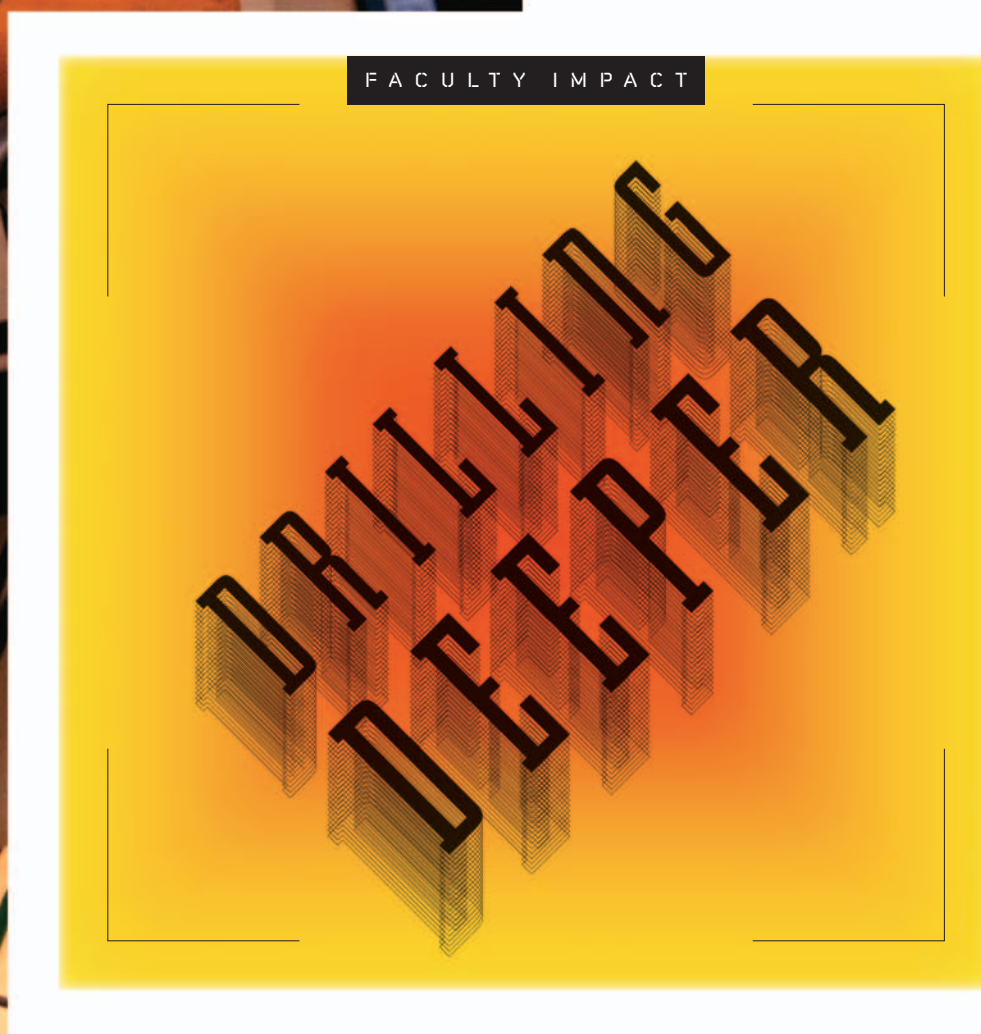


Dr. Yuefeng Sun balances petroleum industry applications with his classroom teaching in the College of Geosciences.



Geology and geophysics associate professor Yuefeng Sun has spent much of his career seeking balance—balance between the theoretical and the applied, academia and industry, teaching and research. Rather than let these dualities pull him in opposite directions, Sun early on recognized how interconnected and interdependent each is with the other. He views these for what they are: two parts of a whole—yin and yang—with their interaction creating new understanding.

Sun started a career in industry in 1981 after completing a bachelor's degree in geophysics at the China University of Petroleum in Shandong Province. He worked for two years as a field geophysicist in the Geological Prospecting Bureau of the Xinjiang Oil Co., a subsidiary of PetroChina Co. Ltd., before advancing to research geophysicist.



Geosciences Professor Addresses Emerging
Problems in Oil Production and Energy Needs



“Like many students, I went into industry after graduating,” Sun said. “But after a few years, you realize you don’t know much—particularly when you face real-world problems. In China, at that time and still today, they desperately needed oil. Scientists were using all the tools they could to find very thin reservoirs.

“When you don’t have much oil and you have so many people, you try to work with whatever you can find. Typical geophysical tools can’t get the resolution you need to find these thin reservoirs, however. I realized that I needed more training and that I should devote myself to doing more research.”

So Sun entered the doctoral program in geophysics at Columbia University in 1988. As a student and later as a postdoctoral fellow at Columbia’s Lamont-Doherty Earth Observatory,

he worked in theoretical geophysics and studied how to best use seismic geophysical data to address problems with extracting oil from reservoirs.

