

AAPG EXPLORER

April 2018

Basics and Beyond

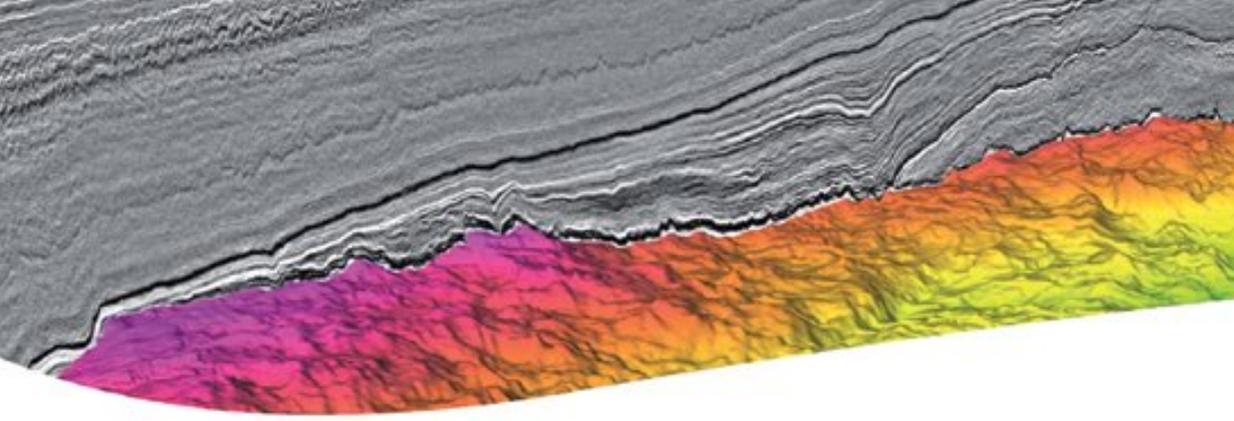
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AAPG

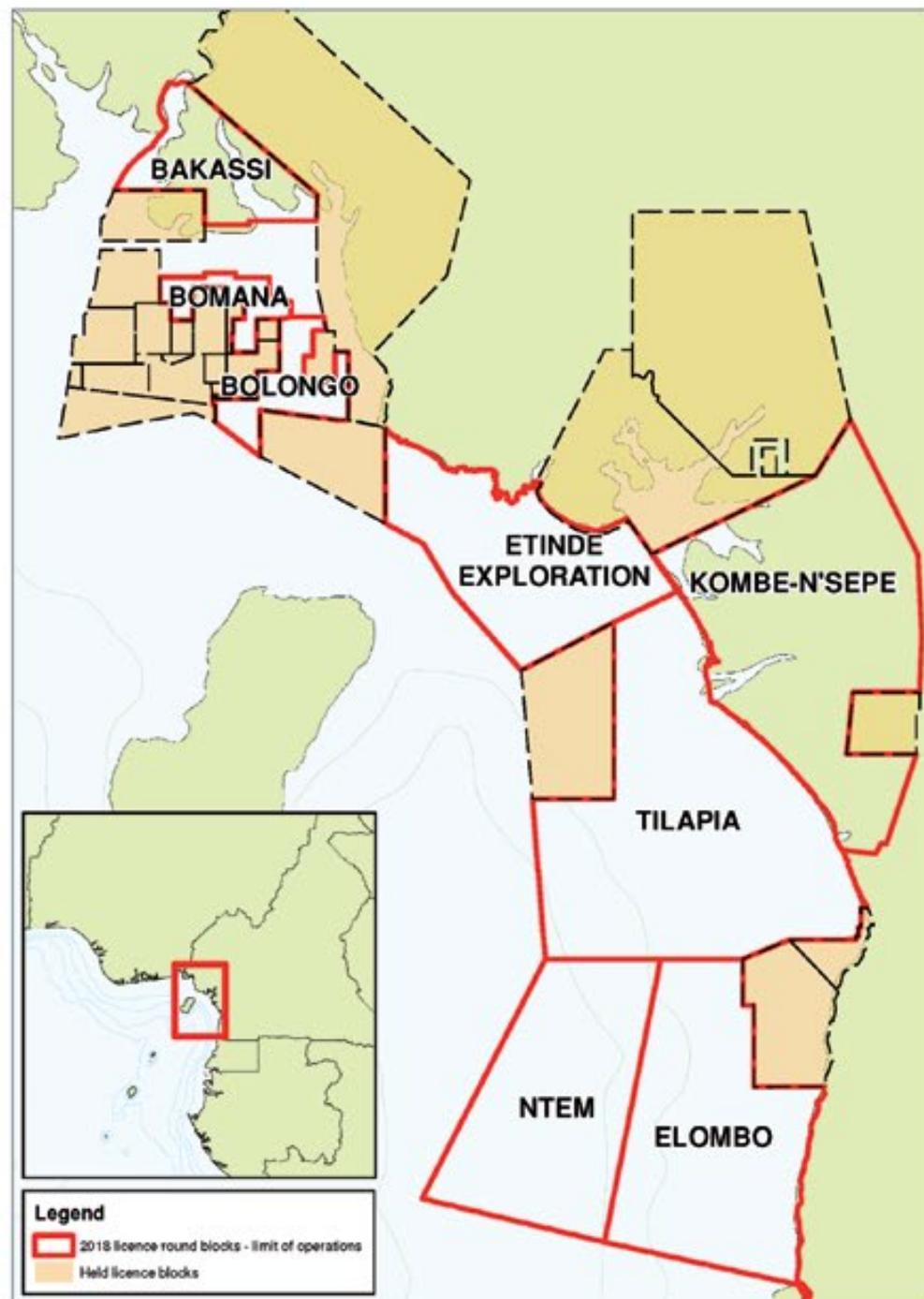
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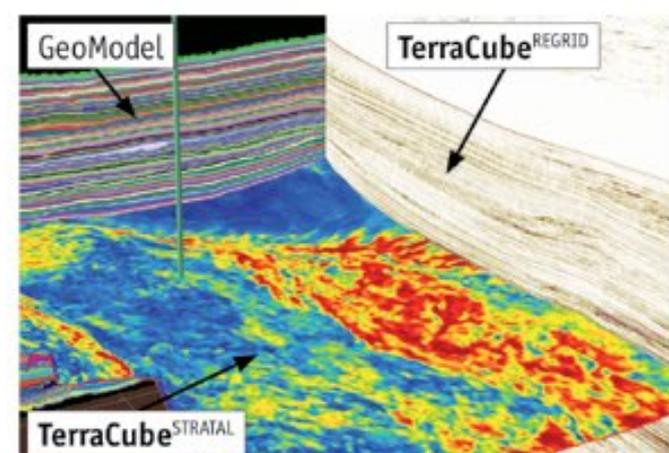
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Staying in Zone: Geoscience Matters

AAPG making the case to energy industry leaders

CERA was a diverse and dynamic week. A record-breaking 4,500 CEO's, leaders, energy ministers and global representatives from more than 70 countries attended the March 4-9 event to ponder the future of the industry. And this year, AAPG got to play an important role in this conversation.

I attended CERA Week for the first time in my long career and I was very impressed. Daniel Yergin and James Rosenfeld, founders of Cambridge Energy Research Associates, first began CERA Week 35 years ago. The program provides comprehensive insight into the global and regional energy future by addressing key issues – from markets and geopolitics to technology, project costs, energy and the environment, finance, operational excellence and cyber risks.

Yergin has long been a friend to AAPG. He spoke at the AAPG 100th Anniversary Gala in April 2017 and we thank him for his leadership.

This year's speakers included U.S. Secretary of the Interior Ryan Zinke; U.S. Secretary of Energy Rick Perry, Senators Lisa Murkowski and Dan Sullivan of Alaska and John Cornyn of Texas.

When I thanked Secretary Zinke for what the U.S. administration is doing for our industry he smiled and said, "Keep the faith."

I was also able to thank Houston Mayor Sylvester Turner personally for his leadership during Hurricane Harvey last August. In fact, I was able shake hands with many of the CERA Week attendees and tell them about AAPG. I was interviewed by IHS Vice President Bob Fryklund and I talked about the value of AAPG to geoscientists and I am pleased this video is publically available on the CERA Week website (visit Ondemand/CERAWEEK.com and search "Sternbach").

The CERA Week Schedule also included Secretary General of OPEC, His Excellency



The AAPG team at CERA week. Linda Sternbach, Bill Maloney (member AAPG Corporate Advisory Board), Charles Sternbach (President AAPG), Rick Fritz (Past Executive Director AAPG), Mike Canich (Candidate for President-Elect AAPG) and Mike Party (Candidate for President-Elect AAPG).

Mohammad Sanusi Barkindo; Fatih Birol, the executive director of the International Energy Agency; Mary Barra, the CEO of GM; and author Walter Isaacson, CEO of the

Aspen Institute, to name just a few.

At the time of this writing, 330 videos are available free online. I encourage you to view, learn, and access this treasure

trove of thought leaders. You can see many presentations online at the aforementioned web address.

High-Level Global Issues for Energy

My high-level summary from the CERA conference would be that demand is strong, future supply could be tight, cost reductions are significant and technology will enable future cost savings as well as energy breakthroughs. Pipeline permitting will get easier in the United States and more infrastructure will be built. Climate change is a real concern and companies are taking measurable action on emissions.

And lastly, natural gas is the fuel of the future.

Will conventional exploration be revived? Current Investment is down. OPEC's Barkindo, John Hess (CEO of Hess) and others expressed concern that \$1 trillion less investment in recent years will lead to future energy shortages from conventional



IHS Vice President Bob Fryklund (left) interviewing Sternbach about the value of AAPG to geoscientists.

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ON THE COVER:

"Geology of Bryce Canyon and Zion National Parks" is one of many field trips offered at this year's ACE in Salt Lake City, Utah.



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Utahraptor
Page 8



Thanking Dan Yergin, supporter of AAPG and co-founder of CERA.

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reservoirs. Counter point to that, Luca Bertelli of ENI gave a brilliant talk on how ENI discovered recent conventional giants, with less cost and a quick-to-market production strategy. Their upstream strategy employs a technical focus on turbidite reservoirs, carbonate platforms and petroleum systems excellence – all of which is bottom line testimony that geoscience matters!

Are unconventional resource forecasts over sold? Mark Papa, CEO of Centennial, said that the best core areas are drilled first, and therefore future production may be less because of reservoir exhaustion. The counter point is that technology is evolving fast and core areas are growing in both areal extent and efficiency. Lorenzo Simonelli, CEO

of GE-owned Baker Hughes, pointed out that getting an extra 2-3 percent recovery in a large oil field is as good as finding another oil field and thanks to existing infrastructure, perhaps even more profitable.

An important geoscience factor, rarely discussed by industry but crucial to success, is finding and staying in the optimal landing zones. Bill DeMis is one of the few thought leaders talking about this critical geological (and mechanical) component of success. I expect more on this topic in future papers on super basins for the AAPG Bulletin and other publications showing how geoscience matters.

Exploration in conventional resources benefits from better-imaged subtle traps. This includes subsalt reservoirs in the Gulf of Mexico, pre-salt microbialite reserves in Brazil, sandstones fringing basement highs in the North Sea and subtle traps in Guyana supercharged by La Luna source rocks. As Bill Maloney says: "Technology advances and subsurface visualization allows geoscientists to see in the data what they already see in their minds." Once again, geoscience matters!

Communicating the Value of AAPG Globally to the C-Suite

This year, as a result of our work with Fryklund and Pete Stark (also of IHS) on super basins, and thanks to the courtesy of Yergin, I was pleased to lead a delegation of current and future AAPG leaders at CERA. AAPG had a big footprint this year and that is very important for our industry and for the Association. An extended AAPG team presence at CERA Week included members of the AAPG Corporate Advisory Board, and in particular I am thankful for the thoughtful leadership of Bill Maloney, Susan Cunningham and Bobby Ryan.

AAPG needs to tell CEO's that geoscience is foundational. As I listened in on the CERA Week special topic sessions, I realized that all these investors, financial analysts, CEO's, engineers, regulators, government officials and policy advisers wouldn't be here discussing energy if it were not for the geoscientists who are the foundation of their industry. I would say to any CEO "that the application of geoscience to find, develop and produce oil and gas is the primary building block of any company. AAPG can offer your team knowledge-enhancing insights, constructive debate, a large and unique database plus access to one of the world's largest professional geological networks."

In short, geoscience matters!

Staying in Zone

How does AAPG differ from other scientific organizations? We are of the energy industry and the energy industry is of us. The extent that we focus on the commercial and financial aspects of the industry that supports us is critical to our success. The extent that industry recognizes that geoscience matters is critical to their success. This mutual win is why we must communicate our foundational role to the leaders of this industry by reminding them that both geoscientists and geoscience matters! That is how we "stay in zone."

Charles A. Sternbach



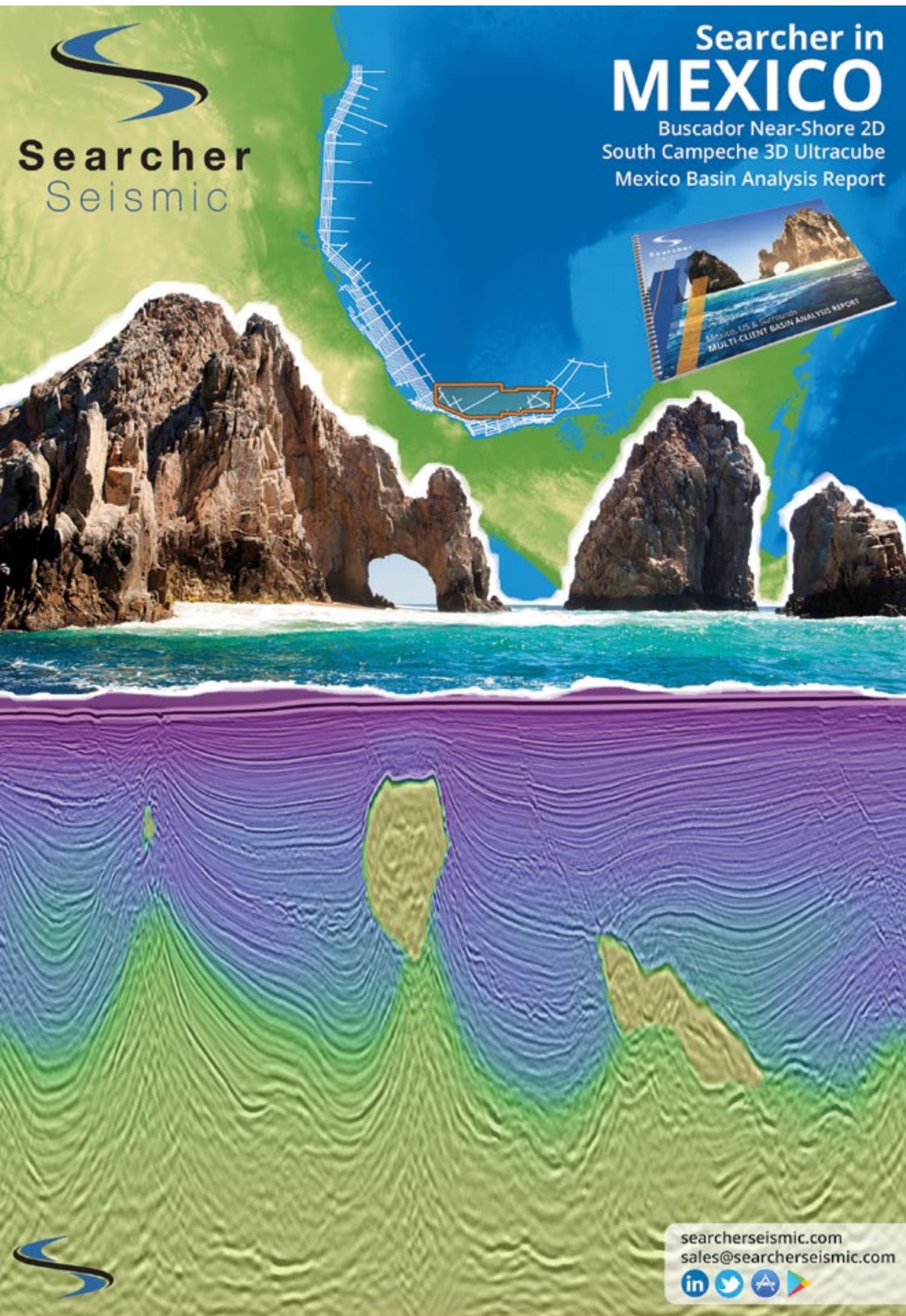
Discussing Innovation with Susan Cunningham, Retired EVP Noble Energy.



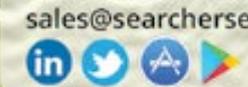
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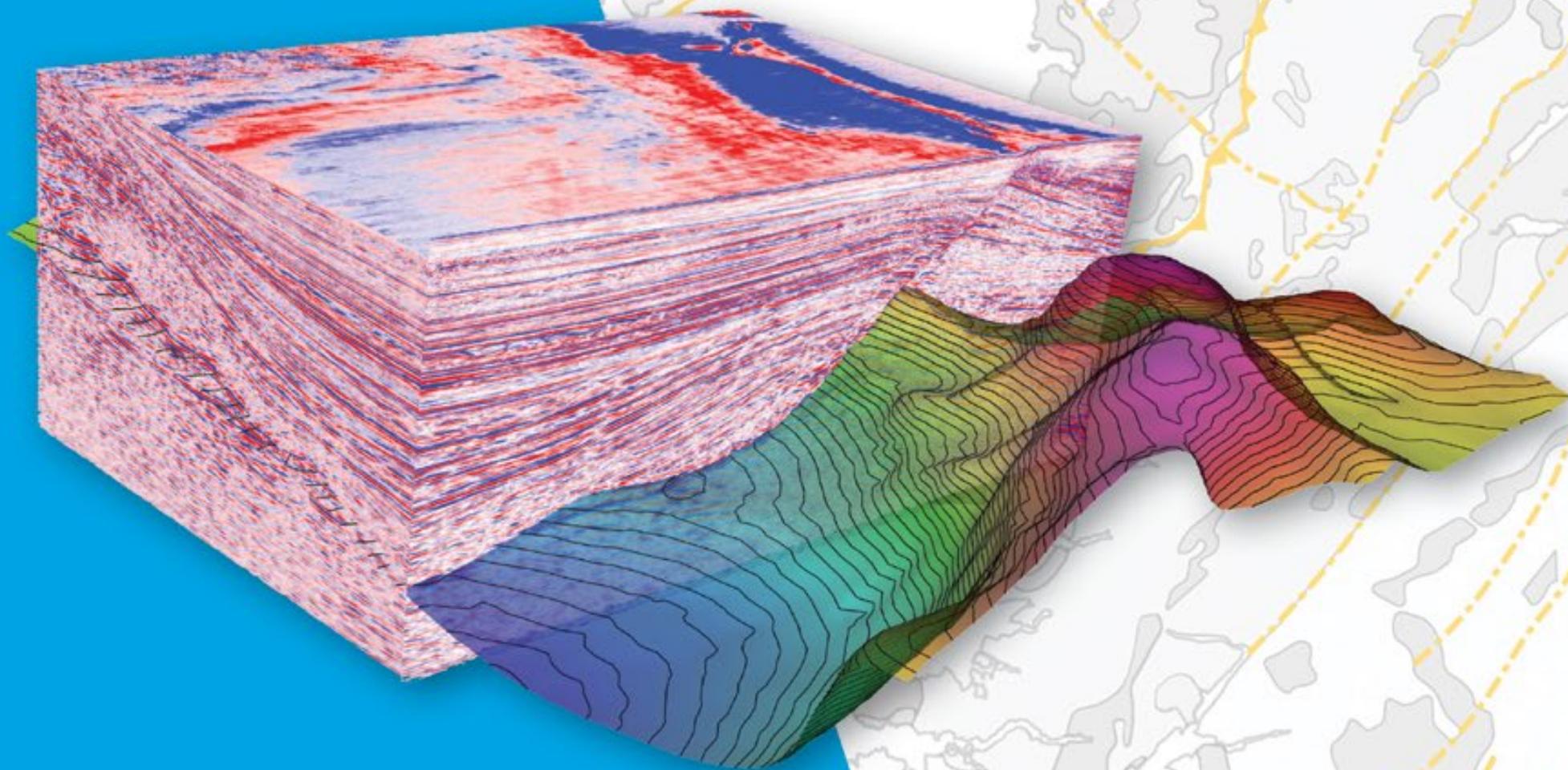
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Learning the Business of Petroleum Geology

“Geologist entrepreneur.” That’s a title many petroleum geologists have taken on in the past few years – sometimes with careful planning, sometimes unwittingly.

