THE JACKSON SCHOOL AT 10

Jack and Katie’s visionary investment inspires geosciences excellence
Dear Alumni and Friends

Time certainly has flown by. It has been 10 years since the Jackson School was elevated to a college-level school, and I can think of no better way to commemorate the milestone than recognizing Jack and Katie Jackson’s visionary investment in this school and the future of Texas.

You will find several touches on the theme in this year’s Newsletter. The cover features the Jacksons and the Wise County gas fields Jack helped pioneer. There’s also a story on page 60 detailing Jack and Katie’s journey from their youth to becoming founders of one of the largest and most prestigious schools of geosciences in the world, and a story on page 34 about Katie being inducted into the Jackson School Hall of Distinction.

I hope you can attend the 10-year symposium on Jan. 22, where we will showcase some of the school’s accomplishments. But even as we take some time to look back, we need to focus firmly on the future. The last 10 years have been great. I think we all share the goal of making the next 10 years even better.

We are currently working on a new five-year strategic plan to help guide the school in the coming years, and I look forward to sharing the details with the Jackson School community soon. My vision is to continue to integrate research and education, especially interdisciplinary, transformative research that advances the geosciences and benefits society.

You will find great examples of exciting research with a positive impact on society throughout the Research Highlights and rest of this issue. I’ll mention just a few — a feature on water resources on page 56, a story on pipeline safety on page 74, and a story on slow slip tectonic research on page 68. All highlight work that holds tremendous value for Texas and the world.

I think it is important to point out the aspect of social relevance because the emphasis fits in perfectly with the Jacksons’ vision. Jack and Katie chose to invest in Texas geosciences and education because of its critical importance to the citizens of Texas.

Sharon Mosher, Dean
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NEWSLETTER HIGHLIGHTS
Drilling into Dinosaur Extinction

An international research team is formalizing plans to drill nearly 5,000 feet below the seabed to take core samples from the crater of the asteroid that wiped out the dinosaurs. The expedition is planned for spring 2016.

Dinosaurs and other reptiles ruled the planet for 155 million years. That all changed 65 million years ago when a 9-mile-wide asteroid slammed into the Earth, triggering a series of apocalyptic events that killed most large animals and plants, including non-avian dinosaurs and large marine reptiles. The event set the stage for mammals — and eventually humans — to take over. Yet, we have few geologic samples of the now buried impact crater.

The team, led by Sean Gulick, a researcher at the Institute for Geophysics (UTIG), and a team of scientists from the U.K. and Mexico are working to change that. The team is planning to take the first offshore core samples from near the center of the impact crater, which is called Chicxulub after a nearby seaside village on the Yucatán Peninsula.

The roughly $10 million in funding for the expedition has been approved and scheduled by the European Consortium for Ocean Research Drilling and the International Continental Scientific Drilling Program.

"With core samples from Chicxulub, we'd have a long-term record of the processes that occurred after the impact," said lead researcher Gulick. "We'd be able to see how life came back."
Ocean may be Melting Glacier

Surface & Hydrologic Processes

Researchers at the Institute for Geophysics (UTIG) have discovered two seafloor gateways that could allow warm ocean water to reach the base of Totten Glacier, East Antarctica’s largest and most rapidly thinning glacier. The discovery, reported in the March 16, 2015, edition of the journal Nature Geoscience, probably explains the glacier’s extreme thinning and raises concerns about how it will affect sea level rise.

Totten Glacier is East Antarctica’s largest outlet of ice to the ocean and has been thinning rapidly for many years. Although deep, warm water has been observed seaward of the glacier, until now there was no evidence that it could compromise coastal ice. The result is of global importance because the ice flowing through Totten Glacier alone is sufficient to raise global sea level by at least 1.5 feet, equivalent to the contribution of the West Antarctic Ice Sheet if it were to completely collapse.

“Now we know there are avenues for the warmest waters in East Antarctica to access the most sensitive areas of Totten Glacier,” said lead author Jamin Greenbaum, a UTIG Ph.D. candidate.

The ice loss to the ocean may soon be irreversible unless atmospheric and oceanic conditions change so that snowfall outpaces coastal melting. The potential for irreversible ice loss is due to the broadly deepening shape of Totten Glacier’s catchment, the large collection of ice and snow that flows from a deep interior basin to the coastline.

“The catchment of Totten Glacier is covered by nearly 5,000 feet of ice, filling a sub-ice basin reaching depths of at least one mile below sea level,” said UTIG researcher Donald Blankenship. Greenbaum and Blankenship collaborated with a team from the United States, Australia, the United Kingdom and France.

Because much of the California-sized interior basin lies below sea level, its overlying thicker ice is susceptible to rapid loss if warm ocean currents sufficiently thin coastal ice. Given that previous work has shown that the basin has drained its ice to the ocean and filled again many times in the past, this study uncovers a means for how that process may be starting again.

“We’ve basically shown that the submarine basins of East Antarctica have similar configurations and coastal vulnerabilities to the submarine basins of West Antarctica that we’re so worried about, and that warm ocean water, which is having a huge impact in West Antarctica, is affecting East Antarctica, as well,” Blankenship said.

The deeper of the two gateways identified in the study is a three-mile-wide seafloor valley extending from the ocean to beneath Totten Glacier in an area not previously known to be floating. Identifying the valley was unexpected because satellite analyses conducted by other teams had indicated the ice above it was resting on solid ground.

Seafloor valleys that connect this deep, warm water to the coast can especially compromise glaciers, a process previously known to be occurring along the coast of the West Antarctic Ice Sheet. Complete collapse of the Totten Glacier catchment may take many centuries. The timing is the subject of intensive research.

The UTIG team collected the data during five Antarctic field campaigns using aircraft loaded with equipment to analyze the ice and seafloor in regions that even icebreakers are unable to reach. The airplane was outfitted with radar that can measure ice several miles thick, lasers to measure the shape and elevation of the ice surface, and equipment that senses the Earth’s gravity and magnetic field strengths, which are used to infer seafloor shape.

Regional Seismic Variation

Solid Earth & Tectonic Processes

Cliff Frohlich

The Williston Basin in the north central U.S. produced fewer earthquakes caused by wastewater injection than Texas, suggesting the link between seismicity and production activities may vary by region. The findings were published in the journal Seismological Research Letters in February 2015.

Ongoing since the 1990s, petroleum and gas production in the Williston Basin, underlying parts of Montana, North Dakota, South Dakota and Saskatchewan in Canada, changed in recent years to include hydraulic fracturing and horizontal drilling. Scientists from the University of Texas at Austin took advantage of new monitoring data to explore the connection between seismicity and petroleum production near the Bakken Formation, an area of historically low seismicity, but with a recent history of increased hydraulic fracturing and wastewater disposal.

“Why are earthquakes triggered in some areas and not in others? It’s an important question for regulators and the scientific community,” said Cliff Frohlich, lead author of the study and associate director of the Institute for Geophysics. “Some answers are emerging.”

UT Pitches in $7.5 Million for Bureau Modernization

Energy Geosciences

The Bureau of Economic Geology (BEG) is in the midst of an ongoing effort to modernize the extensive laboratories and other facilities in Building 35, and to construct a new core viewing facility for researchers and graduate students. The effort received a huge boost in spring 2015 when then University of Texas at Austin president Bill Powers approved a university investment of $1.5 million in the project.

“President Powers recognized that the bureau has been delivering outstanding research and reputational benefit for the university,” said BEG Director Scott Tinker, “and that we are doing fundamental work related to energy, the environment, and the economy that is core to the university mission. He feels that upgrading our laboratory infrastructure is a great investment, and we are very grateful for his confidence in our research capabilities.”

The campaign to raise the additional funding required to complete the project will continue.
SHARP IN THE DISTANCE.

In research of significance to the world’s expanding coastal populations, scientists have found that geology and infrastructure play key roles in determining whether aquifers that provide drinking water are inundated with seawater during a typhoon or hurricane and how long the contamination lasts.

In 2013, Typhoon Haiyan devastated the Philippines, killing more than 6,600 people and destroying nearly $3 billion worth of property. While the country was in the midst of recovering from the storm, Jackson School of Geosciences scientists conducted research that found that an aquifer on the island of Samar inundated with salt water by the typhoon’s storm surge could remain undrinkable for up to 10 years. In contrast, a second aquifer on the island that was also inundated has recovered much more quickly.

The research was published online April 14, 2015, in the journal Geophysical Research Letters. It focused on aquifers used by the village of San Antonio on the island of Samar.

The difference in recovery time is due to the two aquifers’ surrounding geology, said associate professor Bayani Cardenas, who led the research team. The shallower of the two aquifers is made up of beach sand about 10-15 feet deep, which allows salt water soaked up from the storm to percolate to the water table and move through the aquifer for years to come. In contrast, the other aquifer is largely shielded from seepage because of its depth and possibly an overlying layer of volcanic rock.

The University of Texas at Austin team also included geosciences professor Philip Bennett and graduate students Peter Zamora, Kevin Refus, Matt Kaufman and Aaron Jones. Sponsored in part by the Jackson School’s rapid response program, a fund that supports research in areas recently affected by natural disasters, the researchers arrived in the Philippines two months after the storm struck.

Coring the Gulf

Marine Geosciences

In February 2015 the Bureau of Economic Geology’s Tip Meckel led a coring operation to the inner Texas shelf off the shore of Galveston Island.

Meckel’s team previously imaged the site in 2013 using the bureau’s high-resolution 3-D seismic technology (P-Cable). Seismic interpretations indicated a deep-seated gas chimney and identified a suite of shallow seismic anomalies 10 to 40 meters below the seafloor, interpreted to be shallow free-gas accumulations.

The goal of February’s core sampling was to determine if the gas anomalies can be resolved with the fine spatial detail that is imaged in the seismic data. Twenty-three piston cores were located on and off the shallow seismic anomalies, with an average penetration depth, limited by the presence of a stiff clay layer, of 8.5 meters. The lowermost sediments from piston cores will be processed for any gas content.

Six cone penetrometer (CPT) profiles were obtained at similar depths for a subset of the piston-coring sites. CPT data provide tip resistance and friction, which can be used to infer fine-scale stratigraphy. The data set also provides important information for developing monitoring strategies for potential offshore storage of CO2 beneath state waters.

Understanding the Future of the African Monsoon

Climate, Carbon & Geobiology

The Sahara conjures images of a vast desert landscape, but for a period of about 10,000 years the Sahara was characterized by lush, green vegetation and a network of lakes, rivers and deltas.

This “green Sahara” occurred between 14,800 and 5,500 years ago during what is known as the “African Humid Period.” Why and how it ended is the subject of scientific study that holds important information for predicting the region’s response to future climate change.

In a study published Jan. 26, 2015, in Nature Geoscience, a team of researchers provided new insight into the behavior of the African monsoon at the end of the African Humid Period and the factors that led to the region’s desertification.

“Our work suggests that the African monsoon’s response to climate forcing is more complicated than previously understood,” said lead author Timothy Shuman, assistant professor at the Jackson School of Geosciences. “Really big forcings like a collapse in the circulation of the Atlantic can cause synchronous drought across North Africa.”

Africat’s tropical rainfall supplies about 60 to 90 percent of northern and equatorial Africa’s annual moisture, the study noted. As a result, changes in the timing or intensity of seasonal rainfall influence food and water security for more than 500 million people.

In September 2014, two years after it first arrived on the Martian surface, NASA’s Curiosity rover completed its 5-mile trek to its primary destination: Mount Sharp, officially called Aeolis Mons.

Among those behind the proverbial wheel of the rover was Mackenzie Day, a doctoral student at the Jackson School of Geosciences and a Keeper of the Plan for the Curiosity mission—a title that says she gets to help tell the rover what to do.

“It’s not a joystick in a box,” Day said about driving. “All commands are sent using code.”

Each day she attends a conference call between NASA personnel and international collaborators to discuss what Curiosity will do and what samples it will take; she’s especially partial to pit-stops for transverse aeolian ridges, a wind-sculpted sand formation found only on Mars and a major player in her dissertation comparing aeolian processes on Earth and Mars.

Day then takes the mission teams’ commands and prepares them for transmission to the rover.

Now that the rover has reached the base of Mount Sharp, Day will be driving the rover farther up the Mount Rainier-sized mountain in document and sample the 3 billion years of Martian geology recorded in its sedimentary layers. She said seeing and sampling Mars through the rover is awe-inspiring. But she has hopes to experience the Martian vista in person one day. After earning her doctorate, Day plans to apply for the NASA astronaut program.
Two-Thirds of the Earth is Covered by Water — and the Jackson School is there

The Jackson School of Geosciences christened a new coastal research vessel on April 22, 2009.

"It will be used in the next decade for research, as well as more teaching and our rapid response program, where we go out and look at what catastrophic processes happen when you have a storm or a hurricane," said Dean Sharon Mosher.

The 282-square-foot Scott Petty, named by Scott and Eleanor Petty of the Scott Petty Foundation, was put to use almost immediately. Professor David Mohrig and his colleagues used the vessel in the first field course.

Since the majority of geophysical phenomena happen in parts of the planet covered with water, a research vessel is an essential tool for improving our understanding of the planet.

The vessel was a gift from the Scott Petty Foundation. It is also supported by ConocoPhillips, which provided funding for scientific equipment, and ExxonMobil, which is funding a safety program for the vessel.

"Geophysics has been our life, and I hope it will be for some of you all as well," said Scott Petty. "We've come a long way."
Tectonic Explosion of Life

Solid Earth & Tectonic Processes

A geological analysis by Ian Dalziel of the Institute for Geophysics published in the November 2014 issue of Geology suggests a major tectonic event may have triggered the rise in sea level and other environmental changes that accompanied the Cambrian explosion, an apparent burst of life that occurred about 540 million years ago.

The Cambrian explosion is one of the most significant events in Earth’s 4.6-billion-year history. The surge of evolution led to the sudden appearance of almost all modern animal groups. But its cause has been a mystery. The sudden burst of new life is also called “Darwin’s dilemma” because it appears to contradict Charles Darwin’s hypothesis of gradual evolution by natural selection.

Beyond the sea level rise itself, the ancient geologic and geographic changes probably led to a buildup of oxygen in the atmosphere and a change in ocean chemistry, allowing more complex life-forms to evolve, Dalziel said.

“I’m not claiming this is the ultimate explanation of the Cambrian explosion,” Dalziel said. “But it may help to explain what was happening at that time.”

Measuring Volatiles in a Core

Energy Geosciences

Daniel Enriquez, a research scientist associate at the Bureau of Economic Geology and gas geochemistry laboratory technician, invented a device to solve a longstanding problem of core analysis.

The study of in situ fluid compositions under shale reservoir conditions is problematic because volatiles can be easily lost during core drilling and post-core transport. To retain volatiles contained in the sample cores, dips and coatings such as waxes and plastic are used when cores will not be tested within a few hours or days, and when the material will be transported over long distances or requires added mechanical integrity.

Accessing and accurately measuring the volatiles within the cores has been difficult. Enriquez’s invention solves the capture and measurement problem by using a cutting blade inside a vacuum chamber to efficiently pierce the core plug’s thick coating and capture gases for analysis. The instrument was created in collaboration with The University of Texas at Austin’s Applied Research Laboratories and the chemistry department. Enriquez is a graduate student at the Jackson School of Geosciences and an alumnus of the school’s GeoFORCE program, where he was instructed by bureau researchers Jeffrey Paine, Sigrid Clift and others. The program left a lasting impression on him, strongly influencing his decision to pursue his studies in geology and a career at the bureau.

Ice on Mars

Planetary Sciences

Hidden glaciers on the surface of Mars contain enough water to blanket the Red Planet in a layer of water over two meters deep, found Joe Levy, a research associate at the Jackson School of Geosciences, and researchers from Mount Holyoke College and Brown University.

Their findings were published in the Journal of Geophysical Research: Planets in August 2014. Debris-covered glaciers are a type of glacier with ice that is insulated by layers of surface rock and sand. The researchers used satellite images and laser altimeter data from the Mars Reconnaissance Orbiter to search for topological indicators of debris-covered glaciers, such as downslope concordant lineations, convex-up topography, and complex ridges called “brain terrain.”

“It appears that [debris-covered glaciers] are everywhere,” said Levy, who led the research team. “If you melted them all down it would be a global ocean on Mars.”

The debris-covered glaciers give clues into Mars’ past climate conditions and indicate that the past climate was very different from today, supporting extended periods of ice deposition that enabled the glaciers to build up ice hundreds of meters thick.

But debris-covered glaciers are not only a Martian phenomenon. Levy and Jack Holt, a research associate professor at the Jackson School, studied them on Earth, too. In the summer of 2013 they led a class of graduate and undergraduate students to study and map a debris-covered glacier in Wyoming.

“What makes this field course so different is it’s really experimental,” Levy said. “Students get a handle on what it’s like to explore a landform that very little work has been done on...and leave with a very specialized knowledge about how you use tools...and design experiments.”

A Meteorite Under Microscope

Planetary Sciences

Researchers from the Jackson School of Geosciences have improved the understanding of planetary formation processes by analyzing the microstructures of a primitive meteorite on loan from the Smithsonian Institution.

The meteorite is a valuable scientific specimen because it’s a leftover from the earliest stages of planet formation in our solar system when dust orbiting the sun was beginning to coalesce, said Romy Hanna, a doctoral student who led the research.

“It’s original solar nebula material that never melted into a planet,” said Hanna, who is also a NASA Earth and Space Science fellow.

Using X-ray computed tomography (CT) at The University of Texas at Austin High Resolution X-ray CT Facility in the Jackson School, Hanna found that the specimen chondrules, millimeter-sized spherical grains present in primitive meteorites, defined a foliation fabric. By analyzing their 3-D structure and characterizing their microstructures using electron microscopy techniques, Hanna determined that the chondrules likely underwent low energy, brittle deformation as a result of impacts on the parent asteroid body. This finding is in contrast to current knowledge that assumes chondrules are deformed by high energy, plastic deformation during impact.

Tracking Earthquakes in Texas

Solid Earth & Tectonic Processes

Texas Gov. Greg Abbott signed legislation in June 2015 authorizing $4.47 million in funding for the TexNet Seismic Monitoring Program, an initiative led by the Bureau of Economic Geology. TexNet will enhance the ability of the state to gather information about subsurface seismic activity by placing seismometers throughout the state and analyzing data resulting from any future seismic events.

The mission of TexNet is to provide transparent access to data and information regarding the understanding of earthquake activity in Texas, both natural and potentially induced by human activity. TexNet will acquire and install at least 24 permanent seismometers in key locations, augmenting the 16 existing seismometers currently in place in Texas. Another 36 portable seismometers will be staged in bureau facilities across the state, ready to rapidly deploy to investigate key future earthquake activity.

TexNet’s goals are to monitor, locate and catalog seismic activity with magnitudes of 2.0 and larger, and to improve the state’s ability to rapidly investigate ongoing earthquake sequences in Texas. The funding will also support objective research that should provide the residents of Texas with answers to many of their important questions about earthquake activity in the state.
SPECIES OF FRESHWATER MUSSELS. The Colorado River is the habitat of many

Texas water supplies, often stressed by drought, could be further affected by the federal listing of five freshwater mussel species under the Endangered Species Act, but most of the potential impacts could be mitigated by innovative water strategies, according to a study by the Bureau of Economic Geology (BEG). The study in the October 2014 edition of the Journal of the American Water Resources Association addresses an issue that has concerned water managers in drought-prone Texas since 2011, the year when the U.S. Fish and Wildlife Service gave long-standing supply issues; and Wharton

The five species – Texas fatmucket, Texas pimpleback, golden orb, Texas fawnfoot and smooth pimpleback – have not been listed as endangered yet. If the species were listed and critical habitat designated, the federal law could affect environmental flows (water flows required to sustain freshwater ecosystems in certain streams and rivers) especially in Central Texas, where the most mussels are found. "Modeled changes in water availability following possible federal listing of the mussels are minimal when we are not in a drought," said lead author Brad Wolaver, a BEG research associate.

But during times of drought, disruptions to water supply could be significant in areas that already have shortages. They include Bexar County, particularly in San Antonio’s power generation sector; Tom Green County, where San Angelo has long-standing supply issues; and Wharton County, where existing agricultural water supply issues could be exacerbated.

Wolaver, a BEG research associate.

LOBAL MUSEUM OF NATURAL HISTORY PHOTOGRAPHY

THE LONG-NECKED ALAMOSAURUS TOWERS ABOVE OTHER DINOSAUR EXHIBITS AT THE

The Vertebrate Paleontology Lab (VPL) has received three major collections since the beginning of 2014, adding to one of the largest fossil collections in North America. Among them are the Cretaceous sauropod dinosaur Apatosaurus bones the VPL loaned out several years ago. The bones were used to create the massive Apatosaurus display in the Perot Museum in Dallas. The fossils, which represent about one-third of the complete dinosaur, were discovered by noted University of Texas paleontologist Wann Langston Jr. in the early 1970s and weigh about 14,000 pounds.

The second major collection was compiled over the course of about 30 years by biology professor Jon Bashian of Texas A&M University-Kingsville. It includes about 14,000 pounds of Pleistocene fossils, including mammoths, bison, horses, turtles and sloths.

The third large collection was made by Ken Barnes, an educator from west Texas, and includes Cretaceous dinosaur fossils, including a partially complete hadrosaur skeleton and a juvenile ceratopsian.

VPL researchers have also continued to conduct field work, collecting specimens for the lab from sites in Texas, New Mexico and other areas. In total, about 25,000 pounds of fossils have arrived since the beginning of 2014 for permanent curation in the facility.

Tons of Fossils

Climate, Carbon & Geobiology

The researchers discovered the presence of the genes by comparing the whole-genome sequence of a chicken – technically a living dinosaur – with whole-genome sequences from 13 other animals representing various evolutionary lineages. Genes controlling feather development and production in chickens were found in lineages much more ancient than archosaurs, with regulatory genes spiking in ancestors to amniota, the taxonomic group where hard-shelled eggs and internal embryo development first evolved. The spike in protein-encoding genes for feathers didn’t occur until much later, with the evolution of dinosaurs, and later modern birds, from archosaur ancestors.

These findings indicate that regulatory genes required for feathers could be a “flexible toolkit” that controlled the development of many structures, such as hair, as well as feathers. The presence of the regulatory genes in taxonomic groups older than archosaur could also mean that feather precursors may have existed more than 300 million years before more modern-looking feathers appeared in dinosaurs.

Invertebrate Fossils Go Digital, Get Adopted

Climate, Carbon & Geobiology

According to their work, 86 percent of genes regulating feather formation, and 80 percent of non-keratin protein genes required to build feathers were present in the ancestors of archosaurs, the taxonomic group from which dinosaurs evolved.

In the October 2014 edition of the Journal of the American Water Resources Association addresses an issue that has concerned water managers in drought-prone Texas since 2011, the year when the U.S. Fish and Wildlife Service gave long-standing supply issues; and Wharton

The new toolkit for feathers existed long before dinosaurs, says lead author Julia Clarke, a researcher at the Jackson School of Geosciences, and collaborators have found that genes that regulate feather development are much older than the dinosaurs, a group that includes modern birds as well as ancient reptiles. Their findings were published in the journal Molecular Biology and Evolution in November 2014.

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How the Penguin Got Its Waddle

James Proffitt, a Ph.D. student at the Jackson School of Geosciences, and the University of London Royal Veterinary College's John Hutchinson studied penguins at the London Zoo to figure out how they, and their distinctive gait, evolved from ancient seabirds.

The scientists used two tripod-mounted cameras to capture a complete biomechanical picture of the penguins as they walked. The penguin waddle appears very inefficient, making the evolution of the flightless bird's gait a mystery.

"Their body is very weird for a bird," Proffitt said. But, he noted, during the Antarctic winter emperor penguins can walk some 50 miles to their nest sites; they scramble over cliffs, jump over obstacles, and scale sheer surfaces: "They're clearly doing something right."

CO₂ and the History of Weighing Smoke

How do we keep track of the CO₂ we're releasing? And just how do we weigh something that floats in the first place? A KUT article answered this question with historical flair by comparing the answer of Sir Walter Raleigh, a 16th century explorer and guest of Queen Elizabeth I's court, to chemical reality.

"The difference between the weight of the tobacco and the weight of the ashes must be the weight of the smoke!" Raleigh said, according to an early American folk story.

In reality, smoke is heavier than the weight of the combusted material because carbon bonds with oxygen during the combustion process — creating CO₂, a molecule heavier than carbon alone and invisible to humans.

"If we could see it, it would be... super red," says Susan Hovorka, a research scientist who works with CO₂ at the Bureau of Economic Geology. "It's infrared. It's some incredibly more than red color. And you could drive around and see it coming out of every combustion source. So, if you know the amount of fuel you're burning and its carbon content, you can add the weight of the oxygen, and you have a sense of how much CO₂ you've created.

UT Jackson School of Geosciences Aims to Enhance Research in Mexico

The University of Texas at Austin Jackson School of Geosciences and the National Autonomous University of Mexico have strengthened collaborations with each other in the fields of energy, environment and sustainability.

The new partnership will enhance the mutual academic opportunities created by Mexico's recent energy reform.

"In the next two to three years, because of the opening by the energy reform, we are going to have a large number of oil companies that are going to require national engineers and geologists," Jorge R. Pihon, director of the Jackson School of Geosciences Latin America & Caribbean Program, told Rigzone.

Scientists to Dig Deep into Dino-Killing Impact Crater

The catastrophic asteroid crash blamed for the demise of the dinosaurs also left a gaping scar in the Earth. That sprawling crater made 66.5 million years ago may hold the answers to many mysteries surrounding the space-rock event.

"The Chicxulub impact crater has been a remarkable scientific opportunity for the last 20 years since it's been discovered," said Sean Gulick, a research associate professor at the Institute for Geophysics. That sprawling crater made 66.5 million years ago may hold the answers to many mysteries surrounding the space-rock event.

For the first time, scientists have subsurface images from the offshore part of the crater, so they can pinpoint a spot for sampling. They chose a spot along the crater's peak ring — a ring of伴岩 structures around the center of the crater. By sampling there, the researchers can get a clearer picture of ancient biological and geological processes.

Peering Inside Greenland’s Ice Sheet in 3-D

Researchers have created a new 3-D map and animation of the Greenland ice sheet that allows them to study layers of ice tens of thousands of years old. The tools will help scientists better understand how Greenland may respond to climate change by revealing how the ice sheet responded to past changes in climate.

The map will "give people that gut-level feel of what an ice sheet looks like on the inside," said Joe MacGregor, a research associate at the Institute for Geophysics and one of the project's leaders.

Surge Fuels Big Water Problem

Storm surges caused by massive tropical storms can destroy communities and take lives, but they can also contaminate groundwater that people depend on for drinking.

That's the case on Samar, an island in the Philippines. Long after Typhoon Haiyan devastated the area in 2013, an aquifer is still at risk of contamination as saltwater from the surge continues to seep through the ground above it. These findings were published in Geophysical Research Letters, a journal of the American Geophysical Union.

"During the storm they didn't have any water, and all the wells were salty," said Bayani Cardenas, an associate professor at the Jackson School of Geosciences and the lead author of the paper. "They drank coconuts for the first three days. It may take five to 10 years to flush out the seawater."
**STEMFORCE: Building the Next Generation of Geoscientists**

By Bridget Haby, coordinator for GeoFORCE, a high school outreach program in the Jackson School of Geosciences.

