



GEOLOGY AND GEOPHYSICS
TEXAS A&M UNIVERSITY

Newsletter - November 2015

A Note from our Department Head

Dear Alumni, current students, faculty, and staff:

I am the new department head for the Texas A&M Department of Geology and Geophysics and I welcome you to the renewed Department of Geology and Geophysics Newsletter. We decided to re-start a newsletter after hearing from many alumni that they felt disconnected from the department and did not know enough about our faculty, their research, and what the undergraduate and graduate students were doing. We are planning to send out this newsletter electronically and in hard copy approximately four times a year. In this issue you will learn about the nine new faculty members we have hired in the last three years, about Cathy Bruton, our lead office staff member, about the Berg-Hughes Center headed by Carlos Dengo ('84), and about some of the things going on around the department. We also are asking for your stories about field camp or field trip experiences as we are trying to capture many of these stories into a permanent record.



I will be holding meetings with alumni early next year in San Antonio, Dallas, and Houston to discuss some of the challenges and opportunities that face the department, so look for more information about that in the next edition. I thank Cristina Figueroa ('15), a new graduate student in our department for helping put together this newsletter. I look forward to seeing you the next time you make it to College Station and to hearing about your stories from field camp or field trips you took while enrolled at Texas A&M.

All the best, Mike Pope

Meet Cathy Bruton



Cathy is one of the Business Administrators for the Department of Geology & Geophysics at Texas A&M University. She is responsible for processing scholarships, fellowships, tuition and waivers for all department's students in the College of Geosciences, monitoring departmental accounts and gift funds, approving verification reports for all accounts in the College of Geosciences, and assisting faculty and staff with personnel and payroll issues and graduate student contracts. Cathy has worked at Texas A&M University for 17 years, with 13 years in the College of Geosciences and almost 3 years in the Department of Geology & Geophysics. In her spare time, Cathy enjoys spending time with her family, especially her grandchildren, working in the yard, reading and cooking.



An image from Field Camp 2014 submitted by Cristina Figueroa '15 of Clark Canyon Reservoir in Montana. Does this image bring back memories from your field camp experience? If so, we'd love to hear your stories!

ALUMNI - PLEASE SEND US AN EMAIL WITH YOUR TEXAS A&M EXPERIENCES.

Email urock@tamu.edu with pictures and/or personal stories to be published in our next newsletter! Stories can be about field camp, classes or any other memorable geology/geophysics-related nights you'd like to share! We would like these by December 11th.

The Berg-Hughes Center for Petroleum and Sedimentary Systems



Dr. Carlos Dengo,
Director of the Berg-Hughes Center

The Berg-Hughes Center for Petroleum and Sedimentary Systems is a comprehensive program that integrates geosciences, engineering and related disciplines, including the [Department of Geology and Geophysics](#) and the [Crisman Institute for Petroleum Research](#) in the Harold Vance [Department of Petroleum Engineering](#). The Berg-Hughes Center for Petroleum and Sedimentary Systems provides Texas A&M students and faculty a wide range of opportunities for collaboration and integration. The Center emphasizes an interdisciplinary research approach to advance the knowledge of petroleum and sedimentary systems. Research studies rely on integrated, multidisciplinary teams of students, scientists and engineers to find integrated solutions to problems facing the petroleum industry and society. It aims to unite experts cross-college and cross-university to establish the most efficient and effective solutions for the petroleum industry. The Berg-Hughes Center with participation from the Crisman Institute hosts an annual research symposium that brings together faculty, students and industry.

Berg-Hughes Carbonate System Studies (BHCS²)

CARBONATE FIELD SEMINAR

Bonaire, Netherlands
Antilles

May 21–28, 2016

For more information:
dspencer@geos.tamu.edu

Geological Controls on Pore System Evolution to Improve in Recovery Factors

Carbonate pore systems have been studied for well over 100 years due to the complexity of their structure and evolution. However, many problems have not yet been solved, including the effect of dolomitization, fracturing and silicification processes. These processes directly affect the reservoir quality, requiring a better understanding in order to manage oil and gas reservoirs. This research area concentrates on the role of diagenesis in the enhancement of the pore systems in case studies worldwide.

Carbonate Reservoir Characterization and Modeling from Outcrop Analogues

Three-dimensional modeling is a useful visualization tool to understand realistic facies distribution and depositional geometries. These parameters control porosity and permeability and, therefore, reservoir quality. Many different techniques, including satellite images and digital elevation models, generate a facies distribution and provide reservoir analogues to evaluate potential reservoirs. The research focuses on a better understanding of the geometries, shape and sizes of the carbonate deposits. High-resolution sequence and seismic stratigraphy also provide new insights into the depositional and diagenetic characteristics of carbonate successions. These insights are directly applicable to computerized reservoir modeling and characterization.