Three successful geologist entrepreneurs will share their experiences, advice and wisdom, along with ten other speakers in a special session at AAPG’s 2018 Annual Conference and Exhibition in Salt Lake City.

Co-chairs for the May 22 session, “The Business of Oil and Gas: The Many Pathways to Success,” are Rick Fritz, CEO of Council Oak Resources LLC in Tulsa, and Susan Nash, AAPG director of innovation and emerging science and technology.

Session speakers will include representatives from industry, finance and government. Geologists at all levels should benefit from the shared stories offered by these small or independent specialists:

“We geologists typically find ourselves with our head down trying to generate that next prospect, the next drilling opportunity. And we let the engineers run the economics,” noted Don Burdick, CEO of Olifant Energy LLC in Tulsa.

“The mindset we need is, ‘I’m in the business of oil and gas and I use my specialty to create value,’” he said.

Growing Into a Smaller Operation

Burdick worked at Marathon Oil from 1984-94, where his career “started off with a large multinational. After 10 years in that environment, he said, “Slowly and surely, I’ve worked my way down in size,” he said.

His later career path took him to independents of all sizes, then to one successful start-up company, then to



BURDICK

co-founding another.

When he moved to Samson Energy in Tulsa after Marathon, Burdick said, he joined a special project group composed of a geologist, engineer, landman and attorney. That job involved appearances in legal proceedings at the Oklahoma Corporation Commission, “serving as essentially an expert witness,” according to Burdick.

“When I went into it I thought, ‘Well, it’s either going to make me a stronger person or it’s going to turn me into a carpenter,’” he recalled.

“In a court of law, you become extremely aware of the areas in which you are making assessments, and the veracity of those assessments. And you find out about your weaknesses,” he said.

His other experience included a worldwide prospects-and-acquisitions portfolio at Vintage Petroleum, work at Cimarex Energy and a stint at Questar/QEP Resources as manager of the company’s geology group.

“For me, that was the first time to put on a manager’s hat, to lead and to steer the boat a little bit,” Burdick said.

Burdick said when he became manager of A&D at Laredo Petroleum he gained a much wider perspective on the industry and how it works.

“One bad decision or one poor performance, one mistake, can run up your costs tremendously.”



TEDESCO

“Through the Laredo experience, I had the deepest immersion in the business side of oil and gas. As I learned more about that, I thought, ‘Hmmm... There’s really something to this,’” he explained.

That experience led him to a role as vice president of geology and a partner in Panther Energy II, and eventually to co-founder of Olifant Energy. The company, with only a baker’s dozen employees, began drilling its second well this year.

“When you’re 13 people, every one of those folks influences the culture of the whole enterprise. There’s no place to hide,” Burdick observed. “On the financial side, when you’re a small group and you aren’t drilling a lot of wells, rarely do we get the A-plus contractors or services.”

“One bad decision or one poor performance, one mistake, can run up your costs tremendously. It’s one thing to go out and hire 13 people for your company. It’s another to evaluate 130 contractors,” he said.

Beware the Hamster Wheel

Steven Tedesco is CEO and president of independent operator Running Foxes Petroleum Inc., focused mainly on conventional plays in Kansas and Utah, and

founding president of Atoka Geochemical Services Corp. in Centennial, Colo.

He’s also chief science officer for XLS Energy Inc., which he described as a start-up green power generation company that’s working on generating electricity from stranded natural gas and other sources.

Tedesco emphasized the need for good business knowledge in addition to geoscience expertise for the geologist entrepreneur.

“Find a good source of funding,” he said. “Be diligent. Know how to assess a play – I find that a lot of geologists out there don’t use all the tools at hand.”

Geological analysis helped his company take one water-flooded Kansas field from five barrels of oil production a day to 120 barrels/day, Tedesco said.

“That came from recognizing that the field was never properly developed – the field was actually discovered in 1944,” he explained. “When you have eight companies flooding a field there’s a lot of inefficiency. Some of them will be doing it wrong.”

Given today’s realities in the oil and gas industry, Tedesco worries that exploration expertise is being sacrificed.

“I hear this from a lot of my friends, that the number of exploration geologists is dropping dramatically,” he said.

Layoffs and cutbacks in exploration spending during the recent downturn certainly caused part of the problem, but Tedesco sees another trend eroding exploration experience.

“I think the industry’s too focused on shale plays. There’s a large contingent of people who say they aren’t economic,” he said. “Shale plays are like a hamster in a wheel. As soon as they stop, they stop.”

See [Expectations](#), page 33 ▶



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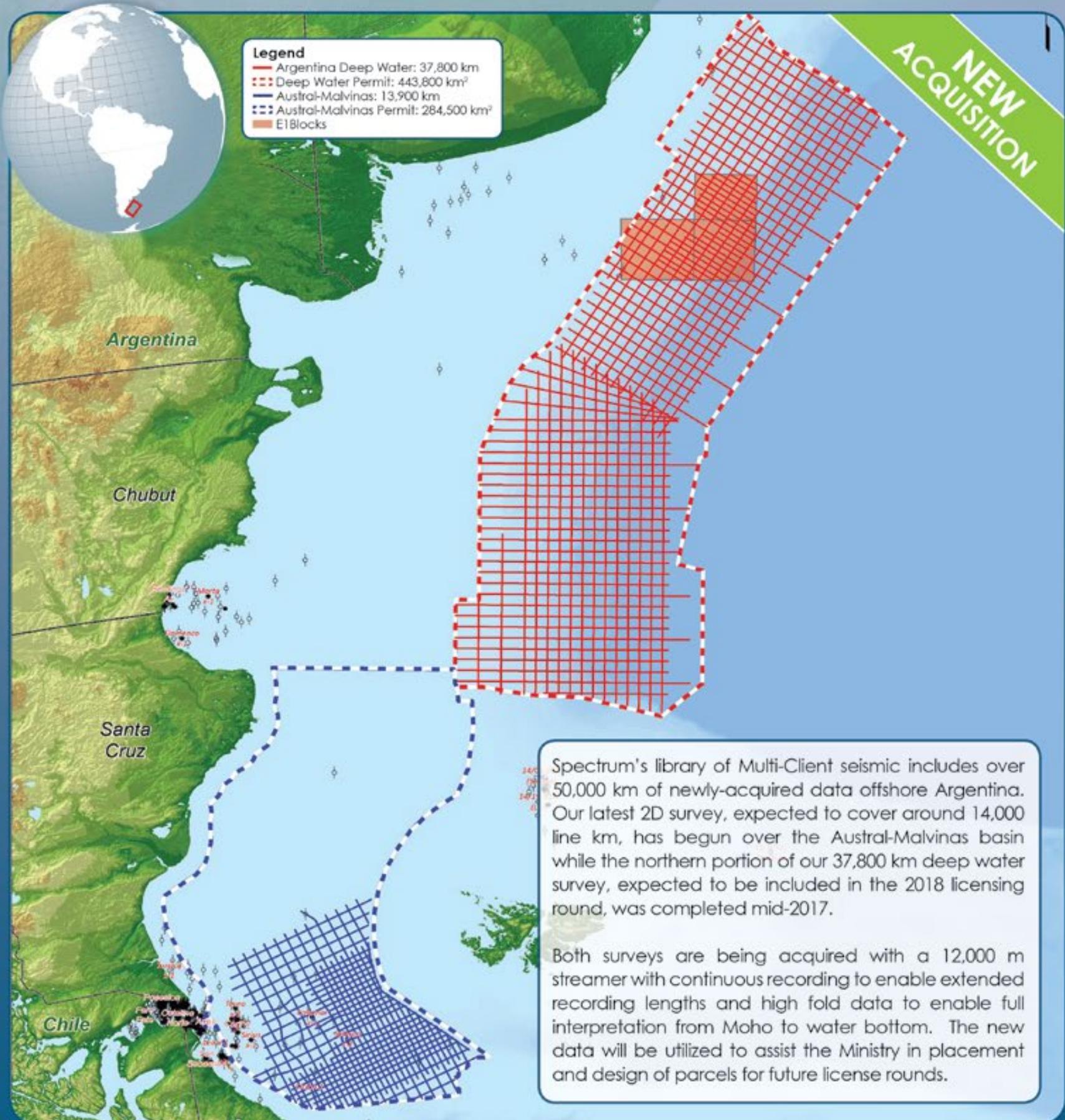
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Taking Fundamentals into the Future

ACE 101: Salt Lake City



There are several obvious reasons oil and gas professionals are interested in AAPG's 2018 Annual Convention and Exhibition in Salt Lake City this year, and at least one more subtle objective.

Michael Vanden Berg is energy and minerals program manager and senior geologist for the Utah Geological Survey in Salt Lake City.

As general chair for this year's ACE, he quickly listed a number of meeting highlights:

- ▶ Field trips to view some of the most compelling geology anywhere, including guided trips to Utah's national parks.
- ▶ What he called an "unprecedented" session on the presalt, with never-before-disclosed information.
- ▶ A massive core display with an extensive amount of continuous core.
- ▶ Background on the Permian Basin, arguably the hottest play in the United States, and an All-Convention Luncheon featuring the CEO of Diamondback Energy, a leading player in the basin.
- ▶ A Wednesday luncheon speaker discussing the effects of unconscious bias in the workplace.
- ▶ Plus the Utahraptor and the world's fastest wheel-driven car.

Throw in a Super Basins Forum, a two-part session on finding success in "The Business of Oil and Gas" (see page 6 story), a special executive forum on innovation and 600 poster presentations, and you get an idea why geoscientists will show up.

But some ACE attendees will be in Salt Lake City to research topics not listed in any of the convention guides: What the heck is going on in the oil and gas industry right now? How is the industry reshaping and repositioning itself for the years ahead?

Vanden Berg hopes the meeting will draw just that kind of attention, with an aim to provide resources for the energy geoscientist of the future.

"There are a lot of ways this ACE is

"There are a lot of ways this ACE is addressing changes in the industry that are coming and those that are happening now."

addressing changes in the industry that are coming and those that are happening now," he said.

This, the first Annual Convention of AAPG's second century, is officially designated "ACE 101: Bridging Fundamentals and Innovation."

Vanden Berg explained that the May 20-23 meeting will "provide an opportunity to return to the rocks and to remember the importance of fundamental geologic concepts, but also to look to the future, to harness and embrace new technology and innovation."

That includes a Machine Learning "Unsession": a new concept for AAPG in an interactive format without formal presentations. The idea is to get geoscientists up to speed on today's computing environment, Vanden Berg explained.

"It's basically a forum-based opportunity as a way to learn about Big Data, machine learning and that kind of thing," he said.

Addressing changes in the social environment, the "Unconscious Bias" luncheon will feature Carlee Beth Hawkins, a researcher and director of training with Harvard University's Project Implicit and an assistant professor of psychology at the University of Illinois-Springfield (see related story on page 12).

"That's something we wanted to highlight because it's different – nothing like this has been given at ACE before. We think it's timely," Vanden Berg said.

AAPG's Division of Professional Affairs will tackle tomorrow's challenges in the

DPA Special Forum: The Future Energy Geoscientist, with industry leaders discussing opportunities, career paths and essential skills in a program geared to young professionals and students.

Scenery and Science

This year's ACE provides a unique opportunity to keep an ear to the ground and an eye on the scenery – anyone traveling to Salt Lake City can take advantage of that local specialty, according to Vanden Berg.

"Utah is known for its rocks. Obviously, it's a beautiful state," he said.

In addition to sightseeing opportunities, the meeting offers 13 field trips to observe and learn from the state's geology, including guided tours of several national parks.

"The cool thing about those trips – like the Bryce Canyon and Zion (national parks) trip – the two guys who are leading that trip are the guys who mapped that whole area," Vanden Berg noted.

He said the availability of knowledgeable local geologists as guides and expert instructors is "a huge privilege," especially because Utah has world-class and world-renowned outcrop analogues.

The state contains the "same types of deposits that are being drilled in the Gulf of Mexico now. Everybody studying the Gulf of Mexico comes to Utah," he said.

Vanden Berg expects the meeting's extensive core display to be a geoscience

focal point. It's being promoted as "Core Like Never Before!"

"We've arranged for several cores from all over the United States and one international. We're displaying whole sections of core from hundreds of feet to over a thousand feet," including 1,600 feet of continuous core from the Green River Formation, he said.

"To complement that, we have a core from the presalt, from the Kwanza Basin offshore Angola," he added.

In addition to those lacustrine cores, other examples include core from the Elko formation in Nevada and a lacustrine microbialite slab display.

"Lacustrine systems is one of our big themes because the meeting is here in Salt Lake City," Vanden Berg said.

Other core displays will come from emerging plays in the Williston basin, as well as the Mancos/Niobrara in Colorado, the STACK play in Oklahoma and the Mancos shale in the San Juan Basin of northwest New Mexico.

The 2018 ACE technical program will explore 11 different themes and Vanden Berg thinks information on the presalt and salt-involved systems will have a huge impact.

"We were able to get Petrobras and some other companies working the presalt to release data and have some of their geologists talk. From what they tell me, this is the first time anyone has discussed these discoveries publicly," he said.

Special Speakers

Scheduled speakers at the meeting include Travis Stice, CEO and director of Diamondback Energy, at the All-Convention Luncheon, and William Armstrong, president of Armstrong Oil & Gas, who will deliver the Michel T. Halbouty Lecture.

Diamondback is "at the forefront of the huge new opportunities and what's going on now in the Permian Basin. They've been a leader in the resurgence of the basin," Vanden Berg noted.

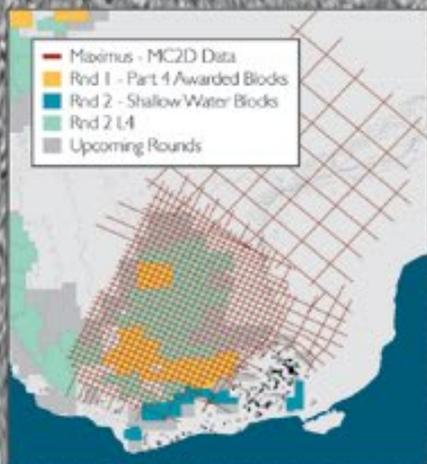
Armstrong will discuss the discovery of the Pikka field on the North Slope of Alaska. His company and partner Repsol made headlines last year when they announced the massive discovery in the Nanuschuk play.

In addition to its scenic beauty, the Salt Lake City area has many sites of historic interest. Just 65 miles to the north, in Promontory, Utah, the first transcontinental railroad in the U.S. was completed with the driving of the Golden Spike in May 1869.

And make no mistake, a number of geoscientists will be attending ACE this year just to find out what's coming down the track. 



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Petrography of Mudrock Hydrocarbon Reservoirs
Saturday, 19 May 8:00 a.m. – 5:00 p.m.

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Concepts, Models, and Case Studies of Dolomitization - With Applications to Hydrocarbon Exploration and Development
Saturday, 19–20 May 8:00 a.m. – 5:00 p.m.

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Chemometric Tools to Establish Petroleum Systems, Predict Physical Properties, and De-Convolute Mixed Production
Sunday, 20 May 8:00 a.m. – 5:00 p.m.

AAPG - EMD

Applied Petroleum Geochemistry
Sunday, 20 May 8:00 a.m. – 5:00 p.m.

MGS

An Introduction to Core Analytical Techniques
Saturday, 19 May 8:00 a.m. – 5:00 p.m.

SEPM

Sequence Stratigraphy for Graduate Students
Saturday, 19–20 May 8:00 a.m. – 5:00 p.m.

UGA

Tricky Carbonates Made Simple
Sunday, 20 May 8:00 a.m. – 5:00 p.m.

AAPG - EMD

Unconventional Resource Assessment and Valuation
Sunday, 20 May 8:00 a.m. – 5:00 p.m.

UGA

Dissecting a Cretaceous Fluvial-Deltaic Succession in Core, Ferron Sandstone, Utah
Saturday, 19 May 8:00 a.m. – 5:00 p.m.

SEPM

Advanced Sequence Stratigraphic Applications for Exploration
Saturday, 19–20 May 8:00 a.m. – 5:00 p.m.

SEPM

Sequence-Stratigraphic Analysis of Shales and Mudstones: Key to Paleoclimate Archives, Subsurface Fluid Flow, and Hydrocarbon Source, Reservoir and Seal
Sunday, 20 May 8:00 a.m. – 5:00 p.m.

PTTC

Petrophysical Evaluation of Unconventional Reservoirs
Thursday, 24 May 8:00 a.m. – 5:00 p.m.

PROWESS

Fracture Characterization
Saturday, 19 May 8:00 a.m. – 5:00 p.m.

UGA

Mechanical Fundamentals for Production from Low Permeability Reservoirs
Sunday, 20 May 8:00 a.m. – 5:00 p.m.

AAPG

UAVs and Virtual Outcrops – from Data Collection to Final Interpretation
Sunday, 20 May 8:00 a.m. – 5:00 p.m.

SEPM

Rock and Seismic Sequence Expression of Carbonate Systems – Exploration and Reservoir Characterization
Thursday, 24–25 May 8:00 a.m. – 5:00 p.m.

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Over Utah, Experience ACE!



Fluvio-Deltaic and Lacustrine Interpretations of Potential Source and Reservoir Rocks: Examples From the Green River Formation, Uinta Basin, Utah, (UGA)
Friday, 18–20 May 2018



Overview and Timing of the Northern Utah Sector of the Sevier Fold-and-Thrust Belt: Its Interaction With Laramide Structures and Ultimate Collapse During Tertiary Extension, (UGA)
Thursday, 24–25 May 2018



Great Salt Lake: Microbialites, Past and Present, (UGA)
Friday, 18–19 May 2018



Stratigraphic Elements of Shinarump and Deltaic Strata, Upper Cretaceous of the Northern Book Cliffs, (SEPM)
Thursday, 17–19 May 2018
Sold Out!



Exploring the Diverse Geology of Capitol Reef National Park, (UGA)
Thursday, 17–19 May 2018



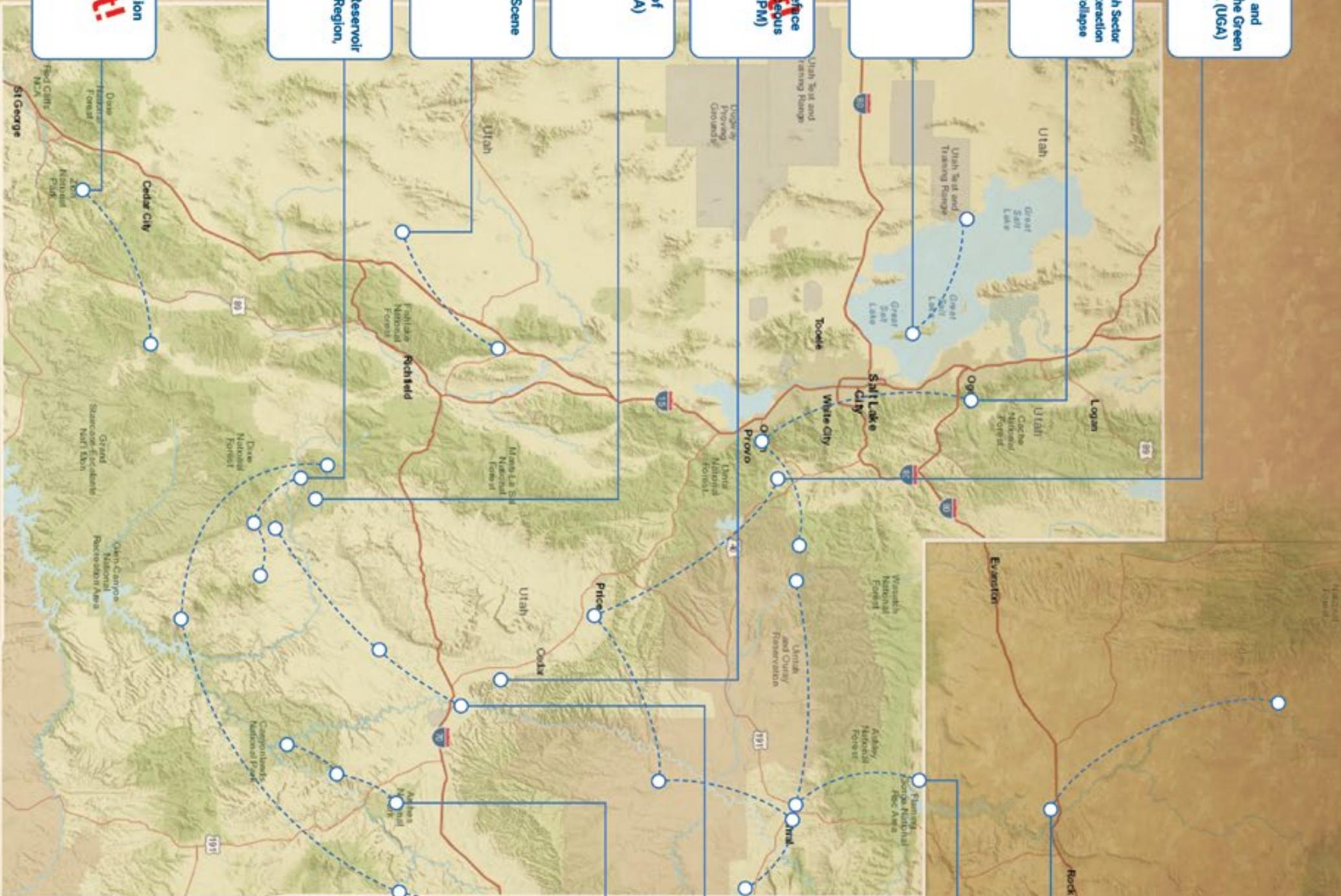
The Changing Power Generation Scene in Utah, (UGA)
Thursday, 24–25 May 2018



Upper Cretaceous Stratigraphy, Depositional Environments, and Reservoir Geology of the Henry Mountains Region, Southern Utah, (SEPM)
Wednesday, 23–27 May 2018



Geology of Bryce Canyon and Zion National Parks, (UGA)
Thursday, 17–19 May 2018
Sold Out!




