alabama coast for Tropical Storm Ida

FACULTY REPORTS

G.B. Asquith

In December Dr. Asquith taught a short course on the Petrophysics of Carbonate Reservoirs at the Petroleum Professional Development Center (PPDC) in Midland Texas. In February he again taught his Petrophysics of Carbonate Reservoirs at the American Association of Petroleum Geologists Winter Education Conference in Houston, Texas. While in Houston he was able to have dinner with former MS student Cindy Welch.

At the Southwest American Association of Petroleum Geologists meeting in April he presented a paper entitled “Maximum Producing Oil Index” which is an Old E-Log method developed by Trixier in the 1950’s. The general chairman of the AAPG meeting in Midland was Mr. Lenny Wood a former MS student of Dr. Asquith. Also in April he presented the AAPG Basic Well Log Analysis School in Austin Texas. This AAPG School has been presented since 1984 and is the longest running school in AAPG history. In May he presented his new logging school entitled “Old E-Log Analysis” at the PPDC in Midland. While in Midland Dr. Asquith had dinner with several former graduate students including Ata Sagnak (PhD), George Anderson (PhD), Lenny Wood (MS), and Cindy Welch (MS).

In June Dr. Asquith was off to Illinois to do consulting Petrophysics on the Mt. Simon Sandstone in the Illinois Basin, which is part of the Illinois Survey’s FutureGEN Project. Then it was over to Golden Colorado to present the AAPG Basic Well Log School at the Colorado School of Mines. This September Dr. Asquith is off to Tyler Texas to present a one day short course on Shaly Sandstone Analysis, and a talk entitled “Gas-Bearing Shale Reservoirs” to the East Texas Geological Society.

In the spring of 2009 Dr. Asquith taught his course in Advanced Petrophysics [GEOL 5399], and this Fall (2009) he will teach the beginning course in Petrophysics [GEOL 5325]. There are two new sections in GEOL 5325, the first covers Magnetic Resonance Imaging (MRI) Logs, and the second covers the Log Analysis of Gas-Bearing Shale Reservoirs.

Cal Barnes

The past year has had “back to the future” echoes for igneous petrology studies. With Aaron Yoshinobu and Kevin Chamberlain (Univ. of Wyoming), we began a new study of the Wooley Creek batholith in the Klamath Mountains of northern California. This was my Ph.D. research area, and was a topic of post-Ph.D. research through the 1980s. The Wooley Creek batholith is a large (35-km-long) pluton that was tilted after emplacement, with erosion exposing a 9-km-thick section of a 160 Ma magma system. The new research is focused on understanding the timing, tempo, and geometry of magma emplacement via detailed mapping, high-precision dating and mineral analysis. We are also studying emplacement mechanisms and the importance of host-rock assimilation on magma evolution. Our group, with Ph.D. student Nolwenn Coint, MS students Samantha Buck and Brendan Hargrove, undergrad Monika Leopold, and Research Associate Melanie Barnes began field work in earnest this summer, including a 10-day pack trip to the center of the batholith. Although it is early days in our work, we already have evidence that batholith construction took around 3 m.y. and involved multiple magma pulses.

I was also able to spend a few days in the Ruby Mountains (Nevada) with Callum Hetherington, our new mineralogist/metamorphic petrologist and two of his students. We were there studying granites in the Ruby Mountain metamorphic core complex, trying to better

understand the timing of granitic magmatism and its relationship to regional tectonics. Some of you may remember that TTU had a major presence in this region in the 1990s, with a Ph.D. and three MS studies completed.



Cal Barnes , Kevin Werts (senior), Callum Hetherington, and Jennifer Roell (M.S. student) on Liberty Pass, Ruby Mountains, Nevada

Jim Barrick

After a rather quiet Fall and Spring semesters, the summer of 2009 was a busy time for me. In June attended the 2009 Meeting and Field Trip of the Silurian Subcommittee in Caligari, Sardinia (Italy) where I present results of the NSF-sponsored research on Silurian oceanic events and carbon isotope excursions in the south-central United States. In early July, Nicole Peavey (Ph.D candidate) and I attended the ICOS (International Conodont Symposium) in Calgary, Canada. During this trip I was finally able to visit the Cambrian Burgess Shale quarry, where I saw examples of the famous soft-body fauna in place (No collecting permitted!). Then, during July and August, I hosted Javier Sanz-Lopez (Coruna, Spain) and Silvia Blanco (Oviedo, Spain) as we worked on taxonomic revision of Mississippian conodonts from Oklahoma and Texas. I am continuing work on Pennsylvanian conodonts from New Mexico, some results of which were included in the 2009 New Mexico Geological Society Guidebook.