The ever-growing gap within the oil and gas industry workforce is a phenomenon that companies are all too aware of. It is projected that within five to seven years, roughly 50 percent of the industry’s workforce will be retired. STEMFORCE, funded in part by Drillinginfo and founded by the organization GeoFORCE Texas, is a new program that aims to encourage students to pursue careers in the geosciences by exposing high school students to geologic fieldwork.

Last week I took our first STEMFORCE cohort of 36 students from the Dallas and Austin areas to Florida to learn about river and coastal processes. For many of these students, this was their very first time on an airplane as well their first time travelling to another state. Over the first two days of the trip I could tell that many students were having trouble grasping the “big idea” concepts of geology, such as the processes that change the Earth’s surface. Once we were out in the field however, and the students were able to physically see modern beach processes occurring on the Florida coast, I began to see my students having “Aha!” moments as they connected the dots. Showing the students how the Earth’s surface is constantly changing and how these processes are reflected in the rock record is fundamental to their understanding of the foundations of geology.

**UT Gets Money to Study New Energy Source in Gulf**

The University of Texas at Austin has won $58 million to investigate a potentially massive energy resource: methane trapped in ice-like crystals under the Gulf of Mexico and oceans around the world. The U.S. Department of Energy is providing $41.2 million toward the grant, one of the largest government grants ever awarded to the university, with the rest coming from industry and research partners. The university plans to use the funding to harvest and analyze core samples of methane hydrate from sandstone reservoirs thousands of feet under the Gulf — the first time the deposits have been retrieved from U.S. waters. Peter Flemings, a professor and research scientist at the Institute for Geophysics, is part of the team that conducted the analysis.

**Texas Budget Includes $4.5 Million for UT Quake Research**

The state of Texas has agreed to fund $4.5 million for the Bureau of Economic Geology to study seismic activity in Texas. House lawmakers approved the funding 145-1. Dallas Democrat Rep. Rafael Anchia secured the money in the state budget, which will be used to buy and deploy seismic equipment. “Our community is rightfully concerned about the unusually high seismic activity in Dallas, Irving and Farmers Branch. This study should help us get to the bottom of it,” Anchia said.

**Early Years of California’s Drought May Be Linked to Lingering Effect of La Niña**

On average, La Niña — the cool phase of a natural climate pattern in the tropical Pacific — leads to somewhat dry winters in California. But a new analysis of historical data from scientists in the Climate Program Office of the National Oceanic and Atmospheric Administration suggests that dryness often deepens into drought the following year, even if the tropical Pacific has technically shifted back to “neutral” conditions. Consistent with that pattern, California’s ongoing drought began in 2011-12, during the second year of a La Niña phase, and it persisted into the “neutral” years of 2012-14. Yuko Okumura, a research associate at the Institute for Geophysics, was part of the team that conducted the analysis.

**The Melting of Antarctica was Already Really Bad. It Just Got Worse.**

Totten Glacier, a massive glacier in East Antarctica, is losing mass because warm ocean water is flowing underneath it and compromising its ability to hold back a flow of ice, a study led by James Greenbaum of the Institute for Geophysics found. The findings are “alarming, because the glacier holds back a much more vast catchment of ice that, were its vulnerable parts to flow into the ocean, could produce a sea level rise of more than 11 feet — which is comparable to the impact from a loss of the West Antarctica ice sheet.” The researchers used gravitational measurements, radar and laser altimetry during their flights to study what is occurring underneath the massive glacier.

**The Washington Post, March 16, 2015**

**CLIMATE.GOV, April 20, 2015**

**The Dallas Morning News, May 28, 2015**

**October 22, 2014**
Texas Standard Interviews BEG’s Scott Tinker on Energy and the Economy

Bureau of Economic Geology Director Scott Tinker appeared on the radio program the Texas Standard to discuss the potential impact of Iran’s oil on the world market and the Texas economy, as well as the recent downturn in oil prices.

Tinker said that the amount of oil Iran could export is modest when compared to global consumption habits, so it’s not likely to have much sway on prices. He also said that the downturn in oil prices, though painful in the short-term, could end up being a stimulant for economic growth in Texas. With oil costs low, businesses can expand, which should eventually drive the price of oil back up, Tinker explained.

“I'm not one who ever worries about it. I think we're in a cycle here in Texas a bit, but Texas is strong and it's going to survive through this downturn and come out the other end probably a little bit more efficient than it was,” Tinker said.

Don’t Let Texas’ Excess Water Go to Waste

By Bridget Scanlon, Bureau of Economic Geology Senior Researcher

The past few weeks have highlighted a challenge for water resource managers in Texas: We have either too much water when we don’t need it or too little when we do.

The recent devastating floods have underscored the need for better preparation in not only monitoring but also keeping as much of that water as possible.

One of the main ways of managing water resources in these extremes is to store water in times of excess for use during droughts. Surface reservoirs are the traditional method of storing water, but unfortunately the rate at which we build new reservoirs has slowed dramatically since the 1970s while our population has doubled, halving the per-capita reservoir storage since then. The prime locations for surface water reservoirs have already been developed, and getting permits for new reservoirs is challenging and expensive. So what should we do?

Instead of storing excess water on the surface, where it can evaporate, particularly during droughts, we should store more excess surface water underground using what’s known as aquifer storage and recovery, or ASR. The San Antonio Water System has been developing this approach that is expanding, with more households installing systems for non-potable water use, including lawn watering. The Texas Water Development Board estimates that the city of Austin could collect about 30,000 gallons of water annually using rainwater harvesting, and Austin incentives rainwater harvesting through its rebate program.

While storage is one of the key approaches to managing the extremes, monitoring these extremes is also critical. As shown by the recent flooding along the Blanco River, the existing monitoring program is inadequate. We should expand it by considering citizen science and community-based monitoring. When and where flooding will occur is extremely difficult to predict, but smartphones can inform disaster management programs if we develop approaches for handling the data.

Water is one of our most precious resources, and although the recent floods have been devastating, they can teach us critical lessons about preparing for the future.

This is a good first step, but Texas can do more. Excess water during flooding could be transferred to aquifers for long-term storage. The heavily depleted Trinity Aquifer near Dallas provides a huge potential storage reservoir for ASR. During the recent heavy rains in Central Texas, excess surface water could have been stored in the saline portions of the Edwards Aquifer in Austin for later use.

Rainwater harvesting is another approach that is expanding, with more households installing systems for non-potable water use, including lawn watering. The Texas Water Development Board estimates that the city of Austin could collect about 30,000 gallons of water annually using rainwater harvesting, and Austin incentivizes rainwater harvesting through its rebate program. While storage is one of the key approaches to managing the extremes, monitoring these extremes is also critical. As shown by the recent flooding along the Blanco River, the existing monitoring program is inadequate. We should expand it by considering citizen science and community-based monitoring. When and where flooding will occur is extremely difficult to predict, but smartphones can inform disaster management programs if we develop approaches for handling the data.

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Fracking Uses No More Water Than Traditional Oil Production

Research done at the Bureau of Economic Geology has cleared fracking of one of the most serious allegations leveled against it by environmentalists who oppose the practice — that it uses a disproportionate amount of water and risks depleting water sources for agricultural and residential users, especially in already water challenged South Texas.

But Bridget Scanlon, a senior research scientist at the Bureau of Economic Geology, tells Newsradio 1200 WOAI that claim is not true.

“The water used to produce oil using hydraulic fracturing is similar to the water used in the U.S. to produce oil using conventional techniques,” she said.

“The reason we’re using more water is because we are producing more oil, not because hydraulic fracturing is any more water intensive.”
How Can We Keep Track of Earth’s Invisible Water?

Life on Earth depends on a lot of water that we can’t see, from vapor in the air we breathe to freshwater in deep aquifers used to irrigate crops. The podcast Generation Anthropocene went on a continent-hopping tour of the invisible water that drives planetary processes.

Kaustubh Thirumalai, a doctoral student from the Institute for Geophysics, appeared on the show as part of an ongoing series, “Convos with Kau.” Thirumalai recently returned from India, where he was part of a team collecting rocks and sediment from the ocean floor around the Indian subcontinent. Their data should reveal more about the history of the South Asian monsoon and how this major player in the freshwater cycle is being affected by climate change.

“We really want to understand when the monsoon turned on and whether the monsoon turned on simultaneously with when the [Himalayas] were built,” Thirumalai said.

Saharan Heat Amped Up by Climate Change

The searing Sahara Desert is getting even hotter, at a rate two to four times greater than the rest of the tropics, say scientists in a new study.

That puts it on par with the Arctic which is also exceeding the global warming average. But whereas the widely studied Arctic “amplification” melts sea ice and permafrost, the Sahara warming could be reducing the huge outflow of dust that blows off Africa and be causing big changes to regional weather — and local people.

“A lot of people live there — three million or so,” said researcher Kerry Cook of The University of Texas at Austin who led the study. “And it’s adjacent to the Sahel region, which has many more people.

They results were published in the August 2015 issue of Journal of Climate. Just why it is warming faster than other regions is not at all clear, said Cook. One possibility is that the hot arid land simply can’t transfer heat up and away, as other, moister lands do.

Commemorate a Decade of World-Class Science

It’s been 20 years since the Jackson School of Geosciences was elevated to the college level. Come celebrate with us at the 10-Year Symposium on January 22, 2016. More details will be available as the date approaches. www.jsg.utexas.edu | facebook.com/UTJSG | (512) 471-6048
When he was a student, his favorite classroom was cold, dark and damp. A classroom built from rock; different kinds from different eras. It’s subterranean and mysterious, the more mysterious the better.

Nicola Tisato loves to explore caves. “Some of my biggest emotions have been in caves,” he said. “When you discover a new cave, and you realize nobody had been there before, you really feel you’ve discovered something.”

French explorer Marcel Siffre says there are three places in this universe that need to be discovered: the outer space, the oceans and the caves.

“When you discover a new cave, and you realize nobody had been there before, you really feel you’ve discovered something.” Tisato said. “Rock(ies) have the same type of behavior, which is non-linear (i.e. viscoelastic). The expectation of energy comes from sources that are located inside.”

Tisato plans to work with associate professor Jung-Fu Lin and associate dean and interim chair of the department of geological sciences Richard Ketcham in mineral physics and geochemistry, and with Farzam Javadpour of the Bureau of Economic Geology on problems within shale gas.

“We are excited about his arrival in January because he will, together with professor Kyle Spikes, set up a rock deformation laboratory and an experimental rock physics group within our geophysics discipline,” said Ronald Steel, professor in the Department of Geological Sciences. “This, together with his excellent research record and background, is what made him attractive to the Jackson School.”

Tisato will study, for instance, the impact of fluid pressure on rock stiffness, or the impact of microbubbles in the absorption of seismic waves.

“The is a quest for understanding the real rheology of geomaterials when they are stressed by seismic waves,” Tisato said. “For instance, while traveling through Earth, seismic waves with specific frequencies fade more quickly than others. This can tell us something about the Earth’s interior.”

At the Jackson School, Tisato will complement existing research into earthquakes, including their relation to hydraulic fracturing. He plans to work with professor G. Di Toro at the University of Manchester and INGV–Rome, which he says owns one of the most recognized schools of geosciences in the world.

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Daniella Rempe brought more than a towel and sunscreen on her visits to Barton Springs when she was an undergraduate at The University of Texas at Austin.

She brought her curiosity. “It’s an exciting place to hang out, but it just isn’t relaxing for me. I’m consumed with where the water comes from,” she said of the afternoons spent at the revered, spring-fed Austin swimming hole.

There she came to terms with her obsession with water. How it travels through rock. What it picks up along the way. How it transforms the environment around it.

Rempe has spent her academic career seeking answers for those types of questions, a quest she’ll continue in September as an assistant professor of water science in the Department of Landscape Evolution and Weathering.

Rempe’s research focuses on how landscapes store water in hillslopes in Northern California. She earned her bachelor’s in geosystems and hydrogeology in 2008. Her interest in hydrogeology was kindled by fieldwork and course projects during her stay at the Jackson School.

“I’m very excited to join the Jackson School because it’s a school that I deeply care about,” Rempe said. “Students and researchers have access to opportunities unlike anywhere else. I had such an enriching experience at UT Austin, and I’m very pleased that several students that I worked with at Berkeley chose to pursue graduate degrees at the Jackson School.”

California and Texas have been hit hard by severe drought. While recent rains have relieved the drought in Texas, California remains in the throes of a record-setting dry spell.

Recently, Rempe has been involved with the Critical Zone Observatories program with the U.S. National Science Foundation. She is part of an interdisciplinary team that is tackling the question of how the critical zone evolves. At the Eel River Critical Zone Observatory, she studied the hillslope to link water in the rock to the atmosphere, rivers, watersheds, oceans, and terrestrial and aquatic ecosystems.

“Often times the indirect observations that we rely on as hydrologists leave us wondering about what pathway water takes,” she said of her work at the Eel River. “But by drilling into the hillslope, we were able to access the rock directly to quantify what we call ‘rock moisture,’ a term that describes seasonally dynamic moisture in rock and the fractures within it. Through long-term monitoring of both the water and the vegetation, we’ve shown that the vegetation rely on rock moisture in this seasonally dry climate.”

In Texas, Rempe will have a prime opportunity to continue her research on the impacts of water transport in the near surface, but with a local twist. Rempe said, she’ll be trading California’s actively deforming, steep coastal ranges for the Central Texas carbonate Hill Country.

“New technologies make this work fun and exciting,” Rempe said. “We are starting to understand how observations we make on the ground at the pore scale relate to the kilometer scale observations we make from space.”

At the Jackson School, she’ll be able to tap into the school’s relationship with NASA’s Soil Moisture Active Passive (SMAP) project to study soil moisture, attempting to extend that capability further into the fractures of the bedrock below. More than 90 of the project’s sensors are located around Fredericksburg, providing easy access.

“As hydrologists, we try to account for every drop of water,” she said. “In Northern California, the streams and the ecosystems are competing with people, grapes and other agriculture. In Texas, and other places impacted by long droughts, understanding how vegetation and land use interface with hydrology is critical to developing effective water resource management strategies. Researchers at the Jackson School have paved the way, and I’m looking forward to joining their team.”

Rempe expects to work with Jack Sharp, Carlton Professor of Geology, and associate professor M. Bayani Cardenas in the hydrology group; professor David Mohrig and assistant professor Joel P. Johnson in the earth surface processes group; and Michael Young, associate director of environmental services at the Bureau of Economic Geology, and Todd Caldwell, a geomorphologist at the bureau.

“Coming to UT is a dream,” Rempe said. “Not only because I’ll have the opportunity to share the mysteries of Barton Springs with my students. I’ll be surrounded by researchers with a diverse set of expertise and dig deeper into landscapes to understand how water moves through them.”

“It is an incredibly exciting time to study how water, rock and life interact,” Rempe said. “Recently, the weathered bedrock zone, along with the overlying soil and vegetation, have been named the critical zone. There is an international, highly interdisciplinary effort underway to understand how physical, chemical, and biological processes within the critical zone influence how water is routed within landscapes.”

A native Texan, Rempe makes her long-awaited return to the Jackson School, where she earned her bachelor’s in geosystems and hydrogeology in 2008. Her interest in hydrogeology was kindled by fieldwork and course projects during her stay at the Jackson School.

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Partnership with Mexico Boosts Research Exchange

Researchers from the Jackson School of Geosciences attended and hosted events in Mexico in the winter and spring of 2015 to promote research exchanges between The University of Texas at Austin and Mexican universities, and the sustainable development of Latin America’s energy resources.

In February a group of researchers from the Institute for Geophysics (UTIG) led by Director Terry Quinn visited Mexico City and met with Mexican scientists from academia, the private sector and public institutions to discuss areas of shared interests such as the deep-water Gulf of Mexico.

The researchers came only a week after the university’s then provost, now president, Gregory L. Fenves signed one of the three new agreements in Mexico City that strengthen collaboration between The University of Texas at Austin and the National Autonomous University of Mexico (UNAM) in the fields of energy, environment and sustainability.

The agreement promotes the mobility of postgraduate students, researchers and faculty between the institutions. It also helps facilitate conferences, symposia, and joint academic programs and scientific research projects to identify and meet sustainable energy challenges.

“The goal of enhancing collaboration between research scientists at UTIG and our Mexican colleagues in academia, industry and government was advanced via this first round of face-to-face meetings in Mexico City,” Quinn said.

Keeping in the spirit of this agreement, the Jackson School hosted in April a Latin American Forum on Energy and the Environment in Mexico City. This event brought together public and private sector decision makers, scholars and scientists for two days to discuss sustainable development of energy resources and environmental issues.

The forum’s technical panels were developed with the support and cooperation of UNAM geoscience research centers and Mexico’s professional geoscience societies. Forum panel topics included: the role of public and private research in the oil and gas sector, understanding and reducing conflicts around water use in the energy sector, plans to explore the Chicxulub asteroid impact site, the future of potential new fuel sources methane hydrates, and the importance of building the next generation of geoscientists and engineers.

Argentina Turns to Texas for Shale Advice

A delegation of high-ranking public officials, and oil and gas executives from Argentina visited The University of Texas at Austin twice in 2015 to discuss how to safely and sustainably develop the country’s energy resources.

The university’s Jackson School of Geosciences and the Kay Bailey Hutchison Center for Energy, Law, and Business hosted the visits on June 3 and August 17.

Argentina holds the world’s second-largest technically recoverable shale gas reserves. But the experience of developing the reserves is new to the country, said Argentine Delegate Rodolfo Urtubey, national senator for Salta Province and member of the Energy Senate Committee.

“We’re here at The University of Texas at Austin because you have concentrated in this academic institution the different views — the legal views, the technical views, the financial views. We have to know the experiences,” Urtubey said.

At both meetings experts attended from the Jackson School, the School of Law, the Energy Institute and the McCombs School of Business. Representatives from the Railroad Commission of Texas, the Texas Commission on Environmental Quality and the private sector were also present.

University President Gregory L. Fenves visited the first delegation on his first day in office and emphasized the long and important history between the university and Latin America, and the university’s strength as a leading energy research institution.

Welcome to the Laser Show

The University of Texas at Austin and Texas Tech University hosted the inaugural North American Laser Ablation Workshop at the Jackson School of Geosciences on May 27 and 28, 2015. The workshop consisted of poster presentations, short talks with moderated discussion, and selected invited presentations. Nathan Miller, the Jackson School’s laser ablation and ICP-MS lab manager, was an organizer.

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Catching Carbon in China

A team of scientists from the Bureau of Economic Geology travelled to China in April 2015 to attend and present at a series of meetings and workshops on carbon capture and storage. The team — made up of Tip Meckel, Susan Hovorka and Jiemin Lu — visited Beijing, Shanwei and Guangzhou. They attended the U.S.-China Carbon Capture Working Group’s second-ever workshop on carbon, capture, use and storage (CCUS) to promote carbon capture in the Gulf of Mexico and offshore Guangdong. The team also continued to establish working relationships with various Chinese research groups and industrial partners who are involved in potential offshore CCUS projects in the Pearl River Basin offshore of the Guangdong Province.

The trip was facilitated and hosted by the U.S. Department of Energy.

Jackson School Talks Energy at UT Energy Week

In February 2015 the Jackson School of Geosciences participated in UT Energy Week, a gathering of experts from academia, industry, non-profit organizations and the news media, co-hosted by The University of Texas at Austin’s Energy Institute and student-run Longhorn Energy Club. Jorge Piñon, interim director of the Jackson School’s Center for International Energy and Environmental Policy and director of its Latin America and Caribbean Energy Program, moderated a discussion on the expected benefits to Mexico and North America from energy regulatory reform. Michelle Michot Foss, chief energy economist at the Bureau of Economic Geology’s (BEG) Center for Energy Economics was on the panel. In addition, BEG Director Scott Tinker and Ian Duncan, a BEG program director, participated in a panel on the impact of hydraulic fracturing moderated by Russell Gold, Wall Street Journal senior energy reporter.

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President Obama Honors Jackson School of Geosciences Mentoring Program

IN MARCH 2015 PRESIDENT BARACK OBAMA HONORED THE UNIVERSITY OF TEXAS AT AUSTIN’S GEOFORCE TEXAS PROGRAM WITH THE PRESIDENTIAL AWARD FOR EXCELLENCE IN SCIENCE, MATHEMATICS AND ENGINEERING MENTORING, THE HIGHEST SUCH HONOR FROM THE UNITED STATES GOVERNMENT.

GEOFORCE Texas, an outreach program of the Jackson School of Geosciences, takes high school students from inner-city Houston and rural Southwest Texas on field trips each summer to geologically significant sites across the country for four years. As a result, potential geoscientists are introduced to the profession, and students from disadvantaged areas find a path to college and rewarding careers.

“We are thrilled that the president has honored the program,” said Dean Sharon Mosher. “GEOFORCE plays such an important role in shaping and improving young people than helping young people achieve their full academic and personal potential. GEOFORCE is a wonderful example of a program doing just that.”

GEOFORCE was the only organization to be recognized with an award. The 14 other recipients were individuals.

GEOFORCE Director Samuel Moore and former Director Doug Ratcliff accepted the award at a dinner hosted by the National Science Foundation on June 17, 2015. The award winners also met with President Obama in the Oval Office.

Eighty percent of GEOFORCE participants are members of minority groups. Since its inception in 2005, GEOFORCE has been a robust success. It served more than 1,500 students with 100 percent of students graduating from high school; 96 percent going on to college; and 16 percent majoring in geoscience — more than 50 times the national average.

“These educators are helping to cultivate America’s future scientists, engineers and mathematicians,” President Obama said in a press release honoring all of this year’s recipients. “They open new worlds to their students and give them the encouragement they need to learn, discover and innovate. That’s transforming those students’ futures, and our nation’s future, too.”

The program also supports high school students with SAT and ACT preparation, and guidance in applying for college. It has also awarded more than $2 million in scholarships. After high school, GEOFORCE continues to mentor students through college, into internships and the workforce.

Austin Geological Society Celebrates 50 Years

In 1965 the Austin Geological Society was founded by a small group of geologists looking to promote professional communication between members of the Austin’s geosciences community. Among that group was the society’s inaugural president Peter Flawn, then the director of the Bureau of Economic Geology and future University of Texas at Austin president.

In October 2015 the AGS officially celebrated 50 years as Austin’s geoscience hub. And in the half century since Flawn helped found and lead the society, the relationship between AGS and the university has only gotten stronger.

University staff, faculty and alumni have consistently held leadership positions within the AGS over the years. Its current president Rebecca Smyth is a project manager at the Bureau of Economic Geology. Since the Jackson School of Geosciences was established as a college in 2005, half of the society’s presidents have been faculty or staff. Starting from most recent, they include Jack Sharp (2014-15), Dennis Trombatore (2013-14), Dallas B. Dunlap (2010-11), Ann Molineux (2009-10), and Ernest Lundelus (2006-07).

The society has brought the university and Austin geology community together in more than one way. At monthly meetings, invited speakers give talks about topics in science and business important to the geosciences community. And AGS’ connection with other societies enables its members to get involved with other geoscience groups. The AGS is both an affiliate of the American Association of Petroleum Geologists and a member of the Gulf Coast Association of Geological Sciences.

The society is also a prolific publisher of guidebooks authored by members describing Austin and Central Texas geology. Over 30 have been published since the AGS founding. One in particular succinctly states the connection of the society to the university through its title: “Rocks, Resources, and Recollections: A Geologic Tour of the Forty Acres — the University of Texas at Austin campus.”

For more about the AGS, including guidebooks and monthly meetings, visit: www.austingeosoc.org.

Five Graduate Students Receive NSF Fellowships

In spring of 2015 the National Science Foundation (NSF) selected five students from the Jackson School of Geosciences for its prestigious Graduate Research Fellowships Program. Douglas Edward Barber, Rachel Eleanor Bernard, Laura Estelle Lindsey, and Kimberly Allison McCormack.

The NSF graduate fellowship program recognizes and supports outstanding graduate students in science, technology, engineering and mathematics who are pursuing research-based graduate degrees in the United States. Since the program’s inception in 1952, the NSF has provided fellowships to individuals selected early in their graduate careers based on their academic achievements and potential for significant achievements in science and engineering.
Hall of Distinction Adds Two New Members

The Jackson School of Geosciences’ Hall of Distinction added two new members in spring 2015: Katherine G. “Katie” Jackson, a teacher and Jackson School co-founder along with husband John A. “Jack” Jackson, and Munib Masri, a Palestinian businessman, statesman and philanthropist.

Katie Jackson graduated from the University of Texas at Austin’s Jackson School of Geosciences in 1939 and has 32 members, including Jackson and Masri. She died in 2001 at the age of 83. In honor of her induction, the Jackson School established the Katie Society, which recognizes individuals and organizations that have made exceptional contributions to the field of geosciences in industry, government or academia, and have a strong connection to the Jackson School. The hall was started in 1980 and has 32 members, including Jackson and Masri.

Munib Masri has had a distinguished career in business, government and philanthropy. But first he was a Longhorn, graduating with a bachelor’s degree in geology in 1955. He began his career working in the oil and gas industry with Phillips Petroleum Company, a position that led to his appointment of Minister of Public Works in Jordan in 1970. Afterwards, he spent decades in the energy and water sectors before founding Edgo, an oil and gas services company that operates throughout the Middle East. Masri has maintained a strong connection to his Palestinian homeland, and has dedicated the past four decades to working toward creating a peaceful two-state solution between it and Israel through foundations and organizations that promote development of industry and well-being in Palestine and the wider Middle East.

The Hall of Distinction honors individuals who have made exceptional contributions to the field of geosciences in industry, government or academia, and have a strong connection to the Jackson School. The hall was started in 1980 and has 32 members, including Jackson and Masri.

Ellins Receives Fulbright to Teach in Jamaica

Katharine Ellins, the program manager for geoscience education research at the Jackson School of Geosciences, received a Fulbright award to teach at the University of the West Indies in Kingston, Jamaica, and to establish an educational seismic network on the island.

Ellins, who was born and grew up in Jamaica, received the award through the U.S. Fulbright CORE Scholar Program. She’ll begin her six-month fellowship in January 2016.

Jamaica experiences more than 200 earthquakes every year because of its location in the boundary zone between the North American and Caribbean tectonic plates. Ellins says she is planning her course to focus on seismic risk and other geoscience issues of concern to the island, such as water resources and climate change.

The seismic network will complement the country’s existing seismic monitoring program, as well as serve as an educational tool for students across the island. Working with IRIS, a global coalition of 120 universities, Ellins will deploy a suite of research-grade seismometers across the island’s universities, technical colleges and high schools.

Two Undergrads Selected for Prestigious NSG/USGS Internships

Jackson School of Geosciences undergraduate student Taylor Canada (top photo) and recent graduate Tyler Fritz have been selected as interns at the U.S. Geological Survey (USGS)/National Association of Geoscience Teachers Cooperative Summer Field Training Program. The program pairs interns with USGS mentors, with whom they conduct field work.

Canada will be studying surface water and ground water networks with Gerard Butch, supervising hydrologist at the USGS New York Science Water Center, in Troy, New York.

Fritz will be developing new devices and methods for analyzing the stable isotopes in geological, hydrological and biological materials with Craig Johnson and Matthew Emmons, a research geologist and physical scientist at the USGS Crustal Geophysical and Geochemistry Science Center, in Denver, Colorado.