Lake Type Evolution and Microbialite Facies of the Eocene Green River Formation, Wyoming, (SEPM)
Thursday, 24–26 May 2018



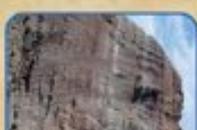
Shelf to Basin Transect Through the Phosphoria Formation in Northeastern Utah and Implications for Hydrocarbon Exploration, (UGA)
Thursday, 24–25 May 2018



Fault Zone Structure Controls on Fault Sealing and Fluid Migration in Hydrocarbon Reservoirs and Caron Capture and Storage Prospects: Examination of Natural Analogs From Southeastern Utah, (UGA)
Wednesday, 23–26 May 2018



Classic Geology of Arches and Canyonlands National Parks, and Spectacular Points Along the Way, (UGA)
Thursday, 24–26 May 2018



Predictive Models for Fluvial Reservoir Development and Properties: Salt Wash Distributive Fluvial System, Morrison Formation, (UGA)
Wednesday, 16–19 May 2018

Moving Beyond Bias

ACE session provides strategies for increasing fairness in the workplace

Do you tend to favor people who look like you? Do you feel that men are better fit for certain jobs, while women are better for others? Do you make judgments without understanding why?

Questions like these are the subject of research by Carlee Beth Hawkins, assistant professor of psychology at the University of Illinois at Springfield and researcher with Harvard University's Project Implicit, an international organization studying attitudes, thoughts and feelings held outside conscious awareness and control.

The Project website, established in 2005, boasts more than one million visits annually by universities, corporations, health care professionals, law firms and others who seek information about biases concerning race, gender, sexual orientation and other topics.

Hawkins will discuss her research at the "Unconscious Bias" luncheon session during the 2018 AAPG Annual Conference and Exhibition in Salt Lake City.

Discovering Bias

Hawkins, native of a small town in East Central Illinois, said she first encountered bias when she entered university.

"To say that my town lacked diversity is an understatement," she said. "College introduced me to people who were different from me, and I was filled with both curiosity and discomfort. I didn't know how to relate outside my bubble."

Conflicting feelings remained when she began working in services with adolescents from disadvantaged backgrounds.

Hawkins described having a moment



of clarity late at night in a jail cell. She was helping resolve a family conflict between a single mother and her rebellious teenage daughter. The mother wanted her daughter to sit in jail for the night to think about her decisions, hoping that tough love would keep her from repeating the same mistakes she made years earlier.

"The mother told me her story, and I realized in that moment that she and I had grown up in different Americas," Hawkins said. "I committed my career to understanding prejudice and discrimination."

She began to study implicit bias in graduate school and pursued her doctoral program working with Brian Nosek, one of the creators of the Implicit Association Test (IAT), an online assessment that asks users to associate words and images and measures attitudes and beliefs that people may be unable or unwilling to report.

Hawkins has worked with Project Implicit since 2007, serving as training director and leading workshops throughout the United States.

"Our minds are very good at providing reasons why our thoughts and behavior are objective and rational. These compelling reasons lead us to dig in our heels and reinforce our self-concept as objective and unbiased."

Diversity in Science

Lauren Birgenheier, University of Utah assistant professor of geology and ACE 2018 technical program chair, met Hawkins at an "Implicit Bias" workshop in late 2017.

"Carlee was engaging and relevant, and the workshop was really educational, even for people who try to keep up with topics related to diversity in the workplace," she said.

Birgenheier approached the committee and AAPG leadership about including the topic in the program.

"We wanted to highlight the strength of diversity in science and the strength that different perspectives can bring when working with plays," she said. "We talked to AAPG President Charles Sternbach and President-elect Denise Cox, and they were very supportive of the topic."

A Fair Shake

Birgenheier said introducing the topic of unconscious bias is important because,

regardless of background or our training, all people have attitudes or stereotypes that affect their decisions and actions.

"We are all good, well-meaning people, but even good, well-meaning people have biases. We all have biases, and that is what the workshop addresses," she said. "It helps us to adopt useful and easy strategies to try to minimize that bias and make sure that everyone is heard, and that we are succeeding in our organizations."

As a female geoscience professor, Birgenheier is a minority among predominantly male peers. She noted how Hawkins' workshop helped her to discover her own biases.

"It's important for me to understand that I have gender biases just from being in our society," she said. "Even I am someone who may actually value male over female contributions. That's not what I want to do, so I've been really excited about learning practical ways that I can reduce that bias."

Birgenheier said that Hawkins helped her develop strategies for managing bias at work.

"As a professor I write recommendation letters for students, and it's well documented that males receive better or more glowing reviews than females with the same credentials," she said.

Hawkins' workshop helped Birgenheier find strategies to write balanced letters for recommendation.

"I learned that if you put off (a task) until the last minute, your bias will become stronger, so setting time aside to write a recommendation

See [Critics](#), page 16 ►

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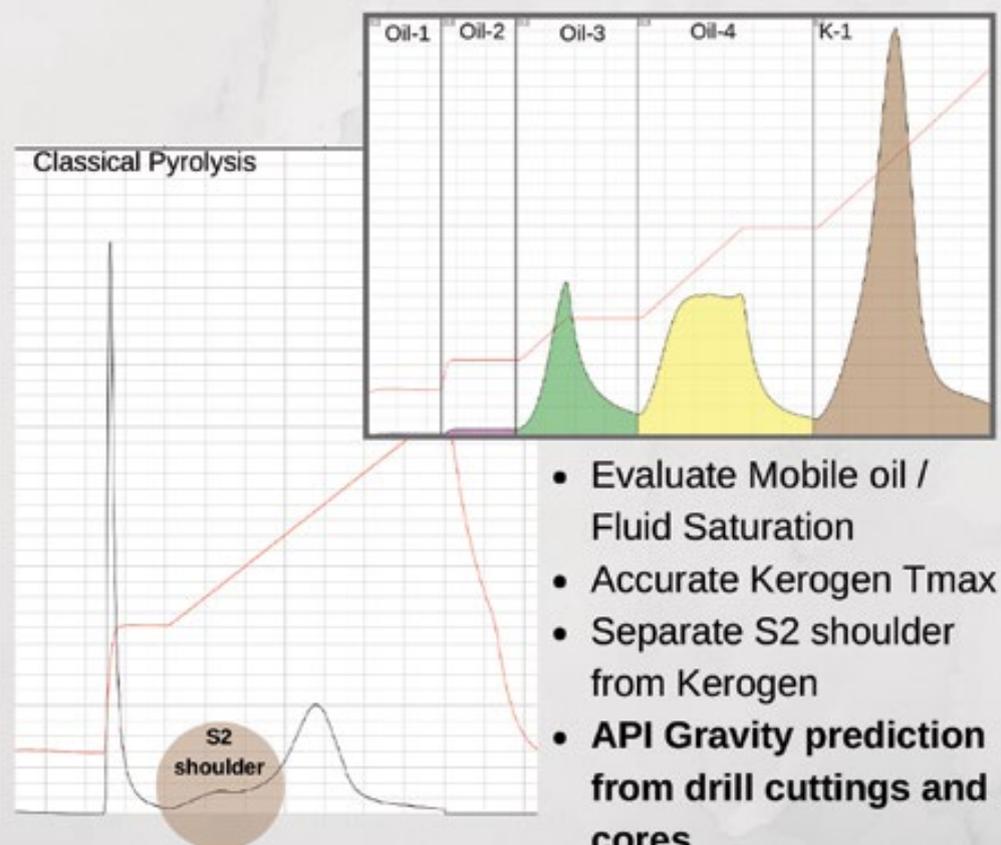
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Around the World in 80 Minutes

The International Pavilion brings global opportunities

A APG presidents' job description includes following global industry activity, visiting different parts of the world and attending AAPG events. The International Pavilion, a staple at AAPG annual conventions and international conferences since 1994, enables them to accomplish these tasks simultaneously.

AAPG President Charles Sternbach noted how the International Pavilion affords the opportunity to travel (virtually) to many countries, all in one convenient time and place. He met with representatives from Australia, Africa, Europe and the Americas exhibiting in the IP during the International Conference and Exhibition (ICE) icebreaker reception in London late last year.

"The IP enables explorers to scan global opportunities, to learn about the latest discoveries and bid offerings, and to network with those who know the areas in detail," he said. "The data, displays and interactive presentations offer a high bandwidth of opportunity and technology sharing. Overall, it's a way to have a fun and productive experience while being sensible on the travel budget."

Gina Godfrey, co-founder of petroWEB, has managed the International Pavilion for AAPG for the past 14 years.

"The mission of the IP is to help provide a worldwide showcase for countries promoting exploration and investment

opportunities, she said. "We focus on providing a platform for bringing together countries with oil and gas resources and oil and gas companies looking to explore and produce them."

The ICE London IP featured 15 exhibitors representing 14 countries from six continents. Their participation highlighted global opportunities for exploration and development in both traditional markets and lesser-known areas.

Volcanoes and Prospects

IP participation brought global attention to the Faroe Islands, a country of 50,000 people located halfway between Scotland and Iceland.

Heri Ziska, head of geoscience exploration at the Faroese Geological Survey, attended primarily to promote the Islands' bid round closing in February 2018.

"We need to maintain visibility as well and to capture people who come by. There are people who still don't know we have a round," he said.

The Faroe Islands have both oil and gas potential. The nine wells drilled offshore and three stratigraphic tests onshore have drawn interest from abroad. But the country's volcanic geology creates uncertainty.

"We are a high-risk/high-reward area. There are really large opportunities, but there are risks associated as well," Ziska said.

In addition to participating in the IP, Ziska attended technical sessions focused on topics relevant to the Faroe Islands.

"At ICE there are talks about volcanic geology and how it affects hydrocarbons, how you can produce from these reservoirs" he said. "This is kind of new and very interesting for us."

New Logo, New Future

Namibian national oil company, NAMCOR, used the ICE London IP as a platform to announce the company's transformation from a traditional government regulatory agency to an integrated commercial company.

Managing Director Immanuel Manulunga distributed business cards with the new company logo – a 12-point spiral representing the movement of the Namibian sun.

He shared high hopes for Namibia's upstream and downstream potential, highlighting one of the country's greatest assets – its data.

"The Namibian database is unequalled in Africa. It's one of the best you can find," he said.

Manulunga talked to ICE attendees about the potential for turning data into discoveries. Namibia's last significant discovery was in 1974, a small field with 1.3 trillion cubic feet of gas. Wells drilled in 2012 found oil in source rock, but the find was not economical enough to continue.

"We know that there is oil and gas in Namibia. But it needs to be discovered," Manulunga said. "We are still a frontier country."

He said there have been fewer than 30 wells drilled on the entire continental shelf, and the country has nearly 1,800 kilometers of unexplored coastline.

He added that Namibia's plentiful data, geological potential and open licensing system are not the only benefits available to investors.

"We have a stable exploration environment, a stable government, political stability, and rule of law," he said. "It's predictable, so you know what you're bargaining for when you come to Namibia."

An Easy Place to Do Business

Frontier exploration potential and stable operating environments were themes at the other end of the International Pavilion, where representatives from Geoscience Australia and the state of South Australia promoted onshore and offshore bid rounds and prospectivity.

Handing out fuzzy koalas and USB drives, Elinor Alexander, director of South Australia's geoscience exploration branch, talked with visitors about prospective basins. She highlighted the benefits Australia offers to companies.

"Australia is still largely unexplored. There are a lot of frontier opportunities so companies can get in early and make discoveries at the ground level," she said. "There's enormous potential and easy access to data. It's a friendly democracy, an easy place to do business and a great place to visit and take in some amazing geology."

She hopes that exhibiting at ICE and other events will continue to attract investors to Australia.

"We love making as much data available as possible," she said. "It's free and easy-to-get and people love that."

Geoscientists as Civil Servants

Making data accessible is a strategy shared by Nova Scotia, Canada's Department of Energy, which joined the IP to announce a bid round in offshore Cape Breton.

Petroleum Branch Executive Director R.A. (Sandy) MacMullin explained how his team conducted a play fairway analysis on the play and made the results available online free of charge.

In the past 10 years, the province has spent \$32 million (\$26 million U.S.) on geoscience work – an amount MacMullin



Continued on next page ►



The Namibian national oil company NAMCOR announced its recent overhaul at ICE in London recently. The country has nearly 1,800 kilometers of unexplored coastline. Photo courtesy of And Beyond.

Continued from previous page

considers a worthy investment.

"We realize that the great risk in our offshore is geological in nature. It hurts exploration economics. If we can help reduce exploration risk we will encourage companies to come to Nova Scotia," he said.

MacMullin notes that since Nova Scotia started hiring geoscientists to do analysis, the province has received more than \$2 billion in exploration commitment bids from Shell, BP and Statoil.

"There's no question that the work that we did had an impact. Industry has said they found the work to be trustworthy and they use it," he said. "What we're comfortable with in our analysis, we say; what we are not comfortable with, we say that too."

MacMullin noted how lower energy price environments have caused governments

to examine what role they can play to increase investment or reduce risk in their jurisdictions.

"It's interesting to see the new model we developed is working," he said. "We can do original work, and companies see it as helpful. The analysis is free and complete. It's made available to everyone."

Veteran Participants

Working closely with industry to promote exploration is a key theme for ANCAP, the Uruguayan national oil company and regulator who came to London to promote the Uruguay round 3, offering exploration and production contracts in the country's offshore basins.

"ANCAP has systematically and permanently participated in the International Pavilion over the last nine years," said Santiago Ferro, the agency's administration

and contracts manager. Ferro noted that IP participation in different locations provides the opportunity to meet contacts in many parts of the world.

During ICE in London, ANCAP representatives met with companies who do not traditionally travel to Uruguay or South America.

"We accomplished the objective of making new contacts, and promoting Uruguay round 3," Ferro said. "Our meetings and presentations helped us introduce our opportunities to important oil companies from Europe and Asia."

He shared ANCAP's message of "more exploration with better contracts, excellent data availability, less risk, and lower investment requirements for future operators."

ANCAP's search for future partners includes participation in the International Pavilion. The agency has reserved space

for a stand at the IP at the AAPG Annual Conference and Exhibition (ACE) in Salt Lake City on May 20-23.

Expanding Opportunities

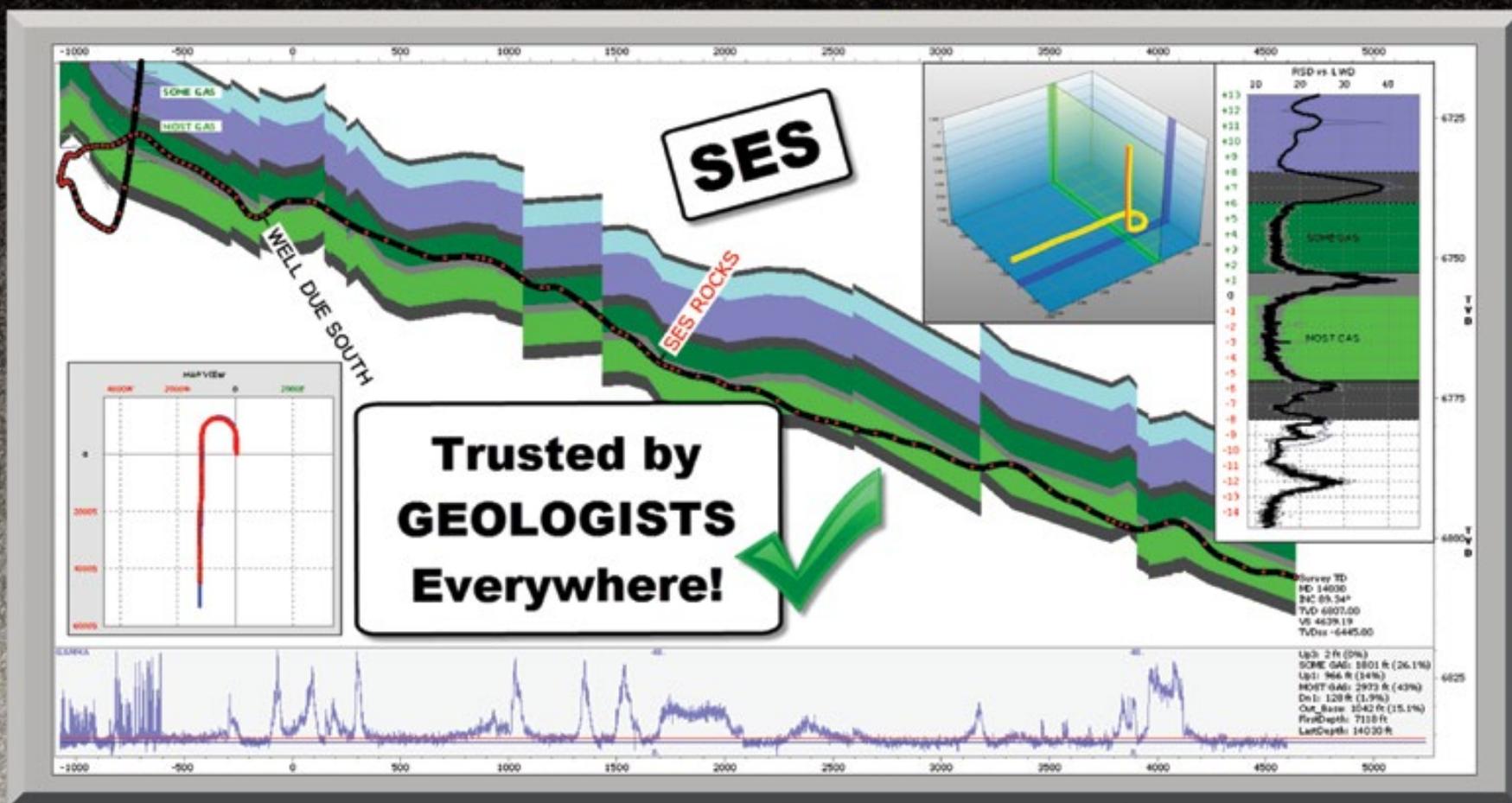
Godfrey noted that the IP will have a new feature at the upcoming ACE. In addition to the traditional exhibition of countries, the IP will be offering a new International Speaker Program hosted in the IP Theater on the exhibition floor.

The program features three tracks, license rounds and open acreage, current exploration activity and opportunities and new data acquisitions.

"Attendees can expect to come away with heightened insight into current and future global activity," she said.

To join the IP or for more information, contact Gina Godfrey at ggodfrey@petroweb.com.

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Critics

from page 12

letter can be really helpful," she said. "Because I'm someone who trains students who go into the industry, I want to make sure I'm giving them all a fair shake as they go forward."

Accepting Bias

Hawkins noted that most people consider themselves objective and unbiased.

"We think we treat people equally; sometimes people even say things like 'I don't see race' or 'I treat men and women the same.' Even if we know that biases exist in our culture, we tend to think that we personally do not harbor them. Some of us may realize that we have some biases toward certain groups, but even then, we are often unaware of when

and how those biases influence our decisions and behavior."

She added that when people receive feedback about having said or done something biased, they tend to be defensive, refusing to believe it.

"Our minds are very good at providing reasons why our thoughts and behavior are objective and rational. These compelling reasons lead us to dig in our heels and reinforce our self-concept as objective and unbiased," she said.

Hawkins suggests an alternative, accepting the fact that all people have biases and that these biases can influence decisions and behavior.

"If we can bring acceptance and humility to our own biases, we can begin to understand what our biases are, and we can start to work on changing those decisions so that our biases may have less of an impact on us," she said.

Critics

Experts disagree on the extent to which individuals' bias affects their behavior.

A January 2017 article from The Chronicle of Higher Education cited IAT founder Nosek's writings noting a "very weak overall" connection between implicit bias and discriminatory behavior.