Hopefully, this year Anne Proske (M.S. Mississippian conodonts) and Nicole Peavey (Ph.D. Late Silurian conodonts) will finish their theses and graduate.

Katharine Hayhoe

Katharine is currently serving on the National Academy of Sciences' committee, "Stabilization Targets for Greenhouse Gas Concentrations." This work is directly relevant to international negotiations such as the United Nations Climate Change Conference (COP 15) taking place in December 2009, as her research addresses both the consequences of unchecked climate change for the United States and the magnitude of emission reductions needed to avoid the most serious impacts of climate change on our world.

Katharine Hayhoe is the co-author of a recent book, "*A Climate for Change: Global Warming Facts for Faith-Based Decisions*" (FaithWords/ Hachette). In this book, she tackles many of the long-held misconceptions about global warming that most of us discuss every time we get into a conversation about climate change. Written with a pastor, this book uses a faith-based perspective to show how human-induced climate change is in no way incompatible with belief in God. Rather, the reality of climate change is about thermometers and measurements over the last few hundred years, not about blue, or red, or any shade of politics at all.

Callum Hetherington

The last 12 months has seen a number of high points in both professional and personal life. The new course in Earth Materials, which is a requirement for all students in geology and geophysics, is going well. In 2008, 36 students successfully completed the course, with the high point being the 3-day fieldtrip to New Mexico. In 2009, there are 45 students enrolled in the class – perhaps the biggest major's class in recent memory?

The laboratory space has been cleared and painted and is occupied by two new graduate students and two undergraduates conducting senior research projects. The students are working on projects in the Ruby Mountains of northeast Nevada and the Klamuth Mountains in northern California, in collaboration with Cal Barnes, and pegmatites from Norway. The summer of 2009 was spent travelling to participate in workshops, fieldwork and research. Highlights include a visit to the College of William & Mary (VA), the "Ruby's" in Nevada (quite spectacular), the Ballachulish Complex in Scotland (it rained), and the Oakridge National Laboratories in Tennessee.

My wife Caroline moved to Lubbock in early April. We are all settled into our new home and were delighted by the safe arrival of our first child, James, in mid-September.

Peter Holterhoff

We've re-focused efforts on the geology of the Permian on the Eastern Shelf of the Midland Basin. Specific activities include working out the depositional systems and sequence stratigraphy of the uppermost Clear Fork and San Angelo formations (by graduate student Matt Horton), depositional systems and sequence stratigraphy of the upper Valera and Bead Mountain interval (by graduate student Ryan Lellis), and continuing efforts on the Lueders Limestone by myself. Undergraduate students are also stepping up and examining Permian units of the Eastern Shelf for their Senior Research Projects. This includes Grant Blair working on the Elm Creek Limestone and Crystal Woolfolk working on the Quartermaster Formation. I have been synthesizing all of this work to interpret the large – scale supersequence architecture of the Midland Basin and through the course of the year managed to present these results to the professional geological societies in Roswell, Midland, and Abilene. I've also been fortunate enough to strike up collaboration with the Smithsonian to begin fieldwork on these Permian units

in north Texas to gain a better understanding of the interaction of coastal and marine processes in controlling the lithofacies observed in our units.

We are also stepping down into the Pennsylvanian on the Eastern Shelf to examine stratigraphic and depositional issues (by Britt Campbell for a senior project). Significantly, I have begun working with Troy Rasberry at SUNY – Stony Brook to examine the provenance of detrital sediments that filled the Ft. Worth and eastern Midland basins to better understand the evolution of the Ouachita Orogeny. Some of our preliminary results have been surprising, so stay tuned for these results in the future!

