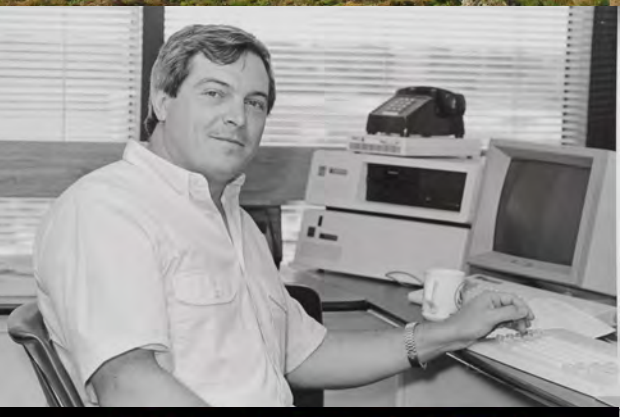

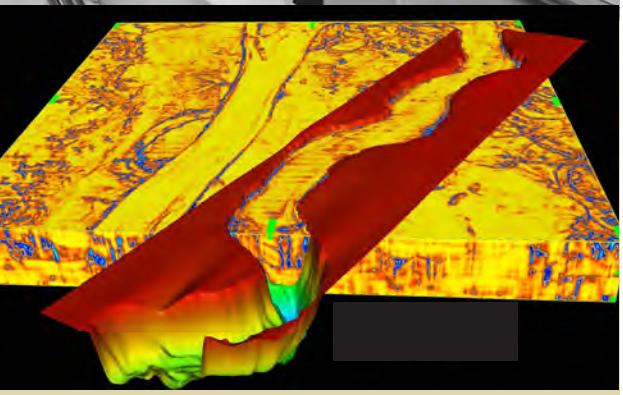

The Newsletter, a tradition since 1950, is published annually for friends and alumni of the Jackson School of Geosciences at The University of Texas at Austin.

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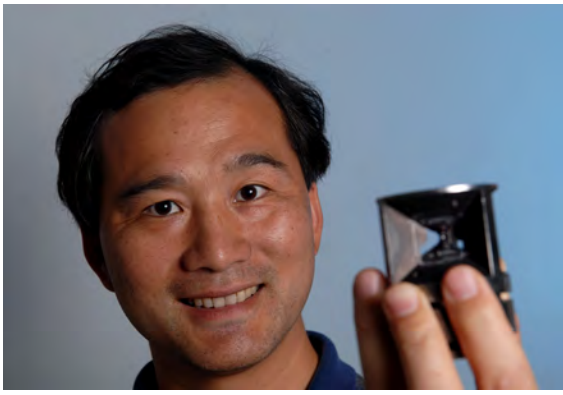


FEATURES

ON THE COVER: Poza Azul in Cuatrociénegas (Spanish for "four marshes"), a region of desert springs in Northern Mexico's Chihuahuan desert teeming with endemic species on a level biologists compare to the Galapagos Islands. The historically lush region is under threat (see opposite photo, this page) due to recent and extreme water loss. Jackson School Ph.D. graduate Brad Wolaver believes regional agribusiness is the main culprit, and his hydrogeological research makes a case for rewriting water policies in the region. See story on page 45.

WELCOME

Dear Alumni and Friends,

It is my pleasure to share with you the 2008 Jackson School Newsletter covering the 2007-2008 academic year. This was an exciting time in the school as we began to implement our plan to become the country's preeminent geosciences program.

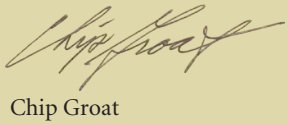
The first order of business was our drive to recruit new faculty and research talent in four strategic areas: energy geoscience, climate science, hydrogeology and surface processes, and crust / mantle / core dynamics. Our efforts met with great success. More than 500 candidates applied for our positions (a number equal to four percent of all of the geoscience faculty in the country). After a rigorous interview process, we hired 15 outstanding new faculty members, a mix of established and emerging stars who hold out great promise of keeping our school at the forefront of the earth sciences for years to come. You can read about several of them in the Scientists section of this *Newsletter*.

Our feature stories give you a feel for some of the outstanding research across the school. Hydrogeology is at the fore of Ph.D. graduate Brad Wolaver's pioneering work in Cuatrociénegas, a fragile ecosystem in Northern Mexico. Geophysics, hydrogeology and environmental geology come together in Jeff Paine's aerial survey work for the Bureau of Economic Geology. The STARR program, helping operators extend the yield of oil and gas resources in Texas, represents some of the school's applied research in energy. In tectonics, fundamental insights combined with innovative hands-on techniques helped Sharon Mosher and her team resolve a mystery at Macquarie Ridge.

Through our partnership with the Texas Advanced Computing Center, the Jackson School is emerging as a leader in computational geosciences, as you can learn from our efforts to reduce uncertainty in computer models. Our impact on public policy is documented throughout this publication, in items about research on energy, water, climate, and even the country's territorial integrity. We also continue to increase our impact on K-12 education through GeoFORCE, our summer academy program, and now through the Texas Earth and Space Science Revolution, a multi-year NSF-funded program for teachers in Texas.

Finally, we honor the work of two departing leaders: Eric Barron, who left after two years as dean to become director of the National Center for Atmospheric Research, and Paul Stoffa, the long-time director of our Institute for Geophysics.

Our hiring and program development activities have depended heavily on income from the Jackson endowment. To be the best, we need support that takes us beyond this funding and I encourage you to consider a contribution using the form included with this newsletter. Please update us on your activities and contact information so we can stay in touch and share your news with alumni and friends of the Jackson School.



Chip Groat
Interim Dean

RESEARCH HIGHLIGHTS

Bigger Splash

Researchers from the Jackson School have compiled the most detailed three-dimensional seismic images yet of the Chicxulub crater—the mostly submerged and buried impact crater on the coast of Mexico—and the new images may modify a theory explaining the KT Extinction Event.

Most scientists agree the impact that formed the Chicxulub crater, when an asteroid struck Earth 65 million years ago on the coast of the Yucatan Peninsula, played a major role in the extinction of 70 percent of life on Earth, including the dinosaurs.

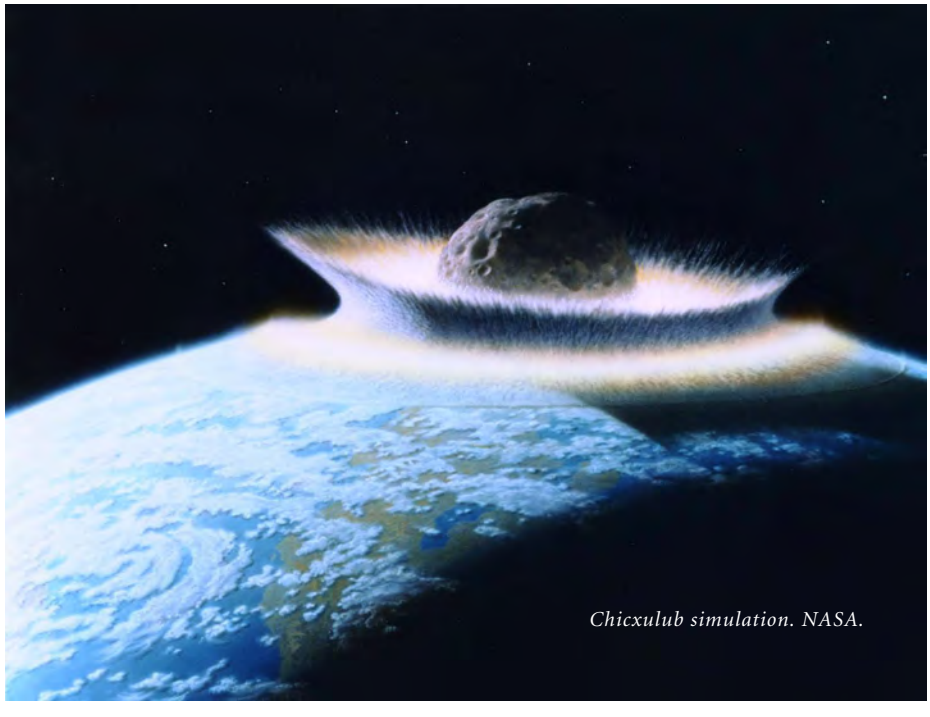
According to Sean Gulick, a research scientist at the Institute for Geophysics and principal investigator for the project, the new images reveal the asteroid landed in deeper water than previously assumed. As a result, it released about 6.5 times more water vapor into the atmosphere.

The impact site also contained sulfur-rich sediments called evaporites, which would have reacted with water vapor to produce sulfate aerosols. According to Gulick, these could have made the impact deadlier in two ways: by altering climate (sulfate aerosols in the upper atmosphere can have a cooling effect) and by generating acid rain (water vapor can flush the lower atmosphere of sulfate aerosols, causing acid rain). Earlier studies had suggested both effects might result from the impact, but to a lesser degree.

"The greater amount of water vapor and consequent potential increase in sulfate aerosols needs to be taken into account for models of extinction mechanisms," says Gulick.

The results appear in the February 2008 edition of the journal Nature Geosciences. Collaborators included Gail Christeson also at the Institute, Penny Barton at the University of Cambridge, Joanna Morgan and Mike Warner at Imperial College, and several graduate students.

Gulick says the mass extinction event was probably not caused by just one mechanism, but rather a combination of environmental changes acting on different time scales, in different locations. For example, many large land animals might have been baked to death within hours or days of the impact as ejected material fell from the sky, heating the atmosphere and setting off firestorms. More gradual changes in climate and acidity might have had a larger impact in the oceans.



Chicxulub simulation. NASA.

Exploration Gets Small

Since January 2008, the Bureau of Economic Geology has been managing the Advanced Energy Consortium (AEC), a new multimillion-dollar research consortium dedicated to the development of micro and nanotechnology applications to increase oil and gas production. The Richard E. Smalley Institute for Nanoscale Science and Technology at Rice University is a collaborative technical partner.

The consortium's primary goal is to develop intelligent subsurface micro and nanosensors that can be injected into oil and gas reservoirs to help characterize the space in three dimensions and improve the recovery of existing and new hydrocarbon resources. By leveraging existing surface infrastructure, the technology will minimize environmental impact.

AEC
ADVANCED ENERGY CONSORTIUM

Members of the privately funded consortium include BP America Inc., Baker Hughes Incorporated, ConocoPhillips, Halliburton Energy Services Inc., Marathon Oil Corp., Occidental Oil and Gas, and Schlumberger. The Bureau is managing the Houston-based AEC on behalf of the funding members.

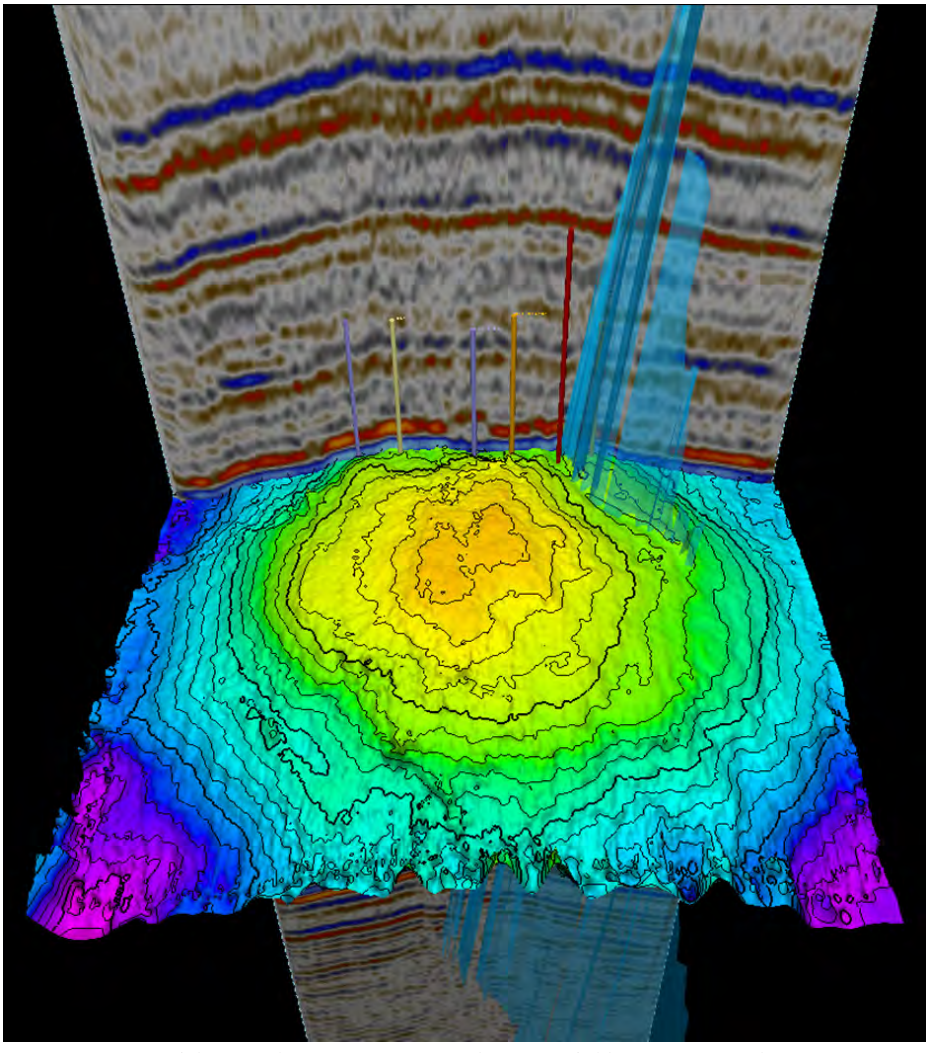
"The petroleum industry realizes there are exciting possibilities for the application of nanotechnologies that will provide a more comprehensive picture of existing oil and gas reserves," said Scott W. Tinker, director of the Bureau. "The consortium provides a vehicle for this critical pre-competitive research and sends a great message to young people that the industry is investing substantially and for the long term."

Major Carbon Storage Test

The Bureau of Economic Geology has received a 10-year, $38 million subcontract to conduct the first intensively monitored, long-term project in the U.S. studying the feasibility of injecting a large volume of carbon dioxide (CO_2) for underground storage.

The project is designed to build public assurance about the use of carbon sequestration—storing CO_2 underground—to reduce atmospheric emissions.

The project is a phase III research program of the Southeast Regional Carbon Sequestration Partnership funded by the National Energy Technology Laboratory of the U.S. Department of Energy (DOE) and



Seismic image of the Tuscaloosa Formation, Denbury Cranfield Unit near Natchez, Miss., where Bureau researchers are monitoring CO_2 injected 10,000 feet below the surface.

managed by Southern States Energy Board of Norcross, Georgia. Denbury Resources Inc. of Plano, Texas, will host and support in-kind the Bureau-led field project.

"This is the next step in a series of bureau-led experiments to test much-needed carbon capture and storage technologies," said Scott W. Tinker, director of the Bureau.

"I am very proud of our carbon research team led by Susan Hovorka," Tinker said. "They are the reason the Bureau of Economic Geology has been chosen for this historic 10-year effort to reduce emissions."

The Bureau's project will study the feasibility of injecting large volumes of CO2 at high rates into deep brine reservoirs. The project has been designed to develop best practices for future large-volume injections by gathering a greater variety of subsurface data than any previous experiments. Key issues include estimating the CO2 storage capacity of brine reservoirs, understanding the effects of injection pressure and developing methods for documenting retention of CO2 in the injection zone.

The SECARB partnership will demonstrate CO2 injection rate and storage capacity in the Tuscaloosa-Woodbine geologic system that stretches from Texas to Florida. The region has the potential to store more than 200 billion tons of CO2 from major point sources in the region, equal to about 33 years of U.S. CO2 emissions overall at present rates.

The project will involve 20 research partners worldwide, including the University of Mississippi, Mississippi State University, Schlumberger, Advanced Resources International, Southern Company and four national labs. The injection will take place 10,000 feet below the land surface near the Cranfield oil field about 15 miles east of Natchez, Miss.

Caribbean Tsunami Risk

Many people enjoy vacations on Caribbean beaches or crisscrossing the Caribbean Sea on cruise ships. Should visitors to the region be concerned about being engulfed by an earthquake-triggered tsunami similar to the Sumatra earthquake and tsunami that killed 225,000 people in December 2004?

That was the question posed—and answered—by Paul Mann, senior research scientist at the Institute for Geophysics in an article for Phi Kappa Phi Forum, the quarterly magazine of the national academic honor society.

The short answer, wrote Mann, is yes, there is a danger of large tsunamis in the Caribbean. The 3,000 kilometer long North American-Caribbean plate boundary ranks with the great seismogenic, strike-slip plate boundaries of the world including the San Andreas fault zone of California and the North Anatolian fault zone of Turkey.

The plate boundary—which runs through Jamaica, southern Cuba, Hispaniola, Puerto Rico and the Virgin Islands—is a known killer. The largest strike-slip event recorded on the western plate boundary was the M7.2 Guatemala event of 1976. That event took the lives of 22,780 Guatemalans and left more than a million homeless in a country with a total population then of about 5.5 million people. In the past 500 years, several other major earthquakes and the tsunamis they spawned have led to fatalities.

Mann and colleagues have discovered at least two more reasons for concern.

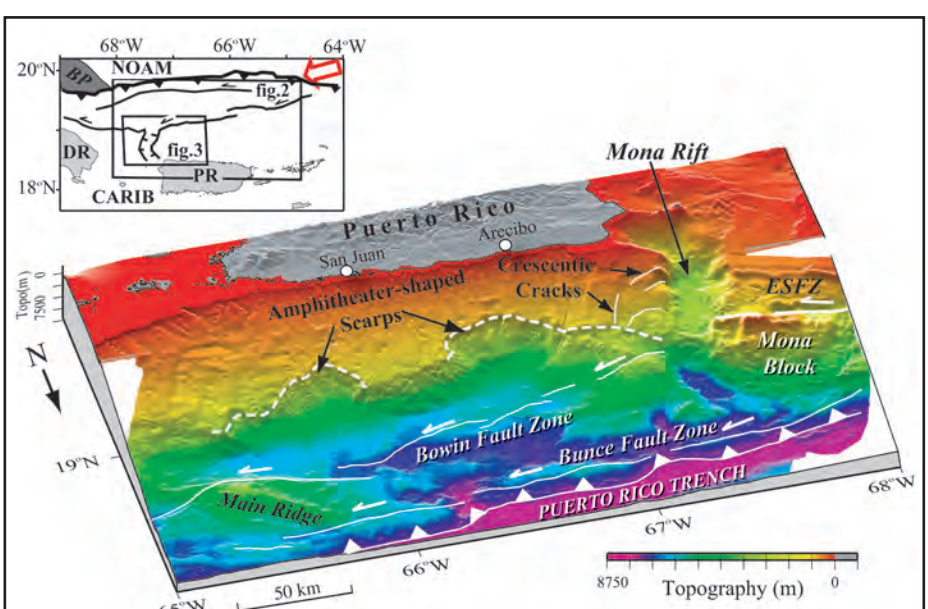
For one thing, it's been 800 years since the plate-boundary fault that passes through northern Hispaniola last ruptured. Since then, the fault has been quiescent but silently accumulating strain in the upper crust imparted by a steady 20 millimeters per year of plate motion at depth. Even at lower estimates of fault motion, the fault has accumulated about 5 meters of stored slip that could be released suddenly to produce an M7 earthquake.

Even more sobering is the presence of two large-scale, amphitheater-shaped slump features on the seafloor that may have produced immense, prehistoric tsunamis along the northern margin of Puerto Rico. Mann and colleagues mapped the seafloor and identified large, 35- to 40-km-long crescent shaped cracks forming in a shape similar to the dimensions of the prehistoric slumps. Cracking indicates these areas are close to failure in the same mode as the older slump scars.

Matt Hornbach, a research associate at the Institute, is using the bathymetric and seismic reflection data to identify slumps in the area of a 1918 tsunami and will then use modeling

to match the location and size of the slump to the location and wave run up heights.

The estimated total volume of slumped material in one of the slump areas (1,100 kilometers) is similar to the calculated volume of the Storegga slide off Norway that generated a 25 to 30-m-high tsunami along the coast of Scotland. The effects of future large tsunamis on the densely populated coast of Puerto Rico (including the city of San Juan with a population of 434,000 plus many visitors) would be devastating.



Large ampitheater slump features on the northern margin of Puerto Rico and the Virgin Islands may have produced big, prehistoric tsunamis, and might be poised to do so again.

Hot Water

In the coming decades, experts predict water shortages for Texas due to population growth—and now climate change, which could exacerbate the state's problems if warmer weather leads to lower rainfall.

The three-day conference "Forecast: Climate Change impacts on Texas Water," organized by Texas State's River Systems Institute and co-sponsored by the Jackson School, gathered experts from across the country working to understand the potential impact of climage change on water resources. Meeting in Austin, the scientists explored Texas' preparation for climate change, its impact on rivers, agriculture, water resources and biodiversity.

Kathy Jacobs of the Arizona Water Institute said increased aridity will undoubtedly lead the state to explore desalination plants and projects to move major amounts of water from one part of the state to another.

The only problem, she said, is that's going to take a lot of energy to move the water.

"The energy equation is so dependant on water supply," Jacobs said. "I don't think there is enough appreciation of how important it is that it takes a lot of water to create a lot of energy and it takes a lot of energy to pump and treat water."

Gerald North, an atmospheric scientist from Texas A&M University, noted another potential impact a water shortage could have on energy. With many visions of the state's future including a growing number of rivers not making it to the coast, he said there could be a very concrete impact on power production.

"What will happen to the nuclear reactors we've placed on those rivers for cooling?" he asked.

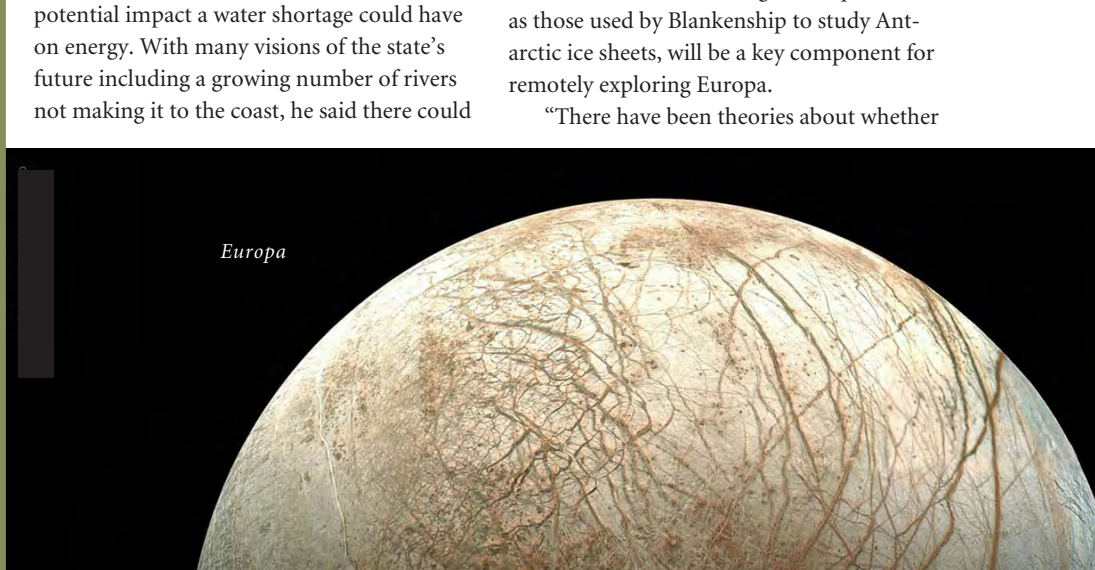
Return To Europa

Jupiter's moon Europa is just as far away as ever, but new research is bringing scientists closer to being able to explore its tantalizing ice-covered ocean and determine its potential for harboring life.

Don Blankenship, research scientist at the Institute for Geophysics, has been involved in the planning of an unmanned space mission to Europa.

Some of the new ideas for exploration of Europa from orbit include improved measurements of chemical compounds at the surface and a method for combining gravity and magnetic data to determine the thickness of the ice and the salinity of the underlying water. New radar sounding techniques, such as those used by Blankenship to study Antarctic ice sheets, will be a key component for remotely exploring Europa.

"There have been theories about whether



If A Tsunami Hits

Because tourist facilities are concentrated in coastal areas, tourists and visitors should be advised they are treading in a tectonically active area with a long historic record of infrequent large earthquakes and accompanying tsunamis. Here are two practical and possibly life-saving pieces of advice during an earthquake and tsunami:

1. Do not run out of a house or hotel when earthquake shaking begins. You are likely to be hit by falling debris, including telephone and electrical wires, poorly attached storefront signs, and building ornaments. Instead, do not panic, stay indoors, and get under a table or bed to protect yourself from falling debris that may include the ceiling fan of your room, wall hangings, and bookcases. After the shaking subsides, make your way outside.

2. Seek higher ground if you are on the coast and you see the water suddenly start to withdraw and expose the shallow seabed. Many lives have been lost during tsunamis (including the Sumatra event of 2004) because uninformed people have blithely walked seaward to investigate the exposed seafloor rather than hurrying landward to seek higher ground. Because the height of some tsunamis is fairly modest (several meters), gaining only a few meters of elevation (including going to a second floor) may be all that is required to remove yourself from the zone of inundation.

Gardner

BRIEFS

the ice above the ocean is thick or thin, and now we have the ability to determine this with radar," said Blankenship. The ice-penetrating radar will also be able to locate liquid water both within and beneath the shell, he continues, just as it can spot water within crevasses and lakes beneath the ice of Antarctica. "Free water within the icy shell and its relationship to the underlying ocean will be a critical factor in determining the habitability of Europa," he added.

Researchers are also preparing for the day when they will be able to get to Europa's surface and ultimately into its ocean to explore it with robots.

"Ice-covered lakes in Antarctica are good, small-scale analogs to what we might find on Europa," said Peter Doran, associate professor at the University of Illinois at Chicago. Doran is lead investigator of a project in collaboration with Austin-based Stone Aerospace to develop an autonomous underwater robotic vehicle to test procedures for exploring Europa's ocean.

The explorer will be able to create three-dimensional maps of a subsurface lake and map the biochemistry of the water body, pinpointing chemical signatures that may indicate life. As reported in the 2007 *Newsletter*, Stone Aerospace previously used a prototype of the robotic explorer to plumb the depths of the world's deepest fresh water sinkhole, Cenote Zacatón in Mexico.

Solomons Update

One year after a devastating earthquake and tsunami in the Solomon Islands killed 52 people and displaced more than 6,000, scientists are revising their understanding of the potential for similar giant earthquakes in other parts of the globe.

Geoscientists from the Jackson School and their colleagues reported in the journal *Nature Geoscience* that the rupture, which produced an 8.1 magnitude earthquake, broke through a geological province previously thought to form a barrier to earthquakes. This could mean other sites with similar geological barriers, such as the Cascadia Subduction Zone in northwestern North America, have the potential for more severe earthquakes than once thought.

The scientists report that the rupture started on the Pacific seafloor near a spot where two of Earth's tectonic plates are subducting, or diving below, a third plate.

The two subducting plates—the Australian and Woodlark plates—are also spreading apart and sliding past one another. The boundary between them, called Simbo Ridge, was thought to work as a barrier to the propagation of a rupture because the two plates are sliding at different rates, in different directions, and each is likely to have a different amount of built up stress and friction with the overlying rock. But the boundary did not stop the rupture from spreading from one plate to the other.

"What our work shows is that this is a barrier, but not a reliable one," says Taylor, who used the uplift and subsidence of corals to reconstruct how the fault ruptured. The work has implications for earthquakes in other parts of the world.

"If such boundaries are not a barrier to rupture in the Solomons, there's no reason to believe they are in Cascadia either," says Taylor.

The last great earthquake along the Cascadia Subduction Zone was in the year 1700 with an intensity estimated around magnitude 9. The geological record suggests such great quakes occur there every few hundred years.

Tiny Bubbles

Volcanoes, like people, each have their own distinct personality. Hawaii's lava oozes gently without a care in the world. Mount St. Helens and Mount Vesuvius seduce hapless strangers with their quiet slumbering beauty, then abruptly awaken in fury. Fickle Mount Aetna can't seem to make up its mind.

According to Jim Gardner, associate professor in the Department of Geological Sciences, the personality of a volcano has a

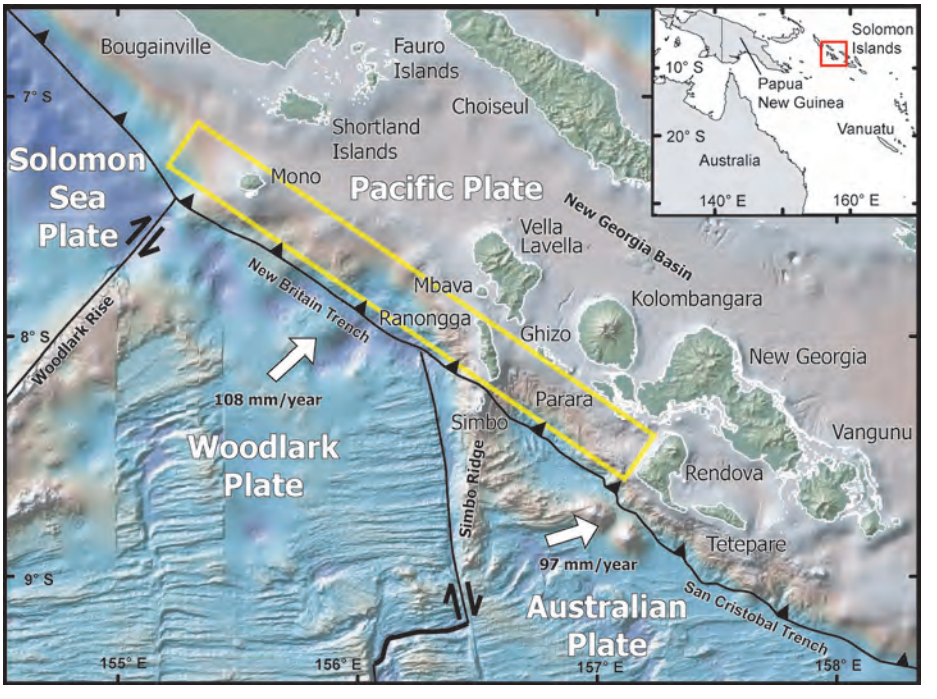


Plate tectonic setting and bathymetry of the western Solomon Islands. The yellow rectangle indicates the approximate rupture zone for the April 2007 earthquake.

Recent discoveries near a major oil field offshore of Trinidad suggest the potential for a large earthquake.

lot to do with how easily molten rock deep underground can form bubbles. The technical term is "degassing," a process in which gases such as carbon dioxide or water that were dissolved in the molten rock come out of solution. The National Science Foundation recently awarded Gardner a three-year grant to conduct a series of laboratory experiments investigating how the composition of molten rock affects degassing.

"You can imagine if it's harder to get bubbles to nucleate, then you might be more likely to get an explosive eruption," said Gardner. "If it's easier, you're going to get a much more passive eruption."

In the Experimental Petrology Laboratory, Gardner uses a pressure chamber and furnace to create small slugs of glass that resemble molten rock. Next, he lowers the pressure to force bubble formation. Finally, he quickly drops the temperature to freeze the bubbles in place in the solidified sample for easier study, then repats the process many times over with variation.

"With this project, we're trying to find out where the balance is for a whole range of magma compositions—anything from basalts, which form at mid-ocean ridges or Hawaii for example, to rhyolites, like those erupting at Mount St. Helens or Yellowstone," said Gardner. The project won't help scientists predict when a volcano will erupt but could "help us answer the question, 'If an eruption occurs, what will it be like?'"

Earthquake Hazard in Trinidad

The Republic of Trinidad and Tobago is the largest oil producer in the Caribbean region. Its oil and gas riches are partly due to the complex geologic structures and thick sedimentary basins formed by the eastward motion of the Caribbean plate past the northern edge of the South American continent. GPS studies show this active plate motion is accommodated by the Central Range fault that cuts through the central part of Trinidad. The country occasionally feels strong earthquakes related to episodic slips in the jerky plate motion, but has not experienced a large destructive quake in its 500 year long history.

One of the largest oil fields in the area is the Greater Angostura field located on the broad shelf area east of Trinidad and operated by a consortium led by BHP, an Australian natural resources company and Talisman, a Canadian exploration company. BHP, aware of possible seismic hazards, funded a group from the Jackson School to improve the offshore mapping of the fault and its offset.

David Soto (M.S. '07, now with Repsol) received a 3D seismic block measuring 60 km long and 25 km wide to work on as part of his master's study. Working with his advisors Paul Mann and Alejandro Escalona (Institute for Geophysics) and Lesli Wood (Bureau of Economic Geology), Soto was first to recognize an active fault zone that ran the length of his seismic cube and was continuous with the on-land Central Range fault zone. Soto's data suggests the fault could be storing as much as 3.7 m of accumulated strain. If released suddenly, a magnitude 7.2 earthquake could result, suggesting the importance for Trinidad to improve earthquake contingency plans.

Research Push on Sea-Level

When the three-day WALSE workshop convened in March 2007, Don Blankenship knew the timing was good for a meeting on the fate of the West Antarctic Ice Sheet. As described in the 2007 *Newsletter*, the West Antarctic Links to Sea-Level Estimation (WALSE) workshop, hosted by the Jackson School, brought together U.S. and European experts in ice sheets, oceanography and atmospheric circulation. They developed a new hypothesis to explain why the ice sheet is thinning at an accelerating rate. Since the conference, the scientific community has mobilized to better understand the behavior of the ice sheet.

Shortly after the workshop, the National Science Foundation created an entirely new interdisciplinary program called Antarctic Integrated and Systems Science, incorporating some of the recommendations from the workshop. A subsequent article by the workshop participants, published in *EOS*, set out a vision for future research.

Blankenship and Ginny Catania of the Institute for Geophysics have begun working with researchers at the University of Kansas to collect and analyze radar data from Thwaites Glacier to see how the ice sheet margin has changed over time.

Three months after the WALSE workshop, a NASA-sponsored workshop was held to start designing ICESAT II, a new mission to monitor ice sheet mass balance and sea ice thickness. The new satellite, recognized as a top priority by the National Academy of Sciences, is slated to launch in 2015. In recent years, NASA had cut earth science funding to free up money for the International Space Station and manned space missions.

According to NASA researcher Robert Bindschadler, since WALSE, the earth science funding climate at NASA has greatly improved. He credits WALSE with raising awareness about how rapidly ice sheets are changing and with helping define what kinds of data NASA's new mission should acquire.

"It's hard after just a year and a half to point to something and say, that happened because of the workshop," said Jack Holt, researcher at the Institute. "Things often take years to get off the ground. But the workshop certainly raised awareness in the scientific community."

"I've never been part of a workshop that has had so much impact so quickly," said Blankenship.

Anti-Greenhouse Gas?

Alan Robock, a professor of environmental science at Rutgers University, sat in a scientific meeting listening to his colleagues explain how global warming might be reversed by a novel technique: injecting sulfate aerosols into the stratosphere. The idea made some sense. Immediately following large volcanic eruptions, such as Pinatubo in 1991, global temperatures drop and remain lower than normal for a few years. The global cooling results from sulfate aerosols spewed into the atmosphere which block out some of the incoming sunlight.

As he listened to the plan for a global warming fix, Robock immediately thought of reasons why it might be a bad idea. In fact, before the talk was through, he had a list of 20. He later used a NASA climate model to test his concerns. At the invitation of Liang Yang, professor in the Jackson School of Geosciences, Robock presented his critique to Yang's students:

- Climate models suggest that parts of the world such as India, North and Central Africa and South Asia would get less precipitation. That could impact many millions of people who rely on rain for agriculture and drinking.


Robock

- A host of environmental disturbances would likely result, including depletion of Earth's protective ozone layer, more acid rain, more ocean acidification and less direct sunlight for plants.
- The cost could be staggering. Because temperatures would rise quickly once injection stops, the process would have to be continuous and never ending.

BRIEFS

Excerpts from "There's Adventure in Geology," 2007 GSA Presidential Address by Jack Sharp

There's Adventure in Geology is a book written for young people in the late 1950s. It was given to my wife by one of her best friends before we were married with the admonition, "If you are going to marry a geologist, you have to read this." In my opinion, it wasn't really a great book, but I can certainly attest that the title is true!

My scientific odyssey has taken me to places I never would have imagined in my youth and early career. Who would have thought—I certainly didn't—that I would conduct field studies and present papers in Egypt, Australia, the UK, México, and Italy, as well as many U.S. states, most notably Missouri and Texas?


Sharp

I could not have imagined 35–40 years ago that my research path would have looked at processes in great sedimentary basins, surface water–groundwater interactions in major alluvial systems ... the effects of urbanization on groundwater systems, and karst hydrology. I never conceived I would have been even remotely associated with exploring Earth's deepest water-filled sinkholes as a prelude to eventual exploration of the solar system. To the geologists of the future: you are lucky; who knows what scientific adventures await you and where they will take you. Have fun! Truly, there is adventure in geology.

We geologists are a fortunate group of scientists. We work over a range of spatial and temporal scales that is rivaled only by the cosmologists. We look for minute chemical traces of life in ancient rocks and examine isotopic ratios, but we are also looking at deep earth structures and the evolution of the solar system where geology provides the ground-truth data. Unique to our science is the fact that we are concerned with both prediction and retro-diction of the processes that shape the world upon which we live. We are trying to decipher 4.5 billion years of Earth's history. The idea of geologic time (deep time), the evolution of life, and the concept of uniformitarianism are a few of our science's many gifts to mankind.

It might, however, be geology's projections of earth processes into the future that are the most important. What are our energy, mineral, and water resources? This question is important politically and economically.

Perhaps the great question of today is—how large a population can a state or region or the world sustain given predicted climate, geologic, hydrologic, technical, and socioeconomic changes? The failure to project these changes and their probable effects continues to be a major source of political and economic conflict.

Prediction of geologic hazards is also critical. In some cases, we do this relatively well—flood stages and major volcanic eruptions are examples—in other cases, we are less precise, such as in predicting major earthquakes, catastrophic subsidence, or the effects of mankind as a primary geologic agent of change. On much of the world's land surface, it is difficult to find a square kilometer that hasn't been profoundly affected by mankind. We are, perhaps, the major geologic agent affecting Earth's surface. Finally, our field of research has expanded beyond planetary confines.

Our challenges are exciting, and daunting. They also include:

- Integrating science, especially geology, into public policy decision making. For instance, we can predict sea level rise and floods, but we continue to build within one meter of mean sea level and on flood plains, areas that we are sure will be inundated eventually. We just cannot predict the timing. Are we rebuilding New Orleans in a rational manner? How do we communicate science to politicians, the business community, and the public?
- Environmental and climatic change. Geologists are in a unique position—we have documented significant changes over Earth's history. How do we predict the effects more precisely and how do we deal with the predicted change?

If addressing these challenges isn't an adventure, what is? We are indeed lucky to be geologists. The adventure continues!

Originally published in GSA Today. Republished with permission.

Robock said there are also many unknowns that would have to be addressed before such a system could be used in good conscience. For example, how do you get the world to agree on optimum climate conditions?

"Whose hand would be on the thermostat?" he wondered. "What if Russia wants it a couple of degrees warmer and India wants it a couple of degrees cooler? Would you have geoengineering wars?"

Aegean Symposium

In April 2008, the Jackson School hosted an international symposium on the geology of the Aegean region, which includes Turkey, Greece and the southern Balkans.

Experts presented talks on five general themes: outstanding problems and key geologic features of the Aegean, the geologic history of specific domains within the region, dynamic tectonic processes, links between geology and humans (including archaeology, human migration and natural hazards), and comparisons of the Aegean to regions elsewhere (such as the Basin and Range in the western U.S.).

"One of the most important outcomes is that the participants outlined a vision for future geologic studies in the Aegean," said Elizabeth Catlos, associate professor in the Department of Geological Sciences and lead organizer for the event. "That will be of great value to people wanting to start work there or extend current work."

Many of the talks have been expanded into papers, peer reviewed and collected in a downloadable volume at Earth and Environmental Sciences, a new online scientific proceedings archive.

Catlos and many of the participants hope the symposium will be the start of an ongoing series of meetings on the geology of the Aegean and have proposed a second symposium in 2010 in Athens, Greece.

A portion of the funding for the Donald D. Harrington Symposium on the Geology of the Aegean came from five endowed lectureships which typically support an annual presentation at the Jackson School: the Virgil E. and Mildred L. Barnes Distinguished Lecture, the Robert H. Cuyler Distinguished Lecture, the Fred L. and Frances J. Oliver Lectureship in Texas Hydrology and Water Resources, and the Judd and Cynthia S. Oualline Centennial Lectureship in Geological Sciences. Other major sponsors included the Jackson School of Geosciences, the Getty Oil Company Centennial Chair in Geological Sciences, and the American Association of Petroleum Geology.

Paleo Newt

Most people know Newt Gingrich from his Republican Party leadership in the 1990s and, more recently, his appearances on political talk shows. Few realize the former Speaker of the House is an avid amateur paleontologist.

As a child, he told Asher Price of the *Austin American-Statesman*, "I wanted to be a paleontologist or a zoo director." As a 14 year old he spent a summer documenting fossils in a Pennsylvania museum. And as speaker, he kept a T-Rex skull in the meeting room of his office, "just to remind ourselves that 85 million years ago, she thought she was very important, too."

Gingrich demonstrated his passion for paleontology during a special guest lectureship on "Dinosaurs, Birds, and the Challenge of Science in the 21st Century," an event sponsored by the Jackson School and conducted during the annual Society for Vertebrate Paleontology meetings, held in Austin in October 2007.

Professor Tim Rowe said the university brought Gingrich to Austin in part to help educate paleontologists about how they can influence public policy. During a closed door meeting with the leadership of the society, Gingrich made suggestions for how members could successfully approach policy issues of importance to the society, including ongoing debates about the validity of teaching creationism in the public schools. (Gingrich is on record as being strongly opposed to creationism in its claims to scientific validity.)

Gingrich spiked his lecture with examples of paleontological controversies from the 20th and 19th centuries.

"Knowledge evolves over time, and we should be cautious about what we know," said Gingrich.

At the same time, we should be passionate, he said, about the ways we can excite young people to become interested in science, which the former Speaker singled out as a vital necessity for the future of the country.

Former U.S. Speaker of the House Newt Gingrich meeting in Austin with leaders from the Society of Vertebrate Paleontology.

2007-2008 Commencement Address Excerpts

Lauren Greene, B.S. '07

Like most of the geologists in the crowd, I didn't originally come to UT as a geology major. After I attended Dr. Long's first introduction to geology class, I immediately fell in love with geology and decided to switch my major from biology to geology.

Both of my parents graduated college as geoscience majors, and my dad actually earned his master's in geophysics here at UT. You would think my parents would be excited, right? Well, the first thing my dad said after I told him was, "No way!" He couldn't believe it! See, he graduated in 1983 during the oil bust, when there were too many geologists and not enough jobs. The job market now is radically different than when they graduated, though. Recruiters from over 30 environmental and energy companies interviewed and hired students from the Jackson School this year, and the numbers are rising every year.

We are graduating in an exciting time. Some of the most important issues concerning the future of our country and our world will be decided based on the work of geologists. Rising energy prices, future fuel shortages, and political tensions will revolve around the oil and gas resources that geologists locate. Hydrogeologists are needed to help us know how to use our limited water sources in the most efficient way possible. Geophysicists and structural geologists prepare us for and warn us about earthquakes, volcanoes, and landslides. Global warming and the challenges of climate change are issues that revolve around the earth sciences.

Scott Tinker, Bureau of Economic Geology

Welcome to the first day of the unscheduled portion of your life. Welcome to the part of the script that you get to write; the part of the symphony that you get to compose. Now is your time! What could I possibly say that might be of use as you become the Shakespeare or Mozart of your own life?

I'll begin with a simple truism that I have learned from the many graduations I have attended. Let's call it Tinker's Axiom: Work hard, do right, show thanks.

Perhaps one day you may help save our planet, be recognized by the Nobel committee, and become wealthy and send money back to the Jackson School. These and similar undertakings, for the most part, are not under your control. Better to focus on things fully under your control, among which are how hard you apply yourself, how well you live, and your ability to recognize help and show thanks.

Larry Faulkner, Houston Endowment Inc.

Mr. Jackson provided the wherewithal for this university's programs in the geosciences to be at the very top internationally, and he did so with great hope and confidence and expectation.

As I consider the Jack Jackson whom I knew, "thoughtful ambition" is the phrase that keeps coming into my mind. He was indeed competitive and ambitious in his career. He was definitely ambitious for this Jackson School. About that, he was quite explicit. The very top of international leadership is what he identified as the goal.

But raw ambition can be grindingly destructive. In his life, Jack tempered ambition and made it constructive with both thought and thoughtfulness. Ambition alone was not a driver in his life. It was ambition coupled with an animating idea of value, an underlying concept or purpose. With his dedication to family and community, Jack Jackson also coupled thoughtfulness to ambition. His purposes generally included the future well being of others, even generations not yet born.

"Thoughtful ambition." That's what gave rise to the Jackson School. It affords a lesson for our individual lives.

James Pape, B.S. '08

A couple of years ago, the University of Texas adopted a new slogan. I'm sure more than a few of you probably remember the ad that appeared during UT football games with the resonant voice of Walter Cronkite boldly declaring: "What starts here changes the world." Admittedly, my first thought was, "Man, that seems a little grandiose." I mean, really, I didn't come to college to change the world. I came to college to better myself, to get an education, and to open the doors to future opportunities. However, today, as I look out at my fellow graduates, I believe that UT's motto may not be quite as grandiose as I first thought.

Left to right, from the 2008 Spring Commencement: Dan Smith, Anna Collins, Larry Faulkner, James Pape, Eric Barron, Sharon Mosher.

As graduates from the Jackson School of Geosciences, we have developed skills that are increasingly demanded by numerous sectors of society. Geologists and geophysicists are at the forefront of meeting the worlds ever-expanding energy needs. Hydrologists and geochemists face the task of managing increasingly scarce water resources, and tackling the remediation of environmentally hazardous sites. Researchers in a myriad of disciplines advance our understanding of a diverse array of topics ranging from the environment to the workings of Earth's core, and even processes occurring on planets beyond our own.

We, the graduates of 2008, are preparing to go out into a world that needs our talents today more so than ever before, and we will certainly have an impact on the future. The perseverance and integrity that characterize each of you make me confident that what we've started here really can change the world, and change it for the better.

Jackson School Hosts Fort Valley Students

Eight undergraduate students from Fort Valley State University (FVSU) visited Austin last April to meet students and faculty of the Jackson School of Geosciences and consider transferring into the school to complete their degrees.

The students from FVSU, one of Georgia's designated Historically Black Colleges and Universities, are members of the Cooperative Developmental Energy Program (CDEP). In the CDEP program, students complete three years of study in math or chemistry at FVSU and then go on to a second university (either UT Austin or Pennsylvania State University) to study geosciences for two more years or petroleum engineering for three more years. At the end of the program, students receive two degrees—one from FVSU and one from the second university.

This was a chance for the Jackson School to display educational and research opportunities, as well as lay out the requirements for admission and degree completion.

Charles Kerans and Peter Flemings, professors in the Jackson School, took the prospective students on a field trip to southwest Austin to study the geological remnants of an ancient volcano. They were asked to develop an explanation for the kinds of rocks they saw—their depositional history and why they changed—and even to predict where a good place might be to drill for oil. The students got a taste of academic life in the school by attending lectures on sedimentary rocks and geostatistics and touring the Jackson Geological Sciences Building.

Fort Valley State University students with Jackson School Professor Peter Flemings on a field trip near Austin.

Prospective students from Fort Valley State University toured Austin and the Jackson School with their professor Aditya Kar (far left), Jackson School professors Charlie Kerans (back row, left) and Peter Flemings (back row, third from right), and Stanley Stackhouse (back row, second from right), a FVSU alumnus and Jackson School graduate student.

"It's a two way street," said Flemings. "It exposes the students to potential opportunities. On the other side, it's teaching the Jackson School and the university about what these kids are like, the hard work they've put in and their potential."

All geoscience students at Fort Valley study under professor Aditya Kar. In fact, Kar, a petrologist by training who has taught at Fort Valley for 13 years, *is* the geology department. In addition to teaching students in their first three years of the CDEP program, he also takes high schoolers out on geological field trips each summer as part of the Mathematics, Science and Engineering Academy (MSEA) program, a pipeline program designed to encourage minorities to go to college and to study geosciences.

After many years working with hundreds of students, he's starting to see the fruits of his labor. For the first time ever, he now has two students who entered the MSEA program as 8th graders, went through the CDEP program, went on to work in industry, and are now returning to help him lead rafting trips in the Grand Canyon for 8th graders.

"For many years, I didn't get much feedback on the program," said Kar. "But now it's coming full circle. And that's a good feeling."

Science Literacy Workshop

Science radio journalists from across the U.S. participated in a Science Literacy Project workshop at the University of Texas at Austin last April to learn about current scientific research and gain tools for better reporting of complex science news stories.

The six-day workshop included sessions on geoscience, chemistry, genes, cells, the scientific method, responsibilities of a science journalist, astronomy and other topics. The workshop also included discussions with science reporters and editors from a variety of media, as well as experts in law, ethics, statistics and research.

Seven scientists from the Jackson School of Geosciences presented their work.

In a climate change panel, Don Blankenship and Ginny Catania discussed their work on large ice sheets, climate change and sea level rise, while Charles Jackson spoke of the uncertainties in climate models.

A second panel discussion focused on energy sources for the future. The panel, which addressed the scientific, technological, societal and political dimensions of energy, featured Eric Potter, Michael Webber and Paul Mann. Sean O' Kelly, associate director of the university's Nuclear Engineering Teaching Lab, also spoke.

Bridget Scanlon presented her work on the impact of changing land-use on water sustainability, which has implications for the future of global economics and politics. She discussed some of the surprises she discovered in studying the potential worldwide

effects of converting grassland to cropland and the long-term implications of irrigated agriculture.

"The generosity of the presenters was remarkable," said Bari Scott, executive director of SoundVision Productions of Berkeley, Calif., which sponsored the project in cooperation with Latino USA and KUT-FM at the university. "Professors and research scientists alike were eager to meet with our group, took great care in preparing their presentations, rearranged their schedules to accommodate ours, and accepted honoraria far below what they usually receive."

"One of the issues that we consider is that most of the reporters have very little science background, yet, they are more and more being given the responsibility to communicate science and technical issues, research and implications to their audience," she said. "They feel that this is an awesome responsibility or should I say an overwhelming obligation—one that they want to get right, but don't have the training or the background."

Peña and researchers from the Institute for Geophysics sailed the Drake Passage on the U.S. Coast Guard cutter Healy, shown cutting a path through the Antarctic ice. Image: U.S. Coast Guard.

Teachers in the Field

The Institute for Geophysics continues to involve K-12 science teachers in field programs and research cruises. Katie Peña, a science teacher from Zilker Elementary School in Austin, sailed on the Scotia Sea cruise as part of PolarTREC, an NSF-sponsored educational research experience for K-12 teachers. Texas science teacher and TXESS Revolution participant Julie Pollard sailed on IODP expedition 317 to develop curriculum materials for the Consortium for Ocean Leadership's Deep Earth Academy. During the summer of 2008, 10 TXESS Revolution minority-serving high school teachers participated in SIEDCAR (Seismic Investigation of Edge Driven Convection Associated with the Rio Grande Rift) by deploying seismographs along the western edge of the Great Plains in New Mexico and Texas. The teachers will return to the Institute in the summer of 2009 to help analyze the SIEDCAR data. In addition to receiving the data, teachers will get an AS-1 seismograph with software and instructions for use. The teachers will use the seismometers to teach the basics of seismology in their classrooms.