UTIG Researcher Selected for International Scientific Leadership Role

James Austin, a senior research scientist and associate director of international relations at the Institute for Geophysics (UTIG), has been selected as focus chair of the International Ocean Discovery Program (IODP), a coalition of 26 countries dedicated to studying some of the planet’s most important environmental and earth science topics by sampling sub-seafloor environments.

The international consortium uses data recovered from sub-seafloor sediments and rocks to improve scientific understanding of changing climate conditions, risks posed by geohazards such as earthquakes and tsunamis, the origins of ancient life, and the structure and processes of the Earth’s tectonic plates and uppermost mantle.

As chair, Austin will serve as the face of the scientific ocean drilling program, representing the IODP at scientific meetings, and attending its facility board meetings and proposal evaluation panel meetings. Austin will also preside over the IODP’s annual forum meeting. Austin began his two-year term on Oct. 1, 2015.

Fisher Receives Alumni Achievement Award

The College of Liberal Arts & Sciences at the University of Kansas has selected William Fisher, inaugural dean of The University of Texas at Austin’s Jackson School of Geosciences, to receive its Alumni Distinguished Achievement Award for 2014-2015. The award is the highest recognition the college bestows upon its graduates.

Kerans: Pettijohn Medal

Charles Kerans, the Robert K. Goldhammer Chair in Carbonate Geology and BEG senior research scientist, has been awarded the Francis J. Pettijohn Medal from the Society for Sedimentary Geology. The medal recognizes “excellence in sedimentology and stratigraphy.”
Advances in understanding the role of diagenetic processes in sedimentary rocks.

Milliken was also the co-recipient of the Wallace E. Pratt Memorial Award, recognizing her contributions to the exploration geophysics field.

The American Geophysical Union (AGU) named the Bureau of Economic Geology (BEG) an AGU Fellow. This prestigious distinction is given to AGU members who have made exceptional contributions and attained acknowledged recognition by AGU bylaw, no more than 0.1 percent of the total membership of AGU can receive the award annually. Scanlon leads the BEG's Sustainable Water Resources Program.

**Awards**

**Common Abbreviations:**

- AAPG: American Assoc. of Petroleum Geologists
- AGA: Amer. Institute of Prof. Geologists
- AGS: Austin Geological Society
- AGU: American Geophysical Union
- BEG: Bureau of Economic Geography
- DGSI: Dept. of Geological Sciences
- GCAGS: Gulf Coast Assoc. Geological Soc.
- GSA: Geological Society of America
- SEG: Soc. of Exploration Geophysicists
- SEPM: Society for Sedimentary Geology
- UTIG: Institute for Geophysics

The American Geophysical Union (AGU) named the Bureau of Economic Geology (BEG) an AGU Fellow. This prestigious distinction is given to AGU members who have made exceptional contributions and attained acknowledged recognition by AGU bylaw, no more than 0.1 percent of the total membership of AGU can receive the award annually.

**Faculty and Researchers**

- **BILL AMBROSE**
  Certificate of Merit, AAPG Division of Environmental Geosciences
- **JAIME BARNES**
  Faculty Annual Evaluation Award, Assistant Professor, DGSI
- **WHITNEY BEHR**
  Knebel Teaching Award, Graduate
- **BAYANI CARDENAS**
  Faculty Annual Evaluation Award, Associate Professor, DGSI
- **ELIZABETH CATLOS**
  Knebel Teaching Award, Intro Course
- **GAIL CHRISTESON**
  A. J. Lieverson Award
- **SHIRLEY DUTTON**
  Doris Malkin Curtis Medal, GCAGS
- **KATHERINE ELLINS**
  Fulbright award
- **WILLIAM FISHER**
  Alumni Distinguished Achievement Award, University of Kansas, College of Liberal Arts and Sciences
- **WILLIAM Z. FISHER**
  Endowed Chair in Geological Sciences established

**SEG Awards Sen Honorary Membership**

- **MINNIE K. MILLIKEN**, an Institute for Geophysics professor and Jackson Chair in Applied Seismology, was awarded the place of Honorary Membership in the Society of Exploration Geophysicists (SEG) in spring 2015.

Honorary Membership is bestowed on individuals who “in the unanimous opinion of the Honors and Awards Committee and the Board of Directors, have made distinguished contributions, which warrants exceptional recognition, to exploration geophysics or a related field or to the advancement of the profession of exploration geophysics through service to the Society.”

**的学生**

- **LAUREN ANDREWS**
  Technical Sessions Best Speaker, Fall, Ph.D.
- **RACHEL BERNARD**
  Graduate Research Fellowship, NSF
- **REETAM BISWAS**
  Schlumberger Ocean Competition, 2nd Place
- **EMILIE BOWMAN**
  Folk/McBride Petrography Contest, 2nd Place, Grad.

**INSTITUTIONAL**

- **AMANDA CALLE**
  Marta Sutton Weeks-Walt Award, AAPG Off-Campus Research Award, JSG
- **TAYLOR CANADA**
  USGS/NAGT Internship
- **SEBASTIAN CARDONA**
  Ronald K. DeFord Field Scholarship
  Norman H. Foster Memorial Grant, AAPG

**School of Geosciences through support of friends, and endowed by Jackson School of Geosciences through support of friends, University of Texas at Austin.**

**WILLIAM FISHER**

- **TINKER FAMILY BEG PUBLICATION AWARD**
  - **AKAND ISLAM**
  BEG Publication Award, Most First-Author Publications in 2014
  - **MAGGIE HUDEC**
  Knebel Family AGU Fellowship Award
  - **THOMAS A. PHILPOTT**
  Excellence of Publications in 2014
  - **WENDY SHIRLEY**
  Jackson School Research Symposium
  - **LAUREN ANDREWS**
  Technical Sessions Best Speaker, Fall, Ph.D.
  - **RACHEL BERNARD**
  Graduate Research Fellowship, NSF
  - **EMILIE GENTRY**
  USGS/NAGT Internship
  - **EMILIE BOWMAN**
  Folk/McBride Petrography Contest, 2nd Place, Grad.

**AMANDA CALLE**

- **Marta Sutton Weeks-Walt Award, AAPG Off-Campus Research Award, JSG**
- **TAYLOR CANADA**
  USGS/NAGT Internship
- **SEBASTIAN CARDONA**
  Ronald K. DeFord Field Scholarship
  Norman H. Foster Memorial Grant, AAPG
  Research Grant, Clay Minerals Society
  Student Grant, 7th International Symposium on Submarine Mass Movements and Their Consequences, New Zealand
- **TOMAS CAPALDI**
  Outstanding TA Award, DGSI
- **MIGUEL CISNEROS**
  Folk/McBride Petrography Contest, 2nd Place Graduate
- **DAVID CONWELL**
  Technical Sessions Best Speaker, Spring, MS
- **LAURA DAFOV**
  Undergraduate Best Poster Award, Honorary Mention, Jackson School Research Symposium
- **DEBANJAN DATTA**
  Schlumberger Ocean Competition, 3rd Place
- **RATANAPORN FONG-NGERN**
  Outstanding Student Award, Houston Geological Society
  Late Career Ph.D. Best Poster Award, 2nd Place, Jackson School Research Symposium
- **TYLER FRITZ**
  USGS/NAGT Internship
- **EMILIE GENTRY**
  Undergraduate Best Poster Award, 1st Place, Jackson School Research Symposium
- **SARAH GEORGE**
  Graduate Research Fellowship, NSF
  Garth W. Taylor Memorial Grant, AAPG
  Graduate Student Research Grant, GSA
  Graduate Student Grant, SEPM

**2015 Newsletter**

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In February 2015 the Jackson School of Geosciences held its 4th Annual Research Symposium.

The day-long poster competition occurs every spring semester and allows students to present their research to a panel of judges composed of faculty, research scientists and industry representatives. Alumni and interested members of the public are also invited to attend. Winners and honorable mentions are as follows:

**Staff**

**Melissa Garcia**  
President’s Outstanding Staff Award

**Adrian Hui**  
DGS Staff Excellence Award

**Jessica Hust**  
UT’s 2015 Vick Academic Advising Award

**Mandy Lancaster**  
Guion Library Staff Honors

**Laure Mattys**  
Guion Library Staff Honors

**Jesse Zehr**  
DGS Staff Excellence Award

**Research Symposium Showcases World-Class Knowledge**

**LATE-CAREER PH.D. BEST POSTER AWARD**

1st Place: Stephanie Wafforn, Magnetism and hydrothermal fluid flow in the Ertsberg-Grasberg Mining District, Papua, Indonesia; Insights from zircon U/Pb and trace element analysis

2nd Place: Rattanaporn Fong-Ngern, Clinoform growth in a Miocene, Para-Tethyan deep lake basin: thin topsets, irregular foresets and thick bottomsets

Honorable Mention: Nick Perez (now an assistant professor at Texas A&M University), Pseudotachylites in the footwall of the Whipple detachment: implications of seismicity along low angle normal faults

**LATE-CAREER MASTERS BEST POSTER AWARD**

1st Place: Woong Mo Koo, Coupling of basin-floor fan behavior with shelf-margin processes: Maastrichtian Washakie Basin, Wyoming

2nd Place: Aleksandr Montelli, Late Quaternary history of Bering Glacier dynamics and sedimentation

Honorable Mention: Reed Roush, Hierarchical cluster analysis of a high-resolution XRF-dataset from the Cline Shale, Midland Basin, Texas

**EALRY-CAREER GRADUATE BEST POSTER AWARD**

1st Place: Pamela Speciale, Evaluating the consistency of experimental paleopiezometers using naturally deformed rocks

2nd Place: Timothy Prather, A combined stratigraphic, architectural and chronologic analysis of the Loid Sandstone (late Cretaceous) near Rangely, Colorado

Honorable Mention: Eric Petersen, An ice flow modeling approach to understanding regional and aspect-dependent differences between debris-covered glacier lobes in Deuterolius and Protonilus Mensae, Mars.

**UNDERGRADUATE BEST POSTER AWARD**

1st Place: Emile Gentry, Pseudotachylites in the footwall of the Whipple detachment: implications of seismicity along low angle normal faults

2nd Place: Andrew McPeak, Seamount arrival into the Franciscan Subduction Complex at 100 + 2 Ma: Marin Headlands, San Francisco Bay, California

Honorable Mention: Laura Dafov, Provenance of Adriatic turbidites (Alps-Apennines system)

**BEST REPRESENTED RESEARCH GROUP**

1st Place: Sergey Formell’s Research Group

2nd Place: Jack Holt's Research Group
Walter Geology Library Looking to the Future

This year, the first children born in the 21st century turn 15 years old. Soon they will be on campus, bringing a decisive break with the 20th century. How they seek and use information, and when and why and how they do so, will drive a lot of changes in libraries (and classrooms) in the coming years.

Our younger users are not native print users; for most of them it is an artifact or last resort. Thus it is imperative to have a print and digital collection that closely reflects their real needs. It’s also important to develop strategies for introducing them to the existence of print resources and the methodologies for interacting with them. Breaking down their assumptions about print is not a trivial exercise, but without those skills, their full education as geoscientists will be shortchanged.

To that end, this past year has been full of back-office projects, with plenty more to come, as we deal with encroaching space and access issues, funding for collections and services and evolving technology. We outsourced about 1,000 items for processing, allowing us to eliminate 18 shelves of partially cataloged items in our collection and much of our gift backlog. We also did a complete rebuild of the library’s web pages (www.lib.utexas.edu/geology) to make them more consistent and consolidated, as well as to improve maintenance, and make room for some new features. Next year we will complete a rebuild of the UT geology thesis index to integrate the several files and improve their utility. You can also now find us on Facebook.

The UT Libraries hired its first ever map cataloger, who we are hoping will also help lead us into Geographic Information Services. We put in storage most of our United States Geological Society print holdings, since the USGS Publications Warehouse now offers about 90 percent of them in digital formats. The 200-plus shelves freed up by that major decision give us several years of growth space. Ultimately, we will be reducing the total amount of material on site by storing little-used resources and print journals with reliable digital access, and removing duplicates within and between collections.

Looking ahead, the UT libraries have been approved for a new library storage facility at the university’s J.J. Pickle Research Campus, LSF-3. And we are already planning for LSF-4, as more and more of the physical collections are being moved to storage, creating space for new materials and new opportunities for interaction, collaboration, and online user space. Most journals are now in online-only formats, or “E-formats,” and we are increasingly acquiring E-books, though the platforms and business models are still maturing.

On other fronts, Virtual Landscapes of Texas and our thesis scanning project both continue to grow. We also were caught up in the building closure when the old wing of the Jackson Geological Sciences Building got a complete HVAC and power supply overhaul. Since most of the building was closed, the library was not open to the public this summer. But we ensured continued collection access by camping on folding tables in the entrance areas and handling material requests by scanning pages, and offering delivery of books to other libraries for pickup. Special thanks to the Jackson School for providing temporary air conditioning and humidity control for the collection during this project, and working with us to ensure continued services!

In staff news, Calla Smith-Dowling got married in April and has resigned to pursue other opportunities just shy of her seventh anniversary. She has been replaced by Stacy Ogilvie, formerly evening supervisor in the Life Sciences Library. Best wishes to Calla and welcome to Stacy!

Six student workers graduated this year, Shakera Guidry, Hannah Johnson, Taylor Brunner, Laura Mattys, Madeline Guy and Sandra Ogenche. This year’s winners of the Guion Service Award were Graduate Research Assistant Laura Mattys and Amanda Lancaster from the cataloging department. They were recognized with the award for all their work on our big cataloging project. Dennis Trombatore attended the Geological Society of America meeting in Vancouver, the American Institute of Archeology meeting in New Orleans, and continued to serve as chair of the American Geosciences Institute GeoRef advisory committee. He joined with a classics faculty member to do a demonstration on clay technology and clay tablets in the ancient word for Explore UT.

-Dennis Trombatore, Librarian
Fieldwork is an integral part of the Jackson School of Geosciences experience. Each summer, field camps led by Jackson School faculty enable geoscience students to literally get their hands dirty and feet wet as they study the processes that shaped the landscapes that surround them. Being primarily for undergraduates, these courses are many students’ first introduction to geosciences outside of the classroom.

“Field camp is where the pieces click together — tectonics, glaciation, modern alluvial deposition volcanics. All layered together and for the first time it is our job to separate them, understand how one process affects another. We must read what is exposed on the surface and tell the story!”

Natalie Rasa
The hydrology field class brought 15 students to the Valles Caldera preserve in the Jemez Mountains for a week of studying mountain hydrology and shallow groundwater processes. The students conducted field work such as stream gauging, a dye trace, water sampling, ground-penetrating radar and slug tests. They also conducted a 24-hour pump test in Hornsby Bend in Austin.

“It was an absolutely incredible experience. Despite being unfamiliar with most [people in] the class, the vast and beautiful landscape instilled a unique sort of camaraderie amongst us all.”

Lee Hanes

In 2015, the Marine Geology and Geosciences field course went to Freeport for the first time. The class examined the lower Brazos River and adjacent fluvial systems as well as the ancestral versions of these river systems where they carved into the Texas shelf during the last sea level low stand. During the course, the Brazos River went into flood stage due to the major rainfall in May, providing opportunities for the students to study sedimentary processes in action.

“I loved this course. I don’t know what I was expecting, but I was really impressed by how realistic an experience the instructors managed to create while compressing the lifecycle of a research project into three weeks.”

Laura Lindzey

Marine Geology and Geosciences

Top Right: Maggie Flannery taking a break at the well field. Middle: Lee Bobbitt, Ian Hanes and Peter Carlson setting up the dye/salt trace. Bottom Left: Kelli Wolf and Richard Bagans stream gauging. Bottom Right: Maggie Flannery and Andrew Harris quality checking the Chirp Sonar data in real-time.
MESSENGER FINDS INGREDIENTS FOR LIFE ON MERCURY

Mercury, the closest planet to the sun, was long thought to be a blazing, desiccated world containing not much more than an iron core surrounded by a thin, silicate crust.

Sean Solomon, director of the Lamont-Doherty Earth Observatory of Columbia University, an Edwin Aldary Lecturer, and principle investigator for NASA’s MESSENGER mission, challenged that perspective in a February 2015 talk at the Jackson School that presented findings from MESSENGER, a Mercury probe.

Instead of a bleak iron world, Solomon said MESSENGER showed that the surface of Mercury contained volatile elements, as well as traces of carbon and frozen water that were delivered by comets. They are findings that could shed light on the origins of life on our planet.

“We’re left with the intriguing notion that there is a record on the planet closest to the sun, on the planet with the largest range of diurnal temperatures, of the delivery to the early solar system of H2O and some of the building blocks of life,” said Solomon. “It’s unlikely life exists or ever existed on Mercury, said; there’s no evidence that water was ever in its liquid state. But finding that comets with carbon and water made it to Mercury helps support the idea that life on Earth was seeded by comet material billions of years ago. A sample of what that material contained is on Mercury right now, Solomon said.

“If we think that these building blocks delivered to Earth and possibly other bodies were factors in the origin and evolution of early life on our planet, there’s a place we can go in the solar system — not the place we thought of — where there’s a witness...to at least the recent delivery of these compounds to the solar system,” Solomon said.

These insights were made possible because of readings taken by MESSENGER, a spacecraft launched in 2004 to orbit and study Mercury. Solomon began his talk explaining the engineering challenges that scientists faced while building the probe, such as guiding it into Mercury’s orbit and protecting its electronics from the extreme heat. The remainder of his talk focused on explaining how data collected by MESSENGER challenged prior assumptions scientists had about Mercury’s environment.

Before MESSENGER, scientists thought that Mercury’s volatiles would have evaporated during the planet’s formation due to high temperatures caused by a large asteroid impact or the sun’s rays, Solomon said. But data from the probe’s X-ray and gamma ray spectrometers told a different story: Mercury’s surface contained ten times the amount of sulfur as Earth; about the same amount of potassium as the Earth; and about the same amount of chlorine as Mars.

“These volatile elements are much more abundant than predicted by any of the formation models prior to our mission that call for extended periods of high temperatures,” Solomon said. “So the formation of Mercury, and by implication the formation simultaneously of all the inner planets, is being rethought.”

In addition to chemical analysis, the MESSENGER probe provided pictures of Mercury’s surface. These pictures showed evidence for past volcanic eruptions on Mercury, including lava flows and pyroclastic deposits. They also gave scientists a closer look inside the planet’s many impact craters, Solomon said, mentioning the discovery of depressions inside craters called “hollows.”

Analysis by MESSENGER instruments indicated that they were formed when underground volatiles, brought close to the surface by the force of an impact, evaporated into space.

It was also inside craters where MESSENGER found water in the form of ice, Solomon said. Since Mercury’s axis of rotation has no tilt, parts of the poles have been void of direct sunlight for billions of years, making them a much cooler environment than most other regions of the planet. Observatories on Earth first detected the ice as “bright spots” on radar readings. Instruments on MESSENGER confirmed the radar data, while finding that the ice was covered by an insulating layer of carbonaceous material about 20-30 centimeters deep.

At the time of the talk, MESSENGER was about two months away from running out of fuel. Solomon ended his presentation by assuring the audience that the probe would continue to do science until the end.

“This mission only has two months to go, but it will be a very interesting two months where we are making chemical measurements, taking pictures, making other measurements...at a closer range than ever before,” Solomon said. “Stay tuned.”

MESSENGER met its end on April 30, 2015, when it crashed into Mercury’s surface.

— Monica Kortsha
Astronaut and NASA researcher Piers Sellers gave a digital tour of the Earth’s biosphere in a February 2015 talk at the Jackson School of Geosciences that highlighted the causes and effects of climate change.

In his talk, Sellers, who is deputy director of the Sciences and Exploration Directorate at NASA’s Goddard Space Flight Center, used computer graphics generated from satellite data to illustrate an array of phenomena happening on planet Earth, from the winding flow of ocean currents to electric nodes of cities seen from space.

“It’s a revolution in Earth science, an absolute revolution,” Sellers said after explaining the many parameters that satellites constantly monitor as they orbit the globe.

The topics he focused the most on were the state of the planet’s ice sheets and atmospheric CO₂ concentration.

The Arctic ice sheet has undergone dramatic change over the past 30 years, Sellers illustrated using a graph and model. The multiyear ice is almost all gone, and the area of the ice sheet has shrunk by half since 1979.

“If you believe the models, it means in 30 years you’ll be able to kayak over the top of the world…over an ice-free ocean,” Sellers said. “It’s quite a remarkable change here.”

The reason for the extreme and rapid loss is complex, Sellers said, with factors as varied as winds pushing ice, and the self-catalyzing albedo effect — a process where dark ocean water absorbs heat, melts ice, and perpetuates the process by revealing more water.

“It is not a straightforward problem. It’s not just heat in, melt out,” Sellers said. “There’s other stuff going on.”

However, based on measurements from scientific instruments, from LIDAR deployed on planes and monitoring devices on satellites, the net state of ice on the planet is in decline, Sellers said. And although the Arctic is experiencing the most dramatic decline, the ice sheets of Antarctica and Greenland are also experiencing changes. In both regions, the rate glaciers are moving toward the sea is accelerating, with Greenland’s rate doubling in speed since first being recorded 20 years ago.

While sea ice is decreasing, carbon dioxide is on the rise, Sellers said.

Using a graphic indicating atmospheric carbon dioxide concentration from 2004-2014, Sellers showed how the concentration of carbon in the atmosphere is increasing overall, while still cyclically rising and falling as carbon is released by industry, volcanoes and fires, and absorbed by oceans and plants. A progressively thickening band of CO₂ across the northern hemisphere is the result of industry activity, Sellers said.

“There is a constant gradient between the northern hemisphere and the southern hemisphere because all the release is up there,” Sellers said.

Years of data combined with mechanistic knowledge have enabled models of the whole planet accurate enough to save lives by predicting the paths of storms, such as Hurricane Sandy in 2013, Sellers said. However, in the long term they paint a bleak picture of global temperature rising with CO₂ levels.

The models are reliable at predicting the impacts of a 4-degree temperature increase. After 4 degrees is when things become uncertain for the models, as well as the planet, Sellers said.

“When we get into a 4-degree world it’s rough. It may be a different kind of planet,” Sellers said.

Despite the model projections, Sellers said he believes it’s possible to turn the future around.

“We have an example that should give us a course for optimism,” he said. “The ozone hole.”

Through an international effort started when the hole was first detected in the 1980s, humans have been able to halt the hole’s widening, and create an environment where the ozone layer may be able to recover to its baseline state, Sellers explained.

“It was policy that was advised by scientific data and predictions that gave a good example of a happy ending.”

Sellers said that he has similar hopes for humanity when it comes to tackling climate change.

“Every person who arrives on the Earth not only comes with their own demands, but their own talents and creativity and what they want to contribute,” Sellers said. “And so the people who arrive are going to be part of the solution to get us out of trouble, and that includes all of you younger people here.”

— Monica Kortsha

PIERS SELLERS, A NASA ASTRONAUT AS WELL AS NASA'S DEPUTY DIRECTOR, HAS BEEN ON THREE SPACE SHUTTLE MISSIONS AND HAS DONE SIX SPACE WALKS.

A REVOLUTION IN EARTH SCIENCE
Amazon-Andes Interactions

Brian Horton, a DGS professor and UTIG research professor, and Ph.D. students Lily Jackson and Sarah George travelled to southern Peru in July 2015 for a short field course on the relationship between the evolution of the Andes mountains and biodiversity of the Amazon rainforest.

The uplift of the Andes over time has greatly influenced Amazon climate and hydrology. The team, collaborating with a group of international researchers, sought to understand how these geophysical factors have influenced the diversification of plant and animal species in the rainforest.

The course spanned a diverse range of geologic, climatic and biologic settings, from the high plateau of the Altiplano to the remote Amazon lowlands of Manu National Park. The course had over 20 participants, which included international faculty, graduate students and postdocs representing 11 universities, as well as a journalist and photographer from Science magazine.

The course is part of a five-year, $4.5 million project between a group of over 20 geologists, climatologists, and biologists from universities and institutes across the U.S. and South America. Horton is a principle investigator on the project. It is funded by the National Science Foundation’s Frontiers in Earth System Dynamics program.

Laramide Rocky Mountains and Rio Grande Rift

In fall 2014, 16 graduate students from the Jackson School of Geosciences and the University of Houston embarked on a week-long field trip to the Laramide Rocky Mountains, Colorado Plateau, and Rio Grande Rift of northern New Mexico and southern Colorado.

The adventure began with a regional overview of the depositional, structural and volcanic history of northern New Mexico in the late Paleozoic through Cenozoic. Students mapped, described and measured geologic formations, focusing on angular and cross-cutting relationships among various structures and stratigraphic units. The trip included a visit to the iridium-bearing Cretaceous-Paleogene boundary horizon within the Raton Basin.

This field trip represented a unique opportunity for students to work closely with professors and other fellow graduate students in the field to develop an understanding of the tectonic evolution and sedimentary character of New Mexico and Colorado, in addition to developing lasting collaborations and friendships.
A Sedimentologist at Sea in the Indian Ocean

In November of 2014, I embarked on a tremendous journey in my geoscientific career as I flew to Singapore to be a part of the International Ocean Discovery Program (IODP) Expedition 353. In Singapore I boarded the JOIDES Resolution, the IODP flagship, and began two months in the Indian Ocean drilling sediments in the Bay of Bengal.

The main goal of Expedition 353: Indian Monsoon Rainfall was to understand how the Indian monsoon evolved over the last several tens of millions of years. We did this by retrieving land-based sediments transported by rivers and wind to the Bay of Bengal, where they settled on the seafloor.

We use sediments to look deep into the past to learn about monsoons because we only have perhaps 100 years of instrumental measurements of rainfall over India — a geological instant.

I sailed as a sedimentologist. There were nine of us, and it was our job to document the cores using the SHIL and SHMSL: two imaging instruments that take high-resolution photographs, and make color-based and magnetic susceptibility measurements. After these scans were finished, the fun began. Using tried and tested tools, we described the makeup of the mud. We documented the colors using Munsell charts, noted the texture of the sediments using the spatula, and examined interesting features using our hand-lens. We also documented how the drilling process might have disturbed the recovered cores, and made smear slides, where a small amount of sediment is placed on a glass slide for observation under a powerful microscope.

On Expedition 353, we drilled about 4.4 kilometers and described every meter in detail. These two months at sea helped solidify my love for climate and oceanic sciences. I learned a lot and had the opportunity to interact with experts from around the world. In October 2015, we will sample all the cores we collected, which are currently housed in Kochi, Japan. These sediments will form the basis of my scientific research for the coming few years and I am very eager to work with them.

— Kaustubh Thirumalai, Ph.D. candidate

PRIVATE COMPANIES AND GOVERNMENT ORGANIZATIONS FACE A GROWING NEED FOR PROFESSIONALS IN THE ENERGY AND RESOURCES SECTORS THAT CAN PLAN, EVALUATE, AND MANAGE COMPLEX PROJECTS THAT ARE OFTEN INTERNATIONAL IN SCOPE AND INCLUDE PARTNERS WITH INTERDISCIPLINARY PROFESSIONAL BACKGROUNDS.

The Jackson School of Geosciences’ Energy & Earth Resources Graduate Program (EER) is meeting this need by preparing students for careers in these diverse industries. The program offers classes that touch on all facets of the energy and resources sectors, including geosciences, engineering, management, finance, economics, law and policy.