I also have students working in the Guadalupe Mountains. Katy Mainwaring is examining the relationship between lithofacies and spectral gamma ray signatures in the Lamar Limestone around McKittrick Canyon. Sergio Ojeda, a graduate student working along with Seiichi Nagihara, will be in the Last Chance Canyon area examining the stratigraphy and lithofacies distribution of the Grayburg Formation using high – precision GPS and outcrop laser scanning technologies. This is a really exciting work and I look forward to getting more students involved with digital outcrop characterization and analog reservoir modeling.

Related to the outcrop characterization work, Matthew Oyedeji completed a Senior Research Project on rudist build-ups at the platform margin of the Edwards Formation near Sweetwater. He has stayed here at Tech and will be expanding this project to examine the sequence stratigraphy and lithofacies distribution of the entire Fredricksburg Group in the Callahan Divide region.



Matt Horton, Yujia Lee, and Peter Holterhoff inspect the Woodford Shale during the Spring 2009 Geology Society Field Trip to the Arbuckle Mountains, Oklahoma.

I have two graduate students that are wrapping up their theses now. Graham Butler worked on the high – frequency sequence architecture of the Bethany Falls Limestone, an Upper Pennsylvanian unit the outcrops in the northern mid-continent and is a significant reservoir interval of western Kansas. Jason Lodge, who has been working with David Leverington, has used satellite imagery to examine the distribution and “patchiness” of carbonate facies on several modern carbonate platforms. This quantification of lithofacies distribution can be used by reservoir modelers to realistically reconstruct facies patterns in the subsurface.

This has been a busy year for talks, presentations, and field seminars. The students and I have given six talks or posters at the regional and national level. We have also submitted six presentations for the upcoming national AAPG meeting this spring. We will also be running the Permian Basin Section of SEPM Spring Fieldtrip this April to examine the Permian units on which we have been working. Indeed, it looks as though the coming year will be even busier than this past year!

Tom Lehman

Tom continues his research endeavors in the Big Bend country and on the High Plains. His most recent research project is a USGS-funded investigation of the mineralogy and petrology of Ogallala Formation sand and gravel. Of course, the Ogallala Formation comprises the majority of the High Plains Aquifer in northwest Texas. Although the basic distribution, thickness, physical stratigraphy, and depositional history of the Ogallala are well known, there has been virtually no documentation of its mineralogical composition. A few studies provide qualitative assessments of relative abundance for sand and gravel, and regional variation in gravel lithologies, but there are no published quantitative mineralogic analyses or detailed petrologic descriptions, and we have no information regarding how mineralogic composition may vary regionally or stratigraphically.

The goal of the research is to compile a database for mineralogical analyses of the Ogallala Formation. The Department of Geosciences houses an archive of Ogallala samples collected over the past several decades from drill cuttings obtained at water wells around the High Plains and from outcrops along the periphery of the High Plains. The existing sample archive covers most of the Southern High Plains region from the Canadian River valley on the north, to the Midland area on the south, and from Ft. Sumner, New Mexico on west to the Crosbyton area on east. This archive will serve as the initial sample base for the proposed research. Additional samples will be obtained as necessary by sampling peripheral Ogallala outcrops and/or by soliciting samples from other sources during the project to fill gaps in regional coverage.

Mineralogical variations within the Ogallala Formation are likely of importance in governing mineral-water reactions in the High Plains Aquifer and therefore quantitative determinations of mineral abundances are useful in understanding regional variation in ground-water chemistry. Ogallala sand and gravel appears to have been derived largely through erosion of Paleozoic and Mesozoic sedimentary rocks, Proterozoic metamorphic rocks, and Neogene volcanic rocks in northeastern New Mexico. Documentation of the regional mineralogical variation in Ogallala sediments, and identification of likely source areas for specific gravel lithologies will therefore provide information on the timing of uplift, volcanism, and drainage evolution during early phases in development of the southern Rocky Mountains.

David Leverington

Research over the past year has involved both planetary and terrestrial components. The planetary work has emphasized the study of large outflow channels on Mars, Venus, and the Moon. The basic nature of these systems is of central importance to our understanding of the geology and climate histories of these bodies, and may also have significance with regard to the study of early surface environments of the Earth. Current Mars work involves the use of mineralogical data in the evaluation of models of channel formation.