GeoFORCE Keeps Growing

GeoFORCE Texas completed its fourth year during the summer of 2008 with enrollment topping 500 students. The increase resulted from the addition of students from the Houston Independent School District and from two new one-time events for the Texas High School Project (funded by the Communities Foundation of Texas).

Recognizing that GeoFORCE provides an excellent opportunity not just to experience geology but also to engage in public service, the program began recruiting Jackson School undergraduates to serve as counselors. In 2008, thirteen undergraduates took part in GeoFORCE activities. Nysha Chaderton, a Jackson School doctoral student, served as co-instructor for the ninth-grade academy in Washington, D.C.

In addition to Leon Long of the Department of Geological Sciences, who has participated as an instructor for four years, this year the program added Terry Quinn and Bayani Cardenas from the faculty, along with emeritus faculty member Ernie Lundelius. Three Jackson School alumni also assisted as instructors: Chock Woodruff, Cristopher Marshal, and Jim Sansom. Several scientists and staff from the Bureau of Economic Geology also helped as instructors: Jeff Paine, Ramon Treviño, Becky Smyth, Tiffany Hepner, Scott Rodgers and Sigrid Clift.

In 2009, the program includes a full contingent of Houston students, bringing student participation to the objective of 640. The program is seeking increased funding to accommodate the expansion and to provide scholarship assistance for students who will begin their college careers in the fall of 2009.

GeoFORCE, the Movie

On the GeoFORCE Web site you can view a nine-minute movie where students explain what they love about the program. DVD versions are also available if you would like to show the movie to your organization or classroom.

See www.jsg.utexas.edu/geoforce.

Scenes from GeoFORCE Texas 2008

Left to right, top to bottom: 12th grade Young Geoscientists at White Sands National Monument, New Mexico; 12th grade Southwest academy students at Lover's Key, Florida, with Terry Quinn of the Jackson School; Jeff Paine of the Jackson School teaches 11th grade Houston academy students at Great Sand Dunes, Oregon; students find fossils on Bright Angel Trail, Grand Canyon, Arizona; 11th grade Southwest Young Geoscientists at Mount Bonnell, Austin, Texas.

Book Review: Fisher Publishes Memoir

Leaning Forward: A Memoir

By William L. Fisher
Bureau of Economic Geology (2008)

Years ago when William Fisher was a graduate student getting ready to begin his dissertation research at the University of Kansas, his advisor, Raymond C. (R.C.) Moore, called him into his office and told him his topic would no longer be the Plattsmouth Limestone, as he had been planning, but the Grand Canyon. The legendary geologist didn't ask Fisher about the change, he simply told him, "in pure Moore fashion," writes Fisher.

Realizing the trip would cost $10,000, Fisher told his advisor he couldn't afford it. Moore, writes Fisher in his memoir, *Leaning Forward*, "gave me a look that suggested that was my problem, not his." But then Moore made a phone call—to Kansas alumnus Dean McGee of the Kerr-McGee Corporation—and with that one call, he funded the trip.

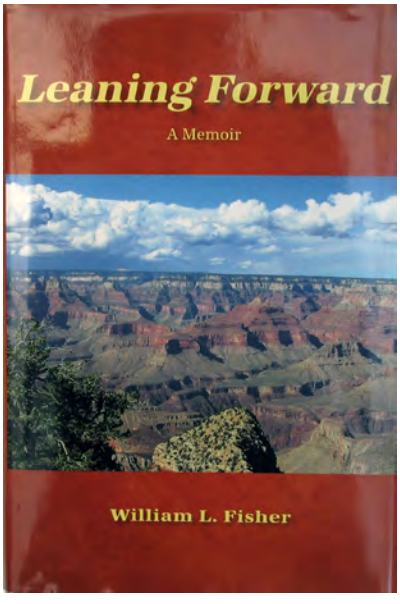
It's the kind of moment many of Fisher's students can appreciate, showing the impact a mentor can have on a young scientist's career. *Leaning Forward* is full of such stories, many as amusing as they are enlightening, detailing the varied life of one of the country's most celebrated petroleum geologists.

Today's students know Fisher as the first director and inaugural dean of the Jackson School, where he holds the Leonidas T. Barrow Chair in Mineral Resources. They may not realize the full breadth of his career, which spans six decades and multiple leadership roles in academia, the national geoscience societies, federal and state government, punctuated by his own pioneering research and recognition with the most prestigious awards in his field.

Readers of *Leaning Forward* can glean many lessons from Fisher's experience—and the learning goes down easy, because Fisher spikes his story with a wealth of anecdotes and stories. Some reveal unexpected sides of his character.

There's the story from Fisher's early career at the Bureau of Economic Geology, for example, about a colleague who got under his skin with his claims of superior petrologic knowledge. Fisher came back from the field one day with a sample bag containing scuffed up plaster of Paris casts, which he said were specimens he couldn't identify. Weeks later Fisher's boss, Peter Flawn, called Fisher into his office to gloat that this young scientist had just prepared a paper identifying a new mineral. "I knew I was in trouble and figured I had best cut my losses then and there," writes Fisher. He confessed to Flawn, who "gave me hell" but then called in the colleague to tell him "how stupid he had been."

To Fisher's credit, he points out the man later enjoyed a successful career in mining. This is a refreshing quality of the book—Fisher presents unvarnished stories of tension within the academic ranks, including run-ins with fellow faculty members. But in the end, he usually notes a friendship forged (even after one colleague threw a lit cherry bomb at him),



and he never fails to note the accomplishments of others.

Fisher was born in 1932 in Marion, Illinois. His family struggled during the Great Depression, and Fisher can still remember the day their farm finally got electricity. His parents encouraged him to pursue higher education, as did his surroundings: "[T]the continuous obligation of milking cows and cleaning stables were a good spur to do something else."

Following forays into agricultural studies and chemistry, Fisher discovered his love of geology. After a stint in the Army, he wound up at Kansas with Moore, one of the greatest stratigraphers and paleontologists of his time, "if not the greatest," writes Fisher. Moore went on to become Fisher's benchmark. A highlight of Fisher's career was receiving the Sidney Powers Medal in 1994, the highest honor of the American Association of Petroleum Geologists, which Moore won in 1959.

It was Moore's letter of recommendation that helped Fisher land his job at the Bureau of Economic Geology in Austin. The memoir includes an excellent abbreviated history of the Bureau and its predecessor surveys along with Fisher's personal perspective on the organization's growth under Flawn and then Fisher himself, who became director in 1970.

By that time, Fisher had established a national reputation as a researcher with his pioneering work in depositional systems. In the fall of 1967, the subject became the official name of a course Fisher co-taught with Al Scott. It has been taught at The University of Texas at Austin ever since while becoming common at other universities.

The main narrative of Fisher's book follows his career, including his work in Washington D.C. as Deputy Assistant Secretary of Energy (1975-76) and Assistant Secretary of Energy and Minerals; his return to Austin where he retained directorship of the Bureau and did stints as chair of the Department and long-time director of the Geology Foundation; and the launching of the Jackson School.

Additional chapters flesh out side themes, including the art of fundraising. There's something for just about everyone, from tips on how to get reports out of stalling government bureaucrats (withhold their travel funds) to Fisher's brief encounter with Al Gore.

Throughout, Fisher's voice livens the prose, as when he describes his twenty years working on low-level nuclear waste as "pure public service—a lot of hard work with a lot of ridicule, harassment, and baseless allegations and never the slightest expression of gratitude."

The title of the book, which comes from a cold war term meaning a "willingness to be aggressive, to take risks," embodies a philosophy of life for Fisher. "I have always been around and known people that were smarter than I," writes Fisher, "but I had drive and plenty of energy I was willing to expend—in my mind and soul, leaning forward—and some good fortune of timing." He describes life as "basically fate dealing you a hand; it is up to you how you play it. I have seen those dealt a good hand—brains, money, family—and make little. Some others deftly played a poor hand to advantage and accomplished much."

—J.B. Bird

Leaning Forward *can be purchased at the Bureau's TXshop online publications store or at Bureau Publication Sales.*

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IN THE NEWS 2007-08

Links to complete articles, streaming audio and video files, and current In the News items can be found on the news section of the Jackson School Web site.

In Geosciences, Business Is Booming

***Science*, Aug. 8, 2008**

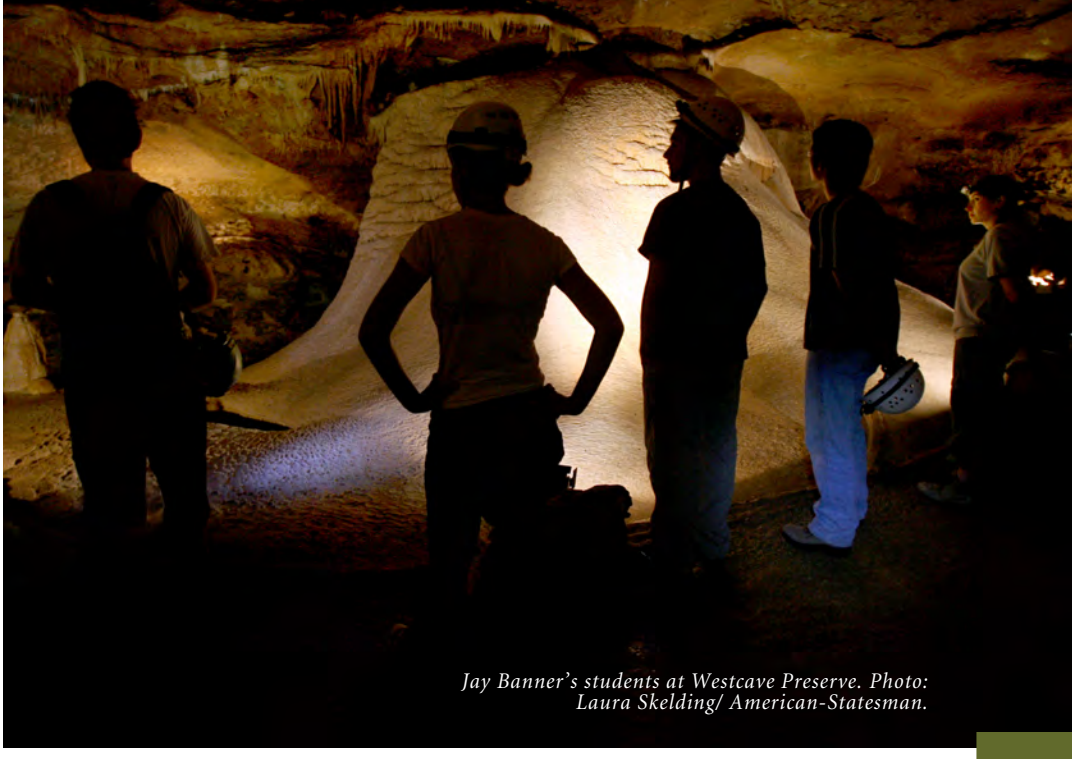
Flat federal funding means tight times in academia, but jobs abound in the petroleum, mining, and environmental consulting industries, where a desperate quest for new talent has sent companies scrambling to hire new graduates. The boom has been great for recent graduates like Kira Diaz-Tushman, who earned a master's degree at the University of Texas at Austin's Jackson School of Geosciences. A radio story six years ago about USGS retirements prompted the one-time aspiring lawyer to consider a career in geosciences. She's now an operations geologist for BP.

Kara Diaz-Tushman

Cow Power Could Cut GHG Emissions

***ABC, BBC, Daily Telegraph, Times of India, et al.*, July 24-Aug. 1, 2008**

"Cow power" from livestock manure could provide up to three percent of North America's electricity needs and lead to a significant cut in greenhouse gas emissions, according to Michael Webber, associate director of the Center for International Energy and Environmental Policy at The University of Texas at Austin. His study co-authored with undergraduate engineering major Amanda Cuellar was the first attempt to quantify the amount of renewable energy obtainable from herds of cows and other livestock on a national scale. Anaerobically digested, manure is converted into energy-rich biogas that can drive turbines to produce electricity.



Jay Banner's students at Westcave Preserve. Photo: Laura Skelding/ American-Statesman.

Prof Finds Climate Clues in Caves

***Austin American-Statesman*, July 08, 2008**

In the eyes of Jackson School geology professor Jay Banner, stalactites and stalagmites offer a frozen record of climate, rainfall and atmosphere changes over the past 70,000 years. As scientists work to measure global climate and levels of carbon dioxide, answers may turn up in the caverns that lie beneath Central Texas. Banner has made at least 100 trips beneath Texas to uncover clues about the past and future of the state's aquifers. "We can form a baseline level for the climate system before humans started doing things that supposedly change the climate," he said.

Seeing the Light

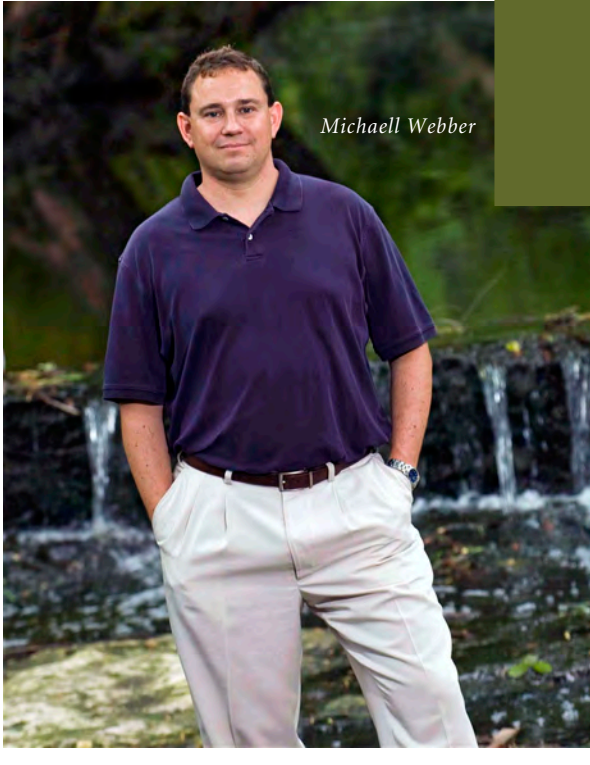
***The Economist*, April 10, 2008**

Paleontologists can now look inside fossils without damaging them, using the new synchrotron machine, which accelerates subatomic particles in a circle. A side effect of all these digital data is that they encourage the sharing of specimens, albeit virtual ones. The University of Texas's digital library, known as Digimorph, for example, contains hundreds of specimens and nearly a terabyte of data. Virtual paleontology thus promises to shake up a profession that once jealously hoarded items that were too precious or fragile to share, or were too rare to sacrifice to destructive techniques.

Water and Energy–Is There Enough?

***Detroit Free Press*, March 16, 2008**

It takes a lot of water to produce energy and a lot of energy to provide water. The two are inextricably linked, and claims on each are rising. "The water supply is as critical as oil," said Charles Groat, director of the Center



Michaell Webber

BRIEFS

for International Energy and Environmental Policy at the Jackson School. Water is consumed in countless facets of life, with no higher-level authority to control consumption. "No one is in charge," said Groat, a former director of the U.S. Geological Survey in Washington. "Energy planners assume we will have enough water. Water planners assume we will have enough energy." According to Michael Webber, associate director of the center, the problem is going to get worse since future alternative fuels are likely to be water-intensive.

Hybrids Save Gas But Not Water

***New York Times*, March 18, 2008**

One way to reduce the world's dependence on oil is to produce more cars that get power from the electrical grid rather than the gas pump. But Carey W. King and Michael E. Webber of the Jackson School of Geosciences found the shift would result in a significant increase in water use. With every mile driven by an electric car instead of a gas-powered one, about three times as much water is consumed (lost to evaporation) and 17 times as much withdrawn (used and returned to its source). While they do not think it would be bad to transition into electric vehicles, King and Webber say the impact would be severe enough to merit much more serious consideration in policy planning.

Courtesy HybridCarsNews

Supercomputer Opens New Era

***Austin American-Statesman, HPC Wire*, Feb. 18 & 22, 2008**

Marking the beginning of the Petascale Era in high-performance computing, "Ranger," the most powerful computing system in the world for open scientific research, entered full production Feb. 4 at the Texas Advanced Computing Center at The University of Texas at Austin. "The computational science community has been advocating for petascale machines for a decade," said Omar Ghattas, a professor at the Jackson School and director of the Center for Computational Geosciences. Ghattas leads an early user team that will produce the highest resolution models of convection in the Earth's mantle to date, enabling a better understanding of the evolution of tectonic deformation. Their work is emblematic of how larger high performance computing systems allow for better statistical analysis and higher-resolution visualization.

Sue Hovorka looks looks through a string casing for a well used to test changes resulting from the injection of CO_2 underground.

Carbon Capture for Coal in Question

***National Public Radio*, Feb. 8, 2008**

Half the country's electricity comes from burning coal, but the process pumps a lot of greenhouse gases into the atmosphere. The coal industry says it can curb greenhouse gases with technology called carbon capture and storage—grabbing the CO_2 and putting it in the ground. But does it work? Yes, according to Susan Hovorka of the Jackson School's Bureau of Economic Geology, where she leads the country's largest carbon sequestration test program. "Sequestration is absolutely doable," says Hovorka. "If I got to say one thing to people out there it would be that if you want power that reduces your guilt of releasing CO_2 into the atmosphere, you can have it. The question is, do people want it? Because it's not free."

Hovorka One of the 35 Shaping Future

***Texas Monthly*, Feb. 2008**

Here's a convenient truth: Many greenhouse gases polluting the atmosphere can simply go back where they came from, and the environment will be better and cleaner for it. That's the theory behind the work of Susan Hovorka, a research scientist at the Bureau of Economic Geology, who pioneered testing of carbon sequestration. Her research team just received a $38 million, ten-year federal grant to test the process on its largest scale yet in the U.S. "Texas has a mix of viable energy sources: hydroelectric, biofuels, solar, wind, hydrothermal, oil, natural gas, uranium, and coal," said Hovorka. "Texas needs to take a lead role in guiding energy policy so that this diversity can be best used."

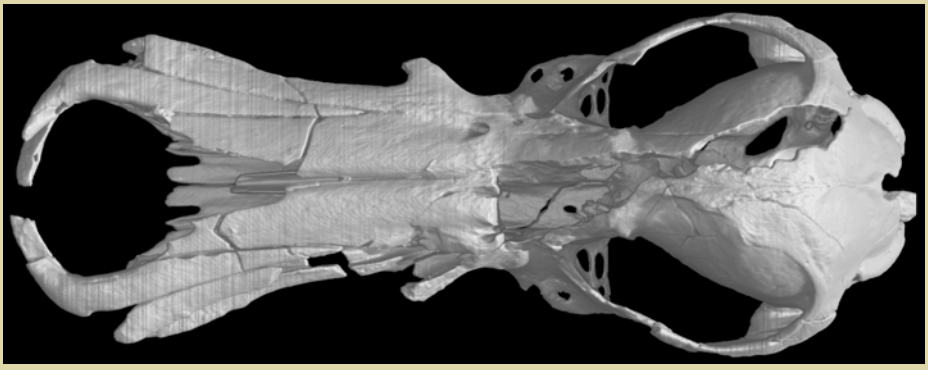
Nano Group Seeks Oil from Existing Fields

***Austin American-Statesman*, Jan. 16, 2008**

The Jackson School's Bureau of Economic Geology is managing a new research consortium to use nanotechnology to recover more oil and gas from existing oil fields. The Advanced Energy Consortium will be backed by seven companies that have agreed to invest $1 million a year each for the first three years of the program, including BP America Inc., Baker Hughes Inc., ConocoPhillips Co., Halliburton Energy Services Inc., Marathon Oil Corp., Occidental Oil and Gas, and Schlumberger Ltd. The Jackson School's Bureau of Economic Geology will coordinate the international research effort.

Platypus Much Older Than Thought

***National Geographic, New York Times, Associated Press, et. al*,**
Jan. 22-29, 2008
The following article by Scott Norris appeared in National Geographic News. Reprinted with permission.



Cranial Endocast from a Fossil Platypus, Obdurodon dicksoni. Digimorph.

Australia's duck-billed platypus has been around much longer than previously thought, according to a new fossil study that found the egg-laying mammal's origin traces back to the dinosaur days.

Platypuses and their closest evolutionary relatives, the four echidna species, were thought to have split from a common ancestor sometime in the past 17 million to 65 million years.

But remains of what was believed to be a distant forebear of both the platypus and the echidna—the fossil species Teinolophos—actually belong to an early platypus, according to scientists who performed an x-ray analysis of a Teinolophos jawbone.

The finding means the two animals must have separated sometime earlier than the age of the fossil—at least 112 million years ago.

Outlived the Dinos

The international team, led by Timothy Rowe, of the University of Texas in Austin, used a specially modified CT scanner to capture high-resolution images of the internal structure of a 112.5- to 122-million-year-old Teinolophos jawbone found in southeastern Australia.

The scientists found that the Teinolophos had already developed features thought to be unique to modern platypuses, including an electro-sensitive "bill" for finding aquatic prey.

"This pushes the platypus back across the K-T boundary," Rowe said, referring to the mass extinction event that wiped out the dinosaurs about 65 million years ago.

"Now it looks like [platypuses] crossed the boundary without any problem."

The study appears in the journal *Proceedings of the National Academy of Sciences*.

Platypus bills are complex sensory organs loaded with electrical receptors. In murky waters the animals hunt by tracking the weak electrical fields generated by muscle activity in fish and other prey.

Teinolophos had an electro-sensitive bill, the scientists concluded after imaging revealed a broad canal running through the bone of the lower jaw.

All mammals have some type of canal that conducts nerve fibers to the teeth, Rowe noted. But in the platypus, this canal is greatly enlarged to accommodate a massive network of fibers that carry sensory information from the bill. The claim that Teinolophos is a very ancient platypus rests largely on this feature.

"Nothing but the platypus has this huge canal," Rowe said.

Matt Phillips, of the Australian National University in Canberra, offered an alternative explanation for the new findings—that an early platypus-echidna ancestor had wide jaw canals, and this feature was retained by platypuses but reduced during subsequent echidna evolution.

In such a scenario, the split of the two species could still have been relatively recent, Phillips said.

Lead author Rowe counters that evidence for a more recent divergence is weak. He says it makes more sense to assume the wide canals are a unique feature of the platypus lineage.

Resetting the Molecular Clock

Because platypus and echidna fossils are rare, Rowe noted, most previous estimates of the strange animals' antiquity were based on molecular rather than fossil evidence.

The gradual accumulation of changes in the DNA of closely related species provides a kind of "molecular clock" that biologists can use to estimate when the species branched apart from one another.

DNA changes, however, don't occur at the same rate in different kinds of animals. The clock must be calibrated using other evidence, such as fossils.

Studies suggesting a more recent platypus origin have used a molecular clock calibrated with fossil information from marsupials and other mammals, not platypuses and echidnas, Rowe said.

The newfound early days of the platypus suggest that molecular evolution in platypuses and echidnas has proceeded at a far slower pace than in other mammal groups, the researchers say.

"None [of the molecular studies] predicted we'd find a platypus this old," Rowe said.

"The picture now emerging is that the monotremes are 'slow' in many respects," he continued.

Platypuses and echidnas are the only extant "monotremes," or mammals that lay eggs.

"Their metabolic and respiration rates are slower, their body temperature is lower, and it's possible that the monotreme lineage evolved at really slow rates," he said.


Don Blankenship

Closer Look at Europa Possible

***Science Daily, Spaceflight Now*, Dec. 14 & 24, 2007**

Jupiter's moon Europa is just as far away as ever, but new research is bringing scientists closer to being able to explore its tantalizing ice-covered ocean and determine its potential for harboring life. New radar sounding techniques will be a key component for exploring Europa, according to Don Blankenship, a research scientist at UT's Institute for Geophysics. "There have been theories about whether the ice above the ocean is thick or thin, and now we have the ability to determine this with radar," said Blankenship. "That's been proved by the radar on Mars Express, which imaged the north polar cap of Mars, and the higher-resolution radar on the Mars Reconnaissance Orbiter."

Dinosaur-Killing Meteor Made Bigger Splash

***Discovery Channel, USA Today, et al.*, Jan. 23-25, 2008**

Sean Gulick of the Institute for Geophysics was principal investigator of a study appearing in Nature Geosciences (with Gail Christeson of the Institute as a co-author) reporting that the asteroid that blasted out the Chicxulub impact crater landed in deeper water than previously assumed. As a result, the impact released about 6.5 times more water vapor into the atmosphere. This could help explain why the impact, thought to have been a major cause of the KT Mass Extinction, was so deadly.

Cores are Open Books to Geoscientists

***Midland Reporter-Telegram*, Nov. 25, 2007**

"Cores are irreplaceable," said George Bush, who manages the Bureau of Economic Geology's Midland Core Research Center. "The Earth doesn't change, but the technology of how we study the Earth is constantly improving," observed Bush, who has transformed the Midland center into an easily accessible resource for those looking to analyze cores and cuttings from oil and gas wells, essential in the search for more oil. Andrew Faigle, a geological materials specialist with the Bureau who staffs the center, said he has noticed an increase in requests for samples as the price of oil has risen, fueling an increase in drilling activity.

Barron: Current Science of Global Warming

***Earth & Sky Radio*, Nov. 21, 2007**

Eric Barron, climate expert and dean of the Jackson School, spoke with Earth & Sky Radio about the way scientists are now speaking about global warming. He said, "I think it's left behind, the notion of whether it's happening and whether or not humans play a role." The real debate, he said, is on how fast changes will occur, how big they'll be, and what impacts they'll have. He predicted that cities in arid regions, like Denver, will feel global warming's impact most in their water resources.

Some Areas More Tsunami Prone

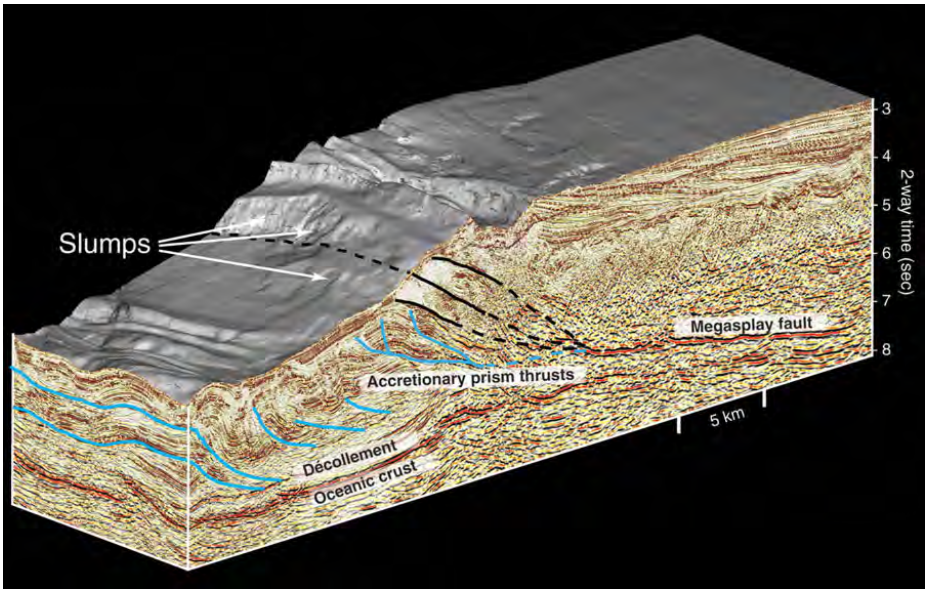
Asian News*, Nov. 16, 2007*

Geoscientists have long wondered why the Nankai Trough, a region of the Pacific seafloor off the coast of Japan, is so good at generating devastating tsunamis. A new study published in the journal Science just might answer that question. Nathan Bangs, a senior research scientist at the Institute for Geophysics, collected 3D seismic data from within the trough and found two possible contributing factors. "By understanding places like Nankai, we'll have more information and a better approach to looking at other places to determine whether they have potential to generate tsunamis."

East Texas Field Will Produce Through 2030

***Longview News-Journal*, Oct. 31, 2007**

The East Texas Oil Field is still producing about 11,000 barrels of crude a day, and should be around at present production rates for another generation, according to a year-long study by the Bureau of Economic Geology. Eric Potter, assistant director for the Bureau, said while 11,000 barrels of oil pumped daily may sound like a lot, the volume is a fraction of what it once was. "The field is just a ghost of its former self," Potter said. "At current rates, it's producing only about 2 percent of its peak in 1940." "But at current oil prices, producing here can still be very attractive," Potter said.



Nankai Trough: 3D seismic data volume depicting the location of the megasplay fault (black lines) and its relationship to older in sequence thrusts of the frontal accretionary prism (blue lines). Steep sea-floor topography and numerous slumps above the splay fault are shown.

JSG Alumnus Kick-Starts Texas Vodka Industry

***Arkansas Democrat-Gazette*, Oct. 21, 2007**

Bert Butler Beveridge II, a University of Texas graduate with degrees in geology and geophysics and experience in the oil patch, launched Tito's Handmade Vodka in 1997. As the granddaddy of the Texas vodka distilleries, Beveridge's label is celebrating its 10th anniversary this year, producing about 200,000 cases of vodka this year. Texas' vodka distillers, all three of which are located in the Austin area, hope to tap into the global thirst for vodka, the world's most popular alcoholic spirit.


Liz Catlos

Rock of Ages

***Smithsonian*, Sept. 22, 2007**

Elizabeth Catlos took leave from Oklahoma State University to come to the Jackson School to analyze the garnet-laden rocks she brought back from Menderes Massif in western Turkey. She hopes to dispel some of the mystery of this rugged range's formation. Throughout her geologic expeditions, from the Himalayas to Nepal, Catlos started collecting garnet-bearing rocks, exquisite recorders of geologic data that contradicts the prevailing picture of how the Himalayas were formed. She found that when India slammed into Asia around 55 million years ago, a massive crumpling of the earth's crust occurred, which contradicts popular thought that this crumpling occurred in a rather orderly fashion. "Liz basically rewrote the geological time frame for one of earth's major features, meaning that a lot of people's work got reexamined very quickly," said Sorena Sorensen, a geologist at the Smithsonian's National Museum of Natural History.

Opinions

Reorganize an Earth Systems Science Agency

***Science*, July 4, 2008**


Groat

In the July 4 edition of *Science*, Charles Groat and six co-authors, all of whom have held senior earth and environmental science positions in federal government, called for establishment of an independent Earth Systems Science Agency by merging the National Oceanic and Atmospheric Administration and the U.S. Geological Survey. Pointing out the country will face unprecedented environmental and economic challenges in the decades ahead—among them climate change, sea-level rise, altered weather patterns, declines in freshwater availability and quality, and loss of biodiversity—the authors say they "strongly believe organizational changes must be made at the federal level to align our public institutional infrastructure to address these challenges."

Oil Windfall Taxes a Bad Idea

***National Public Radio*, June 20, 2008**


Foss

Windfall profits in the oil industry have led some to suggest a windfall profits tax on oil to help explore new forms of energy and lessen the impact of high prices for consumers. Energy economist Michelle Michot Foss, chief energy economist and head of the Center for Energy Economics at the University of Texas at Austin, says a windfall profits tax is a terrible idea that stems from misconceptions about how the oil industry works. "Overall, something like 90 percent of what the industry makes gets reinvested in its core businesses," she says. A windfall profits tax, says Foss, "would not help at all, and it could have a negative effect and be very detrimental."

Stimulate Americans to Go Green

***Houston Chronicle*, Feb. 12, 2008**


Tinker

"Congress missed a major opportunity with the stimulus package," writes Scott Tinker, state geologist of Texas and director of the Jackson School's Bureau of Economic Geology. Tinker belives the stimulus package should have included much stronger incentives for energy efficiency. Instead of flat cash payments to consumers, he suggests payments tied to green behavior: credits for purchasing more efficent light bulbs and cars or improving your home's insulation. "If they want to help us now, lawmakers should stimulate energy efficiency — not more profligate consumer spending — while keeping their eyes on the prize of our long-term energy future," writes Tinker.

Time to Fill the Strategic Petroleum Reserve?

***Geotimes*, March 2008**


Webber

"The U.S. Department of Energy's recent decision to set aside $584 million to purchase oil for the Strategic Petroleum Reserve (SPR) has added fuel to the fire of a political controversy" over whether to double the SPR's capacity, write Benjamin Eisterhold and Michael Webber of the Center for International Energy and Environmental Policy. Critics say buying oil now only serves to tighten supplies "and induce still higher prices," but the authors say this does not hold up to scrutiny. Oil from the SPR is only sold during crises—times when oil generally commands premium prices. Stocking up now could lead to profits for the government later.

AWARDS & HONORS 2007-2008

All awards are for the 2007-2008 academic year unless otherwise noted.

Texas Exes Recgnize Cloos, Ukar for Teaching

The alumni association of The University of Texas at Austin, the Texas Exes, awarded 2008 Teaching Awards to two Jackson School of Geosciences educators—Professor Mark Cloos and Teaching Assistant Estibalitz "Esti" Ukar—for their "positive influence on the educational experience of university students."


Cloos

Mark Cloos began teaching at the university in 1981. In 2007, he taught Structural Geology (GEO 428) and a graduate course, Tectonics II. His research focuses on structure, metamorphism, geochronology, sedimentation and seismicity at convergent plate margins. He has recently focused on the tectonics of arc-continent collision zones and the origin of porphyry copper ore bodies. He conducts field projects in Papua, Indonesia and in the central and northern Coast Ranges of California.

"In my entire undergraduate and graduate career, I have never met a professor that was so passionate about his work and about his students," graduate student Ashleigh Bomar wrote in his nomination letter.

Estibalitz Ukar first came to the university as an exchange student from the Basque region of Spain in 2001. She returned in 2004 with a full scholarship from the Basque government to work on a Ph.D. Her doctoral work involves metamorphic petrology, geochemistry, and plate tectonics of blue schist and graphite-schist blocks from the Franciscan Melange in San Simeon, California. In 2007, she taught Earth Materials, an introductory course in mineralogy.


Ukar

"Esti is a deserving recipient because she does everything a teacher should to the highest standard," undergraduate Nick Perez wrote in his nomination letter. "Labs are fun, educational and well organized while she is patient, knowledgeable and eager to help us. She is a teacher teaching well and creating a quality class."

According to the solicitation for nominees, "The persons selected should demonstrate warmth of spirit, concern for society and the individual, the ability to impart knowledge while challenging students to independent inquiry and creative thought, and respect for an understanding of the permanent value of our culture."

Faculty & Researchers

Bill Ambrose (BEG)
Second place EMD oral presentation, American Association of Petroleum Geologists, Energy Minerals Division

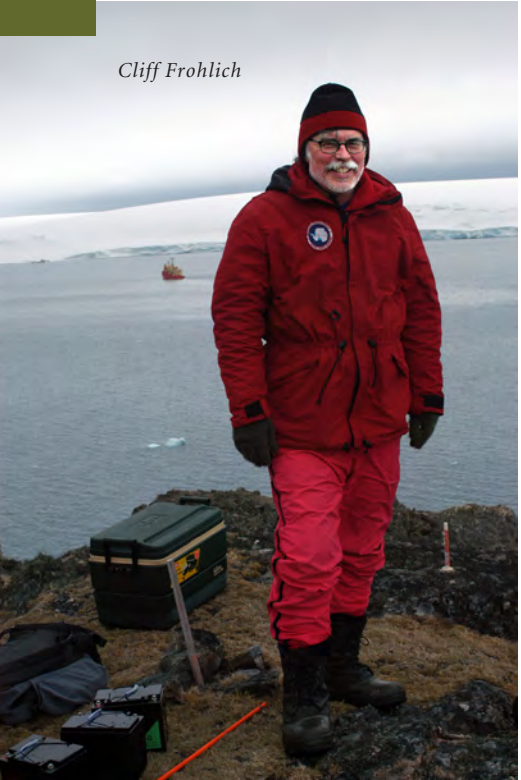
Jamie Austin (UTIG)
Dean's List, University of Rhode Island
Jackson School Service Award, Institute for Geophysics

Jay Banner (DGS)
Award for Excellence in Teaching, Division of Instructional Innovation and Assessment, UT Austin

Chris Bell (DGS)
Outstanding Teaching Award, Chancellor's Council, UT Austin
G. Moses and Carolyn G. Knebel Distinguished Teaching Award for Excellence with Introductory-level Courses, Jackson School

Flo Bonnaffé (BEG)
Top 10 Oral Presentation (co-recipient), American Association of Petroleum Geologists

Frank Brown (BEG)
AAPG Pioneer Award, American Association of Petroleum Geologists
Doris Malkin Curtis Medal, Society for Sedimentary Geology, Gulf Coast Section


Cliff Frohlich

CEE/"Africa Partnerships"
Best Outreach Program (Finalist), World Oil Awards

Bill Carlson (DGS)
Jackson School Teaching Award

Sigrid Clift (BEG)
Staff Excellence Award, UT Austin

Mark Cloos (DGS)
Teaching Award (Professor), Texas Exes

Ian Dalziel (UTIG)
Joseph C. Walter Jr. Excellence Award, Jackson School

Tim Dooley (BEG)
Jules Braunstein Memorial Award, American Association of Petroleum Geologists

William Fisher (DGS)
Distinguished Service Award, Association of American State Geologists

Peter Flemings (DGS, BEG, UTIG)
Distinguished Lecturer, Consortium for Ocean Leadership

Cliff Frohlich (UTIG)
IRIS-SSA Distinguished Lecturer, Incorporated Research Institutions for Seismology & Seismological Society of America

Julia Gale (BEG)
President's Certificate for Excellence in Presentation (co-recipient), American Association of Petroleum Geologists, Energy Minerals Division

James Gibbs (Advisory Council)
Michel T. Halbouty Outstanding Leadership Award, American Association of Petroleum Geologists

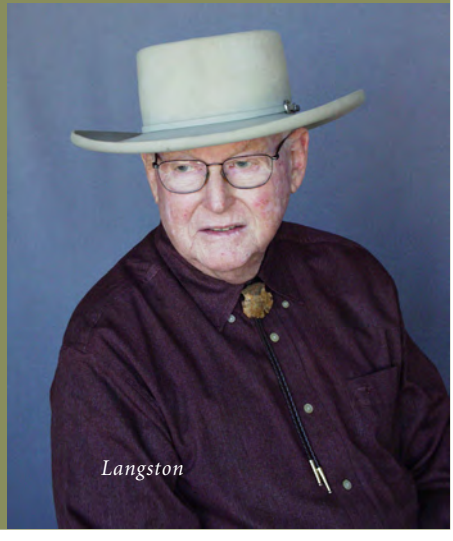
Langston Receives Vertebrate Paleontology's Highest Honor

Wann Langston, professor emeritus in the Department of Geological Sciences, is the 20th recipient of the Society of Vertebrate Paleontology's highest honor: the A. S. Romer-G. G. Simpson Medal.

The medal is named for Alfred Sherwood Romer and George Gaylord Simpson, two intellectual giants of the 20th century in vertebrate paleontology and evolution. The award is given annually to a member of the SVP who demonstrates sustained and outstanding scholarly excellence and service to the discipline of vertebrate paleontology. Langston accepted his award during the 67th annual meeting of the SVP in his hometown of Austin, Texas.

Langston's fossil-collecting career spans almost seven decades and includes iconic fossils such as the giant pterosaur Quetzalcoatlus, and Deinosuchus, one of history's largest crocodiles. His publication record spans 59 years and includes many important papers of enduring impact. While a professor, he supervised 14 graduate degrees and served on many more graduate committees. He served as vice president and president of the SVP in 1974-1975, and continues to play an active role in the work of the society. Significantly, Wann is also dedicated to the public understanding of paleontology, and in his career has shared his knowledge of fossil organisms and ecosystems through museum exhibitions, popular articles, and television appearances.

Timothy Rowe, J. Nalle Gregory Regents Professor of Geology at the University of Texas at Austin, and a nominator for Langston, commented that he "presents an awesome model for the diverse and sustained contributions he has made to the Society and toward the expansion of our audience. I don't believe that any one member of the Society has ever embodied so many talents or performed for so long at such a high level of accomplishment."



Langston

Steve Grand (DGS, UTIG)
Jackson School Research Award

Chip Groat (JSG/DGS/EER)
Faculty Appreciation Award for Best Managed Policy Research Project, LBJ School of Public Affairs, Graduate Public Affairs Council

Sean Gulick (UTIG)
Distinguished Lecturer, Consortium for Ocean Leadership

Ursula (Uschi) Hammes (BEG)
Thomas A. Philpott Excellence of Presentation Award, 2nd place, Gulf Coast Association of Geological Societies/Gulf Coast Section of SEPM

Bob Hardage (BEG)
Honorary Member, Society of Exploration Geophysicists

Mark Helper (DGS)
G. Moses and Carolyn G. Knebel Distinguished Teaching Award for Teaching Undergraduate Geology, Jackson School

Sue Hovorka (BEG)
One of "35 People Who Will Shape Our Future," *Texas Monthly*

Mike Hudec (BEG)
Top 25 "Hottest Articles" (co-recipient), Science Direct
Jules Braunstein Memorial Award, American Association of Petroleum Geologists

Martin Jackson (BEG)
Jackson School Service Award
Top 25 "Hottest Articles" (co-recipient), Science Direct
Jules Braunstein Memorial Award, American Association of Petroleum Geologists

Dave Jennette (BEG)
Top 10 Oral Presentation (co-recipient), American Association of Petroleum Geologists

Xiangyun Jiang (UTIG)
Top 10 Poster Presentation (co-recipient with Mann), American Association of Petroleum Geologists

Charlie Kerans (DGS/BEG)
Grover E. Murray Best Published Paper Award, GCAGS Transactions
Excellence of Poster Presentation (co-author, tie), SEPM

Steve Laubach (BEG)
Top 10 Oral Presentation, American Association of Petroleum Geologists
Outstanding Service Award, Society of Petroleum Engineers

Larry Lawver (UTIG)
Most Cited Paper 2003-2007, *Palaeogeography, Palaeoclimatology, Palaeoecology* (journal)

Bob Loucks (BEG)
Best Poster Award (co-recipient), American Association of Petroleum Geologists, Energy Minerals Division
Jackson School Research Award, Bureau of Economic Geology

Jerry Lucia (BEG)
Excellence of Poster Presentation (co-author, tie), SEPM

Paul Mann (UTIG)
APEX Grand Award Communications Concepts
Top 10 Poster Presentation (co-recipient with Jiang), American Association of Petroleum Geologists
Jackson School Research Award, Institute for Geophysics

Randy McDonald (BEG)
Staff Excellence Award, UT Austin

Angela McDonnell (BEG)
A.I. Levorsen Memorial Award for Best Oral Presentation, Gulf Coast Association of Geological Societies

Kitty Milliken (DGS)
Innovative Instructional Technology Award, UT Austin

Beatriz García-Fresca, doctoral candidate, won SEPM's Excellence of Poster award for "Numerical Model of Reflux Circulation during the Deposition of the Permian San Andres Formation, Guadalupe Mountains and Algerita Escarpment," with Charlie Kerans and Jerry Lucia.

David Mohrig (BEG, DGS)
G. Moses and Carolyn G. Knebel Distinguished Teaching Award for Teaching Graduate Geology, Jackson School
Joseph C. Walter Jr. Excellence Award, Jackson School

David Pyles (BEG)
Top 10 Oral Presentation (co-recipient), American Association of Petroleum Geologists

Robert M. Reed (BEG)
Best Poster Award (co-recipient), American Association of Petroleum Geologists, Energy Minerals Division
President's Certificate for Excellence in Presentation (co-recipient), American Association of Petroleum Geologists, Energy Minerals Division

Bridget Scanlon (BEG)
Joseph C. Walter Jr. Excellence Award, Jackson School

Jack Sharp (DGS)
Excellence of Poster Presentation (co-author, tie), SEPM

Ron Steel (DGS)
Best Paper honorable mention, SEPM

Scott Tinker (BEG)
Don C. Haney Distinguished Lecturer University of Kentucky

Mark Tomasso (BEG)
Top 10 Oral Presentation 2007 (co-recipient), American Association of Petroleum Geologists

Clark Wilson (DGS)
William T. Pecora Award (Group) as member of team for GRACE Satellite Mission, NASA and U.S. Dept. of Interior

Hongliu Zeng (BEG)
Gordon Atwater Best Poster Award, Gulf Coast Association of Geological Societies / GCSSEPM

Leadership Positions

James Austin (UTIG)
Chair, American Geophysical Union Development Board (2004-Present)
Chair, UTIG Fellowship Committee

Eric Barron (JSG)
Chair, Board of Trustees University Corporation for Atmospheric Research

Michelle Foss (BEG/CEE)
Emeritus Chair, U.S. Association for Energy Economics

Craig Fulthorpe (UTIG)
Chair, Jackson School of Geosciences Endowment Committee

John Goff (UTIG)
Chair, JSG Strategic Planning Council
Chair, JSG Rapid Response Committee

Chip Groat (JSG/DGS/EER)
President, Division of Environmental Geosciences, AAPG

Sharon Mosher (DGS)
Chair, GeoScienceWorld

Terrence M. Quinn (DGS/UTIG)
Chair, System Science Search Committee

Jack Sharp (DGS)
President, Geological Society of America

Scott Tinker (BEG)
President-Elect, American Association of Petroleum Geologists

Steve Laubach (BEG)
Elected to the Petroleum Group Committee, Geological Society of London

Students

Jennifer Aschoff
Tech Sessions Best Speaker (Ph.D., Spring), DGS

Miriam Barquero-Molina
Second Place (Graduate), Petrography Contest, DGS

Trevor Budge
Tech Sessions Best Speaker (Ph.D., Fall), DGS

Sasha Carter
Outstanding Student Paper, Cryosphere Section, American Geophysical Union

Nysha Chaderton
Outstanding Student Presentation, Geological Society of Trinidad and Tobago

David Contreras
Best Student Poster at AAPG Annual Meeting, American Association of Petroleum Geologists

Ned Frost
Best Oral Presentation at 2007 Long Beach Annual Convention, Shell

Joshua Garber
Estwing Hammer Award, DGS

Beatriz Garcia-Fresca
Excellence of Poster Presentation (co-author, tie), SEPM

Stacy Loewy
One of 50 Most Cited Papers of Last 5 Years, *Tectonophysics*

Aysen Ozkan
SPIRIT Scholar, ConocoPhillips

Nick Perez
Second Place (Undergraduate), Petrography Contest, DGS

Ted Playton
Second Best Oral Presentation, American Association of Petroleum Geologists

Audrey Sawyer
Outstanding TA, DGS

John Singleton
First Place (Graduate), Petrography Contest, DGS

Estibalitz "Esti" Ukar
Teaching Award (T.A.), Texas Exes

Bryce Wagner
SPIRIT Scholar, ConocoPhillips
Michael Bruce Duchin Endowed Presidential Scholarship, UT Austin
SEG Foundation Scholarship, Society of Exploration Geophysicists

Meghan Ward
Award of Excellence "Top 10" Oral Presentation (co-recipient), American Association of Petroleum Geologists

Thomas J. Wiles
Tech Sessions Best Speaker (MS, Fall), DGS

Andrea Wolfowicz
First Place (Undergraduate), Petrography Contest, DGS

Corrine Wong
Tech Sessions Best Speaker (MS, Spring), DGS

Staff

Lauren Darcy (JSG)
Staff Excellence Award, Dean's Office

April DeRome
Thelma Lynn Guion Geology Library Staff Award, Department of Geological Sciences

Patricia Dickerson (JSG)
Exceptional Public Service Medal, NASA

Tinley Hald (DGS)
Staff Excellence Award, Department of Geological Sciences

Jackson School Communications Team
First Place, Medical/Scientific News Writing, Council for the Advancement and Support of Education, Southwest District
Second Place, Medical/Scientific Feature Writing, Council for the Advancement and Support of Education, Southwest District


Wanda LaPlante

Caitlyn Lam
Thelma Lynn Guion Geology Library Staff Award, Department of Geological Sciences

Wanda LaPlante (BEG)
Staff Excellence Award, Bureau of Economic Geology

Judy Sansom (UTIG)
Staff Excellence Award, Institute for Geophysics

Escalona Gets Sproule Award

Alejandro Escalona (Ph.D., 2003) received the 2008 J.C. "Cam" Sproule Award from the American Association of Petroleum Geologists (AAPG) to recognize and reward younger authors of papers applicable to petroleum geology.

The paper appeared in a special edition of the AAPG Bulletin in April 2006 focusing on the Maracaibo supergiant basin in northwestern Venezuela, co-edited by Escalona and his doctoral supervisor Paul Mann, research scientist at the Jackson School. In the paper, titled "Petrophysical and seismic properties of lower Eocene clastic rocks in the central Maracaibo basin," Escalona infers from seismic data the rock properties of Eocene reservoir rocks for giant oil fields.

Mann is impressed with how much Escalona has achieved so early in his career. He pointed to that fact that Escalona published eight papers based on his doctoral research, mentored several students, taught classes on workstations as a lecturer, and is now an associate professor at the University of Stavanger in Norway.

Rosero Receives Flood Forecasting Fellowship

The National Weather Service (NWS) awarded Enrique Rosero, a Ph.D. student at the Jackson School of Geosciences, a graduate fellowship worth $50,000 a year to support his work to improve computer models that the weather service uses to forecast flooding.

More Americans die each year from floods than any other severe weather related hazard. So the NWS continues to look for ways to improve the accuracy and lead time on flood warnings across the U.S. The NWS currently uses the River Forecasting System (NWSRFS), an integrated set of computer programs first developed in the 1970s (with some modifications through the years) that use near real time precipitation data to generate probabilistic forecasts for stream flow.

The system has its weaknesses, though, such as handling high-flow events or spatially distributed mixes of rain and snow. The system makes many compromises in simulating the features of the real world, sometimes because the underlying physics are not well

Enrique Rosero

understood and sometimes to reduce computational needs. For example, impervious land cover is not accurately distributed throughout a region, but instead taken as a lump sum across the whole region.

"So you're just taking a chunk of available land out," he says. "But it makes a difference where you take the chunk out, whether it is in the upstream part of the catchment or the downstream part, because it's going to slow down or speed up the velocity of water waves. With the new models, we can take into account this heterogeneity."

In 2007, Rosero had already run simulations on Lonestar, one of the most powerful supercomputers in the world.

"In my application, I was very specific in saying this is very expensive, but we can do it here," he says. "I've done it before and this is what I expect. With the implementation of a new generation of software and computer at UT, we can afford it."

NSF Grants Kiel Graduate Research Fellowship

Brian Kiel, a master's student in the Jackson School, has received a Graduate Research Fellowship from the National Science Foundation providing $30,000 per year in living expenses for the next three years as he conducts research towards his master's degree.

Kiel will analyze three-dimensional seismic data collected by the oil industry on the Sunda Shelf offshore Indonesia to reconstruct the ancient climate and hydrology of the region. This information will help climate modelers make more accurate forecasts of future climate.