The article cited a review of 499 studies over 20 years involving more than 80,000 participants using the IAT and similar measures. Researchers concluded that "the correlation between implicit bias and discriminatory behavior appears weaker than previously thought" and that "there is very little evidence that changes in implicit bias have anything to do with changes in a person's behavior."

Hawkins cited numerous studies connecting bias to discriminatory behavior, but

also recognized that there is a question about to what degree methods like the IAT predict discrimination.

Hawkins noted how experts are working to understand methods' limitations and on improving measures to assess discriminatory behavior.

"It's important to note that while implicit bias work has exploded in recent years, the first IAT paper was published just 20 years ago," she said. "We still have a lot of work to do."

What Not to Do

Regardless of the degree to which implicit bias affects our actions, Hawkins and colleagues agree that mandating diversity training will not help to reduce discrimination.

Experts also agree that compulsory diversity training often backfires, creating defensiveness and resentment among attendees.

A July 2016 article in the Harvard Business Review cited laboratory studies concluding that force-feeding diversity training can activate bias rather than eliminate it. The article cited conclusions drawn from reviewing 30 years of data from 800 U.S. companies.

"We've seen that companies get better results when they ease up on the control tactics. It's more effective to engage managers in solving the problem, increase their on-the-job contact with female and minority workers, and promote social accountability – the desire to look fair-minded," authors wrote.

Hawkins agreed that mandatory training tends to be counterproductive, while voluntary training is helpful.

"Diversity training may increase defensiveness in some participants, but learning things that make us uncomfortable can motivate us to change," she said. "Ignoring a problem does not make it go away."

Expectations for the Session

Hawkins said she hopes the ACE session will help attendees accept that all people have biases and motivate them to understand their own biases better.

Her presentation includes three primary concepts:

- ▶ Much of mental life occurs outside of conscious awareness.
- ▶ Implicit thoughts can contradict conscious beliefs.
- ▶ Action is shaped by intended and unintended thoughts.

Birgenheier said she hopes luncheon participants will be excited about the topic and that they will want to learn more.

"I want to see what the appetite for this topic is so we can potentially plan future events around this discussion," she said. "We have received a lot of financial support and enthusiasm for the event," she said. "It's been refreshing to find that when you have an exciting topic, people are motivated to get behind the event. There is a lot of support to talk about the issues and highlight the strengths of diversity in the workplace."

Big Step for AAPG

For Catherine Campbell, ACE 2018 sponsorship chair and senior geologist at Camino Natural Resources, hosting the Unconscious Bias Luncheon is a great step forward for AAPG.

"There is a strong bimodal distribution in our field and communicating across the experience and age gaps can be complicated by unconscious bias," she said. "I am excited to identify my personal biases and learn techniques to look past them. This opportunity is unique and important for all members of AAPG who are looking to grow personally and professionally."

The Unconscious Bias Luncheon will be Wednesday, May 23 at 11:30 a.m. in the Salt Palace Convention Center. For more information visit ACE.AAPG.org.



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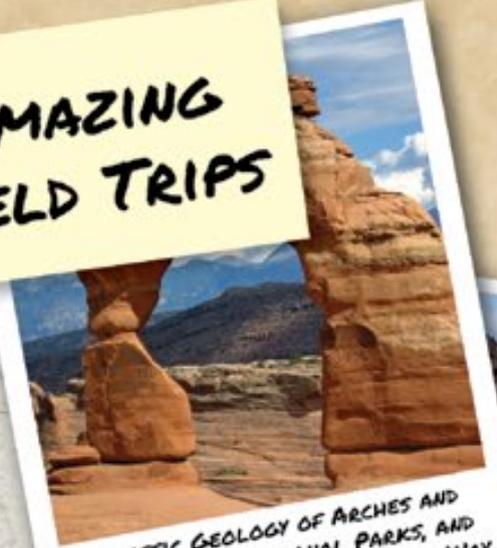
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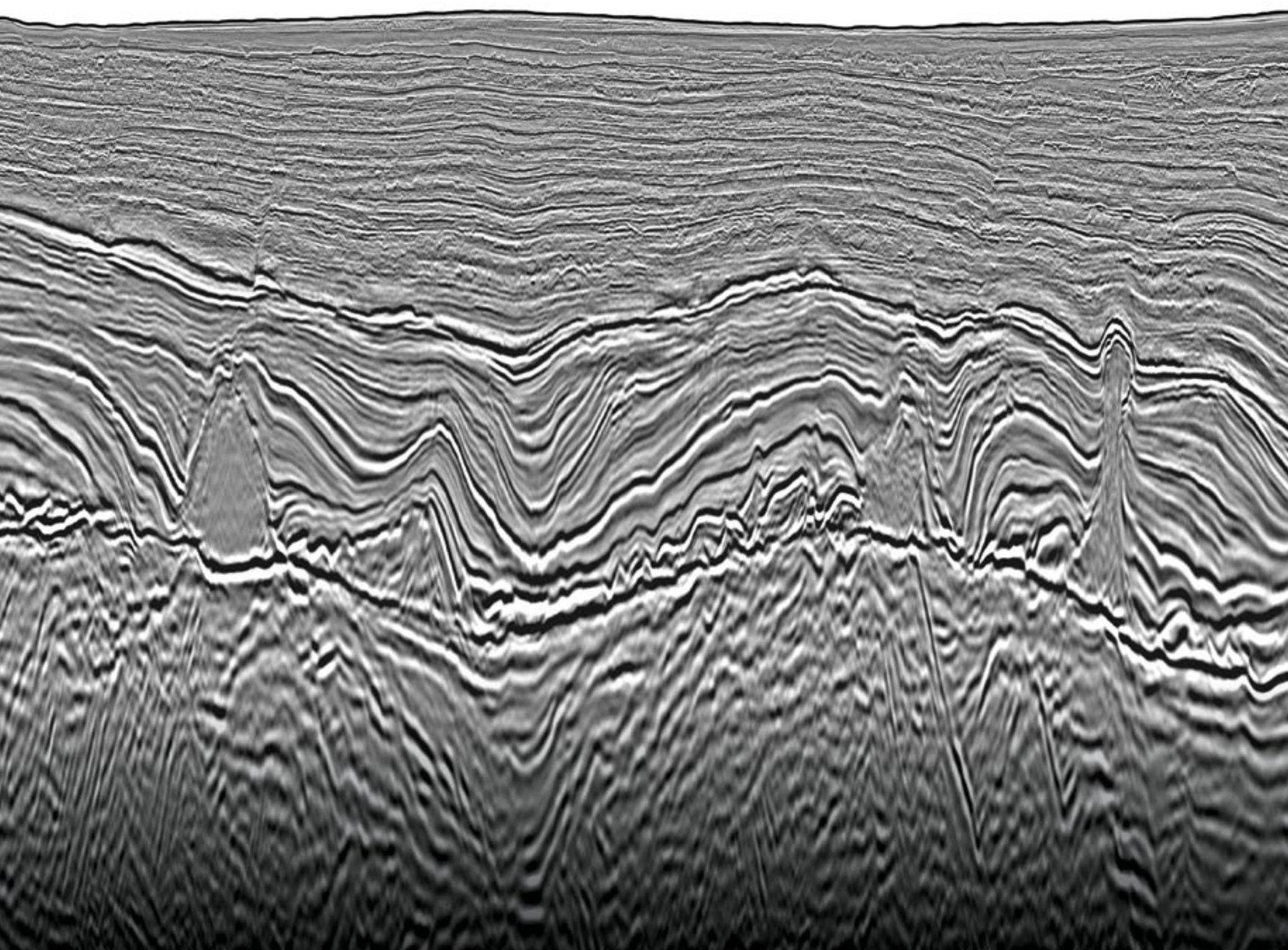
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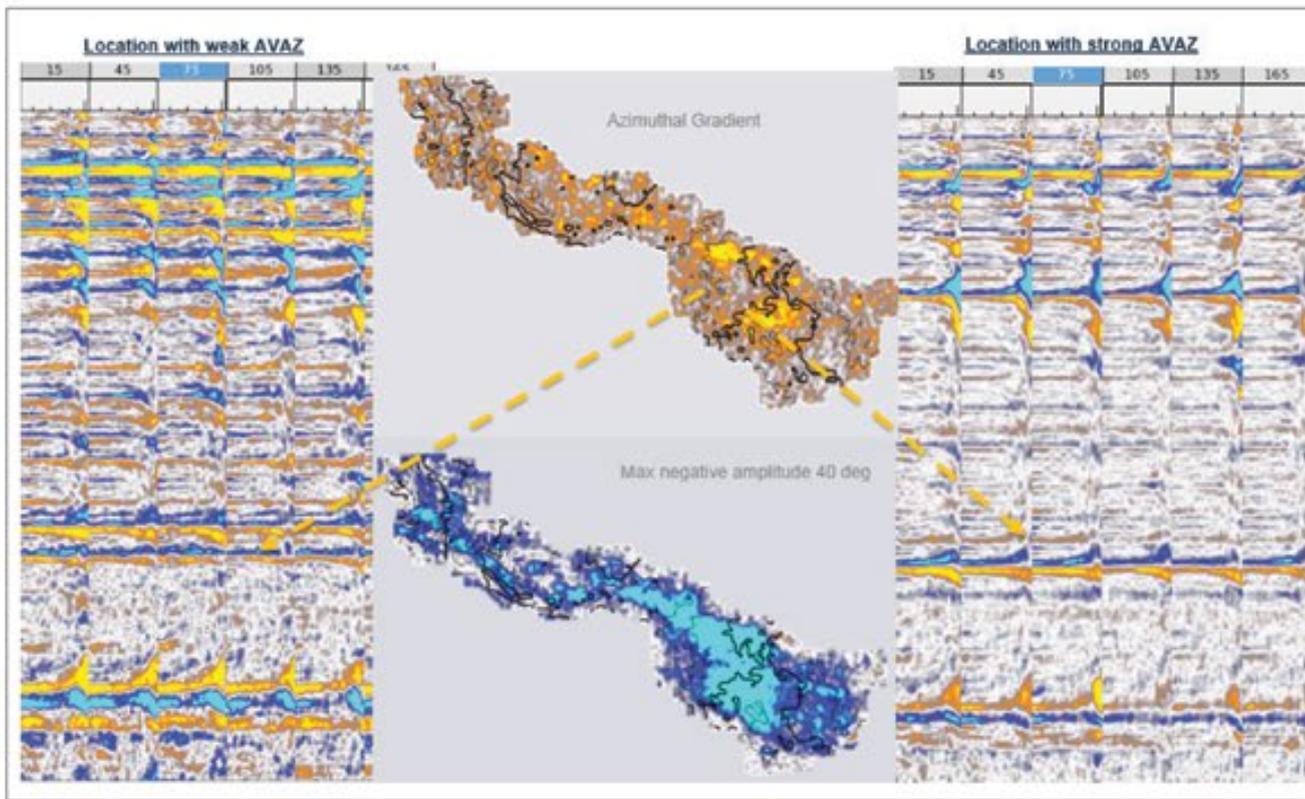
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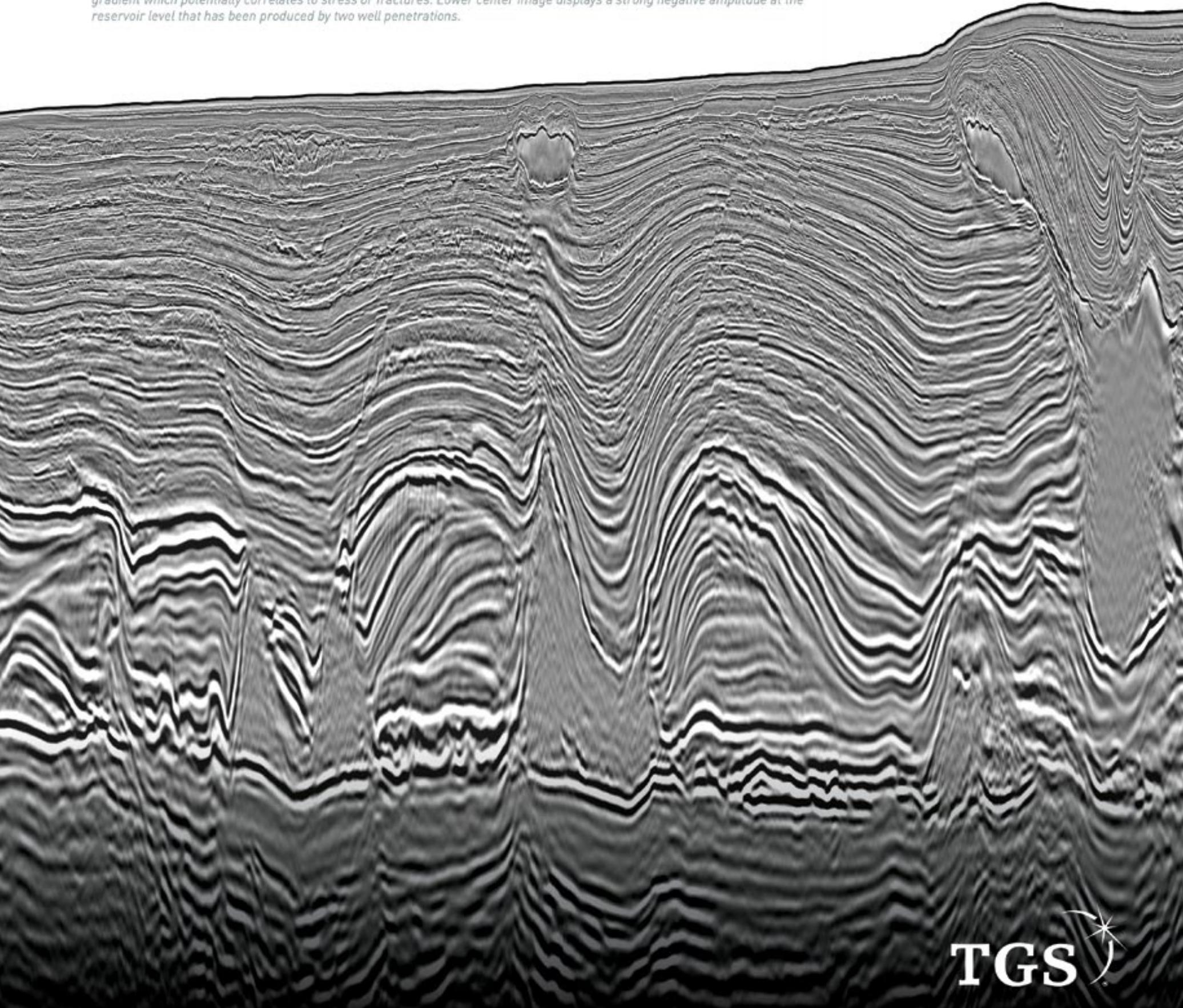


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Historical Highlights

John T. Scopes: A Summer in Hell and a Career in Petroleum Geology

Who was the most famous person you didn't know was a petroleum geologist?

That would probably be John T. Scopes, of "Monkey Trial" fame.

Scopes was the defendant in the sensational 1925 trial that tested a Tennessee law prohibiting the teaching of the theory of evolution in public schools.

Scopes was born in 1900 in Paducah, Ky., and moved to Salem, Ill. at the age of 17. (Coincidentally, Salem was also the birthplace of William Jennings Bryan, of whom more will follow.) He earned a bachelor's degree in law at the University of Kentucky, with coursework in science, including a minor in geology.

His first professional job, at the age of 24, was as a high school football coach and math/science teacher in the small Bible Belt town of Dayton, Tenn., some 40 miles north of Chattanooga.

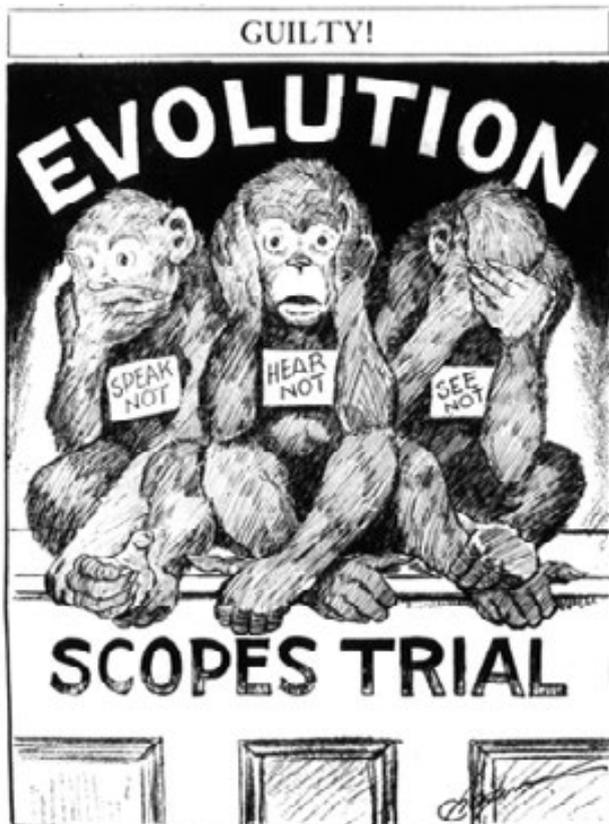
The Butler Act had just been passed by the state legislature to prohibit public schools from teaching the theory of evolution, due to the widespread belief that it denies the biblical account of man's creation. Religious fundamentalism was ascendant and schools around the United States were under pressure to suppress the discoveries of Charles Darwin and Alfred Russel Wallace, as well as later scientific work that provided evidence for the evolution of life from common ancestry.

To test the constitutionality of the Butler Act, the American Civil Liberties Union said it would defend anyone who defied the new law. A civic booster and the ACLU recruited Scopes, who said he was known locally as "an independent thinker," to be that defendant. He urged his own students to testify against him to a grand jury, which quickly indicted him. Scopes was charged and arrested, though he never actually served time in jail.

In effect, the trial was staged to attract publicity to Dayton, which was struggling economically, as well as to oppose the Butler Act. Scopes later admitted that he was unsure if he really had taught evolution during his stint as a substitute biology teacher, but said, "I furnished the body that was needed to sit in the defendant's chair." Eager to test the new law, his motivation was that a science teacher should be free to teach science, not Scripture. Years later he summarized this position, "I did not think the state of Tennessee had any right to keep me from teaching the truth."

Clash of Titans

In a sweltering, overflowing courtroom, Scopes was convicted in a jury trial that pitted two legal giants of the age against one another. Among other lawyers, fiery Clarence Darrow appeared for the defense, and the great orator, politician and champion of the common man, William



Evolution and the Monkey Trial, San Francisco Examiner cartoon.

Jennings Bryan, argued for the prosecution. The defense brought numerous experts on evolution, including Kirtley F. Mather, a distinguished Harvard petroleum geology professor, but only one was allowed to testify.

Eloquent, agnostic, progressive and passionate, Darrow (1857-1938) was the greatest defense lawyer of his day. He had represented anarchists charged in the Chicago Haymarket Riot of 1886, the socialist Eugene V. Debs who was arrested following the Pullman Strike in 1894, and labor leader William "Big Bill" Haywood, for whom he obtained an acquittal on murder charges. Darrow saved wealthy teenaged thrill killers Nathan Leopold and Richard Loeb from the death penalty in 1924. He was a powerful advocate for Scopes, subjecting Bryan to withering questions on the literal interpretation of the Bible.

Bryan (1860-1925), a Nebraska populist and experienced officeholder, was the Democratic nominee for president in 1896, 1900 and 1908, and the only candidate from a single major party to be defeated three times. Dubbed "The Great Commoner," Bryan dominated his

party for two decades, opposing the gold standard, while favoring Prohibition and women's suffrage. He rejected the teaching of Darwinism because he believed it conflicted with Scripture and because he felt "social Darwinism" led to nationalism, conflict and immorality. Bryan had lobbied for state laws banning the teaching of evolution, and boldly responded to Darrow's lengthy examination on the veracity of the accounts in Genesis.

H. L. Mencken (1880-1956) was the journalist who coined the phrases "Bible Belt" and "Monkey Trial." As a reporter, literary critic and world-class curmudgeon, he was called "the Sage of Baltimore," and became famous for his sarcasm, broad misanthropy and tireless campaign against American provincialism and prudishness. Mencken covered the entire trial, leading one of the earliest media circuses. It was the first U.S. trial to be broadcast live, coast-to-coast on the radio.

Scopes never testified, and after eight intense and stifling July days, the jury found him guilty within minutes. He was fined \$100 and resigned forever from teaching.

Exhausted, Bryan died five days after the trial ended.

Life After the Monkey Trial

Scopes' conviction was later overturned on a technicality related to sentencing by the judge, not the jury. The law, however, was upheld as constitutional by the Tennessee Supreme Court.