Recent terrestrial research has complemented the planetary work through evaluation of hyperspectral techniques in the mapping of lithological and vegetation classes in arid regions. As at other solar system bodies, the techniques of imaging spectroscopy can be very effective in the quantitative mapping of mineral and element abundances at the surface of the Earth.

Graduate projects are ongoing for masters students Jason Lodge (improving reservoir models through the characterization of modern reef environments), Sandra Calderon (reconstructions of late-glacial environments at high latitudes), Josh Hopper (investigations of Martian surface processes), and Jesse Breedlove (study of recent fluvial environments of southeastern Texas).

Seiichi Nagihara

It was very nice to see so many of you at the alumni receptions in Houston last October (GSA) and in Denver in June (AAPG). I was also glad see Ramey (BA 2002) and Bryan (MS 2003) Musgrave and their newborn, when I visited Midland for an SEG meeting in May. In the past year, some of our alumni have returned to the campus as recruiters for their companies. I am always excited to see how well they are doing.

I am currently working with two new master's students. Olabisi Ajiboye, who came from Nigeria in January, studies the growth faulting and salt-shale tectonics in the continental shelf off Texas, using 3-D seismic and well data. Sergio Ojeda, who started in the fall, is working on high-resolution stratigraphic mapping in the Last Chance Canyon of the Guadalupe Mountains in New Mexico. Sergio uses the three-dimensional laser scanning and GPS surveying technologies in generating digital models of outcrops. Pete Holterhoff is co-supervising Sergio with me on the project. I also serve on thesis/dissertation committees of several students working on geophysics, petroleum geology, and GIS projects.

Besides working with the students, I am getting busier in helping NASA prepare for its return missions to the Moon. Because of the politics in Washington, nothing is certain about the missions that are still a decade or more away. But the NASA scientists and engineers are already discussing what kind of instruments should be deployed and how. I am working with multiple teams of researchers in designing lunar heat flow probes and in figuring out their deployment logistics on the Moon. I have also started working on a project to restore and reanalyze the geophysical data obtained during the Apollo missions in the 1970s in collaboration with the NASA National Space Science Data Center in Maryland.

In the coming year, I plan to attend more alumni receptions. I also plan to attend the AAPG Gulf Coast section meeting in San Antonio. I hope to see some of you in one or more of those occasions.

Moira Ridley

Research has continued to collectively examine the interaction of water with geologic materials, with the main emphasis being nanogeoscience. Over the past few years we have been performing very fundamental experiments to develop a basis for understanding the behavior of nano-particles when they are released into the environment. Our early results show that nano-particles do indeed have different chemical behaviors to comparable larger particles when in water. We are now building on the early results, and expanding our experimental and modeling studies to examine how nano-particles react with potential contaminants in natural waters. This new nano-geochemistry research is facilitated by NSF funding, and is being conducted in collaboration with colleagues at Illinois State Water Survey and the Pennsylvanian State University. At present Philip O'Brian, an undergraduate student is involved in the project; and we are actively looking to recruit graduate students to work on the project.

Our long running experiments examining the dissolution of the jarosite (of importance in acid mine drainage remediation and as an indicator of water on Mars) continue. A unique aspect of this study is the extensive period over which the experiments have been performed. Our initial set of experiments ran for 3 years, and the second set of experiments is well passed the 2 year mark. These lengthy experiments have provided new insights into the dissolution of this environmentally significant mineral. Many graduate and undergraduate students have been involved in taking care of the experimental setup, and the on-going help of James Browning and Dr. Melanie Barnes is appreciated.

Jian Zhou (current Ph.D. student) is continuing our research on metal availability and mobility at the Anaconda Superfund site in Montana. Some of his studies on samples collected at Anaconda will be in-keeping with our nano-science research. Preliminary work suggests that the contaminant metals (e.g., arsenic, cadmium, lead) are associated with nano-sized particles that coat the coarser soil grains.

Last spring a new geochemistry course was introduced in the undergraduate curriculum at the sophomore level. The course provides for developing quantitative skills early in the geosciences curriculum, these skills are utilized further in the upper division petrology courses.

Aaron Yoshinobu

2009 has flown by very fast and I still can't believe I've been at TTU for 10 years! Work and life are going well and I continue to be amazed and honored to work with some wonderful students in the Geosciences Department.