Late Paleozoic Carbonate Petroleum Systems Opportunity for Exploration

The Carboniferous and Permian periods produced Pangea, which resulted in forming extensive sedimentary basins and developing major Gondwanan glaciation. In South America, Upper Paleozoic strata were deposited extensively over cratonic areas and in intracratonic basins, but in many areas these are poorly documented, although they do have significant petroleum potential.



BERG-HUGHES
CENTER

Chevron Basin Modeling Center of Excellence

In 2013, Chevron funded a research and teaching center of excellence in the Berg-Hughes Center focused on basin modeling. The multi-year graduate program will develop next generation basin modelers and advance research in basin modeling. Research focus is on the generation, retention and expulsion of hydrocarbons in variety of basin settings and play types. The Center uses industry-standard modeling software platforms. Basin modeling integrates petroleum engineering, geochemistry, organic and inorganic rock fluid interactions, fluid properties, sedimentology, geophysics, petrophysics, stratigraphy and data analysis.

Unconventional Resources

Unconventional oil and gas shale resources are transforming the global energy outlook with the largest impact being in the United States, and specifically Texas. The project focuses on unconventional resources in Texas, primarily in the Permian Basin and the Eagle Ford/Eaglebine Groups. The project is a collaborative effort with the Crisman Institute in the Petroleum Engineering Department.

Two of the most important shale plays are located in Texas - the Eagle Ford/Eaglebine across south-central Texas and the Wolfcamp-Spraberry Formations in the Permian Basin. These two basins have been an area of major drilling and technology development in shale reservoirs over the last 10 years. These organic-rich, fine-grain deposits tend to be self-sourcing reservoirs with rock properties varying with sedimentary facies, kerogen type(s) and richness, depth, and thermal maturity. As such, the rock mechanical, petrophysical, and compositional properties will vary vertically and laterally. Also, formation fluid pressure and hydrocarbon fluid types can also change in such formations due to complexities such as pore size distribution.

Most of the reservoirs the oil and gas industry has developed over the last 150 years have been in sandstone or carbonate reservoirs that are essentially inert over the life of the field development. However, unconventional shale reservoirs are not inert. We plan to study how shale reservoir properties change as field development and production occurs. Understanding these changes will be the key to developing predictive models and better stimulation treatments, leading to improved recovery in these reservoirs.

The proposed research program is unique in that its goal is to describe the evolution of the physical, chemical and mechanical state of unconventional shale reservoirs, such as the Eagle Ford/Eaglebine and the Wolfcamp from pre-drill to production decline and depletion. The comprehensive and integrated research program will test the hypothesis that by describing these changes in the state of the reservoir, largely as a result of production-induced fluid-rock interactions, we will be better able to predict future reservoir performance. New, process based, models will enable additional oil and gas recovery from these reservoirs. Application to other global unconventional resources is an additional expected benefit of this program.

The research program is directed towards improving predictive models that result from the integration of four key themes:

- 1) Geological and geophysical characterization of unconventional reservoirs
- 2) Hydraulic fracturing
- 3) Nano- and molecular scale phenomena
- 4) Reservoir modeling

Welcome New Professors

With a current undergraduate Geology & Geophysics population of over 500 students, the department's faculty continues to grow.

Below you can find brief summaries about our newest professors and their research interests.

Dr. Ryan Ewing

Dr. Ryan Ewing is an Assistant Professor in the Department of Geology and Geophysics at Texas A&M University. He graduated from the University of Texas at Austin with his Ph.D. in Geology, and taught Sedimentology and Stratigraphy at the University of Alabama before starting at Texas A&M University in 2013. His primary research interests are process sedimentology and planetary geology. He specializes in modern and ancient aeolian sand dune systems on Earth, Mars and Titan. He uses field and experimental methods along with remote sensing and numerical modeling to do his research. Most recently, Dr. Ewing's research on sand dunes on Titan was published by *Nature Geoscience*. His other recent publications focus on Earth's Late Neoproterozoic glacio-aeolian systems and modern aeolian bedforms on Earth and Mars. Dr. Ewing is also on NASA's Mars Science Laboratory team and works operationally to help interpret terrain properties over which the Curiosity rover drives.



