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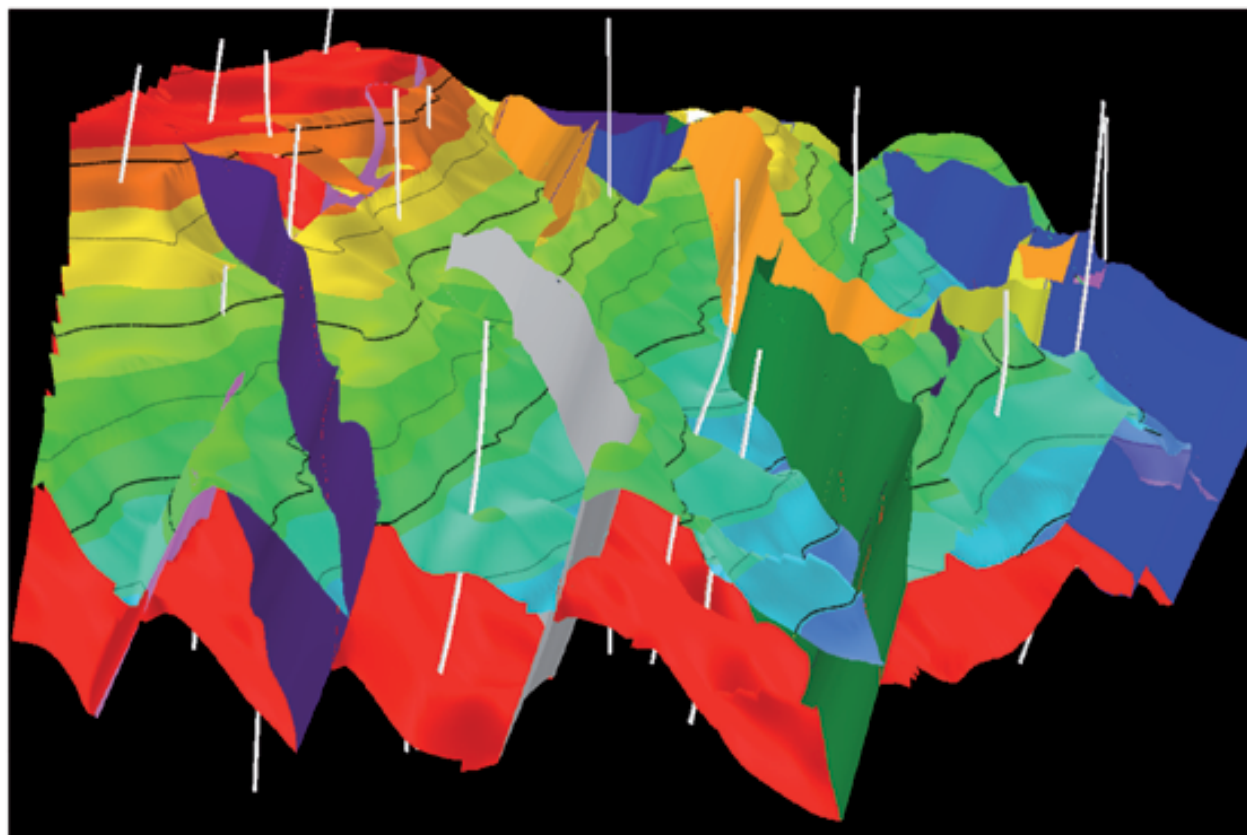


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PRESIDENT'S COLUMN

# Exploring the Potential of the Association

BY PAUL BRITT

As we approach our 100th year as an association, the obstacles we face threaten to overshadow the mission. The struggle to adapt to the changing industry environment has dominated the landscape and AAPG is coming off a second consecutive year of declining revenues, with an outcome of restructuring and continued austerity.

Despite these challenges, AAPG is leveling-off with a nearly balanced budget, and I remain focused on the primary missions of the Association.

It's a tall order, but one I'm ready to accept. I look forward to this opportunity to work with the new incoming Executive Board members as well as the members remaining on the Executive Committee. Together we will strive to get the momentum back into the programs that bring value to the membership.

The most prominent are events. The International Conference and Exhibition (ICE) is in Cancun this September and promises to be a robust convention at a location convenient to many U.S.-based members who might otherwise not consider attending an ICE. I encourage you to take a serious look at it.

We are evaluating the publications program, including Datapages, and considering ways to return publications to its former primacy as a comprehensive program utilized by more Members. The publishing world and the ways data are accessed are constantly evolving, and we intend to stay ahead of those changes.

NAPE and the Offshore Technology Conference both continue to be strong, and AAPG is involved in the events with timely, cutting-edge technical programs. The revenue from these events also drives many of our other efforts, including programs for Students and Young Professionals.



BRITT

I would like to hear from Members with ideas for products or services they would like to see that are not already provided through AAPG, and from YPs especially.



The Cancun International Convention Center in "Punta Cancun," Cancun, Mexico's central business district, will be the site of AAPG's 2016 International Conference and Exhibition in September.

The 100th Anniversary Annual Convention and Exhibition is next April in Houston and promises to be an outstanding event. I hope to see many of you there.

\* \* \*

Last year, there were many discussions about the purpose of AAPG.

Is it 1) a professional association, 2) a scientific association or 3) a social or networking association?

After some deliberation, I maintain that the answer is, primarily, 4) all of the above. Talking with Members across the United

States and internationally, I find that most belong to AAPG for the networking, the science and the professionalism, and don't prioritize any over the others. Even though about half of our convention and education attendees are not AAPG members, they come for the interaction with other professionals, as well as for the science.

As AAPG adapts to a changing industry climate, these points need to be kept in mind. There are scientific societies, social organizations and professional groups, but they are not AAPG. The difference is what defines AAPG as the premier association that it is.

Along those lines, I would like to reiterate the promises I made for what I would do "if I was elected":

► Work to advance Members' careers by providing the best products and service possible, focusing on those needs in the downturn.

► Promote opportunities for YPs within the Association.

► Continue to advance membership growth, globally and within the United States, while maintaining the ethics, standards and expectations of our existing Members.

I would like to hear from Members with ideas for products or services they would like to see that are not already provided through AAPG, and from YPs especially. The YPs are the future of the industry and our Association, and they are particularly hard hit in the current employment environment. And, membership growth is slowing at a time when professional contacts and networking couldn't be more important.

I would like to issue a challenge to all Members to become engaged and offer ideas and potential solutions, so that we can explore other opportunities to accomplish these goals.

At the beginning of the year, we are facing many challenges and many more opportunities, and I am looking forward to working with the EC, the AC, the House of Delegates and the Members to explore the potential of the Association.

Paul Britt

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## ON THE COVER:

This shot of the Great Wall of China is from the vast and varied catalogue of this year's Harrison J. Schmitt Award winner, Gary Barchfeld, who has helped document AAPG and the industry for the past four decades. See story on page 12.

Left: Barchfeld himself at the Great Wall.





*John Breyer pauses in front of a section of the Eagle Ford study area, which quickly became a world-class reservoir and contributed to the recent supply glut of oil.*

# Exploring the Eagle Ford

By KELSEY TAYLOR, EXPLORER News Editor

One of AAPG's newest volumes was released just in time for the 2016 Annual Convention and Exhibition.

"The Eagle Ford Shale: A Renaissance in U.S. Oil Production" continues the memoir series as Memoir 110.

The volume describes the evolution in geologic understanding that quickly transformed a world-class source rock into a world-class reservoir, which produced 1.7 million barrels of oil per day.

John Breyer, the editor of the volume, explained that many of the chapters focus on the main producing area of the Eagle Ford play. This spans from the San Marcos Arch in central Texas southwest

to the Maverick basin near the border of Mexico. The area northeast of the arch is also covered.

"The volume touches on all aspects of the Eagle Ford petroleum system from the generation and geochemistry of the oils, to the pore spaces which hold them, to the techniques used to locate and develop the resource in the most cost efficient way," he said.

Breyer began to study the Eagle Ford when his employer became interested in acquiring acreage and developing the play.

"The 'boom' was on, as with the Barnett a few years earlier, and it was exciting to be involved," he said.

This is the second volume he's edited for AAPG.

"In my previous life as a professor at Texas Christian University, I found that I never learned so much about a subject as when I taught it. Editing is a lot like teaching. In editing the volume, I got to learn from among the best and brightest working on the play," said Breyer.

When asked about the work that went into the volume, Breyer explained that many of the authors took time outside the office with little or no reward to work on their chapters.

"For them this is a volunteer service to the community," he said. "That so many were willing to contribute is especially remarkable, given that the industry was going full blast when I made the request and everyone was probably going above and beyond already."

## Framework For Continued Work

The information gathered by the authors in the volume has created a framework for continued work in the area. Breyer added that a group of chapters highlights the need for integrated studies so the resource can be utilized in the best possible way.

The Eagle Ford play "truly did lead to a rebirth in U.S. oil production, but then the play became a victim of its own success," he explained.

"Production from the Eagle Ford Shale and other shale oil plays in the United States helped contribute to a glut in world oil supply that led to a precipitous drop in oil process beginning in the summer of 2014," he added.

"Future activity in the area will depend on commodity prices but continued innovation by operators in the play is lowering the economic threshold needed to be surpassed in order to reignite drilling activity," Breyer also said.

For more information about the volume, visit [store.aapg.org](http://store.aapg.org) and type Memoir 110 in the search bar. [E](#)

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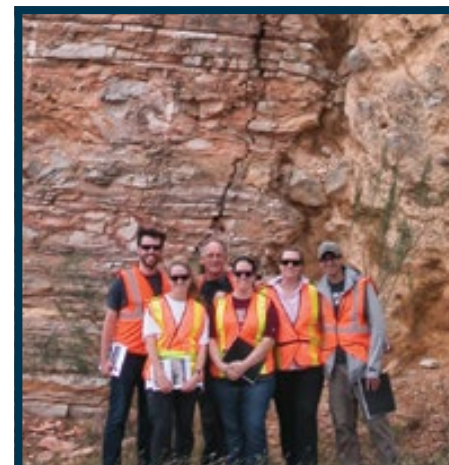
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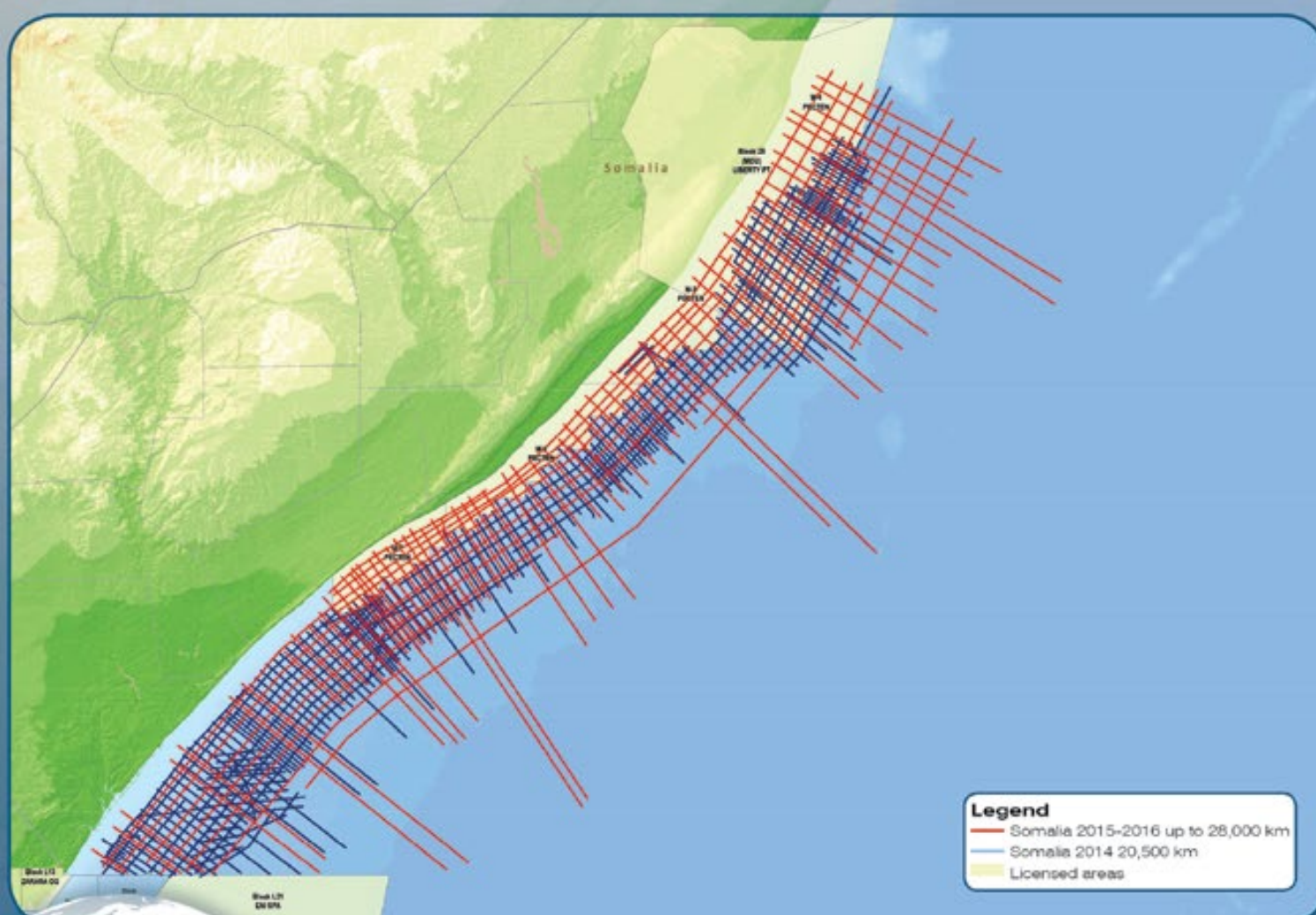




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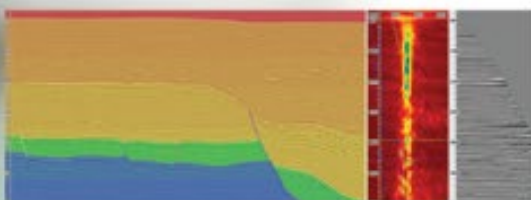


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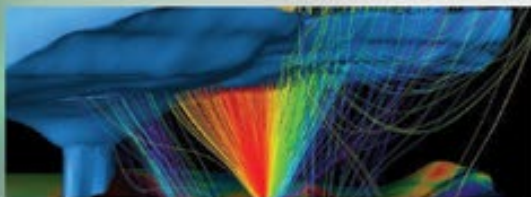
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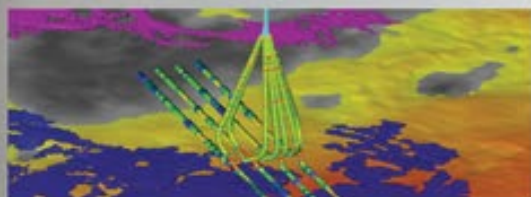
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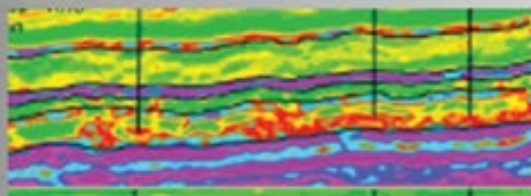
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# A World of Opportunity

By DAVID BROWN, EXPLORER Correspondent

**T**here's a world of opportunity in unconventional resources.

Literally.