In January I received a 3 year NSF grant to work on the Wooley Creek plutonic complex, along with Cal Barnes at TTU and Kevin Chamberlain at the University of Wyoming. While I was unable to do field work during the first season, Cal, Kevin and a host of students were able to begin with a 2 week jaunt into the Marble Mountains Wilderness.

I'd like to report on what some my previous students have completed. Ms. Heather Anderson completed her M.S. on the Andalshatten pluton, central Norway, in Dec. of 2008. She gave one of the finest thesis defenses I have seen in my 10 years at TTU and is now working with ExxonMobil in Houston. As a friend and colleague who has spent three seasons in Norway with us, it was sad to see her go, but the next step is waiting for Heather. Figure 1 displays some of the fantastic outcrops in Heather's field area.

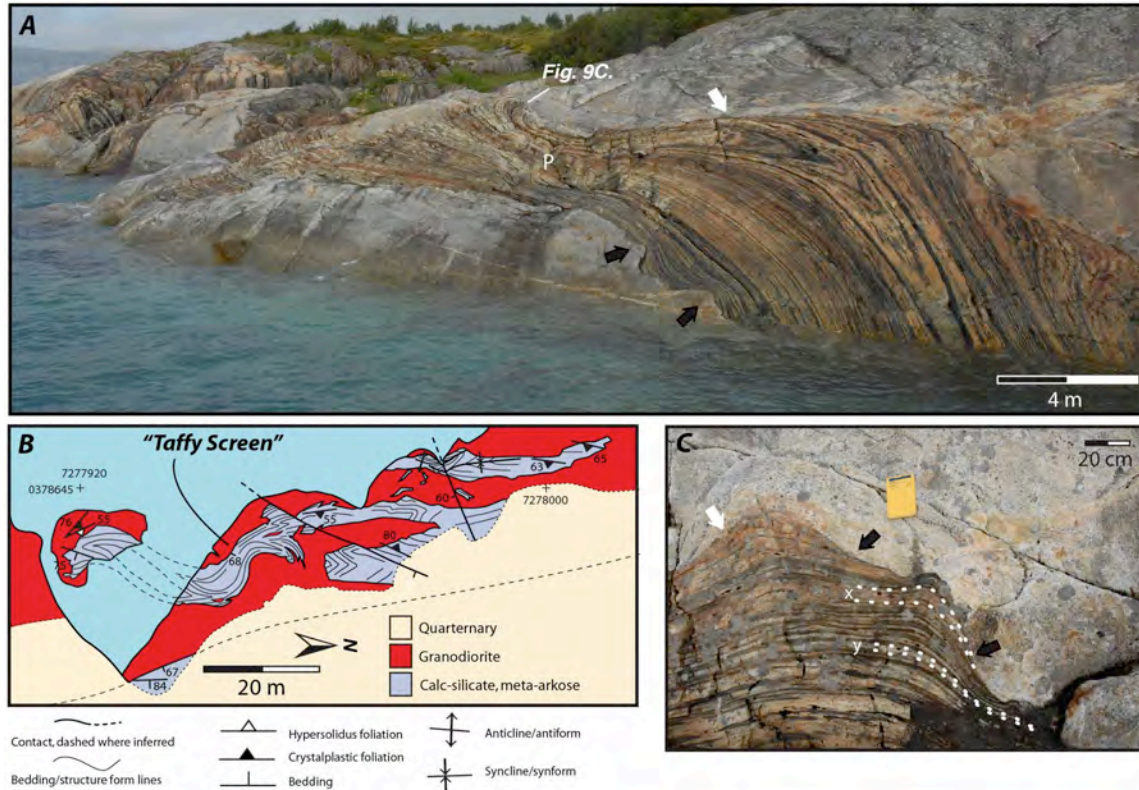


Fig. 1. A. Plastically deformed calc-silicate screen “Taffy Screen” contained within granodiorite near the margin of the Andalshatten pluton. B. Geologic map of the screens in this region. Granodiorite contains a moderate to weak magmatic foliation. C. Detailed view of ‘cut-off’s between bedding within the calc-silicate screen and the granodiorite indicating that the screen deformed first by plastic creep and then brittle failure, yielding the intrusive contact relations. From Heather Anderson’s thesis area.