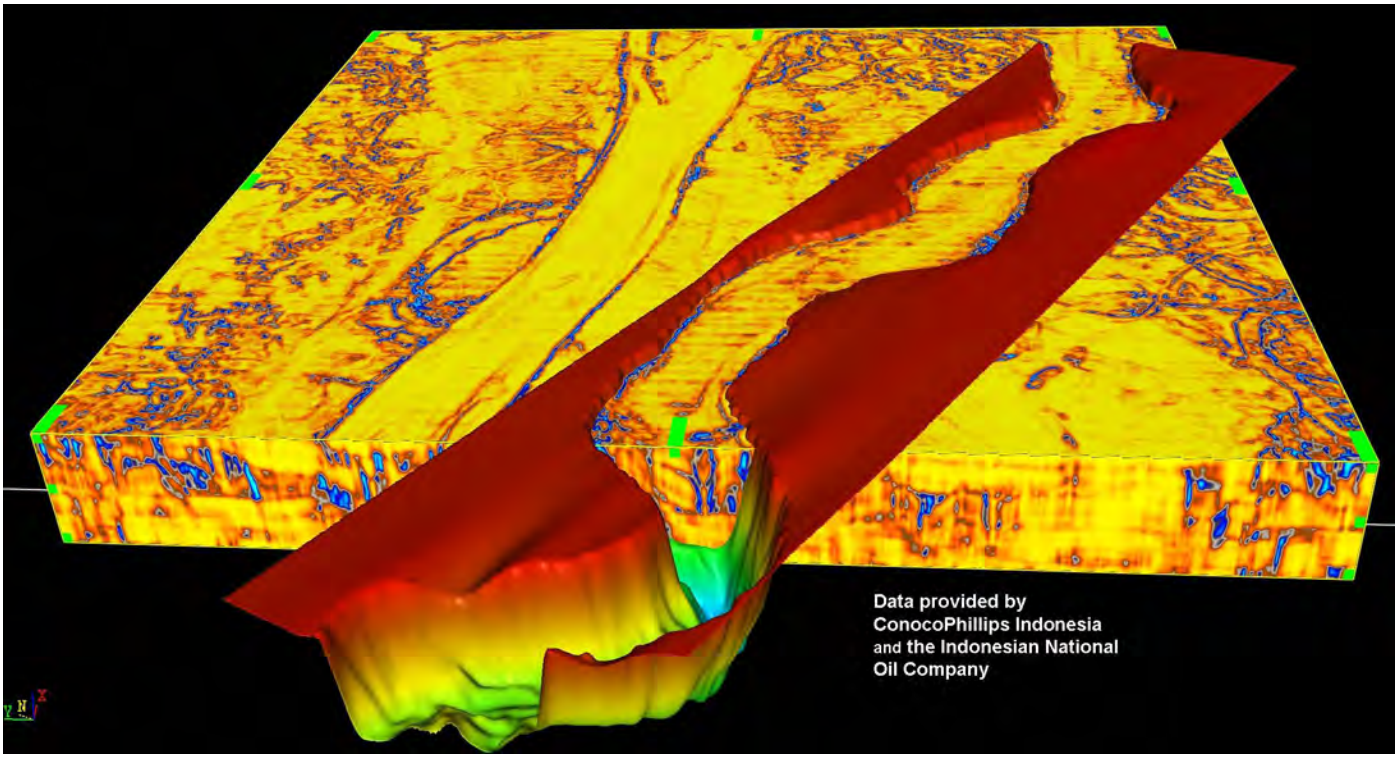
The Sunda Shelf interests climate modelers for at least two reasons. First, over the last 10 million years sea level rose and fell, sometimes leaving the shelf exposed above the water and at other times, such as today, leaving it submerged in shallow water. Exposure of the ancient shelf led to creation of land bridges for human and animal migration between islands, changed the regional ratio of land mass to water mass impacting climate, and affected connections between the Asian and Indian ocean, changing ocean circulation patterns.

Second, strata of the Sunda Shelf contain an indirect record of changes in Asian monsoons, an important but very poorly understood element in global climate. Layers of rocks and sediments imaged by seismic data record cycles of shelf exposure and paleolandscape development due to monsoons.

"There are many signals woven into the geology," said Kiel. "So untangling them takes a lot of effort, but we're on our way."

Kiel and his advisor Lesli Wood see this type of data as a vast, untapped resource for university researchers. Collected by the government of Indonesia and ConocoPhillips Indonesia Inc. Ltd. to explore for potential oil and gas reservoirs, the data is expensive to collect and valuable to its owners. Petroleum companies tend to guard it carefully because it gives them an edge over competitors. So most academic researchers aren't accustomed to using this type of data.

"In the case of the data we're using, it's shallower in the subsurface than the industry is focusing on," said Kiel. "So they don't mind giving us data from an area they're not hoping to produce from. Everyone wins and they don't have to worry about data getting out."



Three-dimensional seismic data from the Sunda Shelf near Indonesia reveals past river channels and climate variability. Data provided to Brian Kiel by ConocoPhillips Indonesia and the Indonesian National Oil Company.

Promotions Enhance Geology Library

The Jackson School recognizes promoted faculty members and research scientists by inviting them to select a book to be added to the Walter Library with a name plate in their honor. The 2007-08 individuals are below along with their books and excerpts from their explanations.

Sergey Fomel

Research Scientist to Associate Professor

***Information-based Inversion and Processing with Applications,* by T.J. Ulrych and M.D. Sacchi**

"[Ulyrch] is known for his ability to explain difficult concepts such as seismic inversion and data processing clearly and using simple motivational examples. I find his work inspirational and hope it will also inspire many generations of students at the Jackson School of Geosciences."

Sean Gulick

Research Associate to Research Scientist

***The Mediterranean Was a Desert,* by Dr. Kenneth Hsu**

"This book describes the amazing events of Deep Sea Drilling Program Leg 13 when they first drilled into the M-reflector that underlies all of the Mediterranean Sea. … I first read this book during a scientific writing class as a freshman at the University of North Carolina. … [I]t was reading of the exciting events on the drill ship, of life at sea, and of how geophysics and geology can be integrated in the marine environment to answer scientific questions that led me to decide on marine geology as a career."

Mike Hudec

Research Scientist to Senior Research Scientist

***Darwin on Trial* (2nd ed., 1993), by Phillip E. Johnson**

"[Johnson] looks at the structure of the arguments used to support naturalistic evolution, and asks if they are logical. After careful analysis, he concludes that many are not. …

"Johnson is willing to attack scientific orthodoxy wherever he finds it unconvincing. He insists that points of scientific debate should be decided on the merits and logic of the arguments and not on philosophical or religious bias. In doing so, he raises the level of the debate on both sides, and forces proponents to analyze their presuppositions more carefully."

Mark Helper

Senior Lecturer to Distinguished Senior Lecturer

***To a Rocky Moon: A Geologist's History of Lunar Exploration,* by Don Wilhelms**

"I've recently become involved in an effort to develop an astronaut field geologic training program for a return to the Moon in 2020. This book has been a great resource as I've come to know some of the principal participants from the Apollo days. It's also been an invaluable example of the process of developing a program amidst competing interests and bureaucracies."

John Lassiter

Assistant Professor to Associate Professor

***The Mantle and Core,* R.W. Carlson, ed.**

"If we are truly to make progress in our understanding of the Earth, we must all be willing to look beyond self-imposed boundaries of our fields of specialization and learn to recognize the links that relate all sub-disciplines of the earth sciences. This book presents a compilation of contributions from some of the top geoscientists active in the study of Earth's deep interior, and is a perfect example of the multi-disciplinary approach that I espouse. … The book provides an excellent introduction to one of the most exciting and dynamic areas of research in the earth sciences."

Randy Marrett

Associate Professor to Professor

***"Surely You're Joking, Mr. Feynman!" Adventures of a Curious Character,* by Richard P. Feynman**

"Richard Feynman's contributions to physics were recognized in 1965 by a Nobel Prize, but he might have made an even bigger impact in science by inspiring countless minds with this hilarious book. It glorifies the spirit of science at it's best, the attempt to perceive and understand nature, including ourselves. Adventure is the inevitable outcome of honest insightful science. … I think we should all strive to have as much fun doing science as Feynman did."

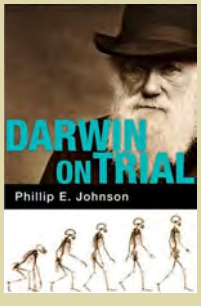
Liang Yang

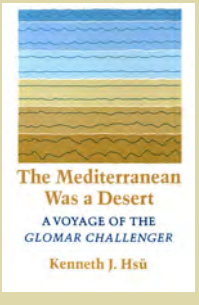
Associate Professor to Professor

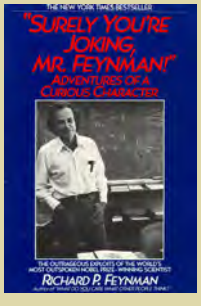
***Climate Variability and Extremes During the Past 100 years* Stefan Broennimann, Jürg Luterbacher, Tracy Ewen, Henry F. Diaz, Richard S. Stolarski, Urs Neu (Eds.)**

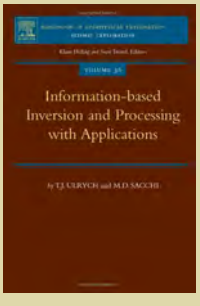
"Defining, understanding and predicting characteristics of extreme climactic events is only one of the grand challenges in the climate research community, but also of direct relevance to society. It appears that this book is in line with what my group is doing. Also, I hope that this book will be useful to other researchers and students in the Jackson School."

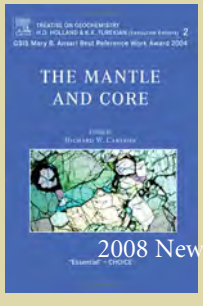
BRIEFS

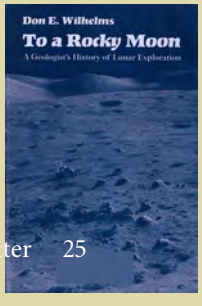












Joseph C. Walter Jr. Excellence Awards, 2007-08

The Joseph C. Walter Jr. Excellence Award is the most prestigious internal award in the Jackson School of Geosciences. It carries a cash prize of $2,000. This award was provided for in an endowment created by Mr. J. C. Walter, Jr. and approved by the Board of Regents in 1977. It was originally titled the Houston Oil and Gas Corporation Excellence Award and was designed to provide annual awards to faculty "in recognition of outstanding service and special contributions to teaching and research programs."

With the creation of the Jackson School, and with the thorough endorsement of Mr. J. C. Walter III, the award has been renamed the Joseph C. Walter Jr. Excellence Award and is now extended school-wide. Walter awards are made based on demonstrated excellence in any or all of the areas of the School—research, teaching, service, professional activity, and administration. We have three recipients this year.

Excerpts are from Dean Barron's remarks at the annual Jackson School Awards Ceremony April 24, 2008.

Ian Dalziel
Institute for Geophysics

There is no other word for it—Ian is famous for his research efforts to unravel the geological and plate tectonics history of Antarctica. The nomination suggested that he was equally comfortable with ice axe or hammer as he was with laptop or GPS, or making measurements from sleds, ships, or airplanes.

Imagine leading 30 field expeditions to Antarctica, Patagonia and Tierra del Fuego, more than 100 peer-reviewed papers, six cited between 100 and 500 times. Add 20 Ph.D. and M.S. students, the Murchison Medal from the Geological Society of London, the Clough Medal from the Geological Society of Edinburgh, the Bownocker Medal from Ohio State, Fellow of the Royal Society of Edinburgh.

Ian Dalziel

You get the picture. And, there are no signs that he is slowing down.

Bridget Scanlon
Bureau of Economic Geology


Bridget Scanlon

Bridget focuses on the sustainability of water resources in the context of climate variability and land use/land cover change. Clearly, this topic is of major importance to society and to the research and educational future of this School. In this important topic, Bridget distinguishes herself.

As a PI, she has attracted $7.3 million of research over the last 10 years. 36 papers and 11 book chapters demonstrate the impact of her research. She has served on four National Research Council committees, four NSF committees, and several DOE and AGU committees. Those committees are strong indications of how her advice is valued. Finally, she was named the 2007 Birdsall-Dreiss Distinguished Lecturer, sponsored by the GSA Hydrogeology Division.

Each of these elements—external research, publications, prominent role in important advisory committees, and the distinguished lecturer role—demonstrate that her peers in water resources recognize her outstanding accomplishments. It is our pleasure to now recognize her in the Jackson School.

David Mohrig
Department of Geological Sciences

David's nomination epitomizes the combination of balance and high level achievement in our combined mission of teaching, research and service. He is a dynamic presence in the School—through service in strategic planning, theme search committee chair, curriculum committees, IT committees—he could easily be recognized for service. He is also an inspiring teacher and supervisor.

Because of his skills he was a DIIA's UT-Austin Faculty Orientation faculty panel member. His research is also innovative, interdisciplinary and of great significance. He is Co-PI of the National Center for Earth-surface Dynamics—just refunded for $18 million for five years. David is leader of one of the three projects that are the focus of the center.

His major focus is on the Mississippi Delta, and his work truly combines the fundamental with the desire to serve societal needs in management and restoration. For excellence in three areas, congratulations,


David Mohrig (left) and Eric Barron

Eric Barron Leaves Jackson School to Become Director of National Climate Center


Eric Barron

At the end of the spring semester in 2008, Dean Eric Barron announced he had accepted a new position as director of the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. A climate specialist, Barron had been dean of the Jackson School since August 2006, having previously served five years as dean of the College of Earth and Mineral Sciences at Pennsylvania State University.

Barron began his scientific career at NCAR and prior to becoming director had served as chair of the Board of Trustees for the University Corporation for Atmospheric Research, the governing body for NCAR.

"In many ways, this opportunity is unique for me personally in that I will lead the world's premier facility in atmospheric research, including my personal area of climate research," Barron wrote the Jackson School community. "I would not make this decision lightly, especially given my relatively short tenure as the dean of the Jackson School, but I believe that this position would not be open again during the future span of my career."

During his two years as dean, Barron created and began implementation of a new strategic plan to make the Jackson School the country's preeminent geosciences program. Under the plan, the school made a major push to hire new talent, advertising nationally to attract people in four areas that members of the school community deemed strategic priorities: 1) energy geosciences, 2) crust, mantle, and core dynamics, 3) Earth surface and hydrologic processes, and 4) climate sciences.

The hiring campaign successfully galvanized national attention and resulted in 15 hires of new faculty members. Six of the new hires are women, significantly increasing the representation of women in the Department. Five of the new hires work in climate systems science, including three prominent established researchers (see "Scientists" section), giving the Jackson School a national presence in the discipline.

The university named Charles G. "Chip" Groat interim dean of the Jackson School of Geosciences while conducting a national search for the next dean. Groat was director of the U.S. Geological Survey (USGS) from 1998-2005, appointed by President Clinton and retained by President Bush. Since 2005 he has directed the Energy and Earth Resources Graduate Program and the Center for International Energy and Environmental Policy at The University of Texas at Austin, where he holds the John A. and Katherine G. Jackson Chair in Energy and Mineral Resources.

"Chip Groat has an outstanding blend of administrative, academic and research experience," said William Powers Jr., president of The University of Texas at Austin. "He is an ideal leader to guide the school at this time, when the eyes of the geoscience community are upon us."

Undergraduate Honors Students Explore Chile

The Atacama desert in northern Chile is a geological wonderland. The driest place on Earth outside of Antarctica, it has salt flats, volcanoes, geysers, mud pots, mines, fold belts, and perplexing unconformities. There's an attraction for biologists too: if there is life on Mars, it might resemble the unique microbes that hang on by their cilia in the extreme environment, where it's mostly cold, dry, and awash in ultraviolet light. Three professors from the Department of Geological Sciences took a group of students in the department's undergraduate honors program to the Atacama for a field trip during spring break 2008.

"This was by far the best field trip I've been on," said student Julie Mitchell. "The sheer number of amazing geologic sites we visited is something I had never before experienced."

Honors students, selected as freshmen based on previous academic performance, conduct advanced research and write a thesis, something not required of other geoscience undergraduates. Randy Marrett, one of the instructors, felt the group was ideal for this kind of trip, where "we invested our time, energy and money into students among the most likely to be leading geologists 20 years from now."

Marrett said typical field trips involve students going from site to site receiving lectures in front of different geological backdrops, but this trip was different.

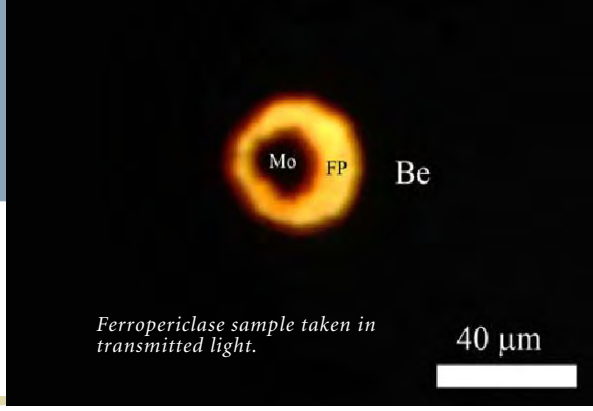
"I'm a big believer that students get the most out of it if you give them a task," he said. So students measured water chemistry in geysers at the Tatio hydrothermal field and compared structure above and below a geological unconformity, among other things.

"Our trip to Chile definitely influenced what I would like to study in graduate school," said student Casey Huff. "We saw at the Cordillera de la Sal large scale deformational features, such as anticlines and synclines, and discussed their origins. I now hope to study structural geology next fall to continue learning more about the subject."


El Tatio Geyser, Chile. Photo by Mark Helper.

Working Under Pressure

JUNG-FU LIN INVESTIGATES MINERAL PHYSICS OF PLANETARY INTERIORS



Ferropericlase sample taken in transmitted light.

Studying material properties under the extreme pressures and temperatures that exist in planetary interiors, including Earth's interior, presents extraordinary experimental challenges. By pushing diamond anvil cell techniques literally to the breaking point, Jung-Fu "Afu" Lin, a mineral physicist and new assistant professor in the Department of Geological Sciences, has probed material properties and discovered new insights into their behavior under the pressure-temperature conditions that exist deep within the Earth and other planetary bodies.

Researchers have long been able to achieve very high pressures using diamond anvil cells, which can reach millions of atmospheres of pressure at small scales. More recent work has also used laser heating to simulate the high temperatures that exist in Earth's iron-rich core and lower mantle, which is made up primarily of silicate perovskite, an iron-containing magnesium silicate, and ferropericlase, an iron-containing magnesium oxide.

Getting to the Core

"Mineral physicists' quest to the Earth's core falls largely around stably creating pressure-temperature conditions and simultaneously measuring properties of the subject iron alloys, and that is also true for the Earth's lower mantle," Lin said. "In the past we really didn't have such capabilities. But with the advances in diamond anvil cell techniques, especially laser-heated diamond anvil cells, combined with synchrotron X-ray spectroscopies, we are now in a position to probe the properties of planetary materials under relevant pressure-temperature conditions."

These improved techniques are yielding new results in mineral physics, such as the discovery of the phase transition from perovskite to post-perovskite at the bottom of the lower mantle.

"What is interesting about the perovskite to post-perovskite transition is that for a long time people kind of gave up on looking at another transformation in the lower mantle," Lin said, because it was believed that perovskite was a stable mineral form in the lower mantle. "But people had only looked at pressure-temperature conditions up to about 120 GPa [gigapascals], instead of 136 GPa where the transition occurred."

In his recent work, Lin has pioneered experimental capabilities to examine the electronic spin transition of iron in ferropericlase, the second most abundant mineral in the lower mantle. He discovered a transition from an electronic spin-unpaired (high-spin) to a spin-paired (low-spin) state occurs gradually in iron over a pressure-temperature range in the middle part of the lower mantle, extending from about 1,000 kilometers in depth and 1,900 degrees Kelvin to 2,200 kilometers and 2,300 degrees Kelvin in the lower mantle.

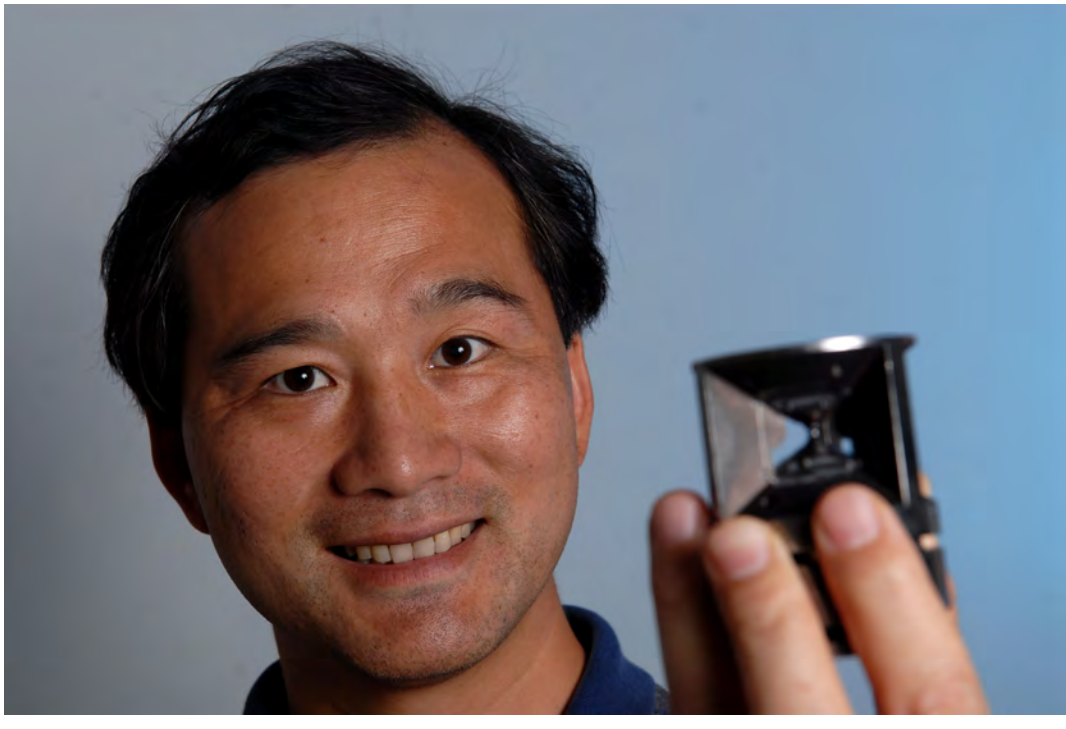
This finding, together with its associated effects on the properties of the mineral, will help give scientists a better understanding of how seismic waves travel through the mantle, how the mantle moves dynamically and how geomagnetic fields generated within the Earth reach the surface.

Spin Man

"That is what I'm most excited about in my research in recent years," Lin said. "It's really a new research direction. When people talk about the Earth's interior, they usually talk about temperature, pressure, or compositional variables. This spin transition research is a new 'spin' on our understanding of the properties of the Earth's interior. What is really interesting is that just tiny electrons of iron in the Earth's lower mantle oxide can significantly affect our understanding of the Earth's interior."

After demonstrating the high-spin to low-spin transition and its effects in ferropericlase, Lin has recently turned his attention to the spin transition in perovskite and post-perovskite.

Spin transition research is a new 'spin' on our understanding of Earth's interior.


Jung-Fu "Afu" Lin holds up a diamond anvil cell, which compresses small (sub-millimeter) materials to extreme pressures recreating the pressure existing deep inside planets.

"We now see not just a high-spin to low-spin transition, but there is actually another spin state, called the intermediate-spin state in which electrons of ferrous iron are partially paired, that occurs in both perovskite and post-perovskite under lowermost mantle conditions," he said.

Lin performs many diamond anvil experiments at the Jackson School, but he also performs research at synchrotron radiation centers, such as the Advanced Photon Source, the nation's brightest synchrotron X-ray source, at Argonne National Lab in Chicago. His goal is a better understanding of the full array of properties that describe candidate materials under deep-earth pressure-temperature conditions, such as crystal structures, phase relations, sound velocities, electronic spin transitions and chemical reactions. He is also particularly interested in the role of volatiles, such as H_20 and CO_2, in planetary interiors.

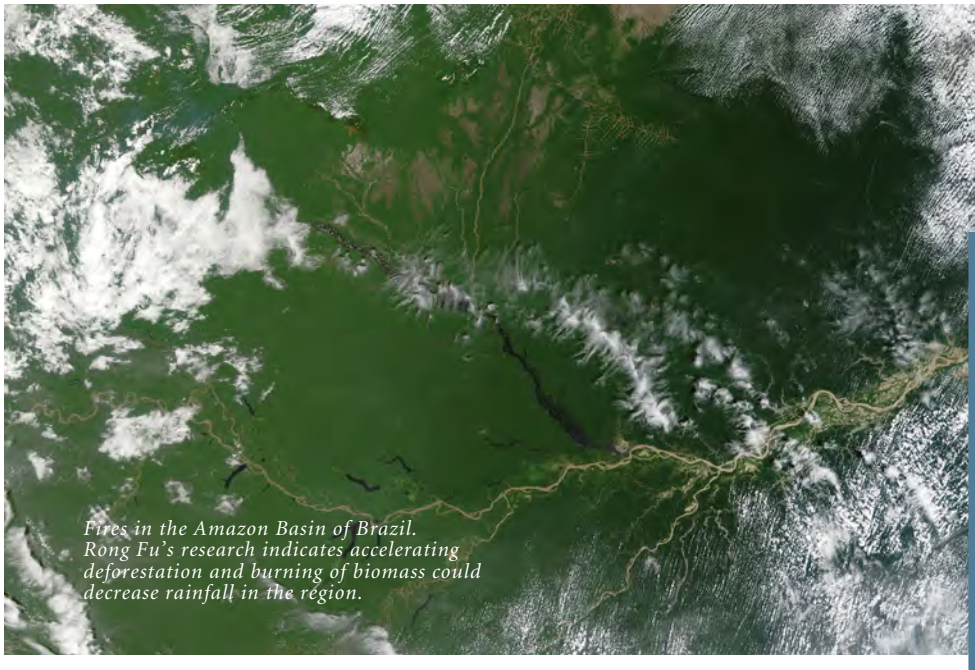
"These volatiles consist of very light elements, so it's really difficult to detect some of their properties under high pressure-temperature conditions," Lin said. "On the other hand, these volatiles are also very intriguing in the sense that, since they could be so chemically active, they can play very important roles in many properties of minerals under high pressures and temperatures."

Lin continues to work with his colleagues to push for even higher pressures and temperatures within diamond anvil cells, and to refine techniques to probe mineral physics properties of deep-earth materials. Pressures at the center of the Earth's core are estimated at 360 gigapascals (GPa), and Lin has reached 250 GPa and high temperatures in recent experiments on iron-silicon alloys – though he broke four pairs of diamonds in the process. Reaching relevant temperatures of the core, somewhere from 4,000-7,000 degrees Kelvin, is much more difficult.

"High-quality diamonds can handle the strain of the pressure – that's not a big problem," he said. "Normally when we shine the laser through the diamond to the sample, the sample is the only medium that we want to supply with heat from the laser. With the use of an insulating material between the sample and the diamonds, the heat is mostly kept in the sample. But once under very high pressures and high temperatures there's just enough space to insert sufficient insulating materials to keep the heat from dissipating into the diamonds. So when you provide more heat to the sample in order to reach to higher temperatures, the diamond anvil gives up – a popping sound that signals the end of the experiment."

Lin is constantly thinking of how to solve this heating problem. "There must be ways to statically reach the pressure-temperature conditions of the Earth's core," he said. "One way to really improve the situation is to use super hard materials as the gasket to sustain a very thick sample chamber under such extreme conditions."

Lin recently received funding from the National Science Foundation to continue his research into the electronic spin transitions of iron in the lower mantle to determine how the spin transitions affect density distribution, speeds of seismic waves and heat transport, among other properties in the deep mantle. He plans to incorporate this research into the training of the next generation of mineral physicists at the Jackson School. ✷



Fires in the Amazon Basin of Brazil. Rong Fu's research indicates accelerating deforestation and burning of biomass could decrease rainfall in the region.

The Big Picture

RONG FU USES SATELLITE DATA TO STUDY CLIMATE PROCESSES

Climatologist Rong Fu prefers a bird's eye view of the Earth's climate. That's "birds," as in satellites, which she uses to study climate processes in remote areas such as the Amazon, the Tibetan Plateau, and tropical oceans. This perspective helps Fu understand how climate changes in these remote areas could have an impact closer to home.

Fu had studied the mechanisms that control the Amazon's monsoon season, which alternates between the northern and southern regions with one receiving rain while the other is dry. But the trigger that caused the monsoon to switch over was unknown. Fu had speculated that the rain forest itself might be involved through evapotranspiration, the process by which leaves release water vapor. This water vapor, in sufficient quantities, could kick start the thunderstorms that would bring the onset of the monsoon.

Her observations revealed that evapotranspiration did indeed increase toward the end of the dry season, but she could not explain why. Satellite data provided the answer: Leaf coverage in the Amazon actually peaks near the end of the dry season, thus increasing evapotranspiration. While perhaps counterintuitive, it turns out that sunlight, not precipitation, is the limiting factor for leaf production.

"It's some of the first evidence that the rain forest plays an active role in rainfall climatology," Fu said. "If you lose rainforest you are likely to have a longer dry season and a drier climate over the Amazon. When I started more than 10 years ago, there was very little observational work to try to understand the mutual dependence between rainforest and climate. There were models, but their results need to be supported by observational

Rong Fu

data. Through my observational work, at least now we have a mechanism in place."

Burning Questions

Fu has also investigated the impact of biomass burning on the Amazon's monsoon season; her results point to a weakening or delaying of the transition from dry to wet season. Climate models predict that deforestation and biomass burning will result in a drier Amazon, and Fu's observations seem to lend support to that conclusion.

Together, these observations may spell trouble for the future. Fu is concerned that the rapid clearing of the rainforest for such things as cattle, coffee, soy beans, and biofuels, combined with possible intensified droughts, could cause rainforest loss on a large scale. The carbon stored in the rainforest would then be released into the atmosphere, further increasing atmospheric CO_2 by an amount comparable to that emitted by a decade of global fossil fuel use. Should this occur, it would greatly complicate efforts to keep atmospheric CO_2 below levels considered dangerous for global climate. What's more, flow changes in the Amazon River could also affect hurricane intensity as storms move across the Caribbean Sea.

Rising atmospheric carbon dioxide levels have drawn the public's attention in recent years but, of course, there's more to the climate change story than just CO_2. Water vapor also plays a significant role, and Fu has been investigating how water vapor is transported to the troposphere and stratosphere.

"If you warm the climate, you will evaporate more water vapor into the atmosphere," Fu said. "Water vapor is a strong greenhouse gas which will in turn amplify the warming. It is a positive feedback that amplifies the original warming, and this is a destabilizing factor."

There is evidence that water vapor played a role in the distant past when Earth's climate was significantly warmer, and so it may again in the future. A better understanding of how water vapor influences climate will help researchers refine current climate models.

"If you double CO_2 concentration, you get approximately 1 to 1.5 degrees of warming," Fu said. "But if you increase the water vapor associated with this, you get another degree or degree and a half. It is really the single biggest positive feedback."

Stratospheric Heights

Fu has used data from the Upper Atmosphere Research Satellite and its successors, NASA's Aura and Aqua satellites, which are part of the Earth Observing System (sometimes called the "A-Train"), as well as other satellites. Like most scientists, she is happy with good data wherever she finds it.

"The main advantage of the A-Train is that the measurements are closely synchronized," Fu said. "These satellites take a variety of different measurements so you can see the depths of these systems, how much ice is being injected, and how much water vapor and carbon monoxide is being pumped into the stratosphere."

While at the Georgia Institute of Technology's School of Earth and Atmospheric Sciences, Fu led a group that combined data from Aqua and Aura to study how water vapor reaches the stratosphere. Previous research had focused on water vapor entering from the tropics, but Fu's team discovered that thunderstorms over the Tibetan Plateau, with its high elevation, are one of the primary pathways for water vapor to reach the stratosphere. This same pathway, it turns out, can also transport air pollutants efficiently into the stratosphere, where they can rapidly spread around the globe.

Land & Sea

One of Fu's current projects is investigating the role that land surface processes and large-scale atmospheric circulation play in determining the transition to a warm season precipitation regime and summer drought in the Southeastern United States. She is examining the role played by the Bermuda High, a persistent zone of high pressure over the Atlantic, which can influence rainfall patterns in the United States. When this zone moves westward, the Southeast comes under its sway and experiences reduced rainfall as moisture is transported along its edge.

"The empirical link is definitely there—you can very clearly see that from the data," Fu said. "But we don't really understand the physical mechanisms behind it. To study this, long-term meteorological data is very important to get the large-scale picture."

The current understanding of what might control year to year or decade to decade variation of climate for the United States centers on ocean surface temperature anomalies, such as the El Niño southern oscillation or the Atlantic sea surface temperature decadal variations.

"People find that simply using this information cannot explain the drought," Fu said. "Maybe the land surface and the soil moisture memory, which results in surface flux that can either amplify or dampen the variation forced by the ocean, becomes a more important factor. This is an area where we don't have decent data."

Calculating soil moisture by using rainfall and temperature data from the last 50 years in the land surface model, and then combining that with available satellite data, is one approach – but Fu recognizes its limitations.

"The good thing is now you actually have something that is physically reasonable because it's based on the model," Fu said. "But I am an observation person, so I'm usually more skeptical of the models."

That is something that Fu would like to work on at the Jackson School. She hopes to use her observations in collaboration with other scientists to help refine current climate models. ✷

Beyond the Bucket

ROBERT DICKINSON ADVANCES CLIMATE MODELS

When Robert Dickinson began working at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado in 1968, global climate models were crude and wildly inaccurate.

"The code I worked with covered Los Angeles with snow," he laughs. "That was a problem with modeling how frost forms on the ground."

He eventually concluded that the most primitive part of the climate models, the bit that needed the most improvement, was the description of the land surface and how it interacts with the rest of the climate system. In the models, the surface tended to be boiled down to either water or land. Scientists didn't know how, or have the computing power, to accurately account for things like soil moisture, albedo (how well the surface reflects sunlight), topography and vegetation. He refers to one early model that oversimplified soil moisture as the "bucket model."

Dickinson has spent more than three decades working to improve how the land surface is represented in the models. To recognize that work, in 1996 the American Meteorological Society awarded him the Rossby Award, the highest honor bestowed by the society on an atmospheric scientist. That same year he also received the Roger Revelle Medal, the American Geophysical Union's highest award for contributions to the science of climate dynamics and to predictions of expected climate changes. He has also been inducted into numerous prestigious scientific organizations, including the National Academy of Sciences, the National Academy of Engineering, and the Chinese Academy of Sciences.

Because of his effort and that of thousands of other researchers, climate models are far more robust today. But, he says, much remains to be done.

From Yellow Jacket to Longhorn

Dickinson set off for Harvard as an undergraduate in the late 1950s to study English, not science. But he enjoyed physics and his other science classes.

"I gradually thought that you need to go into something where you could see job opportunities," he says. So he switched to a physics and chemistry major. He never lost his love of explaining complex subjects simply and clearly. "My success as a scientist is due to strong writing skills," he adds.

He completed a doctorate in meteorology at the Massachusetts Institute of Technology, where his research focused on the theoretical dynamics of global atmospheric circulation. At that time, the idea of using computers to model global climate was just getting off the ground in cutting edge research labs and the work hadn't quite filtered down to the students. Edward Lorenz, a professor of meteorology at MIT created one of the first simple, global atmospheric circulation models around 1960. That work led to the observation that complex systems are extremely sensitive to initial conditions, sparking an entirely new field of study: chaos theory. The example he is best known for is the "butterfly effect," in which a small disturbance such as the beating of a butterfly's wings in Brazil might yield a big change in the system, such as the birth of a tornado in Texas.

"I took one class from him on statistics and enjoyed it," says Dickinson. "But like many students there, I wasn't aware of what he was doing that he would later become famous for."

Dickinson went to work at NCAR, one of the world's premier climate research organizations. Then in the early 1970s, he and colleague Steve Schneider were asked to outline possible new research initiatives. During the process, he became fascinated by the idea of using computers to model climate. Now, 35 years later, he's still working on those models.

As a professor at the University of Arizona in Tucson in the 1990s, he worked with a bright young post doc named Liang Yang on improving the land surface components of climate models. He and Yang, now a research associate professor at the Jackson School, have continued to collaborate on research and co-author papers.

Together, they have made many improvements to the land and atmosphere components of the Community Climate Model, an open source model initially created with other collaborators at the University of Arizona and now hosted at NCAR. Dickinson and Yang will be able to work more closely now Dickinson has left his most recent university home, the Georgia Institute of Technology in Atlanta, home of the Yellow Jackets, to be a professor at the Jackson School.

"Liang is good at identifying interesting problems to work on," Dickinson says. "One of my skills is in refining definitions of what the science is and in describing it in writing."

Dickinson joins several other leading climate scientists who have recently moved

Robert Dickinson

to the Jackson School, expanding the school's climate research and teaching capabilities. Dickinson and his colleagues are strongly committed to training a new generation of climate scientists.

"It's a good opportunity to share students," says Dickinson. "When students have several faculty, they have more people to turn to with questions, so they get more rounded guidance than if they have just one."

More Veggies

When Dickinson began working on climate models in the 1970s, they were simple affairs.

Consider how they handled soil moisture. In the models, all soil had the capacity to hold 15 centimeters of water. If there was more water, the ground became saturated and the excess water would run off. If there was less, it would be absorbed and evaporation would be reduced. If there was exactly 15 centimeters of water, then the land surface acted pretty much the same as the surface of the oceans in terms of evaporation. Dickinson calls this the bucket model. It turns out soils

It's all about trying to get details right. When you ignore any one detail, you can get hugely wrong answers.

are far more complex when you fully account for their capacity for water, rates of evaporation, and transpiration by plants.

The earliest models didn't incorporate vegetation at all. When a colleague introduced a plant canopy into a climate model in the early 1980s, Dickinson was inspired to consider the myriad impacts that vegetation could have on the water cycle, wind patterns, and the amount of solar radiation reaching the ground. Figuring out how to represent the land surface—especially surface water and vegetation—in models became a major focus of his research.

One difference between vegetated and non-vegetated land is that once water is in a plant's leaves, its harder to get it back into the atmosphere than it is to get it out of non-vegetated soil. Leaves don't act like wet surfaces. It takes a pull to get the water out of the leaves and into the air (transpiration).

"It's a detail," says Dickinson. "It's all about trying to get details right. When you ignore any one detail, you can get hugely wrong answers."

More recently, Dickinson has turned to looking at how vegetation affects the absorption and reflection of incoming solar radiation. Current models treat a tree canopy as a flat surface with a uniform albedo. But in reality, a forest has gaps and variations in foliage density. It turns out the physical structure of vegetation matters—along with the color of the soil, altitude of the landscape, and myriad other factors.

"All previous models had taken land as the same everywhere, there was no geographical distinction," he says. "So I have tried to define land in terms of details instead of saying there was one universal property of land."

He says there are still many aspects of the real world that need improvement in the models, such as thunderstorms or the effects of deforestation on rainfall. He relishes the challenge because it gives him the chance to make an impact on society.

"It's in the top 10 of issues people care about like global disease and hunger," he says. "So being a part of trying to resolve these issues is pretty exciting."

Think Local

Earlier this year, Dickinson served on a committee appointed by the U.S. Department of Defense to identify grand challenges in climate change research. One conclusion was that climate modelers need to develop the ability to make climate predictions on a regional rather than global scale and on the decadal rather than century scale. These are the temporal and spatial scales that are most useful to decision makers. Global circulation models, the standard tool of climate modelers today, simply don't have high enough resolution to offer practical help to the people who need it.

"The nation needs detailed information regarding the magnitude and timing of the climate changes and of the consequent impacts to which human societies will have to adapt," the scientists wrote in an unpublished draft report. "Such information would provide the basis for assessing the desirability of different adaptation options."

Decisions on how best to manage water resources for example depend on predictions of future precipitation, flooding, and droughts. In the old days, before satellites and computer models, those predictions were based on historical observations.

"But that only works statistically if you have an unchanging system," says Dickinson. "If the system is rapidly changing, that doesn't work. You can no longer say the future is the same as the past."

There are at least two challenges in making model predictions with finer spatial resolution. One is computational power. Global climate models currently divide the world up into 100 square kilometer grids.

"Details involving local climate would start getting better if you could get down to a 10 square kilometer grid," says Dickinson. "That doesn't seem like much, just an order of magnitude, but the increase in computational power is really a factor of 1,000."

The other challenge is to accurately model how the land interacts with the climate. On the small scale, the land surface—from pavement to forests to grasses to deserts to glaciers—can have a big impact.

The Department of Energy is now considering how it can redirect research efforts to implement the report's recommendations. ✷

The Jackson School of Geosciences' programs

Modelers, Improve Thyselves

Apart from the technical challenges of developing more useful climate models, Dickinson says there needs to be improvement on the human side of the equation. Because the climate system is so complicated, he says, scientists have developed many different ways to describe it in models. He sees this go-it-alone attitude as detrimental to the climate community.

"People have different descriptions and they each come up with their own answers," he says. "They're difficult to judge by anyone outside that particular research group."

He says part of the problem is that scientists are trained to follow their own interests and not worry so much about how it might be useful for society. In his opinion, climate modelers should be trained more like engineers, to solve very specific problems. And they need to have more of what he calls social organization.

"To make climate models work, you have to have some agreement of 'I do this and you do that and we'll talk together and figure out how to do it together'," he says.

Darfur (above) is one of many vulnerable regions in the Sahel which is heavily dependent on the onset of the West African rainy season, a subject of Kerry Cook's research. Photo: United Nations Environment Programme.

Summer Rain

KERRY COOK'S CLIMATE RESEARCH BENEFITS AFRICA & THE AMERICAS

in climate research and education will benefit tremendously from several new high profile faculty and researchers including Kerry Cook.

Her research focuses on how Earth's surface structures—including topography, water, soil, vegetation, geology, and human development—affect atmospheric circulation and precipitation and how those impacts in turn affect surface structures. She studies these interactions using regional climate models, concentrating primarily on Africa and the Americas. The insights she gains can be applied to help people better manage water resources, including the mitigation of the effects of floods and droughts.

In a recent study, she projected that, as a result of climate change driven by a "business as usual" carbon dioxide emissions scenario, the Amazon rainforest will die back by 70 percent by the end of the century. As Earth warms, she discovered, annual monsoons will begin later, effectively shortening the wet season and lengthening the dry season.

"In our simulations, the dry season becomes so long that the Amazon rain forest vegetation can't make it through," she says.

Cook received her Ph.D. in atmospheric sciences from North Carolina State University in Raleigh. She was a postdoctoral research associate at Oak Ridge National Laboratory and spent six years as a researcher at the Geophysical Fluid Dynamics Laboratory at Princeton University. Most recently, she was a professor and director of graduate studies in the Department of Earth and Atmospheric Sciences at Cornell University.

Cook served as Cornell's representative to the University Corporation for Atmospheric Research (UCAR), a nonprofit consortium of research universities that promotes collaboration in atmospheric and climatic research. Among other things, UCAR manages one of the world's leading climate research institutions, the National Center for Atmospheric Research (NCAR). She was recently elected to the UCAR Board of Trustees and continues to serve in that capacity.

New Graduate Program

Cook's first task is to establish a new graduate studies program in Climate Systems Science. As the program's first director, she is developing a new curriculum in collaboration with current Jackson School climate faculty and researchers such as Jay Banner, Liang Yang, Charles Jackson, and Terry Quinn, as well as other incoming faculty and researchers including Robert Dickinson and Rong Fu from the Georgia Institute of Technology. The program will attract top climate science graduate students from around the world to the Jackson School.

"I'm very excited about the opportunity to put together a program in climate systems science from scratch," she says. She notes that because climate change is such a hot topic, other universities are modifying their existing geoscience programs to include it. "In the Jackson School, because of the growth, we have an opportunity to sit down and think from square one how to make a flagship program," she adds.

At Cornell, she led the development of an undergraduate major in the Science of Earth Systems, and served as its first director. She stresses that she is not coming to the Jackson School with a set agenda for the new program. Instead, she plans to sit down with members of the school to find out what kind of program will compliment and enhance existing programs.

Cook also pointed out that climate systems science covers a lot of territory. It involves the entire Earth and has strong connections to biological, geological, and human systems. The challenge for the new program will be to walk a tightrope between breadth and depth.

"We can't turn out people who are jacks

Kerry Cook

of all trade and masters of none—but at the same time, we need to have students who can communicate across disciplines and work very effectively," she says. "They will need to be able to both work in a focused area at the forefront of knowledge and also connect to the big picture." The program is expected to begin in fall 2009.

Africa

In addition to her commitment to teaching and fostering new scientists, Cook is actively involved in several research projects. One major interest involves the West African monsoon system.

People living throughout West Africa, including those in the Sahel, a semi-arid region south of the Sahara Desert, depend heavily on the annual monsoons from May to September. Cook's research encompasses all aspects of this monsoon system, including the dynamics of monsoon onset and monsoon breaks, and how the system may change in the future. Monsoon onset over West Africa is particularly intriguing. When the rains begin in May, the monsoon tends to sit and dump precipitation over the Guinean coast region, where the continent bulges out into the Atlantic.

"Then all at once, over just a few days, the strong rainfall jumps into the interior," she says. "The rain gets up to the Sahel which is very marginal for agriculture. They're very dependent on that rain."

This phenomenon is known as the West African Monsoon Jump. Predicting this jump, which is also the onset of the rainy reason in the Sahel, is of primary interest for farming and managing the region's water resources.

"People plan for it by watering crops differently or postponing planting or planting different crops," she says. "Weather prediction on one week to 10 day time scales is very valuable for agricultural planning. We try to understand the basic physics, we don't do the predictions currently, but we want to develop advanced understanding so models can be improved."

Cook also studies the African Humid Period, about 8,000 years ago, when the Sahara Desert was vegetated. Cook notes that, "This time period is particularly fascinating because the geological evidence indicates that the climate of northern Africa changed rapidly from a desert state during the Last Glacial, to a vegetated state with large sustained lakes, and then back rapidly to today's desert state." The fact that the climate in this region can change abruptly is of concern for the future, and Cook has a new grant from the Department of Energy to study the dynamics of abrupt climate change in this region, and also in the Central U.S.

"I wanted to work on climate and atmospheric science problems that affect people," she says. "These are life and death issues related to weather and climate in Africa. This is the place where drought affects the most people, so it really matters to improve the science."

Great Plains

Developed countries, such as the U.S., are not immune to fickle climate. The Great Plains Low Level Jet is a summertime circulation pattern that carries moisture from the Gulf of Mexico up into the Great Plains. It's critical for agriculture in the central U.S. because it brings most of the region's summertime rainfall.

At Cornell, an undergraduate economics major asked Cook to work with him on his senior honors thesis to evaluate the impact of climate change on Midwest agriculture and economics. They reviewed the global climate model simulations from the 2007 climate assessment by the Intergovernmental Panel on Climate Change, the international organization of scientists that periodically assesses the state of knowledge on climate change. The global climate models predicted that the jet will intensify in the spring months as Earth warms. This is expected to bring heavier rains to the northern Great Plains and less rain to the southern Great Plains during April, May, and June. While not necessarily good news for Texas, that should make farmers in the northern Great Plains happier, right?

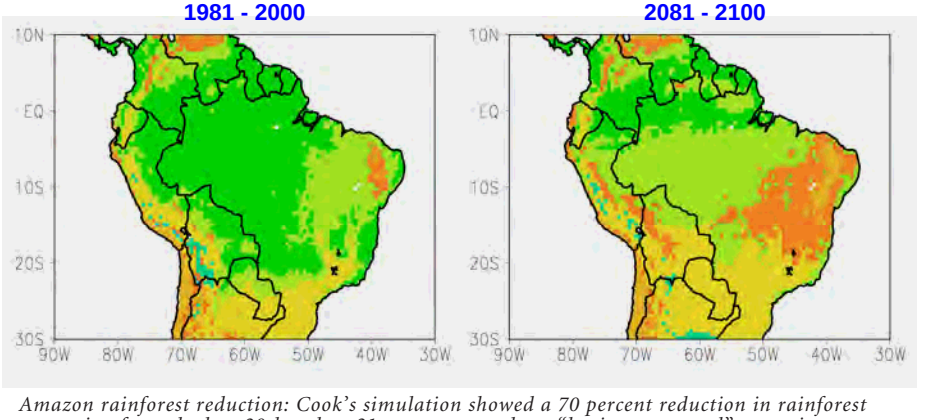
"It might actually be worse for the northern Great Plains becuase it could mean more flooding and more intense storm events," says Cook. "When they get bad flooding in the central U.S., like the floods in 1993, it's this jet that gets more intense."

Cook refers to the Great Midwest Flood of 1993, at the time the most devastating flood in modern U.S. history. Following a typically rainy spring in which soils were already saturated and rivers hovered near flood stage, unusually heavy rains persisted throughout the summer causing rivers to overtop their banks and levees to fail. Centered on Iowa, the deluge covered parts of nine states, caused more than $15 billion in damages and damaged or destroyed 50,000 homes.

Although not as widespread or severe, Midwest floods in spring and summer of 2008 were a vivid reminder of the importance of the ability to predict regional climate trends.

"It is important to advance our climate models to accurately simulate climate change on regional space scales, since these are the space scales important for impacts assessment and because many of the interactions between the atmospheric circulation and precipitation occur on smaller space scales," she says. "Something we'll work on in Austin is developing higher resolution models so we can understand if intensification of the jet will actually mean more rainfall and flooding."

Other active projects in Cook's research group include understanding how African easterly waves develop into Atlantic hurricanes and the impact that plumes of relatively cool, fresh water from the Amazon and Orinoco Rivers into the Atlantic have on climate. ✶



Amazon rainforest reduction: Cook's simulation showed a 70 percent reduction in rainforest vegetation from the late 20th to late 21st century, under a "business as usual" scenario.
Rainforest *Savannah* *Caatinga (semi-arid scrubland and thorn forest)*

H. Scott Hamlin

H. Scott Hamlin rejoined the Bureau of Economic Geology in September 2007 as a research scientist associate. He worked at the Jackson School in the 1980s and 1990s, and completed his Ph.D. in geology at the University of Texas at Austin in 1999 before working at the Texas Water Development Board, where he built groundwater flow models of Texas aquifers.

He points to sedimentary geology, stratigraphy, basin analysis, and hydrogeology as his research interests, but his current research involves taking a closer look at an old petroleum province – the Permian Basin of West Texas. He's developing the sequence stratigraphy of the transition between the shelf and the basin floor.

"By using old data, like geophysical logs and cores, and new data, such as seismic and outcrop models, I hope to refine our understanding of shelf, slope, and basin stratigraphic relationships and depositional systems in the Midland Basin," he said. Currently, he's focusing on Spraberry deepwater sandstones, which still hold billions of barrels of hard to produce oil. Looking back at his accomplishments, Hamlin derives the most satisfaction from the BEG publications he has authored over the years.

"I receive great feedback from Texans who have found these useful, especially my work on the Carrizo Sandstone Aquifer and the Canyon Sandstones tight gas play," he said.

Hamlin first came to the Bureau as a student assistant in the 1970s, working under Doug Ratcliff at the Core Research Center, and has seen the Bureau evolve over the last 40 years. He was involved in a variety of projects, ranging from groundwater resources to unconventional energy, including geothermal and low-permeability gas. His fieldwork took him across Texas and into Wyoming, Colorado, Australia, and Venezuela.

"BEG was a great place to work then, and that has not changed," Hamlin said. "It is a more diverse group having a broader range of background and expertise. And now that BEG is part of the Jackson School, I find myself in a world-class research and academic organization," he said. "The opportunities seem endless."