Basins around the world hold identified potential for unconventional resource development and a combination of exploration, assessment and evaluation seems certain to uncover other favorable plays.

Earlier this year, Canada's National Energy Board (NEB) issued a report estimating the marketable natural gas potential of the lightly drilled Liard basin at 219 trillion cubic feet (Tcf), or about 6.2 trillion cubic meters.

The majority of the Liard basin lies in British Columbia, but it extends northward into the Northwest Territories and the Yukon. The basin has natural gas production potential in both the Exshaw and Patry shales, the report said.

"From a reservoir perspective, it's really deep so there's a lot of pressure. And in fact it's double overpressured. There's a lot of gas there," said Mike Johnson, technical leader-hydrocarbon resources for the NEB in Calgary.

In Argentina, the Vaca Muerta shale might draw more than \$10 billion in future investment from ExxonMobil Corp., according to the company's chief executive officer.

Vaca Muerta could be the world's second-largest shale gas deposit. ExxonMobil has already invested \$200 million in Argentina shale development and plans another \$250 million pilot project.

In China, "shale gas development has been focused on the Longmaxi formation in the Sichuan basin, which is estimated to hold 287 Tcf of technically recoverable volumes," according to the U.S. Energy Information Administration.

China and Russia might offer the greatest possibility for unconventional resource exploration and assessment outside the United States, based on the size of the countries and their known geology.

### Industry Comeback Required

To evaluate projected resource plays and identify new prospects, drill bits need to start spinning again. That will require a comeback in both industry investment and worldwide oil and natural gas prices.

It also will take industry commitment, said Melissa Stark.

Stark is the energy managing director and global liquefied natural gas lead in London for Accenture, a global services firm that provides strategy, consulting, digital, technology and operations services for companies in 120 countries.

"For unconventional resources to be developed outside of the U.S., companies have to commit to being in a basin for five to 10 years," she said.

"There's a need to commit significant investment because a certain well density and base infrastructure is required to really understand an entire basin and to get the operational scale to drive down unit costs," Stark added.

Accenture issued a 2014 overview titled "International Development of Unconventional Resources: If, Where and How Fast?" that identified a number of other prospective basins for resource-play development.

As a disclaimer, recoverable resource estimates are guesses at this point, and will

remain so until more drilling and evaluation take place.

► West Siberian basin, Russia.

The Bazhenov shale has been compared to the Bakken and is estimated to hold technically recoverable resources of 75 billion barrels of oil and 285 Tcf of gas.

This tight oil play area has a long production history, good infrastructure and easy access.

► Burgos basin, Mexico.

The Eagle Ford shale extends south into the Burgos basin, in an area that already accounts for a significant share of Mexico's hydrocarbon output. Infrastructure is already in place with service and supply support nearby.

► Cooper basin, Australia.

With multiple shale gas, basin-centered gas and deep coal-seam gas possibilities, the Cooper basin is one of the most intriguing unconventional resource exploration areas in the world. Targets are mostly Permian; mature source rock is found across the basin.

► South Ghawar basin, Saudi Arabia.

Oil and gas production already exists in Saudi Arabia – to put it mildly – but unconventional resources are a new frontier for the country. Exploration and assessment has begun in South Ghawar, the Rub' al Khali desert and the northwest. Availability of water is an issue. The Saudi oil ministry has estimated South Ghawar unconventional gas reserves at more than 600 Tcf.

► Karoo basin, South Africa.

Recoverable shale resources in the Karoo basin could total as much as 390 Tcf. Prospective, mature black shale is present but a lack of available water could stymie development. Infrastructure is poor, and access to services and a trained oil and gas workforce is limited.

► Bowland basin, United Kingdom.

Unconventional production has yet to be unlocked in the Bowland basin, where estimates of total recoverable gas volumes range all the way from 12 Tcf to 130 Tcf. Significant opposition to resource development, especially hydraulic fracturing, exists in the United Kingdom.

► Baltic basin, Poland.

The Baltic basin in northern Poland is a leading area for unconventional resource exploration in mainland Europe, but a number of large operators have abandoned their search there. With estimated total recoverable resources of 105 Tcf gas and 1.2 billion barrels of shale oil, the basin holds significant production possibility from mostly Palaeozoic targets, including Lower Silurian, Ordovician and Upper Cambrian. Infrastructure and access to services are good.

Concern over legal and regulatory issues, environmental opposition and spotty drilling results slowed the first wave of exploration in the country. But last year Poland and China signed a memorandum of cooperation in geology and mining, which could help restart shale gas development.

### Canada

In Canada, the Liard basin is now the country's second-largest known gas resource after the Montney shale in British Columbia and Alberta, and it ranks ninth in the world, the NEB said.

Johnson said the Liard's shales have

**See Liard, page 8**



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# Geology and Whiskey at Eastern Section Meeting

By KELSIE TAYLOR, EXPLORER News Editor

“Basins to Barrels” will be the theme of the annual meeting of the Eastern Section of AAPG, which will be held Sept. 25-27 at the Lexington Convention Center complex in Lexington, Ky.

Co-hosted by the Geological Society of Kentucky and the Kentucky Geological Survey in the heart of Bourbon Country, the event will focus on the opportunities and challenges of energy resources in the Appalachian, Illinois and Michigan basins.

The event's theme will be explored by opportunities to sample the region's renowned variety of bourbon whiskeys, as well as by a field trip to explore the role of geology in shaping the region's

unique history with whiskey.

A variety of technical sessions have been planned and will take place throughout the meeting.

Presenters will provide a unique insight into topics that include:

- ▶ New production methods and analysis techniques.
- ▶ Ordovician shale resources.
- ▶ The Marcellus Shale Energy and Environmental Laboratory.
- ▶ Emerging unconventional shale plays.
- ▶ Sedimentology.
- ▶ Structure and tectonic effects on reservoirs.
- ▶ Carbon dioxide use and storage.

▶ Groundwater and environmental issues.

Also, interactive workshops will feature topics about dolomite reservoir analysis, communicating with Washington legislators, unconventional reservoir quality analysis and introductory geochemistry for shale-gas, condensate-rich shales and tight oil reservoirs.

Field trips will explore the geology of the area. The first will cover the role of the regional geology in the origins and history of bourbon whiskey. Several production sites and two operating distilleries will be toured, complete with bourbon tastings.


The second field trip will showcase the

Upper Ordovician Lexington Limestone, which contains a mosaic of carbonate facies.

The third will explore new roadcuts in the western margin of the Eastern Kentucky Coalfield. It will highlight the marine to fluvial coastal-deltaic facies in Pennsylvanian rocks.

In addition, an exhibition area will include booths for professional organizations and energy-sector companies where they will be available to share information about products and services they offer.

The Hyatt Regency will be the main hotel. Rooms are reserved at a discounted rate and are available through the website below.

For more details, visit [www.uky.edu/kgs/esaapg2016](http://www.uky.edu/kgs/esaapg2016). 

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## Liard from page 6

over 200 meters of thickness in places. Formations are about 80 to 90 percent silica, rock prone to easy fracturing, “and there's no frac barrier,” he noted.

Source rocks are of Devonian-Mississippian boundary age, equivalent to the Bakken formation in North Dakota “although the rocks are quite different,” Johnson observed.

The new Liard resource assessment was a joint effort by the NEB, the British Columbia Oil and Gas Commission, the Yukon Geological Survey, the Northwest Territories Geological Survey and the British Columbia Ministry of Natural Gas Development.

Producing resource plays in Canada include the Montney, Horn River, Duvernay and Alberta Bakken. And there's plenty of room left over for resource exploration and development, Johnson said.


Possibilities include the Utica shale in Quebec and the Horton Bluff shale in Nova Scotia and New Brunswick, he noted. The Canol shale in the Northwest Territories is a potential tight oil play and the Mackenzie Valley area has other resource options, Johnson added. The northern plays are in the area of conventional oil production at Norman Wells.

“We're talking scales on the size of the big U.S. plays. There's a ton of gas here. From the economic standpoint, however, it's challenged right now,” Johnson said.

### NOCs Take the Lead

Given constrained economics in most unconventional resource plays and the need for continued investment commitment from operators, national oil companies (NOCs) are likely to emerge as near-term leaders in development, according to Stark.

“With that in mind, the next most likely countries to develop unconventional resources are the ones with NOCs who are committed for the long-term – for example, Argentina, China and Saudi Arabia,” Stark noted.

“The UK also bears watching as the government has made a commitment and has put in place supportive regulations and incentives. But in terms of scale of resource development, the major players are expected to be the national oil companies,” she said. 



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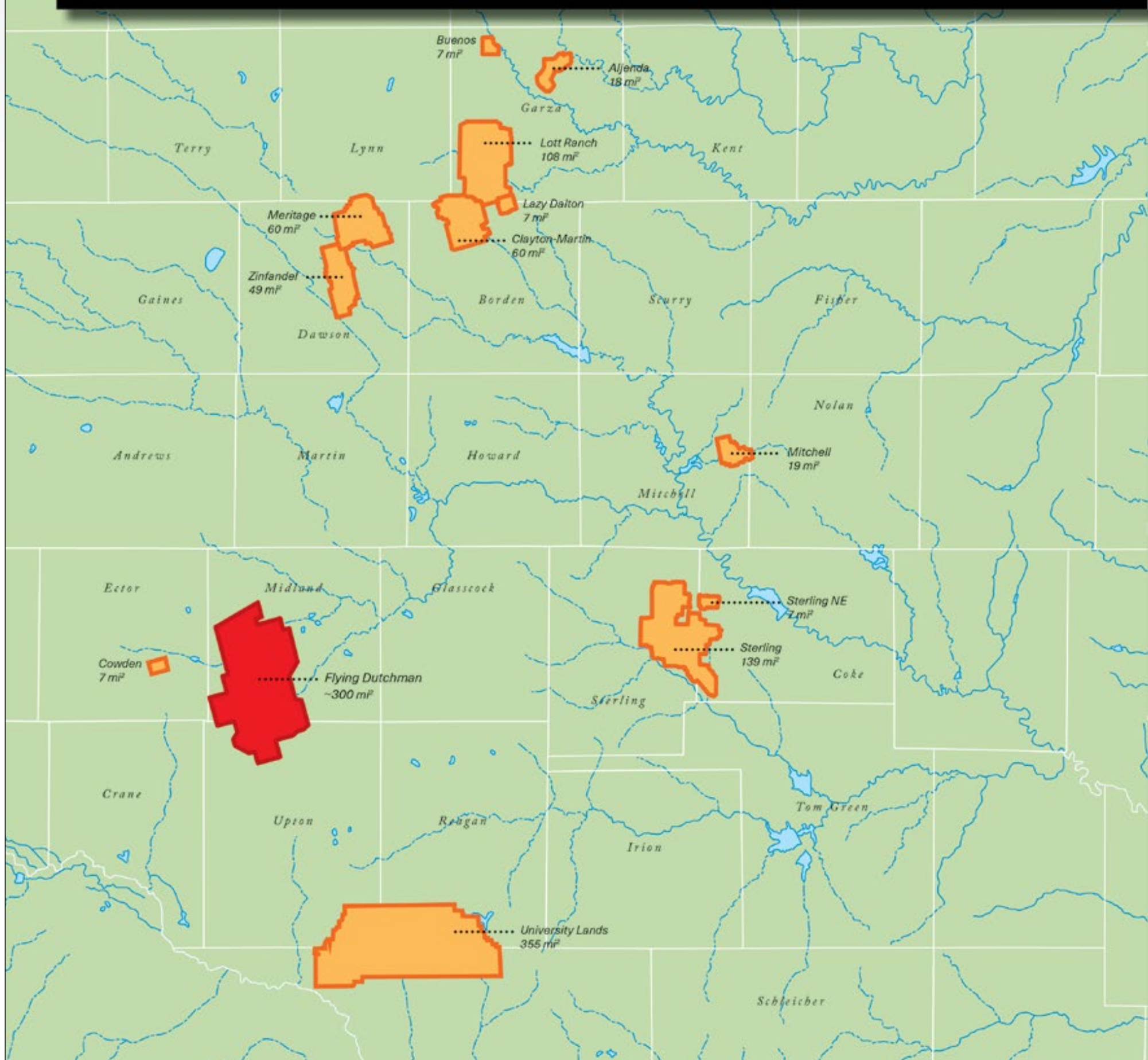
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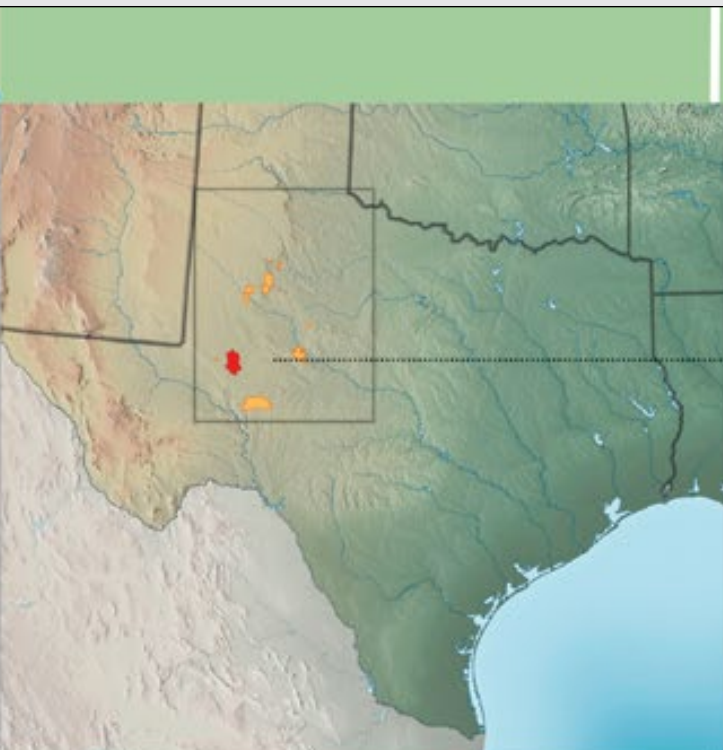
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Harrison J. Schmitt Award

## Capturing the Image of AAPG

By BARRY FRIEDMAN, EXPLORER Correspondent

The year's Harrison J. Schmitt Award winner, Gary Barchfeld, is neither a geologist nor paleontologist. He knows little about hydrogeology or oceanography. He doesn't run or make policies for a mining or petroleum company, nor is he an educator, consultant or author.

He is a photographer.

But if the industry, if AAPG, had an official photographer the way the NFL has official apparel or the Olympics has an official soft drink, Barchfeld, who's been taking photographs of those inside the profession for more than 40 years, would be it.

### Promoting the Science

"My first job was July 4, 1973," he said with a laugh.

Speaking with Barchfeld, one gets the sense that every image he has ever taken since that Independence Day is remembered, catalogued and thought about. But what he does – what he's required to do – has always been clear.

"A lot of what I do for AAPG Members, for example, is to promote the science taking place in their industries," he said.

To do that, he needed to be flexible, needed to go where the work was and where the work was needed.

"There is a broad spectrum of photography. I always enjoyed the advertising, illustrative part, enjoyed



Gary Barchfeld has traveled the world as a photographer for the industry and for AAPG, including Moscow where this photograph was taken.

climbing up on rigs. It was very creative to me, traveling the world to document and project a company's image," said Barchfeld.

Companies, he discovered, were not just different in degree, but in kind.

"I like to say I work for the largest private and public oil companies in the world."

Some of the work, though, was remarkably similar.

"I am called upon to take pictures of their

executives, but it's documentation that has to be done very well, because you never know how important it's going to be."