Dr. Robert Reece



Dr. Robert Reece is an Assistant Professor in the Department of Geology and Geophysics at Texas A&M University. He graduated from the University of Texas at Austin with his Ph.D. in Geophysics before starting at Texas A&M University in 2013. His research interests include the study of plate boundaries and processes associated with climate tectonic interaction, evolution of oceanic crust, development of carbonate systems, and high-resolution studies of marine hazards. Dr. Reece utilizes most types of marine geophysical data, but specializes in seismic reflection, tomography, bathymetry, high resolution techniques, and seismic-core integration. Current research projects are being conducted in Bonaire, the Mid-Atlantic Ridge in the South Atlantic, and the deepwater Gulf of Alaska; the latter two include synthesis with IODP.

Dr. Julia Reece



Dr. Julia Reece is an Assistant Professor in the Department of Geology and Geophysics at Texas A&M University. She graduated from the University of Texas at Austin with her Ph.D. in Geology and worked as a post-doc for the same university as well as Stanford University before starting at Texas A&M University in 2014. Her research interests include sediment mechanics, physical hydrogeology, and shale gas reservoirs. Her research group uses sediment/rock characterization techniques as well as sedimentological and soil/rock mechanical experiments.

Dr. Hiroko Kitajima

Dr. Hiroko Kitajima is an Assistant Professor in the Department of Geology and Geophysics at Texas A&M University. She graduated from Texas A&M University with her Ph.D. in Geology and worked as a post-doc for Pennsylvania State University and a researcher for the Geological Survey of Japan before returning to Texas A&M University in 2014. Her research interests include experimental rock deformation, hydromechanical properties of geomaterials, and earthquake source physics and deformation in subduction zones.



Dr. Masako Tominaga



Dr. Masako Tominaga is an Assistant Professor in the Department of Geology and Geophysics at Texas A&M University. She graduated from Texas A&M University with her Ph.D. in Oceanography and worked as an assistant professor at Michigan State University before returning to Texas A&M University in 2015. She is currently an adjunct scientist at the Woods Hole Oceanographic Institution. Her research interests include Earth's magmatism and lithosphere evolution, geomagnetism and global carbon cycle. She is an expert on deep submergence geophysics using submarine robotic vehicles.

Dr. Juan Carlos Laya

Dr. Juan Carlos Laya is an Assistant Professor in the Department of Geology and Geophysics at Texas A&M University. He graduated from Durham University with his Ph.D. in Earth Sciences, starting at Texas A&M University with the Berg Hughes Center. His research interests include carbonate sedimentology and reservoir characterization and modeling from outcrop analogues, geological evolution of isolated carbonate platforms, also, late Paleozoic carbonate petroleum systems and opportunities for exploration, the role of diagenesis in the enhancement of the pore systems including dolomitization.



Dr. Nicholas Perez



Dr. Nicholas Perez is an Assistant Professor in the Department of Geology and Geophysics at Texas A&M University. He graduated from the University of Texas at Austin with his Ph.D. in Geology before starting at Texas A&M University in 2015. His research interests include understanding the Cenozoic deformation history of the central Andes of southern Peru using a mix of basin analysis (sedimentology/stratigraphy, provenance, geochronology) and structural (field mapping, balanced cross sections, thermochronology) techniques to address questions regarding the timing and mechanisms responsible for crustal thickening found in the central Andes, and he is also interested in how inherited structures influence subsequent shortening and basin development in orogens.

Dr. Patrick Fulton

Dr. Patrick Fulton will be an Assistant Professor in the Department of Geology and Geophysics at Texas A&M University starting in Spring 2016. He graduated from Pennsylvania State University with his Ph.D. in Geosciences and currently works as an assistant researcher at the University of California Santa Cruz. His research interests focus on hydrologic and thermal processes within fault zones and how these processes either control fault slip behavior or provide insightful signatures within fault rocks and borehole and geophysical observations. Much of Dr. Fulton's work incorporates field and laboratory data, including innovative new borehole monitoring techniques, along with careful quantitative analysis and numerical modeling. In general, his research combines hydrogeology, thermal geophysics, and geomechanics and has applications to earthquake physics, tectonic processes, and the transport of subsurface heat and fluids.



Dr. Gibson Awarded

Out of a total of 41 proposals submitted from six different colleges across campus, ten proposals were selected for funding under the First Proposal Call by the Texas A&M Energy Institute. Of these, Dr. Richard Gibson's proposal titled "Integrated Common-Grid Multiscale Models for Seismic Imaging of Subsurface Fluid Flow" of which he is the principal investigator was chosen to be funded.