Qilong Fu

Qilong Fu joined the Bureau of Economic Geology as a research associate in January 2008. He was interested in research that involved both academia and industry, sectors he already had experience with.

"The Bureau has a very good academia-industry interface and has prestige in both," he said.

His research focuses on energy and environmental sustainability. Specifically, he is engaged in reservoir characterization to discover new hydrocarbon reserves and increase recovery. Currently, he participates in studies on Wolfcampian platform carbonate reservoirs in the Permian Basin, West Texas, and Cretaceous carbonate reservoirs in the Campos Basin, offshore Brazil.

In 1990, Fu received his master's from the Institute of Geology at the Chinese Academy of Sciences in Beijing. He worked as an academic researcher at the Nanjing Institute of Geology and Paleontology at the Chinese Academy of Sciences in Nanjing and at the University of Regina in Saskatchewan, Canada. In 2005, he received his Ph.D. in geology from the University of Regina. Before coming to the Bureau, he worked in industry as a petroleum geologist for Canada Capital Energy Corporation and AGAT Laboratories Ltd.

Fu said he enjoys working at the Bureau.

"The Bureau has a friendly work environment, flexible work-time, and diverse cultures," he said. "People are very nice here, and I like to work with them. At the Bureau I feel encouraged, and this is a good place for my career growth."

Katherine Romanak

Katherine Romanak began working at the Bureau of Economic Geology's Gulf Coast Carbon Center as a consultant on the SACROC carbon sequestration project in October 2007. She joined the Bureau full time as a research associate in June 2008.

Sand dunes, Permian Basin

She conducts geochemical analyses on water samples to evaluate potential impacts to freshwater resources above SACROC, a long running CO_2 enhanced oil recovery field in West Texas. She will conduct geochemical analyses of soil gas samples at a second sequestration project at the Cranfield site in Mississippi. At a third site, the Brackenridge Field Laboratory in Austin, she has designed a field experiment to test a nanotechnology based sensor for detecting CO_2 underground.

Her path to the Bureau has been labyrinthine. She set out to become an expert on volcanoes, traveled the world studying active and extinct volcanoes, wrote columns for *Geotimes* and *EOS*, worked as a scientist at the Smithsonian Institution's Global Volcanism Program, and came to The University of Texas at Austin in 1990 to earn a Ph.D. in volcanism. But then fate intervened.

"I lost three of my close colleagues from the Smithsonian to two different volcanic eruptions," she said. "I was just starting a marriage and a family and I thought I don't know if it's fair to my future kids to have a mom off on an erupting volcano."

She talked to Phil Bennett, a geology professor at the university who offered her a chance to study carbon cycling beneath playa lakes in the Texas High Plains as a way of assessing microbial degradation of contaminants.

"At that time, CO_2 sequestration didn't exist," she said. "But I was gathering expertise in measuring CO_2 in soil and water. It prepared me for this whole new industry that, after I raised my kids and came back to science, I was ready to jump into."

SUMMER FIELD CAMP

GEO 660 Summer Field Camp 2008

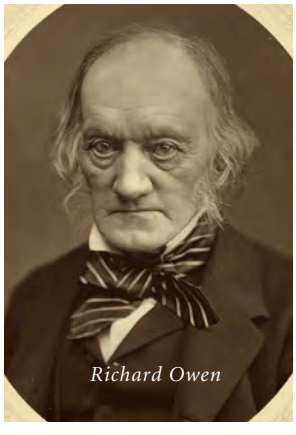
Clockwise from top left (both pages): Students survey White Sands National Monument in New Mexico; Thermophiles bubble away in Yellowstone National Park, Wyoming; students work into the night at Cloudcroft, New Mexico; stalagmites tower in the Hall of Giants, Carlsbad Caverns, New Mexico; Randy Marrett (background) explains himself; two students walk between Goose Egg and Alkali Domes and Sheep Mountain Anticline, Greybull, Wyoming; students ponder the anticline, Sandy Hollow, Dillon, Montana; Elke Baitis puzzles out a problem at Sandy Hollow, Dillon, Montana.

LIBRARY REPORT

By Dennis Trombatore

The Walter Library is approaching a tipping point for the online delivery of information services this year with the AGU journal backfiles (over 1 million pages), Springer journal backfiles (180,000 articles), the Geological Society of London's Lyell Collection (230,000 pages), the Glossary of Geology online (800 pages), and a new license pending for GSA Special Papers (140 volumes). Nevertheless, we continue to add paper-only resources at a rapid rate as well, and the amount of information available in the earth sciences only seems to increase every year (along with prices and complexity).

Our new scanner stations (including one for flat sheets) and laptops for check-out are popular. The Library has also upgraded our student use machines, and we have added one new work station. With Jackson School support, our Graduate Research Assistants (GRAs) from the School of Information continue to advance our goals. Our suite of digitized geology publications has grown substantially this year thanks to GRA Doug Rice and a student assistant. Notable additions include the WPA-era Records of Water Wells and Drillers Logs from the Texas Board of Water Engineers for most counties in Texas. We also continue to produce pdf copies of old Bureau of Economic Geology publications. To see the materials, go to: http://www.lib.utexas.edu/books/landscapes/.



Richard Owen

On the endowment front, it is exciting to report success in our bid to create a Library Hydrology Fund. We surpassed our initial goal and now have approximately $31,000 in the fund. Thanks to the many initial donors, particularly Mike Wiley, Ken Barrow, the Hood-Barrow Foundation, Bob Kier, Fred Oliver, and Jack Sharp. We hope to have the continued support of the hydrology community to double or triple this amount in the next few years. It is now all too common to pay hundreds of dollars for a research monograph and more for journals, so the money goes fast!

This year we also began spending the earnings from the Chernoff Geophysics Fund. Due to poor exchange rates the dollars did not stretch as we had hoped, but we were able to acquire one major 10 volume set, The Treatise on Geophysics, and a new journal subscription, The Journal of Seismic Exploration. Next year we hope to add a second new journal and a number of new books on a variety of topics. The importance of these funds through time cannot be overstated. Since the Walter Library was named in the mid-1980s, close to one million dollars has been expended on information resources that would otherwise not have been available to the research community. Thanks again to our donors and supporters.

By the time you read this, another of Richard Owen's classic paleontology titles should also be available in preservation digitized format—A History of British Fossil Reptiles. Owen's rare and elaborate paleontology text, again with an introduction by our own Tim Rowe, continues the high standards set by the 2007 contribution, Memoirs on the Extinct Wingless Birds of New Zealand. To see the work, go to: http://catalog.lib.utexas.edu/ and search "owen british fossil reptiles," and select the 'electronic resource' link.

GRA's April DeRome and Caitlyn Lam continue to work on catalog improvements and acquisitions projects, respectively. April has been linking digitized materials to catalog records, upgrading records to improve discoverability, and creating original records. Caitlyn has been locating and acquiring serials backfiles and helping us get caught up on ordering. They have accomplished an immense amount of work, and are our Guion Award winners this year.

It is my sad duty to report that Vickie Drake, after more than five years in the Walter Library, is relocating to Washington, D.C. with her spouse. We have benefited greatly from Vickie's efforts: in the library, on our web pages, from her many hours of "chat reference" assistance, and her work on the University Staff Council. It has been a real pleasure to have her working with us.

Our GeoRef indexing arrangement continues with the American Geological Institute. Pat Dickerson has been joined by two additional part-time staff, mining our unique collections for indexing. This has helped GeoRef grow more quickly and diversify its content, making better information available to the research community.

I remain chair of the GeoRef Advisory Committee at AGI, and also serve on the GeoScience World Advisory Committee. I am working on a history of the Walter Library and encourage anyone with information to share to contact me. Of special interest would be any photographs of the library in the "old" geology building (now W.C.Hogg).

Walter Geology Library 2007-08 Donors of Books and Materials

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UNIT UPDATES

Department of Geological Sciences

The Department has grown significantly since 2007 with the addition of new faculty, undergraduate and graduate students, and postdoctoral scientists. Following a nationwide effort to recruit faculty, the school hired 15 new faculty members. More than 500 candidates applied for the school's openings and just as notably, the school achieved an 80 percent success rate on its offers.

Of the new hires, seven started in the fall of 2008, three arrived in January 2009, and five more will start in the fall of 2009. Six are female, which raises the school's total of female faculty to seven. The hires resulted from a strategy of recruiting open positions in four frontier research areas, allowing the school to take advantage of exceptional opportunities and seek candidates who could strengthen collaboration between units. Several new hires are profiled in the Scientists section of this *Newsletter*—look for the rest in future editions. (The group is listed on page 41.)

The Department's educational program is stronger than ever. The school began the 2008 academic year with 100 new undergraduates, bringing total undergraduate enrollment to about 290 students.

"Between active recruiting through our Prospective Student Visit program, recruiting scholarships, and letters and phone calls from Advisory Council members, we have brought in an excellent group of new undergraduate students," reports Sharon Mosher, chair of the Department. "Half of these students went on our second orientation trip, the NeoGeo Trip, for two days prior to classes." The students went to Pedernales Falls, Enchanted Rock, and Inks Lake State Parks to introduce them to local geology and basic geologic concepts—a first experience for most. The main trip aims to give new students a chance to get to know each other and a few faculty and current students, so the large university seems a bit less overwhelming on day one.

For fall 2008 the school also welcomes its largest group ever of new graduate students—60 new students coming to work with faculty in the Department and research scientists from the Bureau of Economic Geology and Institute for Geophysics. During the 2007 recruiting season the school modified its support policy to make it easier for people from other units to recruit graduate students for their research projects. The change, combined with a successful prospective students weekend and a major recruiting push involving all three units, resulted in the unusually large group. Admissions standards went up even as the number of new students increased. As of fall 2008, the school had a total of 182 graduate students from 22 countries, with graduate enrollment about evenly split between the M.S. and Ph.D. students (83 and 99, respectively).

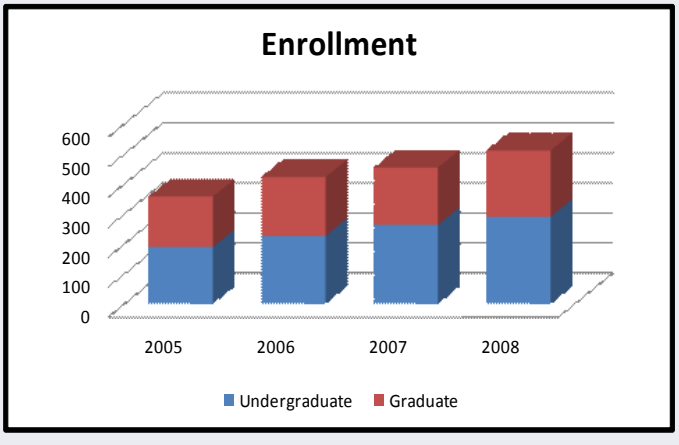
Bureau of Economic Geology

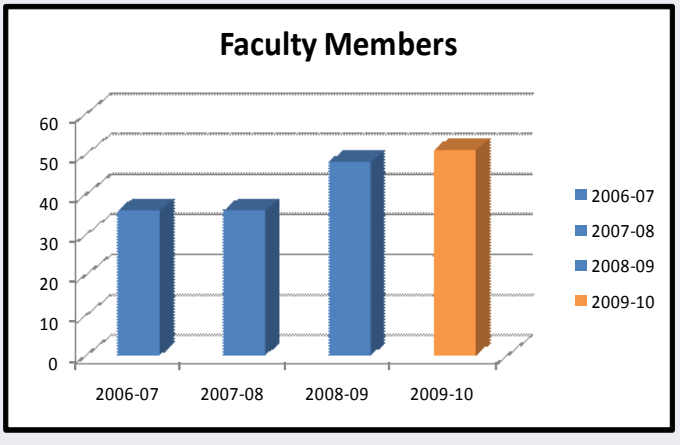
As the Bureau prepares for its centennial year in 2009, its research programs continue the unit's 100-year-old tradition of earth science making an impact. Recent research highlights include:

- **The Advanced Energy Consortium (AEC),** a $27 million consortium developed by the Bureau that includes Baker Hughes, BP, ConocoPhillips, Halliburton, Marathon, Occidental, Schlumberger, Shell, and Total. AEC focuses on the application of nanotechnology to exploration of oil and gas. The goal is to develop subsurface nanosensors that can be injected into oil and gas well bores.


NeoGEO Freshman Orientation

- **The Bureau's Indiustrial Associates (IA)** programs remain healthy with more than 70 companies supporting eight IA programs. The Reservoir Characterization Laboratory, which focuses on carbonate reservoirs, and the Applied Geodynamics Laboratory, which focuses on salt tectonics, are both celebrating their 20th anniversary.
- **The State of Texas Advanced Resource Recovery Program (STARR)** continued its successful contributions to operators drilling on Texas State Lands and the legislature reauthorized STARR for another two years. See related article on page 58.
- **Unconventional resources:** In June 2008, the Bureau began a major and unique three-year research program with ExxonMobil which will focus on unconventional resources. Co-funded by ExxonMobil (two thirds) and the Jackson School (one third), the program comprises 17 Bureau researchers, four Petroleum and Geosystems Engineering researchers, one Department of Geological Sciences researcher, two postdoctoral scientists, and eight graduate students.
- **Mudstones:** A new IA program on mudstones is forming under the leadership of Steve Ruppel. The program was initiated

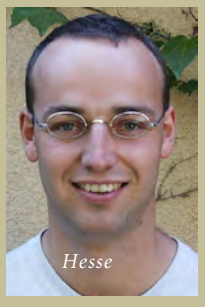


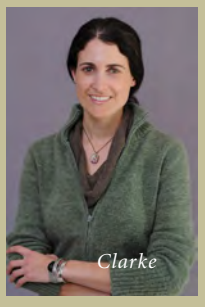


New Faculty Hires for 2008 & 2009


Johnson


Shanahan


Hesse


Clarke


Kim


Barnes

Climate Systems Science

Dan Breecker / Assistant Professor; Ph.D. University of New Mexico, 2008; NSF Postdoctoral Fellow at the University of New Mexico.
Rose Came / Assistant Professor; Ph.D. MIT/Woods Hole, 2005; Postdoctoral Fellow at California Institute of Technology.
Kerry Cook / Professor; Ph.D., North Carolina State University, 1984; Professor, Cornell University.
Robert Dickinson / Professor and Jackson Scholar; Ph.D., MIT, 1966; Professor and Chair at the Georgia Institute of Technology.
Rong Fu / Professor; Ph.D. Columbia University, 1991; Associate Professor at Georgia Institute of Technology.
Tim Shanahan / Assistant Professor; Ph.D. University of Arizona, 2006; NOAA and Woods Hole Oceanographic Institution Postdoctoral Fellow.

Earth Surface and Hydrologic Processes

Joel Johnson / Assistant Professor; Ph.D. MIT, 2007; Postdoctoral Fellowship, USGS at Menlo Park.
Wonsuck Kim / Assistant Professor; Ph.D. University of Minnesota, 2007; Postdoctoral Research Associate, University of Illinois at Urbana.

Crust, Mantle & Core Dynamics

Jaime Barnes / Assistant Professor; Ph.D. University of New Mexico, 2006; Postdoctoral Fellow at the University of New Mexico.
Liz Catlos / Associate Professor; Ph.D. UCLA, 2000; Associate Professor at Oklahoma State University.
Rich Ketcham / Associate Professor; Ph.D. University of Texas at Austin, 1995; Senior Research Scientist UT Austin.
Afu Lin / Assistant Professor; Ph.D. University of Chicago, 2002; Livermore Fellow at the Lawrence Livermore National Laboratory.
Luc Lavier / Assistant Professor; Ph.D. Columbia University, 1999; Research Associate, UT Institute for Geophysics.

Energy Geoscience

Marc Hesse / Assistant Professor; Ph.D. Stanford University, 2008; Postdoctoral Fellow at Brown University.

Paleontology

Julia Clarke / Associate Professor; Ph.D. Yale University, 2002; Assistant Professor North Carolina State University.

in response to the interest shown by shale gas players in the basic geology of mudstone, including deposition, diagenetic eveolution, hydrocarbon expulsion, and fluid flow characteristics.

- **Petrobras and BEG** researchers led by Wayne Wright and Fred Wang are three months into the final one-year phase of a research and training project. The objective is to acquaint Petrobras scientists with workflows developed by BEG for carbonate reservoir characterization, using Pampo field in the offshore Campos Basin as the dataset.
- The first Bureau research sponsored by **China** is under way. The sponsor is BGP, a geophysical company affiliated with Chinese major CNPC. The first project, led by Sergey Fomel with help from postdoc Yang Liu, is studying seismic data attenuation. The second project, led by PI Hongliu Zeng, is focused on conveying BEG's approaches for digital outcrop imaging as a front end to improved sesimic modeling workflow.
- **The Gulf Coast Carbon Center**'s Frio test site, led by Bureau Senior Research Scientist Sue Hovorka, has run its final experiment with the completion of a crosswell seismic experiment by Lawrence Berekeley National Laboratory. This groundbreaking project has been lauded by the Department of Energy as the star of its carbon sequestration research program and has been the first highly monitored CO2 injection into a brine reservoir in the world. See page three for an update on the Carbon Center's latest major test, now underway.

Institute for Geophysics

Paul Stoffa announced his resignation as director of the Institute for Geophysics after 14 years at the helm, the longest tenure of any UTIG director. (See story on page 62.)


Terry Quinn

Associate director Terry Quinn agreed to serve as interim director while the school conducts a national search for Stoffa's replacement.

Several UTIG staff members proceeded with major data acquisition programs that had been delayed by the refit of the R/V Marcus Langseth, completed in November 2007. Harm van Avendonk participated in an onshore-offshore project in Costa Rica in February and March 2008. Sean Gulick and Gail Christeson completed a cruise to Alaska, and Kirk McIntosh was able to plan for a Langseth cruise near Taiwan in early 2009.

Additional research highlights include:

- **Scotia Sea Cruise:** Lawrence Lawver and Ian Dalziel led a cruise to the Scotia Sea during

April 2008 to study the opening of the Drake Passage between South America and Antarctica through a combined marine geophysical and geochemical study of dredged ocean-floor basalts. Dating the passage's opening is key to understanding the formation of the circum-Antarctic current, which plays a major role in worldwide ocean circulation. The current's formation is also connected with the growth of the Antarctic ice sheet.

- **Mississippi Embayment Seismic Reflection Cruise:** To investigate why earthquakes occur in regions distant from plate boundaries and to detect faults concealed beneath surface topography, in the summer of 2008 Kirk McIntosh and UTIG colleagues collaborated with scientists at the University of Memphis to acquire 300 km of high-resolution seismic reflection data and chirp data along the Mississippi River. In 1811-1812, the New Madrid earthquakes, three of the continental United States' largest quakes, occurred just north of the survey region. The Army Corps of Engineers is particularly interested in what the research may show about how earthquakes affect levees and bridges along the Mississippi.
- **Hydrate Ridge Cruise:** In July 2008, UTIG researchers Nathan Bangs and Matt Hornbach sailed on the R/V Thompson offshore of Oregon to carry out a high-resolution 3-D seismic survey of the Hydrate Ridge gas vent system. Their objective was to examine structures that control subseafloor fluid migration pathways and direct gas into the seafloor vent system. Four undergraduate students participated at sea in the data acquisition as part of a hands-on 3-D seismic class taught by Bangs and Hornback through the Department of Geological Sciences.
- **IODP Expedition 317—Canterbury Basin:** One of the fundamental problems in sedimentary geology is to assess the relative importance of global sea level (eustasy) versus local tectonic, sedimentary, and oceanographic processes in controlling depositional cycles on continental margins. Craig Fulthorpe is co-chief scientist of Integrated Ocean Drilling Program (IODP) Expedition 317, which in November 2009 will begin drilling in the Canterbury Basin offshore New Zealand. Analyzing the stratigraphy will help geoscientists read the record—covering tens of millions of years—of the thick sedimentary deposits beneath the world's continental shelves.

Energy & Earth Resources

A joint program with the Department of Petroleum and Geosystems Engineering, the Energy & Earth Resources Graduate Program (EER) continues to expand dramatically since its leadership was transferred to the Jackson School in 2005. The program, which prepares graduates for the evolving demands of the energy industry, currently has 44 students, 19 of them international. Recent alumni have excelled in the diverse areas of portfolio management, risk analysis, feasibility studies, and reservoir engineering. Active recruiters include the large major oil companies, national energy companies such as Korea Gas and Petrobras, energy service firms such as Schlumberger, consulting firms like Navigant and Wood Mackenzie, and environmental agencies. Among its specialties the school is training a number of energy finance specialists, including current students from Mexico, Peru, Venezuela, Taiwan, and China.

The Jackson School's first Ford Foundation Scholar, Walaa Awaad Ali, entered EER in January 2007. In her homeland of Egypt, Ali is a secondary school geology teacher. She is working with Julia Gale of the Bureau of Economic Geology on fractured hydrocarbons and presented a poster session at the West Texas Geological Society fall symposium in September 2008.

McKinsey & Company selected Enes Hosgor, a Fullbright Scholar from Turkey, to attend their Bright Perspectives 2008 conference in Austria. Hosgor is expanding his knowledge of geologic processes with energy finance and risk management training. EER is also taking part in a research project with four scholars from Mexico as part of a USAID/TIES grant with the Jackson School's Center for Energy Economics. The students are reviewing traditional energy resource, along with solar and wind technology, for feasibility studies in Mexico.

Center for International Energy & Environmental Policy

In its fourth year, the Center for International Energy & Environmental Policy (CIEEP) is actively pursuing its goal of formulating policy options underpinned by science and engineering conducted in consultation with the private sector and government. Under founding director Chip Groat and associate director Michael Webber, CIEEP advanced a number of policy research initiatives in 2007-2008, including:

- **Designing a new national energy policy structure:** There is broad consensus that structures in place at the federal level are poorly designed to meet the urgent challenges in energy security and the environment that the country faces. With financial support from the Markle Foundation, and in partnership with the LBJ School of Public Affairs, CIEEP is leading a project to recommend a restructuring of energy policy mechanisms in the federal government.
- **Access to oil and gas on federal lands:** This year-long study was conducted with students from the LBJ School of Public Affairs looking at policies that guide industry access to federal lands for oil and gas development. While the media highlights resources on the outer continental shelf, onshore lands also hold significant reserves. The Congressional Research Service sponsored this project.
- **The nexus of energy and water in Texas:** CIEEP is conducting several parallel studies of the nexus of energy and water in Texas because of the co-dependence of these two sectors. Organizations funding the work include the Texas Water Development Board, State Energy Conservation Office, Energy Foundation, and Environmental Defense. The initial work folds into a $2 million National Science Foundation project in September 2008.
- **Texas Electricity Model (TEMo):** This project is developing an interactive and rigorous online tool that conveys critical lessons about the tradeoffs in Texas power choices. A coalition of industrial providers and consumers of electricity are sponsoring the work.
- **Teaching initiatives:** Since 2006, CIEEP's faculty have created six new classes for the university, reaching hundreds of students at undergraduate and graduate levels. CIEEP is also reaching professionals through the university's Center for Lifelong Engineering Education, including the popular course "Energy Technology and Policy," attended by engineers, diplomats, and staff from state government.

R/V Maurice Langseth

When tectonic plates meet on the seafloor, they tend to do one of three things: slink away from each other (spreading), crawl past each other (transform motion), or smash headfirst into each other forcing one to the bottom of the dogpile (subduction).

Warped

The History of a Curious Plate Boundary

By Marc Airhart

And then there is Macquarie Ridge, which lies south of New Zealand where the Australia and Pacific Plates meet. Here the plates are more like two tireless and entwined sumo wrestlers shifting a hold from here to there, transferring weight from one foot to another, pivoting to exploit any weakness. Over the past 40 million years, the plate boundary has shifted from spreading to transform motion, and now in some spots, to subduction. It's the only place in the world where such a three step transition is clearly recorded in the geologic record.

Geologists from the Jackson School of Geosciences first went to Macquarie Ridge in the mid 1990s on the Australian research vessel Rig Seismic to collect marine geophysical data that might make it possible to reconstruct the plate boundary's tortured history.

Some intriguing details began to emerge. The original spreading ridge hadn't stayed put over time. Rather, segments migrated across the seafloor while becoming shorter and at the same time rotated about 90 degrees. That was consistent with other studies that had shown that relative motion between the two plates had changed over time. It also made this ridge unique because it was one of the only spots on Earth that records signs of such a high degree of rotation. Most other spreading ridges that rotate max out at 20 or 30 degrees.

Perhaps most perplexing was the fact that the spreading ridge segments shrank.

"How does the ridge become shorter?" wondered co-investigator Christina Massell Symons. "It can't just disappear into a black hole. If it becomes shorter, something else must be taking its place or growing at its expense."

The researchers also struggled to explain why magmatism—the upwelling of molten rock into the gap created by the spreading

plates—apparently shut off at some point in its history.

Sorting out the history of Macquarie Ridge is more than an academic exercise. It could have applications to real world problems.

"Ultimately, we'd like to be able to predict earthquakes and volcanoes," said Sharon Mosher co-investigator and more recently chair of the Jackson School's Department of Geological Sciences. (Mosher becomes the next dean of the Jackson School as this edition of the *Newsletter* goes to print.) "To do that, we have to understand how crust deforms along plate boundaries."

On December 26, 2004, the Great Sumatra-Andaman earthquake struck with an estimated magnitude of at least 9.1 and spawned tsunamis across the Indian Ocean that killed more than 225,000 people. Just three days earlier another great earthquake, with a magnitude of 8.1, struck Macquarie Ridge.

"But there was no tsunami because the plates were moving laterally past each other," said Mosher. Tsunamis occur when seafloor rapidly moves up or down, setting large volumes of water in motion. "As the plate boundary evolves to more and more subduction with time we will get earthquakes with large vertical motion at Macquarie Ridge and with the potential for tsunamis."

The team's results might shed light on earthquake and tsunami risks at other plate boundaries.

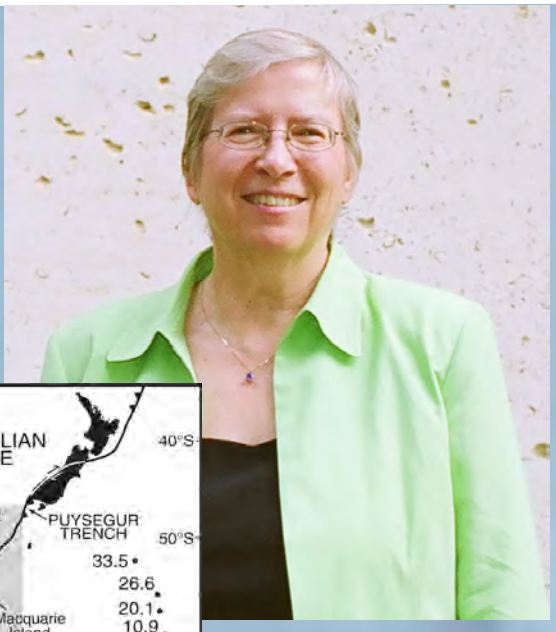
Rock, Paper, Scissors

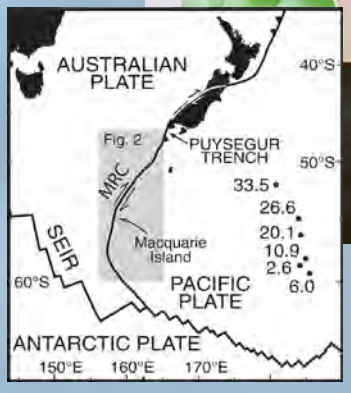
The researchers collected a wealth of data with marine geophysical instruments including multibeam sidescan sonar to map the bathymetry of the seafloor, a seismic array to measure the thickness of sediments, and a magnetometer to record magnetic field reversals that indicate the age of formation of new crust at a spreading ridge and its orientation at the time of spreading.

But all the data in the world is worthless unless you know how to interpret it.

Mosher worked with her colleagues on the problem for years, but struggled to tease the tectonic history of the region from the data. She

Using colored construction paper, plus some scissors, tape and a whole lot of patience, Mosher constructed a model to show how the plate boundary at Macquarie Ridge changed over the last 40 million years.





Map of the Macquarie Ridge, which lies south of New Zealand where the Australia and Pacific Plates meet.

Macquarie Island

became so frustrated that one day she took a stack of colored con struction paper and began to cut it in two along an imaginary spreading zone. She pulled the pieces apart a little, rotated them slightly and then taped them to the sheet below. Then she cut the second sheet and repeated the process. Then the third sheet, then the fourth, and so on, mimicking the continuous creation of seafloor at a spreading ridge as the orientation of the ridge itself changes.

The first series of manipulations didn't match the patterns suggested by the data. So she made more construction paper models, varying her approach each time by, for example, changing the rate of rotation and the length of the spreading ridge segments.

"And then I suddenly realized what could happen and what couldn't happen," said Mosher. "We actually fundamentally changed our ideas after I did those paper models," she said.

As she worked her way down through the stack of paper, earlier steps would be destroyed, so she stopped every few steps to scan the cutouts onto her computer.

"My grad students thought this was pretty hysterical," said Mosher. "But they're pretty impressive when you see them." Her colleagues asked why she didn't just do it all on the computer.

"You can't do them on the computer until you understand what you're doing," she said. "Yes, if I were a really good computational geoscientist maybe I could have done the whole thing that way, but I would be really surprised because there's an incredible amount of intuitive understanding in the whole process."

"It goes to show that geology is hands-on, visual science," said Massell Symons, who began working on the project as Mosher's master's student and now works for the Scripps Institution of Oceanography. "We needed a visual way to capture what was happening through time."

Twisted Logic

In an article published in February 2008 in the journal *Geology*, the researchers proposed a mechanism to explain the changes at Macquarie Ridge.

"In our case, it was by taking a plate boundary broken into multiple spreading ridge segments, rotating the segments, destroying some of them and ultimately converting the plate boundary into transform motion," said Massell Symons. "That's the simplest way to explain it."

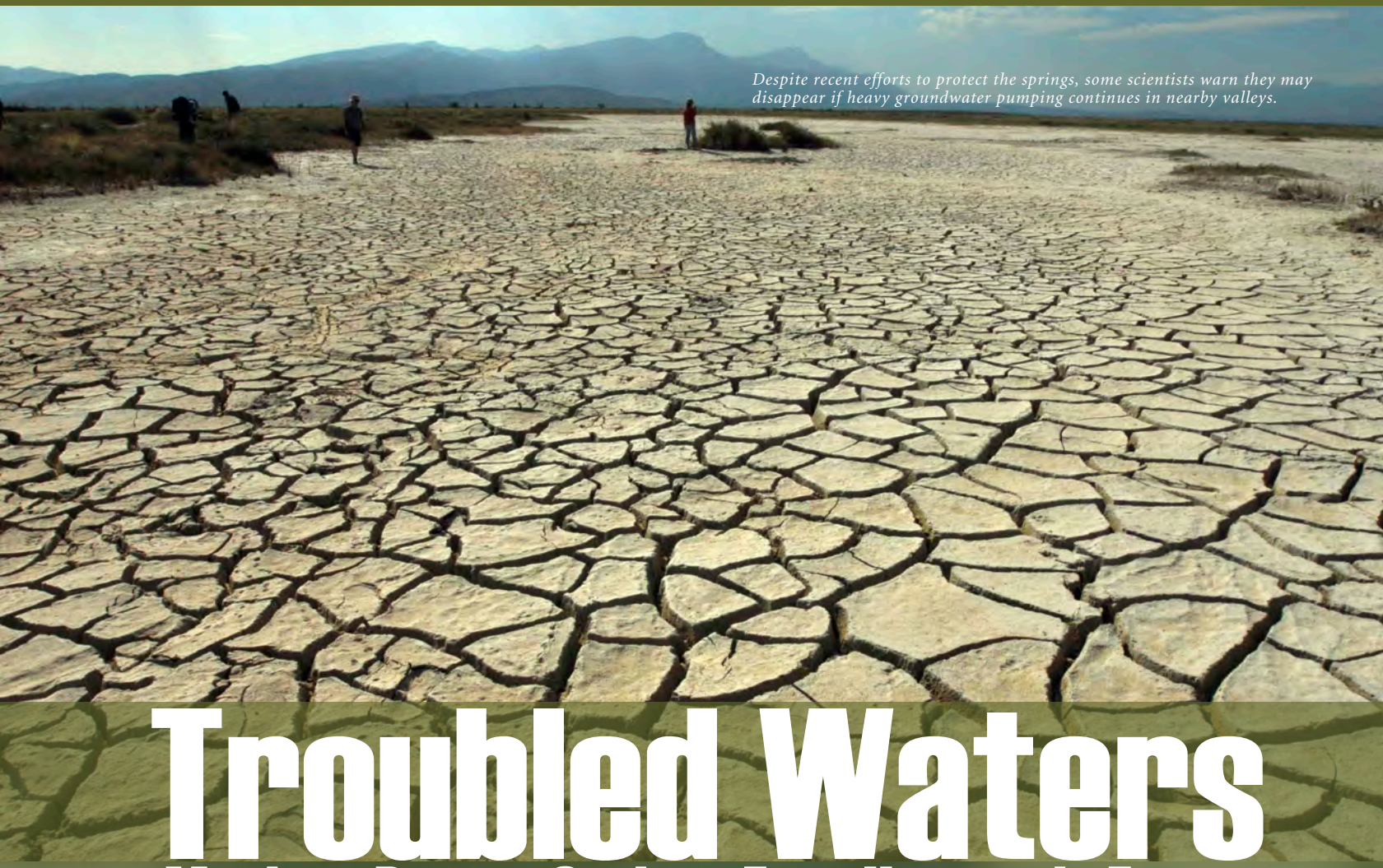
"When those spreading ridges were changing in orientation with time, individual segments migrated through the seafloor, shortening, sometimes completely disappearing, and transferring crust from one plate to another," said Mosher.

The critical insight was that as the ridge segments migrated and twisted into new orientations, one end of the ridge propagated through existing seafloor while the other end failed, and the end that failed did so faster than the end that propagated. Like two crabs scuttling across the seafloor in the same direction, the pursuer faster than the quarry, the gap between the two ends narrowed.

It was a combination of rigorously interpreted geophysical data and good old fashioned paper and scissors that made the insight possible.

"We've presented what we think to be the best explanation of the process of this change in spreading ridge orientation and hence, spreading direction," said Massell Symons. "Our model fits the data well in a geometric sense."

The researchers plan to publish a second paper highlighting the data analysis that supports their proposed mechanism and a third that, for the first time, explains why magmatism ceased at Macquarie Ridge about 6 million years ago. ✶



Despite recent efforts to protect the springs, some scientists warn they may disappear if heavy groundwater pumping continues in nearby valleys.

Troubled Waters

Mexican Desert Springs Face Uncertain Future

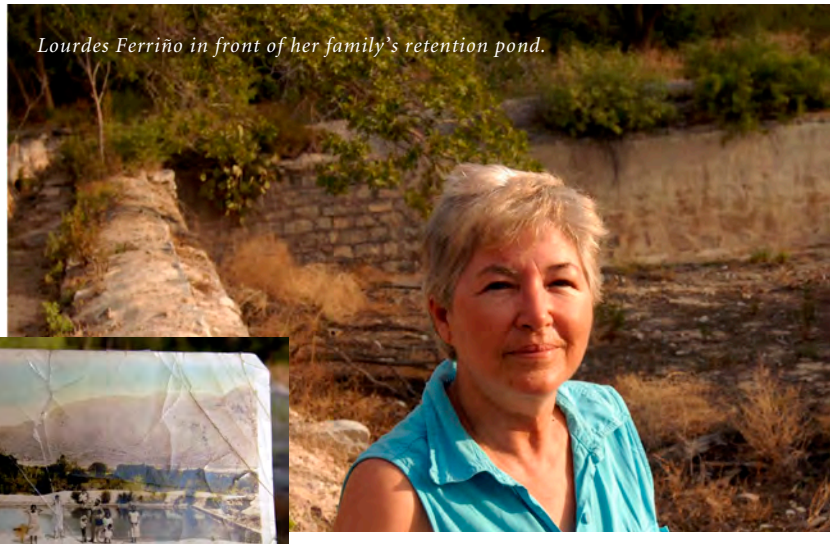
By Marc Airhart

Lourdes Ferriño says the land around her bed and breakfast was once full of life. Castilian roses grew out front next to the road that leads into the village of Cuatrociénegas. Her family sold the blooms to a company in Mexico City for perfume. Closer to town, the family's winery cultivated their own grapes. A spring-fed stream ran through the valley and through her family's mill, which she has spent the last decade converting into a rustic bed and breakfast.

Tucked away in a remote corner of Mexico's hot and dusty Chihuahuan Desert is a watery oasis teaming with life.

After driving hours through northern Mexico's Chihuahuan Desert, visitors to Cuatrociénegas (which means four marshes) still sense they are entering a special place. Here, on a valley floor studded with white gypsum sand dunes and ringed by mountains, hundreds of springs emerge from the ground filling blue-green pools, streams, and rivers. Communities of microbes build rocky freshwater reefs in the warm mineral-rich water. Fish, turtles, shrimp, clams, snails, lizards, and snakes found nowhere else in the desert, or the world for that matter, thrive here. With over 70 such endemic species, it is often compared to the Galapagos Islands. The World Wildlife Fund ranks it as one of the three most "biologically outstanding" desert freshwater ecoregions in the world.

But there is also a sense that like the desert mirage it appears to be, this oasis might evaporate in an instant—that the closer you get to it, the more it might fade into sand, cactus, and bones.



Lourdes Ferriño in front of her family's retention pond.

In this old photo, Ferriño was a child and the family's retention pond was full of water.

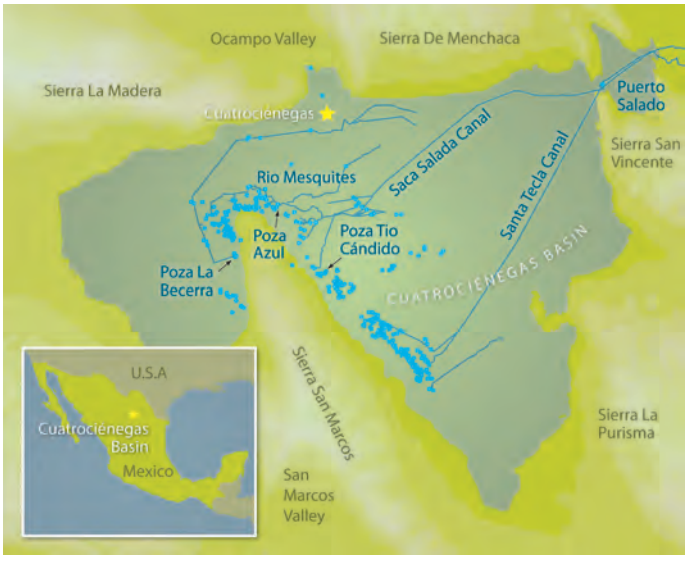
Mirage?

Today, the roses are long gone. The Ferriño winery imports its grapes. And the stream—that once provided drinking water for the village of 11,000 people, irrigated pecan, apricot and fig orchards, and turned the mill stones that ground wheat and corn for local farmers—completely dried up in 2007.

The changes in the valley don't end in the village. Scientists who have carefully studied the water on and under the valley floor also see troubling signs. The water table is falling and the surface is drying out. A Texas hydrogeologist and his students visiting in March 2008 reported that one of two spring vents that feed Poza Azul, one of the area's showcase pools, had stopped flowing. A biologist who has made observations there for decades said he has never witnessed that before.

No doubt some of the changes have resulted from the diversion of springs and streams via canals to water small scale farms over the past two centuries. Climate change might also be causing some drying out. But now there is growing concern among local villagers and scientists from Mexico and the U.S. over a relatively recent arrival in the region—large scale agribusiness.

In the mid 1990s, Grupo LaLa, Mexico's largest dairy, bought land in the Ocampo Valley north of Cuatrociénegas and drilled deep water wells to irrigate fields of alfalfa for their cattle. Cartons of LaLa milk can be found on grocery store shelves and breakfast tables across Mexico. Soriana, a Mexican grocery and department store chain, also began groundwater extraction for farming.



Visitors driving into the Ocampo Valley today might be surprised to see windswept gypsum sand give way to lush green carpets watered by modern center pivot irrigation systems. It's as if a wormhole had opened up in the fabric of space-time, plucked up an Idaho farm, and dropped it in the middle of the desert.

In the Ocampo Valley, the ground water level has fallen by tens of meters and springs have dried up since the pumping began. LaLa representatives claim that the groundwater they are pumping is not connected to the Cuatrociénegas ecosystem. Indeed the two valleys are separated by the Sierra La Madera mountains, which some experts think could form a barrier to underground flow. A study published in 2005 by researchers at Instituto Mexicano de Tecnología del Agua, an agency of the Mexican government, concluded that all spring flow in the Cuatrociénegas Basin (CCB) originates as precipitation falling on the surrounding mountains.

Yet dropping water levels, disappearing springs, anecdotal evidence from villagers, and recent research by scientists at The University of Texas at Austin—including hydrogeologist Brad Wolaver and fish biologist Dean Hendrickson—cast doubt on those interpretations.

Local or Regional?

In many ways, the struggle to manage water in Cuatrociénegas is the same one playing out in arid environments around the world including Texas, California, and the entire Southwestern U.S. The question is how best to manage a limited resource among diverse competing interests—in the case of Cuatrociénegas, small scale farmers, big business, local villagers, tourists, scientists, and a rare ecosystem surviving on a knife's edge.

The Mexican government designated the basin an Área Protegida Natural de Flora y Fauna (a National Protected Area for Plants and Animals) in 1994. The protections curiously didn't extend to the groundwater below the CCB, much less nearby valleys. Some

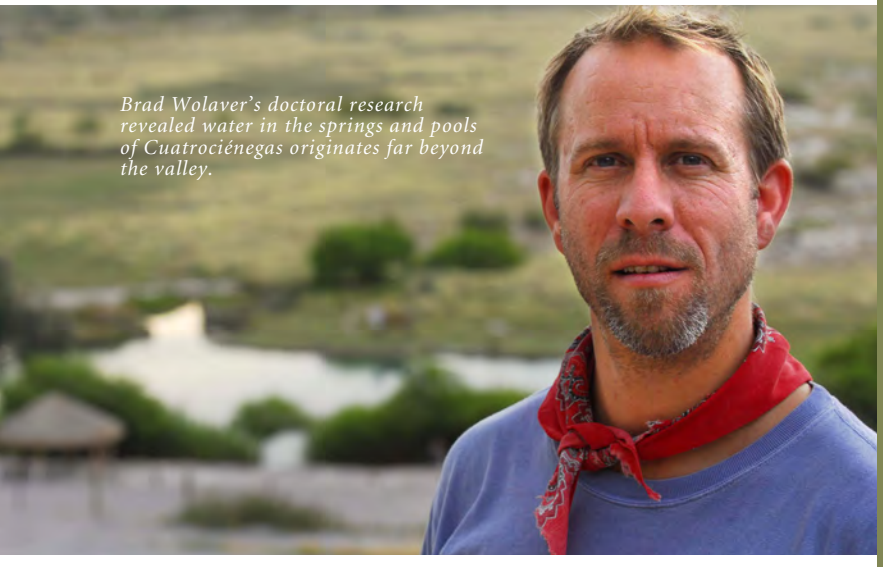
scientists, conservationists, and residents worry that wells in adjacent valleys are sucking water from the same limited underground pool, the aquifer that feeds the springs.

Mapping the size and shape of an aquifer—and the recharge zone, or overlying land that funnels water into it—is no easy task. But it's a critical step in efforts to protect the springs.

Brad Wolaver, at the time a doctoral student working with hydrogeologist Jack Sharp at the Jackson School of Geosciences, set out to determine the size of the recharge zone required to produce the spring flow in the CCB. To tackle the problem, he used a broad suite of tools and techniques that he says could be applied to better understand and manage regional groundwater systems in arid environments around the world.

Wolaver used a handheld device called an acoustic Doppler velocimeter to measure the discharge in two human built canals that drain part of the springs, including the largest spring in the basin (Poza La Becerra). He took this combined discharge as a conservative measure of the total discharge from hundreds of springs in the basin. He determined that more than 35 million cubic meters of water are discharged by the springs per year. That accounts for output, but what about input?

To fill in the other side of the balance sheet, he estimated 3 percent of the rain that falls on the 4,000 square kilometers (or approximately 1 million acres) of the CCB and surrounding mountains would have to be absorbed to produce that much discharge. Could the CCB realistically hold on to that much rainfall?



Brad Wolaver's doctoral research revealed water in the springs and pools of Cuatrociénegas originates far beyond the valley.

The valley floors have a thick layer of caliche, hardened deposits of calcium carbonate that do not readily absorb water. As a result, most rainfall and runoff in the valleys evaporates or is transpired by plants, and local recharge comes almost entirely from the meager mountain rainfall of about 40 centimeters per year. Based on analogous sites in West Texas and Nevada, Wolaver estimated only about 1 percent of that mountain rainfall could be expected to escape evaporation in the dry climate. In other words, it would take several times the land area of the CCB and surrounding mountains to account for the discharge of just two springs in the system.

"The water is not being recharged locally," says Wolaver. "It's being recharged regionally. And that means pumping for agriculture in adjacent valleys can impact the springs."

Humans and the Springs

The basin's stark beauty and diversity of life attract an increasing number of tourists each year. According to an article in the *Austin American Statesman* in March 2008, the annual number of tourists visiting the region doubled from 25,087 (in 2001) to 50,941 (in 2007). Nowadays, during Holy Week leading up to Easter, tourists and locals alike crowd shoulder to shoulder into the few remaining pozas and streams that are open to the public. The Mexican government has plans to develop the valley into an even bigger year-round tourist destination.

In some parts of the world, tourists have been instrumental in preserving endangered ecosystems by raising awareness and bringing money into the local economy, providing an incentive for locals to protect natural resources. Such an ecotourism industry has yet to take root in Cuatrociénegas. Dean Hendrickson, a fish biologist at The University of Texas at Austin who first visited Cuatrociénegas as a graduate student in 1979, says many local villagers simply aren't aware of what is in the valley and why it is so unique.

"Many of them have never explored the valley, except maybe to swim in Poza La Becerra," he says, referring to a popular spring-fed public pool. "There was a huge river, the Rio Garabatal, with a huge marshland. It dried up in the 1970s. Ninety nine percent of the people in Cuatrociénegas don't know it ever existed."

"Maybe they remember grandpa talked about going fishing there, but the fact that it was even there is lost," he continues. "Even people working in the reserve, they came from the outside, so their experience only goes back 10 years at the most. So in their vision, they think we have to save what was there 10 years ago. So that shifting baseline is a hard thing to battle."

He's compiled a series of photos from decades ago and compared them to the same spots today. The changes are dramatic. But, he stresses, photos only tell part of the story.

Some local families, such as that of Lourdes Ferriño, have lived and farmed here for more than a century. They have seen the changes first hand. When it came time to divide up the family land among several relatives, Ferriño, a hard working woman with glasses and an easy smile, picked the old mill.

"I chose the mill because I like the sound of the water," she says. Rio Cañon, the stream that originated as springs in the Ocampo Valley and spilled over a saddle shaped mountain pass into the CCB, once filled a 1 meter wide pipe. It supplied the village's drinking water and powered the mill. A dusty scar snaking across Ferriño's yard is all that remains of the stream. The village has been forced to drill its own water wells, in search of ever deepening water.

What will become of Ferriño's bed and breakfast? Will tourists continue to visit if the springs dry up too?

Time Lag

Other lines of evidence bolster Wolaver's analysis. For example, he used a second technique to estimate recharge in the mountains using chloride levels in precipitation and in the springs. The technique, which has been successfully applied to the Great Basin of Nevada and other arid and semiarid regions, indicates a regional source of recharge over 10,000 square kilometers in area.

Wolaver also demonstrated that the mountains separating the CCB from the Ocampo Valley to the north and the Hundido Valley to the southwest do not pose a barrier to the flow of groundwater as some researchers have suggested. There is increasing concern about Hundido Valley because in 2003, ranchers drilled more than 100 wells there and established 10,000 hectares of new alfalfa fields. Mexico's National Commission for Water has set limits on water pumping in the Hundido Valley, but the limits are very high. Since pumping started about 25 years ago, the water table has declined more than 20 meters.

The discovery that the mountains do not pose a barrier to groundwater flow was made using an analytic model that incorporated a digital elevation model (a three-dimensional map of the landscape), measurements of the hydraulic head (a combination of water pressure and elevation) on either side of the mountains, and the transmissivity of the rock (its ability to transmit water).

Major funding for Wolaver's research came from the Jackson School of Geosciences, Tinker Foundation, Houston Geologic Survey, Geological Society of America, Gulf Coast Association of Geological Societies, BHP Billiton, and Sandia National Laboratory.

Even the smallest life forms on Earth, microbes, point to a regional aquifer that includes nearby valleys.

Valeria Souza, an ecologist at the Universidad Nacional Autónoma de México, carried out a genetic analysis of microbes in water from the CCB, Hundido Valley, and another adjacent valley. She found that 90 percent of the most abundant microbial lineages were found in all of the sample sites. She and her co-authors in a 2006 paper in the journal *Proceedings of the National Academy of Sciences* concluded that the three valleys are connected by a deep aquifer that allows migration of microbes.

"Our microbiological data, along with the low hydrologic recharge of the superficial aquifers and geologic structure of the region indicate that serious concerns are warranted regarding the impacts of regional water extraction on the unique ecosystems in the CCB and nearby valleys," the researchers wrote.

Perhaps even more unsettling, Wolaver's work demonstrates that the water that feeds the springs takes at least 50 years to recharge, maybe much longer. Samples of spring water taken in 2007 showed extremely low levels of tritium, a byproduct of radioactive fallout from atomic bomb tests in the 1950s and 60s. That indicates that the water that feeds the springs hasn't been in contact with the surface for at least as long.

If the aquifer is pumped dry and the springs cease flowing tomorrow, it may be decades before any meaningful restoration could take place. Even then it would be little comfort to the dozens of extinct plant and animal species, as well as small-scale farmers who rely on spring discharge to irrigate their crops.

Living Laboratory

For now, scientists continue to flock to the region for a myriad of research projects.

Cuatrociénegas has been likened to a sort of inverted Galapagos Islands because it harbors over 70 species found nowhere else in the world. Because the Galapagos are separated from South America by nearly 1,000 kilometers of ocean, plants and animals have evolved in distinct ways from their mainland cousins. Similarly, the unique aquatic species in Cuatrociénegas are isolated by desert and mountains.

"So from the biological point of view, there's all kinds of interest there," says Hendrickson. "Why is there all this endemism? How did this place become so special? And how did all this endemic fauna evolve here and not elsewhere?"

Hendrickson has focused much of his research on the Cuatrociénegas cichlid, a fish that seems to be evolving into two distinct species—one with huge teeth to crack open snails and the other without. It raises questions about the ways new species evolve.

"Can one species living in one place split into two species without geologic separation?" he asks. It's easy to imagine a species diverging as a result of a separation, he says, such as that caused when South America and Africa split apart millions of years ago, producing two new internally interbreeding groups, one on each continent, but without the ability to interbreed between continents.

"It looks like sympatric speciation, a species splitting into two side by side, is not real common," he adds. "Yet in Cuatrociénegas, it's clearly happening."

Scientists have also been fascinated by communities of microbes that build rocky freshwater reefs called stromatolites. Unlike stunningly vibrant coral reefs, freshwater stromatolites are a bit unremarkable.

This cichlid is one of more than 70 plant and animal species found nowhere else on Earth.