It can be complicated, difficult work, but Barchfeld knows at its core, the task doesn't change.

"And a lot of it is just taking pictures because pictures are important in today's world."

Some of the pictures that he has taken

were during the coldest of days (-39 degrees in Edmonton, Alberta) to the hottest (109 degrees in the Salton Sea Desert in California).

Before he began his work for the industry, he worked as a staff photographer with the Firestone Tire and Rubber Company in Akron, Ohio, and was there during one of the worst crashes of the Indianapolis 500. He remembers to this day when a car hit a wall, its fuel spilling over the track and fans.

"It was horrific. I have a picture of the car upside down with another race car going under it," he recalled.

You never know how important a picture is going to be.

His arc in becoming one of the top industry photographers has been remarkably smooth.

"It's always been easy getting the work," he said about arriving in Houston in 1973.

"My third interview was with the agency handling George Mitchell (Mitchell Energy) and we were hired before the guy saw my portfolio. It was a testament, I think, to our good work, our personalities before that. We always tried to be service oriented and reflect back to doing the best job you can for each individual client."

The "we" in that is his long-time partner, Greg Zalar.

Their work endured, as did Barchfeld's reputation. He has been the official photographer for the Offshore Technology Conference for the past 37 years and has been going to the event for 40.

But after that much time – much of it spent working with another longtime partner, the late Jon King Keisling, and traveling the world capturing images to document events like trade shows and executive functions – Barchfeld wants to slow down a little. Not because he's tired or burnt out from the work, but simply because there are other things he wants to do, like run for city council in his home town.

### Documenting the World

Having turned 70 in May, Barchfeld said, "It's time to let younger people do this. And I think when you have a gift, a skill, you should give back."

The new generation of photographers, whom he mentors, will have to know more than he did, he insists.



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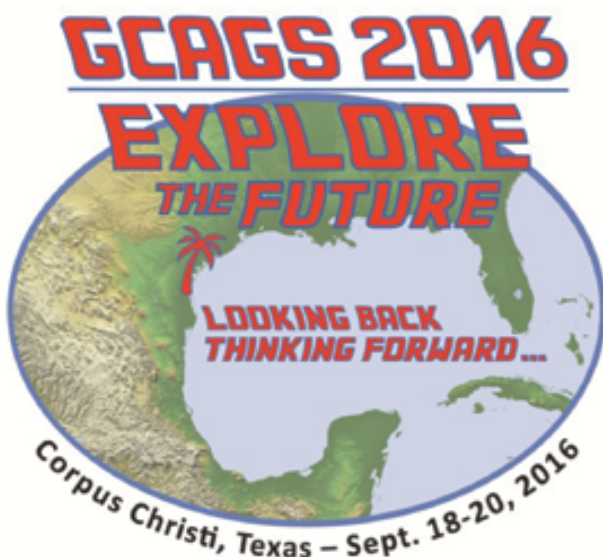


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\*Short course/field trip combination compares ancient and modern clastic systems.

Estimated total attendee cost is less than \$950/person, including early registration, hotel, food, & travel from Houston or San Antonio.

## Profession from page 12

"Used to be you'd do a job, bring the film back, send it to the lab, process it, send contact sheets, then deliver the product two, three weeks later. Now, I have to bring a computer guy with me so we can download it in the morning so that before lunch they can send out tweets."

Through it all, he has always loved the work and still talks about how lucky he is to have done it.

"I am one of the most blessed people in the world to have found a profession I love and that people respect," he said.

And while he may be slowing down, he is still enthusiastic about every job he does – his other community and freelance work – and still remembers and relishes the pressure.

"You have to get every job right, and sometimes you only have seconds to get it right. Once, I was the lead photographer at an All-Star game and the commissioner of baseball was there, the mayor, the governor, Nolan Ryan was throwing out the first pitch. It was big time, I thought to myself, 'It seems like every job you have has a lot of pressure to it. Wouldn't it be great if just once you had an unimportant job once in a while?'"

He stopped and answered his own question.

"But then I remember nobody calls me for the unimportant job, so yes, I'm flattered that people want to give me the ball when there's 20 seconds to go."

So what about this city council business?

"You know, there comes a point in your life when you reassess and I decided to step up and work hard for the community. And since everyone had other things to do, I decided to. It goes to giving back."


But once a photographer, always a photographer.

"When I go on vacation, as a busman's holiday, I always take my camera, because the world fascinates me. And, whether it's someone winning an award or the sun coming up, it is my job to document the world. I want to create that, possess that."

As for the Schmitt Award, he said he was surprised, excited and genuinely humbled.

"AAPG has some very, very, very good people in its membership and to think they would give me an award like this, I thought 'Wow!' It overwhelmed me."

But to say that nothing compares to it, though, is a stretch.

"I am the official photographer for the World Championship Barbecue Contest, which is probably the best job out there," said Barchfeld. 

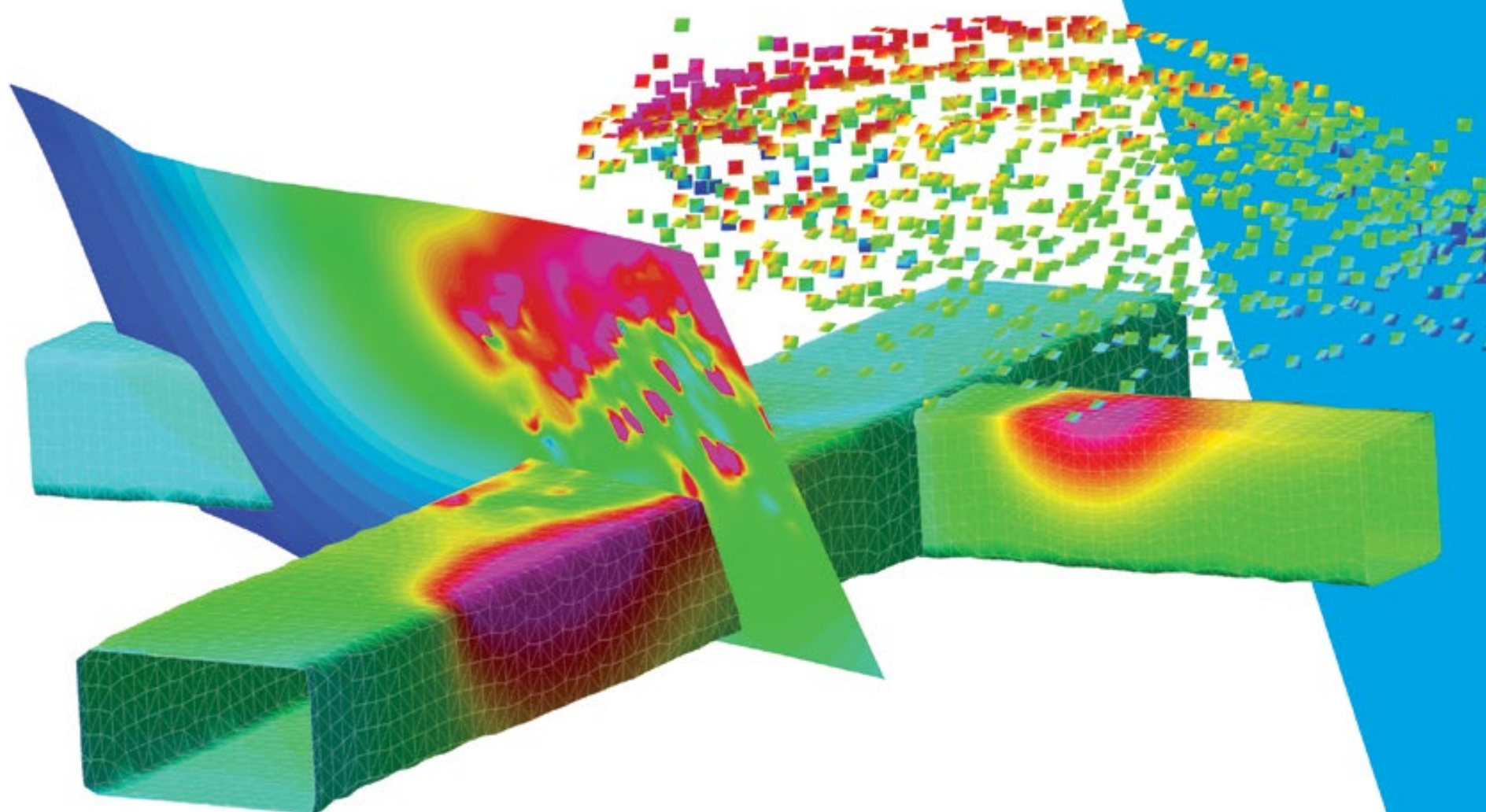




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## U.S. Shale Production Proves Resilient to Price Collapse

By LOUISE S. DURHAM, EXPLORER Correspondent

Given the high profile of U.S. shale production, it's easy to forget this phenomenon kicked off a mere decade ago, give or take.

As the number of shale oil and gas plays proliferated, so did the naysayers.

The negative predictions focused on the well-known rapid decline in production that occurs once these wells go online.

Instead of an early death, the ensuing boom upset the world order in oil production.

A number of the shale-intensive operators have ended up in bankruptcy or closed their doors, but some of the stalwarts cut costs and even increased production by investing only in core



CHARLEZ

Philippe Charlez, unconventional resources development director at Total, and Pierre Delfiner, president of PetroDecisions will present, "Resilience of the U.S. Shale Production to the Collapse of Oil and Gas Prices" next month at the Unconventional Resources Technology Conference (URTeC) in San Antonio, Aug. 1-3.



DELFINER

assets with the best return.

This resilience, a clear refutation of the early doubters, has been the focus of a scientific study detailed by Philippe Charlez, unconventional resources development director at Total, and Pierre Delfiner, president of PetroDecisions.

"In spite of a strong decrease in the number of rigs operating in gas plays after the price collapse in early 2012, the aggregated production of the three major gas plays – Barnett, Haynesville, Marcellus – continued to grow steadily and even at a higher rate," Charlez said. "In 2015, a rig

(was shown) to bring between five and 10 times more instantaneous production than it did in 2008."

### Persistent Production Increase

The average production of these plays hasn't ceased to increase since 2005.

"Over the past two years and with three times fewer operating rigs, the growth has been even more significant than that registered before the collapse of gas prices," Delfiner said.

That shale production is highly resistant to declining activity will likely surprise some industry players.

To highlight and better understand resilience factors of an unconventional play, Total developed a model dubbed Unconventional Factory Development simulator (UFDsim).

Charlez explained that the model simulates the factory development of a core area by calculating the required development schedule.

In other words, it calculates the number of wells to be drilled, fractured and connected to reach and maintain a production potential.

Besides the three gas plays, the software model was used to simulate the production history of the Bakken and Eagle Ford for oil.

Charlez outlined the resilience factors:

- Size of well portfolio: the rig numbers required to maintain a production plateau decreases significantly with time and the number of wells put on stream. The UFDsim model highlights that a large portfolio of wells drilled at different maturities acts as a "shock absorber."

- Improvements in operational performance: apart from the number of wells, drill and complete time/performance appears to be a factor.

- Improvement in production performance and EUR: this entails geological expertise that leads to identification of high potential areas, "sweet spots," along with completion design.

Improvement in EUR and production performance rank as the most efficient of the three resilience factors.

### Play-to-Play Comparison

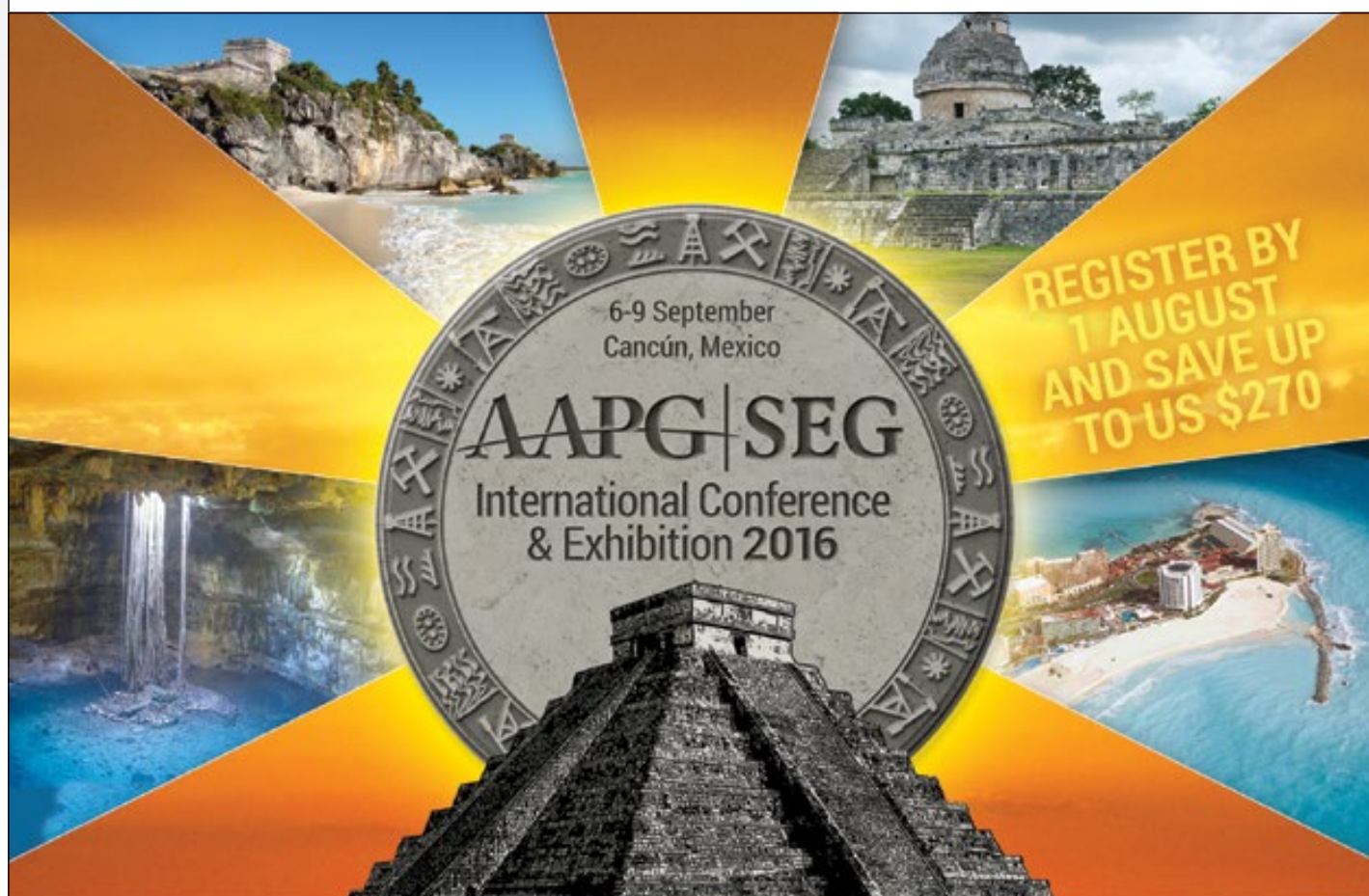
Play-by-play analysis shows highly significant heterogeneity between the mature Barnett, the insufficiently developed Haynesville and the immature Marcellus. To strengthen the gas resilience of the U.S. portfolio, Delfiner said development should focus on the Haynesville and Marcellus.

Regarding oil plays, the Bakken is far more resilient than the Eagle Ford. Absent any new activity, Bakken production only decreases 50 percent in 10 years while the Eagle Ford declines 70 percent.