While at Columbia, he also sailed as a staff logging scientist on four expeditions of the JOIDES Resolution, the research vessel operated by the Integrated Ocean Drilling Program. Texas A&M is the science operator for this international program, the largest worldwide geosciences research effort supported by the National Science Foundation. The drilling program allows scientists from institutions worldwide to participate in collecting and analyzing core samples and measurements from deep beneath the ocean floor.

Sun began working with Shell Oil Co. in its Middle East oil fields during his time at Columbia as well. He devel-

oped a mathematical model in geophysics called the Sun Model that Shell implemented in its advanced carbonate reservoir characterization programs.

“I saw the complexity and difficulty with geology and geophysics and the production aspects of these Middle East oil fields, and that got me really interested in continuing to address the big emerging problems in oil production and energy needs.”

After spending a year as an associate professor at the Petroleum Institute in Abu Dhabi, Sun set his sights on Texas A&M, known worldwide for its strength in petroleum disciplines.

Sun recognized that A&M offered close proximity to Houston, the nation’s petroleum capital; strong faculty and infrastructure support for significant energy-related research; and the benefit of the campus-based Integrated Ocean Drilling Program.

Since joining the College of Geosciences in 2007, Sun has used his unique training and experiences to direct the Reservoir Geophysics Program, which provides a scientific framework in geology and geophysics for exploration, enhanced oil recovery and carbon dioxide (CO₂) sequestration, which is the storing and injecting of CO₂ into existing oil fields.

The program enjoys strong industry support, with long-term backing from Devon Energy Corp. and the Chuanwen Sun Foundation. This organization is directed by Dr. Chuanwen Sun ’96 (no relation), who earned his doctorate in geophysics at Texas A&M. The College of Geosciences seeks further private support for its faculty—by means of chairs, professorships and fellowships established through the Texas A&M



Dr. Yuefeng Sun advised a five-student team that won a regional oil-exploration competition last year.

STUDENTS WIN OIL EXPLORATION CONTEST



r. Yuefeng Sun was faculty adviser to a team of five Department of Geology & Geophysics graduate students who won the Gulf Coast Regional Imperial Barrel Award competition April 3, 2009, in Houston. The team won \$3,000 for Texas A&M and a trophy. Then it moved on to the international competition last June in Denver, placing fourth and winning \$1,000 for Texas A&M.

To compete, graduate student teams analyze an oil basin data set and determine the best drilling site. They must complete a technical assessment of the basin's petroleum potential and recommend a "drill" or "no-drill" plan for exploration based on prevailing technical and economic conditions.

During the competition, students gain experience from a real data set using cutting-edge technology, and they receive feedback from an industry panel. Students can win cash prizes for their schools, network with potential employers in the audience, and gain practical experience.

The Gulf Coast Association of Geological Societies and the American Association of Petroleum Geologists sponsor the competition.

Foundation—as a way to continue producing petroleum industry leaders and making research breakthroughs that are crucial to the world's energy supply.

The Reservoir Geophysics Program has three key objectives:

- ▶ To use geology and geophysics to better understand reservoir heterogeneity and find bypassed oil remaining in discovered fields.

Sun pointed out that oil companies need help finding bypassed oil. Twelve of his students research the heterogeneity, or structural variations, of complex oil reserves and map flow zones to recover more oil.

- ▶ To have a positive impact on CO₂ levels in the atmosphere while recovering more oil.

As part of an ongoing project in Texas' Permian Basin, several of Sun's students investigate the injection of CO₂ into the ground to extract more oil. These students explore the same basic science as the students working on reservoir structure, but with a focus on the influence of geology on CO₂ sequestration.

- ▶ To support efforts to find additional oil by drilling deeper wells onshore, drilling in remote areas such as the Arctic or drilling deeper wells offshore.

Sun works with four Ph.D. students to determine the formation mechanisms of carbonate reservoirs in super-deep basins with support from China Petroleum & Chemical Corp.

According to Sun, China and Brazil have the two most recent deep reservoir finds. "These finds could change the strategic thinking of deep exploration and the outlook for the world's future energy," Sun said. "When you drill deeper, everything changes—the whole petroleum geology changes. Pressure increases. Temperature increases. This presents a lot of challenges. By making progress in this area, we can help direct the future of oil exploration."

Sun's yin-and-yang approach to these challenges is helping future geoscientists bridge the gap between theory and application, academia and industry, teaching and research.

Working with his students (tomorrow's industry leaders), research colleagues, and an extensive network of geology and geophysics former students (today's industry leaders), Sun hopes to construct a fundamental scientific framework that will help to maximize petroleum production and supply for our nation. Support for College of Geosciences faculty will augment this endeavor, leading to discoveries that fuel the world long into the future. ☞

—BY CAROL TRONO

For information about how you can support the College of Geosciences, contact:

Diane Barron
Director of Development
Texas A&M Foundation
(800) 392-3310 or (979) 845-3651
d-barron@tamu.edu
giving.tamu.edu