Left: In the mid 1990s, Mexico's largest dairy bought land in the Ocampo Valley north of Cuatrociénegas and drilled deep wells to irrigate alfalfa fields for cattle. Right: Now that we know groundwater extraction in adjacent valleys can impact the springs, the question is does it make more sense for Mexico to grow alfalfa in the desert to help feed a growing population or to protect a rare ecosystem surviving on a knife's edge? Photo at left by Tullio Bernabei, from the book, "Under the Desert." Used by permission of Associazione La Venta.

They're lumpy and slimy. They range from brown to grey to green. But to the trained eye, they are actually quite extraordinary.

In geological terms, stromatolites are laminated sedimentary structures formed by mats of cyanobacteria and other microbes. Cyanobacteria, or blue-green algae, are thought to have been the first organisms to use photosynthesis to turn sunlight into energy and release oxygen, contributing to the atmosphere that made more complex life possible. The fossil record shows that stromatolites were common from 3.5 to 1 billion years ago. Now, almost non-existent, these living fossils offer a unique window into early life on Earth.

NASA scientists have been keen to study them in hopes of finding "biosignatures" that could be used to reveal alien microbes on other planets. Research in Cuatrociénegas can also have more down to Earth benefits.

Wolaver says Cuatrociénegas is an ideal laboratory to explore ways to make human use of water resources sustainable. World population is expected to reach 9 billion by the year 2050, according to United Nations projections. That's nearly half again as many people as were alive in 2000.

"We're going to have to figure out how that many people can live, eat, and do all the things they want with water," said Wolaver. "How does Mexico, which is a mostly arid and semiarid country with increasing populations, grow enough food for its people?" asks Wolaver.

Ten Years On

When asked what the Cuatrociénegas basin will be like 10 years from now, Juan Manuel Rodriguez, a researcher from the Universidad Autónoma de Nuevo León in Monterey who has studied the springs for several years, responds, "It will be finished."

"It's not going to be a pretty picture," adds Hendrickson. "I'm not optimistic about the future of the place with all of the agricultural development that's going on. Unless that can be completely stopped, I think the chances of recovering the place are pretty dismal. It'll just continue going downhill very slowly. Hopefully there will be a lot of yelling and screaming as it dries even more."

He says the balance may have already tipped beyond the point of recovery. With a new sense of urgency, he has shifted much of his energy from basic research to conservation.

Hendrickson and Wolaver say the scientific evidence is clear that large scale irrigated agriculture in adjacent valleys is contributing to the slow drying out of the CCB, but that local, state and federal officials seem to lack the political mechanisms or will to stop the practice and provide truly sustainable solutions for the ecosystem and the human economy it now supports.

Despite the forces arrayed against the springs, there are a few glimmers of hope.

In 2000, The Nature Conservancy teamed up with Pronatura Noreste, a Mexican conservation organization, to buy and manage a 7,000 acre ranch harboring over 130 of the valley's springs. According to The Nature Conservancy, it is "the first-ever conservation easement in the state of Coahuila and the largest private land conservation purchase in Mexico's history." Water from springs on the land flowed via a canal to a nearby ejido or farming cooperative. Pronatura Noreste bought the spring discharge water rights, closed the canal, and are using the water to nourish and restore wetlands, another first for Mexico.

In 2006, Hendrickson created the Centro de Investigación Científica de Cuatrociénegas, a permanent research station to facilitate visits by researchers from around the world who want to study the endemic species, stromatolites, archaeology, hydrology, and geology of the area. The station helps researchers navigate the paperwork required to work in the protected area and encourages them to share data with scientific peers, conservation managers, policy makers, and the public.

In 2007, the Mexican government expanded the natural protected area to 10 times its original size, although it still does not limit the use of groundwater within the protected area.

Hendrickson helped start an eradication program for Arundo, an invasive plant that is spreading across the valley and crowding out native plants.

He's now reaching out to the University of Texas at Austin community to drum up support for his most ambitious idea yet: to create an interdisciplinary research project that brings together researchers from across the university to intensively study the system and search for solutions. It would include not only scientists, but also policy experts who could help bridge the gap between the science and what farmers, corporations, and policy makers actually do.

"The goal would be to change agriculture to preserve a natural ecosystem," says Hendrickson. "What do we need to do to preserve this? How is agriculture going to have to change and how do we implement policy changes that would result in changes to agriculture that would sustain this natural system?" ✷

The "Ranger" supercomputer, located at the Texas Advanced Computing Center at The University of Texas at Austin, is one of the most powerful high-performance computing systems in the world. In its four year expected lifespan, it will do more computational work than an ordinary desktop PC operating continuously for 200,000 years. Photo courtesy of Advanced Micro Devices.

Confidence Building

Computational Scientists Get a Grip on Uncertainty

Charles Jackson

Omar Ghattas

Mrinal Sen

By Marc Airhart

"It's tough to make predictions," quipped baseball player and manager Yogi Berra, "especially about the future."

Scientists who use computer models to predict the future can relate. At every turn, they find themselves stymied by a little gremlin called uncertainty. They might be trying to predict what sea level will be 100 years from now, the effects of a hypothetical San Andreas earthquake, whether a heat shield on a spacecraft will survive reentry, or the best place to drill for oil. Perhaps they just want to better understand some physical process such as ocean circulation or convection of molten rock deep inside Earth.

Yet uncertainty clings to their work like a sock to a staticky sweater in the drier. There are always gaps in the data that have to be filled in, biases and imprecision in the observations, a lack of understanding of the basic physics, differences of opinion on how to interpret proxy data, and trade-offs made to save computing power.

Until recently, computational scientists did the best they could. They filled in missing data with what amounted to educated guesses. They nudged and jiggled and wrenched and kicked their models until finally the results seemed reasonable. They even ran the models thousands of times with slightly different inputs and averaged the results. Finally, they said, "Voila! This is the result." Between the lines, they really meant, "This is my best guess."

The problem is that it's hard for the public or policy makers or even other scientists to evaluate just how much confidence they should place in a result, especially when it will be used to make tough decisions. In other words, is a particular scientist's "best" good enough?

Now, scientists at the Jackson School of Geosciences including Omar Ghattas, Charles Jackson and Mrinal Sen are embracing uncertainty, looking it straight in the eye, tamping it down like an overflowing suitcase, sometimes even exploiting it to learn new things about the world.

With ready access to two of the most powerful supercomputers in the world, Ranger and Lonestar, and expertise in how to efficiently run complex geophysical models on them, they're well positioned to do so. They say the emerging field of uncertainty quantification will give society the tools it needs to chart a course in the choppy seas of a nebulous future.

Making Models Relevant

According to Omar Ghattas, most standard geoscience computer models—called deterministic models—are designed to yield results as single numbers. For example, a result might be that sea level will rise by 1 meter by the end of the century or a certain size earthquake on the San Andreas fault will shake downtown Los Angeles with a certain maximum ground acceleration. Ghattas, the John A. and Katherine G. Jackson Chair in Computational Geosciences at the Jackson School, who has a joint professorship in the Cockrell School of Engineering and serves as director of the Center for Computational Geosciences, says it's extremely difficult to assess the validity of such a black and white result.

"In the geosciences, a deterministic result is not sufficient," he says. "In fact, it's giving the false illusion that you have perfect confidence in that number and the reality is we don't. What decision makers really need to know is the level of confidence that we have in the predictions of the model."

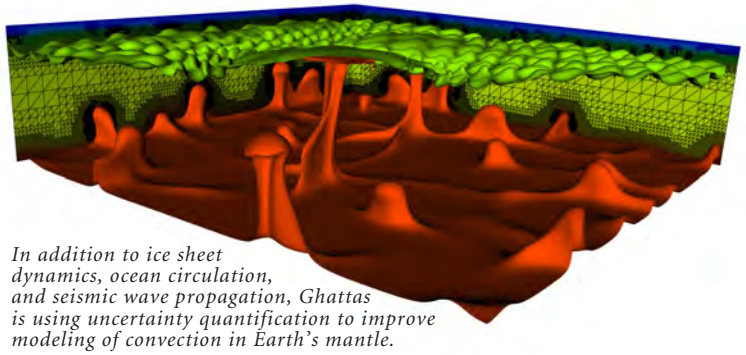
Charles Jackson, a research scientist in the Jackson School's Institute for Geophysics, explores uncertainty in climate models. He's particularly concerned about thresholds in the climate system, tipping points beyond which climate abruptly changes. He says ultimately he'd like to be able to make a prediction like the following: If global temperatures warm by 2.5 degrees Celsius, then there is a 30 percent chance that all of Greenland's ice sheet will melt, leading to catastrophic global sea level rise; if temperatures warm by 4 degrees, then the risk rises to 70 percent.

"Then society has to decide what risk is acceptable or not," says Jackson. "Do you want to not exceed the 30 percent likelihood of catastrophic sea level rise or perhaps 70 percent?"

One solution modelers have tried for assigning confidence is to compare the results of several different models, each with their own unique way of handling the same data and representing the same real world system. This approach was taken in 2007 by the Intergovernmental Panel on Climate Change (IPCC)—an international group of climate scientists working to forge a consensus on climate research—to try and make some sense of several climate models that produced wildly divergent results for future global surface temperatures. The IPCC treated the spread of results as a measure of uncertainty.

"Unfortunately, this subjective measure of uncertainty is subject to peer-pressure," says Jackson. "That's more a measure of how comfortable people are to disagree. If a modeling group's predictions are significantly different from what other groups are getting, there will be some amount of social discomfort and pressure to keep working." He suggests a more rigorous approach to quantifying the sources of uncertainty.

Take a different example—earthquakes. The solution Ghattas is working on is to build uncertainty probabilities into the models at every step—from the rupture model, which deals with the dislocation at every point on the fault, to the propagation path and local site response, including the representation of density and stiffness of rocks.



In addition to ice sheet dynamics, ocean circulation, and seismic wave propagation, Ghattas is using uncertainty quantification to improve modeling of convection in Earth's mantle.

Now, scientists at the Jackson School of Geosciences including Omar Ghattas, Charles Jackson, and Mrinal Sen are embracing uncertainty, looking it straight in the eye, tamping it down like an overflowing suitcase, sometimes even exploiting it to learn new things about the world.

It's an acknowledgement that there are always gaps and errors in the data and an incomplete understanding of how the world really works. Through careful study, researchers hope to understand which sources of uncertainty are the real troublemakers and which are benign. The product is known as a stochastic model.

Ghattas and his collaborators are using the method to study California earthquakes and are beginning to apply it to spacecraft reentry and to mantle convection modeling. In the future, he plans to extend the work to other problems such as modeling the flow of polar ice sheets and ocean circulation, in collaboration with scientists at the Institute for Geophysics. What makes the approach viable, he says, is access to advanced supercomputers.

"This is going to be expensive," in terms of computational resources, he says. "The only way to do it is by petascale computing."

A petaflop, a measure of a computer's processing speed, equals 1,000 trillion floating point operations per second. The university's Texas Advanced Computing Center operates Ranger, one of the world's most powerful supercomputers, which is capable of executing more than a half petaflop per second. As co-chief scientist for Ranger, Ghattas advises on how to make the most effective use of the computer to do science.

As Charles Jackson points out, uncertainty quantification isn't just about assigning confidence to model results. It can also be used to sharpen our understanding of fundamental Earth processes and to make more robust models. To do that involves turning models on their heads.

Does it Hold Water?

When climate scientists began looking at ice cores drilled from the Greenland ice sheet in the 1990s, they were shocked to find evidence that during the past hundred thousand years, there were abrupt swings in climate. In just a few years, average temperatures would soar or plunge like a roller coaster by 15 degrees Celsius.

"Before then, we thought that climate changed gradually and smoothly," says Jackson.

To explain this volatility of past climate, some paleoclimate researchers proposed that the culprit was an influx of freshwater into the North Atlantic ocean due to melting of polar ice sheets. The added freshwater would have shut down the global ocean conveyor belt, a circulation pattern carrying heat and salts on a continuous loop across the world's oceans. If the conveyor belt stopped, so went the hypothesis, so would the heat carried to the surface of the North Atlantic, which would lead to ice age conditions in that region.

If that explanation is correct, then it could mean déjà vu all over again as the current period of human-induced greenhouse warming melts polar ice and injects more fresh water into the North Atlantic. In other words, it could mean one of the more outlandish and contradictory scenarios of global warming: a regional ice age for northeastern North America and northwestern Europe.

There was just one problem with the freshwater hypothesis: it did not seem to explain why scientists observed periods of abrupt warming in the past, also as a result of flooding the North Atlantic with melt water from polar ice sheets. Jackson and his colleagues decided to test the hypothesis.

There were two sources of uncertainty that made testing it a challenge. First, it's hard to tell how much freshwater was going into the North Atlantic at any given time. Fossil corals give a rough idea of sea level over time and sea level changes can be attributed to changes in freshwater input. But the coral data are very sparse and scientists aren't sure just how precisely they record sea level.

Second, there was uncertainty about how to represent with a computer model a feature of the ocean called vertical mixing, that is, the way heat moves up and down in the water column.

Rather than let the uncertainties stump them, Jackson and colleagues incorporated them into a simple game. It involved running a computer model of the oceans in reverse. In the technique, known as inverse modeling, the modelers start with some outcome, run the model backwards and determine what range of starting conditions could have led to the outcome. In this case, they began with some observations (surface temperatures reconstructed from 30,000 to 39,000 year old ice core layers) and used the model to derive possible inputs (sea levels) that could have led to the observations.

"You're trying to find a freshwater forcing that agrees with your observations given a certain physics of the model," says Jackson.

In the end, the team found that there were many possible pairs of freshwater inputs and vertical mixing variations that gave the observed temperatures. For one thing, that meant that concerns over how to represent vertical mixing in the models could be taken off the table. The uncertainties didn't really matter much.

"We learned that vertical mixing did not impact our freshwater forcing solutions," he says. Some researchers had feared that until vertical mixing was well understood, the freshwater hypothesis could not even be tested.

Another discovery was that sea levels could rise and fall in a way that both yielded the observed temperature record seen in ice cores and matched well with sea level reconstructions made by analyzing fossil corals.

"Low and behold, there was some agreement," he says. "In particular where we had the greatest warming and longest time, our model agreed that sea level needed to drop 15 to 20 meters over 3,000 years."

So, while their analysis doesn't prove or disprove the freshwater

BURNING UP

NASA has set a goal of returning humans to the moon—for the first time since Apollo 17 in 1972—by the year 2020. Early plans call for a new reentry capsule similar in shape to the original Apollo capsules, but larger. With supercomputers far more powerful than those available in the late 1960s, scientists now have the opportunity to test virtual spacecraft designs in ways that are either too expensive or dangerous to do with real spacecraft. In this case, computational uncertainty becomes a life or death issue.

One of the most dangerous parts of a roundtrip mission to space is the reentry of the vehicle in Earth's atmosphere. The speed of reentry can be a blistering 20, 30, or even 40 times the speed of sound. The air surrounding the vehicle can become hotter than the surface of the sun. To protect the craft, it is coated with a special material designed to partially burn away. A similar coating of Teflon was used to protect the Apollo capsules.

"What NASA wants to know is not that the protective coating will recede by this much," says Omar Ghattas. "They want to know what is the probability that the vehicle will survive reentry."

Modeling the surface of the vehicle and the air around it is difficult because the system is so complex, involving physical processes such as high speed aerodynamics, thermal radiation, turbulence, chemical dissociation of the air, and burning of the surface. Each of these processes involve some uncertainty. Ghattas and his colleagues at the Institute for Computational Engineering and Sciences (ICES) at the University of Texas at Austin received a five-year, $17 million grant from the Department of Energy (DOE) to build a stochastic model of the system and a method for estimating confidence in the model's results.

The team will work with partners in the university's Cockrell School of Engineering, DOE's National Nuclear Security Administration, NASA, Texas A&M University, and Florida State University.

"We're trying to come up with a computer prediction that says not only what the best estimate of the answer is, but what is the level of uncertainty in the answer," says Robert Moser, professor of mechanical engineering and a scientist at ICES. "We want to be able to say to the decision makers, 'According to this calculation, there's a 5 percent chance of failure if we re-enter in these conditions.'"

hypothesis, it shows that it is certainly possible.

It also supports another hypothesis that might explain the abrupt warming seen in ancient climate records. Developed by Jackson's former dissertation advisor, that hypothesis involves the way northern ice sheets behave. After an ice sheet collapses, there is a long period of rebuilding in which precipitation gets trapped and freshwater flow to the sea stops. Then once it grows beyond a stable size, it collapses and starts the process all over. There is a natural time lag in the system, but, according to the hypothesis, when the ice sheet is building up and there's less freshwater flow to the sea, it eventually leads to a boosting of the ocean conveyor belt and a rapid warming at the surface.

A side benefit of Jackson's analysis is that it could direct researchers where to go for more data to help reduce uncertainties. The results of the study were submitted to the journal *Paleoceanography* in February 2008.

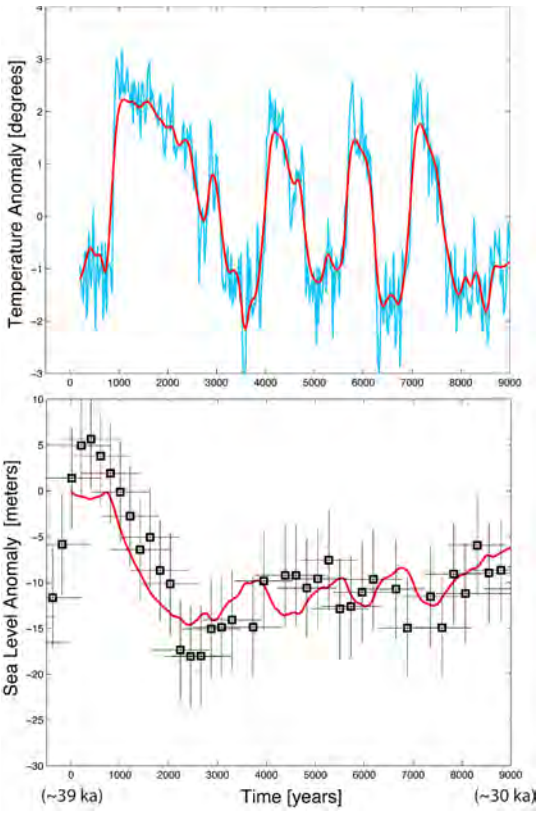
Filling in the Gaps

Oil and gas explorers often find themselves searching in the dark, able only to see dimly if at all into the ground where hydrocarbons might be. Porosity, a useful indicator of their whereabouts and concentrations, is not an easy quantity to measure from the surface. Three-dimensional seismic imaging can provide a rough overview of a large region, but with very poor resolution. Wells can provide very high resolution information—from instruments lowered inside, extracted cores, and production rates—but just in those thinly scattered vertical straws where they have been drilled, leaving vast gulfs in between unmeasured.

Mrinal Sen is a professor and Jackson Chair in Applied Seismology in the Jackson School's Department of Geological Sciences and a research professor at the school's Institute for Geophysics. Just as with Jackson's climate work, he uses the technique of inverse modeling to tackle this problem. In this case, he runs in reverse what are essentially two models in one—a model based on the physics of seismic wave propagation and the other on the physics of fluid flow. Then he searches for the ranges of porosities that can satisfy both seismic and well observations.

It's an iterative process. He starts by proposing a distribution of porosities that seems reasonable. Like picking numbers on a roulette wheel, the distribution is really just a guess. He inputs this distribution into the models, spins the wheel and compares the results to the seismic and well data. Depending on how well the model results match the seismic and well data sets, another hypothetical distribution is created and tried—and so on, until the results converge on a distribution of porosities that match the two data sets reasonably well. This process, called Markov Chain Monte Carlo, can be applied to many different systems.

"This is very simple," says Sen. "This is what we do in our daily lives—we learn from experience and update our knowledge. Except for the fact that we want to quantify how much we know about a particular system."



Jackson found that his computer simulation (red lines) did a good job of simultaneously matching temperatures recorded in ice cores (blue line) and sea levels recorded in corals (black boxes).

In the mid 1990s, Sen developed a version of this process that requires 100 times fewer steps to converge on possible solutions than earlier versions, making it possible to tackle far more complicated problems in the same amount of time. When Charles Jackson first came to the Institute in 2000 he and Sen began to use this technique to evaluate the uncertainties in climate models. Since then, the two have continued to refine the technique and apply it to new problems.

"The problem is that there is always more than one possible distribution that can fit the observations," says Sen. "We want to know what are all the possible solutions that fit our data. That does not mean that the Earth is random. There is only one real solution. We just don't have adequate data to pin it down." Sen's fast Monte Carlo technique could help indicate where more data needs to be collected in order to improve the picture of the subsurface.

Instead of presenting a reservoir engineer with one best fit distribution of porosities, he might be able to produce several good fits and give a level of confidence for each one. Armed with that information, the reservoir manager can estimate what kinds of flow rates can be expected under a certain range of uncertainties and decide where to drill, how many wells to drill, and how to control the pressures.

Finally, Jackson suggests instead of trying to wish it away, scientists should make peace with uncertainty.

"My view is that it can be revolutionary to science and the way society interacts with science," he says. "This is a necessary step for science to absorb the data it has and to improve the models and the ability to effectively communicate that knowledge to people who need to make sensible policy." ✷

USCGC Healy northwest of Barrow, Alaska, Summer 2006.

LAW OF THE SEA:

~ *Institute Researcher Helps Map Arctic Seafloor* ~

By Marc Airhart

In summer 2007, a team of Russian explorers piloted two submersibles to the bottom of the Arctic Ocean at the North Pole and dropped a titanium Russian flag onto the seafloor. Although no other country has recognized Russia's symbolic claim to the North Pole, it raises the question of who owns what below the Arctic Ocean, a region that might contain significant oil and gas reserves.

A few days later, an Arctic expedition headed by scientists from the University of New Hampshire's Center for Coastal and Ocean Mapping/Joint Hydrographic Center (CCOM/JHC) set out from Barrow, Alaska to map an area of Arctic seafloor called the Chukchi Cap. The goal was to collect data that could bolster United States claims to extend its Arctic maritime boundary.

"This is, in effect, a new cold war that is developing and Russia effectively fired the first shot in that cold war when they planted their flag beneath the North Pole," said Fox News reporter Jonathan Hunt on a live broadcast in August 2007. "The U.S. is finally fighting back, with science for the moment—although that could change."

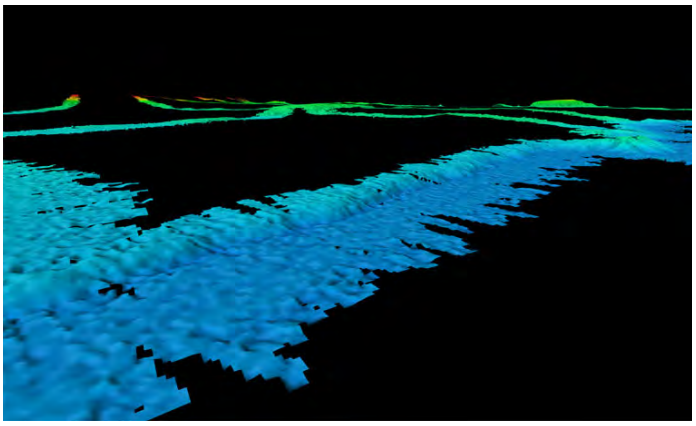
Marcy Davis, a research scientist associate at the Jackson School's Institute for Geophysics who participated in the cruise, disputes the reported motivation.

"Our cruise was not a reaction to the flag planting event at all," she said. "This is an ongoing project. It was the third mapping expedition to this part of the Arctic by this group since 2003 and they plan to return next summer."

Davis was onboard the US Coast Guard Cutter HEALY, a polar-class icebreaker, to assist with bathymetry data collection during the month-long mapping expedition. The team included scientists and students from five academic institutions, the National Oceanographic and Atmospheric Administration, National Ice Center, and the U.S. Department of State.

"This cruise provided me an excellent opportunity to learn more about bathymetric mapping and about the U.N. Convention on the Law of the Sea," she said, referring to the international treaty that describes the process for extending sovereign rights over resources of the continental shelf.

The team found evidence that the foot of the continental slope—the area where the continental shelf meets the deep seafloor—is deeper and farther from Alaska's coastline than previously thought. The location of the foot of the slope is one of several factors in establishing sovereign rights under the Law of the Sea treaty. Any U.S. claims to an extended seafloor and additional resources are still in the wings, since the U.S. has yet to ratify the Law of the Sea. (Despite bipartisan support, the treaty has been held up for years by a few key senators.) Still, the data establishes a foundation for future claims.



The bathymetry of the possible foot of the slope north of Chukchi Plateau. Vertical exaggeration is 3x, looking south-southwest. Water depth range in image: -2880m to -3800m. Courtesy of Larry Mayer, CCOM/JHC.

On the Other Foot

To create their maps, the scientists used a "multibeam bathymetry system"—an active sonar system that transmits a sound pulse, also called a "ping," then listens for the pulse reflection or echo. The time from pulse transmission to echo reception is measured and then converted to seafloor depth using a formula based on the speed of sound in water.

The bathymetric maps they created are analogous to topographic maps of land surfaces, with depths below sea level replacing heights above sea level. The team also deployed ice beacons and buoys for the National Ice Center to collect long-term ice drift and weather data.

"One of the things that surprised us when we got out there was that our preconceived notion of the location of the foot of the slope was wrong," said Larry Mayer, director of CCOM and leader of the expedition. According to Mayer, the continental shelf extends about 200 kilometers farther from Alaska's north shore than once thought.

That doesn't mean that American claims to the Arctic seafloor automatically expanded by 200 kilometers. The Law of the Sea treaty has complicated rules involving more than just the edge of the continental shelf.

"I look at our job as to do the best science we can and present the best information about the areas we measure," said Mayer. "I've always said there's only one shape of the seafloor and that can't be distorted. With the sonar we use, we get a full 3D picture. There's no way to hide things."

Mayer said it will be up to others to make policy decisions based on the data.

"The Law of the Sea has a lot of ambiguities and that's where the lawyers and politicians will argue," he said. "But they won't argue over the morphological issues. The shape is the shape."

To get a sense of the shape of the seafloor that Mayer, Davis and their colleagues discovered, climb into an imaginary underwater buggy and drive straight out from the shore of Alaska's northernmost town, Barrow. You'd be driving on a long, gently sloping plateau called the Chukchi Cap. As you go deeper and deeper, sunlight fades away. Eventually, at a depth of around 2,500 meters, you see in your headlights a steep drop off. After roller-coastering down, you hit another gently sloping plain. Chug along for a while until, at a depth of about 3,800 meters, you come to an even steeper drop off. This is the edge of the continental shelf. As you careen down that step, you finally reach the relatively flat, deep seafloor. It's this newly discovered second step that Mayer and his team believe is the real foot of the slope, or edge of the continental shelf.

Thin Ice

In summer 2007, Arctic sea ice shrank to its smallest coverage in at least a century. Some scientists said the most likely culprit is human-induced climate change. According to Mayer, the thinning made it easier for the HEALY to travel farther north than in previous missions.

"The state of the ice is good for mapping, but bad for the Arctic," said Mayer, acknowledging the irony of climate change melting sea ice, potentially opening access to more fossil fuels, which in turn might fuel more climate change.

"This is where the government needs to step in and do something about it," he said. "We shouldn't stop mapping our oceans, but I think the government has a responsibility to make sure that any development that's done is done in as responsible a way as possible."

Davis said it was exciting to do research in the Arctic at a time of heightened media attention, but she was drawn there for other reasons.

"I love working in the Arctic because it's all new territory," she said. "Nobody knows anything—so it's a lot of fun."

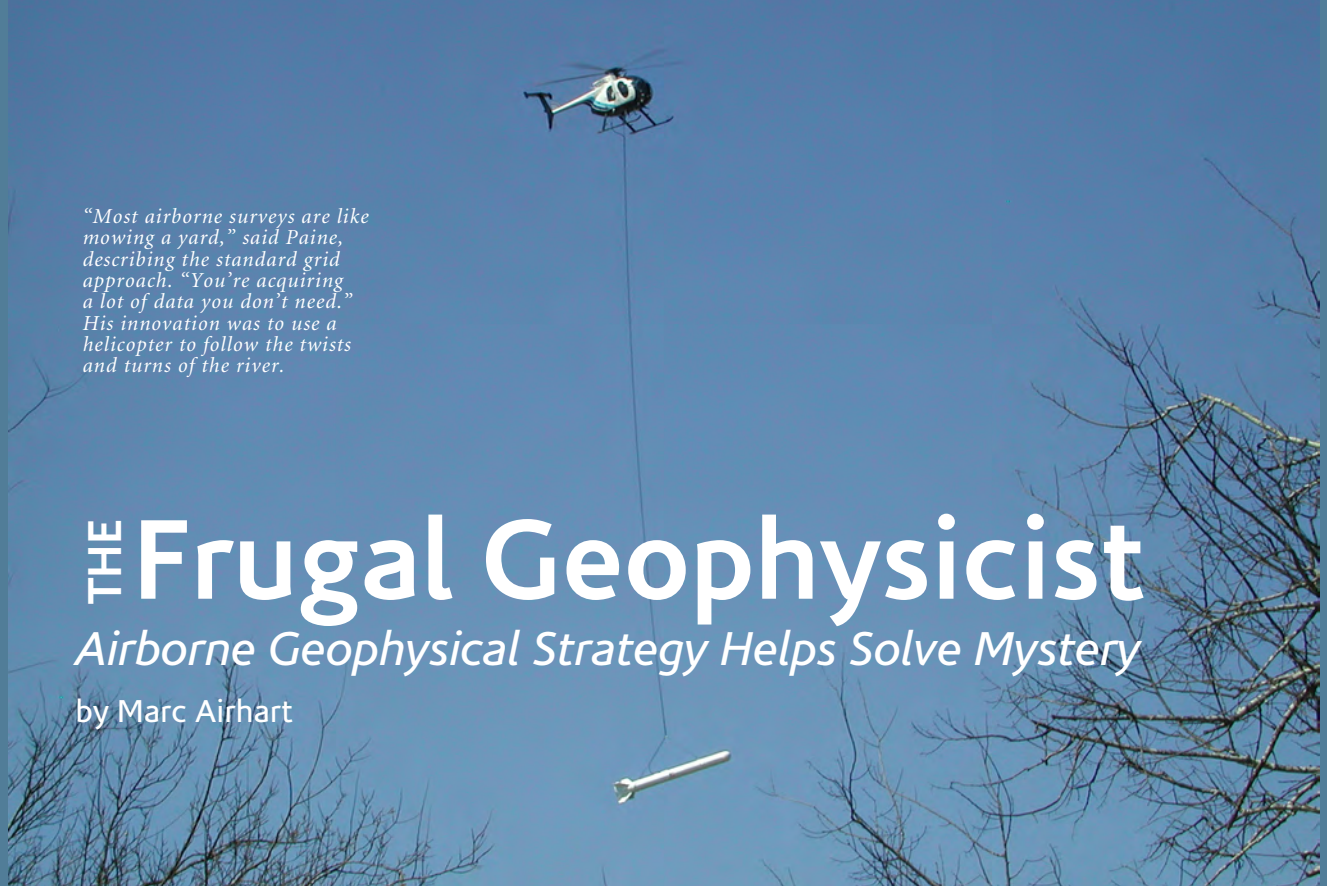
Nations tend to cast a net into the sea and claim for themselves an area of seafloor that extends out a specific distance, currently 370 kilometers (200 nautical miles), plus possible extensions under the Law of the Sea, drawing an imaginary boundary that is perpendicular to the shoreline. Those nets often overlap for neighboring countries. Ironically, of the five countries bordering the Arctic Ocean, Russia and the U.S. are the only two that have actually negotiated the seafloor boundary separating each other. Denmark, Canada, Norway, and Russia still have to sort out their common underwater borders.

"That's the funny thing about trying to establish some conflict between the U.S. and Russia," said Mayer. "That's one of the few boundaries that's been negotiated."

While this might not be the start of a new cold war for the U.S. and Russia, governments and energy companies are keenly interested in the Arctic. The The U.S. Geological Survey released its first publicly available petroleum resource estimate of the entire area north of the Arctic Circle in June 2008. They estimated the region has 90 billion barrels of undiscovered, technically recoverable oil, 1,670 trillion cubic feet of technically recoverable natural gas, and 44 billion barrels of technically recoverable natural gas liquids.

"Look, this isn't the 15th century," Canada's foreign affairs minister Peter MacKay told a CTV co-host in August 2007. "You can't go around the world and just plant flags and say, 'We're claiming this territory.'" ✷

Marcy Davis helped map part of the Arctic seafloor near Alaska during a month-long expedition on the USCGC Healy in summer 2007.



"Most airborne surveys are like mowing a yard," said Paine, describing the standard grid approach. "You're acquiring a lot of data you don't need." His innovation was to use a helicopter to follow the twists and turns of the river.

THE Frugal Geophysicist

Airborne Geophysical Strategy Helps Solve Mystery

by Marc Airhart

Water in West Texas is, as the old saying goes, scarce as grass around a hog trough. With speculators planning to sell rural West Texas water to thirsty cities, state water regulations remaining largely unchanged for over a century, and the specter of more extreme weather courtesy of climate change, prospects don't look much better for the future. You can add one more threat to the list: salinity.

The state of Texas released a report in 2000 identifying a stretch of the Colorado River northeast of San Angelo as "impaired." In other words, levels of salts and total dissolved solids exceeded levels set by the U.S. Environmental Protection Agency (EPA) as safe for swimming, fishing, drinking, and farming.

Farmers and water suppliers began to blame oil producers, oil producers blamed natural geological processes, and everyone blamed an invasive plant.

"Saline water doesn't taste very good, and it isn't very good for farming or fisheries either," said Jeff Paine, a research scientist at the Jackson School's Bureau of Economic Geology. "The Colorado River provides drinking water for hundreds of thousands of people. So there's a real compelling reason to do what you can to protect that resource."

With funding from the EPA, the Texas Commission on Environmental Quality (TCEQ), a public agency charged with protecting the state's air and water, began an investigation into the sources of the salinity and dissolved solids.

Paine, who uses geophysical techniques to study environmental contamination, had an idea for a new strategy to measure water chemistry from the air quickly and economically. The mystery of the Colorado River's elevated salinity seemed like the perfect opportunity to try it out.

Up, Up and Away

Untangling the culprits in reduced water quality can be a difficult task. For one thing, water is slippery. It smears out across the landscape, making it hard to pin down the point of origin. For another, there are many natural and human sources of salts in the environment.

One possible source is abandoned oil and gas wells. During drilling, salty water from depth is brought up to the surface. Before the practice was banned in Texas in the late 1960s, the brine was often dumped into shallow unlined pits. Today the brine is typically reinjected deep underground or is stored in special tanks.

Natural geological processes might also be involved. The watershed has significant deposits of gypsum, a salt, at the surface. Runoff at the surface can carry salts into streams and rivers. Underground mineral deposits can also dissolve into flowing groundwater that eventually discharges to the surface.

Yet another possible source is salt cedar, an invasive plant that is spreading quickly across West Texas. The plant uses groundwater much more rapidly than native plants. As it transports slightly salty groundwater to its leaves, the salts accumulate. When the leaves drop in the fall, they contribute to saltier surface waters through runoff.

To save time on the ground, scientists often start with airborne surveys with geophysical instruments that can measure thermal, electrical or seismic properties of the soil and water to help narrow the search to a manageable number of smaller hot spots. This is typically done with a helicopter or fixed-wing aircraft flying back and forth in a large grid pattern.

"Most airborne surveys are like mowing a yard," said Paine. "You have parallel flight lines in a grid. In salinity studies, 95 percent of the area isn't really germane to the groundwater or surface water problem. You're acquiring a lot of data you don't need."

That's because the areas of interest—rivers and streams—are long and sinuous. Fixed wing aircraft have a difficult time flying twisty, curvy paths. Paine hit on the idea of acquiring a geophysical log of the riverbed using helicopters, which can follow rivers and streams more easily, to collect only the data of interest. He applied for and received a grant from the TCEQ to use the new technique to locate sources of increased salinity on the Colorado, as well as a second waterway in South Texas.

Paine and his colleagues worked with an independent helicopter

crew from Oregon to survey the Colorado with an instrument that measures electrical conductivity of soil to depths as great as 50 meters.

"So the helicopter flies along at low altitude over the river, towing a big white tube with fins," said Paine. "It looks like a cruise missile."

The five meter long tube is actually an electromagnetic induction (EM) instrument. It creates a changing magnetic field, which induces electrical currents to flow in the soil. These in turn create a secondary magnetic field. A receiver in the instrument measures the induced field, the strength of which is proportional to the conductivity of the soil. And because conductivity rises with increased salinity of water in the soil, the magnetic field also provides a measure of salinity.

Over two days in February, 2005 the crew surveyed 400 kilometers (250 miles) of the Colorado River and its major tributaries.

Grounded

The airborne geophysical data showed that there were four regions of elevated conductivity along a 66 mile stretch of the Colorado River below E.V. Spence Reservoir. With the areas of interest whittled down to a manageable size, Paine and his colleagues at the Bureau, Seay Nance and Eddie Collins, took to the ground to search for specific sources of salinity.

Nance, who has worked as a geologist at the Bureau for over 25 years and is now finishing a doctorate in hydrogeology, took two-liter samples of water at 18 spots along the impaired river.

"It was up to me to show chemically how the surface water was evolving along its flow and why it was evolving the way it was," said Nance.

He added that without the airborne geophysical work, the task would have been much more time consuming. And with a cost of about $200 to analyze each sample at an independent lab, the team had to be judicious.

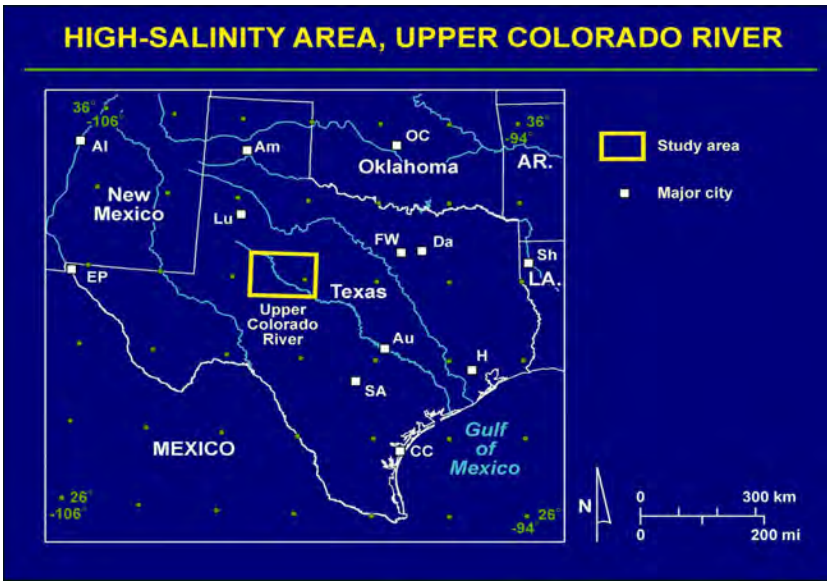
"If we didn't know anything at all, I'd have to go up and down the river who knows how far," he said. "It definitely focused our sampling."

The chemical analysis showed that the signatures of each "hotspot" differed. One area near an abandoned oil field had elevated levels of sodium and chloride. The team concluded that deep groundwater brought to the surface by oil and gas production was the most likely source. Ground and borehole EM induction measurements helped pinpoint specific point sources and groundwater pathways within this hotspot.

Not all of the increased conductivity along the evaluated portion of the Colorado was due to byproducts of oil and gas production. Some came from elevated sulfate levels, which the team concluded came from the natural dissolution of minerals such as gypsum. Some local, shallow accumulations can be attributed to salt cedar, but salt cedar only serves to concentrate salinity already in the system.

One of the significant threats to water quality below Spence Reservoir appeared to come from the Wendkirk oil field, which was in operation for many years under numerous operators.

"Suffice to say it is relatively typical of many west Texas oil fields," said Paine, referring to the fact that produced water was simply dumped at the surface in unlined pits. The practice was common (and allowed by regulators) until the late 1960s.



"With half of Texas oil and gas production occurring before then," Pained pointed out, "there's a lot of salty water out there from oil and gas production."

Today, petroleum companies pay into funds to help clean up sites with no responsible parties such as Wendkirk. Without intervention, Nance estimates that it might take hundreds or even thousands of years for the excess salts from oil and gas production in West Texas to be naturally flushed out of the system.

"It's a great cautionary tale that people need to be more careful developing oil and gas resources near water," said Nance.

Paine said his strategy for quicker, cheaper airborne geophysics could be effective in assessing and mitigating water contamination in other parts of Texas and around the world.

Several other major river systems in Texas are affected by natural and oil field salinity, including the Canadian River in the Panhandle, the Red River in the north, the Pecos in the west, and the Brazos flowing from the north to the southeast. Paine said he would like to survey them from the air but does not currently have the necessary funds.

In Australia, irrigation practices and climate change are increasing salinity of shallow soil and water, threatening food crops. Paine said researchers there are testing his technique as a more focused, less expensive way to monitor saline-water inflows into rivers.

With the kind of information that Paine and his colleagues gather, policy makers and stake holders can move beyond the blame game and start the long, difficult task of cleaning up impaired waterways. ✷

The "cruise missile" Jeff Paine (right) uses to measure electrical conductivity in soil could serve as an affordable way to measure salinity and improve the health of waterways around the world.

STARR

FINDING ENERGY AND HITTING PAY DIRT FOR TEXAS TAXPAYERS

BY J.B. BIRD

In 2006, when independent operators found new natural gas plays in the Matagorda Bay area of the Texas Gulf Coast, estimates showed a reserve potential of 33 billion cubic feet (Bcf)—a quantity that was economically meaningful to operators and shareholders, but modest for Texas consumers, who on average burn up that much natural gas in three and a half days.

But the new find had a significance that went beyond its size. It was another of the successful discoveries that take place each year in regions of Texas that have already been heavily explored. Discoveries like the one in Matagorda Bay prove again the commercial viability of seeking the vast stores of oil and natural gas that remain in place but undeveloped in Texas.

A significant amount of the remaining mobile oil and gas in Texas resides on state lands. Based on estimates, 1.6 billion barrels (Bbl) of mobile oil and 10 trillion cubic feet (Tcf) of gas remain to be recovered on state lands—that's the same amount of gas, and almost as much oil, as has been produced to-date in these "played out" properties.

Thanks to the Republic of Texas's decision in 1839 to set aside state lands for the benefit of public schools, income from these reserves aids Texans immensely. Royalties and severance taxes on more than 13 million acres go to the state's Permanent School Fund. Based on current prices, the state could earn $67.5 billion from the recovery of the remaining oil and gas on its public lands.

It's not easy to hit pay dirt in heavily explored and exploited lands, but Texas operators have a major leg up thanks to researchers in the Bureau of Economic Geology's State of Texas Advanced Resources Recovery project (STARR). Each year, STARR scientists help operators explore new discoveries and target known but hard to access reserves in previously explored fields. At the same time, through workshops and peer-reviewed publications, STARR scientists promote geological concepts that encourage exploration of mature fields and unconventional resources.

STARR fills an especially important gap for smaller operators, who happen to do most of the exploration on state lands.

"We work mainly with small companies that don't have research labs," says Bob Loucks, STARR's former principal investigator (PI) and presently head of the project's work in unconventional resources.

"Many industry geoscientists don't have the time to stay up to date on stratigraphic concepts and methods, such as sequence stratigraphy," says Loucks. "We can work with our industry partners to apply stratigraphic and structural methods that they don't have the background or time to use."

"A lot of the areas where our operators work were abandoned by the majors," adds Ursula Hammes, STARR's lead PI. "Sometimes these wells make just a few barrels a day, or maybe they make a billion cubic feet at most of gas." For smaller companies, that can be enough to turn a profit, especially at today's prices. And the accumulation of work by smaller operators ultimately yields large payouts for the state's public schools.

Finding "New" Hydrocarbons

About a dozen researchers at the Bureau of Economic Geology work with STARR at any given time, an interdisciplinary team of geologists, geophysicists, petrophysicists and engineers. Most have industry experience.

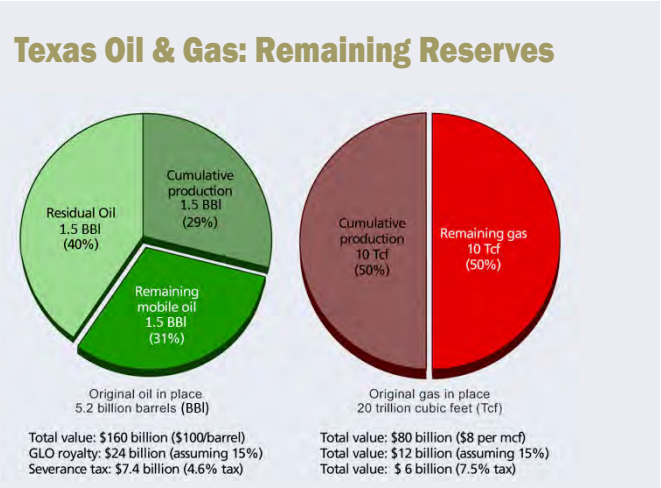
"Our experience and background makes us a perfect fit for small companies," says Loucks. "Our industry experience allows us to com-

municate with them and to know their needs, as we have been there before."

At the same time, because STARR researchers work in a highly collaborative academic setting, they often bring new exploration concepts to bear on their clients' projects.

The discoveries in the Matagorda Bay area were one example. Reviewing data on the exploration zone, Hammes suggested operators drill deeper to target slope and basin-floor fans. She knew from experience and research that similar slope and basin-floor fans had signaled discoveries in deep-water sediments in the Gulf of Mexico and off West Africa. In the Matagorda Bay area, a few wells had been drilled into the fans before but had not been judged economical.

As the operators acknowledged in a letter of support to the Texas



State Legislature, Hammes' insights helped encourage the firm to develop several producing wells.

Hammes is careful to point out that STARR researchers do not work as consultants. They help with background work and leads but do not work up prospects, which is the responsibility of the operator (or their paid consultants). "But we fill an important gap, working with smaller operators—some are two person shops—that don't always have the resources to do background research," she says.

Encouraging Drilling

STARR's reservoir characterization work has yielded great results. Since the program's start 13 years ago, STARR research has led to more than 400 infill wells and 85 recompletions. The program is required to be revenue neutral, generating funds equal to or exceeding its $1.5 million annual appropriation from the State Legislature. STARR consistently beats this mark, helping generate revenues anywhere from eight to 27 times its appropriation.

While reservoir characterization often aids individual discoveries, STARR researchers have found important ways to aid the Texas hydrocarbon industry as a whole. In recent years, STARR has attracted attention for regional studies and groundbreaking research in unconventional resources.

The Barnett Shale has been an especially popular subject. Three sold-out workshops around the state established STARR as an important research center on shale-gas plays.

The workshops highlighted research original to STARR. The study of fractures in the Barnett started in the FRAC Research Consortium at the Bureau with Julia Gale as a key researcher. When Gale joined the

Hamnes with members of the STARR team at the Bureau of Economic Geolog.

STARR group, her continued efforts led to a suite of publications and numerous lectures.

"She is now recognized as an expert on Barnett shale-gas play fractures," says Loucks.

Loucks' research along with Rob Reed and Steve Ruppel on nanopores in the Barnett has been just as noteworthy. The Bureau is the only entity (academic, government, or industry) imaging nano-scale porosity in the Barnett Shale. As a result, Loucks and colleagues have opened up new concepts relative to storage, reservoir-quality distribution, and permeability pathways in the Barnett.

"We caught even some of the large research labs off guard with this discovery and this has changed the way they are now thinking about shale-gas reservoirs," says Loucks. "We feel really good about this because we have promoted a new concept that others find valuable enough to invest their research money into."

Research into the East Texas Woodbine reservoir stratigraphic architecture by Bill Ambrose, Fred Wang, Tucker Hentz, Flo Bonnaffé, and Bob Loucks has been another highlight, yielding public presentations encouraging new development.

"The first principle of finding oil is that you have to drill," says Loucks. "Our regional and unconventional energy studies can encourage this drilling."

Research Environment

STARR, Hammes and Loucks emphasize, is a team effort that relies on contributions from corporate partners and many researchers at the Bureau.

When industry partners authorize release of data, Bureau colleagues can share important aspects of their discoveries with other geologists. This has led to dozens of peer-reviewed and industry publications.

"We see a lot of seismic data that is generally not available to academia," says Loucks. "From these data we can help the company find hydrocarbons and at the same time learn new principles about stratigraphy."

Research on the sequence stratigraphy of the Texas Tertiary sandstones, for example, "is being applied to other Gulf of Mexico areas as well as to other areas of the world," says Loucks.

As a former geologist with Anadarko Petroleum Corp., Hammes appreciates the opportunity to conduct applied research that can influence general concepts.

Loucks, who worked in energy exploration for 20 years, is motivated by the chance to apply research concepts to actual projects: "We get to work on real data and find out in the end whether our ideas work. This means did we find hydrocarbons or did we find a dry hole."

And when STARR researchers help operators find hydrocarbons, the entire state benefits. ✶

Earth Science Revolution

Initiative Aims to Revive Earth Science Teaching in Texas by Training Teachers

The state of Texas is in the midst of a major overhaul of high school science education. To graduate on the preferred or distinguished track, students will soon be required to complete four years of science. When the new guidelines were approved in 2006, only two other states, Alabama and Idaho, required four years of science.

Texas will also bring back earth science (after cutting it in the 1990s) as one of several options to fulfill the required fourth year. The new course, Earth and Space Science (ESS), will be taught as a "capstone course," integrating material from a range of disciplines to help students make connections across subjects.

The changes could help catapult Texas to the vanguard of science education in the nation. But with the first high school seniors starting

Photo: Marsha Willis

Teachers create a cut-away model demonstrating deep ocean drilling.

their required fourth year of science in fall 2010, where are the teachers for ESS going to come from?

The state of Texas already struggles with a chronic shortage of science teachers. In academic year 2008-09, the Texas Education Agency (TEA) designated science as one of six "subject-matter teacher shortage areas," making teachers who are willing to teach science eligible for special benefits. Another indicator is the proportion of teachers who are not certified in the subjects they teach. According to the Council of Chief State School Officers, in 2006, 24 percent of high school chemistry classes in Texas were taught by non-certified teachers. The proportion is higher for other sciences (28 percent for biology and 46 percent for physics).

Scientists and education experts at the Jackson School of Geosciences were instrumental in convincing the state to change the science requirements and options. Now they're working to boost the state's capacity to teach the new course through the TeXas Earth and Space Science Revolution (TXESS Revolution), a five-year, $2.38 million initiative to train eighth through twelfth grade teachers in earth science.

"Teacher preparation for the new capstone course is essential to help ensure that the course remains a viable option for core credit to satisfy the fourth year of science in Texas," said Kathy Ellins, TXESS Revolution lead principal investigator.

Talking About a Revolution

During the five-year program, two cohorts of about 70 teachers each attend a series of professional development academies and two-week summer institutes. In the training sessions, they learn innovative techniques such as inquiry-based learning and develop classroom activities based on real data and research stories from scientists.

Like ripples in a pond, they then train colleagues in their own regions. Those teachers in turn use the unique teaching methods and activities with their own students. Through this multiplier effect, the 140 participants will eventually impact hundreds of other educators and thousands of students.

Researchers from the Jackson School share their research stories and data with the teachers who then use that information to step inside the scientists' shoes and try to solve a problem.