He immediately enrolled in graduate school in geology at the University of Chicago, through the generosity of Mather and others. Scopes took classes, did glaciology fieldwork in Illinois and worked toward his doctorate until he ran out of money. As a consequence of his role in the Monkey Trial, he was denied a fellowship that would have enabled him to study the origin of oil and gas, as well as complete his degree.

Scopes said he was told, "you can take your atheistic marbles and play elsewhere."

Scopes accepted a three-year job for Gulf Oil and left for Venezuela in 1927 where, he said, "I would be just another Yankee oil hunter," instead of the Monkey Trial defendant. He was assigned to work parties in the jungles surrounding Lake Maracaibo and the foothills of the Andes, learning to make maps and take gravity measurements with a torsion balance. Eventually, he was made party chief for Gulf's subsidiary, Mene Grande.

In a letter to Darrow, he said, "I hate office work and city life."

The Grip of Notoriety

An insect bite on his hand became infected, and in late 1928 Scopes was hospitalized with dysentery, malaria and blood poisoning. After convalescing on sick leave in the United States, he returned to Venezuela in 1929.

It was at a country club dance in Maracaibo that he met Mildred Walker, "a pretty brown-eyed brunette from South Carolina," who became his bride the next year.

Gulf instructed Scopes and his party to extend their survey into Colombia, even though the company did not have permission to work there and would be unable to protect them if caught. At the Colombian frontier on the Rio Meta, Scopes concluded, "there was no prize that Gulf Oil could win that was worth the risk of going into a Colombian jail." He turned the boat around, returned to headquarters in Maracaibo and was promptly fired.

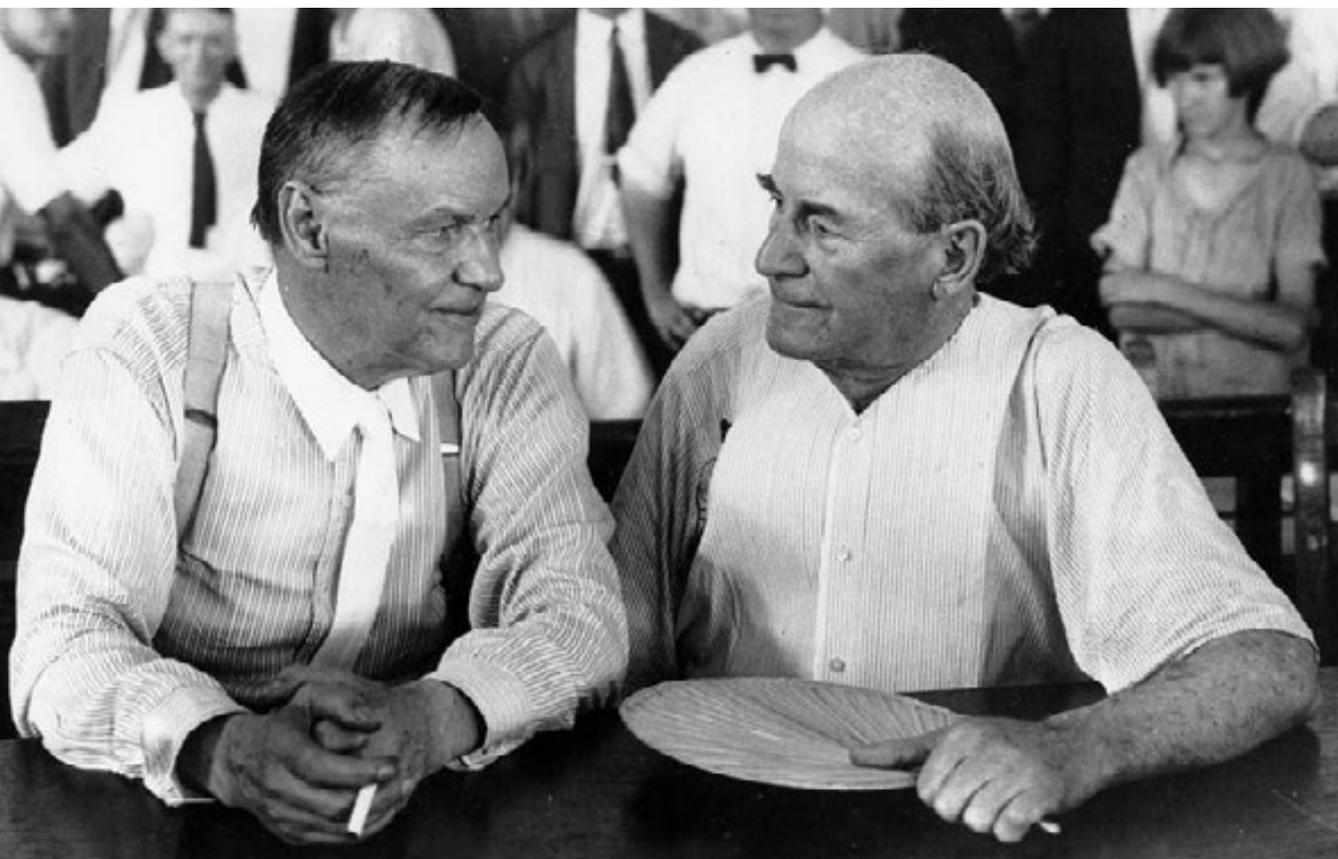
Lacking only his oral examinations and thesis to complete his doctorate, Scopes began collecting data in New Mexico for his dissertation, but was again thwarted by a lack of funds. With the world deep in the Great Depression, and the Scopes family having welcomed their first child in 1932, he needed a job.

"My personal depression ended in the summer of 1933,"

Continued on next page ►



AAPG member **Matt Silverman** is exploration manager for Robert L. Bayless, Producer in Denver, and serves as chair of AAPG's History of Petroleum Geology Committee. He thanks AAPG member Mary Barrett for her generous archival research in Shreveport.



Clarence Darrow, left, and William Jennings Bryan in Dayton, 1925.

◀ Continued from previous page

Scopes wrote, when he accepted a position as a geologist with United Gas Corporation. United was one of the first great gas transmission companies, and he worked for them in Houston, then in Shreveport, La., until he retired in 1964.

His work focused on gas reserves, appraisals, oilfield economics, taxation, pipeline expansion and regulatory affairs. Scopes testified in Washington, Memphis and Baton Rouge, but never joined AAPG (possibly because he had no geology degree). His 1967 autobiography, "Center of the Storm," provides the best insights into his role in the trial, but precious little about his career as a geologist in the Gulf Coast.

In those memoirs, Scopes noted that he enjoyed his work at United, despite the 55 to 60-hour weeks, and that he became a "jack-of-all-trades." He wrote, "Mine was the normal, ordinary work characteristic of any large oil and gas company. There were no highlights and I had the same number and same kind of experiences as anyone else who did that type of work."

Scopes lived a modest, quiet life after the trial, generally uncomfortable with his youthful fame. "Notoriety never completely releases its victims," he said. Eventually though, he began speaking about the trial and current events to local groups, and even

appeared in Life magazine and on the hit TV show, "To Tell the Truth."

An award-winning 1955 play, "Inherit the Wind," used the inspiration of the Monkey Trial to defend intellectual freedom and indirectly denounce the McCarthyism of the day. That hellish summer in Dayton was also the subject of a movie directed by Stanley Kramer and starring Spencer Tracy, as well as several TV adaptations.

When the law was finally repealed in 1967 by the Tennessee legislature, Scopes said simply, "I am very happy." He died in 1970, survived by his wife and their two sons.

John T. Scopes provides a valuable lesson for our times: the denial of science and the disdain for facts are with us even today. It's still our job as geoscientists to enlighten the public and speak truth to power. 

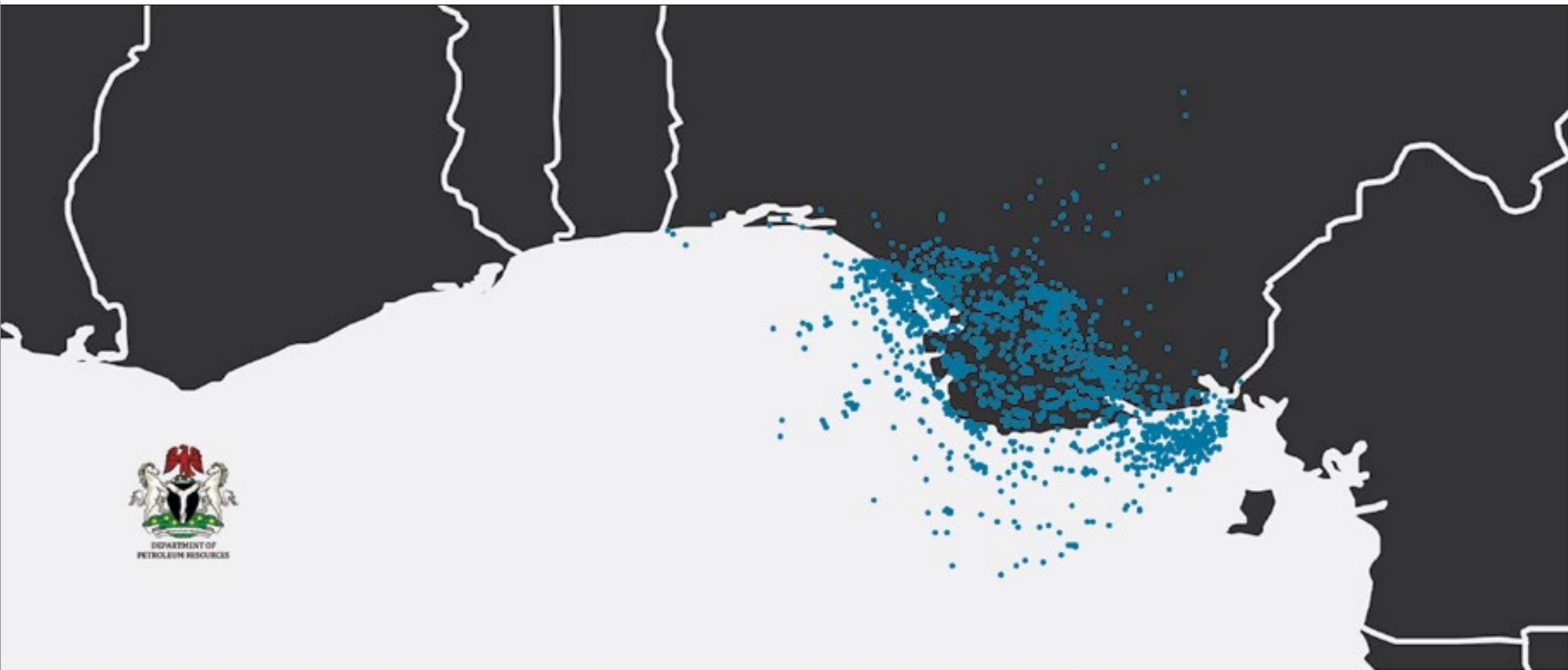
(Editor's Note: Historical Highlights is an ongoing EXPLORER series that celebrates the "eureka" moments of petroleum geology, the rise of key concepts, the discoveries that made a difference, the perseverance and ingenuity of our colleagues – and/or their luck! – through stories that emphasize the anecdotes, the good yarns and the human interest side of our E&P profession. If you have such a story – and who doesn't? – and you'd like to share it with your fellow AAPG Members, contact Hans Krause at historical.highlights@yahoo.com.)



Scopes in Venezuela, 1927. Photo from the Riesenfeld Rare Books Research Center, University of Minnesota Law Library.

History buffs, take note of two upcoming events. AAPG's History of Petroleum Geology session will take place Sunday, May 20, at 11:55 a.m. in the Salt Palace Convention Center at the AAPG Annual Convention and Exhibition in Salt Lake City, Utah. Eight papers, covering historical topics from three continents, will be featured.

The Petroleum History Institute will hold its annual meeting the Friday/Saturday before ACE in the same city. To attend a field trip of petroleum related history sites in the area and to see a day's worth of great papers and posters, please visit: www.petroleumhistory.org.



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Geophysical Corner

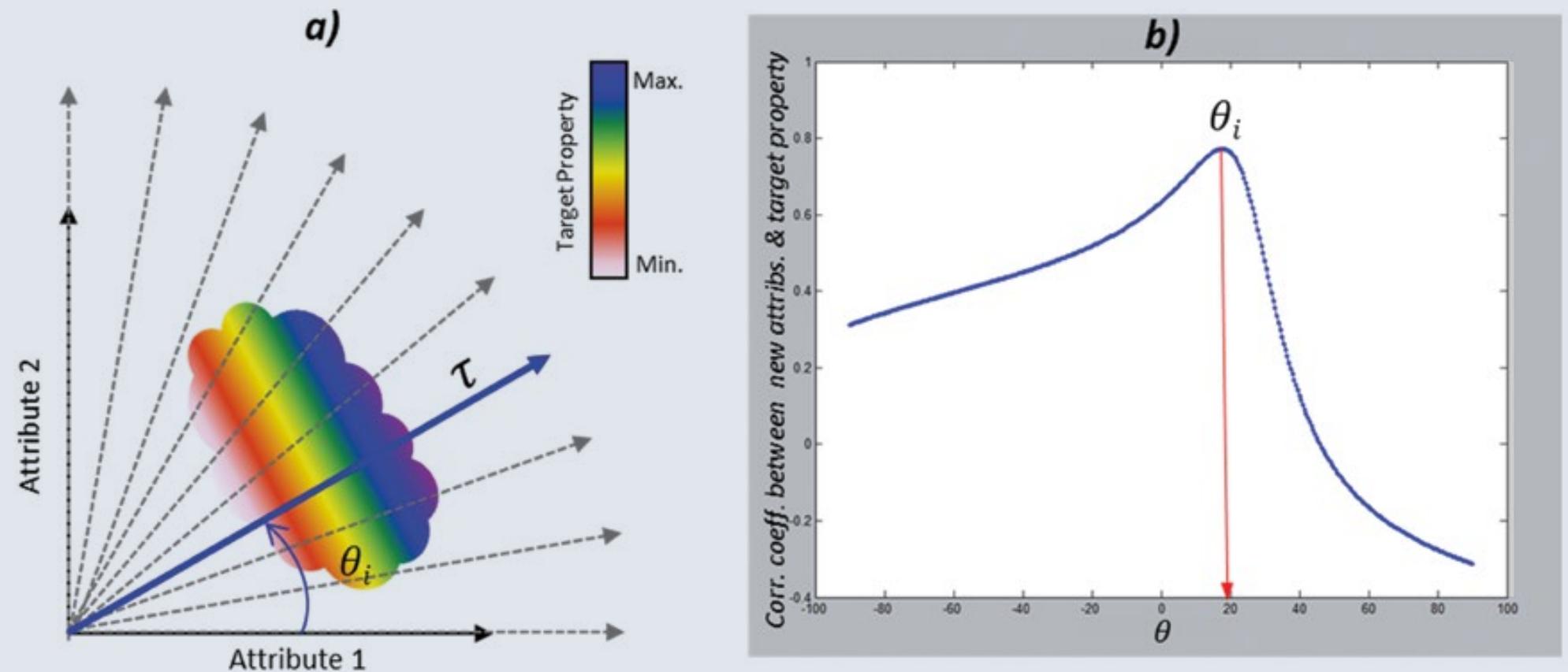


Figure 1. a) Sketch of a cross-plot of two attributes color-coded by a target property. Dashed grey lines represent new attributes estimated via axis rotation, and the blue line represents the attribute that shows the maximum correlation coefficient with the target property. b) Example of a cross-plot between the angles of rotation and the correlation coefficients calculated at each of these angles.

Reservoir Property Prediction From Seismic Inversion Attributes Using MARS

A common way to understand the relationship between seismic attributes and petrophysical properties is by the use of rock physics templates, or simply by cross-plotting well log-derived elastic attributes against a color-coded petrophysical property. Both methods graphically illustrate the relationship between the elastic and petrophysical domains, which can be used to estimate reservoir properties from seismic inversion attributes. The multi-attribute rotation scheme (MARS) is a methodology that uses a numerical solution to estimate a mathematical expression that reproduces the aforementioned phenomena. This methodology uses measured and/or rock physics-modeled well log information as

| Water Saturation | | Volume of clay | |
|------------------|--------------|----------------|--------------------------------|
| Attribute 1 | 1/Lambda Rho | Attribute 1 | (Lambda Rho) ² |
| Attribute 2 | 1/Kappa Rho | Attribute 2 | (Poisson's ratio) ² |
| Angle | -61° | Angle | 12° |

Table 1. Attributes and angle used in the MARS transform for the computation of S_w and V_{clay}

an input to estimate a well log-derived transform between several elastic attributes and the target petrophysical properties. This transform is then applied to seismically-derived elastic attributes to predict the spatial distribution of petrophysical reservoir properties for reservoir characterization and delineation, and/or to estimate secondary variables in geostatistical workflows for static model generation and reserve estimation.

MARS estimates a new attribute t in the direction of maximum change of a target property in an n-dimensional Euclidean space formed by n-number of attributes. We search for the maximum correlation between the target property and all of the possible attributes that can be estimated via an axis rotation of the basis that forms the aforementioned space. Figure 1a shows a sketch illustrating an example for the particular case of two dimensions. This

methodology evaluates the relationship between all possible elastic attribute spaces and a target petrophysical property using a similar correlation approach to the one used by in the extended elastic impedance methodology (figure 1b).

Case Study: Onshore Colombia

For this case study, MARS was used to estimate water saturation, S_w , using a two-dimensional approach in a mud-rich turbidite gas reservoir, of early and middle Miocene age, located onshore Colombia. The global maximum correlation between the attribute t and S_w was found in the $\sqrt{(S\text{-impedance})}$ versus $\sqrt{(1/(\text{Poisson's ratio}))}$ attribute space at -19 degrees, with a correlation of -0.9625. Figures 2a and 2b show a comparison between the actual and predicted S_w curves upscaled to seismic resolution, in cross-plot domain and spatial domain, respectively, showing an excellent match. Finally, the resulting transform was applied to seismically-derived volumes of $\sqrt{(S\text{-impedance})}$ and $\sqrt{(1/(\text{Poisson's ratio}))}$ to obtain a volume of S_w . A cross-section of the resultant S_w volume through well-A (used in the analysis) and well-B (a blind test) along with its S_w curves are shown in figure 2c. In this figure it is possible to see a good match between the seismic and well-log derived S_w , not only at well-A, which was used in the MARS assessment, but also at well-B, which was used as a blind test location.

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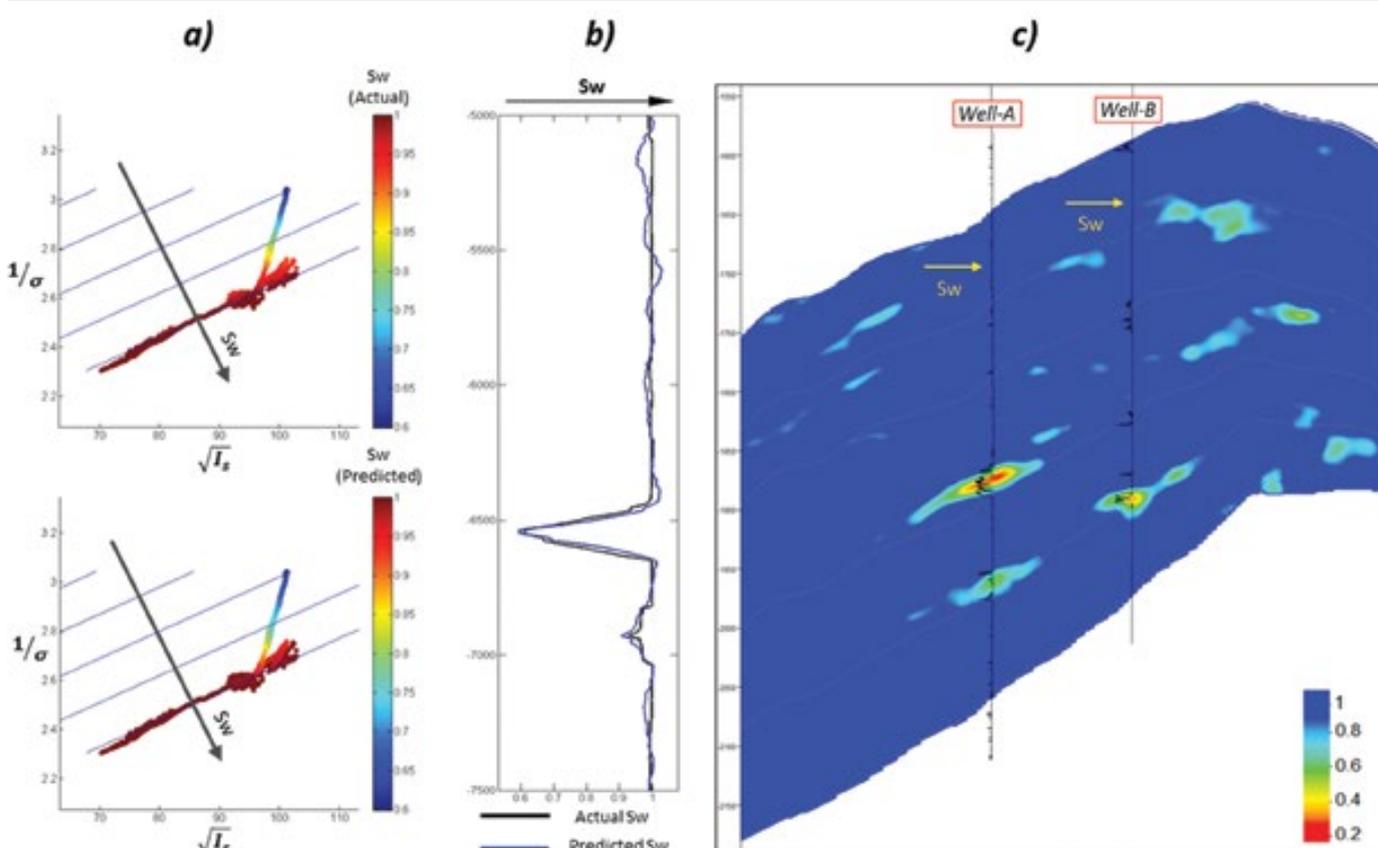


Figure 2. a) Comparison of the upscaled actual and predicted S_w logs in the cross-plot space $\sqrt{(S\text{-impedance})}$ vs $\sqrt{(1/(\text{Poisson's ratio}))}$ (Well-A). b) Comparison between the upscaled actual and predicted S_w logs (Well-A). c) Cross-section along the resultant S_w volume along Well-A and Well-B (blind well) together with its log of S_w . Notice the good match between the seismic and well-log derived S_w .