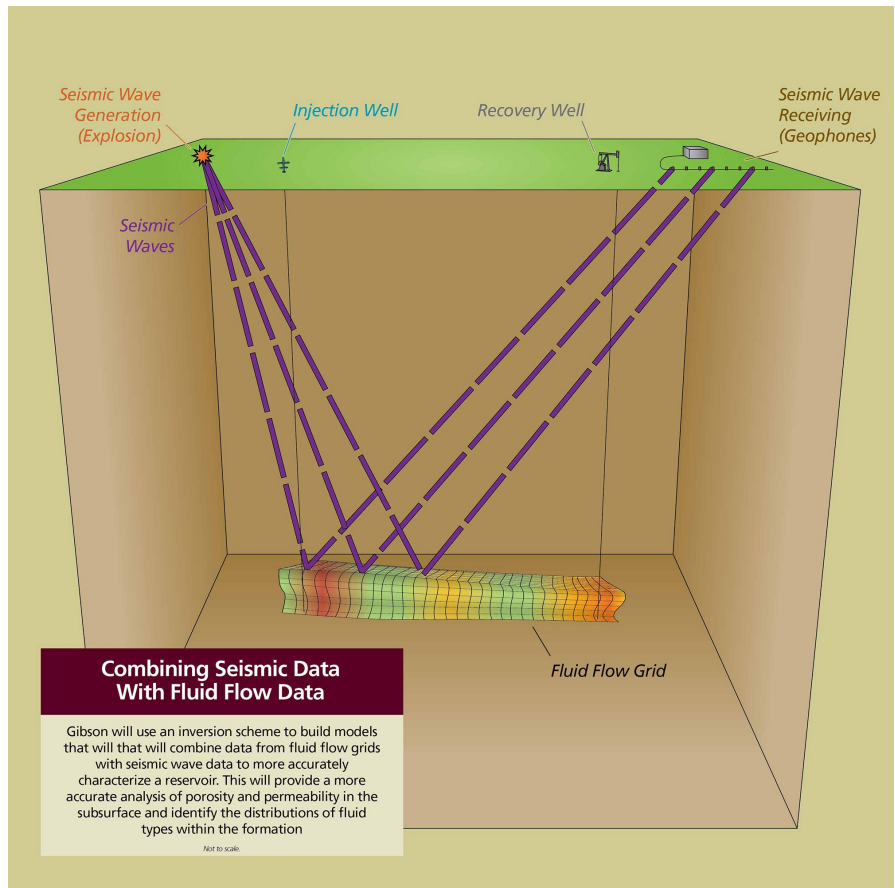
Dr. Richard Gibson, the Francesco Paolo di Gangi/Heep Endowed Professor and a professor in the Department of Geology and Geophysics, is leading this project to combine the seismic wave data with the flow data grids and create a simulator that is built on a common computational grid. This simulator will be a key component of an inversion scheme, a tool that will combine fluid and seismic wave data to

characterize a reservoir, providing analysis of porosity and permeability

in the subsurface and identifying the distributions of fluid types within the formation.

This approach could address many problems that are found in the development of energy resources and in the mitigation of associated environmental risks.

Dr. Richard Gibson will be leading this project along with co-primary investigators, Dr. Yalchin Efendiev from the Department of Mathematics and Dr. Eduardo Gildin from the Department of Petroleum Engineering.



For more information on the opportunities to support the Department of Geology and Geophysics contact:

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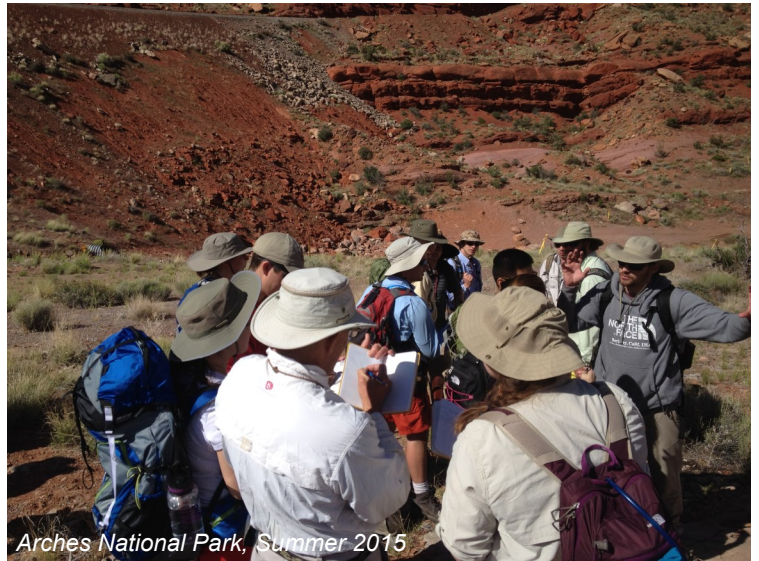
Halbouty, Office 108B