Dual-degree offerings in public affairs, global policy studies, and business administration allow students to specialize within the program. The result is a program that attracts curious people with a wide array of work backgrounds and career goals. We are pleased to introduce you to a few of them.
Xinggang “Chris” Liu

Xinggang “Chris” Liu entered into EER’s well-trained and well-travelled engineer and researcher. After earning both his bachelor’s and master’s in petroleum engineering, he worked as a reservoir engineer in China and Texas and a petroleum researcher in New Mexico. What brought him to EER was the desire to understand the oil and gas industry on a more holistic level. But the program brought more than a broadened perspective; it put him on track for a new career path. After receiving his master’s from EER in the summer of 2015, Liu plans to earn a law degree from the University of Texas at Austin Mississippi School of Business with a focus on energy finance, Gabb is learning to approach drilling decisions using scientific metrics while simultaneously considering the financial impacts.

Kyle Gabb

The decision to tap an oil and gas reservoir begins with insight from geologists and geophysicists about its estimated size and shape. The decision to tap an oil and gas reservoir begins with insight from geologists and geophysicists about its estimated size and shape. Liu was selected to be on both the Jackson School’s and the McCombs School’s teams for their respective energy competitions. At the Jackson School, the team competed in the 2015 Imperial Barrel Award competition, which presents teams with geological datasets and chooses a winner based on their exploration recommendations. At McCombs, it was the 2014 National Energy Finance Challenge, which presents teams with a scenario of financial and operational issues and selects a winning team based on the strategic plan it develops. Gabb’s team took first place in the National Energy Finance Challenge, winning the $10,000 prize and lighting an undergraduate tower orange in recognition of the achievement.

Kyle Gabb is equally comfortable talking with experts in law as it relates to geology and to experts in geology’s legal questions. Stevenson Bunn worked for the Apache Corporation, a company he interned with while in the program. He gave in the summer of 2015 at the National Energy Finance Challenge, which presents teams with a scenario of financial and operational issues and selects a winning team based on the strategic plan it develops. Gabb’s team took first place in the National Energy Finance Challenge, winning the $10,000 prize and lighting an undergraduate tower orange in recognition of the achievement.

Stevenson Bunn

Before enrolling in EER program Stevenson Bunn worked for the National Council for Science and the Environment, an environmental policy firm in Washington.

The work provided a unique combination of environmental and business-related challenges. However, the experience made him realize how true for him, “Liu said, crediting Fishers’ guidance and support to introducing him to people and positions, such as a teaching assistant job, that helped grow his knowledge in geology and confidence at the same time.”

It was Dr. Fisher’s mentorship and teaching that made that a concept important in tidally influenced systems, specifically to improve upon his geologic background and understanding while continuing to build on his previous work experience.

“I wanted to show them that a concept important in tidally influenced systems, specifically to improve upon his geologic background and understanding while continuing to build on his previous work experience.

It was a program where I could base my experience on geology while supplementing my degree with interdisciplinary classes in the kind of environmental and business aspects I was able to handle in D.C.” Bunn said.

Bunn turned back to geology through his research, a requirement of the EER program, with program Director William Fisher introducing him to Lesli Wood at the Bureau of Economic Geology. There he focused his research on using Petro models to model depositional processes and the impact of architectural elements in tidally influenced systems, specifically looking at the Sago Sandstone in the Book Cliffs of Utah.

The work became the topic of his thesis and the topic of a poster presentation he gave in the summer of 2015 at the annual member meeting of the American Association of Petroleum Geologists, the premier international group for petroleum geologists with over 40,000 members in 129 countries.

“Stevenson Bunn was a major highlight of his EER experience. I think that working with Dr. Fisher was one of the best experiences I had in the EER program,” Bunn said. “He took several of us who were interested in petroleum geology under his wing.”

Bunn says Fishers’ mentorship in classes, career path and research was a major highlight of his EER experience.

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In 2011 most of Texas was gripped by a brutal drought that rivaled the worst in the state’s recorded history. Rivers and streams dried up, and reservoirs fell to record lows. Farmers and ranchers were devastated, and some communities were forced to take expensive emergency measures to ensure their citizens had water until heavy rains finally broke the drought in 2015.

At the same time as the drought, deadly floods periodically ravaged communities, with some occurring in the most parched areas of the state.

Providing water during droughts and dealing with floods is challenging in a fast-growing, geographically diverse state like Texas. The Jackson School of Geosciences is working on solving these issues with wide-ranging research. The methods include new forecasting techniques, intricate climate models, studies to determine how to better store water underground and projects to measure water more accurately from space.

The overarching goal is to provide the tools and knowledge to better manage this precious resource.

“This is the type of science that will benefit people throughout the state and beyond,” said Jackson School Dean Sharon Mosher. “This work fits in perfectly with the school’s mission: to advance understanding of the Earth, its resources, systems and environment, for the lasting benefit of humankind.”

Water is the most precious resource on Earth, but there always seems to be too little or too much of it in Texas. Research at the Jackson School is tackling the challenges posed by these extremes.

By Anton Caputo
Under Our Feet

It’s not hard to understand why 2011 devastated the state’s water supply. The blistering summer was the hottest and driest in Texas history. On average, only 14.89 inches of rain fell that year, beating a low mark set in 1917. October 2010 through September 2011 was the driest period ever on record, with average rainfall of only 11.18 inches.

The scorching weather drove up water demand. There were 40 days of 100 degrees or more recorded in Austin that year and 73 recorded in Dallas. And the lack of rain only exacerbated the issue. As a result, rivers, streams dried up, and reservoir levels plummeted.

The rains returned more or less to normal in much of the state in 2012 and 2013, but it didn’t seem to help the rivers or reservoirs much, which puzzled and frustrated many Texans. Todd Caldwell, a researcher at the Bureau for Economic Geology, sums up the reason why water sources remained low in two words: soil moisture — or more accurately, the lack of it.

Simply put, parched soil can soak up a lot of rain water before it runs off into lakes and rivers or recharges aquifers.

“Soil is like a sponge,” Caldwell said. “When it’s dry, you can drip a lot of water on it before it starts to drip out the sides.”

But once that soil is filled to capacity, rain will run off quickly, sometimes with disastrous effects as occurred in the deadly flooding in Austin in 2011 and in Wimberley in 2015.

“Wimberley received 6 to 8 inches of rain in the watershed that day, which is a lot of rain, but it’s happened before without flooding!” Caldwell said. “The amount of water near the Earth’s surface either consumes or radiates the sun’s energy. If there’s moisture, water evaporates and the land doesn’t heat up. If there isn’t, the land and air warm up, causing the winds to blow and water vapor to move. If we know the amount of water, our weather forecasts can really be improved.”

The satellite measures water in the top two inches of soil with a radiometer that measures radiation emitted by the soil. SMAP was also outfitted with a radar sensor, but that equipment is no longer working after it malfunctioned in July 2015.

Understanding Fundamentals and Predicting the Future

Even with the assistance of satellites, forecasting what’s going to happen to the water on Earth is a difficult task. Scientists spend years building complex computer models to make predictions and then years more to improve them, fine-turning the science to better understand how water cycles through the land, ocean and atmosphere.

“This is fundamental,” said Jackson School Professor Zong-Liang Yang, Director of the Center for Integrated Earth System Science (CIESS). “Using these connections can directly be translated to the predictive skill we build into models.”

Yang’s group of graduate students, postdocs and research scientists specializes in models that help monitor water resources, predict floods and droughts, and improve the understanding of water-cycle mechanisms. Their work has been used by leading national centers including the National Center for Atmospheric Research and National Centers for Environmental Prediction, but much of the group’s efforts are also directly aimed at improving knowledge and predictions of an ever-increasing list for the system. He’s been on the road for much of the past year looking for partners, talking to river authorities, water districts, utilities and others interested in water supply.

Participants include the Hill Country Underground Water Conservation District, the Blanco-Pedernales Groundwater Conservation District, Lower Colorado River Authority and NASA’s Jet Propulsion Laboratory (JPL) JPL partnered with TXSOS to ground truth its new state-of-the-art Soil Moisture Active Passive (SMAP) satellite, launched Jan. 31, 2015. The satellite measures soil moisture worldwide every three days, providing data that will enhance the ability to predict weather on a global scale days or weeks ahead of time and improve forecasts of drought, floods, wildfires and severe weather.

“When the soil is either excessive or insufficient, it affects our crop yields,” Caldwell added. “The amount of water near the Earth’s surface either consumes or radiates the sun’s energy. If there’s moisture, water evaporates and the land doesn’t heat up. If there isn’t, the land and air warm up, causing the winds to blow and water vapor to move. If we know the amount of water, our weather forecasts can really be improved.”

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For instance, large-scale climate models are no more accurate than a coin toss at predicting rainfall in Texas in the late spring and early summer months — a time period that’s essential for influencing how a summer drought will play out. A good rain can keep the state from turning into a dustbowl, while dry, hot months can turn a mild drought into a severe one, as it did in 2015. But the odds are getting better thanks to research conducted by Jackson School Professor Ron Fu and former Jackson School postdoc Nilan Fernando, who is now working with the Texas Water Development Board.

Their new prediction method boosts the accuracy of rain prediction to about 70 percent, with work ongoing to improve that number.

The new method is a statistical forecast model that uses more localized data — like atmospheric pressure and land surface conditions — than the larger-scale dynamic climate models. “That’s because in summer the rainfall is determined by more local, smaller-scale processes,” Fu said.

The key difference is the use of historical data on Texas weather to help inform rainfall predictions.

“We can show that there is an empirical relationship between spring drought conditions and summer drought that gives a better prediction of the dynamic model,” Fu said. The team successfully tested the new method in 2014. In 2015, with the prediction enhanced with measurements from the SMAP satellite, the forecast showed that most of the state had a high likelihood for greater than average rainfall. This was proven correct when heavy rain swept across much of Texas during that period, ending the drought.

The Water Development Board is making the new forecast available to water utilities, water managers and decision makers. Fu said the team will work to make the predictions more accurate and available earlier in the year if funding can be secured.

Living with Reality

No matter how good scientists get at predicting the future, Texas is going to have to learn to live through extreme dry spells, said Bridget Scanlon, who leads the bureau’s Sustainable Water Resources Program.

Because of the booming population, reservoir capacity per capita has fallen by 70 percent in Texas since the 1970s. There are some new off-channel reservoirs being built in Texas, but it would be extremely challenging to expand surface reservoir capacity enough to cope with these extremes, she said.

“It’s very difficult to get a permit to build any new surface reservoirs, and the prime sites for reservoirs have already been taken,” Scanlon said.

The future will likely entail a variety of water supply solutions. A strategy that Scanlon champions is aquifer storage and recovery. This entails moving water during wet times into partially depleted underground aquifers, where the water is stored for use during droughts. (For more information, see Scanlon’s op-ed on page 99, titled “Don’t let Texas excess water go to waste!”)

She is also working with the Texas Water Development Board to look at the potential of capturing water flowing down the rivers to the Gulf of Mexico during floods and using it for water supply. Satellite monitoring indicates that excess water is being stored throughout the world, particularly in Australia, which endured roughly 15 years of crippling drought starting in the mid-1990s. She has also worked in California recently, which is in the middle of one of its most severe droughts on record. Both hold hints at what the future may hold for Texas.

“In the future we are going to have to consider all possible water sources,” Scanlon said. “Look at what J.A. is doing now — using stormwater, municipal wastewater, imported water, storing water in aquifers. Having a much broader portfolio increases drought resilience.”
LEFT: PORTRAIT OF JACK JACKSON WITH A PHOTO OF HIS LATE WIFE, KATIE, AT HIS SIDE.

THE MAN BEHIND THE SCHOOL

By Anton Caputo
2015 Newsletter
When Jack Jackson decided to leave his fortune to The University of Texas at Austin, it forever changed the face of geosciences at the university, the state and beyond.

The university already had a long and storied history in geology and the geosciences dating back more than a century. The Department of Geology was formed in 1888 and the Bureau of Economic Geology in 1909. The Institute for Geophysics, by far the largest and most prestigious schools of geosciences in the world.

Jack’s choice to leave his estate to the university was a gesture to an institution he loved and credited with playing a large role in his success. He and wife Katherine, or Katie, for whom the school is also named, never had children. In a way they adopted the university, said Bill Fisher, first dean of the Jackson School of Geosciences.

“The university became their children,” Fisher said. “Jack loved this place. He had fond memories of geology here.”

Beyond loving the university, those close to Jack said he was devoted to the state and people of Texas and held a bedrock belief that education and the understanding of the Earth were paramount to ensuring they thrived in the future. His Feb. 27, 2002, letter making his plans official underscored that belief:

“...The resources of the Earth have been very important to me and to what Katie and I have been able to achieve. The continued study and understanding of geology and the resources and environment of the Earth will be important to The University and the citizens of Texas in the future. Our intent to commit the residue of the estate is in that spirit.”

Despite the generosity of Jack’s actions and the size of the estate — it was conservatively estimated to be worth $150 to $200 million in 2002 and is now valued at greater than $300 million — he did not view it as a gift.

“He made that very clear,” said Scott Tinker, director of the Bureau of Economic Geology. ‘Jack said, ‘I’m not giving you this money. We’re investing in The University of Texas.’”

Fisher, as director of the Geology Foundation, worked closely with Jack for almost 20 years. He and Tinker were among a group of five university administrators that Jack became close to in the later years of his life. The others — then president Larry Faulkner, former president Peter Flawn, and then dean of the College of Natural Sciences Mary Ann Rankin — rounded out what Jack would sometimes refer to as his university family.

“Honestly, it’s hard to convey what an interesting and funny and truly lovely man he was,” said Rankin, who is now Provost of the University of Maryland. “I still miss him.”

**HUMBLE BEGINNINGS**

The Jack those at the university came to know in his later years was a very wealthy man thanks to his success in the gas fields of Wise County and astute real estate investments in the Dallas area. He was every bit the independent oilman — shrewd, hard-working and affable, yet tough when he needed to be. He was a great storyteller by all accounts. But he was unlike the Hollywood portrayals of oilmen from the era.

Absent were the oversized cowboy hats or big cigars. He did not live large or ostentatiously — although in later years he did like to play golf with his friend Byron Nelson and other celebrities during fundraising events for charities that Jack supported. He lived well, in a nicely kept ranch-style home in North Dallas that his friends describe as solidly upper-middle class or the type of home you might expect a college professor to live in. He drove Cadillacs — but he kept them for a decade or more. He liked to eat out, but his standby meal was chili from Jason’s Deli. When he occasionally went more upscale, it was often the Olive Garden.
He had a lifelong love affair with his wife Katie. In fact, Jack left geology and the oil business flat in 1960 when Katie, who was tired of his long absences in the oil fields, reportedly said she would have been better off marrying a shoe salesman. He would later tell his friends that he never spent another day apart from Katie until her death in 2000.

Katie seems to be the one instance where Jack would abandon his Depression Era spending sensibilities. Rankin remembers several times in Jack’s later years when he would become semi-mental talking about Katie, and would show Rankin the closet full of couture gowns he bought for Katie or take her to the bank to look at the jewelry he bought his beloved wife.

“It meant a lot to him that he had bought that for her even though they clearly didn’t spend a lot of money on their home or anything like that,” Rankin remembers.

Katie, in classic Jackson fashion, rarely wore the jewelry, instead choosing to wear duplicates that Jack had made for her.

But like many members of the Greatest Generation who would achieve remarkable success, Jack did not come from wealth. “Jack started as a regular, poor kid,” said Jim Langham, Jack’s longtime accountant. “He didn’t have any money … Jack was successful because he worked, he was smart, he saw the opportunity and he took advantage of it.”

Born in East Texas in 1913, Jack lost his father to influenza at the age of three. He was raised by his mother, a talented woman who became director of public welfare for the City of Dallas.

Jack grew up working. Selling newspapers, bagging groceries and later working in a cotton gin and a department store, were a few of his endeavors. At one point in high school he even branched out into small business by selling his own brand of pomade while delivering newspapers.

He was an exceptionally good baseball and fast-pitch softball player and top-notch southpaw pitcher. This skill would prove to be a valuable professional asset when Jack was a young man looking for employment in an era when companies would often field semi-professional teams and engage in national tournaments. His ball-playing prowess was instrumental for obtaining one of his early jobs at Arkansas Fuel.

By the time Jack graduated high school, the Depression gripped the country. Luckily, oil production was booming in East Texas, and an older cousin, John Atkins, agreed to put Jack to work at his gasoline plant. Jack learned the operations from the ground up — digging ditches, working on pipelines, and even spending time in the chemistry lab. His wage was 95 cents an hour.

Jack’s cousin would eventually let him go, letting the young man see the perfect little while under the impression that he had been fired before explaining that Jack had learned all he could at the gas plant and that he was going to help him pursue a higher education.

COLLEGE AND WAR

Jack chose The University of Texas at Austin to pursue a degree. However, his first foray into academic life during the fall of 1935 didn’t go well. He was determined to pursue his degree, but simply hadn’t yet developed the academic skills necessary to succeed at the university.

On the advice of Assistant Dean of Men Arno “Shorty” Neswisky, Jack transferred to Temple Junior College to improve his academic skills before reentering the university.

“He learned how to study is what it really comes down to,” Langham said. “It’s like a lot of those guys that needed to get into the regi-

The move to Temple Junior College would prove pivotal in Jack’s life. It was during this time that he would meet Katherine Elizabeth Graeter, his future wife and lifelong partner.

It was also one of those life experiences that seemed to color Jack’s view of education.

“Because of his own path, Jack knew that young people are not just programed to succeed,” Faulkner said. “They haven’t necessarily had the right set of experiences at any given moment in life and you need to be open-minded about giving them a chance about getting those experiences together.”

Jack eventually returned to The University of Texas at Austin. He graduated with a geology degree in 1940 and took a job at Arkansas Fuels. World War II broke out soon after and he enlisted in the Navy.

But was hired away by independent oilman Jay Simmons and oil investor Arthur Cameron. For six months, Jack’s role with the duo entailed promoting events and entertaining celebrities and potential investors as much as it did geology.

Jack spent almost two years pulling together logs, maps and whatever information he could find on the geology of the area. Ultimately, it was his experience gained during the war working the bauxite deposits in Arkansas that brought the geology into focus, as Jack explains in his biography:

“The only difference between a bauxite deposit and a porous conglomerate in the Fort Worth Basin is that the weathering of the former dissolved out the silica and concentrated the alumina content. The weathering of the latter reduced silica and formed holes (porosity) which were ultimately filled with oil or gas rising us from the interbedded gray shales. It was that simple. The trick was to learn the pattern of deposition. Once that was established, the rest was mechanical. And I had learned the sedimentation pattern in the Arkansas bauxite ‘field laboratory’ during the war. Core drilling and seismic maps were used to locate the subsurface ridges and valleys there. The thick bauxite deltaic deposits occurred in and along the valleys where the deltas had built rather than on the crests. The conglomeratic pattern in the Fort Worth Basin was very similar. So I transferred my bauxite knowledge over to the Fort Worth Basin. Nobody working Wise
The fortuitous series of events quickly brought Jack into contact with a group of investors with enough capital to pursue Jack's plans and enough knowledge to see the sense in them. The group originally offered to put Jack on the payroll as the project's exploration geologist. But money from the investment was not needed at the time away from home.

During the next several years the group acquired more land and drilled more test wells, with Jack working tirelessly as the landman and chairman of the corporation. Jack paid himself only the 3 percent “override” in the venture and from the royalties. This allowed Jack to make income off the venture if and when it produced income without having to make a capital investment that he couldn't afford.

During the next several years the group acquired more land and drilled more test wells, with Jack working tirelessly as the exploration geologist. But money from the investment was not forthcoming. The group could not strike a satisfactory deal with Lone Star Gas, which served Dallas and Wise County. They eventually struck a deal with the city of Chicago, but it took a new pipeline, a visit to Austin Mayor Richard J. Daley, a new gas processing plant and the defeat of a federal lawsuit filed by Lone Star to get gas flowing from Wise County.

Finally, in late 1957, it was all finished. Gas was being piped to Chicago, and Jack's hard work had paid off — handsomely.

LIFE AFTER THE RIGS

Jack continued to work the oil fields hard for a couple years before Katie finally put her foot down about the long hours and time away from home.

Once she did, Jack left the profession quickly. The couple took a two-month vacation to Europe and then settled into life in Dallas, where Katie quickly became a key figure on the social scene. Jack, on the advice of Bob Smith, invested heavily in real estate in North Dallas. Much of the property would eventually be turned into the North Dallas Tollway, making him another fortune. Jack also worked hard on the political campaign of Dolph Briscoe, becoming something of a kingmaker in Briscoe’s run for governor.

‘Jack had a venturesome mind. He loved geology, and he was interested in new things.”

—Larry Faulkner, former university president

Jack and Katie were strongly religious and believed in the power of education and medicine to help mankind. They donated heavily to Presbyterian Hospital of Dallas, Texas Lutheran College, Austin College, Temple Junior College and many more causes, including, of course, The University of Texas at Austin. Katie was a member of the Texas Lutheran College’s Board of Regents for two decades and an honorary member of the Presbyterian Board of Churches.

But it was Jack's election to The University of Texas Geology Department to be the first dean of the newly created School of Geosciences that was most meaningful to him. As the school grew in size, it was clear Jack had created a new foundation for geosciences at The University of Texas.

WE ALL HAVE A PART TO PLAY

The strategic vision of Jack and Katie Jackson created a strong foundation for excellence. It enabled the Jackson School to hire top faculty and research scientists; and build state-of-the-art facilities that increase the depth and breadth of science conducted at the school and enrich student education.

But it was never meant to support the school exclusively. The Jackson School relies on individual donors to ensure that it can continue its mission of conducting cutting-edge research and offering students a world-class education — just as Jack and Katie intended.

The endowment includes royalties from the estate’s wells and leases. And to honor Jack’s work, the Jackson School is the only institution in Texas University System that manages its own mineral rights. However, royalties can be significantly affected when gas and oil prices fall. The Jackson School relies on thousands of individual stakeholders investing time, money and counsel at a range of levels to continue its path of excellence. Jack and Katie could have no idea that their gift would have such far-reaching impact.

In Jack’s words: “We are investing in the future of a countless number of people at The University of Texas at Austin who will study and will continue to learn of the geology, the earth sciences, and the resources and the environment of the Earth. I know of nothing more worthwhile.”
SLOW SLIP

UNDETECTED BY HUMANS, SLOW-MOTION EARTHQUAKES ARE HAPPENING ALL OVER THE WORLD. UNDERSTANDING THEM COULD HELP PREDICT WHEN DESTRUCTIVE QUAKES ARE COMING.

By Monica Kortsha
They’re also home to a subtler kind of seismic event. Scientists have recently discovered a class of fault movements akin to earthquakes in slow motion occurring on subduction zones around the world. Called a “slow slip event,” the mechanics are similar to those of large earthquakes, but instead of releasing their energy in a few seconds of violent shaking, they happen silently and slowly over a period of days to months.

The only signs of slow slip events at the surface are centimeter-sized shifts in the land that cause it to relax and relieve some previously accrued tectonic stress. They remained hidden until 2000, when a GPS monitoring network deployed by Canadian scientists detected slight movements above the Cascadia subduction zone on the northwest coast of the United States and western Canada. Since that first discovery about 15 years ago, slow slip events have been observed around the world. While imperceptible to humans, the gradual movements of slow slip events may hold major sway when it comes to more destructive seismic events. The 9.0 magnitude Tohoku-Oki earthquake that struck off the coast of Japan in 2011 and ultimately led to the nuclear disaster at the Fukushima Daiichi nuclear power plant was preceded by two slow slip events, one occurring three years and the other one month before the quake. Recent research has framed these — and the final straws that set the earthquake off. On the flip side, it is also possible that slow slip events may relieve stress in earthquake zones and help to prevent such large quakes from happening.

Understanding when slow slip events could signal earthquakes, or potentially prevent them, starts with knowing when and where on the subduction zone they occur, said Laura Wallace, a researcher at the Jackson School of Geosciences Institute for Geophysics (UTIG). Wallace has been studying slow slip events almost as long as anyone on the planet and is now taking her research to uncharted territory: the bottom of the ocean. Using under-water instruments that measure deformation of the seafloor during very shallow slow slip events, she hopes to understand just where along offshore subduction boundaries slow slip events happen. Lada Dimitrova, a postdoctoral fellow at UTIG, will also play a key role in the research. She has developed a new method to analyze the onshore GPS data that provides a view of the spatial and temporal evolution of slow slip events in unprecedented detail.

**DISCOVERING SLOW SLIP**

Wallace discovered the first slow slip events ever recorded in New Zealand while working at New Zealand’s geological research institute, GNS Science. One of her first tasks at GNS was to help design a continuously operating GPS network to monitor New Zealand’s Hikurangi margin subduction zone as part of the country’s GeoNet project, a geohazard monitoring system. Almost as soon as the network was live, slow slip started to appear, Wallace said. The first sign was a GPS site near the city of Gisborne, New Zealand, shifting by two centimeters eastward over 10 days in October 2002.

The jump eastward indicated a break in the ongoing tussle between the Australian Plate and the westward subducting Pacific Plate, with slow slip allowing the Australian Plate to slide back into a more relaxed state, like a released spring returning back to its unstretched state. A GPS device captured the period of gradual stress accumulation punctuated by episodic slow slip events at the Hikurangi subduction zone, and over time produced data with a telltale staircase-like appearance. When Wallace saw the first eastward jump in 2002, it immediately caught her attention.

“I looked at the GPS time series plots on the web and said, ‘Oh my gosh, that looks like a slow slip event,’” Wallace said. The slow slip event didn’t show up on any of the GeoNet’s 10 other devices. There were only about a dozen GPS sites in New Zealand at that time, and they were too far from the GPS site at Gisborne that recorded the event. But data obtained from a local surveyor’s GPS base station also detected the event, proving that slow slip also occurs at New Zealand’s subduction zone.

Since then, the GeoNet GPS network has expanded to over 50 devices across the country and has revealed slow slip activity all along New Zealand’s Hikurangi subduction zone. In parts of the zone monitored by GeoNet, an event occurs about every 18 months, lasts one to two weeks, and causes displacement of up to three centimeters. Some of the recorded events are longer (up to 1.5 years), and have contained about the same amount of energy as a magnitude 7.0 earthquake, larger than the one that devastated Christchurch, New Zealand, in February 2011, killing 185 people.

However, the capability of GeoNet’s GPS monitors ends where the ocean starts. And the Hikurangi subduction zone extends 30 miles into the Pacific Ocean to its place of origin — a trench in the seafloor made by the Pacific Plate as it begins its descent beneath the Australian Plate. So, funded by the National Science Foundation, Wallace led a team of researchers on a 2014 mission that extended slow slip tracking capabilities into the ocean by dropping monitoring devices along parts of the subduction zone out GeoNet’s reach.

Officially called the Hikurangi Ocean Bottom Investigation of Tremor and Slow Slip, the mission goes more frequently by its Tolkien-inspired nickname “HOBITSI,” a fitting choice for research based in New Zealand, the country where “The Lord of the Rings” movies were famously filmed. The mission brought together researchers from seven institutions in the U.S., Japan, and New Zealand, to drop 32 seismic and pressure-recording instruments to the bottom of Poverty Bay on the North Island’s southeastern coast.