Tim Anderson, no relation to Heather (at least that we know of!), finished his thesis on the landscape evolution in the Klamath Mountains in Dec. 2008, as well. Tim was my first student to work on the tectonic geomorphology of an active mountain range and his work has inspired the next generation of tectono-geomorphologists at TTU (more on that below). Tim’s now at Schlumberger in Houston. Tim also holds the Structure and Tectonics Group record for most terrabytes of data acquired; over 1 TB of river profile data! WOW!!!!

Current MS students working with me include Mike Muncy, a former TTU undergraduate who is now the master of growth strata and contractional deformation in the Sacramento Mountains, New Mexico. Mike is mapping a H-U-G-E area along the Fresnal Fault zone (Fig. 2) and will defend his MS in the Spring of 2010.

In addition, Chloe Beddingfield has been working on a new project with me that involves the kinematic and tectonic analysis of structures on Enceladus, an ice moon of Saturn. This has produced some of the most exciting and ‘cutting edge’ research I have worked on in my time at Tech. Chloe, while still an undergraduate, has developed some testable models for the evolution of Enceladus’s surface that involve active and paleo-diapirism. In addition, she is the first scientist to recognize and propose analog relationships between ice structures on terrestrial ice sheets and the ice crust of Enceladus (Fig. 3). She will be presenting some of this work at AGU this December and will be graduating in May 2010.



Fig. 2. View to the north of the Fresno Fault zone displaying the fault zone (between bold white lines), the Fresno overturned anticline/syncline pair (to the north), and carbonate and clastic growth strata in white dashed lines and red lines. Northern region of Mike Muncy's field area.

Fall of 2009 produced a bumper crop of new MS students for me. Brendan Hargrove joined the Wooley Creek group and will be studying the emplacement of a tilted plutonic complex. Brendan is one of a number of structural geologists who I have been so impressed with in the field and I was very pleased that he decided to attend TTU for his MS. Joe Bauman will be carrying the tectono-geomorph torch passed on from Tim Anderson. Joe will be analyzing river profiles in the Sacramento Mountains and will evaluate how drainage systems changed during Rio Grande rifting. As far as I can tell, Joe is an ARCGIS guru and I'm pleased to have him on board.

Teaching Structural Geology continues to amaze me if for no other reason than I've currently got 130 petroleum engineering students and 29 geosciences students!

On the home front, Celeste remains busy as every landscaping homes and schools. Weston is now 11 and is a starting midfielder on a local club soccer team called Lubbock Arsenal FC 98's. Miles (8) and Galen Molly-Matilde Elise (6) continue to amaze and inspire me with their imaginative play. Miles prefers building bombs to going to school and Galen is ready to become the next Mia Hamm. I am currently coaching a fantastic U13 boys soccer team, Lubbock Arsenal FC 97's. They have won the West Texas Premier League in 2008-2009 and won the Plano Invitational tournament this past Labor Day. I'm quite proud of their accomplishments. Still running ultra's as often as I can with the Bandera 100k coming up in January 2010.

I hope all of you are in good health and life is well. Don't hesitate to give me a call or an email and let me know what's new.