Charlez offered some sage advice:

"When hydrocarbon prices are high, the unconventional resources should be developed at a very fast pace in order to fill as much as possible a well portfolio that will be paid through a very fast return on investment," he said. "In case of a sharp decrease in prices, this 'well fitted' portfolio would then allow (operators) to rest on a declining strategy that generates significant profits."

"Owing to the flexibility of the rapid mobilization and demobilization of rigs with unconventional, the development can be resumed as soon as prices recover."



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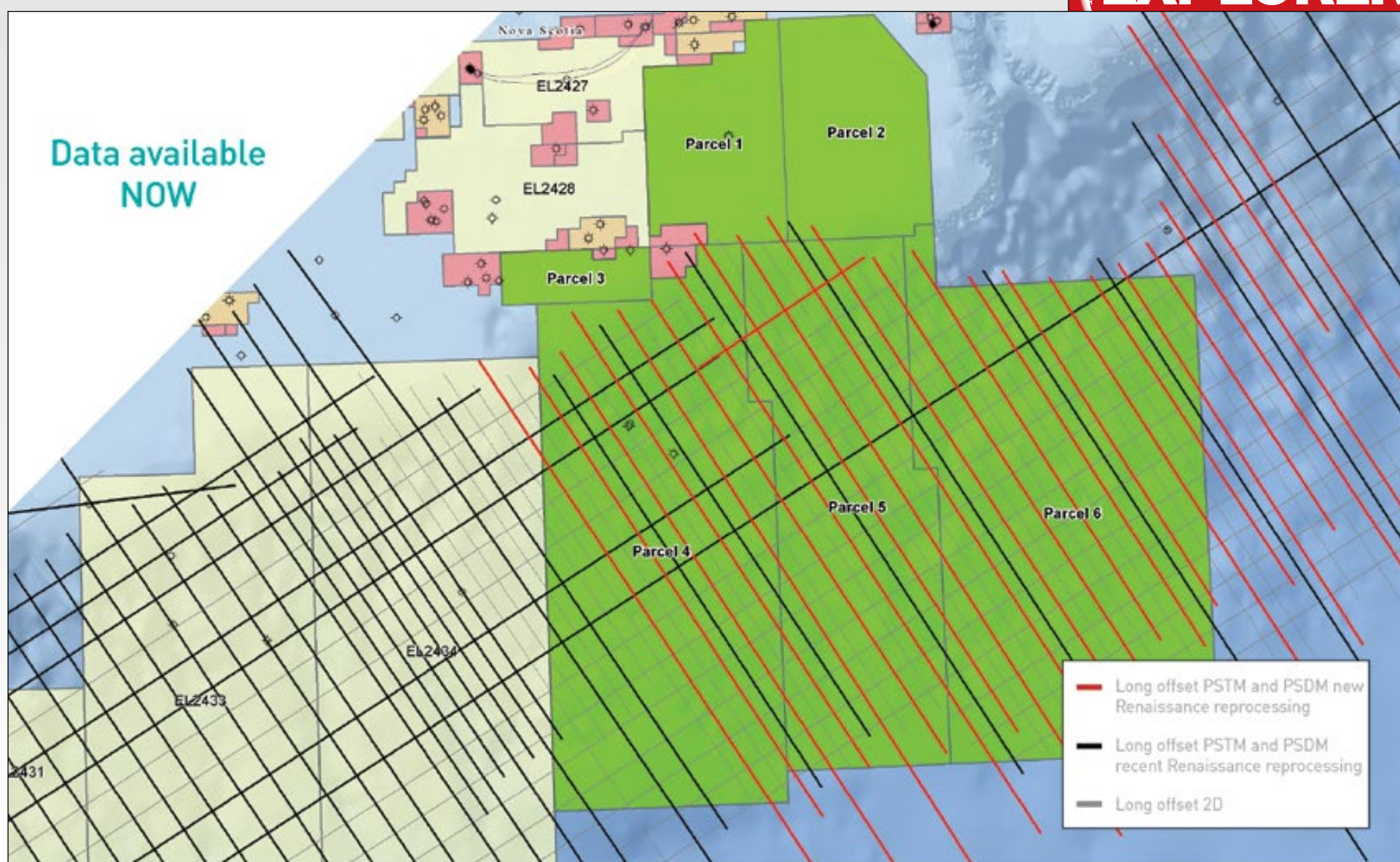
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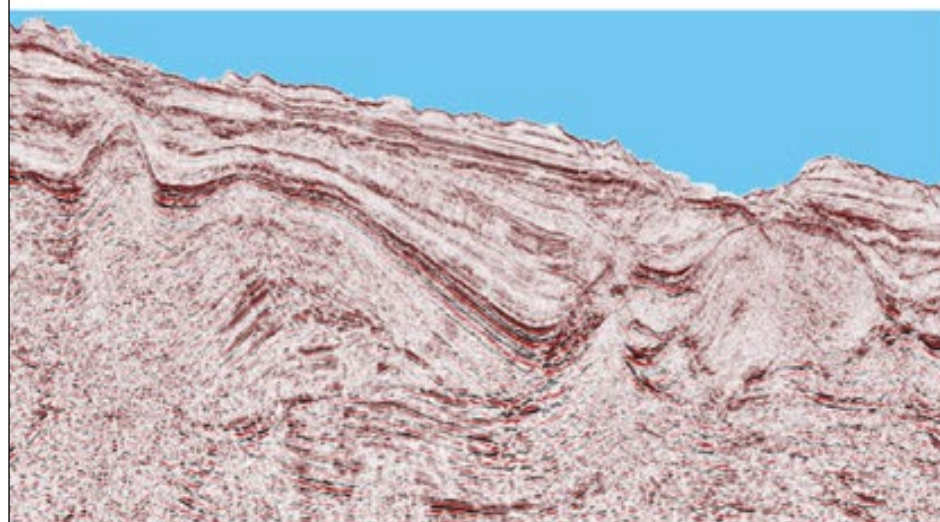
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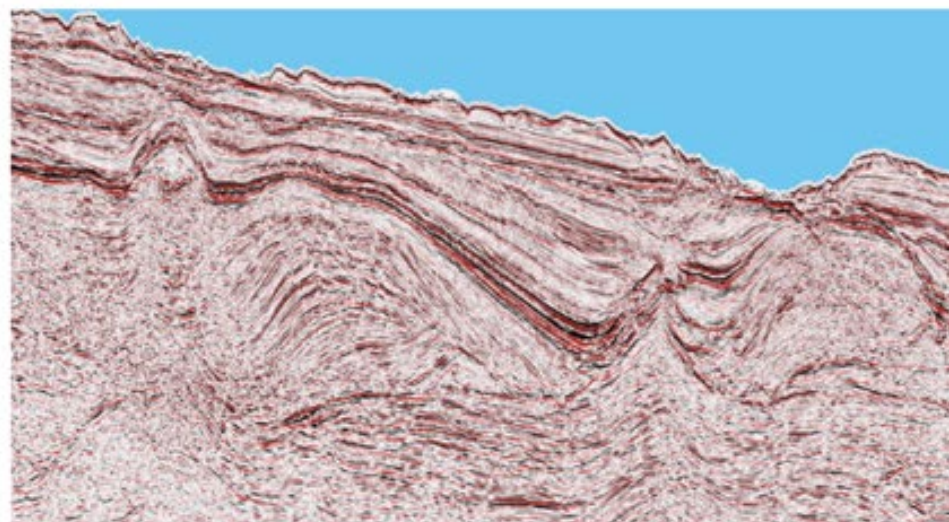


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Map showing the principal hydrocarbon fields of the UAE.



Abu Dhabi in 1949. Photos courtesy of BP Archive.

# The Search for Oil Offshore Abu Dhabi

By MICHAEL QUENTIN MORTON

In 1953, a subsidiary of British Petroleum obtained an oil concession of 31,000 square kilometers off the coast of Abu Dhabi from the ruler, Sheikh Shakhbut bin Sultan Al Nahyan.

In 1954, the famous marine explorer, Jacques Cousteau, was contracted to undertake a geological sampling survey of the seabed using his research vessel, Calypso.

At that time, Abu Dhabi was one of seven territories that formed the Trucial Coast, and was relatively unknown in the West. Indeed, when Cousteau's wife first heard about her husband's survey, she asked, "Where is Abu Dhabi?"

After the survey had been completed, BP went into partnership with Compagnie Française des Pétroles (CFP – later Total) and formed an operating company called Abu Dhabi Marine Areas Ltd. (ADMA), initially owning two-thirds and one-third, respectively.

## Two Gulfs, One Solution

The Arabian Gulf was an uncharted sea as far as oil exploration was concerned. BP set up an offshore drilling study group, whose members visited onshore and offshore operations in the Gulf of Mexico in order to make a comparative study. It soon became apparent that methods used there could be applied – without any great alteration – to drilling in the Arabian Gulf. The drilling equipment would be the same; the structures, marine vessels and aircraft would be similar; personnel of the same type would be required; and there would be the same need for detailed advance planning and close supervision during the course of the work.

But there the similarities ended, since it was immediately apparent that the lack of infrastructure and modern development in the Arabian Gulf region would be major obstacles to progress.

In 1955, ADMA commissioned a geophysical/seismic survey by Geophysical Service Inc. with their seismic vessel, Sonic.

Later that year the company chartered the Astrid Sven, an aging 1,200-ton freighter, for a further seabed survey. This vessel had an interesting past, having been used by the Germans and Japanese during World War II to refuel their submarines in the Indian and Pacific Oceans. The ship was refitted with living quarters for 30 personnel and was equipped to take



MORTON

Quentin Morton grew up in Qatar, Bahrain and Abu Dhabi in the 1950s and 1960s. A barrister, he has written a number of books and articles on the history of oil exploration in the Middle East. His latest book, "Buraimi: The Struggle for Power and Oil in Arabia," tells the story of the battle over energy resources in the region during the 1950s. His father, D.M. "Mike" Morton, was an exploration geologist with the Iraq Petroleum Company. Morton previously wrote for Historical Highlights in April 2015, "Yemen: The Final Frontier."

borings from the seabed.

A deep-sea salvage tug, Dexterous, was also chartered to act as a tender and to help with the moorings; it maintained radio contact with the United Kingdom, which was a considerable advantage in

those pre-satellite and Internet days.

While the Astrid Sven was being fitted out and loaded up with the necessary equipment, the tug sailed to the area with two BP surveyors on board. They marked three prospective drilling locations with

buoys. The Astrid Sven arrived at the first location in the Arabian Gulf on Feb. 7, 1956 and began drilling, with the first test boring in 15 meters of water. Four shallow holes were drilled and from the cores it was discovered that limestone was present to at least 6 meters below the seabed. Tidal readings and metrological observations were made.

On account of bad weather, site survey work at this location was not completed until March 11, due to waves that were more than 10 feet high. Once the weather improved, the survey was able to take borings from the other two sites and the final marking of the sites was completed by the end of May.

Although the operation took two weeks longer than it would have in the summer months, valuable information was gathered about weather conditions and the poor holding qualities of the seabed, as demonstrated by the difficulties experienced in anchoring the vessels.

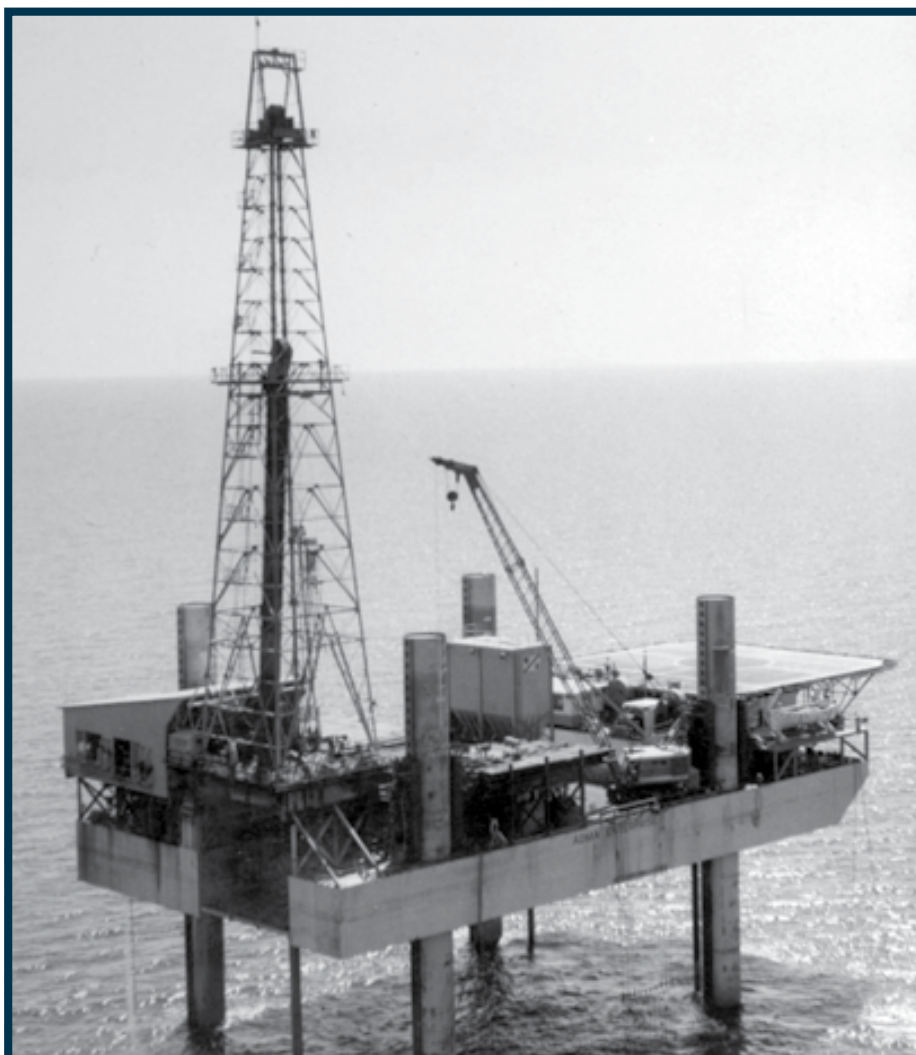
When it came to considering the type of drilling rig, there were several options available, all based on the types of platforms already used in the Gulf of Mexico in depths of 15 to 30 meters. The fixed type of rig was soon rejected because there were no facilities for constructing one in the Arabian Gulf, and because another would have to be built whenever a new well was drilled. The transportable rig, of the type also used off the coast of Qatar, was vulnerable in rough weather when moved between sites. The seabed and depth of waters to be drilled in the Arabian Gulf were not suitable for the submersible barge, which left only those rigs designed by the De Long Corporation of New York.

In the end, the company chose a self-contained mobile type – a barge with a jack-up rig – and placed an order with De Long to design and supervise its construction on-site at a shipbuilding yard in Germany.

## A Strange and Monstrous Craft

On the basis of the marine surveys, they decided to drill the first exploratory well in the vicinity of an old pearl bank named Umm Shaif; the pearl industry was in terminal decline at this time.

The nearest land to this location was the salt plug of Das Island, which was the



ADMA Enterprise in the Arabian Gulf.



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## Das Island from page 20

obvious choice for an operational base, but otherwise the challenges remained. The island was about 170 kilometers northwest of Abu Dhabi town. In those days, it was the occasional haunt of fishermen and pearl divers sheltering from storms. It was far from the industrialized West – a barren, waterless and lonely place inhabited by seabirds, scorpions, turtles and rats.