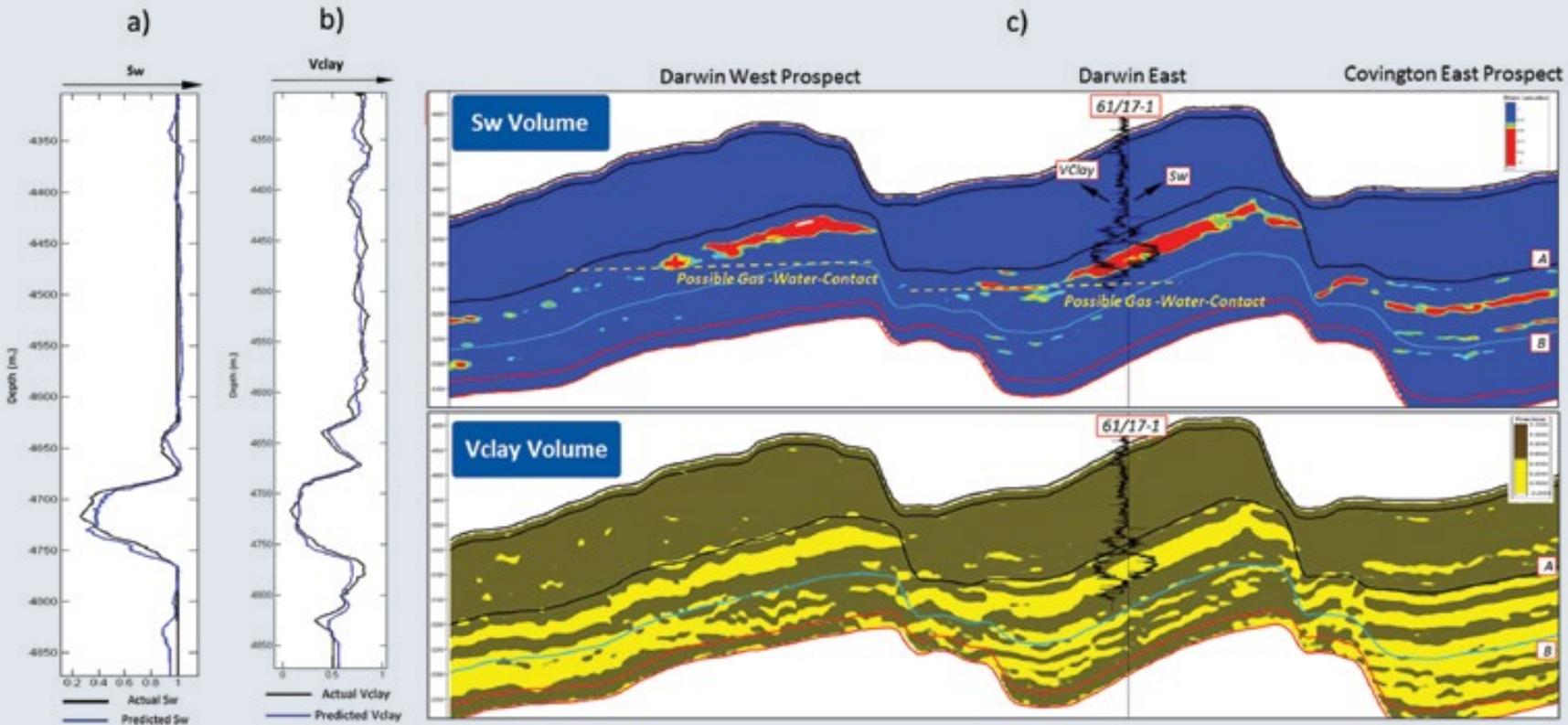


Figure 3. a) Comparison between the actual and predicted S_w logs upscaled to seismic resolution. b) Comparison between the actual and predicted V_{clay} logs, upscaled to seismic resolution. c) Cross section along the resultant S_w volume along wells 61/17-1 together with the S_w and V_{clay} logs. Notice the good match between the seismic and well-log-derived S_w and V_{clay} .

Continued from previous page

Case Study: South Falkland Basin

For this case study, MARS was used to estimate a lithology and fluid saturation volumes in both the Darwin East and West fault blocks. By applying the MARS methodology, customized transforms, using the elastic attributes and angles shown in table 1, were found from the well log data to estimate reservoir properties from

seismically derived elastic attributes. Figures 3a and 3b show a comparison between the actual and predicted water saturation (S_w) and volume of clay (V_{clay}) logs upscaled to seismic resolution, showing an excellent match. The resulting transform was applied to seismically-derived volumes of the elastic attributes shown in table 1 to obtain volumes of S_w and V_{clay} . A cross-section of the resultant petrophysical volume through the

See Properties, page 31 ▶



Pedro Alvarez

received a bachelor's in geophysical engineering from the Universidad Central de Venezuela, and a master's in petroleum geophysics from a joint program between the Centro Superior de Formacion in Madrid, Spain, and the Heriot-Watt University in Edinburgh, Scotland. He is a lead quantitative interpretation geoscientist at Rock Solid Images with more than 12 years of experience in reservoir characterization and exploration projects. In 2016, SEG appointed him a Latin America Honorary Lecturer.



Francisco Bolivar

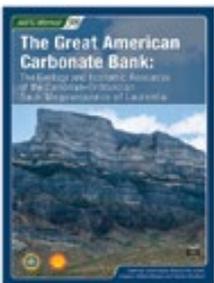
received a bachelor's from the Universidad Central de Venezuela in geophysical engineering and finished his post-graduate specialization in oil and gas reservoir management. Since then, he has worked for Paradigm Geophysical, Rock Solid Images and Tricon Geophysics as reservoir geophysicist and seismic technical adviser.



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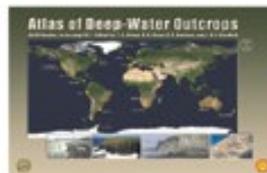
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Michael Forrest: A Career of Bright Spots

Sidney Powers Memorial Award

Michael C. Forrest has been in the industry for more than five decades, first with Shell and then with Maxus, so one could start at any number of points in discussing his impact on geology. Perhaps the best place, though, is the eight-year period that began in 1967 when, at Shell, Forrest recognized the relationship between seismic amplitudes and the presence of hydrocarbons. It was called "bright spots," also known as "direct hydrocarbon indicators."

Though he dismisses the title, Forrest is known as the "Father of Bright Spots."

"Bright spot" in the late '60s," Forrest said, "was an observation of a strong

seismic reflection that corresponded to a closure and had down-dip conformance to structural contour that could be related to a possible hydrocarbon/water contact, with the assumption the velocity and density of a hydrocarbon sand would be lower than a water-bearing sand."

Forrest now has another title to his name: this year's Sidney Powers Memorial Award recipient – AAPG's highest honor, given in recognition of distinguished and outstanding contributions to, or achievements in, petroleum geology.

"Unbelievable," said Forrest about receiving the award. "It's a great honor."

A Bright Discovery

When asked about the seminal moments in his career, one might expect him to talk about DHI, but Forrest remembers something that happened ten years earlier.

"The biggest career change in my life was in 1959 when a Shell manager (name of BB Hughson, now deceased) transferred me from an onshore south Louisiana seismic crew to the Gulf of Mexico Marine Division," he said.

Why was this moment so special?

"I learned how to interpret seismic data and relate to geology."

Those from that era still loom large.

"The Shell hero for most geophysicists was Billy Flowers (deceased) – he was (general manager of) geophysics for many years and ended his career as exploration and production vice president in the New Orleans division in 1985," Forrest recalled.

Forrest is now one of those figures himself. In fact, past AAPG President Paul Weimer, who is currently the Bruce D. Benson Endowed Chair and director of the Energy and Minerals Applied Research Center for the Department of Geological

Continued on next page ►

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Sciences of the University of Colorado in Boulder, said Forrest is one of the most influential geoscientists of his generation in the area of global exploration and development.

Forrest is flattered and wants to dial it back.

"Overstated," he said.

"A major reason I am recognized for bright spots," he said, returning to the subject from which nobody will untangle his name, "is my Shell Oil co-workers were very skeptical of identifying hydrocarbon bearing sands on seismic for several. At that time, seismic was used to make structure maps of the subsurface and using seismic amplitudes to identify gas and pays was a huge paradigm shift. The so-called 'digital revolution' in seismic processing in the late 1960s also was very important for measuring changes in amplitude. After Shell experts confirmed the petrophysics and Shell management committed to using bright spots to rank and risk exploration prospects, my co-workers gave me credit – and the story has continued and even enhanced during the past 50 years," Forrest explained.

That, according to those who know the history, is because it's true – hence the Powers Medal.

"I have been told others recognized shallow seismic amplitudes related to shallow gas (considered low priority) in the mid-1960s, but companies did not follow-up – and we know the Russians were using seismic to map gas zones in the '60s," he added.

The major difference between the two approaches, Forrest explained, was the Shell staff made huge technical

contributions, and management used bright spots to successfully bid on Gulf of Mexico prospects using probability risk analysis. The company was confident bright spots could identify both gas and oil pays.

"Some people thought bright spots were only related to gas pays. Incorrect, as oil has gas in solution (called GOR – gas/oil/ratio), called 'associated gas' during oil production," he explained.

Bright Spots and High Spots

But his career – and this is important – was not just about bright spots. He has made it his business to both promote and fundraise for professional organizations, like AAPG. And he wants you to know he hasn't done it alone. Of his entire career – his successes, his work with various organizations – he said it was the result of good teamwork.

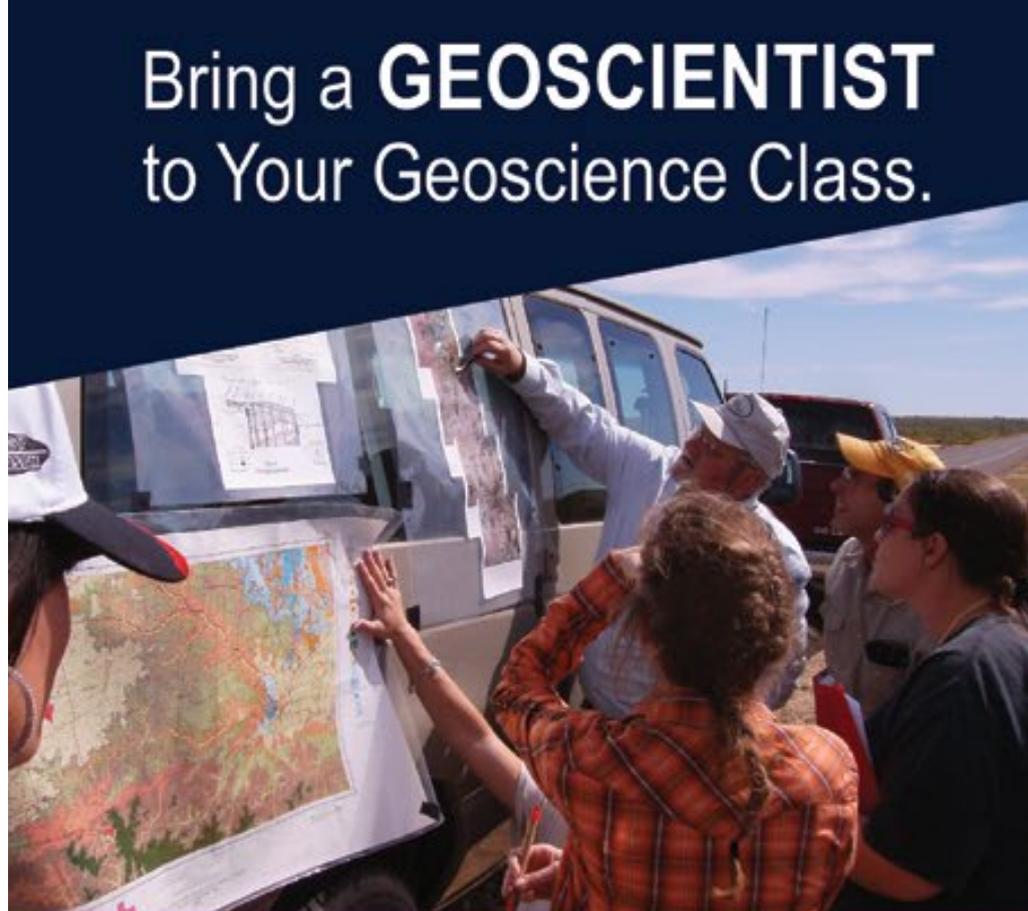
He shuts out the bad news, the bad memories, so when he looks back on his career, he does not think of the ones that got away, the dry holes.

"All highs – a fun and rewarding career," he answered when asked to chronicle the highs and lows of his long career.

For Forrest, it was the determination, the confidence in his work, and the benefit of working for a company where things like that were rewarded.

"Shell Offshore always had the reputation of being a geophysical driven company – I think we were always a step in front of the industry. During the late 1950s to 1990, Shell had its own seismic acquisition boats – we considered that an advantage until the contractors started getting data near similar quality, but

See Powers, page 29 ▶



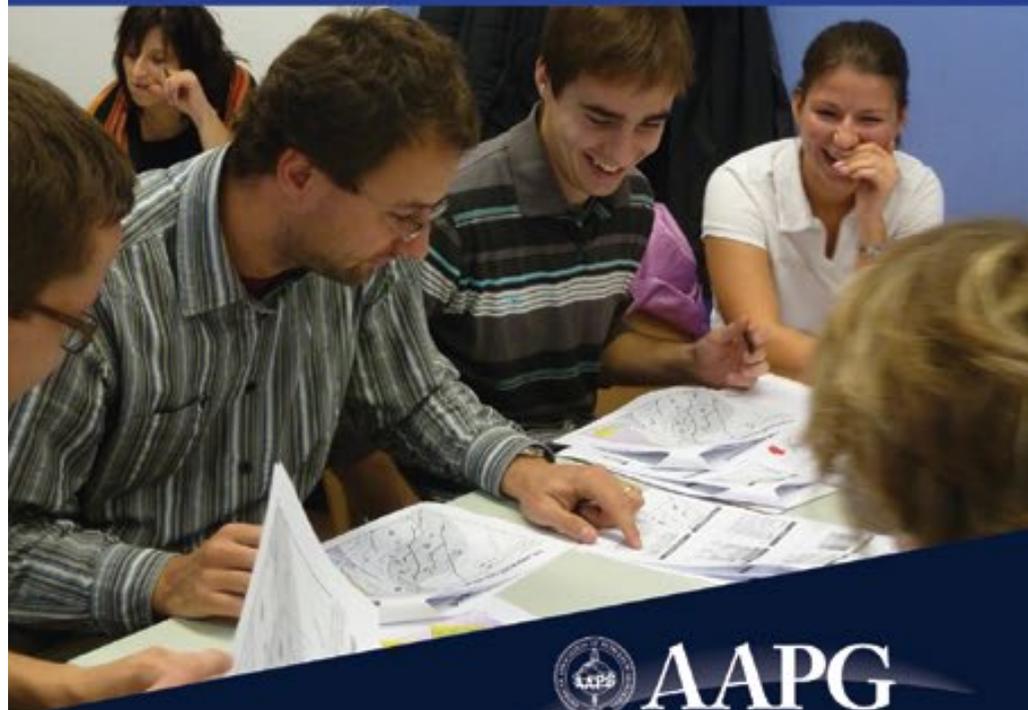
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Hans Krause: History and Hydrocarbons

Michel T. Halbouty Outstanding Leadership Award

Hans Krause, this year's AAPG Michel T. Halbouty Outstanding Leadership Award recipient, has been in the profession for more than 55 years and, when you spend that much time at something, in something, you learn a lot about yourself along the way.

And here's one of them.

"I'm not very keen on self-advertising," said the man who studied agronomy in his first year in college and thought of working on a "coffee plantation or a cattle ranch somewhere in the country."

Lucky for geology (and for the EXPLORER in particular), he also signed up for a physical geology course at Imperial College of Tropical Agriculture in Trinidad.

He was, he said, "hooked."

"I've been very lucky in my career," he said, "but much of that luck has been thanks to the generous and unstinting support of friends and colleagues."

Good answer to a stock question, but when pressed about the particulars, he said, "It's fairly simple: surround yourself with smart people, challenge them intellectually, treat them fairly, reward them generously."

You just know there's something else coming.

There is.

"And make sure," he added, "they don't forget that you're the boss!"

Front Seat View to History

So how did it all start for him?
It was the orchids.

"It was G.C.K. Dunsterville, at that time vice-president of Shell Venezuela and an accomplished orchidologist, who recruited me into the oil industry at the age of 17 – and thanks to whom I obtained a Shell scholarship to attend university," he related.

And Shell and PDVSA, generally, and Venezuela, specifically, is where Krause has spent his career, working in the company's fields in the country, as exploration manager of Compañía Shell de Venezuela, which later became Maraven. Additionally, he's had key roles in the E&P segment of Venezuela's

oil industry, its technology center (PDVSA's research affiliate Intevep) and ultimately oversaw and supervised a staff of nearly 400 and production of just under a million barrels of oil per day.

It was an inauspicious beginning, though.

"I began working in the oilfields in Venezuela in 1963, after completing my master's studies in geology at the University of Kansas. The day after arriving at Shell's office in Lagunillas, on the eastern shore of Lake Maracaibo, I was put in charge of a land drilling rig. I tried to explain to my Scottish boss that I knew nothing about drilling, that I had never even seen a drill bit. His reply was,

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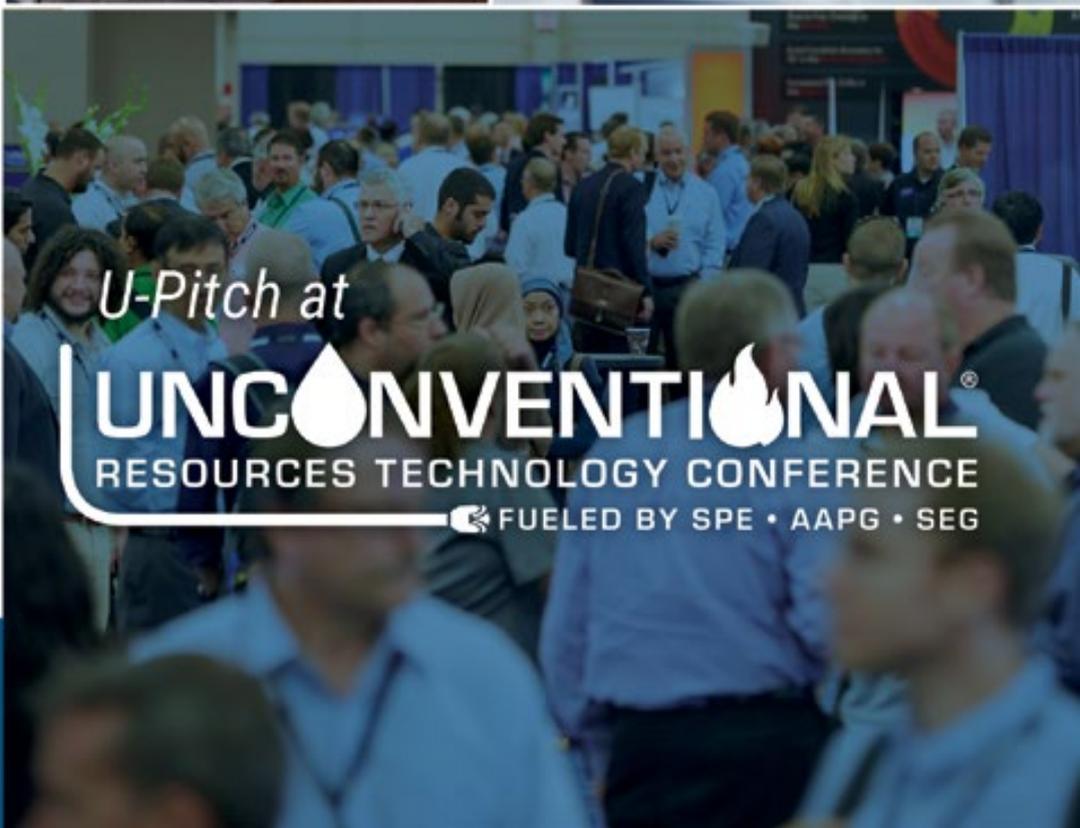
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Photo 1: From left, Don O'Nesky, Rick Fritz, Harrison Townes, Hans Krause. Photo 2: This appeared in the June 2007 issue of the internal Shell Venezuela magazine. The article referred to Krause's general oil industry career, between Shell and PDVSA's affiliate Maraven. Photo 3: In 1980 Krause received his pin for 25 years service in the Venezuelan oil industry. From left, Maraven president Alberto Quiros, Krause and his Tulsa-born wife, Judi. Photo 4: Krause at the town of Castrojeriz. The castle on the hill was built by Romans to guard the route to gold mines in western Spain; it was destroyed by the 1755 Lisbon earthquake. The Church of Santa María del Manzano stands to the right.