Since deployment, the devices have been continuously recording movements and seismicity at the Hikurangi subduction zone, where slow slip occurs only five to 15 kilometers below the Earth’s surface. The data will provide the first comprehensive view at slow slip along the offshore reaches of a subduction zone, where the plate boundary nears the seafloor. Prior to now, studies of slow slip have been restricted to deeper slow slip events (greater than 40 kilometers beneath the earth) where land-based networks are able to detect them.

**BETWEEN A ROCK AND HARD PLACE**

According to Wallace, the scientific community’s current understanding of why slow slip events occur and their relationship to damaging earthquakes is still in its infancy. But a working theory is that the slow slip environment is a transitional zone between two other subduction zone regions: the deeper aseismic zone where the plates move smoothly past each other without getting stuck, and the shallower seismic zone, where frictional hang-ups between the plates cause earthquakes.

“Many of the world’s slow slip event zones seem to straddle a transition between the area where earthquakes are produced, and the steadily creeping part,” Wallace said. “So it looks like slow slip may be related to some sort of transitional frictional behavior.”

Many studies also suggest that abundant water in slow slip zones may help build up high fluid pressures in the fault zone, and that this could promote slow slip behavior. It is likely that a combination of abundant fluids and the frictional properties of the rocks in seismic zones enables stress between plates to be released more gradually as slow slip events rather than as quick jolts that cause earthquakes. Scientists are also interested in the relationship between slow slip events and more typical, “fast slip” earthquakes. There are clear
spatial and temporal linkages between slow slip and earthquakes observed at many plate boundaries, including Japan, New Zealand and Cascadia, but these relationships are not yet well understood.

Since slow slip events are often observed along the boundaries of the area where large earthquakes happen, they may be useful for helping to forecast the locations of future large tremors.

“If slow slip does delineate the locked zone, you could potentially use the distribution of slow slip events as further evidence for where the big quake ruptures are going to,” Wallace said.

**DIY ENGINEERING**

Recording the slow-slip events offshore rests on the ability of bottom pressure recorders, or BPRs, at the bottom of the ocean to detect subtle changes in pressure due to movement of the seafloor during the slow slip events. It is a new role for the devices that have previously been used in studies of tsunamis and submarine volcanoes.

For the HOBITSS experiment, UTIG built five BPRs. Anatoly Mironov, UTIG’s resident electronics engineer, is the man behind the design and construction of the devices.

“This is my specialty,” Mironov said. “All my life I have been designing different equipment.”

At UTIG, Mironov engineers scientific devices that need to be built or modified. He’s provided technical support for the ice-penetrating radar system used by UTIG researchers Donald Blankenship and Ginny Catania to survey features beneath Antarctica, and has built and upgraded many ocean bottom seismometers for various UTIG projects.

Mironov started his geophysics career in the former U.S.S.R, his homeland, as a technical leader in the Russian Arctic and Antarctic expeditions in 1985. It was in Antarctica where he met Blankenship and learned about UTIG; the institution he would join 15 years later.

“In Antarctica people really get to know each other,” Mironov quipped.

Each device Mironov makes comes with its own challenges. For the BPR, the main issues to be overcome were keeping the electronics running constantly for two years and keeping them dry. He learned first-hand about the challenges of the second point years ago when the casing for an ocean bottom seismometer he designed sprung a leak. He now keeps the device, its corroded and salt-crusted motherboard exposed, on his desk.

“It’s on my desk to remind me that there are no minor things when you design or prepare equipment for deployment,” Mironov said. “Any mistake, and you lose the instrument, you lose the data, and eventually many years of your work are thrown in the trash.”

Wallace’s BPRs underwent a strict sealing protocol inside a pressure-resistant case. A release code transmitted to a BPR makes it drop anchor and float to the surface, while a radio beacon, a strobe light and old-fashioned flag on the BPR help guide researchers to it. And just in case someone else finds it first, Wallace’s contact information is on each device, too.

**RECOVERY AT SEA**

At the time this article was written, Wallace, Mironov and other members of the HOBITSS research team had recently recovered the data from the BPRs at the bottom of the sea. Although it will take months to analyze the data, the initial results look promising, Wallace said.

“I am really excited to say that we have recovered our instruments, and that the vast majority of them have great looking data,” Wallace wrote in a blog post for the HOBITSS cruise.

The data recovered from the devices’ first year along the subduction zone will help determine where slow slip events occur on the shallowest reaches of the subduction zone plate boundary. The BPR and ocean bottom seismometer data together will help scientists to better understand the spatial and temporal connection between slow slip and earthquakes.

The data will also help pinpoint the areas of interest for Wallace’s next research project along the Hikurangi subduction zone: drilling near the plate interface itself.

Wallace is part of a large international team of scientists that is scheduled to use the Integrated Ocean Drilling Program’s research vessel JOIDES Resolution in 2020 to investigate the causes of shallow slow slip events offshore New Zealand. They will take core samples from the plate boundary surrounding the slow slip area, and install borehole instruments, such as pressure gauges and fluid flow sensors.

“We’ll be monitoring hydrological changes, deformation rate changes, and fluid chemistry changes to try and look at how these properties vary throughout the slow slip cycle,” Wallace explained.

In the meantime, while the research team parses data and drilling plans are set in motion, slow slip events will continue to shift subduction zone landscapes at a rate only GPS — and now HOBITSS — can notice.
On an evening in September 2010, a cloud of fire exploded above a gas station in San Bruno, California, unleashing an inferno with 300-foot-high flames, killing eight people and injuring more than 50 in the nearby neighborhood. The cause: a ruptured underground natural gas pipeline.

The size and spectacle of such explosions and line failures stick in people’s minds and stoke their fears about the dangers of underground pipelines. Even some industry analysts treat such accidents as inevitable, while environmentalists portray pipelines as inherently perilous ticking time bombs.

But those anxieties may far overshoot actual risks, said Ian Duncan, a research scientist with the Bureau of Economic Geology. Duncan studies the risks of pipeline failures, and has reviewed and analyzed past accident and fatality statistics to better understand just how hazardous different pipelines are. Along the way, he has reached a reassuring, although perhaps unpopular, conclusion: The chance of a person living near a gas or other pipeline dying from a rupture or explosion is close to the probability of that same individual dying from an airplane landing on them in their living room — which is to say pretty low. Duncan’s work suggests that past estimations have over-stated risks by up to four orders of magnitude.

“One of the problems in this world is our perception of what’s risky and what’s not risky is catawampus,” said Duncan.

Duncan’s examination of gas pipelines began as a step toward understanding the risks of another proposed pipeline network: carbon-capture lines that could reduce the release of carbon dioxide into the atmosphere and help mitigate climate change.

Carbon capture and storage (CCS) entails separating carbon dioxide from other gases at electricity generation plants, and then transporting the CO2, usually via pipeline, to be stored underground in geologic formations kilometers beneath the surface. The process has emerged as a promising albeit developing technology to combat greenhouse gas emissions.

Energy companies have used the basic CCS process for decades for enhanced oil recovery — injecting CO2 underground to extract more oil from marginal or dwindling deposits. President Obama’s Clean Power Plan, released this past summer to reduce greenhouse gas releases, included CCS as a possible carbon-reduction strategy for coal plants. But policymakers are still working out whether it will be mandated within the final rule.
Regardless, coal-fired plants are already incorporating CCS. In 2014, the world's first commercial-scale power plant using CCS began operating in Saskatchewan, Canada, sending recovered carbon dioxide to boost oil recovery in North Dakota. Several other U.S. plants are also upgrading to include the technology; CCS systems will be included in two new coal plants being built in Fort Bend County, Texas, and Kemper County, Mississippi, from the outset.

That development means a lot of pipelines. And outside of the power plant infrastructure, the lines are considered the riskiest element of CCS. Some estimates project that every coal plant could need up to 64 miles of pipelines to effectively move carbon dioxide. To accommodate startup of CCS at just the existing U.S. coal plants, the country could need between 4,900 and 40,640 miles of new pipelines and as much as 120,000 miles at full buildout by 2050. Recent studies of pipeline risk by other experts have suggested this is a hazardous proposition, and have pegged fatality risks from CCS pipelines at 1 in 1,000 people per kilometer of line per year. That’s in the range of the risk of working on an offshore oil platform to driving on the freeway, respectively.

“If you’re going to make a policy decision on CCS, as a way to deal with climate change, you need to understand the costs and benefits involving alternatives to make a rational choice,” said Eric Bickel, a research scientist in the University’s Department of Petroleum and Geosystems Engineering, who has collaborated with Duncan.

Without another comprehensive CCS pipeline to evaluate, however, estimates are generally relied on engineering assessments and raw data from databases, Bickel said.

“Some people were highlighting the risks of transporting CO₂, but we need to understand just how big those risks are,” he said. “Rather than theorizing, Ian’s research focuses on actual data from natural gas pipelines or CO₂ pipelines used primarily for oil recovery.”

With a $2 million grant from the Department of Energy, Duncan took a closer look at the likelihood of pipeline failures in CCS networks and elsewhere, and reached much different conclusions.

BREAKING DOWN THE DATA

Duncan began by looking at natural gas gathering lines, which carry resources from well pads to processing plants or refineries, and incident reports from those systems as a useful analog. Those lines are distinct from transmission lines, which run from the processing or refining facilities to customer distribution systems. While gas is much more flammable than carbon dioxide, the size and specs of the gathering-line network provides a useful comparison for the potential CCS pipeline system. After all, there are currently about 240,000 miles of gathering lines across the country, providing a large data set to study. But the task proved to be a complicated one.

In the past, gathering lines were often built to be smaller and withstand less pressure than transmission pipelines. Now, they’re often built with larger diameters, in part, to keep up with the volume and care of gas flowing out of hydraulically fractured, or fracked, wells. Regardless of the specs, though, gathering lines are largely regulated by state agencies, not the federal government. The Department of Transportation’s Pipeline and Hazardous Materials Safety Administration (PHSMA) regulates only about 10 percent of the gathering-line network.

When a gas line blew up near Alice in Jim Wells County in 2012, it was a state-regulated gathering line. No federal or state agency investigated the company that operated the line never submitted an official incident report. The number of “significant incidents” reported to PHSMA has increased since 2004, the rising incident trends and the high-visibility consequences of explosions have contributed to people’s “fear factor” over pipelines, and led some researchers and critics to say that building out a vast network of CCS pipelines would face public opposition — and maybe rightly so.

But as Duncan sifted through previous studies and the accident reports and data, he picked up how information gaps and glitches also were skewing risk assessments of pipelines. For example, while incident reports to PHSMA typically noted incidents that involved a serious injury or death, or cost $50,000 or more. Typically, the largest cost was the value of lost natural gas. So, during a moment when gas prices were peaking, a relatively minor episode causing no human harm but releasing enough gas would show up as a significant incident. Furthermore, other researchers have interpreted the data to infer all incidents as major ruptures prone to explosions. Duncan closer look found that 42 percent of reported incidents were leaks and two-thirds of those cases were just pinholes. Only 15 percent of the leaks were caused by punctures. Past industry and consultant reports have also documented that pipeline age has significant impacts on pipeline safety and risks of failure. Duncan again found that the data were inaccurate, after considering injury and fatality rates as a function of when a pipeline was installed. With advances in materials, building codes and designs, such as increased pipeline wall thickness, one would expect that the failure rate of newer pipelines would decline; Duncan analysis of the data demonstrated that risks of serious injury and death have, in fact, fallen off. Just based on the age of pipelines, newer infrastructure is less likely to fail. In conclusion, said the data demonstrated that risks of serious injury and death have, in fact, fallen off. Just based on the age of pipelines, newer infrastructure is less likely to fail.

Finally, despite the increase in reported incidents, personal injuries and fatalities have actually decreased during the same span. Writing in the peer-reviewed International Journal of Greenhouse Gas Control in 2014, Duncan and a coauthor noted, “That incident rates are so poorly correlated with injury/fatality rates demonstrates the problem of using [that] data to represent risk.”

By the time he completed his reviews, Duncan determined that past risk studies had overestimated gas line risks by several orders of magnitude. As far as risks from proposed CCS pipelines, those rates were also overstated. Rather than being in a 10,000 or a harmful rupture, the probability is closer to 1 in 10 million, or the chances of harm from plane debris or a lightning strike. At the same time, Duncan said it is important not to be complacent about pipeline safety, as natural gas is clearly hazardous.

“Some of those previous research studies were using statistics of pipeline accidents without really going in and looking at the details,” said Bickel. “A couple of incidents in the database were even practice events for first responders, and other researchers counted those as actual accidents. So, there’s a lack of precision that Ian is trying to correct.”

Duncan added, “People making these statements were just looking at the incident rates, and once you understand that the rates are bogus and not robust, rigorous measurements of anything, then you have a totally different perspective.”

Hazard vs. Risk

Duncan finds, published in several papers in recent years, have gained attention from industry, state governments and other researchers. Calling his research “informative,” Sue Gander, director of the National Governors Association Environment, Energy and Transportation Division, invited Duncan to present his work at the association’s 2014 shale gas development forum.

“Ian is addressing the tough decisions in terms of policies surrounding carbon capture and storage,” Bickel added, “and he’s using an interdisciplinary approach,” bringing in geotechnical, engineering, and legal and policy dimensions and working with colleagues who can interpret them. “He’s not just focused on a narrow aspect, he’s trying to address the whole problem.”

And whether we realize it or not, that all comes back to risk, and clearly defining what risk is, and separating the fears associated with pipeline explosions from the statistical chances of pipeline failures that result in accidents.

“Many people, including scientists, don’t seem to understand the concept of risk,” Duncan said. “They tend to confuse it with hazard. If something’s hazardous, it’s risky, but that’s not the scientific definition of risk.”

For the record, risk, in terms of scientists, engineers or insurance companies, is defined as the probability, or likelihood, of an incident occurring multiplied by the consequence of that event. Under that lens, decision makers can choose to define “acceptable risk,” or the chance of injury or loss that is considered tolerable by society.

A somewhat standard level of “acceptable risk” often used is 1 in 1,000 million. The U.S. Environmental Protection Agency, for instance, dictates that if a carcinogenic chemical doesn’t cause cancer effects in lab tests at that level, it’s an acceptable risk to allow its use.

Of course, most people would say even remote odds of a cancer diagnosis — or a nearby pipeline explosion — are unacceptable.

“When you’re a member of the general public, what you view as an acceptable risk tends to be governed by human emotion — that ‘dead’ of something horrible happening — rather than science,” said Duncan.

Duncan’s research may help ease the dread factor, or at least counter other work that reinforces misconceptions about the safety of both CCS and natural gas pipelines. That will be important in supporting responsible decisions on energy policies, from ongoing gas development to carbon capture and storage, and rooting them in sound science.

“This is largely driven by an interest in public policy,” Duncan said, “and we can’t have good public policy unless we really understand what the risks are.”
Research at the Jackson School of Geosciences Bureau of Economic Geology (BEG) into U.S. shale oil gas production and reserves is widely considered to be the most comprehensive public study of its kind. Funded by the Alfred P. Sloan Foundation, a philanthropic nonprofit for supporting science, the bureau’s ongoing research into the six major shale plays in the country has become an invaluable resource for government, industry and fellow academics alike who hope to learn more about a subject that is vitally important to the country and the world.

SO HOW DID THE SLOAN STUDIES COME ABOUT?
Scott Tinker (ST) – It was really the brainchild of environmental scientist Jesse H. Ausubel of The Rockefeller University. Ausubel was the first to map the transition in energy fuels from carbon-based entities such as hay, wood and coal, to complex hydrocarbons such as petroleum, to simple hydrocarbons like methane, eventually to a hydrogen economy generally. Jesse called this decarbonization.

Jesse understood before anyone else how important natural gas (methane) was going to become from an energy perspective in the future. He contacted me and Bill Fisher, professor and inaugural dean of the Jackson School, several years ago and asked if the bureau would be interested in considering a research program in methane. That was a very easy question to answer!

We started by organizing a couple of informal workshops and bringing together leaders from industry, government and academia to see what people already knew and where the gaps in knowledge about future resources were. From these workshops, it became apparent pretty quickly that we didn’t understand shale and our shale reserve future all that well. It was also clear the country at large could benefit a lot from a detailed analysis. After a few months of fine-tuning, we put in a funding proposal to do a study focusing on the Big Five gas basins: the Barnett, Fayetteville, Haynesville, Marcellus, and Eagle Ford shale plays (a sixth — the Permian Basin — was added later).

WHY DID YOU CHOOSE THOSE BIG FIVE?
Svetlana Ikonnikova (SI) – At that time, the shale gas resource was still quite new. There was a lot of speculation over the resource and the potential of different plays. Could it be a game changer? Nobody knew for sure. All we knew was that those five plays had already been producing significant shale gas and were growing. There was not much information and research publicly available. So it took us a few months to fine-tune our funding proposal. We had to go back to basic questions like: how much exactly is underground, what are the technologies to extract it, and what could be the key variables affecting future production?
WHAT EXACTLY DOES THAT MEAN?
Rather than a ‘Top Down’ approach.
You have described your production scenarios for each play.
The current low energy price environment, cost management becomes an important part of the analysis. So we use details about completions, factoring in the cost. Prices may vary, and operators may react by changing their completion strategies. So we can’t simply forecast the future. What we can do, however, is run a set of scenarios with respect to economic and technical assumptions, informing about a range of uncertainties in future production. We designed a model that feeds the geologic, engineering and economic field data, assumptions, and descriptions to explain how future play development may unfold.

WHERE DID YOU FIRST APPLY THIS NEW APPROACH?
ST – It is ironic, but we started with the Barnett Play, which coincidently had been developed mostly by George Mitchell, the father of fracking. Mitchell got his original land position in the Barnett Play. We have looked back at plays like the Barnett and coincidently found that technology and performance and development pace have evolved. When we go back to check our work, we see some variables have changed and others now become more prominent owing to economic and technological advances. For instance, in the older plays, like the Barnett, operators apply infill drilling; in newer, like Fayetteville, cluster drilling. Both affect the number of future locations, well economics and, ultimately, field production.

AND WHAT ABOUT THE DIFFERENCES IN EACH PLAY, GEOGRAPHICALLY, GEOLOGICALLY AND ECONOMICALLY?
SI – We have had mini crises each time we begun a new study because our usual approaches need refinement to fully describe the new play. But the more we work in different areas, the more important it becomes to account for additional variables that could vary. The geology itself can also be different, in terms of porosity and rock information. One of the ways we try to factor in all this new info, through statistical analysis, we were able to identify the key drivers of production in each play. Making all those connections has been a true revelation to us. Suddenly we can see in great detail how all these factors connect.

SO HOW IS THIS INFORMATION USEFUL?
SI – The study offers a set of key parameters and variables that should be considered before any decision to drill. We are currently developing an online tool to show people what we do. This is not just about estimating one value or a single figure for each well potential. The study is about more than just price. Never before has there been this much detail available to the burgeoning shale gas industry.

THE STUDIES HAVE ALSO GARNERED A LOT OF MAINSTREAM MEDIA ATTENTION. ARE YOU INTERESTED IN SHALE GAS...YET? Today it interferes with shale gas…yet. Today it interferes with unconventional natural gas, like Russia and the Middle East, aren’t as keen on shale gas…yet. Today it interferes with their margins selling more affordable conventional gas into markets. However, other regions like Australia and South America would love to see their shale developed. And down the road, Russia and the Middle East will develop their source rocks as well.

SO WHAT’S NEXT FOR THE BEG SLOAN STUDIES?
SI – We will be publishing our results from the Marcellus Play in the next six months. In the meantime we are completing the Eagle Ford and starting the Bakken Play analysis. Then, we will also be looking west: the BEG intends to study the biggest oil basin in Texas, the Permian Basin. We’re getting started on that, but it’s a complicated play. We are also in conversation with the Ohio government to help them understand and perhaps consider a similar study in the Utica Play.

“Whatever research we produce needs to be of the highest quality. That’s what’s important to us.”
Scott Tinker, BEG director

“Between that, our team finishing the Marcellus, as well as doing a loop back into our other three basins, we’re pretty busy.”

ST – In addition, we are expanding the study into new areas. With additional funding from the Sloan Foundation and the Mitchell Foundation we are looking into the water resources associated with shale gas and shale oil production. Recently data on water use in hydraulic fracturing was very sparse. Because of new regulations, operators are now reporting how much water they use. Bridget Scanlon and JP Nicot from BEG are leading the way on that one.

COULD YOU DO MORE STUDIES IF YOU HAD MORE RESOURCES?
ST – It’s not just about resources. It’s about balancing and managing the bureau’s expertise. We could always expand it by hiring more people but the quality Operating the way we are, is very simple and one of us. The public is interested because we all benefit tremendously through enhanced energy security and more affordable natural gas. We have found international, national and state governments are interested, as well as industry and other academics. The study is informing the people who need to make decisions in energy and related sectors of the economy.

We have been contacted by about a couple dozen public and private power producers in the last two years alone. Even many environmental NGOs are interested. They need to understand what the reality of future energy fuels and resources look like before they try to inform government regulatory policies.

WHY ARE FOREIGN GOVERNMENTS AND ENERGY COMPANIES INTERESTED?
ST – Shale gas resources can be found in basins all over the world, even in places that currently have no domestic energy production of their own. So there are opportunities for others to play in this brave new world just like us. Those whose current economic condition is bolstered by selling inexpensive conventional natural gas, like Russia and the Middle East, aren’t as keen on shale gas…yet. Today it interferes with their margins selling more affordable conventional gas into markets. However, other regions like Australia and South America would love to see their shale developed. And down the road, Russia and the Middle East will develop their source rocks as well.

Figure 1: A ‘TAKES CASE’ SCENARIO ILLUSTRATING AGGRAVATED EXPECTED PRODUCTION FROM THE BARNETT / FAYETTEVILLE AND HAYNESVILLE SHALE PLAYS MODIFIED FROM KOMPRAK et al., 2010.

Barnett Fayetteville Haynesville

Natural gas production, Tcf/yr

2005 2010 2015 2020 2025 2030

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EXPLORING

EUROPA

JACKSON SCHOOL SCIENTISTS PLAY A KEY ROLE IN NASA’S QUEST TO FIND LIFE-SUPPORTING ENVIRONMENTS ON JUPITER’S MOON

By Monica Kerraha and Anton Caputo

LEFT: THE SURFACE OF EUROPA AS SEEN BY NASA’S GALILEO SPACECRAFT IN THE LATE 1990S.
Ice is Europa’s “chaos” terrain, areas on the surface that resemble the bottom of the ice floating at the grounding lines of Antarctica.”

But the most unique feature of the moon may lie beneath its frozen exterior: a liquid ocean capable of supporting life. NASA is planning to send a spacecraft in the 2020s to scan Europa for signs of water beneath the ice, as well as chemical ingredients needed for life. Announced in the summer of 2015, among the nine instruments onboard the craft will be an ice-penetrating radar developed by the Jackson School of Geosciences Institute for Geophysics (UTIG).

Called REASON (Radar for Europa Assessment and Sounding: Ocean to Near-surface), the radar will allow scientists, for the first time, to peer beneath Europa’s smooth shield of ice. Its development will be overseen by principal investigator Donald Blankenship of UTIG. He and his Texas team are also collaborating with the European Space Agency and Italian Space Agency on their plans for a radar instrument focused on Jupiter’s moon Ganymede, the largest moon in the solar system. Since the REASON system will work the same way, but to ensure effective penetration of Europa’s ice, the radar will rely on two frequencies: a longer 9 MHz wave and shorter 60 MHz wave. The longer wave can easily pass through Europé’s ice before being reflected back to the receiver. However, radio waves emitted by the planet Jupiter interfere with the signal, so it can only be used on the side of Europa facing away from the planet. In contrast, the shorter waves can scan the entire surface because they are unaffected by Jupiter. But they are more susceptible to interference from rough patches of Europa’s ice.

“Europa is cold, but it’s not totally unimaginably cold. The bottom of that ice shell has the same temperature, the same pressure and possibly the same salinity as the bottom of the ice floating at the grounding lines of Antarctica.”

Donald Blankenship, Senior Research Scientist

1990s, Blankenship has been using a similar ice-penetrating radar system carried by plane to study the substructure of the ice sheets of Antarctica and Greenland. On Europa, the NASA radar will be searching for pockets of water within the ice shell that could serve as passageways to the ocean below for surface-based sulfuric compounds, a chemical building block for life. Under the ice, an environment where life could develop may exist. In other words, “It’s Earth,” Blankenship said. A sign supporting the presence of passageways through the ice is Europa’s “chaos” terrain, areas on the surface that resemble topped icebergs jutting out from the ice. The terrain is thought to be formed by buoyant upwellings of warm ice, called “diapirs,” rising from the bottom of the ice toward the surface. As a diapir rises, it melts the surface of the ice, collapsing it and enabling chemicals at the surface to mix with the water from below. On Earth, portions of floating ice shelves that collapse form similar structures.

The chaos terrain was first observed on Europa by NASA’s Galileo spacecraft nearly 20 years ago. Blankenship’s radar should confirm whether the terrain marks the locations of passageways to an ocean.

Blankenship has been using radio waves emitted by radar systems to capture the environment beneath Earth’s great ice sheets in Antarctica and Greenland for the past 30 years. The REASON system will work the same way. But to ensure effective penetration of Europa’s ice, the radar will rely on two frequencies: a longer 9 MHz wave and shorter 60 MHz wave. The longer wave can easily pass through Europa’s ice before being reflected back to the receiver. However, radio waves emitted by the planet Jupiter interfere with the signal, so it can only be used on the side of Europa facing away from the planet. In contrast, the shorter waves can scan the entire surface because they are unaffected by Jupiter. But they are more susceptible to interference from rough patches of Europa’s ice.

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The REASON system will scan for water under the ice, and also search for signs of it out in space and on Europa’s surface. The Galileo probe has found evidence of Europa releasing water as giant, geyser-like plumes that reach into space and then fall back to the surface as snow. If mixing has occurred between surface compounds and water below, signs of the compounds are expected to be present in the plumes or snow.

If the radar detects water and a way for it to mix with material at the surface, it could help jumpstart new research endeavors, such as a future lander mission to Europa’s surface and ocean. If life was ever found on Europa, it would indicate that it exists across the universe, said Young.

“If you go to this completely different environment, one that has all the chemistry to support life, and it actually turns out to have life, in the end you’ve got two examples in one solar system of life emerging,” Young said. “It would imply that all those exoplanets that they’re finding out there may have something on them as well.”
LEFT TO RIGHT: ROBERT ZINKE (B.S. 2012) AGAINST A WALL OF OBSIDIAN AT LONG VALLEY CALDERA IN CALIFORNIA; JIM GARDNER LEADS A VOLCANOLOGY FIELD CAMP AT VALLES CALDERA, NEW MEXICO; YELLOWSTONE NATIONAL PARK’S GIANT GEYSER; KENNY BEFUS DIGS FOR CHIPS OF OBSIDIAN IN LAYERS OF VOLCANIC DEBRIS IN EASTERN CALIFORNIA.
Millions of visitors flock to Yellowstone National Park each year to see its steaming geysers, iridescent pools and carved, rugged landscape. For the last five years, Jim Gardner, Kenny Befus and a team of undergraduate students from the Jackson School of Geosciences have been among them.