But the prerequisites were there: a preliminary survey revealed a flat southern half where an airstrip could be built, and a northern half with rocky outcrops that could be used to build a small jetty where supply vessels could dock.

It was clear, however, that turning this bleak outpost into a hub of oil operations

would be a major undertaking.

Once the necessary facilities and a harbor had been constructed on the island, preparations for the arrival of the new drilling platform could begin. On Aug. 23, 1957, the 5,250-ton ADMA Enterprise, as the drilling barge was named, left the shipyard on the Kiel Canal under tow from the tug Thames on a 12,725-kilometer voyage to the Arabian Gulf.

Everyone gathered to see her arrival at Das, for this was the moment they had worked for, but all they could do was watch an unsettled sky, a seething current and the “strange, monstrous craft” making its slow progress under tow. Finally, to the tooting of horns, the barge slowly slipped into the harbor, much to the relief of the managers and the crowd of onlookers gathered on the jetty walls.

On Jan. 4, 1958, after six weeks of almost non-stop work during which the top of the rig and extensions to the legs were fitted, the ADMA Enterprise was gently eased out of the harbor. In choppy conditions, tugs towed the platform some 40 kilometers to the location for Well No. 1 at Umm Shaif. The journey was a difficult one, more so because there were no radios on the tugs, leaving those on the platform to communicate with their crews using lamps.

Once the rig was in place and raised on its legs, the routine of drilling could begin. Ten weeks later, something remarkable happened, as resident geologist Keith Todd explained:

“The routine was broken one night when one of the rig crew woke me with a tray of cuttings and the message ‘The driller says you ought to see this.’ There was no mistaking the smell of oil. There was no drama, just an awareness that, if the rock conditions were right, we could be about to change the fortunes of the region.”

### Making Mud

According to John Turnbull, a petroleum engineer on the ADMA Enterprise, the first sign that something was afoot was when the well started “making mud.”

While this was a typical sign of a discovery, it also brought a real risk of disaster.

The blowout preventers were closed and barite was loaded into the mud to increase its weight. The well was “killed” by pumping the heavier mud into the drill pipe; oil was bled under control from the annulus mud column. Only when the columns were balanced and checked and double-checked was it confirmed that the first oil had been struck at a depth of about 2,700 meters in the Lower Cretaceous Thamama limestones, and subsequent drilling located gas in a separate reservoir below the Hith anhydrite.

The oil quality was good (36 degrees API) but – ironically – news of the discovery was greeted with “general gloom” in BP’s London headquarters on account of a global surplus of oil at the time.

But, the discovery could not be ignored and by late November 1959, the field was ready for production.

### The Monks of Das

There was much work to be done before the base could become fully functional. A building program went apace – living quarters went up first, followed by an industrial area with general, cement and chemical stores, workshops, an ice plant, a power station, an administration center, a hospital, and a mosque and kitchen for the local workers’ camp.

Continued on next page

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## CALL FOR PAPERS

The submissions will be processed according to the following timeline:

Submission deadline: **1 November 2016** Publication of issue: **August 2017**

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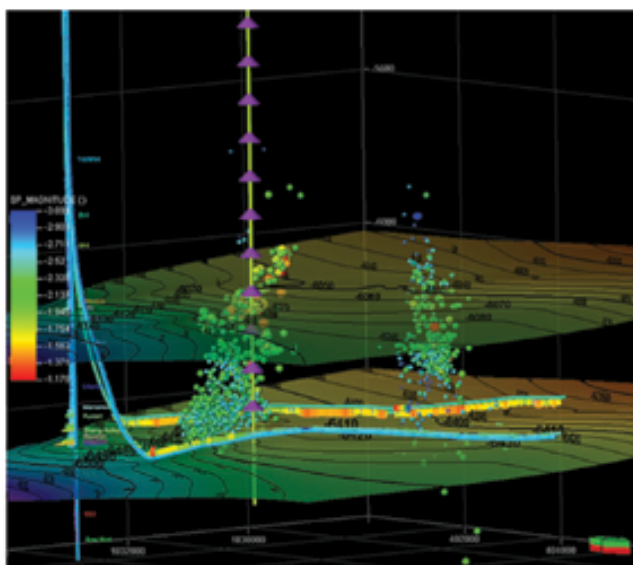
## Appalachian shale gas field exploration and development: Lessons learned

The Marcellus Shale is continuously distributed through the Central Appalachian region of New York, Pennsylvania, and West Virginia. The exploration and development of this unconventional reservoir is driven by estimated resources of between 100 and 500 trillion cubic feet of gas and advances in horizontal well drilling technology. The recent drop in natural gas prices has generated additional technological developments with the goal of increasing the stimulated reservoir volume at reduced cost. The multidisciplinary requirements needed to increase stimulated-to-total reservoir volume ratio, increase gas recovery, and ensure environmentally friendly development require a blend of basic geology, petrophysics, geophysics, geomechanics, and reservoir modeling.

The editors of *Interpretation* (<http://www.seg.org/interpretation>) invite papers on the topic **Appalachian shale gas field exploration and development: Lessons learned** for publication in an August 2017 special section to supplement the journal’s regular technical papers on various subject areas.

We are seeking submissions on related topics including:

- development of new methods to detect and map organic rich reservoir zones using 3D seismic, microseismic data, log, and core data
- reservoir characterization across 3D seismic to core scales
- characterization of the natural fracture network in the reservoir and bounding strata
- insights into reservoir properties gained from microseismic monitoring
- improved measurements of the current state of stress within the reservoir throughout the basin
- development and calibration of mechanical earth models
- applications of new technologies that enhance hydraulic fracture stimulation of organic rich reservoir intervals
- infill well design and development in theory and practice
- other technology developments including image logs and fiber optic monitoring along the length of the shale gas horizontal wells and their incorporation in completion design
- improved prediction of long term well performance based on short term reservoir response



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*Interpretation*, copublished by SEG and AAPG, aims to advance the practice of subsurface interpretation.



## Continued from previous page

Accommodation was basic, but there was a wide range of recreational activities such as golf, swimming, cricket, darts and fishing. Nevertheless, it was far removed from civilization and women were not allowed on the island, hence employees posted there were light-heartedly referred to as "the monks of Das."

Such was the isolation of this "Alcatraz of the East" that new arrivals were warned not to attempt an escape as the sharks would have them.

On the industrial side, the producing wells were to be linked by submarine pipelines to a gathering 180-ton platform (or "hub") in the middle of the field and then to Das Island. Separators were provided for degassing the crude oil on its arrival, and tanks were built to store it. A tanker-loading jetty was constructed 1.4 kilometers offshore. The harbor area was extended in order to accommodate a growing fleet of barges, tugs and service craft. Meanwhile, for local fishermen, the Umm Shaif wellheads provided a convenient place to hang up their nets.

### A Sea of Crude

After a period of refitting, the ADMA Enterprise was towed back to Umm Shaif in order to recommence drilling, and by January 1962, five more wells had been completed, making eight in all.

The work of erecting production towers on six of these was taken on by a new self-elevating barge, which arrived in April. This, the ADMA Constructor, was similar in design to the ADMA Enterprise, but was fitted with a large 100-ton-capacity crane instead of a drilling rig. The barge had been built in Great Britain at a cost of £1.25



Sheikh Shakhbut arrives at Das Island, Oct. 28, 1962.

million (\$1.81 million). Its first task was to build the gathering platform.

On June 11, 1962, production began and the facilities necessary to give the Umm Shaif field an initial output of some 1.5 million tons of crude oil a year were commissioned. Four weeks later the British Signal, the first tanker to carry a full cargo of Umm Shaif oil, sailed for BP's Aden Refinery with 33,500 tons of crude oil on board.

By April 1963, a total of 12 wells were operating or ready to join the production network in the Umm Shaif field. But this was only the start – another promising undersea structure had been located 80 kilometers to the southeast. Here a new exploratory well was drilled – the first of many in a supergiant oil field named Zakum. Two drilling rigs would now divide their time between Umm Shaif, Zakum and

occasional exploration elsewhere. More wells were opened at Umm Shaif so that, by the end of 1964, the production rate of that field had risen to 3.75 million tons a year from 22 wells.

The dream of bringing oil wealth to the region was realized, but whether Sheikh Shakhbut was convinced that it would bring happiness was uncertain. Being a conservative ruler, he may have preferred that the oil remain in the ground.

His parsimony gave rise to many apocryphal stories. In one, he was said to have kept all his money in a shoebox under his bed. However, he was a thoughtful ruler and his resistance to change derived from a desire to protect the traditional ways. He maintained a keen interest in operations, and was often briefed by company executives and geologists on developments in the field.

## Aftermath

Umm Shaif was an important discovery, revealing the potential of Cretaceous carbonate reservoirs in the region.

Zakum is now the biggest oil field in Abu Dhabi and one of the largest offshore fields in the world. The ADMA partners decided to push ahead with developing the lower reservoir layers, but declined to take part in the development of the more difficult upper reservoirs. As a result, two new companies were created: ADMA-OPCO to operate the lower field and the Zakum Development Company (ZADCO) for the upper field.

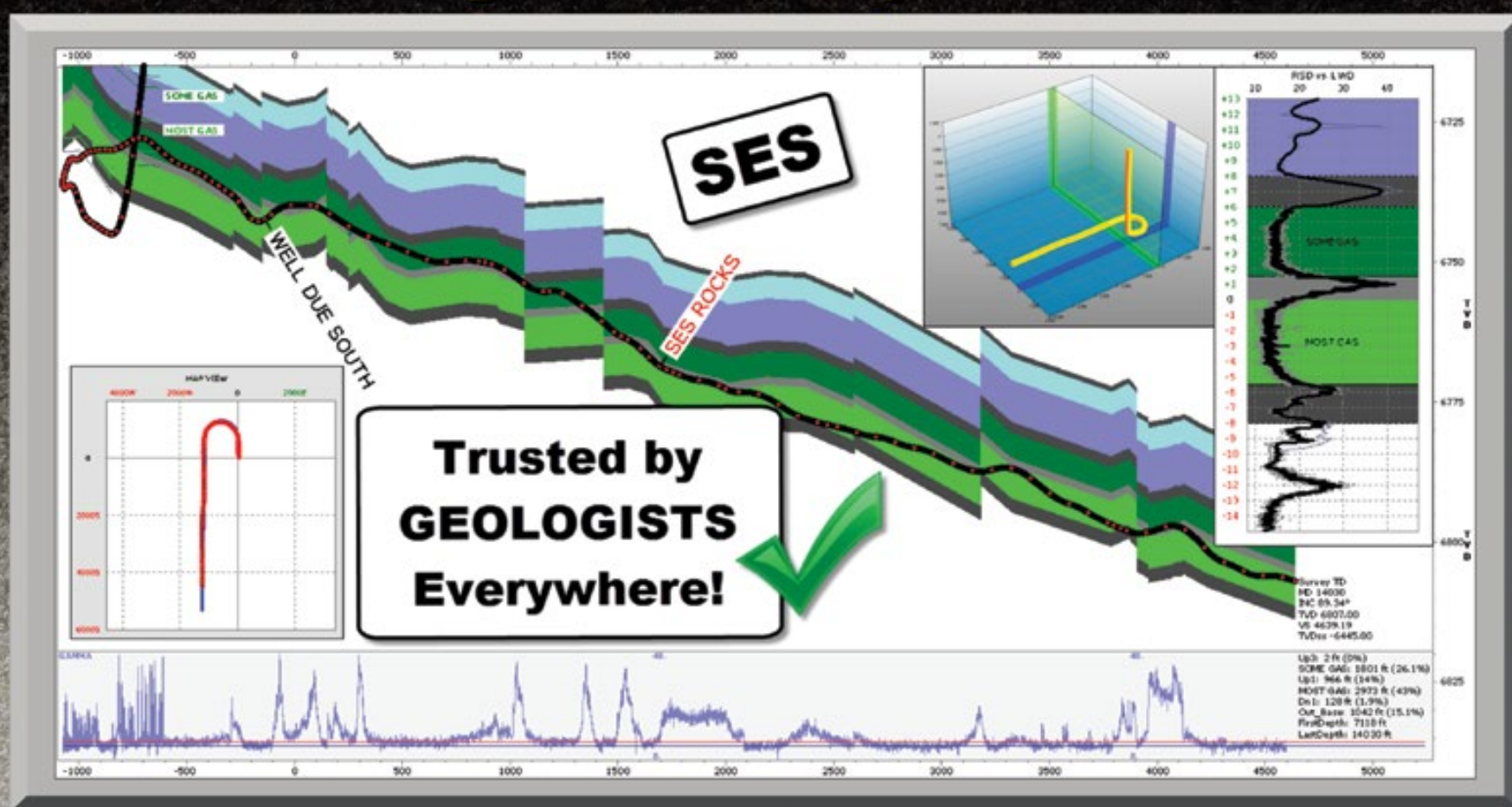
The Abu Dhabi government now has a 60-percent stake in the oil industry through the Abu Dhabi National Oil Company (ADNOC). ADMA-OPCO continues to operate the Umm Shaif field while more foreign oil companies have been admitted to offshore ventures in Abu Dhabi.

Abu Dhabi has been transformed, of course. In 1963, many local people lived in 'arish (palm-frond) huts and there was little infrastructure. By 1971, there were roads, an international airport, telephones and the like. Das had mushroomed into a small city, with a population of 7,000. The island is still an important hub today; it also houses a gas liquefaction plant, which processes gas from the oil fields as well from the vast Khuff gas reservoirs that lie under the Abu Al Bukhoosh and Umm Shaif fields.

In 1966, Sheikh Shakhbut was succeeded by his brother Zayed and, five years later, the emirate of Abu Dhabi joined the United Arab Emirates (UAE). Nowadays, Abu Dhabi city is a modern conurbation and capital of the UAE, one of the richest countries in the world.

*Acknowledgements: Thanks to Alan Heward and Peter Morton for their assistance. [E]*

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# Geologists Need to Know Geosteering

By LOUISE S. DURHAM, EXPLORER Correspondent

Here's a pro-tip for aspiring geologists and their new-to-the-job peers:

Think engineering.

"One of the first roles for a geologist, for an operator, is likely to be very involved in drilling," said Sam Noynaert, assistant professor of engineering at Texas A&M University.

"It would behoove geologists to get in on a course or two on drilling engineering," he added.

Like many aspects of the industry, this need stems in large part from the widespread unconventional reservoir development spurred by hydraulic fracturing and horizontal drilling. Even though horizontal wellbores might not always be essential to production, no one would argue that directional drilling technology alone is what has made most unconventional plays economic, according to Noynaert, whose background includes drilling engineering in unconventional plays.

The key to horizontal effectiveness is geosteering, or guiding the bit along what have become continually extending laterals within precisely defined and generally narrow windows. The defining geological markers are ordinarily the top and bottom of the pay zone. Adding to the intrigue and challenge of the procedure is that these target areas are usually very deep in the subsurface.

This process is not for the weak of heart, considering that the geologist on the well must often make decisions on the fly as the ongoing flow of data are analyzed. Based on numerous discussions with

involved personnel, Noynaert deduced that the thorny aspects of today's geosteering activity can be broken into two primary issues.

The most common issue he noted was a lack of knowledge about basic drilling fundamentals by geologists, which led to an inability to understand the consequences of geology geosteering decisions on the ability to drill a well. Conversely, the drilling group should understand how their decisions impact the geologist.

The second was that the job performance metrics by which technical employees are measured, and thus tend to drive their decisions, are not well aligned between the disciplines.