"It's not too often that teachers can get real data and talk with people who collected it," said Hilary Olson, Institute for Geophysics researcher and co-principal investigator for the program. "They go from not knowing about a topic to several hours later, they feel pretty confident with their answers."

The TXESS Revolution project is designed to inspire teachers so that they can in turn inspire their students. "Research shows that unless kids are exposed to a career, they will never think of going into it," said Karen Ostlund, chair of the TXESS Revolution Advisory Board. "Perhaps some kids have never thought of being a scientist, but this would show them this could be an exciting life."

In other words, the program isn't just about filling a need for outstanding science teachers in the next two or three years, it's about stoking the cycle of excitement around science and science teaching as vocations.

"If we don't have the teachers who are energetic and who love the content and are exemplary, then the kids aren't going to be interested enough to go to college to study science and become a science teacher," said Ostlund. "It's a cycle. At some point, you have to get someone that turns you on to science. That's obviously what teachers who go through TXESS Revolution are meant to do."

Another thing that sets TXESS Revolution apart from other teacher training programs is its emphasis on inquiry-based learning in which students generate their own questions, make a prediction or form a hypothesis that they can test, set up an investigation, and create a process that they can follow to answer the questions. They collect data, look for patterns, and draw conclusions. According to Ostlund, the inquiry-based approach leads to deeper learning.

"Good inquiry leads to two questions where there was only one," she said. "In the process, you learn thinking skills that you use to ask and answer questions. Teachers have to challenge the students with questions that cause them to connect the dots and find out what is going on."

Cupcakes for Science

The professional development academies last two-and-a-half days and include training with geoscience data, field trips, guest lectures, and other special programs. Each cohort of teachers participates in four academies. The first one, "Poking Holes Into the Planet," held February 14-16, 2008, focused on how geologic cores and geophysical logging can help scientists better understand Earth processes and improve the search for resources.

Marsha Willis (left) and Kathy Ellins (center) discuss geological cores with a teacher.

One of Meredith Keelan's favorite exercises involved taking an earth science activity and modifying it for different grade levels. Keelan, a high school science teacher from Van Vleck, Texas, chose the drill core activity in which teachers examined clear plastic tubes filled with sand, gravel, and other materials. These tubes simulate the core samples drilled out by geologists searching for oil and gas or trying to understand events in the geologic past such as flooding, volcanism, and climate change.

Reading cores is an important, yet difficult skill for geologists. But how can a teacher convey a sense of this complicated process in the classroom without the real cores that scientists use, and make it interesting for students from fifth through twelfth grade?

"I wrote an activity using cupcakes," said Keelan. "I baked them with different layers of white and chocolate cake and layers with or without chocolate chips or nuts. The students stick hollow glass rods into the cupcakes and pull out cores. Then they can measure the thicknesses and types of layers."

She planned to use the activity in the coming year in her high school classes. Her elementary school colleagues planned to use it too.

When she presented it to her fellow teachers in the second TXESS Revolution professional development academy, most liked it. But being teachers, they couldn't resist grading it. During her demonstration, the rubber cork on the end of her glass rod popped off and the "core" began to ooze out. The teachers suggested not using the cork because it allowed pressure to build up in the rod. When one of the geologists leading the training commented that that sometimes happens at real drill sites with real cores, she felt vindicated.

"Teachers are hard to teach," she said. "They are a tough audience."

Virtually There

Teachers who participate in the TXESS Revolution program make a commitment to travel to Austin for training several times a year for two years. The rest of the time, they stay in touch through a "virtual café" on the TXESS Revolution website. They share classroom activities, science news, personal stories, and teaching strategies. They can also share their feedback about how the program is going and what could be improved, sending comments to independent evaluators from the University of Texas at Tyler.

The architect and manager of this online learning community is Eleanour Snow, a scientist who came to the Jackson's School Institute for Geophysics from the University of South Florida. (Snow is currently an adjunct professor at the Jackson School.) Snow, who is the project's co-principal investigator, has taught geology at the university level for 21 years. At USF, she was among the first of the faculty to take her teaching online, developing and teaching courses entirely on the Internet. She noted that teachers come from across the state, learn a lot of material, make a lot of new friends, and then go back to their own communities where they sometimes feel a little isolated.

"One of the challenges is to keep the conversation going and keep them interested and excited between our workshops," said Snow. She hopes the online community has an even broader impact.

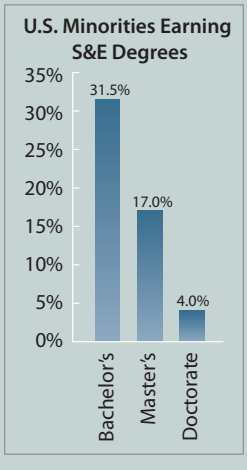
"I really want teachers to start using the Internet more," she said. "Students are so much more computer savvy than they are. That's how they communicate. So showing the teachers how to involve students in online learning is critical."

The program, based at The University of Texas at Austin, received $1.48 million from the National Science Foundation's Opportunities for Enhancing Diversity in the Geosciences program with matching grants from two divisions within the university: the Jackson School and the Texas Regional Collaboratives for Excellence in Science and Mathematics Teaching within the College of Education.

In addition to the Jackson School and the College of Education, major partners include the university's Department of Petroleum and Geosystems Engineering, TERC, and the University of South Florida. ✷

Slip Sliding Away

The TXESS initiative addresses another critical need in Texas and across the U.S.—the retention of minority students. As minority students advance through high school and college, at every level their numbers dwindle and the proportion of them studying science and engineering shrinks. Few go on to pursue careers in science. TXESS Revolution seeks to reverse that trend by training teachers who work predominantly in minority or underserved public schools in Texas.



A few statistics help illustrate the declining involvement of minority students in science.

According to a 2005 report by the Department of Education's National Center for Education Statistics, Hispanic and black high school students are about as likely to take biology and geology or earth science courses as white and Asian/Pacific Islander students. Yet they are less likely to complete physics, chemistry, engineering, and honors science courses than those other groups.The shift away from science continues in college.

The National Science Foundation (NSF) reports that in 2004, 31.5 percent of underrepresented minority students who were U.S. citizens and received bachelor's degrees in the U.S. got them in science and engineering (S&E) fields. That same year, just 17 percent received master's degrees and only 4 percent received doctoral degrees in S&E fields. Clearly, minorities who stay on for graduate degrees opt less and less for degrees in S&E fields.

The slow attrition of minorities in the sciences becomes especially apparent at the end of the education pipeline: where students enter the workforce. According to a 2008 NSF report, while underrepresented minorities make up 24 percent of the total U.S. population, they account for only 10 percent of college educated workers in S&E jobs.

"What if we showed students what they can do in the earth sciences?" said Olson. "Imagine a teacher has a student who is really good at math or science or computers. What if she said, 'Have you considered a career in geology or petroleum engineering?' whereas in the past, she might have said at best, 'Have you considered biology?'"

Minority students who stay on for graduate degrees opt less and less for science and engineering (S&E) degrees. In 2004, 31.5 percent of minority students who received bachelor's degrees got them in S&E fields. That same year, just 17 percent received master's degrees and only 4 percent received doctoral degrees in S&E fields. Source: NSF.

Passing the Tiller

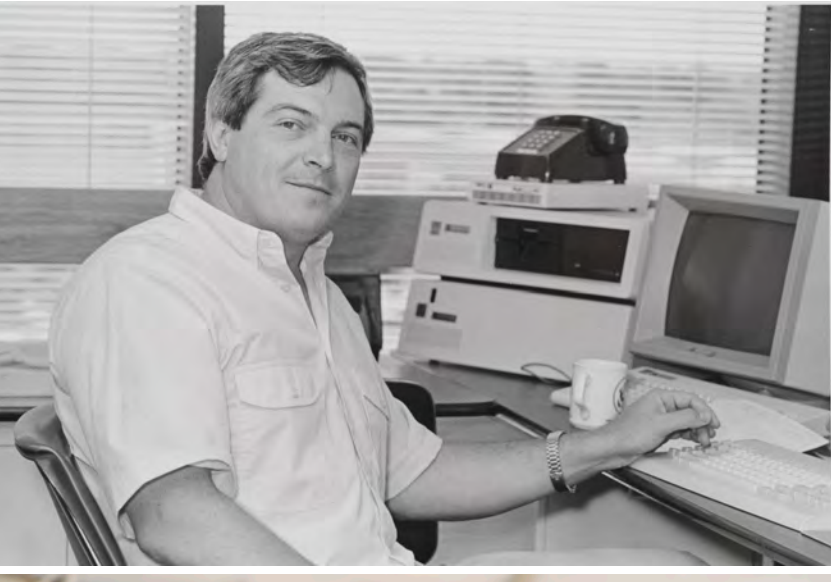
STOFFA RETIRES AS DIRECTOR OF THE INSTITUTE FOR GEOPHYSICS

When Paul Stoffa left behind a professorship at Columbia University and a research position at Lamont-Doherty Geological Observatory in 1983 to make a new academic home at the Institute for Geophysics, he left behind a bit of the glamour of the Big Apple. The Institute for Geophysics was housed in rental space at the end of a runway at Austin's Mueller Airport where it was sometimes difficult to carry on conversations amid the rumble of approaching aircraft. The nomadic Institute, founded in Galveston in 1972, would have two more rented homes before finally settling down at the J.J. Pickle Research Campus in north Austin in January 2007.

Many of his colleagues at the Institute credit Stoffa, who became director in 1994, with the clout and persistence that ultimately led to the establishment of a permanent home on a University of Texas campus. The financial gifts of John Jackson and others cemented the construction of the new building.

"Paul had the Shell distinguished chair in the Department of Geological Sciences," said Jamie Austin, senior research scientist at the Institute. "His stature as a senior faculty member with a chair gave the Institute stature. He made it clear that the Institute wanted to be involved in academic instruction and graduate student advising and he pushed hard to get us a permanent home."

Stoffa stepped down at the end of 2008 as the longest serving



director in the Institute's history, just nudging out for that distinction the man who had hired him and ultimately recommended him as his successor, Art Maxwell. Maxwell, who contributed greatly to the understanding of plate tectonics and sea floor spreading through his work on the Deep Sea Drilling Project in 1968, currently lives with his wife in Santa Fe, New Mexico.

"He's as good if not better than anybody in his field, in theoretical geophysics," he said. "He's done a first rate job there with the Institute."

Expansion

Colleagues credit Stoffa with the expansion of the Institute beyond its foundational strengths in marine geophysics and seismology to include climate research. In the late 1990s, the G. Unger Vetlesen Foundation contacted Stoffa to ask whether the Institute had any climate projects that they could fund.

"It was clear to Paul that we didn't do it, but we could be good at it," said Cliff Frohlich, associate director and senior research scientist at the Institute. "It was also clear that universities of the first class should do that and he was in the vanguard of making it happen. Most climate researchers are here at the Jackson School because of his efforts in the 1990s."

Stoffa's own research focused on nonlinear inversions of large data sets, which is of particular interest in the petroleum industry, where oil field seismic data are "inverted" to find oil. Stoffa realized the same techniques could be useful in modeling Earth's climate.

Today, climate system science is one of four major research focuses of the Jackson School. About a dozen climate scientists, including a member of the National Academy of Sciences and a board member of the consortium that runs the National Center for Atmospheric Research, teach and do research in the school. Faculty members in the Department are developing a new graduate program in climate system science to attract top students from around the world. In 2007, researchers from the Institute hosted an international workshop on Antarctic ice sheets and sea level.

Triple Threat

Stoffa also won praise for his ability to teach and mentor graduate students, conduct advanced research, and be an effective administrator.

"He was devoted to his students," said Eleanor Picard, an assistant to the former director. "They all just loved him." She said he always worked directly with a cadre of three or four graduate students or post docs.

"He was a scientist with real ability and an administrator with skill," said Austin. "Yet he never lost sight of his work as a faculty member. It takes a smart man to cover all those bases. He did that extremely well and for a long time."

"That's not easy to do," added Frohlich. "For some people, that would be at the expense of his administrative duties, but that wasn't the case with Paul."

Stoffa also balanced the needs of the university with the larger academic research community. In 2003, he was asked by the National Science Foundation to build the management infrastructure for a new, international deep sea drilling program. The Integrated Ocean Drilling Program (IODP) was to be built on the model of the U.S. Ocean Drilling Program. Instead of one country and one platform, the IODP would be funded and led by several countries or consortia and involve multiple drilling platforms, each designed to fill a different research niche. Stoffa, with help from Jamie Austin, worked for two years to create IODP Management International, Inc. That infrastructure is now in place and the IODP has begun research cruises throughout Earth's oceans.

Stoffa plans to return to his research and teaching duties at the Institute and Department in 2010. Meanwhile, Terry Quinn serves as the interim director of the Institute until a permanent replacement is found.

When the mantle does finally pass to a new director, what advice does former director Maxwell give?

"Make sure you always hire good people because that's the crux of the whole place," he said. "If they're good, the whole place is good." ✷

Opposite page, clockwise from top left: Stoffa, circa late 1980s; Clark Wilson and Stoffa at Spring Symposium, 1998; Eric Barron, Paul Stoffa, and Scott Tinker at the dedication ceremony for the Institute's new building on the Pickle Campus, January 2007; Stoffa delivers remarks at the dedication ceremony for the building.

This page: Top, Under Stoffa's leadership the Institute accomplished the major milestone of acquiring a permanent, state-of-the-art facility; right, Interim Dean Chip Groat presents Stoffa with a recognition award from Institute staff.

FACULTY UPDATES

Peter Flawn

As President Emeritus, Peter T. Flawn continues to serve on a number of University boards, councils and committees including: Development Board, Geology Foundation Advisory Council, College of Natural Sciences Advisory Council, Marine Science Institute Advisory Council, Department of Computer Sciences Advisory Committee, and the Board of Visitors of the Institute for Computational and Engineering Sciences. He is also a member of The Academy of Medicine, Engineering and Science of Texas.

Mark Cloos

Cloos continues his research on the formation of porphyry copper-type ore bodies and has become increasingly involved in high-level nuclear waste disposal. Since 2003, in part because of his work on subduction zones,

Mark Cloos and student.

he has served as an international member of a panel for Japan to help them select a site for the permanent disposal of their high-level nuclear waste.

Robert Folk

Folk writes, "The BIG news is that after a 42-year span in the same disorganized spot, I am leaving my office; and, that after a 19-year love affair with the old SEM, it has been replaced with a new/better version. No more film. Yeah, I'm still chasing tiny microbes, in pyrite, palygorskite clay, phosphates, rusty bird baths and of course carbonates. Prof. Brenda Kirkland at Mississippi State U. has taken great TEMs of Viterbo slimes, and we have thereby reduced the 'lower limit of life' to 1/50 of what biologists say it is; but they have yet to concede defeat.

"I still manage to do field work in Italia every summer. In '05 Marge, daughter Jenny and granddaughter came along to do north Italy, and in '06 son-in-law Steve Mann and grandson went to Sicilia to enjoy the corpses in the catacombs and the hilarious pupi show of Palermo. In '06 I was also with echinophile Lou Zachos, and in '08 with e-wizard Jeff Horowitz and oil gal Deanna Combs. It is great fun introducing these young innocents to the delights of grappa and amaro."

Brian Horton

Horton has begun a large project sponsored by Ecopetrol to study the basin evolution and structural history of a regional transect through the Middle Magdalena Valley, Eastern Cordillera, and western Llanos Basin of Colombia. The work complements his NSF-funded research to use stratigraphic signatures of orogeny to assess the timing of initial Andean crustal shortening. His NSF-sponsored project on fold-thrust shortening and foreland basin evolution during early continental collision in the Zagros Mountains of Iran is nearing completion, as new NSF projects start in Tibet and Papua New Guinea on low-angle normal faults and extensional basins.

David Mohrig

Mohrig and JSG colleague Jim Buttles have designed and built a research tank housed at the Pickle Research campus, optimized for studying submarine transport mechanics. The deep tank allows them to study channelization processes by turbidity currents and subaqueous landslides in an environment where the ambient fluid is water. Their experiments are coupled with outcrop and 3D seismic studies of ancient systems. The work complements Ron Steel's and Mohrig's RioMar research program investigating the connections between sedimentation processes and reservoir systems on the continental shelf, at the shelf-slope break, and in deep marine settings.

Jack Sharp

Sharp continues to have a very diverse research program but has become increasingly interested in urban hydrogeology, karstic processes, and groundwater management while maintaining a strong interest in the effects of fracture roughness on fluid flow and solute transport.

Douglas Smith

Doug continues to work in the department in much of the winter, but to spend most of the summer in Durango, Colorado. He continues to try to puzzle out relationships between tectonics in the southwestern US, potassic magmatism, and mantle evolution. This last spring, he returned to use of the electron probe, although new software and techniques were a bit of a struggle to try to master. His new data for peridotite xenoliths offer hope of understanding more about how Farallon subduction affected the region. He continues to enjoy the research base provided by the geochemical labs and colleagues in the department and a fast internet connection in Durango. Of course, he also enjoys abundant free time. That free time is consumed in many ways, such as playing with granddaughters, exploring the outdoors of southwestern Colorado, and trying to learn Chinese.

Ron Steel

Steel's research project, Bar's in Tidal Environments (BITE), is investigating how changes in tidal regime (tidal range, velocity of tidal currents, etc.) occur with falling and rising relative sea level, and consequently affect the scale and nature of tidal bars, the infill character of tidal channels, and the extent, nature, and thickness of mud distribution in tidally influenced or tidally dominated reservoirs.

Construction in progress on David Mohrig's morphodynamics lab.

ALUMNI NOTES

Members of the 2008-2009 Jackson School FANS (Friends and Alumni Network) board.

1940s

Thomas Barrow (M.A., 1948) is retired and lives in Houston, Texas.

Steve Clabaugh (B.S., 1940; M.A., 1941) writes, "The grand 2007 newsletter and the Jackson School activities amaze and delight me. Perhaps I established our newsletter tradition by preparing the first few and helping edit others for 15 years. Although they were such brief and simple things, news from former students was the important part. I hope to see many of them in 2008." Steve lives in Spicewood, Texas.

Hugh Curfman (B.A., 1948) writes, "I have been searching for oil & gas here in Lafayette since 1952, independent since 1960, and retired in 2004 after wife Jayne passed on. I enjoy reading about my partners of the 1948 class. Thanks." Hugh lives in Lafayette, Louisiana.

Charles J. DeLancey (B.S., 1940; M.A., 1942) writes, "I am the only surviving member of my family. I have traveled extensively, but now I can't drive or take long trips. I am very pleased with the assisted living I am in. 3 good meals a day, 7 days a week! And I'm NOT gaining weight. We are very active here." Charles lives in Houston, Texas.

Warren P. Fuller (B.S., 1940; M.A., 1940) served as an Air Corps. Lt. Col. He was with the USGS for two years and later returned to Texas to get his M.S. in Geology in 1948. Warren is now retired at 91 and resides in Morgan Hill, California.

Thurman Geddie (B.S., 1945) writes, "I still participate in drilling oil & gas wells. At these prices it is hard to know when to stop." Thurman lives in Austin, Texas and can be reached at tgog1@aol.com.

Margaret "Peggy" Gormley (B.A., 1946) writes, "I am still enjoying royalties from geologic work. My oldest granddaughter will graduate from UT this December." Peggy lives in Dallas, Texas and can be reached at peggormley@msn.com.

Stay in Touch!

Use the enclosed envelope or our online form to let us know what you've been up to and to update your contact information. www.jsg.utexas.edu/alumni/submit.html.

Roy H. Guess (B.S., 1939; M.A., 1940) writes, "A retirement community is greatly superior to trying to keep up a home at age 90. The newsletter is very good. My computer is fun and very good with emails. The stock market is interesting especially since gold and silver are going up as the value of the dollar goes down. Never sell oil or gas royalty. Traveling is now too tough." Roy lives in Casper, Wyoming and can be reached at rhguess@aol.com.

F. Rosamond Haertlein (B.A., 1947) lives in Fredericksburg, Texas.

Elvin M. Hurlbut, Jr. (B.S., 1943) writes, "I was laid off from Shell Oil Company in September 1964 in Corpus Christi, Texas during the general oil-company downsizing of the 1960's. From fall of 1964 to fall of 1965 I was unemployed, then in late 1965, I became an independent and consulting geologist until May 1969. I moved to Houston in November 1968 and went to work for an aerospace contractor at the Manned Spacecraft Center (later named the Lyndon B. Johnson Space Center) in May 1969. I worked for various aerospace contractors until the end of December 1985. Then I moved to Tyler, Texas in January 1986. Details of my aerospace career are listed in the 12th, 20th, and 21st editions of Who's Who in the South and Southwest and the 9th and 10th editions of Who's Who in the World."

Edward R. Kennedy (B.S., 1948; M.A., 1949) writes, "I still live in Midland, TX and continue to explore the Delaware Basin. I see some of the surviving 1940's grads @ SIPES meetings--Harry Miller, Clem George and Nolan Hirsch. We are all still working to some degree." Edward lives in Midland, Texas.

Eugene Lipstate (B.S., 1949) writes, "I turned 80 in December 2007. Oldest granddaughter graduated UT in December 2006 and went to New York City to gain fame and fortune. My youngest is a freshman at LSU and made their marching band. She was really excited that their team won the BCS championship. All of our immediate family resides in Lafayette, LA. I still have lunch with my old buddies at the Petroleum Club. I cannot believe that oil is in the high $90's, and I am sitting out the exploration this time around." Eugene lives in Lafayette, Louisiana and can be reached at e1state@cox.net.

Jule Jacobson Moon (B.A., 1940; M.A., 1941) is retired and resides in Fairhope, Alabama.

G. Allan Nelson (B.S., 1947) is a consultant at G. Allan Nelson in Westminster, Colorado.

Isaac W. Norman (B.S., 1948) is retired and lives in Taylor, Texas.

Charles Porter (B.S., 1949; M.A., 1949) writes, "I have been rereading the Geologic Newsletter and am amazed at how few of my group are in there—age is really taking its toll. Due to a belated 'staff reduction' by Shell in 1961, I left the petroleum geology field for the data processing field, but I have never lost my love for geology. I always feel like I'm 'home' when I return to Texas on periodic visits. After all, the surface geology here in peninsular Florida (my home now) is like Pablum when compared to that of Texas' —filet mignon. And I'm doing my best to educate these transplanted Yankees (snowbirds and permanents) as to the geology and the petroleum industry. I am having a ball doing volunteer work for the U.S.G.S. in this area, even if it is only working with their maps and a GPS receiver. At my age, one does what one is able to do."

Milton R. Scholl (B.S., 1947; M.A., 1948) is retired and now lives in Chula Vista, California. He can be reached at mrscv@aol.com.

1950s

Peyton O. Abbott (B.S., 1950) is retired and lives in Pueblo, Colorado.

Jim W. Adams (B.S., 1951) writes, "Asthma prevents me from climbing outcrops anymore, but I faithfully attend WTGS and SEPM meetings in Midland, Texas. I enjoyed taking four grandchildren on a cruise from

Hartlein Honors Mother and Aunt, Geology Pioneers

As decribed in the February mail out from the Development Office ("Sustaining Excellence"), Albert Haertlein (B.S. 1978) honored the pioneering work of two women geologists—his mother (above), Rosamond Allen Haertlein (B.A., 1947), and his aunt (below), Jeanne Allen Ferrin (B.A. 1948)—by establishing a junior faculty fund in their name. The fund is set up with a preference for supoorting female faculty members. "They were early women in geology, not the first, but certainly at a challenging time," said Haertlein. "I thought it would be nice to make sure their names are associated with an effort to promote women in geology."

Seattle to Juneau. The seaplane flight over the Juneau Icefield was spectacular with blue ice crevices galore. We recommend it for cooling off your summer. I passed through the 80 year old portal unscathed. Four out of five children, seven out of eight grandchildren and two out of three great-grandchildren are living in Midland. They keep us active with baseball and tennis games all year. When in Midland, give us a call at 694-63705. When gone from Midland, email me at slatsjacobs@grandecom.net."

Jerry D. Baker (B.S., 1951) lives in Richardson, Texas.

Don Bilbrey (B.S., 1953; M.A., 1957) writes, "I still lead a dull life, by chance. I travel to Seattle once or twice a year to visit my daughter and two grandchildren. The rest of the time I watch for hurricanes in New Orleans and play golf. At 79 I'm still able to carry a 6 handicap and shoot my age, or better, 80% of the time. Needless to say, my health is good." Don resides in New Orleans, Louisiana and can be reached at donbilbrey@webtv.net.

William D. Blankenship (M.A., 1953) lives in Denver, Colorado working as a manager at Eureka Resources Corporation. He can be reached at boandd@ecentral.com

Harvey Blatt (M.A., 1958) writes, "I'm still living in Israel after 13 years. Most of my work time is spent writing books about environmental problems for both people and university students." Harvey can be reached at harvey@vms.huji.ac.il.

Walt V. Boyle (B.S., 1954; M.A., 1955) writes, "I enjoy world traveling and computer investing. Vada Marie was elected vice president of operations for the Houston Symphony League for 2008-2009. I really enjoy seeing and visiting with Burgegs Stergl and family again now that they have moved to Houston." Walt lives in Houston, Texas.

Philip Braithwaite (M.A., 1958) writes, "We are still enjoying retirement in Dallas and taking the occasional train trip and cruise. Last year I did a fair amount of consulting on a Madagascar project and enjoyed doing some sedimentary and stratigraphy again. For some reason, Barbara and I enjoy our afternoon naps more these days! Could it be our age?" Philip lives in Dallas, Texas.

Leonard C. Bryant (B.A., 1957) is a retired geologist living in Hattiesburg, Mississippi.

Ben Buongiorno (M.A., 1955) writes, "I'm currently searching for oil and gas from Texas to Appalachia." Ben resides in Houston, Texas and can be reached at gooddayinc@aol.com.

Susan K. Cage (B.A., 1950) writes, "I'm enjoying the relaxing life style at Sun City in Georgetown. I also look forward to reading about the activities at the JSG from the newsletter." Susan lives in Georgetown, Texas and can be reached at circlesujack@aol.com

Marvin T. Carlsen (B.S., 1952). Wife Mildred M. Carlsen writes, "Marvin suffered a massive heart attack, March 2006, followed four days later by a stroke. Although he now has aphasia and apraxia, he still enjoys rock shops and attending mineral and gem shows." Marvin and Mildred live in Midland, Texas.

Dwight E. Cassell (B.S., 1955; M.A., 1958) writes, "I continue development of shallow oil reserves. Last year's travels included Russia, UK & China, with more ahead in 2008-2009." Dwight lives in Austin, Texas.

Weyman W. Crawford (B.S., 1950) is retired and lives in Houston, Texas. He can be reached at crawfordw_c@sbcglobal.net.

Gene C. Doty (B.S., 1954) is a retired hydrologist living in Las Vegas, Nevada.

Ruben Ellert (B.S., 1950) is retired and resides in Corpus Christi, Texas.

Curtis C. Franks (B.S., 1950) is retired and resides in Fair Oaks, Texas. He can be reached at ccfrtx@hotmail.com.

James B. Furrh, Jr. (B.A., 1947; B.S., 1950) writes, "I am still active primarily in MS, AL, LA, & East TX. I am participating in the Haynesville Shale play with my family mineral holdings in Harrison & Panola counties of Texas. My wife and I are enjoying good health and activities with my three sons and seven grandchildren." James lives in Jackson, Mississippi.

Fred M. Gibson (B.A., 1951) lives in Austin, Texas.

Wyeth L. Goode (B.S., 1953) lives in Midland, Texas and owns his own company.

Ronald L. Graner (B.A., 1958) writes, "I'm still enjoying retirement in Brentwood, Tennessee." He can be reached at ron@graner.us.

S. Hixon (M.A., 1959) is semi-retired and resides in Friendswood, Texas.

Eleanor "Ellie" M. Hoover (B.S., 1956) writes, "Thanks to the JSG gang for continuing the newsletter. It is awesome -- almost rivals the Texas Monthly. Looking back at some past well-site projects at Exxon: offshore GOM jack-ups and driving through bump gates on the King Ranch. What fun! I wouldn't mind doing it again." Ellie lives in Conroe, Texas.

Ed Hughston (M.A., 1950) writes, "I'm still 'self employed' in Taos, N.M. (I have been for the last 30 years). I'm enjoying life and the high oil & gas prices on the dregs of production accumulated over the past 57 years or so."

Emmett A. Humble (M.A., 1951) is retired from Exxon Mobil. He lives in Houston, Texas and can be reached at ehumble@houston.rr.com.

Will King (B.S., 1950) lives in Austin, Texas and can be reached at kingw@mail.utexas.edu.

Leon M. Lampert (B.S., 1951; M.A., 1953) writes, "I have 6 grandchildren, and one is

at UT Austin. Same wife, working in West Texas and SE New Mexico. I have interests in prospects in Eddy and Lea counties with 10 locations to be drilled in 2007-2008, and I'm having a fun time doing the geology. I enjoyed the alumni affair in October 2007 in Dallas where I met some of the faculty. I was very excited to hear the future plans of the Jackson School. I want to thank Julie Paul for being so friendly and considerate at the Dallas Cocktail party. I enjoyed meeting with the faculty, Dean, and Chairman of the Department." Leon lives in Dallas, Texas.

Don M. Lawler (B.S., 1954) writes, "I was so pleased to receive the 2006 Newsletter with the briefs (including BEG), library (home to many graduate theses), and outstanding photographs of some summer field camps. Mr. Airhart's paper on the Barnett is a great tribute to Mr. George Mitchell. The location map of Giant Fields around the world is very interesting to those of us who have done some re-locating. The Exploration and Development and the Hemispheric vision will no doubt stir memories in those who worked in the Amazon Basin and in shallow offshore Brazil and found scant production. I hope that the Hall of Distinction, which was very nicely represented, will be extended. In the Alumni Notes, Bill Biskamp, Allen Locklin, Bob Williams, Hal Stubblefield, George Pichel and Jimmie Norton Russell remind me that other vintage explorationist keep on keeping on. Jimmie's second career is very fortunate for many children who need a dedicated teacher and anchor in their lives. On a more personal note, my wife Beverly, also a U.T. grad, and I recently celebrated our 50th. Our three children and two grandchildren live here in Dallas. After many interesting years of working for GSI in India, East Pakistan, Brazil, Spanish Sahara and Alaska, we settled in Dallas in 1969. Later, I joined General American Oil Co. (bought out by Phillips Petroleum Company). After retirement, I joined Rosewood Resources, which sold, and I retired again, to begin consulting as the opportunity arises. I will look forward to receiving the 2007 Newsletter." Don lives in Dallas, Texas.

Louis Lee (B.A., 1954; M.A., 1958) writes, "I'm still consulting and enjoying boom times in oil and gas again. Betty and I traveled to the UK last fall with Dwight and Linda Cassell. A high point of the trip was our visit to the Cambridge University Earth Sciences Department and the Sedgwick Museum where many of the fossil and mineral specimens from Charles Darwin's 1831 voyage of the Beagle were on display. After Darwin's death in 1882 his field notebooks and several thousand rock and mineral specimens were given to the Sedgwick Museum." Louis lives in Farmers Branch, Texas and can be reached at llee356@yahoo.com.

J. Ken Liles (B.S., 1950) writes, "Fran and I are still enjoying the retirement years at Emerald Bay Golf Club on Lake Palestine (East Texas). We just finished a cruise with our children and their spouses to celebrate our 60th wedding anniversary. At last count, we have 8 grandchildren and 8 great grandchildren. I have many fond memories of my fellow graduates in 1950 -- a year in which jobs as a practicing geologist were hard to come by."

Ronald J. Marr (B.S., 1952; M.A., 1956) is retired and now lives in Johnson City, Tennessee. He can be reached at rlmnmid@aol.com.

Sabin W. Marshall (B.S., 1952) is a retired manager of geology of Texas Gas Transmission and resides in Houston, Texas.

Robert McBroom (B.A., 1951) is still active in exploration in North Texas. He lives in Wichita Falls, Texas.

C. Carew McFall (B.S., 1950; M.A., 1952) lives in Los Altos Hills, California and writes, "I have finally retired. My wife, Jean, and I are enjoying traveling."

Wayne E. McIntosh (B.S., 1956) writes, "I'm still in Rio Rancho, N.M. (near the kids and grandkids, whoopee) and still consulting with the firm Raytheon JTD in the D.C. area (going on 25 years). I have had to cut back on our motor home travels with diesel near

Ted Schulenberg (M.A. 1958) calls for bids during an auction at the 1950s reunion.

$5 a gallon. I enjoy the newsletter—keep up the good work." Wayne can be reached at wemhuz1@msn.com.

Charles M. Merrill (B.S., 1956) writes, "I continue to enjoy the good retirement life in far south Austin. I enjoy reminiscing about the 'good ol' days' in the oil patch with old classmates Ken Owens and brother-in-law Hank Ford whenever we pop a cold one together." Charles lives in Austin, Texas.

Wayne D. Miller (M.A., 1957) writes, "I'm still consulting for several oil companies on a full time basis. Since this is what I enjoy doing, I will probably continue for a few more years but at a reduced pace. Carole and I took a cruise/land trip to celebrate our 50th wedding anniversary this past fall. I look forward to the next newsletter." Wayne lives in Midland, Texas and can be reached at wdmillergeol@aol.com.

A. Sherrill Motsch (M.A., 1951) lives in Rockport, Texas and writes, "I had some great fishing trips and bird hunts this year."

Kenneth I. Owens (B.A., 1954) writes, "Promoters have staked a location for a Barnett Shale Well six blocks from my childhood home in Forth Worth; and we always 'knew' there were no hydrocarbons in the Forth Worth Basin! Agnes and I have lived in Austin since 1969; we are in the book for old acquaintances to call." Kenneth lives in Austin, Texas.

William "Bob" Pickens (B.S., 1957; M.A., 1959) is retired and lives in Columbus, Texas. He can be reached at bobpickens@hughes.net.

Jerry Pitts (B.S., 1954) is a petroleum consultant for Pitts Energy, Co. He lives in Midland, Texas.

Phil Pitzer (B.S., 1954) writes, "I still have an active office with my son Greg, who is a graduate of Trinity University in geology also. I'm still plying basic geology and geophysics to the Strawn and Pennsylvanian oil sections in North Central Texas. Through the use of modern day computer programs, Greg has had an unbelievable success ratio in reworking the oil fields in this area. My primary contribution has been to look over his shoulder and make him 'nervous!!' I have moved to Caddo Creek Ranch for the last 14 years and have found enough between it and the office to keep me busier than I really want to be; but it also has probably kept me in good health both mentally and physically! I have five grandchildren. Two grandsons are pursuing their work in the oil business also. (Both graduates of UT). One grandson is in the Marines and stationed in North Carolina at this time. Two beautiful granddaughters, one of which is currently a student at UT. Best regards to any 'old' classmates I went to school with." Phil lives in Breckenridge, Texas.

R.K. "Red" Redfearn (B.S., 1958) writes, "My home and wife are still original! Same address. Now proud of 24 grandchildren. Don't get out much anymore. Come visit us." Red lives in Austin, Texas.

James "Jim" V. Richards (B.S., 1956) writes, "I continue as a consultant for Genesis in Houston. I'm having my best year. I enjoy being on the Friends and Alumni JSG Board in 2008. I'm still playing in the Longhorn Alumni Band." Jim can be reached at jr1934@aol.com.

Cecil C. Rix (B.A., 1949; M.A., 1951; Ph.D., 1953) is retired and lives in Houston, Texas. He can be reached at crix1112@comcast.net

Edwin C. Robinson (B.S., 1950) writes, "I have had a very interesting life thanks to petroleum geology. Upon graduation, I worked for Sun Oil Company in Markham, Conroe and Beaumont, Texas and Lafayette, Louisiana. In 1957, I was transferred overseas and lived in Bogota, Colombia, Caracas, Venezuela, and Buenos Aires, Argentina. Subsequently, I lived in Maracaibo, Venezuela working for Martoca S.A. In 1961, I worked for Tenneco and lived in Lagos, Nigeria for a year. Returning to the U.S, I worked for Pure Oil and lived in Lafayette, Louisiana and Houston, Texas. When Union Oil Company of California purchased Pure Oil, I was transferred to Los Angeles, California and subsequently lived and worked for them in Lima, Peru and La Paz, Bolivia. Upon returning to Los Angeles in 1975, I traveled extensively in Asia, Latin America, Africa, the Far East and the Middle East looking for oil exploration prosepects. Since retiring in 1986 to Carlsbad, California we have enjoyed seeing and visiting with my six married children, fourteen grandchildren and two great grandchildren. I owe all of the above experiences to geology. Life has been good!!" Edwin lives in Carlsbad, California.

Rollin M. Roth (B.S., 1958) lives in Breckenridge, Texas and works at Delta Oil & Gas, Ltd.

Jimmie Norton Russell (B.S., 1952; M.A., 1954) writes, "I completed my 11th year as an assistant teacher of junior high to high school special needs, emotionally disturbed students at GOALS Learning Center of the Round Rock Independent School District and will start my 12th year this fall. I honed my Spanish proficiency during June with my dear wife and our friend Don Miles in Mexico. We visited the states of Veracruz, Puebla, and the

Professor Emeritus Ernie Lundelius (left) with William Newcomb (center), former curator of anthropology for the Texas Memorial Museum, and Glen Evans, former UT professor, geologist, and naturalist—during the 2007 Society of Vertebrate Paleontology meeting, held in Austin.

town of San Miguel de Allende." Jimmie lives in Austin, Texas.

Floyd F. Sabins (B.S., 1952) writes, "During my 37 years at Chevron, I rarely had time for volunteer work. Now that I have retired, I am 'paying my dues' with various volunteer groups here in Fullerton. I also manage to have annual fly-fishing trips for bonefish and for Alaska rainbows and salmon." Floyd lives in Fullerton, California and can be reached at ffsabins@roadrunner.com.

Ted Schulenberg (M.A., 1958) writes, "Janet and I spent an entire month in Italy, but never once saw Dr. Folk. Is he for real? Aside from the above, we also took a 3 week driving trip up to New York to visit with family. We have a daughter and a son-in-law teaching Arabic at the University of Rochester, and a son who is an ornithologist at the Cornell Ornithology Lab. All else goes well." Ted lives in Kerrville, Texas and can be reached at schulen@ktc.com.

Eugene P. Scott (B.S., 1957) is a consulting petroleum geologist living in Corpus Christi, Texas.

George Sealy (M.A., 1953) writes, "A U.T. graduate degree in geology has proved valuable in advising the Sealy & Smith Foundation in the management of its lands and minerals in Texas. The foundation is the largest single contributor to any of the universities in the U.T. System, concentrating on U.T. medical branch in Galveston. I am delighted to watch the birth and early growth of the Jackson School. Keep up the good work!" George lives in Houston, Texas.

Left to right: James Richards (B.S. 1956) and Dan Smith (B.S. 1958) at Houston alumni function.

George B. Sewell (B.S., 1954) is retired and resides in Littleton, Colorado.

William "Bill" T. Sherman (B.S., 1951) writes, "I had a great senior field trip to Mason, Burnet and Llano—3 weeks total. Also, I had a 6 week field trip—5 weeks at Texas A&M and 1 week in Big Bend led by Fred Bullard. We celebrated the last evening with a bottle of vodka (mistaken for a bottle of water when carried into the bus). It was a great finish to a great trip!" Bill lives in Austin, Texas.

Samuel J. Sims (M.A., 1957) writes, "All goes well here. I am still doing consulting work with the local stone industries and keeping busy, which I'll probably keep doing for a while longer, or as long as the health keeps going." Samuel lives in Bethlehem, Pennsylvania and can be reached at sims1961@ptd.net.

Daniel L. Smith (B.S., 1958) writes, "I am currently president of the Jackson School Friends and Alumni Network. I am still very active as an exploration geologist working with Sandalwood Oil and Gas Co. and managing my own company on the side. I enjoyed giving the alumni commencement talk to the graduation class in May." Daniel lives in Houston, Texas.

John W. Smith (B.S., 1957) writes, "I spent a varied 39-year career in exploration and

Jim Underwood with Harry and Zoe Vest, 1950s reunion.

A Model Foundation

Jim Underwood (B.S. '49, M.A. '56, Ph.D. '62), professor emeritus of geology at Kansas State University, writes that, "The Kansas State University Geology Advisory Council, approaching its 30th anniversary and patterned in large part on UT's Geology Foundation, has stimulated alumni involvement with the department. The Council has established a Distinguished Professorship in Geology, provided major financial assistance in the development of scholarship, equipment, and travel support funds, enhanced in a very positive sense departmental influence on college and university administration, and through annual meetings of council members with students provided information about career preparation and about career opportunities."

At the 1960s reunion, left to right: Karen Brewton (B.S. 1967, M.A. Nat. Sc. 1973), Joseph Brewton (B.S. 1967, M.A. 1970), Rosanne Bulgarella, Tom Bjorkland (M.A. 1962), Ed Burt (Ph.D. 1970), and Jerry Namy (Ph.D. 1969).

drilling for oil and gas, mostly on the U.S. west coast, Alaska, Rocky Mountains and mid-continental U.S. I retired to Grand Junction, Colorado in 1996. Occasional part-time consulting helps keep me up-to-date on new developments in the industry. The Western Slope to Colorado and adjacent provinces is not only an exciting area with today's level of activity, but it is also a geologist's paradise. Wife, Gayle, and I manage to stay in fairly good health." John can be reached at jwandgpsmith@bresnan.net.

Theodore Stanzel (B.S., 1956) writes, "I am mostly out of steady work since the dissolution of the Victor Stanzel Co., for which I worked for 18 years after retiring from the energy industry. However, personal responsibilities are helping me stay active. It is good to hear of the new developments and programs by the University and the Jackson School." Theodore lives in Schulenburg, Texas.

Bill St. John (B.S., 1958; M.A., 1960; Ph.D., 1965) is consulting for three O&G companies and one seismic company on Africa and Western Indian Ocean. Bill lives in Kerrville, Texas and can be reached at bstjbiz@ktc.com.

Hal Stubblefield (B.A., 1954) is retired and lives in Kingwood, Texas. Hal can be reached at hal.stub@gmail.com.

W.C. "Dub" Swadley (M.A., 1958) writes, "I retired from the U.S. Geological Survey and live in Littleton, CO. I enjoy reading the newsletter."

Eric E. Thompson, Jr. (B.S., 1950) lives in Billings, Montana.

Bernie Ward (B.A., 1955) writes, "I'm still going to the office everyday and doing a little work and a little more traveling." Bernie lives in Tyler, Texas.

Marriott Wieckhoff Smart (B.S., 1957) writes, "John and I continue to enjoy good health. We are able to enjoy Colorado with winter snowshoeing and summer hiking. Last year was our time to go to Italy. We went to Rome for a week and were in awe of what the Romans accomplished 2000 years ago. In September we spent three weeks touring Cinque Terre, Florence, Tuscany and Venice. We did a lot of walking. Generally, we prefer to be away from large cities, but we did like Florence and Venice, especially Venice. We hiked the Italian coast and walked through vineyards in Tuscany. Best wishes to all." Marriott lives in Centennial, Colorado and can be reached at marriot@ix.netcom.com.

1960s

Pat Abbott (M.A., 1966; Ph.D., 1973) lives in San Diego, California.

Tom Anderson (M.A., 1967; Ph.D., 1969) writes, "I'm beginning my 35th year at Pittsburgh. My students are working in Nevada and New Mexico. I continue to pursue details of regional strike-slip faulting in British Columbia. Sara Lee is a veterinarian in Tampa, FL; Garrett is a geneticist (going on attorney) in La Solla, CA. Tanna died from a combination of cancer and dementia in April after a long struggle." Tom lives in Washington, Pennsylvania.

Edward R. Atwill (M.A., 1960) writes, "Helen and I are well. We sold our small cattle ranch and bought a smaller horse ranch. Helen has taken up the sport of 'driving' i.e.., a horse-pulled carriage. Bob only drives the pickup and trailer. We've competed in AZ, CA, NM, and CO so far. We now have six grandchildren and celebrated our 51st wedding anniversary this December. Best regards to old friends." Edward lives in Tubac, Arizona.

Donald H. Campbell (M.A., 1962) is the president of Campbell Petrographic Services in Dodgeville, Wisconsin. He can be reached at campbell@mhtc.net.

Chuck Caughey (B.S., 1969; M.A., 1973) writes, "I'm still working in the Middle East for ConocoPhillips in Houston and active in the new GeoForce program in Houston as well as a Jackson School fan." Chuck can be reached at chuck.caughey@conocophillips.com.

Uel S. Clanton (B.S., 1955; M.S., 1960; Ph.D., 1968) is retired and lives in Kerrville, Texas.

David E. Dunn (Ph.D., 1964) writes, "Sue and I are enjoying a quiet life in southern Arizona. Sunsets on the Santa Rita range are our excitement. We do plan to attend the GSA meeting in Portland next year and hope to see many old friends there. Believe me, old

is now the operative word." David lives in Green Valley, Arizona and can be reached at ddunn4@cox.net.

Russell & Karen Harmon (B.A., 1969; B.A., 1970) write," We continue to enjoy life in the piedmont region of central North Carolina. Karen is a hydrologist for the state of NC and presently working on a revision of the rules for the cleanup of petrochemical spills from underground storage tanks. Russell is a senior program manager for Terrestrial Sciences at the Army Research Office, where he is responsible for funding basic research in geophysical remote sensing, geospatial and terrain analysis, hydrology, and sustainable land use. The twins, now 22, have completed their undergraduate study. Brendan is a first-year student in landscape architecture at the Harvard Graduate School of Design and Jonathan will begin graduate study in architecture at MIT this coming autumn." Russell and Karen live in Raleigh, North Carolina.

Grant Heiken (M.A., 1966) writes, "I published two books in 2007. "On the Moon - The Apollo Journals" (Springer-Praxis), with Eric Jones. "I Sette Colli" (Raffaello Cortina Editore), with R. Funiciello, D. De Rita, and M. Parotto. "I Sette Colli" won the 2007 Il Premio dei Lettori di Biblioteche di Roma, an Italian literary prize (non-fiction category and overall winner). This was the Italian edition of "The Seven Hills of Rome" (Princeton U.P.) by Heiken, Funiciello, and De Rita." Grant lives in Freeland, Washington and can be reached at heiken@whidbey.com.

Jan Houston Knox (B.A., 1969) is retired and living in Austin, Texas.

J. Phil Jones (B.S., 1964) writes, "I'm still busy at Devon Energy. The Texas Panhandle remains very busy where we are pursuing Atoka/Granite Wash horizontal wells. Oil & gas prices as well as drilling costs continue to escalate. Hopefully, we will still be able to continue in our chosen field with the next administration. Of late, I'm hearing the populace getting the ear of the politicos voicing their displeasure at high gasoline prices and insisting that more-not less-drilling take place in areas formerly off-limits. It appears that the politicos may finally be listening. Marilyn and I are enjoying trips to NY to visit grandchildren and view the shales in road cuts. This work stuff is fastly decreasing my time for fishing and playing with the grandkids. I really need about 3 months of vacation to cover it all. I'm headed to Montana fishing in August with brother Gary, son Chris, and grandson Clay." He lives in Edmond, Oklahoma and can be reached at phil.jones@dvn.com.

Joseph H. McGowen (Ph.D., 1969) lives in Jonesboro, Texas.

W.N. McKinney, Jr. (B.A., 1960; M.A., 1963) writes, "I'm mostly retired now but still generating prospects in the panhandle and getting them drilled. It is lots of fun and very rewarding." He lives in Spring, Texas and can be reached at wnmckinney@comcast.net.

Jereld E. McQueen (B.S., 1961; M.A., 1963) is president of Medallion Oil Company in Houston, Texas and can be reached at jemc@kingwoodcable.com.

Joe N. Meadows (B.A., 1962) writes, "McLennan County has some activity for a change. A few wells have been drilled, but everything is 'tight.' At least it has increased my oil and gas law practice." Joe lives in Woodway, Texas and can be reached at joemeadows@sbcglobal.net.

T.I. Poe (B.S., 1962) writes, "Well, I'm back in Texas where I started, literally. I am living in the house where I grew up. I got tired of Colorado. All those mountains block the view. I'm trying to get a shop built so I can resume my gunsmith business, but there's no rush. Like they say, a retiree's weekend is six Saturdays and a Sunday. Anyone is welcome to visit." T.I. lives in Luling, Texas and can be reached at pogopoet1@junocom.

Rubin A. Schultz, Jr. (B.S., 1961) writes, "I'm still working for TxDOT. I haven't received the 'retirement bug' yet. Last fall, Nancy and I enjoyed a week in Rome and Southern Italy, and in May we went back to Maui, HI again. The grandkids are in high school - time flies! We enjoyed the 60's Jackson School Reunion in June." Rubin lives in Corpus Christi, Texas.

F. Carlton Sheffield (B.S., 1963) is retired and lives in Magnolia, Texas.

Herbert "Sam" Travis (B.S., 1960) writes, "After graduation (August 1960), the first five years were tough. My work experience included doing electric logs in Oklahoma and seismology in Dallas, Texas. I migrated (1965) into digital computing and retired in 2003 after 33 years." Herbert lives in DeSoto, Texas and can be reached at herbert_travis@msn.com.

Don Urbanec (B.S., 1960) is self employed and lives in Boerne, Texas. He can be reached at donurbanec@gmail.com.

Richard L. Watson (M.A., 1968; Ph.D., 1975) writes, "I'm living in Port Aransas, 3/4 retired. I spent about 23 years traveling on boats and living in Honduras interspersed with coastal geology consulting and captaining commercial vessels. In the 90s, I switched from boats to planes for adventure. I have built a website about Texas coastal geology with many aerial photos and other interesting stuff. Check it out at TexasCoastGeology.com My other half of 30 years, Betsy Churgai, is now running for city council which is 'interesting.'" Richard can be reached at richard@texascoastgeology.com.

Gerald E. Weber (M.A., 1968) writes, "I'm partially retired but still work as an expert witness in the field of engineering geology. I find the work challenging and interesting. I'm traveling a lot - mostly in Southwest Africa and still-running rivers." Gerald lives in Santa Cruz, California and can be reached at Jweber@pmc.ucsc.edu.

Michael A. Wiley (B.S., 1957; M.A., 1963; Ph.D., 1970) writes, "The Seventies Reunion

was a huge success! Enjoyed renewing old friendships and seeing new faces. Thanks to JSG for hosting this event and kudos to Julie Paul for organizing it in such a marvelous way. All the events were enjoyable and enlightening. It's hard to believe what has happened to the 'Geology Department' that I entered in 1953. Who could have imagined back then the powerhouse that is JSG today. The AAPG Annual Convention was in San Antonio in April. I served as the Technical Program Chair for Energy Minerals Division. The job kept me busy but help abounded from everyone. We had a very successful convention and we're all glad it's over. I'm still consulting on Environmental Remediation data management and reporting software about quarter time. Living in Canyon Lake is living in paradise. When in the area, call, come by, and visit. The beer is always cold!" Michael lives in Canyon Lake, Texas and can be reached at mawiley@gvtc.com.

Leonard M. Young (Ph.D., 1968) writes, "By an odd set of circumstances, I reconnected with Will Rodgers, who, as a fellow Ph.D. aspirant, I hadn't seen since 1968. This past fall, my wife and I visited NYC, and I was able to spend part of the day with Will in the city. A really unanticipated and pleasurable experience!" Leonard resides in Monroe, Louisiana and can be reached at lmfyoung25@colla.com.