Instead of rushing to Old Faithful on their visits, Gardner, a geology professor and volcanologist, and Befus, then a Ph.D. student at the Jackson School and now a geology professor at Baylor University, would lead the team deep into Yellowstone’s backcountry to the remains of ancient lava flows that dominate the park’s landscape.

The backcountry lava flows, as well as the tourist-traversed pools and geysers are all signs of a “super volcano” laying in wait beneath the park. Over the past 2.1 million years it has explosively erupted at least three times, spewing more ash, pumice and smoke than any eruption in recorded history, and creating a caldera that takes up one-third of the park’s total area. However, the last time a “super eruption” happened Homo sapiens hadn’t even evolved yet.

Much more frequently Yellowstone’s magma has been exuded in the form of passive, massive lava flows. Since the last violent eruption, about 30 of these flows — which can reach up to 12 miles wide and hundreds of feet deep — have poured across the land, with the most recent occurring about 29,000 years ago.

It’s the traces left by these flows that have brought Gardner and Befus to Yellowstone over the years. By examining the lava, they’re working to understand what volcanic conditions caused Yellowstone’s past and could happen again in the future.

“Our main target was understanding how these things erupt, but don’t go boom,” Befus said.

AN INTEREST ERUPTS

Gardner grew up near Dallas, safely outside of Yellowstone’s backcountry. But during undergraduate geology class at Southern Methodist University, and he’s been studying volcanoes ever since. His first volcano Gardner himself ever visited was Mount St. Helens, the site of the 1980 eruption that he worked at The University of Alaska Fairbanks and was on staff at the Alaska Volcano Observatory where he evaluated hazards and the eruptive history of volcanoes across the state. And now, as a volcanology professor, he leads undergraduate students each year to New Mexico to study the Valles Caldera, the first volcano Gardner himself ever visited.

The sites he has studied, while varied, have one thing in common: the eruptions happened well into the past, from decades to hundreds of millions of years ago. Like a forensic detective, it’s his job to go to the eruption scene, examine its aftermath and reconstruct the environment that made the volcano blow in the first place.

“By providing information and understanding about eruption processes, maybe others can use it to forecast eruptions and mitigate hazards,” Gardner said.

The key clue to glean from the scene is lava — long solidified into various kinds of rocks by the time Gardner arrives.

GO WITH THE FLOW

The Yellowstone volcano produces rhyolite lava, a silica rich form that solidifies into different types of igneous rock depending on its eruption and cooling conditions. During explosive eruptions, magma is shot into the air, where it instantly solidifies and falls as ash and porous pumice. But during passive eruptions, it quickly cools into other varieties of rhyolite rock that make up the lava flows today.

Obsidian is perhaps the most distinctive rock produced by rhyolite lavas. Pure black, smooth and glassy, its appearance is the result of having cooled so quickly that the silica it’s made of didn’t have time to arrange into a crystal lattice structure.

Native American tribes in the Yellowstone region valued obsidian outcroppings as a raw material for spear tips, arrowheads and cutting tools — the smoothness made for easy shaping and sharp edges.

Gardner and Befus value it’s smoothness, too, but for different reasons. It provides an unobstructed view of minerals and gases that were trapped in the lava during the eruption. These
Volcanic rocks are like tape recorders of the chaotic environment, Gardner said. “These are the quenched products of the magma chamber as it was erupting,” Gardner said. “We look at these products to try and reconstruct what was occurring in the magma chamber before the eruption, as well as the dynamics of the system during the actual eruption.”

So while other visitors would leave Yellowstone with keychains and mugs, Gardner, Befus and the student researchers would return to the Jackson School with fist-sized samples of shining, black obsidian hammered off nearly a dozen lava flows from across the park.

UNDER THE MICROSCOPE

Volcanic rocks are like tape recorders of the chaotic environment inside a volcano’s magma chamber, Gardner said. The minerals and gasses held in them provide a record of variables, such as pressure, temperature and gas concentration, which influence the eruption process.

Gardner references the old technology of a tape recorder for a reason; a volcanic rock captures its environment by constantly recording traces of new conditions over those left by older ones, like a cassette tape used over and over again. The result is a record that is a collage-like conglomerate of the volcanic environment.

“When we’re looking at the products at the surface, we’ve got the entire record of it, but it’s written over each other,” Gardner said.

Reading the record is a matter of close analysis. Trace element concentrations, such as iron and magnesium, reveal pressure ranges; microscopic bubbles trap samples of gas from throughout the eruption that can be identified using spectroscopy; and microcline crystals, which rotate and align together in the flowing magma, can give clues on how quickly magma was flowing through the crust toward the surface.

Clues like these gleaned from a close analysis of volcanic rock allow Gardner to reconstruct a timeline of events for a volcanic eruption. And an experimental petrology laboratory lets him to test it by turning volcanic rocks back into magma.

By comparing the final quenched magma to an original sample, the researchers can see if their simulated environment created outcomes comparable to an actual eruption. “It’s a simple matching game really,” Befus said. “But it’s one of the major techniques we use.”

THE MOST RECENT ERUPTIONS HAVE NOT BEEN THE FAMOUS SUPER ERUPTIONS...

- Kenny Befus

YELLOWSTONE FUTURE AND PAST

The obsidian samples from Yellowstone all hold clues about the particulars of the eruptions that forged them.

Through analysis and the petrology lab, Befus reconstructed the eruption that formed Douglas Kloch, a lava dome made by the slow effusion of magma, for a portion of his Ph.D. dissertation. According to Befus, it went something like this:

On a day roughly 120,000 years ago, rhyolitic magma stored about a mile under the ground at 1,400 degrees Fahrenheit began to rise at a rate of about half a millimeter to 1.3 millimeters per second. Twenty to 70 days later the magma reached the surface and began pouring out of a 1,600-foot-long fissure in the earth. This lasted for anywhere from 17 to 210 days, building a mound of lava in the process.

The shallow depth and slow rise of the magma in the eruption 120,000 years ago bodes well for responding to any future passive eruptions, Befus said. The movement of the magma would likely break rock as it made its way to the surface, creating little earthquakes that would signal Yellowstone’s slow stirring. It’s also possible that the amount of magma in a pre-eruptive magma chamber could be seismically imaged using techniques similar to those used by the oil and gas industry to search for energy reservoirs.

“All of these signals mean that people are going to have time to collect the data that indicate that effusive process is going on,” Befus said. “There should be warning.”

It is comforting knowing that Yellowstone’s future eruptions will likely be slow, controlled and well-announced, but a super eruption is still within the realm of possibility. And as of now, it’s still an open question on what exactly triggers magma to degas slowly and erupt passively or to let its gas out all at once in a violent eruption.

“We know that one has to go fast and the other has to go slow, but the reason why one is going so fast is something we don’t know,” Befus said. “That’s where I plan to spend my next few years. This idea of an eruption trigger, I’m excited about that.”

But even as knowledge about volcanoes and eruptions evolves, Gardner said it’s a field of science where chance will be in control.

“Everything is the structure of a pre-eruptive magma chamber indicates that effusive process is going on,” Befus said. “But we don’t predict volcanoes. They’re too chaotic in nature,” he said.

Instead, the reconstructions offer a peek into a future that could be because it has been. For Yellowstone they indicate a future where eruptions would overwhelmingly be lava flows that move so slow they would likely be the latest geothermal attraction at the park, not a danger. Of course, you can’t rule out a violent eruption.

But Befus, for one, isn’t losing sleep about that.

“The most recent eruptions have not been the famous super eruptions that get press on the news and on the Discovery Channel, but instead it’s been these massive lavas,” he said. “So people who are catastrophic types, calm down a little bit. It’s most likely not going to do that.”
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Mr. Daniel L. Smith, B.S. ’58
Sandalwood Oil & Gas, Inc.
Mr. Richard K. Stoneburner, B.S. ’76
Pine Brook Partners
Mr. John E. Watson, B.A. ’72
Mr. Charles R. Williamson, Ph.D. ’78
EX-OFFICIO
Dr. Gregory L. Fannas
The University of Texas at Austin
Dr. Sharon Mosher
Geology Foundation
Jackson School of Geosciences
The University of Texas at Austin
Mrs. Belle German
Geology Foundation
Jackson School of Geosciences
The University of Texas at Austin

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1940s
Howard Lowe (B.S. ’48) writes, “Spending my retirement years researching climate change. Have written two books - the Sky WILL NOT Fall - Unmasking the Green Revolution (an e-book - Amazon, Barnes & Noble) and the recent one not yet submitted for publication - Beyond Our Control - Debunking Marauding Global Warming. Make a lot of use of geology to prove my points. Recently I was invited to become a team member of The Right Climate Science Research Team, a group of about 50 retired NASA engineers and scientists. The team is involved in very sophisticated research on climate change. Much of their high-powered physics and math is over my head, so I think I am getting a lot more than I am giving. However the education is great. I hope to arrange for a Forum at the Jackson School for some of the Team members to address students. We have our 15 grandkids and 15 great grandkids + one more due in October. Wife & I stay busy just keeping track of all of them. Plan to make the 75th reunion of the Texas NROTC in Austin in November. I was in the first class.”

Jule Jacobson Moon (B.A. ’40, M.A. ’41) was an instructor in Invertebrate Paleontology from 1947-49. She also earned a Masters in Social Work from UT. She worked as a Psychiatric Social Worker with the State of Texas Mental Health and Mental Retardation Department until retirement in 1992. She is still writing short stories and poems and published “Shedrs a Memoire” in 2011. In addition, she contributed to Fairhope Anthology: A Collected Works by the Fairhope Writers’ Group in 2001 and Fairhope Anthology: Second in a Series in 2003.

1950s
Walter V. Boyle (B.S. ’54, MA. ’55) shares, “In fall 2014, Vada and I continued our world travels with a three-week Tauck land tour of Central Europe to Portugal, Hungary, Austria and the Czech Republic. This summer, we completed another three-week Crystal Cruise to Iceland, Russia, Norway and Great Britain. One of the highlights of this cruise was to actually see the Mid-Atlantic ridge exposed at the surface in Iceland and observe rocks from the North American Plate and the Eurasian Plate. Vada stays active attending his investment club meetings, men’s book club sessions, church group studies and working in the yard and garden. Vada continues her second year as president of the North Harris County American Association of University Women, and serving as a member of the Board of Directors of the Houston Symphony League. We continue to enjoy attending the Jackson School of Geosciences functions and dinners and seeing old classmates and friends, and attending the University of Texas Leadership Society luncheons. Another highlight of 2015 for Vada and me was being inducted into the Flawn Circle of Excellence and the Katie Society at the Jackson School of Geosciences dinner in March 2015. And finally, we wish continued success to Dean Sharon Mosher and her staff for another great year leading the Jackson School of Geosciences.”

Philip Braithwaite (M.A. ’58) shares, “Barbara and I are still enjoying retirement in Dallas but have cut back on our travelling these last couple of years. I still do part time consulting for a geophysical company contributing my depositional facies experience.”
grandparent moment came this May, when our grandchildren SheridanGabrielCantrell was born to TCU student Stetson Laude (40). A couple of weeks later she was notified that she is the recipient of a Fulbright Grant and will be living and teaching in Malaysia for 11 months in 2016. They are all making me proud, but this was pretty special! Byron Irving, Jr., continues to be extremely gratified by his winning of the Fulbright, and his papers are extremely enjoyable. Wayne D. Miller (M.A. ’57), who lives in Nautilus, West Bank, Palestine and is active with philanthropic efforts in the education, healthcare, culture, and civil society sectors. He was recently recognized by the Jackson School of Geosciences with induction into the Hall of Distinction. He continues to work toward peace and a two-state solution in the Holy Land. He continues to work toward peace and a two-state solution in the Holy Land. He continues to work toward peace and a two-state solution in the Holy Land. He continues to work toward peace and a two-state solution in the Holy Land.

Wayne D. Miller (M.A. ’57), who lives in Nautilus, West Bank, Palestine and is active with philanthropic efforts in the education, healthcare, culture, and civil society sectors. He was recently recognized by the Jackson School of Geosciences with induction into the Hall of Distinction. He continues to work toward peace and a two-state solution in the Holy Land.

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now grow to 73 volumes dating from 1980, and my collection of UT Geology Newsletters dating from the early 1980s continue to increase each year." Tom can be reached at tspgeocrock@gmail.com or tpatty@wje.com.

Peter D. Rowley (Ph.D. ’68) writes, “I continue as a consulting geologist, mostly doing slope mapping (www.geologicmapping.com). With colleagues, I founded the world’s largest gravity slide; in SW Utah. See by googling “Markagunt gravity slide.” My wife Dawna and grown kids are fine.”

Rubin Amos Schultz, Jr. (B.S. ’61) shares, “Not a lot new. Still enjoying retirement. Spent some time in Utah this spring visiting relatives and enjoying nice weather in the Big Bend area. Recently moved to the lake and I work in the office a few days a week.”

Richard B. Watt (B.S. ’66, M.A. ’70) shares, “After nearly 35 years of intermittent work, my book on Our Power was published by The University of Texas Press in 1982. It’s still going strong and I recently received an update from the publisher indicating that it has been reprinted and is now available in a new format.”

Al W. Erleben (M.A. ’74) and wife Charlotte are retired and enjoying living on their ranch west of Crockett, Texas. They also recently purchased a ranch near Comanche, Texas, and are working and having fun there all the time. Al says, “Our days are divided between ranching, children and grandchildren, traveling, hunting, and raising horses. Every day is Saturday! We highly recommend retirement—as early as possible!”

Murray Felscher (Ph.D. ’71) writes, “Since leaving NASA HQ as Chief, Geological and Energy Applications, in 1970, I’ve been consulting for the government and the private sector primarily in fields related to satellite remote sensing of the Earth. At the same time I have maintained an active New Mexico Press Building in D.C. from which I published three different newsletters. The most “popular” was the Washington Remote Sensing Letter (WRSL), which was published from 1983 through 2013 - Volume 1, Number 1 appeared in July, 1983 and Volume 8, Number 4 was published in December, 2013. WRSL — 4 pages per issue — was mailed out four times per month, except in January and August when the federal government goes into slumber here in DC and we published only 1 issue per month; hence the odd number (44) of issues per year. We finally closed the door on WRSL in 2013. When I say “we” that’s the “editor” and me speaking — actually I’ve been “Working Alone” all these years — and hence the title of a book I wrote that was published by Berkley Press (N.Y.) in 1994 hence the title of a book I wrote that was published by Berkley Press (N.Y.) in 1994.

Herbert Samuel Travis (B.S. ’60) shares, “Currently I’m retired, however, I still work on my Mobile Home and RV Park located in Clearwater, Texas. My web page is lutheranlarrypark.com.”

Mark John Valencia (M.A. ’68) writes, “ALOHA! I am semi-retired living in Hawaii. I still travel to Asia for conferences on maritime security issues 4-5 times a year. I also write frequent opinion pieces on Asian maritime security issues and contribute to online forums on maritime security issues. I live in Hawaii. I still travel to Asia for conferences on maritime security issues 4-5 times a year. I also write frequent opinion pieces on Asian maritime security issues and contribute to online forums on maritime security issues.”

William Feathergall Wilson (B.S. ’60, M.A. ’62) writes, “Oil and gas consulting slowly considering due to low oil prices. Still working steadily in groundwater. UT Geology graduate son (Clayton & Doug) working in London and Denver.”

1970s

Royce Carr (B.S. ’76) writes, “I am still actively working West Texas in the oil and gas industry and the Eagle Ford Play. I am still blogging my opinions on Asian maritime affairs in Asian newspapers, particularly regarding the South China Sea and East China Sea areas. Otherwise we — my Malaysian wife Shabariah of nearly 40 years and I — take care of our grand- children several times a week and just enjoy life — separately — and together. So far so good!”

Rogge Gries (M.A. ’70) writes, “My fun project, working with AAPG Prowess Committee, is research on the History of Women in Petroleum Geology since 1940. The book is in the making, so please keep an eye out for hard copy...I hope it’s a book you can derive from this work.”

John C. Griffiths (B.S. ’75) says, “Hard to believe it has been 40 years since I was sitting at Posse East having a beer after Dr. Muehler’s structural final. If memory serves, I think I was sharing a pitcher with Charlie Greene. I left UT and went to work for TXO in Houston. Moved to Lakeview, west of Austin, in 2000. Still having fun looking for places to drill wells in which my company can participate. It’s a little different than it used to be. Amazing changes in technology. It has gone from taking a week or more to get hard copy logs, production data and scout tickets to build hand colored and colored maps, to generating data into Petra and Kingdom and generating maps and cross sections in minutes. I have enjoyed doing consulting work with an international engineering group that allowed me the opportunity to see some of the geography of northern Mexico, the Gulf of Thailand and Abu Dhabi, among other places. Let’s just say Abu Dhabi is a little different than working with the East Texas Basin. Wishing the best of health to my classmates from 1974-1975.” John can be reached at jgriff@calvinre- sources.com.

Paul F. Hoffman (B.S. ’75) writes, “Hard to believe it’s been 40 years since my days at UT! Now 7 years at the helm of Allen-Hoffman Exploration. Drilling serious wildcats lately — some dry, some great, all interesting, and many with other UT alums! Never imagined 40 years back what a remarkable journey it would be — or that we have 9 grand- children, none yet older than 5! Married nearly 40 years, too, and writing this with Tina beside me and a view of the coast of Chelsea, Maine as we are enjoying a visit to our exiled home in London, England. Looking to a wonderful life of retirement — as early as possible!”

Patricia Wood Dickerson (B.A. ’70, Ph.D. ’74) writes, “Still traveling in our RV — mostly looking for interesting country! Rugged cliffs, lovely lochs and streams down the valleys, here and there... The Isle of Skye was windswept and rugged, though its contours had been softened by the still-hot oven then having been the pig roast at our place commemorating harvest and another season, a time of plenty... The trip to the Scottish Highlands took the place of April field work in Big Bend. Close colleagues in JSG led an excursion for Ash Caye in Belize and a visit to the still-hot oven of the University of Pennsylvania’s Crop Science Center in Pennsylvania. Then to Iceland, so I’m revamping my “Living in Iceland: A Guide to a Life in a Cold Country.” Still traveling!”

R. Murray Felsher (Ph.D. ’71) writes, “After nearly 35 years of doing stratigraphy on Mount St. Helens’ north ashflows on Mount St. Helens’ north ashflows on Mount St. Helens’ north ashflows on Mount St. Helens’ north ashflows on Mount St. Helens’ north ashflows on Mount St. Helens’ north ashflows on Mount St. Helens’ north ashflows on Mount St. Helens’ north ashflows on Mount St. Helens’ north ashflows, I am still actively working West Texas in the oil and gas industry and the Eagle Ford Play. I am still blogging my opinions on Asian maritime affairs in Asian newspapers, particularly regarding the South China Sea and East China Sea areas. Otherwise we — my Malaysian wife Shabariah of nearly 40 years and I — take care of our grand- children several times a week and just enjoy life — separately — and together. So far so good!”

David Lee Kirchner (B.S. ’74) writes, “Hello fellow Longhorns! I am living in Phoenix, Arizona, where I am working as a consultant for BASIN & RANGE HYDROGEOLOGISTS, INC. (since 1987).
Bob Merrill (Ph.D. ’74) shares, "Recently returned from Japan, with a special side trip to Sendai and examination of the impact of the 2011 tsunami zone. Being on the ground was impressive, especially after reviewing many of the videos of the tsunami and debris as it swept inland. Faculty help from Tohoku Univ. was much appreciated. September I will find Diane and I in Newfoundland and Nova Scotia, hoping to examine some of the connections to Scotland that I saw with Ian Dalziel in 2014. I continue doing geoarchaeology work and challenging California politicians on water, drought, and climate change issues. Also find time to spend with grandson, Tyce and his dad, Than Merrill. Bob can be reached at geobob@gmail.com.

Ray Leonard (M.A. ’77) writes, "I completed the CO2 Sequestration Institute in late summer, and spent 2 weeks doing deep-water exploration in a low oil price environment as the President and CEO of Hyperdynamics. We hope to finally test the Fatrap Prospect offshore Guinea in early 2018. My family is well, and I welcomed my 5th grandchild this past year."

Mark W. Longman (Ph.D. ’76) reports, "2014 was a particularly good year as I finally completed editing and preparing AAPG Memoir #80 on the giant Pinedale gas field in the Green River Basin of Wyoming. The book’s 75 chapters total over 500 pages in length and contain abundant color figures that nicely document the geology and reservoir models developed for this important tight-gas sandstone reservoir. The field will eventually produce over 30 TCF of gas, which places it among the top 5 gas fields in the US, and it provides a useful model for how to optimize drilling and production in an environmentally sensitive area.” Independently of the memoir, Mark was honored by AAPG with the Association’s Distinguished Service Award for his many contributions to the organization since 1974, most notably his 25+ years of work as an Associate Editor for the AAPG Bulletin. He also entered his 10th year of working with QEP Resources in Denver on all aspects of hydrocarbon reservoirs in the Rocky Mountain region.

Forrest Hill (Ph.D. ’77) writes, "I am retired and living in Southern California. We have a good time visiting and babysitting for them. Tom still works a couple of days a week, consulting in San Antonio, usually. We were greatly saddened to see the passing of Richard Smith. He was a big brother to me and I have countless good memories of him. Hope you other guys are doing well. We had a great class!"

1980s

Ann Keating Ardis (B.S. ’83) worked for the USGS Water Resources Divison in Austin for 8 years. She writes, "Currently retired, and thoroughly enjoying my personal 40 acres (S. L. Horsn-horn). God is good.”

Linda R. Balcom (B.S. ’87) shares, “The environmental consulting arena continues to be interesting and challenging, currently overseeing Weston’s DOD BRAC program and expanding into the DOD asset management program. With a sophomore in college and two in high school, life continues to be jam-packed but blessed in every way. Hope all is well with my fellow grads from ’87.” She can be reached at linda.balcom@westonsolutions.com.

Stephen Chung (B.S. ’84) shares, “I am an Associate General Counsel - US Pipelines for TransCanada now and have responsibility for environmental, land, litigation supply chain, pipeline safety and legal operations. We are still trying to get the Keystone Pipeline permitting approved, but it is a long legal and political process, and I’ll leave it at that. I keep in touch with some in my class through Facebook, LinkedIn and industry activities but am generally busy working and doing my best to raise two teenage girls.” Stephen can be contacted at stephen_chung@transcanada.com.

1990s

Fred Herbert Becker (B.S. ’83) and Teresa Harkreader Becker (B.S. ’82) share, “Fred and I are enjoying our home on the lake in Marble Falls. I am retired and Fred is still working for Shell (but not as the project manager any more). We have a Viking river cruise planned in October and snow skiing in Colorado with the girls in November. I volunteer one day a week with an Alzheimer’s respite group. I also play Mah Jong, work out at the YMCA and read. We would love to hear from any of our classmates!”

Mark Joseph Beltinger (B.S. ’82) currently resides in League City, TX and can be contacted at mb.1305.cb@gmail.com.

Julie Ann Bonner (B.S. ’83) writes, “Still working in Houston at Chevron as a Drilling & Completions Team Lead and Drilling Advisor for our Southern Angola Business Unit.”

Michael Jamison Clark (B.A. ’89) writes, “Still working in jobs I enjoy at TransCanada now as an environmental specialist. "QEP Resources, as a Drilling & Completions Team Lead and Drilling Advisor for our Southern Angola Business Unit.”

2010s

Steven Michael Carlson (M.A. ’84) resides in Houston, TX and can be reached at steve.carlson@wind-stream.net.

Richard F. Carroll (B.S. ’80) shares, “I have changed jobs again and just in time for oil prices to fall. I am now working for Geas Petroleum in the Woodland, TX area. Much closer to home. Most of the properties I am now working are in the Permian Basin, but I do still get to do some Gulf Coast geology as well. On the home front, my oldest son, Ian, just graduated from UT Austin with a degree in Marketing and is now working in New York City for a large marketing firm, and my youngest, Austin, is on his way to Colorado to attend school. Hope everyone makes it through this downturn okay.” Richard can be contacted at rcarroll@cazepetro.com.

Eleanor Smith (M.A. ’78) shares, “I have moved Firstview into new offices in Seattle, and expanded into the DOD BRAC program and expanding into the DOD asset management program.”

Bob Merrill (Ph.D. ’74) shares, “Recently returned from Japan, with a special side trip to Sendai and examination of the impact of the 2011 tsunami zone. Being on the ground was impressive, especially after reviewing many of the videos of the tsunami and debris as it swept inland. Faculty help from Tohoku Univ. was much appreciated. September I will find Diane and I in Newfoundland and Nova Scotia, hoping to examine some of the connections to Scotland that I saw with Ian Dalziel in 2014. I continue doing geoarchaeology work and challenging California politicians on water, drought, and climate change issues. Also find time to spend with grandson, Tyce and his dad, Than Merrill. Bob can be reached at geobob@gmail.com.

Clair Ossian (Ph.D. ’74) shares, “As I approach the age of 75, retirement still suits me well. Life is very comfortable, and I use my days with my gardens and my koi ponds. While I will never see the results, I tend our small suburban garden, as well. I’ll need to live to at least 150 to finish their growth stage to grand trees. Who knows, maybe I will! I have also developed an unusual style of pottery, which sells well! We have three grandchildren now, both of my chil- dren married well and are settled. My daughter is a TV Producer, and my son is an upper level manager in an Austin software company. Eleanor, my wife, still suffers from the accident she received over a year ago. A simple broken rib turned into horrible infections, and 8 surgeries… so far. She’s a tough one, and slowly is recovering. All in all, life is good. We come to Austin frequently and often go to the Geology Building to walk the halls and reminisce. My years at UT were a great gift!”

Stephen L. Shaw (B.S. ’71, M.A. ’74, M.A. ’74) shares, “I have moved Firstview Resources office to San Angelo where Nancy and I now live on the banks of Spring Creek, and I am doing book sur- veying and consulting. Nancy and I do most of our travel to visit grandkids (well, and our kids too...) in Austin and Cameron Park (north-central) California. Our best to all.” He can be reached at sshaw99@yahoo.com.

Bren Sideraes (B.S. ’74) writes, “Retired May 2014 after 40 years of working strictly onshore Gulf Coast geology without ever having to move to Houston. Something to be said for that great achievement. Retired life is keeping up with 4 grandkids and more trips to Austin for sporting and music events. Most of all, retired life is easy. Not so for my wife as she is still working faithfully. She enjoys that. We take that ‘family’ vacation and one much more restful vacation (just us) per year now. That seems to work well.” Bren can be reached at bren.sideraes@icloud.com.

Cindy Elliott Swinbank (B.S. ’71) writes, “Jim and I still live in Georgetown, TX, with 3 of our kids nearby in Austin, one in Houston and one in Seattle. We have a good time visiting and enjoying our personal 40 acres (S. L. Horn-horn). God is good.”