## Odd Coupling

Noynaert elaborated, noting that the fact that each group seldom understands the reasoning behind other teams' decisions leads to a potentially inefficient and combative geosteering process.

Each discipline harbors different goals and measures of success, which each participant must understand in order to avoid placing the geosteering operation and, in turn, the well productivity at risk.

It's widely recognized in the industry that geologists and engineers are not the same breed of cat.



NOYNAERT

Sam Noynaert, assistant professor of engineering at Texas A&M University will present, "What I Wish My Geologist Knew About Life and Drilling: Geosteering From a Drilling Engineer's Perspective," next month at the Unconventional Resources Technology Conference (URTeC) in San Antonio, Aug. 1-3.

"Sometimes it's like two different cultures," Noynaert remarked. "It's human nature to try to perform to your metrics, and I don't think people understand this."

He commented on a graduate-level horizontal drilling course he taught last year in which he hosted a guest speaker to present a short course in geosteering. "For someone with experience, I learned a lot and thought to myself that this needs to be taught for both engineers and geologists."

"As someone who teaches drilling, I've had less than 20 geology students in seven years," he lamented. "I've found no geosteering courses being offered nor basic drilling courses being required, even though a brand new geologist is likely to be out on a rig or assisting with the operations side."

Time is of the essence.

Lateral lengths are continuing to increase to the point that 20,000 feet likely will soon become just another day in paradise.

"When you're drilling 5,000-foot laterals in the Barnett, torque and drag is not such a big deal," Noynaert said. "But when you're drilling 30,000 feet, say, in the Bakken, it's a huge difference and you're pushing the envelope. Wells are starting to push or extend the technology limits."

## What To Know

So, you ask, what specifically do geologists need to know if they're destined – at least temporarily – to take on the role of geosteering guru?

In addition to their geological and geophysical knowledge and expertise, Noynaert said the geologist must understand three aspects of the field and the engineering teams' roles. They are:

- ▶ The physical fundamentals of drilling a well, including torque and drag, hydraulics and basic directional drilling.

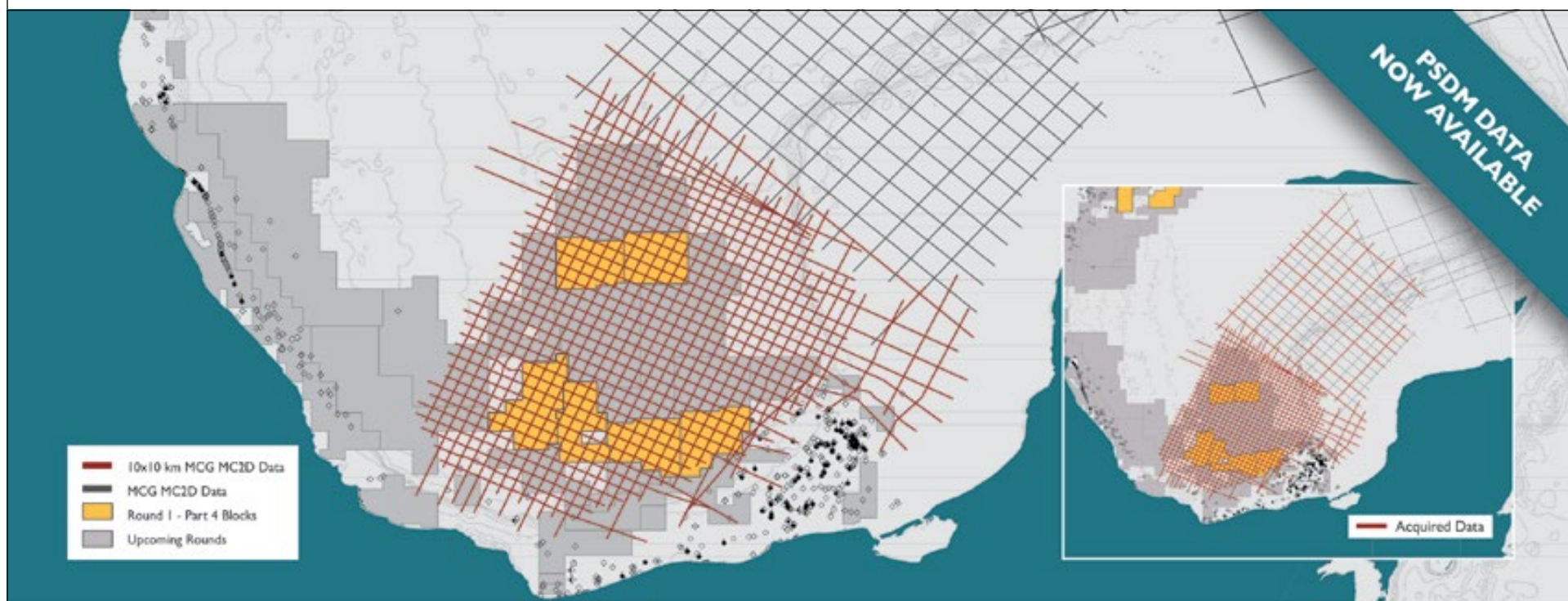
- ▶ The metrics by which the engineering and wellsite teams are measured, such as cost per foot, days per well or hole interval, and drilling authority for expenditures.

- ▶ The consequences of geological team decisions on drilling operations.

He emphasized that the fundamentals of drilling he refers to do not encompass such things as mud mixing, drill bit identification and related drilling basics. Rather, they are essentially the physics involved in what is enmeshed in the process of drilling a horizontal or extended reach well. As a rule, such topics don't receive their due until upper level petroleum courses.

It's essential that the meatier material gets disseminated somehow, somewhere, he said. This includes topics such as maintaining a stable wellbore, circulating and cleaning the hole and much more.

"In short, they are topics which almost no geoscience major will ever study in school and thus will be forced to learn on their own during their career," Noynaert stated.



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**AAPG**  
Education

# Upcoming Education Events 2016

## AAPG HEDBERG RESEARCH CONFERENCE CENTER

### Mudstone Diagenesis: Implications for Exploration and Development of Unconventional Reservoirs

16-19 October 2016 | Santa Fe, New Mexico



The purpose of this conference is to foster the free exchange of new ideas among leading experts from industry, academia and government on the controls and impacts of inorganic and organic diagenesis on mudstone hydrocarbon generation, reservoir properties and seal quality.

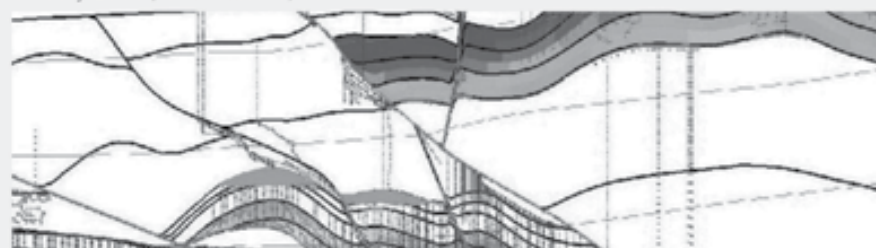
This conference will promote the exchange of new ideas among the leading experts from industry, academia and government on the controls and impacts of inorganic and organic diagenesis on mudstone hydrocarbon generation, reservoir properties and seal quality.

Until recently, most researchers investigating shales concentrated their research efforts towards understanding: (a) hydrocarbon generation and expulsion, (b) seal capacity and (c) overpressure generation. Most data used to support these investigations were derived from organic geochemistry, relatively low magnification optical petrography and bulk rock characterizations. Notably lacking from these studies is the characterization and evaluation of the potential impact of mudstone diagenesis.

New analytical techniques in scanning electron microscopy (SEM) have allowed investigating mudstone properties down to the nanometer scale. New SEM observations of mudstone micro-texture have revealed the presence of authigenic cements, and have captured various stages of the transformation of organic matter during petroleum generation. An improved understanding of mudstone organic and inorganic diagenesis is required to advance the ability to better predict shale reservoir quality and heterogeneity.

## Unconventional Reservoir Assessment – An Integrated Approach

31 July 2016 | San Antonio, Texas



This course is a practical and applied introduction to laboratory techniques routinely employed in unconventional reservoir assessment and their relationship to some of the other tools used in the industry. Geologists, geophysicists, engineers and laboratory technicians who need to become acquainted with the various disciplines that must be integrated for successful unconventional reservoir exploration and production should attend.



In Conjunction with AAPG | SEG 2016 International Conference & Exhibition (ICE) - American Association of Petroleum Geologists (AAPG)

## ICE SC 08 | Salt Tectonics of the Gulf of Mexico (AAPG)

10-11 September 2016 | Cancun, Mexico



This course is intended for geoscientists, engineers and managers who need an introduction to salt tectonics or an update in this constantly evolving field. It is appropriate for those working in any salt basin globally and assumes a basic familiarity with structural geology concepts and terminology.

This two-day short course will provide an overview of salt tectonics in the Gulf of Mexico (GoM), including both the U.S. and Mexican portions of the basin. It will cover a range of topics ranging from the fundamental mechanics of salt-related deformation to the regional distribution of different structural styles, including relevant aspects of extensional, contractional, vertical and allochthonous salt tectonics. It is intended for geoscientists with different levels of expertise, from those new to the GoM or salt tectonics to those with years of experience in exploring in this complex basin.

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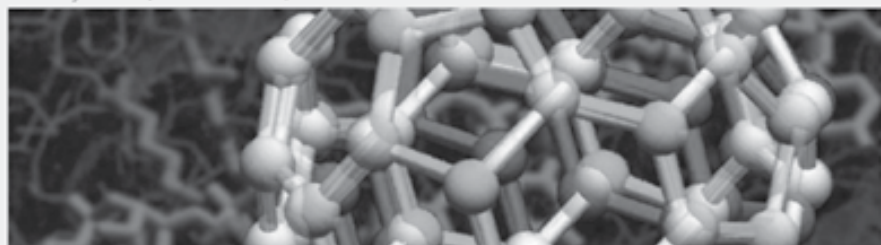
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## SHORT COURSES

In conjunction with URTeC

### Integrating Data from Nano- to Macro-Scale: Improving Characterizations of Unconventional Plays

30 July 2016 | San Antonio, Texas



#### Pre-Conference Short Course 1

This course is for geologists, geophysicists, petrophysicists and reservoir engineers looking for a detailed overview of data integration in analysis of organic shale reservoirs. It will evaluate data from the nano- to macro-scale in order to show how different types of data can be integrated in the evaluation of organic shale reservoirs. By the end of the course, attendees will have developed an insight into how core data and petrophysical evaluations can be utilized to build a more complete understanding of a play.

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# Structure-preserving 6-D Interpolation

By MARK NG and DAN NEGUT

Interpolation of seismic data is an important application in exploration seismic signal processing. The need for interpolation on incomplete data may be due to acquisition limitations, economic constraints or regularizing of merged data with a variety of shooting parameters from different vintages.

Furthermore, the deliverable of interpolation is regularized prestack data, which will improve many state-of-the-art inversion processes and migration imaging.

Better and more accurate interpolation algorithms have come out over the past 10 years. Some examples are prediction filters and rank reduction method, both of which operate in the frequency-space domain, and the minimum weighted norm interpolation (MWNI) method in the mixed frequency-space and frequency-wavenumber domain.

MWNI is the most popular method among them because it closely maintains the original input trace characteristics, including its signal-to-noise, better than other methods.

### Challenges to Most Interpolation Schemes

There are five data scenarios that challenge most interpolation methods:

- Data with random missing traces.

This is considered the least evil kind of data scenario for interpolation because it boils down to a de-noising exercise for interpolators.

- Data with a gap of missing traces.

Depending on the size of the gap, this data can be very difficult to interpolate.

- Data with aliasing in space.

This happens when structural data is not adequately sampled and recorded in space.

- Data with curving events or diffractions.

This violates many interpolators that hang on the plane wave or bandlimited sparsity assumptions.

- Data with regularly missing traces.

This may be considered as up-sampling of spatial data. An example of this is the popular megabin acquisition. It is the most challenging of interpolations, especially when the data is structural and steep dips are aliased. We will demonstrate how our new data interpolation method, which we refer to as "6-D interpolation," stands up against these challenges.

### Why 6-D Interpolation?

The reason "5-D interpolation" is given its name, in spite of interpolator choice, is that interpolation is applied in 3-D prestack seismic data, which can be defined in 5-D space: inline  $x$ , crossline  $y$ , offset  $x$ , offset  $y$  and time (or frequency).

In some applications, offset  $x$  and offset  $y$  are redefined as radial offset and azimuth. The industry 5-D MWNI starts data fitting from the stable low frequency slices, one slice at a time, and recursively layer-by-layer works its way up to higher frequencies. This unconstrained fitting can lead to inaccurate results under challenging scenarios such as meager data support, aliased dips or up-sampling of regularly missing data.

Recently, we proposed the 6-D

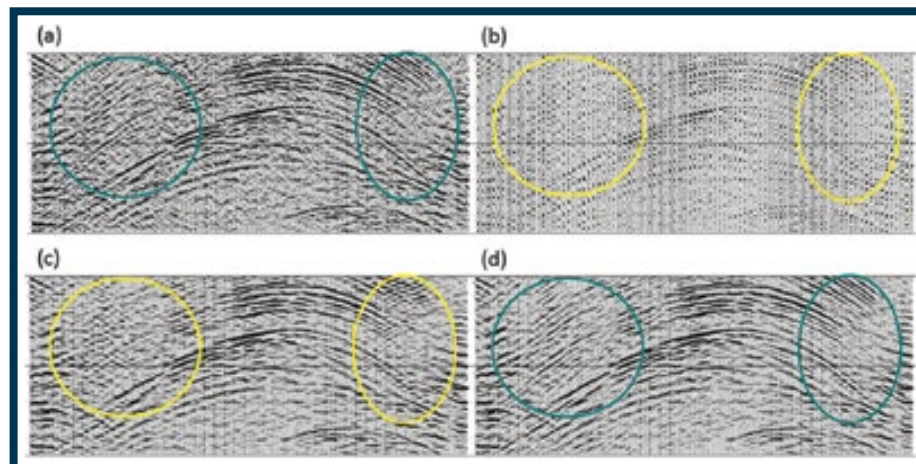


Figure 1. An inline from a 3-D seismic volume from an area with structural features under aliased conditions and recovery methods. (a) The complete data stack, which is also the reference data to which other datasets are compared, (b) the stack of 3:1 decimated gathers; (c) stack from the 5-D interpolation using MWNI method; (d) stack using the 6-D interpolation method. Notice that the data is aliased in (b), and so is not restored properly in (c) as is seen in the highlighting polygons. In (d) we see the data restored well and very similar to the reference dataset in (a).



NG

The 6-D interpolation leads to an important application ... (which) could result in substantial savings in acquisition costs of up to four times.



NEGUT

interpolation method, which has an additional dimension along multiangular directions to be added to the 5-D MWNI in order to guide the *a priori* model in the frequency-wavenumber domain. The angular weights are derived from a scanning of different dips of the input data in the frequency-wavenumber domain along many radial directions pointing away from the origin. Angular weights connect data information across all frequency-wavenumbers globally, which is crucial to de-aliasing of data, but is completely missing in the conventional 5-D MWNI.

A good analogy for 5-D interpolation is the brick-laying process of building a fire pit from low to high level without a global plumb line reference. Even with a good foundation level to start with, this could eventually lead to a slanting brick structure at the top levels. But with a plumb line reference, which in our

case is the angular weight function, or the sixth dimension, it guides the 5-D MWNI engine resulting in a stable 6-D interpolation method. The objective is to preserve structural integrity of the data after interpolation.