William C. Young III (B.A., 1961) writes, "I'm still enjoying retirement, traveling and bridge. Last year, my travels included South America and Italy, and this year will bring the Panama Canal and Hawaii with Christmas in London." William lives in Shreveport, Louisiana and can be reached at wyoung3@bellsouth.net.

1970s

Michael Amdurer (M.A., 1978) writes, "We have two kids, Zach (18 - starts at Tufts in the fall) and Francesca (21 - senior at Brandeis next year - semester abroad in Dublin this spring). I have lived in Denver since 1990. From 1990-1997, I've been managing the investigation, feasibility study (pre-design), and record of decision at the largest non-nuclear hazardous waste site in the US - Rocky Mountain Arsenal (final cleanup bill about $2 billion). From 1997-2005, I managed the Denver office and the Science Department of Foster Wheeler Environmental (now Tetra Tech). I started at AMEC in December 2005. Business lines include water resource management (water supply, storm water design and municipal storm water utility development, floodplain mapping); environmental compliance, investigation & cleanup; emergency/hazard mitigation planning & response (including post-Katrina); and energy auditing (including LEED and wind farms)." Michael lives in Lakewood, Colorado and can be reached at mamdurer@aol.com.

Blair Stanley (B.S. 2007 and current graduate student) with her mother, Sara Avant-Stanley (B.S. 1978) during the 1970s reunion.

Sara Avant-Stanley (B.S., 1978) lives in The Woodlands, Texas.

Chris Barker (B.S., 1978) teaches structure and summer field camps at Stephen F. Austin State University in Nacogdoches. He writes, "Field camp is great because our students get to see some truly spectacular geology in New Mexico, Arizona and Utah. Between mapping projects, we also take them to the Grand Canyon and other national parks in the Southwest. Actually, just seeing rocks at the surface is impressive to east Texas students!" Dr. Barker's research has been mostly in Proterozoic mylonites and accreted terrains in South Carolina, the Llano Uplift and the Burro Mountains of southwest New Mexico. He urges his friends to write and say hi, and mentions that there are great opportunities for graduate students at SFA, too. And, yes, he says, he still bangs on the bongos!

Charmaine Bentley (B.S., 1977) is a teacher in Dallas ISD. She lives in Plano, Texas and can be reached at charmainebentley@csta.acm.org.

Silverio "Sil" Bosch (B.S., 1974; M.A., 1975) writes, "South Texas oil and gas exploration continues to be fun, challenging, and rewarding after 35 years in the business. Coming up with new ideas in old areas and adapting to the new economics are the easy parts of the business. Geology is so much easier with 3D seismic, but the subsurface homework still has to be done in order for it to be meaningful and realistic. I never thought geology would be the easiest part of this business as land, marketing, and drilling of prospects continue to get more difficult as a result of higher commodity prices and resource plays

Attendees from the 1970s reunion.

competing with conventional plays. There's always something to keep it interesting! Matt (20) is a junior in biomedical engineering student at UT and loving it. Eric (18) is a freshman business student at Texas State in San Marcos. Lisa and I are adjusting to the empty-nest syndrome, but are just a few hours away from both boys (and the Hill Country) when we start to miss them. Greetings to all my old classmates who are probably as busy as I am and enjoying the moment after so many tough years early in our careers. Good luck and good health to you all!" Sil lives in Corpus Christi, Texas.

Dr. Arthur B. Busbey, III (B.S., 1974; M.A., 1977) writes, "I continues to work in the Geology Department at TCU in a variety of roles. Janet Busbey Nilsson (B.S., 1976) still teaches at the same middle school and bemoans the destruction of the middle school earth science curriculum in Texas middle schools. Our eldest, Saramae, was married in Florence, Italy in December of '04 in a small medieval castle and lives in Durham, NC. Our youngest remains in FW. I get out to Big Bend 2 to 5 times a year (doing research on the Rosillos Mountain Ranch), and every time I pass the old Leary Ranch, I think of field camp in the Marathon Basin in 1974. It's hard to believe it was over 30 years ago." Dr. Busbey lives in Ft. Worth, Texas. and can be reached at a.busbey@tcu.edu.

J.B. Chimene (B.S., 1979) writes, "Over the past 20 years, I've gone from microscopic examination of Cretaceous ostracodes to microscopic examination of worldwide government rules on information privacy and security. I still take the kids out to find fossils and look at geology around the state, so I'll always be a geologist." J.B. lives in The Woodlands, Texas and can be reached at secure@chimene.com.

Harry Clear (B.S., 1974) is retired and living in Spring, Texas.

John T. Dasch (B.S., 1975) lives in Dallas, Texas.

Patricia Wood Dickerson (B.A., 1970; Ph.D., 1995) writes, "Over the past year, lecture gigs in Midland and Abilene, as well as departmental alumni soirees, afforded occasions to catch up with many of you, and the GSA annual meeting in Houston this October promises more grins! Meanwhile, at the invitation of an Argentine colleague I'll be presenting results of my field work/research on Ordovician tectonics at the International Geological

Congress in Oslo in August. Those results would not have been achievable without the support of friends and colleagues in West Texas, Canberra, Bakersfield, and Austin. Looking forward to reunions with Norwegian and other European cohorts - it's been too long! (And to Argentine tango in Oslo!). Since my last report, our first Big Bend National Park map (Glenn Spring quad) has been published! And the intrepid trio (Collins, Muehlberger, Dickerson) has begun work on a second (Mariscal Mt.). I've also managed to herd three chunky manuscripts into press, and there's another brewing. Re publications, GeoRef work for the American Geological Institute continues to bring fascinating finds to light, to the point that I'm now coaching two additional indexers here in the Walter Geology Library. NASA Planetary Sciences advisory subcommittee work has been most gratifying - an unequaled chance to learn of other worlds from the mission architects! My term just ended and I miss that perspective. But now there's the prospect of conducting basic training for the newly recruited class of astronaut candidates. A grad of a previous class asked me to the launch of STS-124 as a crew guest - thrilling! And he's now sending down intriguing views of Earth from Space Station. A pleasurable and productive year." Patricia lives in Austin, Texas.

Jack Droddy (Ph.D., 1978) writes, "It's hard to believe I've reached the 20 year mark at Baker Hughes. This year has been busy with design and debugging of new rock and fluid testing equipment as well as routine projects. Pam and I are still in the Spring area north of Houston, and Daniel (10) and Leesa (8) keep us going, as always. I was pleased to hear that my advisor Dr. Clabaugh was inducted into the Hall of Distinction. He certainly belongs there."

Al W. Erxleben (M.A., 1974) writes, "I'm currently a senior exploration advisor for El Paso E&P Co. I was formerly VP for Gulf of Mexico and South Louisiana w/El Paso and was VP of Exploration with Black Stone Minerals Company in Houston 1999-2004. We spend our spare time on our ranch just West of Crockett, Texas. I am still involved in geology and geophysics, both domestic and international. I continue to recruit new geoscientists for El Paso each fall. I still greatly enjoy geology and hydrocarbon exploration. I hope to see lots of old UT friends in October." Al lives in Spring, Texas can be reached at al.erxleben@elpaso.com.

John C. Griffiths (B.S., 1975) writes, "I'm still working in the East Texas Basin and the Upper Texas Gulf Coast. Who would have ever thought East Texas would be such a hot area again? I did consulting with an international engineering consulting group on projects located near offshore Brazil, offshore Thailand and onshore Nile Delta, Egypt within the last year. It's very interesting and fun work. I'm fortunate to be able to work with and/or do some business with friends from U.T. days." John lives in Houston, Texas and can be reached at jgriff@calvinresources.com.

Keith Huan (B.S., 1974) writes, "I've been with Duncan Oil for 15 years now, much longer than I ever thought I would spend in one place. I must be getting senile because I started taking working interest in some of our wells. I don't know if that is screwing up the next boom as we all promised not to do or not, but it sure doesn't do much for the blood pressure." Keith lives in Houston, Texas and can be reached at khaun@duncanoil.com.

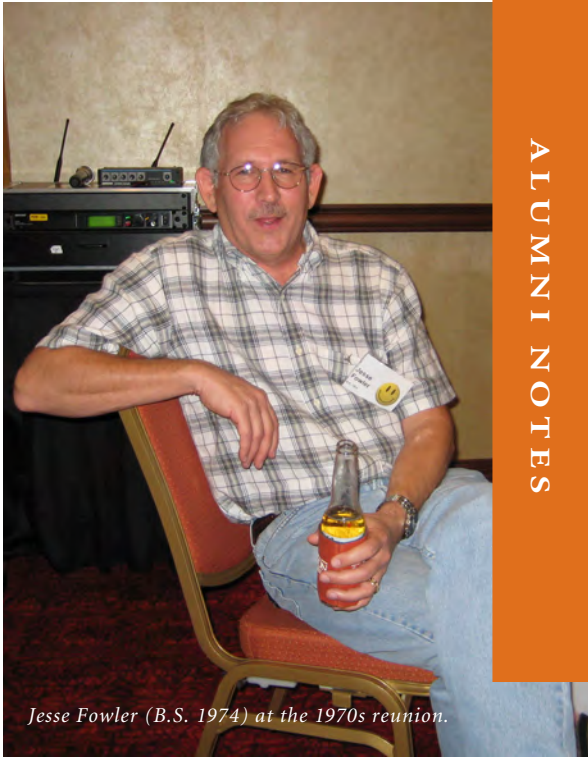
Jim Henry (B.S., 1970) writes, "In 1995, I founded the Republic of Texas Biker Rally in Austin. For a dozen years now, it has been the largest motorcycle rally in Texas and surrounding states, and by 2003 it had surpassed the week-long South by Southwest film and music festival to become Austin's largest annual tourist event. I still do a bit of consulting work in the Barnett Shale play of North Central Texas." Jim lives in Frisco, Texas and can be reached at henry@rotrally.com.

Betty (Becky) Houston (B.S., 1979; M.A., 1983) lives in Houston, Texas.

Russell Jackson (B.S., 1976) resides in Tyler, Texas and works at Tyler Oil & Gas. He can be reached at rwjtogi@suddenlinkmail.com.

L. Chris Johnson (B.A., 1974; M.A., 1980) lives in Shreveport, Louisiana and owns his own company, Johnson Energy Resources, LLC. He can be reached at cjohnson@jerllc.com.

Robert S. Kier (Ph.D., 1972) worked in the Department of Geological Sciences from 1966-1972 and the Bureau of Economic Geology from 1971-1979. Currently, he works at Robert S. Kier Consulting and lives in Austin, Texas.



Jesse Fowler (B.S. 1974) at the 1970s reunion.

Mark W. Longman (Ph.D., 1976) reports that after 22 years as a consulting geologist in the Denver area, he has finally found a full time job as a staff geologist with Queston Exploration and Production. His current areas of activity include the Vinta, Paradox and Green River basins in the Rocky Mountain region. Mark lives in Lakewood, Colorado and can be reached at mwlongman1@aol.com.

Charles Edward McKemie (B.S., 1979) writes, "I still love geology and still look at petroleum deals outside my 'day' job. I'm currently organizing a market facing business unit to penetrate commercial vehicle markets for Dow." Charles lives in Griffin, Georgia and can be reached at peakangus@cs.com.

Peter K.M. Megaw (B.A., 1976; M.A., 1979) writes, "My life has changed completely with the renaissance in metals exploration... plus 3 of our silver projects in Mexico have been extremely successful. The downside is that there's more corporate work than rock knocking, but at least I manage to do both in interesting places. Mineral collection and library are starting to take over my life...but that's fine. Does anyone know people looking to donate a library? I've been organizing book transfers to the needy universities in Mexico for 25 years, and they need more!" Petercan be reached at pmegaw@imdex.com.

Clair Russell Ossian (Ph.D., 1974) writes, "I am still teaching, although retirement will be in a year or two. After those twenty years in the oil patch, I find teaching to be what I wanted all along. I still publish regularly, and my current research is mainly directed towards Egypt, working with Egyptologists, in both lab projects and field excavations in Egypt. The years have slowed me down a bit, and my wife has already retired, but I still feel younger than my age. As long as the students are still a joy to me I'll probably keep at it." Clair lives in Carrollton, Texas and can be reached at clastic@airmail.net.

Cathy Mary Rashin (B.S., 1979) writes, "I have a small business, Earth Current Garden. I make and sell flower essences, give consultations relating to using flower essences and herbs for healing and teach classes in the same subjects. I am also an ordained minister of spiritual peacemaking. I love living in Ashland, Oregon!" Cathy can be reached at earthcurrent@yahoo.com.

Carolyn Rutland (M.A., 1979) is an environmental scientist for the city of Kalamazoo in Michigan. She can be reached at rutlandc@gmail.com.

Stephen L. Shaw (B.S., 1971; M.A., 1974) writes, "I retired and formed Firstview Resources. Times are too good to quit! Nancy and I really enjoy traveling -- every trip is a geo trip!" Stephen lives in Alberta, Canada in the city of Calgary and can be reached at sshaw_firstview@sbcglobal.net.

Perry L. Shaw (B.S., 1976) writes, "After spending 20 years working as a gulf coast geologist for oil and gas independents, I began making oil and gas acquisitions for my own account. I also helped establish a non-profit organization, you can check out the school we are building in Guatemala and our other projects at www.nbri.net." Perry lives in Porter, Texas.

Michael W. Strickler (B.S., 1978) is a partner and geologist at Deep Gulf Energy, L.P. in Houston, Texas. He can be reached at mstrick443@earthlink.net.

Cynthia G. Talbot (B.S., 1976) lives in Annandale, Virginia and works at Hogan & Hartson, L.L.P. in Washington, D.C.

Douglas N. Toepperwein (B.S., 1974) is a geologist at Sage Energy Company. He lives in Fair Oaks, Texas and can be reached at dougt@gvtc.com .

C. Brian Trask (M.A., 1972) writes, "I retired at the end of May and spent June in Maine, looking for housing. My wife and I are planning on moving back to Maine to be near my siblings and to spend more time on the water." Brian can be reached at trask@isgs.uinc.edu.

Bonnie R. Weise (B.S., 1974; M.A., 1979) is a geological consultant in San Antonio, Texas. She can be reached at bweise1@sbcglobal.net.

Steve White (B.S., 1978) lives in Flint, Texas.

James C. Willrodt (B.S., 1977) writes, "Hello to all my old classmates, it's been 30 years since graduating and 30 years with Esso/Exxon/Exxon Mobil. Best wishes to everyone." James lives in Houston, Texas.

Reuniting at the Nighthawk, 1970s reunion.

1980s

Abhaya "Ajay" R. Badachhape (M.A., 1988) is a staff geophysicist for ConocoPhillips. He lives in Houston, Texas and can be reached at ajay.r.badachhape@conocophillips.com.

Charles "Sandy" Beach (B.S., 1987) work at Beach Exploration, Inc. and lives in Midland, Texas. He can be reached at sbeach@beachexp.com.

Teresa Harkrader Becker (B.S., 1982) writes, "I am still consulting from my home office and Fred has just completed 25 years with Shell. Our older daughter Lauren will be off to U.T. in the fall, and Lindsay will be a senior in high school next year. Fred and I are looking forward to the AAPG Grand Canyon raft trip later this summer." Teresa lives in Houston, Texas and can be reached at thbecker@sbcglobal.net.

Mark Berlinger (B.A., 1982) is an HSSE area manager for BP Amoco. He lives in Mount Pleasant, South Carolina and can be reached at marcladom@comcast.net.

Patricia Bobeck (M.A., 1985) writes, "2006 has been an exciting year with two trips to France related to Henry Darcy. In May, I participated in the IAH International Colloquium in Dijon to celebrate the 150th anniversary of the publication of Darcy's Law. Darcy published the law in 1856 in his book titled Les Fontaines Publiques de la Ville de Dijon, and my English translation of the book was published in 2004. Since I was in Paris for a few days, the Société Française des Traducteurs invited me to give a presentation about the Darcy book at the Académie des Sciences. In 1857, Darcy was invited to join the prestigious Académie, but died in January 1858 before he had the chance to do so. In August, I led my first Darcy field trip to France. The group visited the Darcy sites in Paris, including the Sewers Museum (a tourist must!). In Dijon, we followed the trace of Darcy's water supply system using Darcy's map. We visited the spring that supplies Dijon's water and followed the trace of Darcy's 13-km aqueduct. We were able to go down into one of Darcy's reservoirs. We also spent an afternoon with Darcy's descendants. To round out the trip, we went to Chamonix and took two cable car rides over the glacier to Italy, and then to the south of France to see the Pont du Gard, the aqueduct built by the Romans, and the Fontaine de Vaucluse, the largest karst spring in France. We ate wonderful French food at every meal, but ended up losing weight because of all the walking we did. We had a great time, and are planning to go back to visit additional sites next year. " Patricia lives in Austin, Texas and can be reached at pbobeck@earthlink.net.

Cynthia A. Bradford (M.A., 1982) lives in Metairie, Louisiana.

Jeanne Brennan (B.S., 1983) lives in Houston, Texas and works as a geoscience application support analyst at OXY, Inc.

Karen Carlisle (B.S., 1981) writes, "I have great memories of my days in the School of Geology. My daughter is now a junior at U.T. Austin, majoring in ME. We have 3 other kids that we hope will head the way as their time comes. I'd love to hear from old classmates!" Karen lives in San Antonio, Texas and can be reached at karen.carlisle@usdoj.gov.

Steve Carlson (M.A., 1984) writes, "I recently joined Maersk Oil America, working the deepwater Gulf of Mexico. Previously, I was chief technical officer of GeoPatterns Technology, developing pattern recognition techniques applied to 3D seismic data; the technology was purchased by another software firm. Before starting the new job, we took the family on a vacation to the UK and Spain, where one of many highlights was watching the sun rise from the inner circle at Stonehenge." Steve lives in Sugar Land, Texas and can be reached at steve_carlson@windstream.net.

Richard F. Carroll (B.S., 1980) writes, "I've changed jobs again. After Dominion decided to sell us, I took a position at Sanchez Oil & Gas here in Houston. It's a great place to work and has the best exploration staff I've ever been associated with. My boys are now in high school and junior high school. They are both playing football and planning a college career at UT. I took them to the Rice game in Austin this year and by the Jackson School Tailgate party. I also took them on

Burt Beveridge II

Vodka-Making Alumnus In the News

***Arkansas Democrat-Gazette*, October 21, 2007**

Bert Butler Beveridge II, a University of Texas graduate with degrees in geology and geophysics and experience in the oil patch, launched Tito's Handmade Vodka in 1997. As the granddaddy of the Texas vodka distilleries, Beveridge's label is celebrating its 10th anniversary, producing about 200,000 cases of vodka this year. Texas' vodka distillers, all three of which are located in the Austin area, hope to tap into the global thirst for vodka, the world's most popular alcoholic spirit.

their first big trip to England and France in July. In October I went to Machu Piccu, the Amazon, and the straits of Magellan. Don't know where I'll go next year." Richard lives in The Woodlands, Texas and can be reached at rcarroll16@comcast.net.

Daryl Scott Chicken (B.S., 1988) writes, "My family: wife Adriana and two daughters Ally (8) and Hannah (4) have lived in Magnolia, Texas for the past 8 years."

Stephen Chung (B.S., 1984) lives in Cypress, Texas and can be reached at stephen.chung@conocophillips.com.

Joel Coffman (B.S., 1984) writes, "What a year it has been! Especially because the kids are alright - as beginning last summer, one of my daughters got married in San Antonio (Shaina, now lives in Atlanta and works at Emery) and my other daughter (Amber) was on the front page of the New York Times music section with her band "Dirty Projectors." They have a growing fan following world-wide and recently recorded with David Byrne of 'Talking Heads' fame! It has been fun and exciting to see them both pursue their interests and blossom and be happy. For Susan and me, it has been a year of change as well. After some 8 years as the environmental regulator for Napa County, where I closed out over 60% of the open leak cases, I accepted a career appointment with the US Environmental Protection Agency in their San Francisco Waste Division, UST office. Now I help the state of California in their efforts to work with all the Regional and Local agencies that deal with leaking USTs in the state of California. Part of my new duties includes the oversight and management of leaking UST cases on Indian lands in Arizona, and the 4-corners area. So, some trips to the great American Southwest are now in order! A big howdy to all you 660 summer of '83 folks!" Joel lives in Vacaville, California and can be reached at jcoyote1@yahoo.com.

Tom Connally (M.A., 1981) writes, "I've been out of touch with the Foundation lately. The website is nice and a good way to get connected. I'm more or less retired now after stints in Qatar and Holland the past 4 years. I live in western Tuscany now and would love to hear from any of you fellow alums if you pass this way." Tom lives in Italy and can be reached at connalrad@yahoo.com.

David Cunningham (B.S., 1981) writes, "I went to Texas A&M for a M.S. Geology Degree. I worked for Tenneco from 1985-1988. I received a BBA from the University of St. Thomas (in Houston) in 1989. I worked for Arthur Anderson (2 years), Enron (5 years), and now currently at Anadarko Petroleum Company in the Property Tax Department."

Who's in this Picture?

Help us identify some of the people in this picture, taken in 1973 during summer field camp (we got it from Earl McBride's Geo 660 Summer Field course archive), and we'll send you a Jackson School cap and polo shirt. We'll even throw in a free subscription to the Jackson School *Newsletter*. Send answers to communications@jsg.utexas.edu or call us 512-471-6048.

David lives in The Woodlands, Texas.

Kyle L. Davies (M.A., 1983) works as a fossil preparator at the Sam Noble Oklahoma Museum of Natural History in Norman, Oklahoma where he lives.

Benjamin R. Davis (B.S., 1987) lives in Alpharetta, Georgia and writes, "I'd love to hear from anyone from the old days. It looks like our 20-year anniversary is coming up soon. Drop me a line if you can!" He can be reached at 123davis123@bellsouth.net.

Donald Dean (B.S., 1983) writes, "I am now at a small private oil and gas company and having a great time learning the oil business first hand and doing many different things. In my years at UTIG, ARCO, and Veritas I was always in a research/tech service type role. I am now involved in drilling wells. I have three teenagers on the home front and a wonderful wife who keeps it all together for us." Donald lives in Katy, Texas and can be reached at dean.don@gmail.com.

Bill Dingus (M.A., 1987) writes, "Exxon brought me to Midland in 1987 and now I am trying to return to Austin as our State Representative. Visit our website, www.BillDingus.com, if you'd like to know more. I look forward to reacquainting myself with the good folks at the Jackson School." Bill lives in Midland, Texas and can be reached at williamdingus@mac.com.

William K. Duran (B.S., 1983) owns Austin Enviro Solutions and lives in Lago Vista, Texas.

Ernie Easley (B.S., 1980) works for Hunt Oil Company in Dallas, Texas as the senior vice president of U.S. Exploration.

H.C. "Kip" Ferguson, III (B.A., 1988) is the president of Sharon Resources, Inc. in Houston, Texas. He can be reached at kferguson@sharonenergy.com.

Carol Finsrud (B.S., 1981) resides in Lockhart, Texas.

Stephen Fisher (Ph.D., 1982) has retired to the Colorado Rockies after a rewarding and enjoyable career as a hydrogeochemist at the University of Kentucky. After summiting Kilimanjaro in 2007 as a warm-up, Steven and Renee are looking forward to life in the land of blue skies, clear air, clean water, and 14,000-ft. mountains to climb.

Sterling "Chip" H. Fly, III (B.S., 1980; M.A., 1985) writes, "I'm enjoying life in Roswell, NM. D'nese and I are both back in the 'grease game,' after several years of ranching, retailing, water managing, and environmentaling. I kind of like the Prodigal Oil Pig. I hope to see some of you at NAPE." Chip can be reached at urflash47@yahoo.com.

Lisa M. Gahagan (M.A., 1988) is a research scientist associate for the U.T. Institute for Geophysics. She lives in Austin, Texas.

Ray Gedaly (B.S., 1981) is a geophysical advisor for Repsol YPF/Maxus Energy. He lives in The Woodlands, Texas.

Charles Goebel (B.S., 1980) writes, "My son will be graduating December 2008 in Microbiology and my daughter graduates in May 2009. Just one more kid to go -- she is 14, so college grad class of 2016!" Charles lives in Plano, Texas and can be reached at charles.goebel@meritenergy.com.

Brian S. Goodman (B.S., 1980) writes, "I'm still not missing those Gulf Coast summers except when it is -20 degrees Fahrenheit, and I forget what my toes feel like. I left consulting last year and enjoy this new government position. Feel free to pay more taxes and stop in for a visit." Brian lives in Helena, Montana and can be reached at goodmab@hotmail.com.

Lisa Hawkins Paton (B.S., 1985) writes, "We are now living in Laredo. I still work in the schools and our girls, Sarita and Selina, are in 7th and 9th grade. I would love to hear from the 1985 660 Class!" Lisa lives in Laredo, Texas.

Brad Henderson (B.S., 1986) writes, "I'm a staff scientist at Los Alamos National Laboratory in group ISR-2, Space and Remote Sensing Sciences. I got my Ph.D. in geophysics from the University of Colorado in 1994 and have been working in remote sensing since 1989. Right now I am working on a number of different projects in hyperspectral remote sensing, including atmospheric aerosol retrieval, atmospheric compensation, material identification, and emission polarization. I am married and have two children, ages 4 and 1." Brad lives in Los Alamos, New Mexico and can be reached at henders@lanl.gov.

Reid Hensarling (M.A., 1981) writes, "Congratulations for the tremendous success of the Jackson School of Geosciences. This is a gigantic step forward for the geosciences." Reid lives in Lakeland, Florida.

Jennifer G. Hood (M.A., 1989) lives in Evergreen, Colorado.

Ben P. Hooper (B.S., 1980) writes, "I continue to explore the Gulf Coast for Joy Resources/John H. Young, Inc. I enjoy gardening, fishing, cooking and running in my spare time. I ran my first 26.2 mile marathon in Houston this year. Debbie and the daughters are great. Mary (19) is a journalism major at U.T. Austin, Kelly (17) is a senior in high school." Ben lives in Houston, Texas and can be reached at joseyhoop@msn.com.

Janie Hopkins (M.A., 1982) writes, "I have managed the Groundwater Monitoring Section at the Texas Water Development Board since the turn of the millennium. I was thrilled and horrified when asked to talk about the Hensel (old thesis stomping grounds) at the 2007 Austin Geological Field trip led by Brian Hunt and Chock Woodruff. Luckily, I managed to cajole Luigi into a preliminary rock recon on an odd cool day in July. So, lots of years and water under the bridge and ground (fresh to...salty). My oldest

son (the greater Payne) Beck is a senior at UT studying biology, and my younger son (though hardly Lesser) Eli is a sophomore at Rice doing statistics. Their meal-ticket will be eligible for state retirement in a few years, but not eligible for life without pay. I have had such luck finding super bosses (current one is the 'profoundly knowledgeable, highly entertaining' Robert Mace), great employees, and sublime living and work environments with lots of natural light. Gee, how to find similar situations while striking out on a different path, possibly demanding vast improvements in my French or barely-there Spanish? I am considering USAID jobs or the like in 3 to 5 years; would love any suggestions/connections/comments from the vast UT GEO network. Topics need not to be limited to my work life." Janie lives in Austin, Texas and can be reached at janie.hopkins@twdb.state.tx.us.

Raul Huerta (M.A., 1980) writes, "I started (in 2008) working Kazakhstan's Kashagan Field Development as the project's geoscience interface coordinator; lots of travel. Previously, I worked West Africa, Gulf of Guinea exploration new ventures." Raul resides in Houston, Texas.

Jonny Jones (M.A., 1988) is the CEO of Jones Energy, Ltd. in Austin, Texas where he resides. He can be reached at jjones@jonesenergy.com.

Chris R. Jones (B.S., 1981) resides in Black Hawk, Colorado and works at Wyeth Pharmaceuticals as a psychiatry specialty manager. Chris can be reached rcjones172@g.com.

Scott Kelley (B.S., 1986) writes, "Hello to my class of '86. I have been drilling horizontals for the last 3 years in the Barnett Shalo and am now transitioning to the Delaware Basin. I'm finally working the basin that Dr. Detard made so famous with his Hobbs field discovery. What an honor! Paleontology continues to be a huge hobby along with training 2 three year olds to be geologists." Scott lives in Fort Worth, Texas and can be reached at scott_kelley@txoenergy.com.

Marcus M. Key, Jr. (B.S., 1983) writes, "My family and I are off to England for a two year stint teaching geology and chasing fossil bryozoans at the University of East Anglia in Norwich. If you are going to be in the area, e-mail me. It would be great to catch up!" Marcus can be reached at key@dickinson.edu.

Vince Kluth (B.S., 1986) writes, "It's hard to believe I've been out 20 years now. I married Angela in '96 and now have three kids (ages 1-1/2, 5 and 7). I had a hard start, but life's been good. The oil crash of '86 drove me out of Texas oilfields to computer engineering for map-making customer in S.California with Gen. Dynamics. The various defense industry consolidations led to my inclusion into BAE. I moved to Maryland in 2000, still with BAE but served an Intel military customer. I ran into my same era of geo grads out in St.Louis, working in my same field for the military using software to look for caves via hyperspectral analysis of surface debris field to determine cave depth and location. My science background has tremendously helped accelerate my adaptation into engineering from science. The fundamental difference is creation versus discovery, but the scientific method of investigation remains valid in engineering trade studies. I'm not doing much hard science these days, but more project management and HR type duties (hiring, performance appraisals). Speaking of creation, Dr. Walter Brown, Ph.D. MIT, USAF Col. (ret.), and tenured prof (physics, math) at USAF Academy, has an excellent treatise on his Hydroplate Theory which runs circles around current prevailing theories on earth's geodynamics (plate tectonics, paleontology, principle of uniformitarianism, etc.). A very serious piece of RESEARCH worth considering. See www.creationscience.com for a free PDF download, or better yet get the book (7th edition) at a reasonable cost. Do not quickly dismiss as religious fanaticism! Although it contains a religious premise, the work is unique in that it documents a serious scientific approach and offers credible physical/mechanical explanations which align well with nearly ALL the documented evidence available. There are excellent tables that compare various other theories against his, showing strengths and weaknesses point-by-point. Dr. Brown does tremendous justice by spanning many of the natural sciences quite

Master's student Vishal Maharaj makes a poster presentation to Scott Tinker, director of the Bureau of Economic Geology, during a poster contest held in conjunction with the Spring 2008 Geology Foundation Advisory Council meeting.

comprehensively. This is a must-read. Hi to Cathy [Mayes] and Bob, Art "Chico" Seay, and many others whose faces I see but names escape me. Howdy to Haley and Gordo -- hey Lump, where do you find time at work to send me all those joke emails? Do you ever work? Glen "Gurn Blanskin", where you at?" Vince lives in Derwood, Maryland and can be reached at kluth_vs@surfbest.net.

Rick Kolb (M.A., 1981) writes, "I've been an environmental consultant in Raleigh for 16 years after 8 years with Mobil in New Orleans. I left Mobil because I was ready for a weather and geological change. I like the variety of work consulting brings, and enjoy the Raleigh area (2 hours to the beach, 2 hours to the mountains), but I miss the character of New Orleans, even post-Katrina. My born-in-Austin daughter has returned to the city of her birth and plans to attend U.T. eventually, but to study journalism. My born-in-New-Orleans son has returned to Raleigh after traveling in Australia and Southeast Asia, and plans to move to Arizona for college. Not for geology, either. They both seem to be following their father's pattern of getting a late start in college, but as he did, they are having fun in the interim (and maturing, thankfully!). My oldest stepson graduated from high school this year and is off to college (NCSU) next fall. M youngest stepson is a rising sophomore in high school. Three more years until all kids are out of the house and the freedom begins (except for the money part). The wife is a long-time IBM'er and hopes to avoid the regular RIF's that hit tech this millennium like those of the 80's in the oil patch. I have many geologist friends in NC that were formerly in petroleum; it is fun to swap horror stories, even with Aggies!" Rick lives in Sunset Beach, North Carolina and can be reached at rkolb0915@aol.com.

Ralph L. Kugler (Ph.D., 1987) is a geology lead at Schlumberger DCS in Beijing, China. He can be reached at rlkugler@arenisca.com.

George Laguros (M.A., 1987) writes, "I'm still with Marathon in Houston, working the Anadarko Basin. Michael (16) has started driving, Daniel (13) plays the cello, Virginia (age undisclosed) tries to keep us all in line." George resides in Katy, Texas.

Tom & Rosie Layman (M.A., 1987) / (B.S., 1985) write, "In August of 2006 we relocated from Midland to Oklahoma shortly after ConocoPhillips bought out Burlington Resources. Tom is a geoscience manager for the Barnett Shale District of Chesapeake Energy. Rosie is busy with our two sons." They live in Edmond, Oklahoma.

Dave Martens (B.S., 1984) writes, "After 12 years in Bangkok working for Unocal, my family and I moved back to Houston in the summer of 2005 where I held the position of chief geologist for the Gulf of Mexico. After the merger with Chevron, I was assigned to the Reservoir Management Team within the North American Headquarters group. In April 2006, after more than 21 years with Unocal / Chevron, I have decided to move on to Marathon Oil in Houston." Dave lives in Katy, Texas and can be reached at domartens@houston.rr.com.

Ben A. McCarthy (B.S., 1980) is president of 5McC Company, LLC in Houston, Texas where he lives. He can be reached at bmccarthy@5mccco.com.

Jude McMurry (M.A., 1982) is a senior research scientist at the Southwest Research Institute. She lives in San Antonio, Texas.

Patricia Mench Ellis (Ph.D., 1985) writes, "Last summer, the kids and I packed up, left my husband Dave at home to take care of the pets, and we headed for Nepal and Tibet for three weeks with a group from school. After a day or two in India, sweating in Delhi and at the Taj Mahal, we headed for Kathmandu in Nepal to pick up our guide. Other than great shopping, we visited several UNESCO World Heritage sites, including Bhaktapur and Durbar Square. A few days later, we headed for Tibet. Escaped Nepal after a few days, not having gotten caught up in any of the Maoist activities. What mother in her right mind hauls her kids off on a trip to a country that our State Department would rather have us avoid? After driving straight up for about a mile, we crossed the border at the not-so friendly Friendship Bridge. Over about the next two days, gaining about another mile in altitude, we reached Chomolangma (known to us gringos as Mt. Everest) Base Camp, just below the 18,000 foot mark. Sixteen out of 18 members of our group were feeling some effects of altitude sickness. Old Mom, whose kids said was too old for the trip, was bouncing along feeling absolutely great. The last 8 kilometers of the trip was done in Tibetan pony carts, kind of like being in a chariot race! Chomolangma had been shrouded in clouds for days, but we got there on a perfect day. My gosh, that's a huge chunk of rock! We were going to stay overnight at the Buddhist Monastery, but our trip doctor decided that too many people were sick from the altitude, so we headed back down to the Tibetan Plateau at only 12,000 feet. I'm impressed what our Toyota Land Cruisers survived on the trip, and that we survived all the bouncing. Very little of the road is paved between where we crossed into Tibet and Lhasa, several hundred miles away. How Tibetans survive in some of the areas that we saw is amazing. My favorite town was Gyantse, because it had been less altered by the Chinese, and still retained a lot of Tibetan flavor. Speaking of flavors - yak meat isn't too bad! Yak butter tea, on the other hand, is ..... It must be an acquired taste. It was fantastic watching the monks debate – from little kid monks, 5 or 6 years old, to monks that looked older than the mountains. I loved the Tibetan quarter in Lhasa, but the rest of the city was too Chinese. I hope that the culture isn't lost. After 3 weeks, it was back to Kathmandu, Delhi, Delaware, and a mountain of the world's dirtiest laundry! Update for this year – This year, I dumped my husband and both kids and headed off to Egypt for a few weeks. We climbed a little way up the pyramids, slithered inside them (cracking my head on the 3-foot high tunnels about a dozen times), and rode around them on camels. We managed to visit

the pyramids on the day of a sandstorm, so we got a little bit sandblasted. We cruised up the Nile for a few days – very relaxing – hopping off frequently to explore temples and the Valley of the Kings. The tombs in the valley are so close together that it's a wonder that they don't all interconnect. We ended up at Abu Simbel before flying back to Cairo. We had a fantastic tour guide named Osama – a former history/art history/archaeology professor who made everything come alive. This year John will head off to Clarkson University in upstate New York to major in engineering. He ran circles around everyone in cross country this year, sometimes finishing two minutes ahead of his teammates. Katie heads back for her final year at Wellesley College, after spending last summer in Sri Lanka doing tsunami relief work, fall semester in Santiago, Chile, and spring semester in Dakar, Senegal. She'll spend the summer in Washington, D.C. working for Hillary Clinton on a summer internship. John and husband Dave have more karate testing this summer – John will be testing for a 3rd degree Black Belt in Tang So Do, and Dave will be testing for a 2nd degree. The house is so peaceful in the evening when they're at class – I just sit and work on my quilts. After 16 years of trying, the MTBE is finally out of our gas!" Patricia lives in Neward, Delaware.

Michael E. Moore (B.S., 1980) writes, "I finally left Esenjay Petroleum after 23 years and formed a family exploration company called Mango Properties. I'm getting ready for the annual summer pilgrimage to southern Costa Rica to study the Eocene sandstone units and the inside of the 'green room.' GDS members feel free to email me and keep in touch. The SCUM ALSO RISES." Michael lives in Corpus Christi, Texas and can be reached at pigfatsurfer@hotmail.com.

James G. Muncey (B.S., 1981) writes, "In June of 2006, I joined Shell Business Planning and Support, and I'm currently supporting Shell Non-Operated Ventures. My responsibilities include E&P economics in deepwater Gulf of Mexico." James lives in Houston, Texas.

Kenneth Neavel (B.S., 1982) lives in Austin, Texas.

David Noe (M.A., 1984) writes, "Greetings to everyone from Colorful Colorado! Nearly 30 years into my career, I've finally circled back to my primary calling as a field geologist. I stepped away from a supervisory role (i.e., a desk job) and now manage the state of Colorado's geologic mapping program. We map between six and eight 7.5-minute quadrangles each year. This summer I am mapping at Delta and Steamboat Springs... about five months in the field! I've just completed a multi-year field study of the Anton escarpment in eastern Colorado. Fascinating and surprisingly complex Great Plains stratigraphy. Those trench-log drawing instructions from Al Scott at U.T. have sure come in handy!" David lives in Boulder, Colorado and can be reached at dave.noe@state.co.us.

Diane Nolley (B.S., 1981) is a self-employed geologist living in College Station, Texas.

James Mark Null (B.S., 1987) writes, "I have a 21 year career with the U.S. Navy (Meteorology and Oceanography Officer). As a DOD civilian, I served as Division Director for the Naval Oceanographic Office, Stennis Space Center, MS. After Katrina, I relocated with the Army Corp of Engineers in Vicksburg, MS. Currently, I lead and direct science and technology activities in support of military and civil environmental R&D projects." James lives in Clinton, Mississippi and can be reached at jmarknumm@bellsouth.net.

Robert Timothy & Leah Kelley Parks (B.S., 1988; B.S., 1987) live in Houston, Texas.

Matt Parsley (M.A., 1988) is president of Parsley Resources, Inc. and lives in Midland, Texas. He can be reached at mparsley@geospectrum.com.

Elliott Pew (M.A., 1982) is an executive vice president of exploration at Newfield Exploration Co. He lives in Boerne, TX.

Gene Pisasale (M.A., 1980) writes, "Hello to all from the Master's Class of 1980. We were very saddened in the last year with the loss of our good friend and classmate Rick Debus… he is missed. My career as an energy/natural resources analyst has taken me from Denver to San Diego and then back to Philadelphia, my home town... I've been lucky to have the regular interest of Bloomberg T.V. and radio, who often have me on to comment about the energy markets... The sharp run up in commodity prices has me and most analysts very concerned about a global recession...still waiting for elastic demand to decelerate...keep in touch if you're in the Philadelphia area!!" Gene lives in Kennett Square, Pennsylvania and can be reached at gpisasale@comcast.net.

Victoria J. Pursell (M.A., 1985) writes, "I have been living in Salt Lake City for the past 10 years but will be moving to Silver Spring, Maryland this summer with my two sons, Stephen (age 13) and Michael (age 10). I am currently a stay-at-home mom but will be looking for work as a scientific writer in the D.C. area after we move." Victoria can be reached at pursell.victoria@comcast.net.

Cory Richards (B.S., 1985) writes, "I sold our most recent company, Grayhawk Energy, Inc., after establishing a nice horizontal drilling play in the granite wash of the Texas panhandle. The new company, Plano Petroleum, LLC is looking for drilling locations in Texas and Oklahoma. The family is doing great. Hello to all my geo buds from the early '80's." Cory lives in Plano, Texas.

Scott Simmons (B.S., 1987) writes, "All is well in Fort Collins, Colorado. Ronda, Emma, Tommy, and the dogs all enjoy having the mountains right out the back door and hiking up to the unconformity. Having lived most my life on top of Austin Chalk, I thought digging in my backyard would get easier in the Rockies - nope." Scott can be reached at ssimmons@tgstech.com.

Kathleen Fernalld Simpson (B.S., 1982) lives in Houston, Texas.

Matt Sjoberg (B.S., 1986) writes, "I'm in Austin and a partner at Jackson, Sjoberg, McCarthy & Wilson, L.L.P., an oil, gas, and natural resources law firm. My practice consists mainly of trial work and contested matters before the Texas Railroad Commission. I am board certified in oil, gas, and mineral law by the Texas Board of Legal Specialization and am a licensed professional geologist in Texas. Best wishes to the class of 1986." Matt lives in Austin, Texas and can be reached at msjoberg@jacksonsjoberg.com.

Paul K. Smith (B.S., 1984) writes, "I'm a fitness and yoga instructor at Lake Austin Spa Resort and Remedy Center for the Healing Arts; also adjunct professor of personal fitness training at Austin Community College. I'm currently working toward a certification in Integrative Yoga Therapy." Paul lives in Austin, Texas and can be reached at austinyogahealth@aol.com.

Traci Trauba Smith (B.S., 1985) works at Birdsong Real Estate in Lake Jackson, Texas and can be reached at trackeye@swbell.net.

Stephen W. Speer (M.A., 1983) writes, "Life is good and always interesting…better than I ever deserved. I can't wait to see what I'm going to do when I grow up! Therese and I really enjoy living in the Low Country of SC. Grandson #2 on the way in July. Cheers to all of the Dirty Dozen and our mentor AJ." Stephen lives in Mount Pleasant, South Carolina and can be reached at speerex@comcast.com.

Burgess Stengl (B.S., 1985) writes, "Well, after having my 2005 update lost in cyberspace, I'll try to catch up for the past two years. Starting with the children, Shara is still teaching fourth grade at Matthews Elem. in Austin ISD, and has been married for two years. Our first grandchild was born in June 2005, and Kale Turner is growing fast and talking and crawling up a storm. Susan graduated in 2005 from Whitehouse High School, and has just completed her first year at UT Tyler. Soroities were allowed at the school last year, and she is now a founding member of the Alpha Chi Omega chapter in Tyler. She also continues cheerleading and is working at a local cheer/tumbling gym. Kyle has finished second grade at Owens Elementary, where Angela teaches, and is enjoying the summer break with his Mom. He's all boy, and enjoys cars like his Dad. Angela has completed her 20th year teaching and is still enjoying her profession. She also continues to put up with me after 26 years. I have finished my fourth year with Allied Waste, and have just accepted a promotion. The good news is that I now am at the Region level as opposed to the District level, the other news is that the Region office is in Houston. The Region covers all Allied Waste facilities in Utah, Colorado, Oklahoma, Texas and Louisiana. I will still be working with all of my great co-workers, but will now be in the Houston area. Since our Region office is near Beltway 8 and I-45, living in Tyler became a bit of a commute. By the time the Newsletter is published we should reside at 20618 Crescent Arbor in Spring,Texas 77379. Our move date is the week of June 12th, and unlike our move to Tyler, someone else is packing and moving the Stengl household. Angela was offered three teaching positions in the Klein ISD, and accepted a second grade job at Hassler Elementary which is very close to the new house. I will update you next year on the move back to suburbia. In the mean time, hello to all of the '85 graduates, as well as those of you who graduated with my Dad, Gerald Stengl (Walt Boyle, Will Green, Jimmy Russell,...). Have a good year. You may reach me anytime at burgess.stengl@awin.com." Burgess lives in Spring, Texas.

James Stimac (M.A., 1983) writes, "I'm still in Jakarta, Indonesia working on geothermal reservoirs for Chevron. The family enjoys hiking, volcanoes, and beach vacations. Visitors are welcome. " James can be reached at jstimac@chevron.com.

Michael Stowbridge (B.S., 1982) writes, "I'm a geologist at the drilling rig. Also, I map oil fields and prospects. I get a little override sometimes, so that helps pay for my gas." Michael lives in Abilene, Texas and can be reached at mstowlink@peoplepc.com.

Come Tailgate with Us! Nov. 7, 2009

Come to Austin Nov. 7 for the 2009 Tailgate (alumni, friends, and students invited) and don't forget to check the JSG Alumni Web page for other upcoming events.

Carol Swenumson Baker (B.S., 1984) writes, "The kids are getting older - 16 and 10. So are Rodney and I! No complaints - life is good." Carol lives in Houston, Texas.

Jim Vanderhill (Ph.D., 1986) writes, "I am planning and drilling wells in the Deepwater Gulf of Mexico and offshore California, keeping busy and having fun. The girls are nearly grown, 2 in high school and the oldest finishing her first year at A&M. Outside of work, I am keeping busy feeding 3 dogs and playing with power tools in my workshop. For more, see Amy's entry. Best wishes to all." Jim lives in Bellaire, Texas.

Joseph Versfelt (B.A., 1984) writes, "After graduating from UT Austin in 1984, I attended the graduate program at Duke University, participating in the research program 'Project PROBE' dedicated to acquiring multi-channel seismic data and geological field studies in East Africa's giant rift lakes. Upon graduating with a M.S. in geology/geophysics in 1988, I started at Texaco working West Africa and Brazil, and conclude my 10 year stint there working the Far East, China, and the Caspian regions. Since, I have worked West African deepwater and Andean projects

for CMS-NOMECO, Alberta Energy/EnCana, and Occidental. I joined El Paso in late 2004, as an International Exploration Manager. I am currently managing one of largest IOC E&P portfolios in Brazil, and growing rapidly in North and West Africa." Joseph lives in Houston, Texas.

J. Mac Vilas (B.S., 1984) lives in Austin, Texas and writes, "I'm still with the TCEQ. Most of my work is now on air compliance and regulatory issues, but I still work on all medias, including public drinking water, wastewater, Class V wells, PST, MSW, IHW and soil and ground water contamination and remediation issues. I enjoy working in the state government and the public sector but still keep options for private sector work open if one of those opportunities I can't refuse comes along. Carla and I are enjoying watching our two girls, ages 8 and 4 grow up. Both girls love gems and minerals. They have attended several gem and mineral shows and are regulars at the Texas Natural History Museum and the Wild Basin gift shop."

Mark C. Walker (B.A., 1981) writes, "I am excited to announce that I have now joined the El Paso office of Brown McCarroll, L.L.P., an Austin-based law firm. I look forward to more trips back to Austin." Mark lives in El Paso, Texas and can be reached at mwalker@mailbmc.com.

David A. Wallace (B.S., 1986) writes, "The last year has been uneventful compared with the previous year when I switched jobs, industries and locations. The family has finally settled into a routine in The Woodlands, north of Houston, and the wonderful skin rejuvenating moisture (also known as humidity). I am consulting to the oil and gas industry and enjoying $80 a barrel oil. Please let us know if you are in the area." David can be reached at dawalace@yahoo.com.

Amy Wharton Vanderhill (B.S., 1983) writes, "2007 brought many changes. After 11 years with Pogo Producing, we were purchased by Plains E&P. The transition was hard as we parted from close friends. Instead of being a PPP employee, I'm now a PXP employee! I continue to work South Jefferson Co. and I am also working some South Texas again. Work is fast paced and fun. Ceili is a sophomore at A&M majoring in EE, Shannon is a high school senior and Meagan is a sophomore. All three are driving and keeping us so busy! I am still showing and running agility and our Cavalier King Charles Spaniels: Rebel, Colby and our newest addition O'Reilly." Amy lives in Bellaire, Texas and can be reached at avanderhill@pxp.com.

Jefferson Williams (B.A., 1988) writes, "I'm trying to cope with the oil boom. I've opened an office in Cairo and hope to add one in South East Asia. I'm still working on the Dead Sea Earthquakes at GFZ Potsdam, Germany. I still have fun with my daughter Gladys. Life is good." Jefferson lives in Los Angeles, California and can be reached at jefferson.williams@gmail.com.

Susan Williams Haas (B.S., 1986) writes, "We've been living in the Pacific Northwest since 2001 and still love it here, though I miss that orb that I used to call the 'sun' in Texas. Husband, Steve, works with World Vision which takes him all over the globe, and sometimes I go with. Most of the time I'm holding down the fort for a 16, 13, and 10 year old group of inquisitive and compassionate children that I get to raise. Life is good. God is great." Susan lives in Lake Tapps, Washington and can be reached at susanwhaas1@comcast.com.

Douglas Wilson (B.S., 1980) writes, "I've been working Sub Sahara Africa for the last couple of years. Rebecca and Rachel are doing well."

Amy R. Wood (B.S., 1985) works as a webmaster at Goodwill Industry of Central Texas in Austin, Texas. She can be reached at amywood@alumni.utexas.net.

Arnold Woods (M.A., 1981) writes, "Another year gone by already? I've been so busy I hadn't realized how much time had passed. I'm still 'playing' with dinosaurs, especially during the summer. I'll be working this summer with a group measuring theropod trackways in the eastern part of Wyoming. I'm also sitting wells (for those of you wondering if petroleum geology is a good thing, wellsite geologists are getting $700/day, which ain't bad). I updated the little book I wrote on the dinosaurs of Wyoming and am looking for a publisher. I'm doing talks at schools throughout the state on everything from dinosaurs to crocodiles to Incas. I'll be adding in talks on robots and basic physics this fall. I am an adjunct staff member at the local community college, teaching physical geology labs and introductory petroleum geology. I'll be working with the geology department on their new extractive minerals program (I'll be doing well logging, among other things). I'm also working with a teacher from Midwest High School on an extracurricular program to teach students how to find and extract dinosaur and other fossils. Maybe we'll get some students interested enough to head to UT for a degree in vertebrate paleo! Aside from that, I'm just writing articles and getting back into martial arts. Anyone interested can shoot me an e-mail." Arnold lives in Casper, Wyoming and can be reached at arnold@alluretech.net.

Kevin Zonana (B.S., 1982) writes, "After 20 years with Halliburton, I returned to UT to work on my teaching certification. I'm now teaching 7th grade science at Hudson Bend Middle School, just 2 miles from my home. It's a wonderful life!" Kevin lives in Austin, Texas and can be reached at kzonana@gmail.com.

1990s

George Alcorn, Jr. (B.A., 1996) is a senior geologist at Terralliance. He lives in Houston, Texas and can be reached at galcorn@terralliance.com.

Kenneth B. Alexander (M.A., 1990) writes, "At the end of February, I will be starting my new job as a senior geologist in the geothermal energy group of Sinclair Knight Merz. I

will be based in their Auckland, New Zealand Office and working on geothermal projects worldwide." Kenneth lives in New Zealand and can be reached at keg.alexander@gmail.com.