Joel Mark Coffman (B.S. ’84) shares, “Still at US EPA Region 9 in San Francisco but made a number of career moves in jobs a couple years ago. I am now working in the Underground Injection Control Section of the Drinking Water Office, within the Water Division. I issue injection well permits for Class I injection wells in California and oversees the programs on Navajo Lands and in Hawaii. After 20 years working on underground tank issues, it is nice to be back home in the world of deep geology and reservoir engineering. Susan and I are doing great and still in Vacaville. We are back to Texas fairly often as we have farm and ranch land in Cochran and Yoakum Counties to see about and the in-laws live in Morton. Our daughters are both also doing great. Shawna is a social worker at the Atlanta Children’s Hospital where she works with Cystic Fibrosis patients. Amber is in Los Angeles putting finishing touches on her solo album due out this fall. For a taste of her style, look up Amber Coffman - Get Free. If any of you 85/86 graduates are in the area, look us up!” He can be reached at longhornsrock- hound@yahoo.com or coffman.joel@epa.gov.

Alyson Headle Cooper (B.S. ’86) currently resides in Jesusus, AK and can be reached at alysncooperak@gmail.com.

Michael Jamison Clark (B.A. ’89) writes, “Still working in jobs I enjoy at TransCanada now as an environmental specialist. "QEP Resources, as a Drilling & Completions Team Lead and Drilling Advisor for our Southern Angola Business Unit.”

Fred Crawford (B.S. ’83) writes, “I am retired! After 25 years with the Lower Colorado River Authority, I took my pension and hit the easy button. In May, I embarked on my childhood dream of hiking the Appalachian Trail. I completed 500 miles before an injury sidelined me. I’ll be back on the trail in...
Donald Wayne Downey (B.A. ’82) worked 27 years for Gulf and Chevron international exploration and research. He writes, “I retired from Chevron in 2010 and now work with local Pearl Harbor Survivors and other WWII Veterans to capture their life history in video and book form. My sister, Julie Garvin, runs our family-owned oil company, Roxanna Oil, in Houston. Thanks to all the wonderful professors and staff that started me on a wonderful path after graduating with a BA-Geology in 1982!”

Roy E. Easley (B.S. ’80) says, “If you’re not dead yet.....”

Paul Aaron Hardwick (B.S. ’83) worked as Smith Energy Operating Company in Houston exploring in the Williston, Powder River, San Joaquin international and U.S. petroleum and acquisitions manager for this large oil company, Roxanna Oil, in Houston. Last year, we cracked the top 100 privately-held under rocks, pun intended. Last year, we were happy, as oil and gas companies continued to spend heavily on exploration and research. We are already UT Austin grads. Lots of students and acquisitions staff that started me on a new rivalry. We have a little playmate. My youngest son, Bruno, is expecting a boy sometime in early October. As for myself, I am working as a geologic modeler in Exxon-Mobil’s offshore Angola group at our Mobil’s offshore Angola group at our new campus in Spring, TX. I’ll be moving to Abu Dhabi (EARE) in early 3Q 2015 as a seconded geologic modeler with the Zakum Development Company (ZADCO). “Half circle” back to carbonates. My home and office contacts will be in a state of flux, so my business e-mail is the best contact - jesse.patterson@exxonmobil.com. I guess I’ve got one more leg left in me. Back in 5 years!”

Steven James Rainey (B.S. ’84) Grace is in my blood in the streets, there lies opportunity. I continue as chief geologist and acquisitions manager for this large independent producer of crude oil based out of Jackson, Mississippi, and I am constantly evaluating acquisition targets. My niche is extremely narrow, so most deals do not fit our modus operandi, but I continue looking under rocks, pun intended. Last year, we crafted the top 100 privately-held oil producers. We realize that rankings are not important. We would rather be a profitable number one than a money-loser in the top 1. Now officially have two college graduates in biology, more due to grad in December 2015 and another on track for 2017. Of course, with my youngest in grade 5, I will be pulling this plow for a number of years. Weath read, write, and order beer and soja in Korean, so I have the essentials down. Come visit if you get to this side of the world!”

Charles Graham Johnson (B.S. ’82) says, “Holly and I are still doing geophysics for some reason.”

Michael J. Mattalino (B.S. ’81) resides in Weston Lakes, TX and can be reached at mmattalino@sanchezog.com.

Jamie Nielson (Ph.D. ’86) can be reached at jnielden@nielsonlegal.com. My wife Mary and I live in Austin with our two daughters. Little Hannah was born on the second time. In order to decide for the second step at UT Austin! Love to go back to Austin whenever I can, even if just to testify at the RRC, I can’t say that it was fun watching the Oil. Armando, is expecting a boy sometime in Yosemite this year. I continue to represent oil and gas companies before the Railroad Commission.” He can be reached at jamie@nielsonlegal.com.

Bruno Maldonado (B.S. ’82) shares, “Hello fellow Longhorn! I have been working for Exco Oil for the past 33 years. I have worked in several major international and U.S. petroleum systems. I am not quite ready to retire, but have recently been asked to... for the second time. In order to decide for myself when I should retire, I am now available to consult and determine on own when I should retire. Anyone needing a multi-lingual Spanish, some Brazilian Portuguese) highly technical geophysicist (Seismic Interpretation, Imaging, Well Log Interpretation? Enough of that...on the more personal side, my eldest son, Bruno D., just added another rug-rat to the family. I am now the proud grandfather of two grand- daughters. Little Hannah was born on July 24th around 11:53 pm. Ugh, she is not sleeping through the night yet. Sofia, her 3 year old sister, now will have a little playmate. My youngest son, Armando, is expecting a baby sometime in early October. As for myself, I am still involved with the University as I am currently on the Jackson School FANs (Friends and Alumni Network) Board and loving it. I still enjoy fishing, hunting wild hogs and some deer. Don’t worry, I do harvest the meat.”

James Mark Null (B.S. ’87) writes, “I have been promoted to a new post as Hydrologist in Charge, National Weather Service, West Gulf River Forecast Center in Houston, TX. This UT geophysics degree has taken me a long way: 32 countries, retired Naval Meteorologist for the OCTH and Federal Executive positions with the Department of Navy, Army Corps of Engineers, U.S. Geological Survey and now the National Weather Service. It has been a fun ride. However, my most proud moment has been following my middle daughter as she completes her B.S. in Geology at UT expected graduation of Dec 2009. Mark can be reached at jmmultalotex.edu or mark.mull@noaa.gov.

Robert Michael Rosen (Ph.D. ’89) shares, “In June 2015 I was the organizing committee chair of the 6th International Limnology Congress (ILC6) held in Reno, NV. The congress is held every four years and scientists from around the world studying limnology and paleoclimate records of modern and ancient lakes attended the meeting. More than 1800 scientists and students attended the meeting. More than 1800 scientists and students attended the meeting. More than 1800 scientists and students attended the meeting. More than 1800 scientists and students attended the meeting. More than 1800 scientists and students attended the meeting. More than 1800 scientists and students attended the meeting. More than 1800 scientists and students attended the meeting. More than 1800 scientists and students attended the meeting. More than 1800 scientists and students attended the meeting.

Steven James Rainey (B.S. ’84) Grace is in my blood in the streets, there lies opportunity. I continue as chief geologist and acquisitions manager for this large independent producer of crude oil based out of Jackson, Mississippi, and I am constantly evaluating acquisition targets. My niche is extremely narrow, so most deals do not fit our modus operandi, but I continue looking under rocks, pun intended. Last year, we crafted the top 100 privately-held oil producers. We realize that rankings are not important. We would rather be a profitable number one than a money-loser in the top 1. Now officially have two college graduates in biology, more due to grad in December 2015 and another on track for 2017. Of course, with my youngest in grade 5, I will be pulling this plow for a number of years. Weath read, write, and order beer and soja in Korean, so I have the essentials down. Come visit if you get to this side of the world!”

Jonathan Charles Herwig (M.A. ’82) shares, “Anonymgagaeo from the Land of the Morning Calm. Still living 50 miles south of Seoul, part of the program management team constructing the new U.S. base in Pyeongtaek. A little environmental geology and geotechnology, and a lot of facilitating the relationship between one military prime contractor and the other WWII Veterans to capture their life history in video and book form. My sister, Julie Garvin, runs our family-owned oil company, Roxanna Oil, in Houston. Thanks to all the wonderful professors and staff that started me on a wonderful path after graduating with a BA-Geology in 1982!”

Philip Duggan (B.S. ’82) writes, “I’m not dead yet.”

Christy M. Schweikhardt (B.S. ’83) resides in Bremham, TX and can be reached at cmschweikhart@gmail.com.

Scott Simmons (B.S. ’87) shares, “In January of 2009, I left the corporate space and took the position of leading the Standards Program for the Open Geospatial Consortium (OGC). The OGC is an international industry consortium dedicated to creating standards for the use and sharing of geospatial data. My history in geology and mapping has made this a perfect fit and I greatly enjoy the work. It’s also fun to bump into old friends and UT faculty who are active in the OGC process.

I now commute down two flights of stairs in my home in Fort Collins, CO, leaving the rest of my former commute time free for mountain biking or fly fishing.” Scott can be contacted at simmons@opengeoportal.org.

Traci Trauba Smith (B.S. ’85) writes, “Hard to believe I’ve been out of college 30 years! Where did that time go? I am the current Principal Exploration Geologist for TDECU Real Estate (USG) and have been with the company 30 years! Where did that time go? I am the Operations Manager for TDECU Real Estate (USG) and have been with the company 30 years! Where did that time go?

Peter R. Tavares (Ph.D. ’68) is currently Principal Exploration Geologist for Shell UK (his second posting in Kylo). Peter writes, “my wife and I run an art gallery in Kylo featuring Ukrainian Impressionism in our collection, as well as local artists in exhibition every month. We also host music recitals and art history lectures several times a month — www.tavares-gallery.com.

Peter can be reached at peter.tavares@shell.com.

Mark C. Walker (B.A. ’81) shares, “Last year we lost our most wonderful son, Lee Middleton Hooper Walker, after he completed his first year at Texas in the Jackson School and in Plan II. The support from our family, friends, and classmates at Jackson School was overwhelming. We will always be grateful for the support and comfort we were given during this difficult time. Lee’s legacy will live on through the scholarships and memorials that were established in his memory. We are grateful to the school and to all of the students who knew Lee and who were impacted by his spirit and enthusiasm. Lee was a true leader, a role model, and a friend to many.”

Ted Stout (B.S. ’85) writes, “Completed a detail at Carlisbad Caverns this summer. Had a great time visiting Texas kin and exploring one of my favorite places in the world, the Guadalupe Mountains.”

Leslie Leland Warren (B.S. ’85) shares, “Scott and I are now “empty nesters” and actually starting to think about retirement! We still live in Katy, Texas but got to enjoy our retirement as our son is now living there. We divide our time between work and fun at our Lake Livingston getaway and are looking forward to celebrating 50 years together next year. I am still working for Schlumberger (25 yrs), but now as an IT Project Management Office (PMO) Manager. It appears my Geology assignments are over although I still enjoy flipping through my AAPG Explorer! Hope to see more updates from the ‘94 GeoDogs this year! She can be reached at warren@sh.com.

Colby Drechsel (B.S. ’94) writes, “I am working as a Marketor for a small producer in the Williston Basin. Married four years; two boys, a 2 yr old and 6 mos old — the absolute best experience of my entire life hands down, Owen and Everett, rough and tough! All that matters to me are being a good father and husband. If you’re in Denver, come say hello.” Colby can be reached at cdrechsel@trianglepetroleum.com.

Lauri Faulkenberry (M.S. ’99) writes, “Enjoying life in Houston with my husband and daughter. Recently started working the Eastern GOM with Nexen Petroleum USA, and I am loving this stage of my professional life despite the vagaries of the oil industry.”

Kris Connecke (B.S. ’97) writes, “I continue to work as the staff Geoscientist in the Edwards Aquifer Protection Program at the Texas Commission on Environmental Quality in San Antonio, Texas. On December 23, 2014, I married Jesse Mose and became Diana Pavlicek-Mos. We enjoyed the carbonate sand beaches of Cancun on our honeymoon and trips to the interior of the Yucatan Peninsula such as to Chichen Itza.”

Christopher Steen Sweezy (M.A. ’91, Ph.D. ’97) writes, “I continue to work for the U.S. Geological Survey (USGS) in Reston, VA, where I am a project focused on understanding the geologic framework of the US Atlantic Coastal Plain. I am also active with the Geol- ogic Society of Washington, and with the Butler Cave Conservation Society (Bath, Virginia). You can view my USGS Professional Page at https:// profile.usgs.gov/cwessey or contact him at cowessey@usgs.gov.

Christina Massell Simmons (M.S. ’79) resides in Chevy Chase, MD, and can be contacted at christa.simmons.md.com.

Justin Zumbro (M.A. ’99) shares, “I am working as an engineering geolo- gist and hydrogeologist at GeoPren- tech, located in Santa Ana, California and riding my mountain bike as much as I can.”

Dianne Pavlicek-Mos (M.A. ’90) writes, “I continue to work as the staff Geoscientist in the Edwards Aquifer Protection Program at the Texas Commission on Environmental Quality in San Antonio, Texas. On December 23, 2014, I married Jesse Mose and became Diana Pavlicek-Mos. We enjoyed the carbonate sand beaches of Cancun on our honeymoon and trips to the interior of the Yucatan Peninsula such as to Chichen Itza.”
in basin analysis and tectonics research integrating sedimentology, structural geology, geochronology, thermochronology and geomorphology. Nick is particularly excited about new research areas focused on the Andes, the Cascades in the Pacific Northwest, the Rio Grande Rift, the Atlas mountains of Morocco and West Texas. He can be reached at nicholas.d.perez@gmail.com.

Eric Swanson (B.S. ’04) will begin an MBA program at CSU Fresno in Fall 2015 and can be reached at ewswan@slb.com.

Christi Gull Nutter Townsend (B.A.’00) writes, “I earned my Ph.D. in Environmental Geography from Texas State University in San Marcos, Texas (December 2013). Currently, I am working as a lecturer at Texas State.” She can be reached at christiturner@yahoo.com.

Jean-Paul van Gestel (Ph.D.’00) resides in Houston, TX and can be reached at jppgestel@yahoo.com.

2010s

Spencer Whitman (B.S.’10) writes, “Starting the second year of my master’s in the Graduate Program for Hydrologic Sciences at the University of Nevada, Reno. Loving life out west!”

Umul Awan (M.S.’14, Energy And Earth Resources) joined the world’s leading Bank Pakistan Team as a consultant in their Power Sector Reform, Development Policy Credit Program. The team is working jointly with ADD and JICA to extend a development policy credit to the government of Pakistan to support its power sector reforms, which are being implemented as a condition under the IMF program that Pakistan is under.

Alan Barraza (M.S.’15, Energy And Earth Resources) is now a Soil Scientist - Water Quality Assessment at the Texas Commission on Environmental Quality in Austin, TX. He can be reached at alan.barraza@tceq.texas.gov.

Thad Bay (B.S.’11) currently resides in Houston, TX and can be reached at thaddeusbay@gmail.com.

Rita Bitar Nehme (M.S.’15) writes, “After graduating from the Jackson School, I moved to the beautiful city of Melbourne, Australia in May 2015. In Melbourne, I co-founded Steer North an organization that advances health and education through cycling based events. Our signature event is a 4,000 km cycling journey from Melbourne to Cairns. The first Steer North team is formed of 4 riders, including myself, who will embark on the longest annual charity bike ride in Australia. The aim is to create a mobile community delivering an innovative health promotion program across Australia while inspiring, connecting and empowering communities we pass through. The ride will also serve as a vehicle to raise funds for cancer research, education and patient care. Along with establishing Steer North, I will be starting a Ph.D. at the University of Melbourne in sustainable development focusing on the application of renewable energy in international development. This is the new adventure I have been living since graduation!”

Brent Blackwell (B.S.’11) resides in Cypress, TX and can be reached at brentblackwell@gmail.com.

Randy Caber (M.S.’10) shares, “I have graduated with an MBA from the University of Notre Dame and am now working in management consulting with Accenture Consulting in Upstream Oil and Gas as a Manager optimizing operations and creating strategy solutions for clients. I have returned to Houston for the mean time and am having a great time reconnecting with old and new friends. He can be contacted at randycaber@gmail.com.

Marcus Alan Chrobback (B.S.’10) writes, “Transferred from EOG Resources Ft. Worth division to EOG Resources San Antonio division at the beginning of 2015. Currently serving as the San Antonio Chapter Director on the Jackson School FANs (Friends and Alumni Network) Board.” He can be reached at marcus.chrobback@eogresources.com.

Jessica Cori Errico (M.S.’12) resides in Houston and can be reached at jessicacerrc@gmail.com.

Katie Fry (M.S.’15) began working full-time as a Geologist in China’s World Wide Exploration division at location.

Joel Funderburg (B.S.’14) says, “After finishing my (second) Bachelor’s at UT, I started working at Schlumberger in Austin, TX last year and I am thoroughly enjoying it.”

Patrick Gustie (M.S.’14) now resides in Spring, TX and can be reached at pgustie@gmail.com.

Aaron Hantsche (B.S.’13) writes, “I defended my Master’s Thesis at the University of Colorado at Boulder on August 18th. For the past two years, I have been working on a project titled: Provenance of Grenville-age sediments at the Great Unconformity: A U-Pb and Hf detrital zircon study”. With the help of my advisor, Dr. Lang Farmer, I looked at the isotopic composition of a suite of anorogenic intrusions in northwest Mexico and used the information combined with previous characterization of Grenville-age intrusions, to compare U-Pb ages and Hf isotopic composition to zircon found in basinal sandstones deposited at the Great Unconformity in the midcontinent region of North America. We discovered that the Hf isotopic character of these zircon becomes more variable with increased transport distance away from the Grenville Province in eastern North America, and interpreted the western reaches of the continent to have had relatively low topography and negligible sediment contribution during the Cambrian.” He can be reached at aaron.hantsche@gmail.com.

Sam Hiebert (B.A.’10, M.S.’13) resides in Houston, TX and can be reached at samuelhiebert@utexas.edu.

Austin Byron Moore (B.S.’15) is pursuing a Masters of Science in Finance at the McCombs School of Business at UT after graduating with highest honors from the Jackson School. Austin can be reached at ausmoore@utexas.edu.

Kaitlin Moran (B.S.’13) completed her M.S. in Earth Science at Rice University in May of 2015.

Frank Morgan (B.S.’11) writes, “I’m currently in my second year working as a geologist for Devon Energy in Oklahoma City. I work in Devon’s Rockies Business Unit focusing on the Powder River Basin. Enjoying every bit of it! He can be contacted at frank.morgan@gmail.com.

Kimberly Dawn Myers (Ph.D. ’15) writes, “After graduating in May 2015 I began an NSF funded Postdoctoral Fellowship, working in both the Department of Geology and Geophysics at Texas A&M University and the Lamont-Doherty Earth Observatory at Columbia University. My work focuses on the Barberton Greenstone Belt in South Africa, and I am looking at the distribution of arsenic in 3.2 billion-year-old sedimentary rocks. In late July I traveled to long term friends in Germany to conduct my first field season.”

Evan Pearson (B.S.’10) shares, “I will reach my 5 year mark with Pinnacle Potash International, Ltd. in January of 2016. Being able to work in an exciting environment based in Utah has made post-UT life very enjoyable, but I’ll never forget my time on the 40 Acres. Hook’ em!”
Dave Lehman (Ph.D. ’74) believes that scholarships are key to helping students pursue an education necessary for meaningful careers. As a reflection of this belief, Dave is offering to match any gift to this fund at $1.50 for every $1.00 (up to $100,000) contributed to the John C. and Marian B. Maxwell Endowed Undergraduate Scholarship in Geological Sciences this year.

“Dr. Maxwell was not only a great teacher and scholar, but for me personally he was instrumental in opening up academic and professional opportunities.” Dave hopes that others will share his conviction and honor Dr. Maxwell’s legacy by paying it forward. The match is in place through Dec. 31, 2015.

To contribute to the John C. and Marian B. Maxwell Endowed Undergraduate Scholarship in Geosciences, or to honor another professor, visit www.jsg.utexas.edu/alumni/support or call 512-471-6048.
Joseph Louis Brown II “Brownie” (B.S. ’54), 87, passed away peacefully on Sept. 14, 2014. Only child to Joseph Louis and Marie Weinheimer Brown of Houston, Joe grew up in Houston, graduating from Lanier Middle School and Lamar High School. Joe immediately joined the United States Navy after a year in the Navy, he left to attend The University of Texas at Austin. Upon graduation, he re-entered the Navy as an officer for a total of 24 years before he became a full captain on four ships and was commander on many other ships as well as served as military intelligence at the Pentagon.

Siras D. Browning (B.S. ’53), 85, passed away on June 22, 2005 peacefully at his home on 26 years in Sherman. Siras was born July 9, 1929 in Ellinon Springs of Eastland County. He graduated from South San Antonio High School in 1949 and immediately joined the United States Navy. After four years in the Navy, he left to attend The University of Texas at Austin.

Ina R. Brundrett (Spouse of the late Jesse Lee Brundrett, M.A. ’53), 89, entered the Garden of Heaven on May 18, 2018, leaving behind a bountiful legacy of giving to education and gardening initiatives across Texas. Ms. Brundrett was an educator, gardener and philanthropist who served with numerous clubs and organizations devoted to landscape beautification. She was born Aug. 27, 1923, in Victoria County, to Ira Franklin Riggs and Pearl M. Riggs. Ms. Brundrett graduated from A.C. Jones High School in Beaumont, received her bachelor's degree from Texas College of Arts and Industries, Kingsville, and completed 14 hours of graduate work at The University of Texas at Austin. She married Jesse Lee Brundrett on July 5, 1944, before he left for combat service in World War II. In memory of her late husband, she established the Jesse L. Brundrett Memorial Endowed Presidential Scholarship and the Jesse Brundrett Family Rock Garden for the Jackson School of Geosciences at Texas A&M University at Austin. In addition, she established endowed scholarships in education in honor of her parents and another endowed scholarship in architecture to honor her daughter, Lynne Brundrett Maddox. Her contributions also helped to establish the Conservation Education Building at the Stephen F. Austin State University Pineywoods Native Plant Center, the Ina Brundrett Azalea Garden, the Botanical Gardens Preservation Endowment and the Ina Brundrett Presidential Scholars Honorship at Tyler Junior College, and the Ina Brundrett Environmental Health Science Endowment at UT Health Northeast. She gave generously to educational and botanical endeavors with the assistance of matching gifts from the Exxon Foundation.

Wallace E. Brunson (B.S. ’42, M.A. ’54), born Sept. 25, 1914 in the old Baptist (later Memorial) Hospital (demolished) in downtown Houston; passed away on Oct. 1, 2014. He was preceded in death by his daughter, Barbara B. Copeland; parents, Howard E. Brunson and Ouida L. Brunson; and a brother, Donald L. Brunson. He attended schools in Baytown, Texas, and went to the New Mexico Military Academy, and graduated

David Alt (Ph.D. ’61), Professor Emeritus at the University of Montana, geologist, teacher, writer, storyteller you choose the order passed away on April 26, 2015, in Missoula. Throughout his over five decades in the profession of teaching, David inspired countless numbers of future geologists and scientists, college students, environmentalists, rock enthusiasts, hobbyists and birdwatchers alike, with his unique ability to convey and translate complex geological and natural science into exciting and understandable concepts, often with an artistic and colorful flare. Born in grumpy, depression-era St. Louis, Missouri, in 1933, David set his youthful sights out of the world, a byproduct of his insatiable love of books and stories — passions that would endure throughout his entire life.

He went on to graduate from Washington University in St. Louis in 1955, followed by a Master of Science from Washington University in St. Louis in 1955, and received his B.A. from The University of Texas in 1950 and his M.A. in 1952. Asa was married to Bonnie Hinson in 1949, and they had a remarkable relationship. They enjoyed some wonderful trips together. Their daughter Sue was born in 1950, and their son, Alex, was born in 1952. Asa was married to Bonnie Hinson in 1949 and they had a remarkable relationship. They enjoyed some wonderful trips together. Their daughter Sue was born in 1950, and their son, Alex, was born in 1952. Asa was married to Bonnie Hinson in 1949 and they had a remarkable relationship. They enjoyed some wonderful trips together. Their daughter Sue was born in 1950, and their son, Alex, was born in 1952. Asa was married to Bonnie Hinson in 1949 and they had a remarkable relationship. They enjoyed some wonderful trips together. Their daughter Sue was born in 1950, and their son, Alex, was born in 1952.

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from The University of Texas in Austin with degrees of B.S. (1942) and M.A. (1943) in geology, and was the first president of Delta Chi Fraternity and was a member of Sigma Gamma Delta, honorary chemistry society. Jean was a Life Member of the Texas Ex-Students Association. Wallace retired from Amoco in 1980, after 26 years and has remained semi-active as an independent geologist. He served in the U.S. Air Force in WWII and in Korea in 1951-52 where he was a Captain, and was Officer-in-Charge of the massive aerial photo lab in the 5th Air Force 67th Tactical Reconnaissance Wing. Wallace had memberships in the Society of Petroleum Geologists (AAPG), Society of Independent Professional Earth Scientist (SIFES), Houston Geological Society and Petroleum Club in Houston. He was past president of the Lubbock, Texas Geologist Society, Editor for the Fort Worth Geological Society and Past President of the Southwest Section of the AAPG.

Wallace is survived by his wife of 72 years, Elizabeth (Betty) C. Brunson; son and daughter-in-law, Dr. Richard and Carol Brunson; Jr. grandson, Trey Brunson; brother and sister-in-law, Howard E. and Lindy Brunson of Austin; son-in-law, Dr. James Copeland of Austin; and numerous cousins, nieces and nephews.

Jeff Burnett, Jr. (B.S. '49) passed away peacefully with his children at his side on January 9, 2015, after a short illness. He was born in Houston on the South Side in 1934 where he lived with his wife Catherine. He is survived by their three children, Jeff III and his wife Buela of Houston, Robert J. and wife, Joanne of Austin, and John Leslie Douglas of New York City; his wife, Catherine Gaeke and their husband Dwaine of Wimberley; his eight grandchildren and 11 great-grandchildren. He will be remembered for his love of family, friends and sports. He passed away peacefully with his children at his side on January 9, 2015.

Jean F. Burney (Spouse of William Burney, Jr., B.S. '48) was welcomed into Heaven on Monday, Dec. 15, 2014, while surrounded by her family. Jean, known lovingly by her family and friends as “Gegs,” was a beloved wife, mother, grandmother and great-grandmother. Everyone who met and knew her were instantly taken in by the twinkle in her eyes and her gorgeous smiling.

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John J. Chambers Crowell (B.S. ’39) passed away May 13, 2015, an hour after his 89th birthday in Monte Carlo, California. He was a world-renowned geologist and professor emeritus at University of California Santa Barbara. During World War II, with two other officers he forecast surf conditions for the Allied Invasion of Normandy. Norman Crowell was born on May 14, 1926, in State College, Pennsylvania, to James White and Helen Hunt Chambers. A succession of moves took the family to Claremont, California, where John’s father took a position as professor of Romance languages at Claremont College. After graduating from The University of Texas with a degree in geology in 1949, Crowell undertook graduate work at UCSB. While studying the geology of a part of the San Joaquin Valley, he was offered employment as a geologist with Shell Oil Company and would have followed that career path had not World War II military service serendipitously intervened. The U.S. Army put him into intensive training as an oceanographic meteorologist with several of the world’s leading meteorologists and geographers. He was commissioned as a second lieutenant in May 1943. Crowell became a member of General Dwight D. Eisenhower’s Operation Overload, a naval geology team that made the critical forecasts of sea, swell and surf for the June 6, 1944, Normandy Invasion which earned Crowell the Bronze Star. Later in the war he was based in Ceylon preparing for the invasion of Burma and led a U.S. Army geology team on the Southern Road from India into China. He was working on the planned invasion of Japan when the war ended in 1945. In 1946 he met and married Betty Marie Bruner of Claremont. They remained married for 69 years until his death in 2015. They had a daughter, Maria Bruner, a geologist with Shell Oil Company and married to Paul S. Bruner, who followed his father into the oil business and was a geologist with Shell Oil Company and later served as a member of the Texas Ex-Students Foundation Board.