Our first example illustrates the proof of concept.

We show this example to test and compare the recovery performance of the new 6-D interpolation with the conventional 5-D interpolation, both operated by an MWNI engine, under the earlier mentioned most challenging scenarios: spatial aliasing of incomplete curving diffractions and up-sampling of regularly missing data (deliberately decimated in this experiment) of three times. A complete structural 3-D real dataset is considered the "hidden" control reference when two out of three of its crossline prestack gathers are zeroed and treated as the input to both

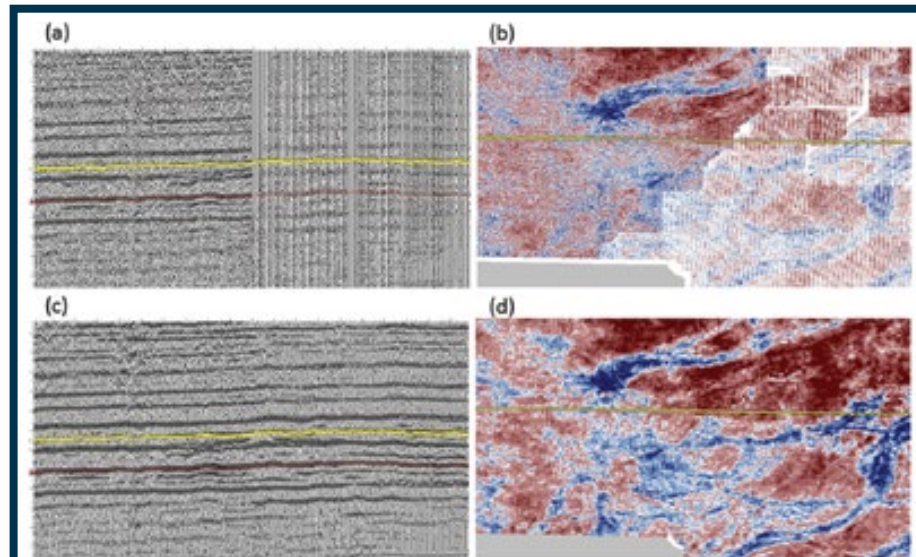


Figure 2. An inline and a time slice (in color) from a 3-D merge of 17 datasets (a), (b) respectively without, and (c), (d) respectively with 6-D interpolation. Notice the uneven quality of the data due to the different acquisition parameters. After 6-D interpolation the data quality looks good as well as uniform.

5-D and 6-D interpolators.

Figure 1(a) exhibits an inline from the CMP stack of complete prestack data gathers and is considered as the "hidden" reference data.

The data is 60-fold. Conflicting diffraction curves with different amplitudes are present in both left and right sides of the figure.

In figure 1(b) we show the CMP gathers that have been regularly decimated 3:1 in the crossline direction. Consequently, only 33 percent of the original data are used and treated as input to the 5-D and 6-D interpolation tests. The steeply dipping diffraction curves become aliased inside two yellow highlighted circles.

Figure 1(c) shows the data recovery results of the conventional 5-D interpolation by MWNI, performed in small overlapping data blocks so as to preserve local structural details. The yellow highlighting circles depict the poor recovery of the aliased steeply dipping events. Poor quality recovery of aliased steeply dipping data is shown in the yellow circles.

Figure 1(d) shows the data recovered by the proposed 6-D interpolation method using the extra dimension angular weights on MWNI. Identical data blocking parameters are used as in (c). The new 6-D interpolation recovery is acceptable when compared to the reference data shown in (a). When the data complexity is less challenging outside the highlighted circles, the 5-D and 6-D interpolations converge to similar results.

Our next example is from a real super merge of different data volumes.

Figure 2 shows that 6-D interpolation is used to address all five aforementioned data challenges (regular and random missing data, block gaps, up-sampling and data aliasing) on a super merge of 17 different 3-D's (i.e. nine megabin and eight orthogonal surveys) with widely different acquisition parameters. Note that 6-D interpolation in figure 2(c) and (d) preserves structural integrity – long and short wavelength features; the AVO response is also well honored, although not displayed here.

### Where Does That Lead?

The 6-D interpolation, in contrast to the conventional 5-D interpolation (MWNI), has an additional angular weight function dimension that connects dipping data information across all frequency-wavenumbers, which in effect can delineate aliased data in highly structural and deficient in data support situations. This idea can lead to improvements in other frequency-space interpolators as well. Furthermore, the 6-D interpolation leads to an important application: a natural CMP grid size can be subdivided by half in both directions, and 6-D interpolation can be used for up-sampling to achieve effective resolution of the data without actual field acquisition for the finer grid size. This could result in substantial savings in acquisition costs of up to four times. It's comparable to a 1080p high-definition television producing an effective 2160p ultra-high resolution at a small cost.

Mark Ng and Dan Negut work for Divestco Inc., Canada.





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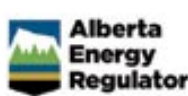


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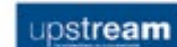


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# YPs Enjoy Conversation, Cleanups and Crawfish

By LAUREN STORM, Southwest Section YP and Geologist at EOG Resources, and CALVIN NIX, Southwest Section YP and Geologist at Emerald Energy

Midland, Texas, was originally founded as the midway point between Fort Worth and El Paso on the Texas and Pacific Railroad in 1881. Today, it's more commonly known as the geographic center of more than 16 percent of the nation's oil reserves.

But, as we've all seen, the downturn hasn't been so kind to a large number of geoscientists, many of whom are young professionals. Some will leave the oil and gas industry for good, but others will persevere through these tough times by networking and staying involved as members of local societies.

In a recent talk to the Midland Southwest Section YP group entitled, "Young Professionals in the Industry: How to Survive in Turbulent Times," this continued involvement and volunteerism is

exactly what past AAPG President John Hogg urged YPs to take part in. He emphasized the importance of staying connected with the industry, because it not only provides opportunities to network with other geoscientists, but might also be what helps YPs land an interview or secure their next job.

In April, the Young Professional Geoscientists in Midland participated in the "Great American Cleanup/Don't Mess with Texas Trash-Off," a program that is part of the Keep Midland Beautiful annual spring community cleanup. This year, they chose to clean around the Permian Basin Petroleum Museum, which just celebrated the opening of their new petroleum exhibits. Just as the museum has become a showcase for innovative and creative thinking, the Midland YPs are striving to better the community as well as remind others, in between jobs or not, that they don't have to be employed to add value to their resume.



STORM



NIX



*This is the second consecutive year the annual Dallas Geological Society Crawfish Boil was hosted and organized by DGS YPs.*



## Crawfish, Despite the Odds

Over in Dallas, the YPs recently hosted the Annual Dallas Geological Society (DGS) Crawfish Boil at White Rock Lake. This year marked the 17th year of the event – and it almost didn't

happen.

That might seem like a petty thing to fret over, especially during this downturn. The way the Dallas YPs saw it, however, was that these tough times made the annual get-together that much more essential. People needed a call to

normalcy. They needed a night to forget their woes and kick back with a couple of cold drinks and a big ol' plate of mudbugs.

Whereas the first 15 years of this event had been handled by a committee of "elder statesmen," this is the second consecutive year that the reins have been in the hands of DGS YPs to organize and host the annual tradition. The event is also enjoyed by members of the Dallas Geological and Geophysical Society and the Dallas chapters of the Society of Petroleum Engineers and the Association of Petroleum Landmen, as well as numerous friends and family members.

The easy part of that responsibility was in tasks like reserving the event space, hiring a band and catering, promotion and advertising and even cleaning up the venue at the end of the night.

The hard part was obtaining the necessary amount of sponsorship this year. Anyone who has tried to make a deal in the industry recently can probably imagine the difficulty of pooling together enough money to throw a party with a five-figure price tag. We had to make some understandable concessions, but in the end we were able to make it happen, thanks to the help of many old friends and a few new ones. We had a turnout of more than 250 members, and they tore through a whopping 700 pounds of crawfish.

Conditions may presently be far from ideal in our industry, but they will get better. Downturns are always followed by recovery and growth. We take these times to learn, develop and improve, while at the same time, hanging on for dear life. Every now and then though, we need to stop, take a breath, forget our troubles and have a good time.

Want to get more involved with the YPs in your area? Visit us online at [www.aapg.org/youngpros](http://www.aapg.org/youngpros) to contact your Region or Section coordinator.

To learn more about YP events and initiatives, 'like' the AAPG Young Professionals Special Interest Group on Facebook and follow us on Twitter and Instagram @aapgypsig. [E](#)

## DPA

### from page 34

will be to continue to deliver the many programs that aim to help geoscientists to attain this level of professional stature, and truly become leaders within the global petroleum geoscience community.

Specific plans will include:

- ▶ Continuing the very successful "Playmaker's Forum" series around the United States, which have provided inspirational case studies on how to turn promising geologic ideas into economic engines.
- ▶ Delivering high quality "Discovery Thinking Forums" for the upcoming Cancun International Conference and Exhibition this September and Houston Annual Convention and Exhibition in 2017.
- ▶ Ongoing certification of qualified geoscientists.
- ▶ Delivery of convention short courses.

▶ Disseminating timely information that affects our profession via the DPA's quarterly publication, the Correlator.

Of particular importance will be improving connection with and participation from AAPG's international membership and its Young Professionals to broaden the DPA membership to more truly reflect the diversity of our profession and ensure the continuity of the organization into the next generation.

Given the state of our industry, it will be more important than ever to provide our members with programs and services to help them to be more competitive and employable in today's tough business environment.

This promises to be an exciting journey during an admittedly turbulent time in our industry. I look forward to this task, and invite all AAPG members who share this vision for our profession to join me by becoming members of the DPA. [E](#)

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Red Rock Canyon NCA, photo by Jerry Walker



By APRIL STUART, AAPG Foundation Program Coordinator


Bend has trained geologists and engineers within industry and academia for more than 35 years. Prior to entering academia, Bend worked as a petroleum geochemist and as a petroleum geologist in South America, Europe, the Middle East, Scandinavia and North America – among other locations.

"I am very honored to receive the 2016 AAPG Foundation Professorial



Bend has trained both master's and doctoral candidates in organic petrology and organic geochemistry, authored

"I consider myself part of a community of professors who actively care about the education and training of our young aspiring professionals," he continued. "A community of professors who enjoy

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The American Association of Petroleum Geologists (AAPG) Foundation and the Education Awards Committee is proud to announce the Grants-in-Aid recipients for 2016.

The Foundation's Grants-in-Aid program is a highly competitive grant program promoting research in the geosciences. Grants are made to provide financial assistance to master's or doctorate level students whose thesis research has application to the search for and development of petroleum and energy-mineral resources and/or to related environmental geology issues.

In 2016 the program awarded 116 graduate students across the world with a total of \$260,000 in research funds. These funds are available annually thanks to our named grants, most of which bear the names of generous donors and innovators in the energy industry.

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## Canada

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- Natasha Morrison, Grants-in-Aid Fund

### Laurentian University

- Melanie Bouchard, Roger W. Stoneburner Memorial Grant

### Queen's University

- Justin Drummond, Jay M. McMurray Memorial Grant

### Simon Fraser University

- Chloe Chateau, Donald A. and Mary O'Nesky Named Grant
- Lucian Rinke-Hardekopf, David Worthington Named Grant
- Sarah Schultz, Merrill W. Haas Memorial Grant

### The University of Western Ontario

- Kienan Marion, Martin D. Hewitt Named Grant

### University of Alberta

- Ruija Wang, SEAPEX Named Grant

### University of Calgary

- Bram Komaromi, Wallace E. Pratt Memorial Grant

### University of Saskatchewan

- Andrei Ichaso, William E. and Jean Crain Named Grant
- Maximiliano Paz, The Institut Français du Pétrole Grant
- Yu-Chen Zheng, David Worthington Named Grant

## China

### China University of Petroleum, Beijing

- Di Chen, Gustavus E. Archie Memorial International Grant

## India

### Indian Institute of Technology Bombay

- Ashutosh Tripathy, Horst and Jessie von Bandat Memorial Grant

## United Kingdom

### Heriot-Watt University

- Anastasia Polymeni, Grants-in-Aid Fund

### Keele University

- Hannah Warrenner, Grants-in-Aid Fund

### University of Aberdeen

- R.E. McAdams Memorial Grant

### University of Leeds

- Sherman A. Wengerd Memorial Grant

### University of Leicester

- Joseph Emmings, Donald F. Towse Memorial Grant

### University of Manchester

- Daniel Bell, R. Dana Russell Memorial Grant
- Sarah Newport, John H. and Colleen Silcox Named Grant

## USA

### Alabama

#### Auburn University

- Karena Gill, Don R. Boyd Memorial Grant
- Jason Fisher, J. Ben Carsey Sr. Memorial Grant

#### The University of Alabama

- Lee Drago, Grants-in-Aid Fund

### Alaska

#### University of Alaska, Fairbanks

- April Knox, Kenneth H. Crandall Memorial Grant

### Arizona

#### Northern Arizona University

- Daniel Foley, Thomas A. Hendricks Memorial Grant
- Rachel Krueger, Paul Danheim Nelson Grant

#### University of Arizona

- Andrea Stevens, Arthur A. Meyerhoff Memorial Grant

### California

#### California State Polytechnic Pomona

- Kenneth Craig, James E. Hooks Memorial Grant

#### California State University, Sacramento

- Michael Stephens, Frederick A. Sutton Memorial Grant

#### San Diego State University

- Matthew Dorsey, John Teagle Memorial Grant

#### Stanford University

- Nora Nieminski, Lawrence W. Funkhouser Named Grant

### University of California, Riverside

- Alex Zumberge, John E. Kilkenny Memorial Grant

### University of California, Santa Barbara

- Julie Zurbuchen, Marta S. Weeks Named Grant

## Colorado

### Colorado School of Mines

- Alexander Cheney, John and Erika Lockridge Named Grant
- Hang Deng, Grants-in-Aid Fund
- Shawn Lopez, John and Erika Lockridge Named Grant
- Bryan McDowell, John and Erika Lockridge Named Grant
- Jinqi Xu, Jon R. Withrow Named Grant
- Mimi Do, Peter W. Gester Memorial Grant
- Andrew Reisdorf, John and Erika Lockridge Named Grant
- Elizabeth Wilson, Duncan A. McNaughton Memorial Grant

### University of Colorado, Boulder

- Frank Boudinot, Gustavus E. Archie Memorial Grant
- Rebekah Simon, Ike Crumbly Minorities in Energy Grant

## Florida

### University of Miami

- Anna Ling, Jean G. Funkhouser Memorial Grant
- Leticia Rodriguez Blanco, Nancy Setzer Murray Memorial Grant

## Georgia

### University of Georgia

- Sarah Wright, Horst and Jessie von Bandat Memorial Grant

## Idaho

### University of Idaho

- Andrew Canada, Kenneth H. Crandall Memorial Grant

## Illinois

### Northern Illinois University

- David Canova, Grants-in-Aid Fund
- Nicholas Williams, Grants-in-Aid Fund

## Indiana

### Indiana University

- Cameron Stewart, Grants-in-Aid Fund
- Zalmai Yawar, Grants-in-Aid Fund

### Indiana University, Bloomington

- Ciara Mills, Harold J. Funkhouser Memorial Grant

## Kansas

### The University of Kansas

- Bridget Pettit, Barrett Family Named Grant
- Erich deZoeten, Frank E. Kottowski Memorial Grant
- Deserae Jennings, David Worthington Family Grant
- Katherine Kulewicz, Weimer Family Grant
- Fan Zhang, Jon R. Withrow Named Grant