James R. Anderson (M.A., 1996) writes, "In July 2008, I switched jobs to SPADAC, Inc., of McLean, VA, which is a company that specializes in predictive analytics. Sadly, you just cannot get even semi-decent barbecue in the Washington, D.C. area, unlike Austin. We recently returned from a vacation in Croatia and Montenegro, seeing remarkable landscapes along the Dalmatian coast and islands, where marble mountains plunge into the Adriatic which is so clear, that you can see the sea floor 40 feet below the surface. If not in person, every geoscientist ought to visit the Dalmatian Islands via Google Earth." James lives in Ashburn, Virginia and can be reached at da266@hotmail.com.

Karen Bergeron Thompson (B.S., 1992) writes, "The last five years I've been working as a meeting planner. Since June 2005, I have returned part time to using my hydrogeology background as a technical assistant at ARCADIS... it has been fun getting back to using the jargon." Karen lives in Helena, Montana and can be reached at mtntrio@earthlink.net.

Sevin Bilir (M.A., 1992) writes, "I moved to Seattle last year and am enjoying the change from CA. I got through my first winter here so I guess I can handle the weather. I'm currently working mostly on hydrogeology at some county landfills. I'm also in the process of starting a business in the fitness field, and I'm planning to continue in both fields, part-time. More later when the new business is up and running. On the personal front, I've joined the locals and started playing soccer again after a 25 year lapse. I hope to hear from any UT friends." Sevin lives in Seattle, Washington.

Robert H. Blodgett (Ph.D., 1990) writes, "The second edition of my freshman geology textbook, *Natural Hazards; Earth's Processes as Hazards, Disasters and Catastrophes*, was published by Pearson Prentice Hall last October. Co-authored with Ed Keller of UC-Santa Barbara, the book is being used at over 130 colleges and universities in the U.S. and Canada, including two of my alma maters, The University of Texas at Austin an The University of Nebraska at Lincoln. This past year also saw a transition as I moved my office to Austin Community College's Rio Grande Campus, only 3 miles from home. My partner, Jeff Hudson, also re-located his psychotherapy office to within a mile of our home in Rosedale. We celebrated our 20th anniversary together with a trip to Hawaii and had a wonderful stay at a cottage on the Puna Coast. Hawaii seemed remote and exotic until we took an early morning, mile-long hike to the top of Pu'u Huluhulu cone in Hawaii Volcanoes National Park; the only people at the top of the cone were Bart and Jenny, two friends from the geology department at Ohio Wesleyan and Eastern Washington Universities!"

Eleanor Camann (B.S., 1999) writes, "I received my Ph.D. from the University of North Carolina at Chapel Hill in August 2005. My dissertation research focused on beach-dune-near shore interactions on Shackleford Banks, an undeveloped barrier island in North Carolina. I am currently an assistant professor in the Department of Geology and Geography at Georgia Southern University." Eleanor lives in Statesboro, Georgia and can be reached at ecamann@georgiasouthern.edu.

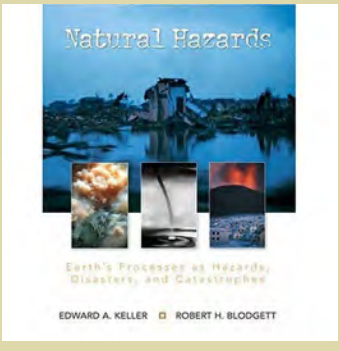
Amy L. Campbell (B.S., 1997) is associate vice president at Morgan Stanley in Austin, Texas. She can be reached at amy.campbell@morganstanley.com.

Jianli Chen (Ph.D., 1998) is a research scientist for the Center for Space Research at U.T. He lives in Austin, Texas and can be reached at chen@csr.utexas.edu.

Timothy E. Crump (B.S., 1991) is a project manager for TGE Resources, Inc. He lives in Houston, Texas and can be reached at bumptywoof@msn.com.

Bruce K. Darling (Ph.D., 1997) writes, "I started my company, Southwest Groundwater Consulting, in October 2007, after many years with LBG-Guyton Associates. I enjoy being my own boss, but I work as hard as ever to pay the bills." Bruce lives in Austin, Texas and can be reached at bkdarling@southwest-groundwater.com.

Colby Drechsel (B.S., 1994) writes, "Doing well in the energy business in the only region of the country that is growing production! I just finished my M.B.A. with the University of Mary (Thanks J&L for the support - you're on my list next trip to D.C.) Stick with it S.L. - the opportunities are worth the investment. But it's good to live the simple life too - hence no change in location. I am remodeling the house on the river and often go kayaking/mountain biking, etc. Consider coming to this year's pig roast, see www.colbyshogfest.com." Colby lives in Casper, Wyoming and can be reached at colbydrechsel@yahoo.com.



Alumni Publication

Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes, *by Edward A. Keller and Robert H. Blodgett (Ph.D. 1990)*

Frederic G. Dupuy (B.S., 1999) writes, "Since graduation, I have owned and operated Lakeside Motosport Raceway in Bastrop, managed a same day delivery courier service, worked for Trinity Engineering (a geotechnical engineering firm), became an airline pilot for Northwest Airlink, and now I'm a financial planner for Primerica Financial Services. I miss those rocks though." Frederic lives in

Austin, Texas and can be reached at dupuyenterprises@hotmail.com.

Steve Dworkin (Ph.D., 1991) writes, "I take great pleasure in reading about the accomplishments of my fellow alumni in the yearly newsletter, although in my case a career update is obviously not necessary. You all know who I am, and my scientific accomplishments speak for themselves. But a big HELLO to all of you!" Steve lives in China Springs, Texas.

Jianhua Feng (Ph.D., 1995) is a geological associate at Exxon Mobil. He lives in Houston, Texas and can be reached at feng8216@sbcglobal.net.

Christine Fox (B.S., 1995; M.A., 2006) lives in Singapore and can be reached at crzfox@alumni.utexas.net.

Douglas Gale (B.S., 1997) is an assistant vice president at Citibank Texas in Dallas, Texas where he lives.

Charlie Gell (M.A., 1996) writes, "Christi and I are doing well. We just purchased 50 acres in Lyons, Texas near lake Somerville and are having a great time learning about AG exemptions, mineral rights, and local wildlife." Charlie lives in Houston, Texas and can be reached at cgell@lgc.com.

Kimberly Gordon (B.S., 1999) is an assistant engineer at INTERA, Inc. She lives in Austin, Texas.

Bryan Griffin (B.S., 1996) lives in Cedar Park, Texas and works as a test grader at Randstad in Austin, Texas. He can be reached at bgriffin15@austin.rr.com.

Gregory Scott Grubbs (B.S., 1995) is the chief technical officer at Storm Water Risk Management in Centennial, Colorado.

Jose I. Guzman (Ph.D., 1999) was a research assistant for the Bureau of Economic Geology from 1996-1998. Currently, he is a senior research geoscientist for C&C Reservoirs, Inc. He lives in Katy, Texas.

John Huelsenbeck (M.A., 1992, Ph.D. Zoology, 1995) writes: "I am currently a professor of Integrative Biology at UC Berkeley. I received a Masters degree in Geology, under the supervision of Jim Sprinkle. In my Masters Thesis, I began research into statistical phylogenetics, an area I am still active in. I no longer work with fossils, but was hired at UC Berkeley as a computational biologist. I am teaching Statistical Phylogenetics at the graduate level, and will probably co-teach a course in computational biology in the Spring."

Karen Jarocki (B.S., 1992; M.A., 1994) is a senior hydrogeologist at CH2M HILL in Albuquerque, New Mexico where she lives. She can be reached at kejarocki@yahoo.com.

Keith Klepeis (Ph.D., 1993) is an associate professor at the University of Vermont in Burlington, Vermont.

Lis Konnecke (M.S., 1997) is a senior seismic engineer at Schlumberger-WesternGeco. She lives in Albuquerque, New Mexico and can be reached at liskonn@yahoo.com.

Khib A. Kugler (B.S., 1988; M.A., 1993) is vice president of AKG Energy, L.P. He writes, "It is great to be back in Austin working with my family!"

David Mackintosh (B.S., 1993) is an attorney for the Department of Health and Human Services. He lives in Miami Beach, Florida.

Tim McMahon (Ph.D., 1994) writes, "Since leaving Austin, Amy and I have lived in Houston, Bakersfield, Calgary and now Houston again. We have had two children along the way: Emily is 5 and Virginia (Gigi) will be 4 in August. Amy has been staying home with the girls since leaving Landmark Graphics in 2004. I also left Landmark Graphics in 2004, and went to work for Burlington Resources. Since ConocoPhillips bought Burlington this spring, I have been working as an exploration geologist for COP's New Ventures group, focusing on SE Asia." Tim lives in Houston, Texas.

John Huelsenbeck

Nurlan Muratov (B.S., 1997; M.A., 1999) lives in Weybridge, a town in Surrey and works as a geoscientist at Exxon Mobil International. Nurlan can be reached at nurlan.i.muratov@exxonmobil.com.

Eric Phinney (M.A., 1997) is a senior geophysicist at BP in Egypt. He can be reached at phinneej@bp.com.

Dickson Cunningham

Cunningham Co-Authors Special Publication

Dickson Cunningham (Ph.D. 1993) co-edited, with Paul Mann of the Institute for Geophysics, *Tectonics of Strike-Slip Restraining and Releasing Bends*, a special publication from the Geological Society of London (2007). Cunningham is presently a senior lecturer in Tectonics at the University of Leicester in the UK.

Rafael E. Ramirez (M.A., 1998) is a senior geophysicist at Chevron in Houston, Texas and can be reached at rafael_ramirez_558@hotmail.com.

Calixto Ramirez (Ph.D., 1992) lives in Monterrey, Nuevo León in Mexico and can be reached at calixto.ramirez@gmail.com.

Jennifer Winkler Truax (B.S., 1992) writes, "Life is good. I have been a director of a summer camp with over 200 kids for 4 years now. I teach and love being home with my kids. I have a great husband and two terrific kids. I do miss the oil and gas industry—will reenter as soon as my youngest starts kindergarten." Jennifer lives in Rowlett, Texas.

James V. White (M.A., 1995) is a geoscience supervisor at Exxon Mobil in Houston, Texas.

Kristin Miller White (B.S., 1999; M.S., 2005) is a principal/geologist for Escarpment Environmental. She lives in Austin, Texas.

Warren James Wiemann (B.S., 1998) is vice president of Engineered Semiconductor Products, Inc in Austin, Texas. He can be reached at jwiemann@espspares.com.

Christopher Williams (B.S., 1996) writes, "It's been a busy year for us, and probably only going to get busier. My wife and I are expecting our first child, a boy, in late September. We are very excited and a little nervous. Other than that, it's been about the same with work, recreational activities, and pets. I'm looking forward to getting back in touch with people through the Jackson School's alumni outreach efforts!" Christopher lives in Austin, Texas can be reached at chris.williams@tnris.state.tx.us.

2000 +

Trevor J. Aitken (M.S., 2005) writes, "I was GSEC President 2004-2005 school year. I'm currently exploring deepwater Brazil and recruiting at UT for Devon Energy." Trevor lives in Houston, Texas and can be reached at trevor_aitken@hotmail.com.

L. Taylor Bartholomew (B.S., 2006) lives in Ft. Worth, Texas working at TCU/EOG Resources.

Carrie Beveridge (B.S., 2001; M.S., 2004) is hydrogeologist at LBG-Guyton Associates. She lives in Austin, Texas and can be reached at carriebev@yahoo.com.

Stacey Bilich (B.A., 2006) is a 6th grade science teacher in Plano, Texas where she lives. She can be reached at damestaceybilich@gmail.com

Clay Brollier (B.A., 2005) is a geologist at Pedernales Energy, LLC. He lives in Houston, Texas and can be reached at brollier@gmail.com.

Johnathan Bumgarner (B.S., 2002; M.S., 2005) is a scientist for QEA, LLC. He lives in Austin, Texas and can be reached at jbumgarner@qeallc.com.

Robert Burger (Ph.D., 2002) is an assistant provost for science technology at Yale University. He lives in New Haven, Connecticut and can be reached at robert.l.burger@gmail.com.

Hussam Busfar (B.S., 2004) is a geophysicist at Saudi Aramco and lives in Cambridge, Massachusetts. He can be reached at h.busfar@yahoo.com.

Norma Chaires (B.S., 2005) is a project scientist at Conestoga-Rovers & Associates. She lives in Houston, Texas and can be reached at nchaires@alumni.utexas.net.

Ming-Chu Chen (M.S., 2007) is a research assistant at Georgia Tech. He lives in Atlanta, Georgia and can be reached at chipper@gatech.edu.

Yann Curtis (B.S., 2002) is a treasurer for Omnisport Inc. at the Skatepark of Austin. He lives in Austin, Texas.

Matthew Davis (M.S., 2005) lives in Denver, Colorado where he works for EnCana Oil & Gas. He can be reached at matthew.davis75@comcast.net.

Christian Dohse (B.S., 2007) lives in Corpus Christi, Texas and works as an exploration geologist at Mango Properties/Apex Energy.

Patricia Franco (B.S., 2004) is a graduate student in the school of architecture at the University of Texas in Austin. She can be reached at pfranco@mail.utexas.edu.

Justin Funk (M.S., 2007) works as a geophysicist at Devon in Houston, Texas. He can be reached at justin.funk@dvn.com.

Sally Holl (M.S., 2004) writes, "I just started as a geographer at the TX WSC in September 2007." She lives in Austin, Texas.

Reilly J. Holmgreen (B.A., 2001) works at Bastion Technologies and lives in Houston, Texas. He can be reached at reilly.j.holmgreen@nasa.gov.

Lindsey Huang (B.S., 2004) is a hydrogeologist at Pastor, Behling & Wheeler, LLC. She lives in Port Lavaca, Texas.

Jamey Jones (Ph.D., 2005) is an assistant professor of geology at the University of Minnesota at Morris. She lives in Morris, Minnesota.

Tamara Kahn (B.S., 2005) is a senior data processor at WesternGeco in Houston, Texas.

Jesse B. Kimball (M.A., 2004) writes, "I'm taking the entrepreneurial route, and I'm in the beginning stages of starting my own oil and gas investment company." Jesse lives in Austin, Texas and can be reached at kimballj@windsweptenergy.com.

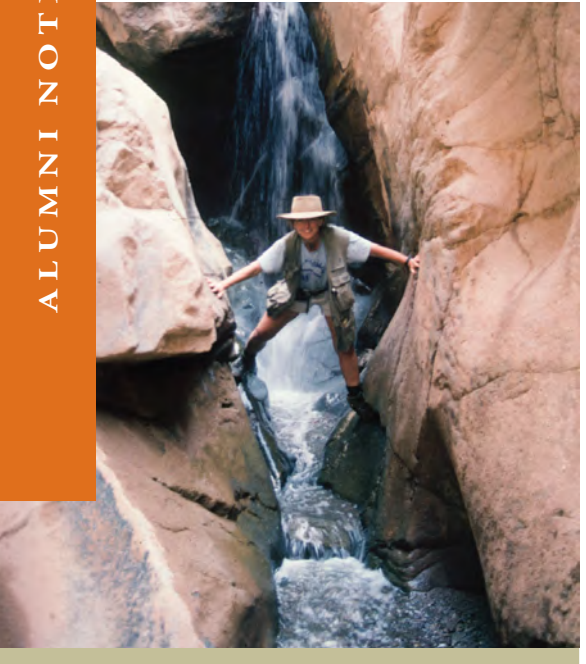
Paul Kirby (B.A., 2002) is a staff scientist and CAPM for Daniel B. Stephens & Associates, Inc. in Austin, Texas. He can be reached at paulkirby@austin.rr.com.

John Kolvoord (B.S., 2005) is a geologist at Hunt Petroleum. He lives in Houston, Texas and can be reached at jkolvoord@gmail.com.

Dhananjay Kumar (Ph.D., 2005) lives in San Ramon, California and can be reached at dhananjaykumar@gmail.com.

Joel Le Calvez (Ph.D., 2002) lives in Farmers Branch, Texas and works at Schlumberger as a Senior Geologist. He can be reached at lecalvez@alumni.utexas.net.

Jim Levy (B.S., 2001) writes, "I'm currently exploring, drilling and producing oil and gas in Concho, Menard and Schleicher counties on the Eastern Shelf of the Permian Basin. We expect to drill ten wells during the coming year, and put eight more on pump. As a student during the heyday of the 'dep-dump superstars' (Luigi Folk, 'Uncle Al, the kiddies' pal' Scott, Earle the Pearl McBride, etc.), I was fortunate enough to have been taught by the best depositional teachers in the world. Their excellence can still be seen, where just last year, US News and World Report rated UT/Austin as having the #1 sedimentology graduate program in the world, over 20 years after the sed department's actual peak. Talk about the 1927 Yankees! I remember when some of the 'hard-rock' guys (OK -- just Bill Muehlberger, but he'll count for three normal-sized people) would deride us 'soft-rock' folks, calling our beloved sedimentology field 'just a bunch of dirt and vegetables.' Well, every time I cash an oil run check these days, I have to say, 'hooray for dirt and vegetables!' Best of all (even better than $75 oil), my wife Liz and I are raising Leah - our little six year old paleontologist-in-training. As a father, I've found that kids think that we geologists are really cool; we know all about the same stuff that they like: dinosaurs, volcanoes, earthquakes and asteroids.. Try to have a kid think you're cool if you're some damn tax accountant (not that there's anything wrong with that...)! I would love to hear from other (cool) alumni." Jim lives in El Paso, Texas and can be reached at jim@geotexas.com.



Loewy's Paper Honored

Staci Loewy (Ph.D. 2002), shown above in a photo from 2002, co-authored one of the "top 50 papers from '03-'07" in *Tectonophysics*. Loewy, now an assistant professor of geology at California State University Bakersfield, wrote "Eastern Laurentia in Rodinia: constraints from whole-rock Pb and U/Pb geochronology," back in 2003, with Jackson School professors James Connelley and Ian Dalziel.

Chadwick N. Lyons (B.A., 2003) is a manager at West LB in Houston, Texas where he resides. He can be reached at lyonscn@yahoo.com.

Ana A. Manzolillo (B.S., 2006) is a development geologist at Repsol YPF. She lives in Houston, Texas and can be reached at amanzolillo@alumni.utexas.net.

Amanda McCutcheon (B.S., 2002) works at Aerotek-Construction Management in New York City where she resides. She can be reached at amccutch@aerotek.com.

A. Dax McDavid (B.A., 2003; M.A., 2006) is a geologist at Stalker Energy L.P. He lives in Austin, Texas and can be reached at dmcdavid@stalkerenergy.com.

Kristine Mize (M.S., 2004) is a geologist at EnCana Oil & Gas, Inc. She lives in Centennial, Colorado.

Yusliza Mohd Sufian (B.S., 2004) lives in Kuala Lumpur, Malaysia and works as a geoscientist at PETRONAS CARIGALI.

Karen I. Mohr (Ph.D., 2000) writes, "I was recently promoted to Associate Professor with tenure in the Department of Earth & Atmospheric Sciences at the University at Albany SUNY in Albany, NY. I teach courses in hydrology and remote sensing. My research area is land/atmosphere interaction and its impact on the development of clouds and precipitation." Karen resides in Albany, New York and can be reached at mohr@atmos.albany.edu.

Ken Mosley (B.S., 2001) is an XRD mineralogist/geologist for Core Lab. He lives in Houston, Texas.

Petro K. Papazis (B.S., 2003; M.S. 2005) is a development geologist at Chevron Canada Resources. He lives in Calgary and can be reached at p.papazis@alumni.utexas.net.

Ethan Perry (M.S., 2005) lives in Ashland, Maine.

Thuan Phan (B.S., 2006) works as a geoscientist at Schlumberger in Denver, Colorado where he resides. Thuan can be reached at thuan.phan@gmail.com.

Robert Rogers (Ph.D., 2003) writes, "I started a new tenure-tract position at California State University, Stanislaus in Fall of 2006." Robert lives in Turlock, California and can be reached at geology.csustan.edu.

William Kurt Rucker (B.S., 2006) is a graduate student at UCLA. He lives in Los Angeles, California.

Chris Schneider (Ph.D., 2003) is an adjunct assistant professor for California State University, Bakersfield. He lives in Bakerfield, California.

Sunday Shepherd (M.S., 2000) works as a clastic stratigraphy team leader at Chevron Energy Technology Company in Houston, Texas and can be reached at suns@chevron.com.

Jonathan Skaggs (B.S., 2001) writes, "Since I graduated from UT, I've worked in the environmental consulting industry in Texas and California. I am a California professional geologist." Jonathan lives in San Francisco, California and can be reached at skaggsjm@gmail.com.

Nicholas Sommer (B.S., 2003) is a graduate student at Colorado University in Boulder, Colorado. He can be reached at nsommer@gmail.com.

Keith Trasko (M.S., 2007) lives in Bullard, Texas.

Tony Troutman (M.S., 2004) writes, "I am currently working as an exploration geologist at Swift Energy Exploration Services, a subsidiary of Swift Energy. Our primary focus is in the coastal transition zone of the Gulf of Mexico. One of our recent exploration wells tested 7429 b/d and 5.5 MMcfd. Our other work is in New Zealand, Texas, and we recently entered Alaska. Here in Carpinteria we have tar sand outcrops on the local beaches, extensive outcrops of Cretaceous through Pleistocene rock, and numerous active oil seeps to keep us thinking about petroleum systems. Surfing after work is a regular activity and keeps us inspired. " Tony lives in Carpinteria, California and can be reached at tony.troutman@carbonates.us.

Ronald S. Tykoski (M.S., 1998; Ph.D., 2005) writes, "I am the chief fossil preparator at the Museum of Nature and Science in Dallas, Texas. Most of my time is spent extracting vertebrate fossils collected from Cretaceous high-latitude deposits of Alaska's north slope. I still find time to pursue my own research in early Theropod and Saurischian evolution, as well as direct excavations and digs of fossil vertebrates in the DFW area. My wife MJ, son Stephen, and brand-new daughter Christine reside in Nevada, Texas." Ronald can be reached at rtykoski@natureandscience.org.

Matthew Van Wie (B.S., 2000) lives in Houston, Texas and works as a geologist at Anadarko Petroleum in The Woodlands, Texas.

Abigail L. Watkins (B.A., 2005) is a junior geologist at Ecology and Environment. She lives in Dallas, Texas and she can be reached at abigail@paperclipped.net.

Karah Wertz (Ph.D., 2003) works as a program development coordinator in the School for Environmental Research at Charles Darwin University in Australia. She can be reached at karah.wertz@cdu.edu.au.

Mark Wiley (B.S., 2006) is a graduate student at the Colorado School of Mines and can be reached at mlwiley@hotmail.com.

Clarence Winzer (B.A., 2001) works at Shaw Environmental & Infrastructure as a geologist/environmental scientist. He lives in Austin, Texas and can be reached at clarence.winzer@shawgrp.com.

Jonathan M. Wybar (B.A., 2001) lives in Philadelphia, Pennsylvania.

Susan Young (B.S., 2005) lives in Tyler, Texas. She is a senior field engineer at Schlumberger Wireline & Testing and can be reached at youngsa@gmail.com.

Sarah Zanoff (B.S., 2006) works at Schlumberger in Houston, Texas.

Friends, Faculty, Former Faculty, and Staff

Glynis Morse works at the U.T. Geology Foundation. She lives in Austin, Texas.

Annette Marshall lives in Los Gatos, California and can be reached at annettefinsterbusch@yahoo.com.

William Mullican lives in Pflugerville, Texas and works as a deputy executive administrator for the Texas Water Development Board in Austin, Texas. He can be reached at bill.mullican@twdb.state.tx.us.

They Love Her in Norway

Sylvia Nordstrom (Ph.D. 2006) was the subject of a profile in the major daily newspaper in Stavenger, the oil capital of Norway. Nordstrom works for Shell in Stavenger and devotes about a fifth of her time to teaching stratigraphy at Stavenger University. For those who can read Norwegian, the profile opens thus: "Under utdannelsen som geolog ved universitetet i Austin, Texas, tok Syliva Nordfjord doktorgraden på havbunnen utenfor New York, ned til 30 meter. Der fant hun ikke en dråpe olje, men til gjengjeld ble den amerikanske marinen interessert i forskningsprosjektet. Fordi det kunne forklare signaler marinen oppfattet som ubåter."

Carlos I. Huerta Lopez is a research associate at the Dept. of Seismology of the Research Center and Higher Education at Ensenada. He is a member of SNI (National Investigators System) as "Investigador Nacional Level I". Currently he is the Chairman of Seismology Department. He is a full time professor and his research interests include: global seismology, engineering seismology, geotechnical earthquake engineering, and exploration geophysics. He is working on side effects of seismic ground motions; wave propagation techniques; earthquake engineering seismology; analysis and modeling of spatially variable seismic ground motions; non-conventional signal processing techniques; simulation techniques; system identification; random vibrations; and non-destructive examination tests (NDT). He is currently developing a Bi-national project (supported by UC-Mexus-CONACyT) for the estimation of seismic ground motion response of San Diego, U.S.A.-Tijuana, Mexico metropolitan area. Carlos lives in San Ysidro, California and can be reached at m-huerta@alumni.utexas.net.

MEMORIALS

Alumni

Douglas Leland Bostwick (M.S. 1953), 78, a resident of Albuquerque, New Mexico, passed away unexpectedly on Sunday, September 23, 2007. He was born in Wadsworth, Ohio on March 28, 1929. His father's employment at the University of New Mexico brought the family to Albuquerque. After graduating from Albuquerque High School in 1947, he attended the College of Wooster where he received his undergraduate degree in geology and then completed his master's degree in geology at The University of Texas at Austin in 1953. His career as a petroleum geologist with Exxon spanned 33 years and took him and his family to Mississippi, Louisiana, Texas, Singapore, and Malaysia. He enjoyed watching Texas Longhorns football games and proudly wore his UT workout clothing to the gym. He was a great friend and father. He was preceded in death by his parents and his sister, Lois Bostwick Beirne. Mr. Bostwick is survived by his wife, Judith Richards Bostwick; daughter, Karen Gonzalez and husband, Richard of Fort Worth, Texas; son, Richard Bostwick and wife, Sharon of Mandeville, Louisiana; daughters, Pamela Bostwick of Alamogordo, NM and Gayle Bostwick of Conroe, Texas; grandson, Donald Loehr of Hattiesburg, Mississippi; granddaughter, Michelle Loehr of Mandeville, Louisiana; sister Phyllis Bostwick Ewald of Sarasota, Florida; brother, Maynard Bostwick and wife, Jane of Stockton, California; and many nieces and nephews.

Douglas Leland Bostwick

Furman Alexander Grimm (B.S. 1947) of Temple, Texas passed away on June 25, 2008 at the age of 85. Mr. Grimm was born August 25, 1922 in Bosque County, Texas. He graduated from Clifton High School in 1939 and The University of Texas at Austin in 1947 with a B.S. degree in geology. He was a retired Exxon geophysicist and later a Bosque County cattle rancher. He was also a highly decorated WWII veteran, having served in the 99th Infantry Division in the Battle of the Bulge where he was captured and spent the remainder of the war in Stalag XIIIC. Survivors include wife of 59 years, Frances of Temple, son Mike (BBA 1977) and his wife Vicki of Horseshoe Bay, and grandchildren Tyler (B.S. 2006) of Ft. Worth and Kirstin of Dallas.

Otis Lee James, Jr. (M.A. 1952) passed away in Dallas, Texas on June 23, 2008 at the age of 81. Born on July 18, 1926 in Forth Worth, Texas, he is pre-deceased by his father Otis Lee James, Sr. and mother Isabella Storrie James. Survived by his wife Gretchen Hall James; stepchildren Heidi H. Bass, Audrey Hall, Robert A. Hall, Jr. and three step-grandchildren; sister Mary Beth, her husband, a niece and nephew. He served in the U.S. Navy during WWII and was a Merchant Marine. He graduated from Rice University and then received his master's degree from The University of Texas at Austin. He was an independent oil producer and a member of the Texas Alliance of Energy. Otis was an avid tennis player, world traveler, and Dallas Cowboys fan. He loved to laugh, and never failed to bring a smile to everyone's face. Whether reminiscing about his rollicking times in San Francisco before shipping out during World War II, or recounting his flight aboard the DH-106 Comet, the first commercial jet airliner to reach production, he always had a story to tell and was a font of information. He will be forever loved and greatly missed.

Vance Milton Lynch (B.S., 1951), 80, passed away peacefully in his home on July 4, 2008. Born on the family farm in Ellis County, Texas, he served in the Army in Korea, returning to Texas to earn his Bachelor of Science in geology from The University of Texas in 1951. Vance loved the University and rarely missed a Longhorn football game even when he lived in California. After graduation, he went to work for Tidelands Exploration Company. It was on an assignment for Tidelands in Orange, Texas, that he met and fell in love with his first wife Charlotte Copenhaver. After losing Charlotte to breast cancer, Vance was fortunate to meet and fall in love with Sarah Townsley, whom he married in 1982. Vance and Sarah lived in Southern California, Houston, Dripping Springs, and for the last 14 years near Liberty Hill. Vance had an illustrious career as a geophysicist. He earned his Master of Science degree from the University of Houston in 1959. A few years later, in 1964, Vance accepted a job with Union Oil Company of California and the family moved to Los Angeles. Vance loved working in the oil business. He traveled the globe looking for oil and had many great adventures. He was Chief Geophysicist of the International Division for 13 years. Vance held other positions for Unocal culminating in his position as Vice President of Scientific Computing. He was a proud member of the Society of Exploration Geophysicists and the American Association of Petroleum Geologists. Vance was a lifelong member of the Church of Christ. He loved to discuss his favorite subjects, particularly science and religion. He is survived by his second wife, Sarah Lynch, daughter and son-in-law, Leah & Lee McFadden, son and daughter-in-law, Luke and Debbie Lynch, sister and brother-in-law, Ina and Brent

Green, brother, Lynden Lynch, brother and sister-in-law, Fred and Sherry Lynch, and his three grandchildren.

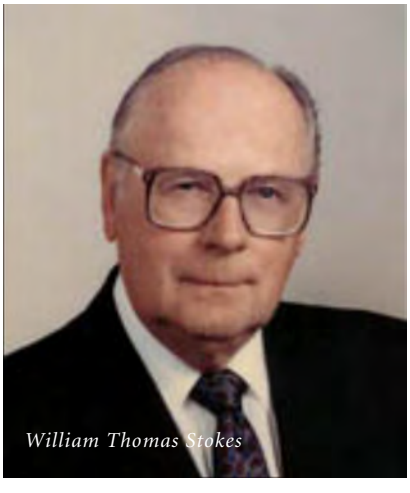
Louise Cromwell Morrison McLaurin (B.A., 1946) died Thursday May 15, 2008 in Austin. Louise was born in Pelham, New York on July 10, 1926 to Edythe Glover and Hiram Louis Morrison. She grew up in New Rochelle, NY and Westfield, New Jersey before moving with her family to Dallas in 1940. Louise graduated from Highland Park High School and The University of Texas at Austin with a bachelor's degree in geology. She and husband Banks McLaurin, Jr. lived in Houston, Corpus Christi, Kingsville, and Midland, moving with Banks' work with Exxon and Atlantic Richfield. In 1954, they settled in Dallas and lived there 50 years. Louise was active with her three children's schools; the Plaid Door and choir at St. Luke's Episcopal Church; the Dallas Woman's Club, where she served on the Board of Governors; several square dance clubs; her sorority alumni group; as a volunteer at Old City Park; the Lide Spragins and Pierian book clubs; Profitears Investment Club; and the Marianne Scruggs Garden Club. Louise and Banks traveled to more than 100 countries and especially enjoyed skiing, the family ranch, and trips with their children and grandchildren. Surviving her are her three children, Candace McLaurin Volz, Thomas Banks McLaurin, and Marion McLaurin Forbes, and eight grandchildren. She is also survived by her brother, H. Lou Morrison Jr., a niece and two nephews.

Charles Eugene "Gene" Mear (B.A. 1951, M.A. 1953) died September 18, 2007 after a courageous battle with Parkinson's Disease. He was 80 years old. Gene was the beloved husband of Tonie, father of eight children, and blessed with eight grandchildren. Gene attended school in Leakey and Sabinal, Texas and served in the 11th Airborne Division in World War II. After an honorable discharge, he attended Southwest Texas State Teachers College, which is now Texas State University, and The University of Texas at Austin, where he earned his B.S. and master's degree in geology. Gene enjoyed a long and productive career as a certified petroleum geologist and certified professional geoscientist, working in Colorado, Oklahoma, and Texas. He discovered the Kincaid Shelter, a rock shelter in the Texas hill country that was first inhabited by people 13,000 years ago. He published numerous professional articles in geology and archaeology and belonged to many associations, including the American Association of Petroleum Geologists, The Kincaid Shelter, The Society of Independent Professional Earth Scientists, and the Knights of Columbus.

Jan Sloan (B.S., 1982) passed away at her home in Reno, Nevada, May 17, 2008. Born January 22, 1949, at the Seton Hospital in Austin, she was the second child of J.C. and Josephine (Jo) Sloan. Jan attended her first two years of college at Trinity University in San Antonio, where she began her career interest in geology. After Trinity, Jan enrolled at The University of Texas at Austin where she received her Bachelor's of Arts in Education in 1972. In 1978 after her divorce from Jules Posey she began working as a geologist at the Bureau of Economic Geology while attending UT Austin and raising her daughter Dee. Jan received her second degree, a Bachelor's of Science in Geology from UT Austin in 1982. After graduation, she worked as a petroleum geologist with Crown Central Petroleum in Houston and in 1984 married Chris Henry, whom she had met while working at the Bureau of Economic Geology. The new family lived in Tarrytown in Austin. Jan accepted a position as a geologist at Hall Southwest, a small environmental consulting company. By 1991, she had risen to Operations Manager, overseeing some 40 employees. After Dee graduated from the Science Academy in May of 1993, Jan and Chris moved to Reno, Nevada. Chris became a research geologist with the University of Nevada at Reno, and Jan pursued her master's degree in Environmental Science at UNR, graduating with an M.S. in 1997. Jan was diagnosed with breast cancer in 1996. She managed to successfully battle the cancer, accomplish all that she did in her professional and personal life, and maintain a positive attitude and love of life throughout. Jan is survived by her husband, Chris Henry, a geologist with the University of Nevada; her faithful Jack Russell terriers, Tex and Harley Belle; her daughter, Dee Posey; parents J C and Jo Sloan; brother Jon Sloan; sister Joy Sloan Stryker; and her nieces and nephews.

William Thomas Stokes Jr. (B.S. 1950) passed away on Feb. 25, 2008. He was born April 15, 1920, in Corsicana. Stokes was an avid golfer, an ardent supporter of The University of Texas at Austin, and a great storyteller. After graduation from Corsicana High School, he attended college until the outbreak of World War II, when he built aircraft and then served in the Navy as a crew chief on a PBY flying boat, patrolling the Gulf of Mexico for German U-Boats. After the war, he returned to college at The University of Texas in Austin, where he earned a Bachelor of Science degree in geology in 1950.

Bill had a long career as petroleum geologist. In the 1950s he worked for Pure Oil, Sun Oil and Bright & Schiff Company. In the 1960s he became affiliated with Oliver and West, a petroleum consulting firm in Dallas, which he later purchased with partner Jack Boone. In 1972, he sold his interest in Stokes and Boone and moved to California to join R.L. Burns Corp., as executive vice president and member of the board of directors. In 1978 he co-founded Fortuna Energy Company in Oklahoma City. In 1980 King Ranch prevailed on Stokes to start King Ranch Oil



William Thomas Stokes

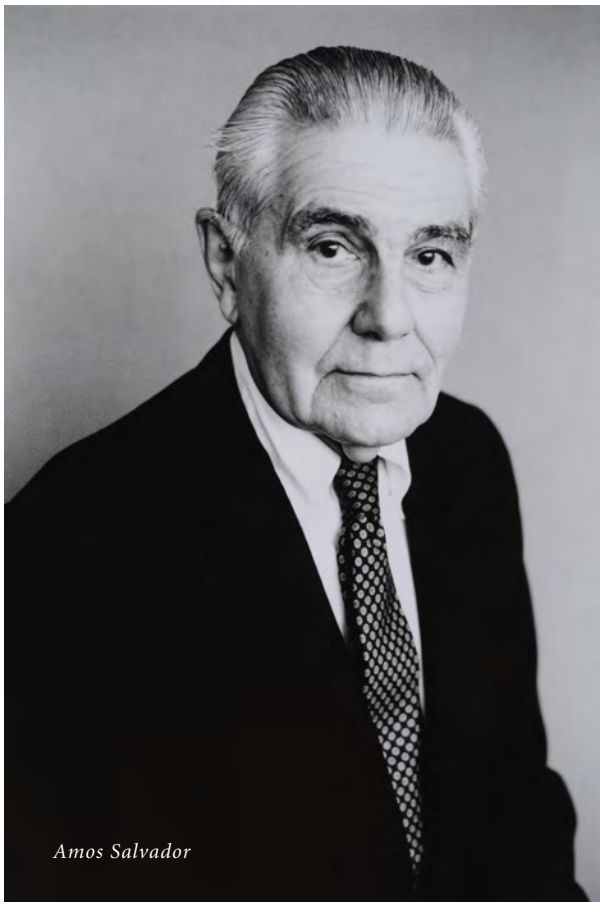
& Gas Inc., where he served as executive vice president until retiring in 1987. Bill participated in many professional organizations throughout his career. He was a member of the American Association of Petroleum Geologists serving as a secretary of the house of delegates, trustee associate, and vice chairman of Texas. He served as president of the Texas section of the American Institute of Professional Geologists. He was a charter member of American Association of Petroleum Landmen and served as the vice president of the Dallas section.

He was especially proud of his association with The University of Texas at Austin, and he actively supported the academic and athletic programs. He was a member of the executive committee of the Chancellor's Council. He served on the Longhorn Foundation Executive Committee and was an honorary life member. He served for many years on the Geology Foundation's Advisory Council, including a stint as its chairman. He served on the Advisory Council of the College of Natural Sciences; and he represented the athletic department on the Texas Campaign for Endowments. He created and endowed the William T. Stokes Centennial Teaching Fellowship.

Survivors include his wife Fiona; son Bill Stokes III of Dallas; son Brad Stokes and wife Melissa; and granddaughters, Catherine Stokes and Emily Stokes, all of Corpus Christi; his sister Thelma Thompson of Corsicana; and his nephew, nieces and their families.

Walter E. Zabriskie (M.A., 1951) passed away peacefully on March 17, 2008 after a long illness. He was born in Provo, Utah in 1925 to John Irwin and Maud Lillian Zabriskie. He served his country faithfully during World War II in the Navy. He returned and married his childhood sweetheart, Donna Ellertson, in the Salt Lake Temple on September 23, 1946. He graduated from BYU in geology, completed his master's degree at The University of Texas at Austin and later his Ph.D. in geology at BYU. He worked in the oil business his entire career as a research and exploration geologist mostly with Conoco Oil, for whom he worked for nearly 30 years. Between his service in the Navy and his career as a geologist, he traveled to nearly every part of the world. He was a faithful member of the LDS Church his entire life and served in many callings throughout the United States. Perhaps his most enjoyable service was with his wife as ordinance workers in the Denver temple for nearly 12 years, stopping only when his health failed. He is survived by his wife of over 61 years, Donna, his dear daughter, Julie, who was such a support to him especially these last years, sons Dr. Walter Zabriskie Jr. and Dr. Norm Zabriskie, and seven grandchildren.

Faculty



Amos Salvador

Dr. Amos Salvador, professor emeritus in the Department of Geological Sciences at The University of Texas at Austin, well known for his contributions to stratigraphic classification, research on the Gulf of Mexico, and writings on the future of energy resources, died Dec. 2, 2007 of complications from pneumonia and a malignant brain tumor. He was 84.

Editor of the second edition of the *International Stratigraphic Guide* (1994) and co-editor of an abridged version, Salvador contributed to international agreement on principles of stratigraphic classification, making possible greater communication, coordination, and understanding of some of geology's fundamental systems of classification.

After retiring from teaching at The University of Texas at Austin in 1993, Salvador continued his work on stratigraphic classification and pursued research estimating consumption and possible sources of energy in the 21st century.

His energy research culminated in the publication of *Energy: A Historical Perspective and 21st Century Forecast* (2005). The American Association of Petroleum Geologists (AAPG) honored the book and Salvador with the Robert H. Dott Sr. Memorial Award in 2006, given to the author or editor of the best special publication dealing with geology published by AAPG.

Another of Salvador's major accomplishments was editing *The Gulf of Mexico Basin* (1991), part of the Geological Society of America's Decade of North American Geology Series. Salvador wrote major chapters for the volume synthesizing a wide variety of geological data for the Gulf of Mexico Basin. The work has been a standard reference since publication.

In recent years, Salvador made it a mission to protest efforts to eliminate the Tertiary and Quaternary periods from official classifications of the geologic time scale. Although the Tertiary and Quaternary are widely accepted as periods within the present geologic era of the Cenozoic, in 2004 the International Commission on Stratigraphy published time scales eliminating both terms. Salvador contended this was folly and that "the Tertiary and the Quaternary are here to stay," so long as geologists continue to use the terms, which he showed was the case.

Born in Madrid, Spain, in 1923, Salvador spent part of his youth in Havana, Cuba, where his father was stationed at the Spanish Embassy during the period of the Second Spanish Republic. When the Republic fell to Franco's Nationalists, Salvador's family

moved to Venezuela, where he earned his B.S. in geology from the Universidad Central de Venezuela in 1945.

In Venezuela Salvador worked for Mene Grande Oil Company, a Venezuelan subsidiary of Gulf Oil, where he had the good fortune to be guided and advised by Hollis D. Hedberg, the famous Gulf Oil exploration geologist who later taught at Princeton University. Hedberg advised him to earn his Ph.D. from Stanford University, which he completed in 1950. Salvador and his wife, Lynn Sherwood, were married that same year following their graduation from Stanford.

From 1950-55, Salvador worked for Gulf Oil out of New York as a regional and surface geologist covering North Africa, Europe, and South America. He left Gulf Oil in 1955 to work for Creole Petroleum Corporation, an affiliate of Esso (now ExxonMobil) in Venezuela and from then until 1980 worked for several Esso affiliates retiring as chief geologist of Exxon Company, U.S.A. in 1980.

Salvador and his wife moved to Austin in 1980 when he accepted a position with the Department of Geological Sciences. At The University of Texas at Austin, he was first the Alexander Deussen Professor of Energy Resources and, after 1990, the Morgan J. Davis Professor of Petroleum Geology. The Department of Geological Sciences recognized Salvador's dedicated teaching by awarding him the Houston Oil & Minerals Corporation Faculty Excellence Award in 1988.

Salvador is survived by Lynn, his wife of 57 years, his children Phillip, Michael and Rosario, and his grandchildren Solomon, Leo, Claire, Lucas and Carla.

Dr. William D. Sill (Bill), 70, died March 15, 2008, of respiratory failure. According to an article in the *Austin American-Statesman* published upon his death, "William Sill's heart was always in the Valley of the Moon. And so, in July, it will be again."

Sill, once a senior lecturer at The University of Texas at Austin, helped establish his beloved spot in the San Juan region of northern Argentina as an important destination for the study of dinosaur fossils. Following his instructions, Sill's family will return to San Juan with the ashes of his heart, said his son, Bill Sill of Austin.

Sill died at Mountain View Hospital in Las Vegas, where he was born and where he had lived since 2005.

A study in gentle contrasts, Sill was dashing yet unassuming. He tirelessly pursued adventure but was insistent upon sharing the fruits of his discoveries.

"Dad never made much money," Bill Sill said. "He was disinterested in fame, or money, or significant scientific recognition. He very much tried to hide from the limelight. But he always had these adventurous notions."

Not particularly religious at the time, William Sill accepted an offer from the Church of Jesus Christ of Latter-day Saints in the late 1950s to be a missionary because it would take him to Argentina. It was during the mission, from 1958 to 1961, that he met his wife, Nelida Salinas. They were married for 47 years.

The Sills returned to the United States, and he earned a Bachelor of Arts degree in geology from Brigham Young University. He went on to earn master's and doctoral degrees in geology from Harvard. Until 1971, Sill was a curator of collections at Yale University's Peabody Museum of Natural History .

But he was eager to return to Argentina and do field work. He took a position teaching at tiny San Juan University and began to take students into the Valley of the Moon, named by locals for its barren expanse and starkly marked by rock formations. There Sill and other scientists unearthed a trove of fossils, including the discovery of Herrerasaurus , one of the oldest of the meat-eating dinosaurs.

Amid political unrest in the late '70s in Argentina, Sill returned to the United States to work at UT Austin, Bill Sill said. William Sill served as a research associate and a visiting professor at UT Austin. From 1981 to 1989 he was a senior lecturer in geology.

After Sill was diagnosed with muscular dystrophy in 1990, the Sills longed to return to Argentina. Through the environmental group Earth Watch, he began taking groups of amateur paleontologists on fossil-finding trips into the Valley of the Moon. When he could no longer ride a mule, he drove to sites on a specially fitted all-terrain vehicle.

Sill devoted years to getting the valley recognized internationally. In 2000, the U.N. Educational, Scientific and Cultural Organization added the valley to its World Heritage list of more than 850 places of significance.

In his last years, Sill would tell his 12 grandchildren stories of his adventures, weaving in vivid stories of the flesh eaters whose bones Sill found, catalogued, and studied.

"He was like Indiana Jones. There are so many stories, so many things that he did," Bill Sill said. "It's a hell of a thing to be his son."

Dr. James Lee Wilson Sr. (B,A, 1942, M.A. 1944), 87, internationally recognized expert on the geology of carbonate sedimentary rocks, passed away on February 13, 2008 at his home in New Braunfels, Texas. He was born in Waxahachie, Texas on December 1, 1920, and was raised in San Antonio and Houston, Texas. Jim leaves behind the love and helpmate of his life for nearly 64 years, his wife, Della Moore Wilson; his children Burney Grant Wilson and James Lee Wilson Jr. and James' wife Carolyn Ann Wilson; his brother Phil Wilson; grandchildren Kimberly Wilson Broesche, Robert M. Wilson, Amanda Wilson Loggins, Jason Wilson, James Burney Wilson II, Holly Wilson, Hayley Wilson; four great grandchildren and numerous grand nieces, nephews, cousins, and all the students he taught over the years. Dr. Wilson was preceded in death by his son Dale Ross Wilson, his sister, Betty K Mitchell, his mother, Christina Hawkins Wilson, and father, James Burney Wilson.

Jim Wilson was one of those rare people who knew exactly what he wanted to do in his life at the early age of 10 years. He wanted to be a geologist. His many camping and fishing trips in Texas and Mexico with his father and brother during his early years prepared him for one of the things he loved most, geologic field work. His early geologic field studies for Carter and Shell Oil Companies made him a

recognized authority on limestone geology, and later academic research at The University of Texas at Austin, Rice University, and the University of Michigan brought him international acclaim.

After graduating high school in Houston, he attended Rice University and then The University of Texas at Austin, where he earned B.A. (1942) and M.A. (1944) degrees in geology. It was while doing field work in Montana in 1944 that Jim met and fell in love with a Methodist preacher's daughter, Della Moore, and they were married shortly thereafter. After serving in Italy at the end of WWII, Jim returned home, and he and Dell and new baby boy moved to New Haven, Connecticut, where in 1949 he received his Ph.D. in paleontology from Yale University.

Dr. Wilson was an associate professor at The University of Texas at Austin from 1949 to 1952. From 1952 to 1966 he was a research geologist for the Shell Development Company in Houston. During this time he worked in The Hague, Netherlands doing a research assignment in the Middle East. In 1966 Jim returned to the occupation he loved most, teaching. He accepted a professorship of geology at Rice University. While at Rice, Dr. Wilson held the Harry Carothers Weiss Chair of Geology and served as chairman of the Geology Department, along with teaching and mentoring many graduate students. In 1979 Jim left Rice to join the graduate faculty in geology at the University of Michigan–Ann Arbor. He retired from there as a distinguished professor in 1986. Although "retired," Dr. Wilson stayed very active doing extensive consulting geology in Mexico and the United States and during his 21-year residence in New Braunfels, he and his wife took great pride and joy in helping the homeowners' association on Patio Drive caring for the beauty of their street. Throughout his busy career Jim worked in Texas, Mexico, New Mexico, North Africa, the Rocky Mountains, the Austroalpine, and in the Middle East.

His 1975 book "Carbonate Facies in Geologic History" is still a standard text on stratigraphy of carbonate rocks. It has been published in several languages, including Chinese and Russian.

Dr. Wilson belonged to many geological societies, including the Geological Society of America, American Association of Petroleum Geology, SEPM – the Society for Sedimentary Geology, International Association of Sedimentology, Gulf Coast Association of Geological Societies, the Paleontological Society, and the South Texas Geological Society. Dr.Wilson won high awards from several of these societies, including the prestigious Sidney Powers Award presented by the American Association of Petroleum Geologists. This devoted family man, world-renowned paleontologist, award-winning geologist, and respected educator will be greatly missed by family, friends and colleagues.

A private memorial service was held for family and friends at the Zoeller Funeral Home, 615 Landa St. in New Braunfels, Texas on February 20, 2008. Anyone wanting to honor Dr. Wilson is urged to make a contribution to the James Lee Wilson Young Scientists Recognition Award through the SEPM, or the Heritage Museum of the Texas Hill Country Assn., P.O. Box 1598 Canyon Lake, Texas 78130, or Hope Hospice at 611 Walnut in New Braunfels, Texas 78130.

Friend

John Alan (J.A.) Hord, retired Gulf Oil exploration geologist, died in Midland, Texas on Sunday, May 11, 2008. After he and his future wife Ruth Waldrop, who was also interested in geology, graduated from Oak Cliff High School in Dallas in 1934, they attended North Texas Agricultural College (NTAC), then an Arlington, Texas, junior college and now the University of Texas at Arlington. John Alan later received a B.S. degree in Geological Engineering at OU in 1940. Ruth went on to The University of Texas at Austin, where she typed papers for graduate students, was a geology department student assistant and earned a B.S. degree in Geology in 1939. After working as a field geologist, John Alan was sent to the Gulf Research Laboratories in Pennsylvania in 1951 for geophysical training. He returned to Ft. Worth to become Division Chief Geologist. In 1957 he was transferred to Wichita Falls, Texas, as manager of the North Texas District. In 1960 the Ft. Worth Division was enlarged to the Southwest Division adn John Alan became General Manager of Exploration for the expanded division and held that position covering geological, geophysical and land activities until his retirement in 1979. John Alan is survived by his wife Ruth; daughters, Elaine Hord Hutchinson and Melinda Hord Reaves; son Thomas Alan Hord II; seven grandchildren and six great-grandchildren.


J.A. Hord

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The staff and members of the Jackson School of Geosciences would like to convey our respect to the families of the following alumni:

Mustafa Cengiz Bastug, B.S. 1968, M.A. 1970
Ernst Walter Chatham Jr., B.A. 1948, M.A. 1950
Wayne M. Cowan, B.A. 1941
James H. Croom, Jr., B.S. 1960
Victor L. Ettredge, B.S. 1948
Harvey Fischer, B.S. 1959
William Hughes Frye, B.S. 1951
David Haymond Harrington, B.A. 1951
James F. Hyde, Jr., B.S. 1956
Jack Houston Ragsdale, B.S. 1951
J.W. "Bill" Rogers, B.S. 1949
John S. Shambaugh, B.S. 1949, M.A. 1951
Richard William Aylett Walker, B.A. 1951

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All alumni, including former researchers and staff affiliated with the school's organized research units, are encouraged to submit. If you are not receiving the newsletter in the mail, this form will ensure that you receive future copies.

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