◀ Continued from previous page

"Well, then you better learn quickly, laddy!"

Fast-forward 28 years and a journey from lowly engineer in charge of a small land rig to E&P manager at the head office.

"I remember in 1996, taking a group of 18 senior international oil executives and Tulsa AAPG friends on a plane trip from Caracas to western Venezuela. They saw Maraven's heavy oil steam-soak recovery activities near Lagunillas and later the company's production operations in Lake Maracaibo. I was especially pleased when, after chugging along in a boat for about an hour past oil wells, drilling rigs, production platforms and gas injection facilities, one of the visitors commented to me that he hadn't seen the sheen of a single drop of oil in the water. Yes, Maraven's people on the ground took great pride in being environmentally-responsible operators!"

He retired from Maraven at the end of November of 1997, upon reaching the Venezuelan mandatory retirement age of 60 years.

But it was a brief hiatus.

He returned in 1998 to Shell as a vice president and director of their companies in Venezuela, and stayed there for the next three years during the private oil industry expansion phase that followed Venezuela's Apertura.

Since then, he has remained active as an independent consultant, working in Colombia, as well as Venezuela, a place he's called home and about which, in spite of the present economic landscape, he's still optimistic, even though, as he points out, its capital city, Caracas, still lacks a convention center.

(In 1993, AAPG along with the Venezuelan Geological Society, SVG, held an international meeting in Caracas. Krause calls this meeting a "game changer for AAPG" specifically beyond AAPG's "safe" world. AAPG followed this success by holding an ICE there in 1996.)

"Venezuela is indeed going through a severe crisis, one that has affected most Venezuelans in very negative ways. But bad weather never lasts forever – and this storm will be no exception," he said.

As for AAPG – Krause, obviously, has seen the changes within the Association, but he has seen the consistency, as well.

"One thing AAPG has enjoyed throughout the years is exceptionally high-quality volunteer leadership. I find very impressive the effort and the dedication of those on AAPG's Executive Committee, on our committees, and also of the staff that work for the association," said Krause.

It has been a symbiotic relationship.

"Joining AAPG 50 years ago was one of my smartest professional moves," he said. "It provided me with a front seat in the theater of changing petroleum geology technology and rewarded me with many excellent friendships."

See **Halbouty**, page 28 ▶

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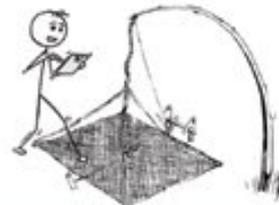
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Submission deadline: 1 June 2018

Special-section editors: Sumit Verma, Olga Nedorub, Ron Bianco, Richard Pagel, Fangyu Li, Tao Zhao, Mohamed Zobia, Robert Trentham, and Joon Heo

MAY 2019

Interpretable seismic velocity

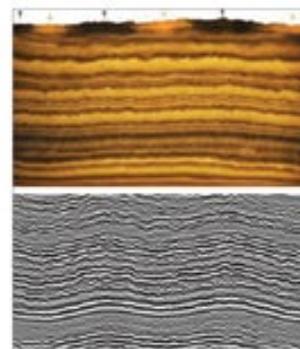
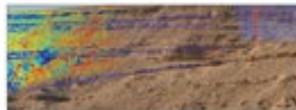
Submission deadline: 1 August 2018

Special section editors: Jianxiong Chen, Alfred Liaw, Xianhui Zhu, Xin Wang, Tao Li, Priyank Jaiswal, Yafei Wu, and Xin Cheng

Near-surface impact on seismic exploration

Submission deadline: 1 August 2018

Special section editors: Claudio Strobbia, Daniele Colombo, Rick Miller, Andreas Laake, and Cedric Schmelzbach



Seismic geometric attributes

Submission deadline: 1 October 2018

Special section editors: Xinming Wu, Hongliu Zeng, Haibin Di, Dengliang Gao, Jinghui Gao, Kurt Marfurt, and Saleh al Dossary

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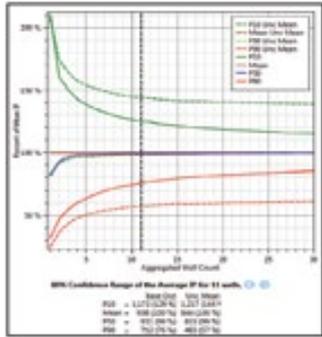
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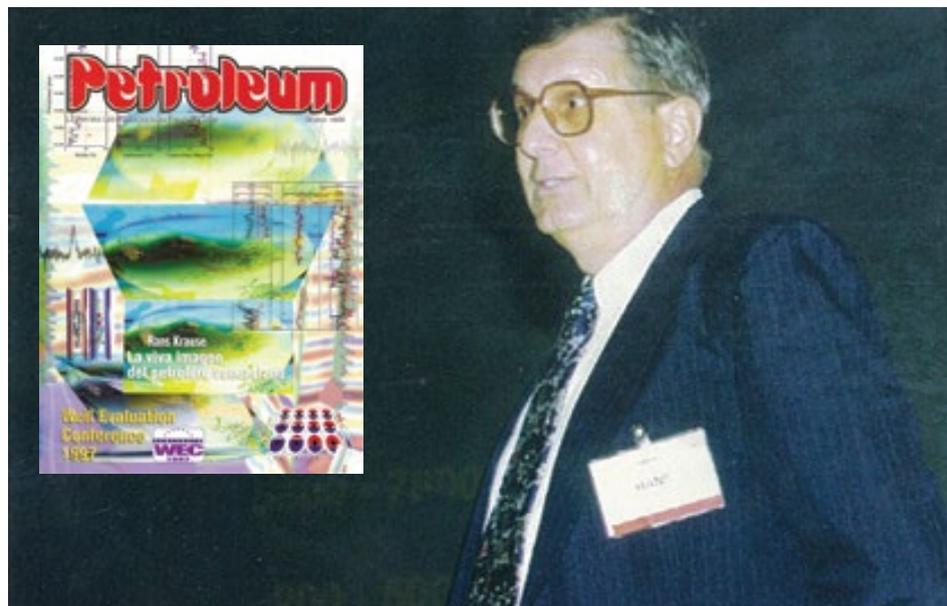
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Halbouty

from page 27

Advance of Knowledge

When talking to a man like Krause, it's often best to sit back and listen, especially when you ask him to review the state of geology – the state of knowledge, really – over the past 100 years.

"Your question," he repeated, "What have been, say, the 10 most important moments in the geology in the past 100 years?" could be the basis for a whole article devoted to it."

It is, he believes, the mother lode, the whole shebang.

"Knowledge of the Earth as a whole has advanced enormously in the last 100 years because of mankind's quest for oil and gas. In their search petroleum geologists have not been shy in utilizing a broad range of physical, chemical and biological scientific tools. These tools have not only found the desired hydrocarbons but they've expended our knowledge of the internal structure of the Earth and its development over the course of millions of years. Since future new oil and gas discoveries will likely require even better tools, this accumulation of knowledge will continue – and I'm sure that some of it will be applied elsewhere in the quest for resources beyond our planetary home," Krause answered.

Good Yarns from Geologists

Closer to home, he talks of the reasons he began the EXPLORER's Historical Highlights series, which premiered in 2011.

"I figured that in addition to the high-quality scientific papers in AAPG's Bulletin there was room for a "petroleum geology-light" series devoted to the good yarns that geologists love to tell each other and to unsuspecting non-geologists," he said.

At last count, he estimates, there have been more "than 85 great stories generously contributed by many authors from around the world on a broad range of petroleum topics."

Some of those stories belong to people he admires and loves, people who have accompanied him on this geologic journey.

"I owe thanks to many people ... and am privileged to join the 11 past Halbouty Award recipients, each of whom has made significant contributions to the geosciences and to AAPG," he said.

He mentions his wife, Judi, of 53 years – and their four children, as well as his brother Federico Krause (who is also a geologist, and it's plain that the two have a special connection). Here, too, he remembers the smart, the creative and diligent people with whom he's worked, especially, he said, "My colleagues in the Venezuelan oil industry."

"Be mindful," he said, when asked about one's place in the pursuit of geology and knowledge, "of your working, social and political environment and make sure it perceives value in you remaining there. And do not tolerate dishonesty ... it's a minefield."



Forrest with teammates on the Shell bowling team.

Powers from page 25

especially at a lower cost. We also excelled at teamwork between geologists and geophysicists," he said.

Forrest knows that nothing much happens in the profession without intellectual curiosity. "My friends tell me I have a high interest in geophysics and geology – especially in reviewing and understanding data. Same as curiosity – very important."

Of all the changes in the profession – and he's seen many of them – he pinpoints one in particular.

"The biggest technical change in geophysics," he said, "has been the huge advancements in seismic imaging – required in some difficult geology plays such as subsalt. But seismic interpretation to help understand geology is a very important key to successful exploration."

There's something else, too.

"All geoscientists have to deal with the oil price downturns and the cyclic business," he added.

Geology First

Forrest is 84 now, so one could be

forgiven for wondering how much longer he wants to do this. How much passion does he have left?

Enough to send an email the morning after the interview was completed to clear things up.

"Woke up this morning realizing I should have written a couple of paragraphs," he said.

There is the ongoing relationship with the Rose & Associates DHI Consortium, which he has led for the past 18 years with associates Rocky Roden and Roger Holeywell, and its work regarding AVO technology – amplitude versus offset.

His message continued:

"The consortium has been very satisfying for Rocky, Roger and me as we have contributed to the understanding and improvement of the use of geophysical data integrated with geology to assess the risk on DHI prospects. I like to state 'geology first' and 'it's all about the rocks.'

A member of the SEG Foundation board, Forrest is also now helping to raise funds for Geoscientists Without Borders for an educational program for students and early professionals called "EVOLVE."

"I still have energy, passion and ideas for geophysics, especially seismic interpretation," said Forrest. 



Forrest with colleagues in the 1960s.

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Foundation Update

Why Donate to AAPG: Two Members' Stories

AAPG is special to its members. There is no greater evidence than the number of members who donate to AAPG and the AAPG Foundation each year.

This year, two new grants were established with the AAPG Foundation's Grants-in-Aid program. Two donors with two stories and one mission: to provide assistance to graduate students in the pursuit of research, study or technological advances in the geosciences.

William E. Galloway

William E. Galloway was a geologist, a research professor at the Jackson School of Geosciences at the University of Texas at Austin and author of "Terrigenous Clastic Depositional Systems." His awards include the Grover E. Murray Distinguished Educator Award, the A. I. Levorsen Memorial Award, the Distinguished Lecturer Award, the Wallace Pratt Memorial Award and Award for Best Paper in the Energy Minerals Division, among others.

When Galloway passed away recently, his wife Diane and their son decided to establish a memorial grant scholarship in his name. Diane knew the AAPG Foundation would be a good choice because she had dealt with her father's bequest to the AAPG Foundation years earlier.

"Each year the family receives a letter informing us of that year's recipient of our father's grant, often accompanied by a picture of the recipient," she said. "We have the pleasure of sending him or her a letter of congratulation. We include a little bit about our father and his desire during his life to give a helping



GALLOWAY

hand to others."

At the close of each year, the family can reconnect with the recipient and "read a summary of the research and what they learned, thanks to the grant they received," she added.

Diane said she knows that the grant she established in her husband's name would receive the same reliable care, transparency and attention to detail.

"We know in advance that the funds will be handled well, and that each year we will be contacted with the recipient's name," and most importantly, she said, her family "will have a reminder of the gift that keeps on giving, thanks to AAPG Foundation. This is a wonderful way to establish a legacy to remember your loved ones in a way that also helps others."

Chandler and Irene Wilhelm Grant

Chandler and Laura Wilhelm put a great deal of thought into their plans for the future. The couple met in school while each earned a master's in geology. Later, Laura would work as a paleontologist for Amoco while Chandler pursued a career as a petroleum geologist with Shell Exploration and Production.

Throughout their careers, AAPG had special meaning to them.

"Being a petroleum geologist has enriched my life in ways that I could not have imagined when I was a student contemplating what to do with a degree in geology," he said.



Chandler and Irene Wilhelm

As a petroleum geologist and organizational leader for Shell's global deepwater exploration and appraisal evaluation, Arctic exploration and unconventional exploration and appraisal programs, Wilhelm has traveled the globe, making notable discoveries of deepwater fields in Angola, Brazil, Nigeria and the Gulf of Mexico, along with multiple unconventional plays in British Columbia, Alberta, the Texas and Louisiana Gulf Coast, the Delaware Basin

in West Texas, Pennsylvania and Argentina.

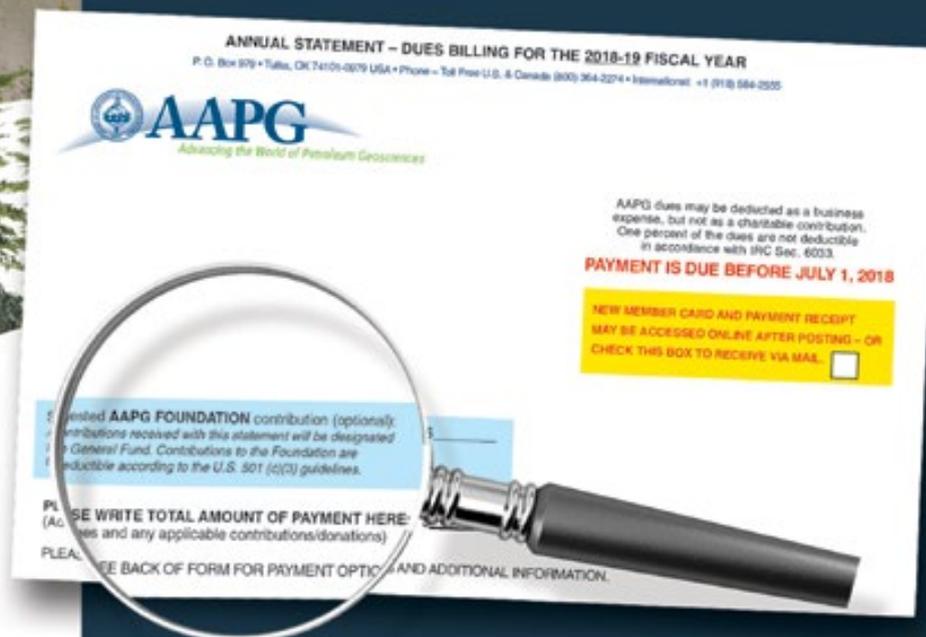
Wilhelm served as president of AAPG's Division of Professional Affairs and he is a Trustee Associate of the AAPG Foundation and of the American Geosciences Institute Foundation. He has been honored with AAPG's Distinguished Service Award and co-authored two "Discovery Thinking" papers

Continued on next page ►



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The monthly list above of AAPG Foundation contributions is based on information provided by the AAPG Foundation office.

Continued from previous page

presented at the AAPG annual convention, and co-authored a DPA special publication, "Heritage of the Petroleum Geologist."

Wilhelm saw that his education in geology laid the foundation for his career and he wanted to give others the opportunity to achieve what he has from his own education. He and his wife decided to establish the Chandler and Irene Wilhelm Grant.

"My wife and I established this fund," he said, "to help students who desire to enter this great profession realize their educational goals."

Other Opportunities to Contribute

Each year, AAPG Foundation receives donations for grants and scholarships to assist deserving geoscience students, student organizations and educators. The Grants-in-Aid program awards graduate-level research in the geosciences. Applicants are awarded based on merit, and in part, on the financial needs of the applicant.

Members of the Education Awards Committee spend a significant amount of time

and talent scoring the applications received over a five-month period. Each is scored at least three times on the basis of the student's academic and employment history, the scientific merit of the proposal, the financial merit of the proposal, the suitability to program objectives and the faculty or department adviser's endorsement.

The rigorous nature of the approval process creates a need for highly qualified AAPG committee member volunteers. Please email the AAPG Foundation at Foundation@aapg.org or call 918-560-2644 to inquire about the qualifications of the Education Awards Committee members.

There are a total of 124 graduate students from across the world who are Grants-in-Aid recipients for 2018, with a total of \$283,500 in geoscience research funds awarded.

The impact of AAPG members' generous support keeps the mission and promotion of geoscience education, research, technological advancement and high ethical standards of the AAPG Foundation intact. The AAPG Foundation is a 501(c)(3) public foundation, qualified to receive contributions in support of educational and scientific initiatives or projects related to the geosciences. [E](#)

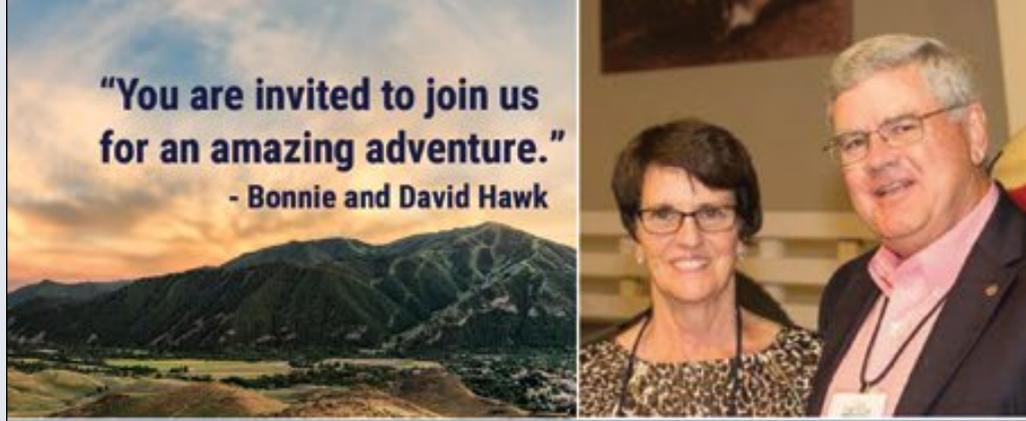
Properties from page 23

calibration well together with its S_w and V_{clay} curves are shown in figure 3c. In this figure it is possible to see a good match between the seismic and well-log derived petrophysical properties in Darwin East. Results suggest that the Darwin West prospect has similar properties to Darwin East in terms of reservoir quality and content. The resulting reservoir property volumes (S_w and V_{clay}) can further enhance the characterization of the

heterogeneity of the reservoir, and can be applied during static model generation, reserve estimation, and to optimize the exploration, appraisal, and exploitation plan in the area.

The data shown in this article were provided courtesy of Pacific Rubiales Energy (now Frontera Energy) and Borders and Southern Petroleum Plc. [E](#)

(Editors Note: The Geophysical Corner is a regular column in the EXPLORER, edited by Satinder Chopra, chief geophysicist for Arcis Seismic Solutions, TGS, Calgary, Canada, and a past AAPG-SEG Joint Distinguished Lecturer.)



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A group photo for the young professionals and students.

Pro Tracks

YPs and Students Enjoy Rich Program at GEO 2018

GEO 2018, which was March 5-8 in Bahrain, included several days of educational and career-boosting content for young professionals and students.