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Walter Wilson Carter, Jr. (B.A. '49) age 83, of San Antonio passed away on Dec. 2, 2014. He was born on April 11, 1932, in Mount Airy, North Carolina. During World War II he received an appointment to the United States Naval Academy. Upon war’s end, he transferred to The University of Texas where he received a degree in geology. Walter was a member of the Texas National Guard for 15 years, and he was a Major in the Army. Walter Wilson Carter, Jr. (B.A. '49) age 83, of San Antonio passed away on Dec. 2, 2014. He was born on April 11, 1932, in Mount Airy, North Carolina. During World War II he received an appointment to the United States Naval Academy. Upon war’s end, he transferred to The University of Texas where he received a degree in geology. Walter was a member of the Texas National Guard for 15 years, and he was a Major in the Army.

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Clarence Orson "Clay" Durham, Jr. (B.S. ’42) passed away Sunday, April 12, in Houston, at the age of 94. Clay was born in Victoria on Oct. 20, the son of Clarence Durham, Sr. and Maud Leffland Durham. He received a B.S. in geology with honors from The University of Texas in 1942. He earned a professional certificate in meteorology from the University of Chicago in 1945 and served as a meteorologist in the Army Air Corps during World War II. After the war, he continued his education at Louisiana State University where he was awarded his Ph.D. in geology. Clay joined the faculty at Louisiana State University in 1945 as a professor of geology. He also served as Director of Research for the Louisiana Geological Survey during his tenure at LSU. In 1965, he was named Chairman of the Department of Geology, a position that he held until he retired in 1975 to pursue work as a consulting geologist. Clay moved to Houston in 1988 and began a successful career in oil and gas exploration in partnership with Longhorn Exploration. He was active in the oil industry and academia. He earned a second B.S. degree, graduating from The University of Texas Permian Basin, in computer programming in 1988. Married Brenda Osborn on Sept. 22, 1990, in Houston, he was the father of two girls, Vanessa Van Abtine of Dallas and Katie Hemphill Thompson, her husband Gary and their children John and Gladys Teagan, and her family; a sister-in-law, Melissa Gaido; and a niece, Morgan Ealand. He is preceded in death by his parents, Mrs. Louis Gayer of San Angelo. Survivors include his wife, Brenda of Wylie, Texas, and their daughters, and his parents.

Herbert “Bert” A. Hemphill, Jr. (B.S. ’50) of Dallas, died Jan. 17, 2015, after a lengthy battle with congestive heart failure. He was called to his wife Phoebe on the 76th anniversary of their passing. Bert was born in Columbia, South Carolina, on Oct. 12, 1925, to Herbert Augustus Hemphill, Sr. and Helen Sellards Hemphill. He moved to Midland as a young boy. On graduation from high school he served in the United States Navy. He earned a degree in geology from The University of Texas and became a geologist like his father, his grandfather Elias H. Sellards and his wife’s father Frank E. Lewis. He worked for many years in the oil fields of West Texas then moved his family to Austin where he worked as a realtor and appraiser before moving to his family’s farm in Burton. Bert is survived by his children Leigh Hemphill Thompson, his husband Gary and their daughter Holly; Tig Hemphill Irarudaf, his husband Sam and their daughter Kat, Amy Shine and her husband Nick; and by his son Mike Hemphill. He is also survived by his sister Nancy Hemphill Guido, his husband Sandy and their daughters Missy Guido Allen, her husband Rich and children Gus and Astrid; Ashley Guido; and Lindsay Guido Braumuhl, her husband Jake and their son Zane. Bert was preceded in death by his wife Phoebe Lewis Hemphill, and by his sister Susan Hemphill Kouworth and her husband Bill.

Harold T. Henslee (B.S. ’50) of Boonville, Mo., and recently Denver, Colo., died peacefully on Aug. 12, 2015. He was 90 years old. Mr. Henslee was born May 9, 1925, to Dorothy and Al Neff Henslee. His father was a highly-respected oil-drilling supervisor for Humble Oil Company and his mother was an accomplished 

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including the Kiwanis Club, the Conopus Club, the San Antonio Country Club, the Town Club, the American Legion, and the German Club and Girurad.

Clarence Orson "Clay" Durham, Jr. (B.S. ’42) passed away Sunday, April 12, in Houston, at the age of 94. Clay was born in Victoria on Oct. 20, the son of Clarence Durham, Sr. and Maud Leffland Durham. He received a B.S. in geology with honors from The University of Texas in 1942. He earned a professional certificate in meteorology from the University of Chicago in 1945 and served as a meteorologist in the Army Air Corps during World War II. After the war, he continued his education at Louisiana State University where he was awarded his Ph.D. in geology. Clay joined the faculty at Louisiana State University in 1945 as a professor of geology. He also served as Director of Research for the Louisiana Geological Survey during his tenure at LSU. In 1965, he was named Chairman of the Department of Geology, a position that he held until he retired in 1975 to pursue work as a consulting geologist. Clay moved to Houston in 1988 and began a successful career in oil and gas exploration in partnership with Longhorn Exploration. He was active in the oil industry and academia. He earned a second B.S. degree, graduating from The University of Texas Permian Basin, in computer programming in 1988. Married Brenda Osborn on Sept. 22, 1990, in Houston, he was the father of two girls, Vanessa Van Abtine of Dallas and Katie Hemphill Thompson, her husband Gary and their children John and Gladys Teagan, and her family; a sister-in-law, Melissa Gaido; and a niece, Morgan Ealand. He is preceded in death by his parents, Mrs. Louis Gayer of San Angelo. Survivors include his wife, Brenda of Wylie, Texas, and their daughters, and his parents.

Herbert “Bert” A. Hemphill, Jr. (B.S. ’50) of Dallas, died Jan. 17, 2015, after a lengthy battle with congestive heart failure. He was called to his wife Phoebe on the 76th anniversary of their passing. Bert was born in Columbia, South Carolina, on Oct. 12, 1925, to Herbert Augustus Hemphill, Sr. and Helen Sellards Hemphill. He moved to Midland as a young boy. On graduation from high school he served in the United States Navy. He earned a degree in geology from The University of Texas and became a geologist like his father, his grandfather Elias H. Sellards and his wife’s father Frank E. Lewis. He worked for many years in the oil fields of West Texas then moved his family to Austin where he worked as a realtor and appraiser before moving to his family’s farm in Burton. Bert is survived by his children Leigh Hemphill Thompson, his husband Gary and their daughter Holly; Tig Hemphill Irarudaf, his husband Sam and their daughter Kat, Amy Shine and her husband Nick; and by his son Mike Hemphill. He is also survived by his sister Nancy Hemphill Guido, his husband Sandy and their daughters Missy Guido Allen, her husband Rich and children Gus and Astrid; Ashley Guido; and Lindsay Guido Braumuhl, her husband Jake and their son Zane. Bert was preceded in death by his wife Phoebe Lewis Hemphill, and by his sister Susan Hemphill Kouworth and her husband Bill.
Kenneth Roland Johnson (B.S. ’50) passed away on Dec. 23, 2014, in Houston, at the age of 90. He was the son of the late Dr. A. M. Johnson and Doris Johnson. Ken was preceded by his younger brother Hugh Edward Johnson. He is survived by his beloved wife Kathy Fraser Johnson, daughter Cindy Northington, sons Jeff and Jeff Jr. and his spouses Guy Northington, Mary Price Johnson and Amy Tatum Johnson. Ken had 12 grandchildren: Will Northington; Wes Northington and wife Kelly; Ginny Northington Quinn and husband Daniel Fletcher Johnson and wife Tracy. Price Johnson and wife Sarah; Gardner, Wilson, and Hill Johnson; Tatum, Rawls and wife Sarah; and his dear former-in-law Barbara Johnson. Ken had three wonderful wives, two of whom preceded him in death: Bertha Fletcher Johnson and Katherine Lamar Johnson. His stepchildren were: Shepherd Smith; Margaret Lamar and husband David Gaier, Bill Fraser and wife Maria Reed; and Reuben Jeff and husband Jeff. He had a number of step-grandchildren, two great grandchildren and one great great grandson. He also leaves behind long-time faithful friend of the family, Justina Villalobos. Ken was born in San Augustine on the 23rd of September 1924 and grew up in Houston where he attended Lanier Junior High and Lamar Senior High schools. He began his college career at Texas A&M before going into the service. He spent 44 months in the Merchant Marine and U.S. Navy during World War II. He served 3 months in the Southwest Pacific participating in the New Guinea and Philippine Islands campaigns before being assigned to the 5th Air Group, the ‘Flying Tigers’. He was discharged in 1946 and received the Bronze Star. Ken and his wife, Verna, were married for 59 years and raised four children. He is survived by three daughters and a number of grandchildren.

Susanne C. Hooper (Spouse of late Charles Jackson Hooper, B.S. ’50), died peacefully in Austin on Nov. 2, 2014, following a beautiful life that began in Okemah, Oklahoma on Oct. 3, 1925. She was the beloved daughter of W. E. and Mary Newton Catlett and Mary Board Catlett.

Lambert “Bert” Millholland Macy (M.S. ’74), of Tappan, New York, died Nov. 28, 2014. He was survived by his wife Stacy A. Macy (formerly, Stacy M. Andreas), his children Elizabeth Roger Macy of St. Louis, Missouri, and Ted Macy of Corpus Christi, Texas, and his grandchildren: Will Northington; W es and wife Sarah; Gardner, Wilson, and Hill Johnson; Tatum, Rawls and wife Sarah; and his dear former-in-law Barbara Johnson. Ken had three wonderful wives, two of whom preceded him in death: Bertha Fletcher Johnson and Katherine Lamar Johnson. His stepchildren were: Shepherd Smith; Margaret Lamar and husband David Gaier, Bill Fraser and wife Maria Reed; and Reuben Jeff and husband Jeff. He had a number of step-grandchildren, two great grandchildren and one great great grandson. He also leaves behind long-time faithful friend of the family, Justina Villalobos. Ken was born in San Augustine on the 23rd of September 1924 and grew up in Houston where he attended Lanier Junior High and Lamar Senior High schools. He began his college career at Texas A&M before going into the service. He spent 44 months in the Merchant Marine and U.S. Navy during World War II. He served 3 months in the Southwest Pacific participating in the New Guinea and Philippine Islands campaigns before being assigned to the 5th Air Group, the ‘Flying Tigers’. He was discharged in 1946 and received the Bronze Star. Ken and his wife, Verna, were married for 59 years and raised four children. He is survived by three daughters and a number of grandchildren.

Loring G. Lemmon (B.A. ’60) passed away quietly in the home of his son, Zack Lemmon, in Sandy, Ore., on the morning of Jan. 26, 2015. Loring was born in Christiansburg, Montgomery County, Va. A longtime resident of Radford, Va., he developed friendships in childhood that he carried throughout his life. Loring grew up loving nature and animals of all kinds, particularly dogs. He was a kind man who was always aware of the good things that he was a steward over. He was the epitome of a Southern gentleman, bred with good manners and charm. Loring served in the U.S. Air Force and was a veteran of the Korean War. He received his bachelor’s degree from University of Texas at Austin and spent much of his career working for the Roy Scouting of America. Loring was a faithful member of the LDS Church and served in many and varied callings during his life. He and his family joined the church in 1969 and were later sealed as a family in the Washington D.C. LDS Temple. Loring was a dedicated husband of more than 50 years. He was a kind and loving father who loved his children and his family more than his work. He was known as a man of integrity and principle. Loring is survived by his two children, Zack Lemmon and Elizabeth L. Chandler; six grandchildren, three great grandchildren, and his brother, Carson. He was preceded in death by his wife, Elizabeth Reed Shoemaker, his only sister, Gladstone Lemmon and his father, Loring Lemmon.
James C. Loomis... 

Robert "Al" Moore... 

Gustave Allan Nelson (B.S. ‘47), passed away Jan. 21, 2009, in Boulder, Colorado. He was born May 6, 1924, in Summit, New Jersey to Gustav Albert and Lillian (Olander) Nelson. He graduated from Coleman Agricultural College in Arlington in May 1947 receiving his Bachelor of Science in Animal Science. In 1947, after graduating from The University of Texas at Austin in geology, he joined the United States Geological Survey South Texas. He served honorably and received a Purple Heart for his service in the Korean War. Returning from his army service, he attended The University of Texas where he graduated in 1947 receiving a Master of Science in geology. He met and married Ruth Virgínia Kentta, and Lt. army veteran, and they were married June 25, 1945, in the Augustana Lutheran Church in Denver, Colorado. G. Allan became a consulting petroleum geologist in 1947 and worked in this capacity his entire life. He served as president of the Denver Round Table, Presidents Round Table, Petroleum Pioneers, Remagen Bridge Society; executive vice president of Big Broth; and national president of the 99th Division Association and as a member of the Demer Jaycees. He also was a member of the Mountain Association of Geologists-Wyoming, the Geologic Association, American Association of Petroleum Geologists and the Denver Well Logging Society, becoming an honorary lifetime member. After retiring in 1985, he and his wife, Eliza "Lynne" Nelson ( bushand), and their children, Gary, and Byron Nelson. He was preceded in death by his wife, Jeannie, Mark Loomis and his family...
Cecil Taylor Rhodes, Jr. (B.A. ’49) was born on Jan. 19, 1927. After
Saturday, Nov. 29, 2014, at the age of 87. Cecil was the grandson of Nolan Potter of San Angelo,
and his brother, Art of Pittsburgh, Pa., sister Betty Dunn and husband Nelson of Arlington, his step-grandson Sheldon Hough and wife
Potter and husband husband of Nolan Potter of San Angelo,
his step-daughter Boni McSorely and husband Art of Pittsburgh, Pa.,
step-grandson Columbus, Ohio.
and husband of Nolan Potter of San Angelo,
his step-daughter Nelson of Longview, Texas, and their sons Jonathan and Jeremiah; sister, Deane (Alan) Gremmel; nieces, Katrina (Timothy) Boughal, Heidi (Doug) Geiser, Michelle Gremmel and
cousins, cousious, cousins, nieces and nephews, Wyatt, Becca, Ava and
and friends. His family were a blessing and
and Devon Hooks. He also enjoyed coaching his son’s
and spending time with his family and spending
time with his family and spending

Cecil Taylor Rhodes, Jr. (B.A. ’49) worked in oil exploration for Petty and
his stepson Chilton Harris and wife
Rhodes and Steve Allen; nieces Janet
and husband of Nolan Potter of San Angelo,
and his step-daughter husband of Nolan Potter of San Angelo,
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Linda Duncan and Patty Walker. Glen
Jessica Taylor, Jennifer Bridges and
by his wife, Barbara, his daughters
Netherlands and more. He is survived
in 1997. He and Barbara were able to
company. He worked there until retiring
Authority, helping to reorganize the
Pipeline. He later moved from New York
mental in opening up the Alaskan
for British Petroleum and was instru-
administration. He then went to work
Department as Head of the Lands and
Colorado-
time, he met and married his wife of
in underwater demolition. During this
part of the Special Services, specializing
in the oil industry.

Lloyd "Rex" Travis, Jr. (B.A. '48) was born on August 19, 1924, in
in Texas. He lived in Lakewood, Colorado
the past 35 years. He spent his career
first with the USGS and later in research

Robert "Bob" Theodore Terriere (Ph.D. '60), born in Seattle on July
on to Davis Oil in the 1970s. He later
worked in the oil and gas business after
years, his son and daughter. Ben was
and was a staff sergeant in the U.S. Army
outlook on life. He was a lifelong
understanding. He was a loving and
could always go to for good advice and
like to have. He was the person you
also had four grandchildren and many
nies and nephews.

Robert "Bobby" Theodore Terriere (Ph.D. '60), born in Seattle on July
grew up in Sweetwater. After graduating
Sweetwater High School in 1948, he
attended Texas Tech for two years, his
son and daughter. Ben was
married Marie Ross Sagesar on Jan. 12,
He obtained his Bachelor and Master of
Texas, and his Ph.D. from The University
M.A. '54), 93, passed away in Houston on October 4, 2015. He was
as a writer. He was known to
was the person he
could always go to for good advice and
understanding. He was a loving and
generous husband. Chan will be missed for
his sense of humor and his positive
outlook on life. He was a lifelong
Longhorn fan and was proud that all five
of his grandchildren graduated from UT.

Julie Anne Ullrich (B.S. '76), 60, of Houston, passed away peacefully in her sleep
Dec. 30, 2014. She was born on Jan. 18, 1954, in Oklahoma City to Gaston and
Betty Jane Broyles. She married Martin S. Ullrich on Oct. 1, 1973. Julie was a long
resident of West University Place. She graduated from Sharpstown High School in 1972 and The University of Texas in 1976 with a B.S. in Geology. She was a longtime volunteer with the Girl Scouts of America San Jacinto Council, serving as troop leader for her daughters. Julie is preceded in death by her husband, Martin, and parents, Gaston and Betty Jane. She is survived by her three daughters, Betty Ganske of San Antonio, Anna Ullrich and Marie Ullrich of Houston; her granddaughter, Evelyn and grandson, August, both of San Antonio; and her brother Gaston Broyles, Jr. of Austin.

Ben Taylor Whitefield (B.S. '60) died on Thursday March 5th in Corpus Christi. He was in the
company of his wife, living in Dripping Springs, Texas. He
and Betty Jane. She is survived by her
tres daughters, Betty Ganske of San
Antonio, Anna Ullrich and Marie Ullrich of Houston; her
granddaughter, Evelyn and grandson, August, both of San
Antonio; and her brother Gaston Broyles, Jr. of Austin.

John William Wood (Ph.D. '65) of Dripping Springs was born in Hazel-
hurst, Mississippi, on April 2, 1929, and died in Austin on Feb. 13, 2015. His parents were Katherine Slone Wood and Claude Sandifer Wood. John graduated from Hazlehurst High School in 1947, and received a degree in geology from Mississippi State College in 1944. He completed a degree in geography for his dissertation from the University of Texas at Austin in 1945. John served his country during the Korean Conflict with the 40th Infantry Division in Japan and Korea from 1951 to 1953. He was a member of the Lawton Guard of the Texas Technological College in 1966, and received a Ph.D., also in geography, from The Univer-
sity of Texas at Austin in 1965. John went on to work in the oil and gas business after graduating from The University of Texas at Austin in 1965.

Robert Joseph Whitson (B.S. '83) passed away on May 23, 2015. He was 52
days old. He was born in South Carolina to
James A. Whitson Jr. on June 14, 1962, and grew up in Houston. He attended Memorial High School and The Univer-
sity of Texas at Austin where he pursued a career as a petroleum geologist. In addition, he earned a Ph.D. in geology from the University of Texas at Austin in 1983. His research focused on the geology of the Gulf Coast region of the United States. He was a member of the American Association of Petroleum Geologists and the Society for Sedimentary Geology. He was also a member of the American Geophysical Union and the Geological Society of America. He died on May 23, 2015, in Houston, Texas.

recently through his own company, Tyco Oil and Gas Associates. Chan was kind of a very private person,
but he worked for 25 years. He was a vital part of his father's last few months managing the family
business. He married Pamela Haskins in
College Station, Texas, and in Covington, Louisiana. He then
Law at The University of Texas for three years,
where he played baseball, then joined
the Marines and fought in World War II. Once the war was over, he returned to UT Austin and obtained his degree. He worked for Exxon, 33 years as a geophys-
iciest, until he retired and opened his own consulting firm. Rex was a member of the Katy VFW and St. Peter's United
Methodist Church. He loved to travel and his greatest passions were watching
the Houston Astros play baseball, watching the Katy Tigers football team.
Rex passed away at home in Katy surrounded by his loved ones on Sunday, Dec. 30, 2014. He is survived by his wife of 60 years, Johanna
Tyree; their five children and their spouses, Susan Lloyd (Robert), Janet Kim (Patrick), Robert Chan Tsyr Jr. (Mary), Alice Maynard (Jeff) and Roger Tyree; 15 grandchildren; his brother
James Tsyr (Fran), and his niece and nephews. Chan was born Jan. 3, 1931 in Dallas and was raised in the Oak Cliff
area. He graduated from Crozier Tech High School at the age of 16 and
attended The University of Texas at Austin. Chan graduated from UT with a B.S. in geology and entered the U.S. Navy during the Korean War. In
1954 Chan married the love of his life, Johanna Barnes. He was widely recog-
nized as one of the most knowledgeable and most successful petroleum geolo-
gists in the Texas gulf coast region. He began his career at Amoco, then moved to Dallas Oil in the 1970s. He later
worked with a number of independents and continued his passion until very
Faculty

Daniel Stephen Barker (F.M. Bullard Professor of Geology Emeritus at The University of Texas at Austin’s Jackson School of Geosciences) died May 23, 2019, in Austin. He was born in Waltham, Massachusetts, on Feb. 27, 1934, the only child of Kenneth Watson Barker and Sadie Brown Barker. Raised in rural Maine, he was probably the last UT faculty member to be educated in a one-room schoolhouse. After graduating in 1952 as valedictorian from Cony High School in Augusta, Maine, he attended Yale University on full scholarships, graduating magna cum laude in 1956. He then earned his M.S. in Geology in 1958 at the California Institute of Technology, and in 1961, his Ph.D. from Princeton University.

He came to Austin in 1963 and stuck. In 1964 he and Barbara Catharine Mackin wed and produced Molly in 1965 and Amy in 1967. These they considered their finest achievements. He and Barbara remained the best of friends long after their marriage ended in 1984, until her death in 2002. In 1994 Dan and Rosemary Brant married, in a joyous union that lasted until her death in 2006. He is survived by his daughters and sons-in-law Molly and Billy Gray of Austin, and Amy and Mark Rielly of Needham, Massachusetts; a grandson, Mackin Murphy Rielly; a granddaughter, Sadie Fallon Daphne Rielly; and a step-granddaughter, Paloma Gray. Four first cousins, Jane E. Barker, Ph.D. of Bar Harbor, Maine, Judith B. Carducci of Hudson, Ohio, Donald C. Freeman, Jr. of Brewster, Massachusetts, and Hank Freeman of Provo, Utah, also survive him, as does his cat, Big Joe.

Dan enjoyed 36 years of teaching and research at the University. He supervised seven doctoral students and 11 master’s students. He demanded that each come up with his or her own original research topic and write a proposal that competed with him for his endowed research funds. His colleagues benefited from his enthusiastic help and cheerful humor. He inherited great empathy for animals from his grandfather, Maine farmer Zebediah Barker, of whom it was said, “His animals were always glad to see him.” Colleagues and students felt the same way about Dan.

In the undergraduate classroom, his approach was traditional, but engaging. For graduate students, he produced a teaching collection that forced them to think independently and on their feet. And he had nearly one of everything, acquired on vacation and on field trips with experts that spanned the globe. His stories from those expeditions provided a colorful backdrop for the science. His lecture notes and reference lists were up to date. At 9 a.m. on Tuesdays he could be found at the new acquisitions table in the Walter Geology Library.

In 1994, Dan was awarded the Jubilee Medal of the Geological Society of South Africa, and the Knebel Distinguished teaching Award in the Department of Geological Sciences in 1976, 1980, and 1987. In 1949 and 1999, the College of Natural Sciences conferred on him the Teaching Excellence Award. He was most gratified when students called him Obi-Wan. He was a senior fellow of the Mineralogical Society of America and the Geological Society of America, and received several research grants from the National Science Foundation.

Dan was a Fullbright Senior Research Fellow in Denmark in 1949. He published a textbook, several guidebooks, five encyclopedia articles and more than 50 peer-reviewed papers and book chapters. Dan believed in careful study of rocks as key to understanding how the earth works, and he collected samples all over the world, from Greenland to the Cape Verdes, Scotland to Italy, New Zealand toNamibia, Easter Island to Patagonia and Japan to Turkey. During these travels, he met many strangers, some of whom were not very nice. His enthusiasm for collecting inspired his colleagues to do the same. In 2009, he made a substantial contribution to start the Jackson School of Geosciences International Rock Collection Endowment, a resource for teaching and research that will be useful to geologists all over the world. Dan retired in 1999, but continued his research. He made a variety of contributions to the University of Texas Digital Repository, a resource that can be searched and accessed online. Included are PowerPoint slide shows on igneous rocks and folders of published and unpublished data. All geologists, specialists and non-specialists alike, will find some material to enjoy among Dan’s catalog of work. Travel, photography, pipe smoking, classical music, reading, New York Times Sunday crossword puzzles, food and family were among his loves. He enjoyed puns, even good ones, and tried to hide Down-East humor that “was so dry it made your nose bleed,” according to one friend. He thought he had a good life. Memorial gifts in Dan’s memory can be directed to the endowment he created, the Jackson School International Rock Collection. Contact the Development and Alumni office for further assistance.
2015 JACKSON SCHOOL OF GEO SCIENCES
ALUMNI NEWS UPDATE SUBMISSION FORM

All personal and work information submitted is confidential and will not be shared outside of The University of Texas at Austin. All alumni, former researchers, faculty and staff affiliated with JSG and its research units are encouraged to submit. If you are not receiving the Newsletter in the mail, this form will ensure you receive future copies. All fields are optional but we appreciate your effort to help us keep your information accurate and current.

### Personal Information

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### Class Notes for the 2016 Newsletter

Attach a separate sheet or use the online form at www.jsg.utexas.edu/alumni for longer entries.

### Additional Details on UT-Austin or JSG Experience:

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### Check if you would like more information on:

- Alumni events in your area or at upcoming geoscience meetings
- Mentoring and recruiting students
- K-12 outreach programs
- Continuing education and learning programs
- Endowments and other support opportunities

### Or submit news and updates at www.jsg.utexas.edu/alumni

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Great Professors Change Lives

Honor one of the following mentors who changed your life with a contribution to their existing endowment.

- Milo M. Backus
- Virgil E. Barnes
- Fred M. Bullard
- Hal H. Bybee
- William D. Carlson
- Stephen Clabaugh
- Robert H. Cuyler
- Ronald K. DeFord
- Alexander Deussen
- Samuel P. Ellison
- W. Maurice Ewing
- William L. Fisher
- Peter T. Flawn
- Robert L. Folk
- Robert K. Goldhammer
- F. Earl Ingerson
- Martin B. Lagoe
- Wann Langston
- Ernest L. Lundelius
- J. Hoover Mackin
- Arthur E. Maxwell
- John C. Maxwell
- Earle F. McBride
- William R. Muelberger
- Ed. Owen
- Amos Salvador
- Elias Sellards
- Frederick W. Simonds
- Scott W. Tinker
- Johan A. Udden
- Glenn Vargas
- Martha Vargas
- John A. Wilson
- Keith Young

Don't see your mentor on the list? Contact the Development and Alumni Relations team about creating an endowment!

(512) 471-6048 • alumni@jsg.utexas.edu
www.jsg.utexas.edu/alumni/support