OR

Field Camp



Montana, Summer 2015



Arches National Park, Summer 2015



Arches National Park, Summer 2015

Field camp (GEOL 300) is a required course for all students wishing to receive a B.S. in Geology, and for many is their most cherished memory. With the growing population of our undergraduate students, this past summer's geologic field camp consisted of four different groups accompanied by seven faculty members and several graduate teaching assistants. Two groups went to stay in the dorms of the University of Montana Western in Dillon, Montana. The other two groups were traveling camps, and they camped in various locations such as New Mexico, Utah, Colorado, and Montana.

Special thanks to Javin Hatcherian '15 for his field camp pictures!

Field Trip Course

The Geology field trip course (GEOL 330) is a required course for all students wishing to receive a B.A. in Geology, and optional for all others. In the past, there were two different trips during the semester. One trip that would travel to Death Valley National Park and the other trip would travel to Big Bend National Park. These trips were previously run by Dr. Andrew Hajash, who has since then retired. This upcoming winter break, Dr. Andreas Kronenberg and Dr. Anne Raymond will be hosting the GEOL 330 course as they travel to Big Bend National park in early January.

Picture taken by Academic Advisor, Suzanne Rosser, on the GEOL 330 Western U.S. Trip in 2013!



G&G Meet and Greet



The Department of Geology & Geophysics successfully hosted a Meet and Greet on September 18th for both new students and alumni to network. Check out these pictures from the event! Feel free to attend any of the future events listed on the back of our newsletter!

Texas A&M University Alumni Events:

Feel free to attend any of the A&M Club events for your respective city! Here are the links below:

Houston - www.houstonags.org

Dallas - www.dallasaggies.org

San Antonio - www.aggiepark.com

Calendar of Events

November 2015

6 - Geology & Geophysics Seminar at 11:30am in Halbouty, Room 101
Speaker: Hui-Hai Liu, Aramco Research Center, Houston
Title: Unconventional spontaneous imbibition in shale matrix

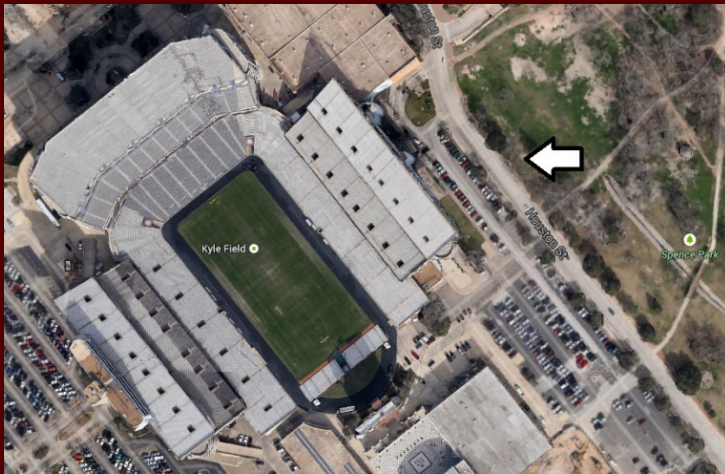
7 - G&G Society Tailgate; A&M vs. Auburn

13 - Geology & Geophysics Seminar at 11:30am in Halbouty, Room 101
Speaker: Franco Marcantonio, Texas A&M University
Title: Dust deposition and migration of the Intertropical Convergence Zone through the last glacial cycle in the west-central Pacific (Line Islands)

14 - G&G Society Tailgate; A&M vs. Western Carolina

20 - Geology & Geophysics Seminar at 11:30am in Halbouty, Room 101
Speaker: Mark Everett, Texas A&M University
Title: Ground-penetrating radar investigations beneath Alcatraz Island, San Francisco Bay

Please contact urock@tamu.edu, if interested in speaking at any Geology & Geophysics Organization meetings.



Map of G&G Society Tailgate location across from the Aggie War Hymn statue next to Kyle Field

Special thanks to Jeremy Herron '15 for providing the November 2015 newsletter cover picture from his 2015 field camp!

Department of Geology & Geophysics

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