Inaugurated in 1994, GEO is the largest and best attended technical event of its kind in the Middle East Region. A world-class exhibition and an exceptional technical conference with presentations by key industry figures combine to offer exceptional networking, business and educational opportunities to all oil and gas professionals with an interest in the future development of the Middle East's hydrocarbon resources.

This year, the YPs and students program was full of activities by merging the programs of the three top geoscience societies: AAPG, the European Association of Geoscientists and Engineers and the Society of Exploration Geophysicists.

The program started one day prior to the GEO Conference with the Imperial Barrel Award competition. For the first time in the Middle East, a total number of nine universities participated in the competition from five countries with about 44 students participating in the 2018 Middle East Region IBA. Participating teams of graduate and undergraduate students from geology departments have eight weeks to analyze a real dataset, with the winning team going on to represent the Middle East Region at the international IBA competition finals during the AAPG Annual Convention and Exhibition in Salt Lake City. This year, Sultan Qaboos University will be representing the Middle East Region.

On the first day of the GEO Conference, YPs and students had a soft skills course, "The Art of Science," the aim of which was to understand the considerations for

choosing a research portfolio, make a work plan for research, learn common pitfalls and opportunities in research, describe the elements of efficient oral communication, and comprehend fundamentals of time management.

The next day started with Dhahran Geoscience Society Core Workshop where the YPs and students worked with real cores from Saudi Arabia, sponsored by DGS. Following that, the EAGE GEO Quiz competition started with 23 teams competing to win a travel grant covering a round trip ticket and free registration in the EAGE 80th Conference and Exhibition, as well as EAGE support for part of the accommodation expenses, held from June 11-14 in Copenhagen, Denmark. Here the team will participate in the global EAGE Geo Quiz and compete against students from all over the world. The winning team was from

Petroleum Institute of Abu Dhabi, UAE.

After the GEO Quiz, undergraduate and graduate students presented 19 e-poster presentations, with the winner receiving a signed copy of the book, "Out of the Desert," by H.E. Ali Al-Naimi.

After the e-poster session, the Meet and Greet Session started, and according to the student vote, it was one of their favorite sessions. The purpose of the Meet and Greet event is to give YPs and students the opportunity to ask industry professionals questions about career development, life after university and other questions about the industry.

The keynote speaker was Dr. Ramadan Ghalayini, who related his experience of being a young professional in the oil and gas

Continued on next page ►

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Expectations from page 6

When companies chase the shortest-cycle payouts possible, they overlook the benefits of long-life, long-producing conventional wells.

"Up in the Williston Basin a lot of companies have conventional targets below the shale but they will not drill them. Just like down in the Permian Basin, they have a lot of conventional targets. There, financing will not allow them to drill," Tedesco said.

Burdensome regulations remain a problem for everyone on large independents to stripper-well owners, he observed, to the point where he sees some small operators leaving the industry entirely.

"At some point the regulations will have to be set up to help the independents instead of hurting them. I do see a time when some people will just walk away from production," Tedesco said. "A lot of the technologies the EPA and some of the states want to implement aren't cost effective."

Expectations and Capital

Shane Matson, director of geology for Jericho Oil Corp. in Tulsa, comes from a family with a long history in oil and gas.

He's a descendant of George C. Matson, president of AAPG in 1921. The Association confers the Matson Memorial Award annually in recognition of the best paper presented at the previous year's annual AAPG convention.

"We've been at it here for a long time, as independents, mostly," he said.

Matson founded BlueJacket Energy LLC in Tulsa with two partners during the recent industry slump. He said the company evolved into primarily a consulting firm.

"One of the things we found is that in the downturn the geological staff was gutted and a lot of assets were bought," he said.

As a result, Matson said, operators were caught without enough staff to analyze and assess their new holdings, and they called on

BlueJacket for expertise. Jericho Oil ended up bringing him on board as an employee.

"My first advice is, we understand that money has expectations. Every dollar deployed has expectations for making more than that dollar," Matson said.

"It took me 10 years to grasp that capital has expectations, and not all capital has the same expectations," he added.

Matson recalled working for a manager who gave him some unvarnished advice about the oil and gas industry: As a geologist, you're likely to get fired or laid off. At least once in your career, maybe more.

"You have to be prepared for that. You'll need more than a nest egg," Matson said. "You have to be prepared for the storm and you have to be able to invest in yourself."

And despite the industry's economic swings, "keep your skill set sharp. It sounds cliché, but it's absolutely necessary," he added.

A previous employer told him to volunteer in the geoscience community, and Matson said that has helped him immensely.

He began volunteering with the Tulsa Geological Society and his AAPG section. After serving as co-chair of the technical program for the AAPG Midcontinent Section meeting in 2009, Matson was general chair of the 2015 meeting.

"That was just a brutal fall to have a section meeting, but we ended up doing quite well," he said.

"You have to have a network. That's kind of lost in these bigger companies. It's in volunteering that you get out of the world of your own company," he noted.

"Integrate yourself into those societies. You're lucky to have them. And then look at what it would be like to go out on your own," Matson said. "And here's the reality: It's not going to be what you think it will be."

Burdick, an industry veteran, said his journey through companies and start-ups did not come without trepidation, and the same will be true for any geologist entrepreneur setting out on his or her own path.

"If you aren't afraid, you probably haven't assessed the risk you're about to take," he said. 



IBA 1st place winner team, Sultan Qaboos University

Continued from previous page

industry. After the speech, YPs and students interacted with industry professionals, including H.E. Shaikh Mohammed bin Khalifa Al-Khalifa, minister of oil for the Kingdom of Bahrain.

The following day, the program started with the continuation of the student posters, followed by the SEG/DGS Challenge Bowl. The winning team was from King Abdullah University of Science and Technology in Saudi Arabia. The next course was offered by DGS: "Tectonics of the Arabian Plate Petroleum Systems from Basin to Prospect and Field Scales." Thank you to DGS for

offering this high-quality technical course.

The last session was a panel discussion, "Technical versus Academic," which is the choice YPs and students make after graduation – either to join an oil and gas company or complete their higher education and continue in academia.

Thank you to the sponsors of the event: Saudi Aramco, Petroleum Development Oman, Schlumberger and BGP. Also, thanks to the AAPG Middle East Region office for their great efforts and support. Thank you to DGS for offering courses to the YPs and students and helping in organizing the events. Thanks to the GEO2018 Young Professional and Students Activities Committee. 



Abdullah Al-Kandari is a geologist with Kuwait Oil Company as well as the YP Committee chair and Imperial Barrel Award competition chair for AAPG's Middle East Region. He also served as the GEO2018 Young Professionals and Students Activities Committee chair.

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Interested applicants should forward resumes to Grant Eidson, Paisano Energy Advisors, 4441 Buena Vista Street, Dallas, TX 75205.

Analytical Specialist, Department of Geological Sciences, Brigham Young University

The Department of Geological Sciences at Brigham Young University (BYU) invites applications for a full-time, continuing faculty status-track Professional Faculty position beginning as early as the Fall of 2018.

We are seeking an individual with interest and experience in managing analytical facilities. Experience in the operation and maintenance of at least some of the following is essential: X-ray diffraction, liquid scintillation and alpha counting, ICP and XRF spectrometry, stable isotope analyzers. Field expertise may include shallow sediment coring, geophysical surveying, and water chemistry sampling. This professional faculty position is designed to assist and collaborate with Professorial faculty, as well as mentor graduate and undergraduate students. The successful candidate will not conduct a self-guided research program.

Moreover, the successful candidate will spend much of his or her time working with students one-on-one or in small groups, and may be assigned to teach an instrumental methods course. The position requires a PhD in the geological sciences or a related field.

Excellent research infrastructure exists within the Department, including laboratories and field equipment that support a wide-range of geophysical, geochemical, isotopic, and petrologic studies. Excellent computational facilities are also available within the Department and University.

The Department consists of 13 Professorial and 3 Professional faculty, and offers B.S. and M.S. degrees. Research areas include environmental geology, hydrogeology, continental magmatism, structure and tectonics, stratigraphy, paleontology, planetary geology, mineral surface chemistry, geophysics, climate studies, and petroleum geology.

Applicants should send by US mail a curriculum vitae, graduate transcripts, a statement of experience managing analytical facilities, and the names and contact information for three references to: Chair, Search Committee, Dept. of Geological Sciences, PO Box 24606, S-389 ESC, Brigham Young University, Provo, UT, 84602. Applications will be considered until May 31, 2018.

Brigham Young University is an equal opportunity

employer. All faculty are required to abide by the university's Honor Code and Dress and Grooming Standards. Preference is given to qualified candidates who are members in good standing of the affiliated church, The Church of Jesus Christ of Latter-day Saints. Successful candidates are expected to support and contribute to the academic and religious missions of the university within the context of the principles and doctrine of the affiliated church.

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Director's Corner

Life is Change, and That's OK

At every stage of your career AAPG is there to help you succeed.

As we discussed last month, our Association was conceived more than a century ago to help petroleum geologists do their jobs better. No matter if you're just getting started or have earned your experience over a long career, AAPG wants to connect you to the best science and professional practice and one of the chief ways we do this is by getting together.

Already this year we've hosted numerous gatherings, from the APPEX Prospect and Property Expo in London, to GEO2018 in Bahrain, to the new Super Basins Global Leadership Conference in Houston. It's been a busy quarter.

AAPG section meetings are gearing up with both the Southwest and Pacific sections hosting their annual meetings this month. And next month, we'll be gathering in Salt Lake City for our Annual Convention and Exhibition.

These events span generations, and one of the developments you might notice is how many younger professionals are stepping forward and leading at AAPG.

Our emerging leaders are developing innovative new sessions, such as the "Next Generation Deal Makers" workshop at APPEX, and initiatives like the ACE luncheon workshop on "Unconscious Bias" that seek to make AAPG and our profession more responsive to the needs of our Members and customers and to enhance our professionalism.



CURTISS

Demand for oil and natural gas is not going away. The source of demand might shift ... The need for energy remains.

Changes Ahead

These innovations are key to AAPG remaining a relevant organization well into its second century. It doesn't mean everything is changing. But some things are. And that's OK.

This month you'll be receiving your dues renewal notice for the new membership year that begins on July 1.

Full Member and associate dues are \$125 for the year and Emeritus dues will be half that amount. The graduated dues structure also remains in effect for those who qualify.

New this year, we are shifting completely to online delivery for the Bulletin. This will allow us to reduce printing and shipping costs. You will still be able to purchase paper copies of individual Bulletin issues, but they will be produced on demand and can be purchased through the AAPG Bookstore.

The Executive Committee and our staff continue to monitor and manage the Association's finances to ensure that we are

operating in the most efficient and effective manner possible – keeping costs under control while preserving and improving the products and services that you expect as a member.

When you receive your dues notice you'll also have an opportunity to contribute to the AAPG Foundation. These contributions are completely voluntary. But the AAPG Foundation Trustees are committed to a vision of supporting the geosciences, and particularly building a new generation of geoscientists that will be the petroleum geoscience workforce for tomorrow. And that's a topic each of us should be concerned about.

I can tell you that current geoscience students are thinking about it. At every meeting I attend, whether in the United States or one of our regions, the questions always come up: Will there be a job for me? Can I still build a career in oil and gas?

With ongoing media chatter of energy transitions away from fossil fuels and to renewable energy sources, the electrifica-

tion of motor vehicles and much-discussed global efforts to reduce carbon emissions, it's only natural that geoscience students question oil and gas as a career path. They are uncertain.

But demand for oil and natural gas is not going away. The source of demand might shift due to increased electrification of motor vehicles, away from oil as a combustion fuel and to natural gas, coal, nuclear or renewables as a source of electricity. Efficiency gains, allowing us to do more with less, will continue and social norms and values will evolve. Things will change, and that's OK. The need for energy remains.

Having the discussions of how petroleum fits into the global energy picture, how emerging plays and technology will change how we practice petroleum geology, what responsibilities we have as geologists to steward Earth's resources, and how upcoming geologists can succeed in a changing world is what we need to be about at AAPG.

From the newly minted graduate to the seasoned veteran, this Association wants you to succeed. We need you, we need each other to fulfill AAPG's mission of advancing the science and expanding the profession of petroleum geology.

Our planet needs us to safely and reliably find and produce the energy that fuels the world. Together we can.

By JIM HILL, DPA President

Divisions Report: DPA

Running for AAPG Office

Since this is the last article I am going to write for the EXPLORER as president of the Division of the Professional Affairs, I put some extra thought into the topic I wanted to share. Over the years I have been asked to run for DPA office four times. After being soundly defeated the third time by a great candidate from Houston, I figured my political career within AAPG was at an end. I had been Pacific Section councilor for many years by then and felt I had contributed and repaid for some of the many good things the DPA and AAPG had done for me.

I then retired and started watching my granddaughters grow. I was there to hear some of their first words, which – much to my pride – included "rock" and then "big rock"! I'm not sure what genetics has to contribute, but all four granddaughters have an unusual interest in rocks.

This is when the call came to again run for office, this time for president-elect of DPA. After some soul-searching, I agreed to run with the certain knowledge I would again come in at a strong second place.

Life does take some strange turns, and I was elected by what I am sure was the narrowest of margins.

Being involved as an officer in the DPA has truly opened my eyes to the importance we play to the organization and most importantly to our members. It has been a great pleasure for me to work with the people that really make the organization work. The staff in Tulsa, the volunteers who sit on committees and the councilors who give their time and effort to keep the DPA focused on priorities that will benefit and bring value to members and our science.

I strongly encourage you to participate



HILL

I have noticed over the years that each new generation of geoscientists brings new energy, perspectives and ideas into AAPG, thereby revitalizing it. It is time we bring those energies and ideas to the DPA.

in the organization and experience running for office. For young professionals, there is no better way to build your contacts than by participating as a section counselor or a member of a committee. I have enjoyed every minute and it certainly helped my career.

DPA Events

This year, the DPA is going to sponsor great events that will help bring current technical knowledge to the membership. The Playmakers event in Midland, which focused on the explosive developments in the Permian Basin, was a great success. The next Playmakers event is scheduled in Houston on April 26 and will focus on "Re-emerging Shale Plays of the Gulf Coast." This is an all-day collection of talks on the new developments in the Haynesville, Eagle Ford and Austin Chalk. Poster sessions will also be presented, and there will be discussion of the current development and completion technology that has led to these successful plays. As with most DPA events, our members will receive a significant discount to the event and we will offer even greater discounts to our unemployed members. We are also hoping to put together a job and resume board to bring

qualified people together with companies seeking them.

DPA at ACE 2018

The AAPG Annual Convention and Exhibition in Salt Lake will also feature several DPA sponsored events:

► DPA Luncheon on Tuesday, May 22 will feature a talk by Tim Rynott: "Global Natural Gas Markets: Their rapid expansion and the implications to the Western United States." This should be of great interest to all who develop and explore for hydrocarbons throughout the United States.

► 2018 ACE Forum: "Future Energy Geoscientists." The forum will be held the morning of Wednesday, May 23, and will feature a great panel put together and modeled after a similar forum from the Houston ACE last year. What are the career paths for geologists going forward? The technologies of today and tomorrow will provide new challenges for both young and experienced geoscientists. New ideas and technologies find new resources. This forum should give participants a view of where the industry is headed.

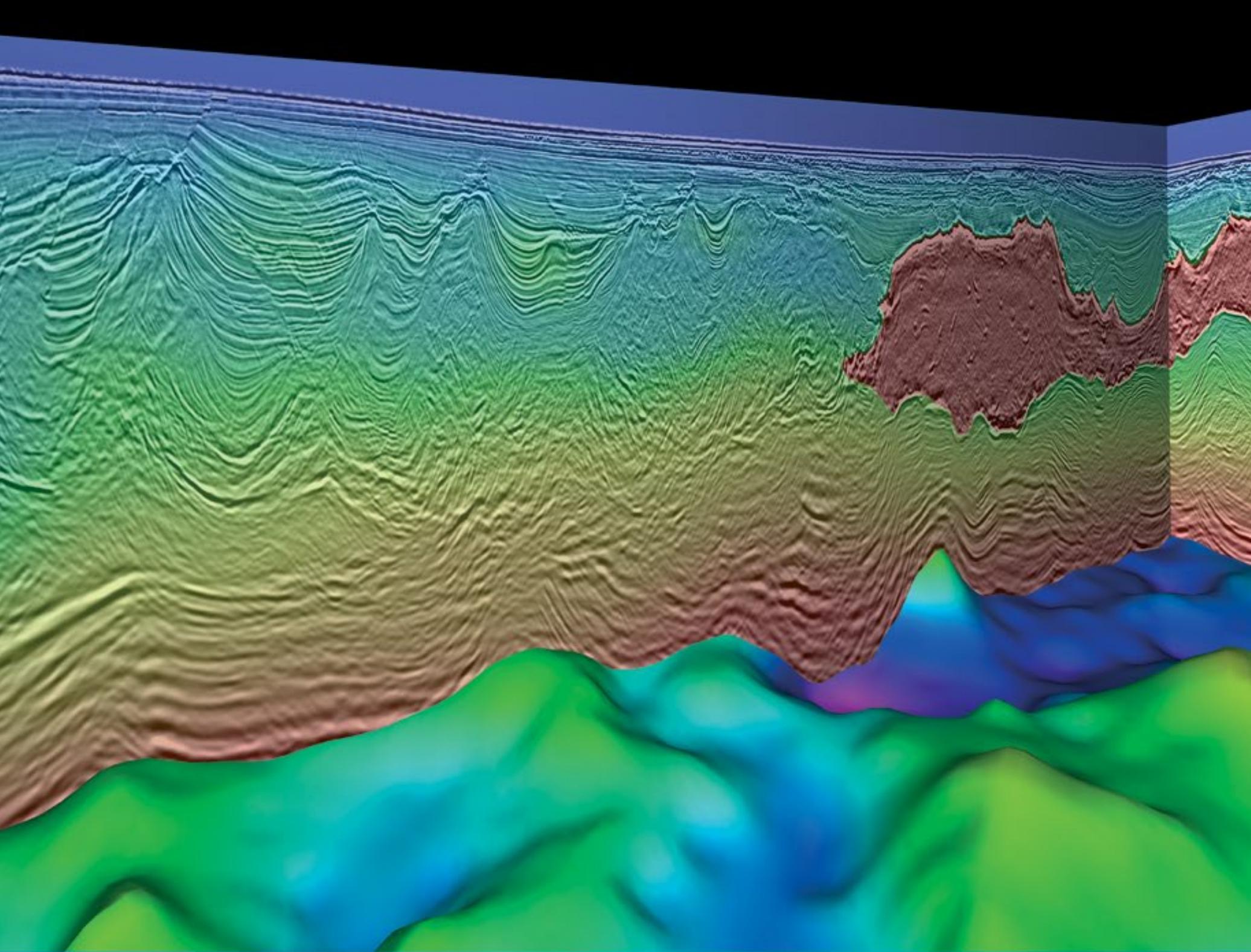
► A second DPA-sponsored luncheon will be held on Wednesday, May 23, and will fea-

ture researcher and training director, Dr. Carlee Beth Hawkins, assistant professor of psychology at the University of Illinois-Springfield. (See page X, this issue.) She will be speaking on "Unconscious Bias in the Workplace." This event is more focused on students and young professionals but is open to all who have an interest. We all have some biases and better understanding should help us overcome any negative consequences.

Provisional Membership

Another focus for the year in the DPA is our new member status for young professionals: provisional member. This level of membership is focused on those AAPG members who currently meet the requirements for membership, except for the eight years of experience for certification. The provisional member status, although non-voting and uncertified, will have all the benefits of full membership, including discounts to DPA events and access to the website content. Provisional members can be members of committees and I hope will add a new level of energy to our committees. When the eight years of experience is reached, these provisional members must apply for certification or their membership will be terminated. Dues for the new level are only \$25 per year. The application for membership is now available on the DPA website.

I have noticed over the years that each new generation of geoscientists brings new energy, perspectives and ideas into AAPG, thereby revitalizing it. It is time we bring those energies and ideas to the DPA. I hope all who qualify will join. We look forward to working with you and sharing ideas.



Gulf of Mexico Crystal C

Exploring the Northwest Deepwater GOM

PGS is pleased to announce the availability of its newly reprocessed and re imaged Crystal C 3D Wide Azimuth survey in the western deepwater Gulf of Mexico. The original acquisition of these data was completed in 2010 and covered 485 OCS blocks in the East Breaks and Alaminos Canyon protraction areas.

The new data provide improved imaging of the slope to basin-floor elements of the Wilcox depositional system, for which the Deep Nansen well in East Breaks 645 is a crucial control point.

Base deliverables include RTM and high-resolution Kirchhoff depth products. PGS expects this survey to be indispensable for exploration in the Wilcox play in the western Gulf of Mexico for the foreseeable future.

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