Cheers,

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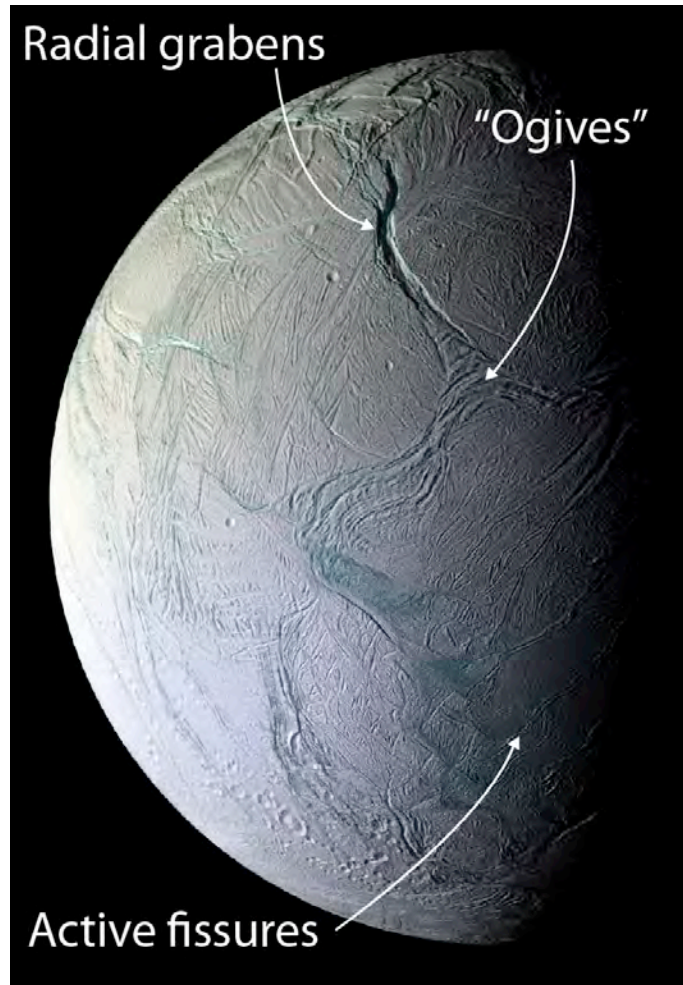


Fig. 3. Cassini image of Enceladus (~512 km diameter) showing radial grabens, fold and thrust belts and active fissures over a diapir at the south polar region. “Ogives” are folded and sheets of ice flowing downward into the graben.

Hua-wei Zhou

Besides me, my research group now consists of two research scientists, three PhD students, and a visiting scholar. Our work is focused on seismic imaging, velocity model building, and correction for near-surface statics. We are developing some of the best tomographic inversion methods and software to map subsurface distribution of seismic wave velocities. These tools are useful to both petroleum exploration and solid Earth geophysical studies.

My research and teaching have been supported by the Pevehouse Endowment, as well as grants from National Science Foundation (NSF), National Natural Science Foundation of China (NSFC), and several petroleum firms. In fall 2009 I won another year of 185k grant from CNPC/BGP for research on seismic imaging. These funds have provided stipends for five full-time persons of my group, two research associates and three PhD students.

During 2009 I published three papers, one each in Geophysics, The Leading Edge, and Journal of Applied Geophysics. A fourth paper has just been accepted by Geophysical Journal International. Since March 2009, I started a two-year writing project with Cambridge University Press on a textbook titled “Practical Seismic Data Analysis”. My research group presented two

abstracts at the 2008 AGU fall meeting, and has seven peer-reviewed expanded abstracts accepted by the 2009 SEG Meeting in Houston. Now I'm pushing my students writing their own journal papers.

My undergraduate course of "Geology of Hydrocarbons" was attended by 74 students in spring 2009. After teaching this course twice, I have confidence now to make it a more exciting learning experience to future students. In terms of my graduate courses, although the number of students has been small so far (around five per course), I will keep teaching one graduate course per semester. I taught "Seismology Methods and Practice" in fall 2008, "Seismic Velocity Analysis" in spring 2009, and "Seismic Data Analysis" in fall 2009.

The most exciting experience for me during the pass year was a two-month field trip in summer 2009 to monitor reservoir-induced earthquakes in the Three-Gorge Reservoir region, China, with several students. The Mother Nature has been very kind, allowing us brought back high quality data of dozens of seismic events occurred in that region.

During the past year, I have given eight invited seminar talks in PGS, BGP, Shengli Oil Field, and several Chinese universities. I taught several short courses, including a three-day course on "Regularization" for Western Geophysical, a five-day course for Petrobras, and a five-day course on "Methodology of Seismic Tomography" in China U of Geosciences. In addition, I organized a three-day workshop on "Seismic Attributes" for CNPC, and coordinated a field course on Carbonate Petroleum Geology for BGP.



StickNet probe being deployed by Brian Hirth (Ph.D. candidate) and John Schroeder

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Big Bend National Park Trip April 10-13, 2009

Over Easter weekend 26 Texas Tech Geoscience students had the opportunity to tour Big Bend led by Dr. Tom Lehman.

See the department web page for more photos