## Louisiana

### University of Louisiana at Lafayette

- Scott Hamilton, Edward B. Picou Named Grant

## Michigan

### Western Michigan University

- Matthew Rine, Richard W. Beardsley Named Grant

## Missouri

### Missouri State University

- Wesley Weichert, Grants-in-Aid Fund

### Missouri University of Sciences and Technology

- Xin Zhan, M. Ray Thomasson Named Grant

## Mississippi

### Mississippi State University

- Patrick Jordan, Michel T. Halbouty Named Grant

## Nebraska

### Lincoln University of Nebraska-Lincoln

- Edward Matheson, Rodney A. Bernasek Memorial Grant

## New York

### Binghamton University

- Emma McNulty, Mruk Family Named Grant

### Cornell University

- Jonathan Casey Root, Raymond C. Moore Memorial Grant

### State University of New York at Stony Brook

- Alireza Bahadori, Michel T. Halbouty Named Grant

## Ohio

### Ohio State University

- Selina Cole, Michael S. Johnson Named Grant

### University of Cincinnati

- Anastasia Fries, Ohio Geological Society Named Grant

## Oklahoma

### Oklahoma State University

- Aaron Prock, Fred A. and Jean Dix Named Grant
- Ashley Dupont, Allen and Eleanor Martini Named Grant
- Yulun Wang, Grants-in-Aid Fund

### The University of Tulsa

- Brian Diehl, James E. and Elloie B. Wilson Memorial Grant

### University of Oklahoma

- Gerhard Heij, Jon R. Withrow Named Grant
- Niles Wethington, Norman H. Foster Memorial Grant

## New Mexico

### New Mexico State University

- Ryan Creitz, William E. and Jean Crain Named Grant

## South Carolina

### University of South Carolina

- Erica Rubino, Suzanne Takken Memorial Grant

## Texas

### Texas Tech University

- Eric Friedman, Grants-in-Aid Fund

### Texas A&M University

- Philipp Tesch, James E. Hooks Memorial Grant

### Texas Christian University

- Jonathon Weiss, William E. Gipson Named Grant

### The University of Texas at Austin

- Nick Ettinger, Kenneth H. Crandall Memorial Grant
- John Li, Edward C. and Caroline Beaumont Named Grant
- Michael O'Connor, Grants-in-Aid Fund

### The University of Texas at San Antonio

- Nicolas Quante, John W. Robinson Named Grant

### University of Houston

- Pin Lin, M. Ray Thomasson Named Grant
- Yiduo Liu, J. Elmer Thomas Past-Presidents Memorial Grant
- Tyson Smith, Classen Family Named Grant
- Crystal Saadeh, Arthur A. Meyerhoff Memorial Grants

### University of Texas at Arlington

- Yuxiang Zhang, Gustavus E. Archie Memorial Grants

### University of Texas at Austin

- Yaser Alzayer, Meckel Family Named Grant
- Sarah George, Gordon I. Atwater Memorial Grant
- Ashlyn Murphy, R.E. McAdams Memorial Grant
- Margaret Odum, Alexander and Geraldine Wanek Memorial Grant
- Benjamin Smith, Hugh D. Miser Memorial Grant
- Katie Taladay, William Dow Hamm Memorial Grant
- Anna Weiss, David Worthington Named Grant

### University of Texas at El Paso

- Eric Bergersen, Marilyn Atwater Memorial Grant
- Rachelle Kernen, W. David Wiman Memorial Grant

## Utah

### University of Utah

- Aubrey DeReuil, Raymond D. Woods Memorial Grant
- Ryan Gall, Robert K. Goldhammer Memorial Grant
- Joao Luna Gonzalez, Kenneth O. Stanley Memorial Grant
- Shawn Moore, Harry and Joy Jamison Named Grant

### Utah State University

- Amy Moser, L. Austin Weeks Memorial Grant
- Weston Martin, Garth W. Caylor Memorial Grant

## Wisconsin

### University of Wisconsin-Madison

- Benjamin Barnes, Robert and Carolyn Maby Memorial Grant

### University of Wisconsin-Milwaukee

- Nicholas Fedorchuk, Robert and Carolyn Maby Memorial Grant

## West Virginia

### West Virginia University

- Oluwasegun Abatan, Grants-in-Aid Fund
- Anna Sofia Andeskie, Grants-in-Aid Fund
- Jeremiah Bemau, James W. Milliken Memorial Grant
- Haibin Di, AAPG Eastern Section Named Grant
- William Frier, Pittsburg Association of Petroleum Geologists Named Grant
- Brittany Hupp, Grants-in-Aid Fund
- Mohammad Kazemi, Richard C. Hasson Memorial Grant
- Liaosha Song, Jon R. Withrow Named Grant





# AAPG

Asia Pacific Region

3rd AAPG/EAGE/MGS Oil & Gas Conference in Yangon

## Exciting Evolution: Myanmar's Petroleum Systems, Plays and Field Developments

22-24 February 2017 • Yangon, Myanmar

Call for Abstracts Open

2nd Geosciences Technology Workshop in New Zealand

## Influence of Volcanism and Associated Magmatic Processes on Petroleum Systems

14-16 March 2017 • Oamaru, New Zealand

Call for Abstracts Open

2nd GTW in Indonesia, Bandung

## Hidden Potential in Mature Basins: Play Analogs and Best Practices

13-14 September 2017 • Indonesia, Bandung

For more information contact  
Adrienne Pereira:  
apereira@aapg.org



Visit [www.aapg.org/events/event-listings](http://www.aapg.org/events/event-listings)



UNIVERSITY  
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### UK Frontier Basins Research: Two Post-Doctoral Research Associate (PDRA) posts:

Applications are invited for two two-year full-time Oil and Gas Authority (OGA) Post-Doctoral Research Associate (PDRA) positions to be based in the Department of Geology & Petroleum Geology at The University of Aberdeen and in the Centre for Exploration Geoscience, in the School of Energy, Geoscience, Infrastructure & Society at Heriot-Watt University (HWU).

Both posts were recently awarded as part of the OGA's Frontier Basins Research competitions and each represents a substantive £250,000 investment in the two highly-respected Universities.

The successful PDRA candidates will interpret and analyse well calibrated high-fidelity seismic data acquired as part of the £20 million UK Government-sponsored campaign of seismic acquisition in the Rockall and Mid-North Sea High areas of the UK Continental Shelf. The evaluation of these data will be used, in conjunction with other relevant associated data, to provide a regionally consistent, comprehensive and integrated assessment of the petroleum systems and will ultimately inform on the potential prospectivity of these largely underexplored areas of the UKCS.

Further particulars can be obtained from and applications made via the following URL links.

#### Aberdeen University:

Rockall project: <https://www.abdn.ac.uk/jobs/>  
Informal enquiries should be directed to:

Dr Nick Schofield (email: [n.schofield@abdn.ac.uk](mailto:n.schofield@abdn.ac.uk))

#### Heriot-Watt University:

Mid North Sea High project:  
<http://www.hw.ac.uk/about/careers/job-opportunities.htm>. Informal enquiries should be directed to:

Professor John Underhill (email: [J.R.Underhill@hw.ac.uk](mailto:J.R.Underhill@hw.ac.uk))

Closing Date for applications: 17:00 BST August 1st 2016



Oil & Gas  
Authority

## POLICYWATCH

*Was it worth it?*

# Looking Back at the Oil Boom

By EDITH ALLISON, Geoscience and Energy Policy Office Director

Even though oil prices are up from their January lows, many people are focused on the current economic hardships, business bankruptcies and layoffs, and the question naturally arises – was the boom worth it?

Two recent economic analyses show that the boom was economically beneficial and that local governments report stronger fiscal health than before the boom.

In addition, and contrary to some media reports, the crime rates did not go up in areas with increased oil and gas development.



ALLISON

correlates with changes in the population and economic activity associated with oil and gas production. In addition, these numbers do not include the important benefits of some states' grant programs, which allocate revenue to local governments where industry impacts were the greatest.

**Another study confirms the economic benefits of the drilling boom.**

### Burdens and Benefits on Local Governments

A recently released multi-year study from Duke University finds that through the fall of 2015, oil and gas development had positive impacts on most local governments, even though they bore the brunt of the responsibility for maintaining roads damaged by truck traffic and filling increased demand for public services, such as sewer, water, fire protection, emergency medical services and law enforcement.

Several county and city case studies within the 16-state study found that as drilling and production declined, a minority of smaller, geographically isolated and less diversified communities face significant fiscal risks.

Richard Newell and Daniel Raimi lead the Duke University Shale Public Finance project, which examined the major onshore oil and gas-producing regions of the United States from 2013 through 2015. Ongoing research examines fiscal issues associated with decreased oil and gas activity in 2015 and beyond.

Using 2013 data and interviews, the researchers found that as oil and gas exploration and production surged, some local governments' revenue did not keep pace with rapidly increasing costs and demand for services. Finding money to maintain roads damaged by increased truck traffic was a major problem for most local governments. Other impactful costs to local governments included: sewer and water services, fire, EMS and law enforcement, and the difficulty of hiring staff in competition with industry. However, the financial burden was much less in places with existing infrastructure or where industry operators made in-kind or cash contributions directly to local governments.

Variations in the financial burdens on local governments also depended on how oil and gas revenue was allocated to local governments. In the major oil producing states, the local allocation varied from 0.5 percent (Ohio) to more than 9 percent (Wyoming) in 2013.

There are a few caveats to the Shale Public Finance analysis.

The analysis does not tally sales tax, which is important to municipalities and

### Mixed Results

In the fall of 2015, even with falling oil prices and drilling activity, local governments in North Dakota reported that their fiscal health was better than before the Bakken development. In 2015, population growth and related demand for local services had declined. In addition, the North Dakota Legislature passed laws in 2015 providing additional revenues to local governments. One potential downside or risk is that many local governments took on additional debt during the boom but now have less revenue to service the debt. More diversified economies can better weather downturns in a single industry. However, the rural nature of many of the shale development areas makes it hard to diversify the economy and maintain economic activity.

Another case study looked at Garfield County and Rio Blanco County, adjacent counties in the Piceance basin of western Colorado. The counties experienced rapid growth then decline in drilling and production activity related to the tight gas boom that preceded the shale cycle by several years. Piceance basin gas drilling rapidly expanded in the early 2000s; drilling peaked in 2011 and gas production peaked in 2012. State impact grants helped both counties. Garfield County government experienced a large boost from the drilling boom, helped in part from an industry partnership for road maintenance. Rio Blanco County, on the other hand, has less population and infrastructure and is not faring as well. The county's net assets increased but not enough to balance the costs of needed road repairs.

Another study confirms the economic benefits of the drilling boom. A 2015 analysis of income, employment and crime statistics by Dartmouth economics and business faculty (National Bureau of Economic Research Working Paper 21624) found that the areas surrounding extraction operations enjoy significant economic benefit: for every million dollars of oil and gas extracted, wages increased \$117,000 within 100 miles of production. The researchers also found no significant change in crime rates in areas with oil and gas extraction.





**AAPG**  
Education

# Upcoming Education Events 2016

## GEOSCIENCES TECHNOLOGY WORKSHOP

### Making Money with Mature Fields - Geosciences Technology Workshop

5-6 October 2016 | Houston, Texas

The goal of this workshop is to review mature fields and to identify the amount and nature of oil that can be recovered, and to evaluate competing strategies for economically producing the remaining reserves. In addition to looking closely at fields, we will review new and improved technologies that may help revitalize reservoirs and overcome problems such as low pressure, paraffin, corrosion and more. We will identify companies willing to offer a "no money down" approach, or other forms of innovative financing. In addition to reviewing the technology, we will review case studies.

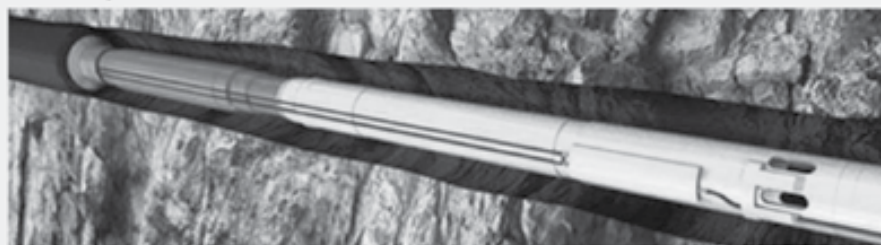
#### Themes

- Mature fields: examples and profiles
- Typical issues resulting in oil left behind
- EOR
- New technologies and techniques
- Reality checks: water, environmental issues, infrastructure
- Opportunities and economies of scale: how to make the economics really work
- Is there funding? Where? How? Who?

## SCHOOLS AND SHORT COURSES

### Basic Well Log Analysis

11-15 July 2016 | Golden, Colorado



The course assumes no logging knowledge and seeks to establish an understanding of basic petrophysical measurements and interpretation techniques which can be applied to routine tasks, and upon which more complex and advanced information and interpretive techniques can be built. The Basic Well Log Analysis course strives to provide a strong and coherent foundation for the understanding of other, specialized interpretation techniques involving well log data, which are not covered here.

### Fractured Reservoirs: From Geologic Concepts to Reservoir Models

22-26 August 2016 | Casper, Wyoming

Course plus Field Trip



The short course provides a unique opportunity to learn all the aspects related to the understanding and modeling of fractured reservoirs. The unique feature of this course is the ability to take the geologic concepts and use them in reservoir modeling. Hands-on sessions are devoted to the examination of outcrop, core and log data and using that information and a software to create 3D fractured reservoir models.

*Great discounted rate for all geoscientists. Our loyalty discount provides a great way to take advantage of AAPG Short Course, "Basic Well Log Analysis". Use the discount code: WECARE! and receive 75% off the regular rate. We've also provided a discount for the "Fractured Reservoirs course plus field trip". To take advantage of a 25% discount, use the code: AAPG4U*

## SHORT COURSE INFORMATION COMING SOON:

### Carbonate Depositional Systems

5-6 October 2016 | Houston, Texas

## E-SYMPOSIA AND ONLINE COURSES

- **Fluvial Sedimentology and Geomorphology**  
by John M. Holbrook, Texas Christian University, Fort Worth, TX
- **Origin of Non-Hydrocarbon Gases in Petroleum Reservoirs**  
by Christopher Laughrey, Dolan Integration Group (DIG), Westminster, CO
- **Permian Basin Geologic / Reservoir / Completion Models: How to Assure They Are Working Reservoirs**  
by William (Bill) Fairhurst, Riverford Exploration, LLC

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# It's Time To Begin Anew

By DAVID CURTISS

I vividly recall the feelings I had while driving across the United States from Salt Lake City, where I had been working at the University of Utah, to Washington, D.C. where I was going to work in the U.S. Congress as a Congressional Science Fellow.

I was in my early 30s, driving an old car with the windows down, the hot August winds blowing like a convection oven over me and my possessions. It was exhilarating. Sure, there were pangs of sorrow, leaving behind friends and colleagues. But the feelings of excitement, and a bit of nervousness of stepping into the unknown, quickly overwhelmed those pangs as I was filled with the sense that I had embarked on a grand adventure and a major life transition – a new beginning.

Little did I know how monumental a milestone this experience would prove to be. Two weeks later, on Sept. 11, 2001, as I sat in a room in the Madison Building of the Library of Congress, the world changed for all of us.

\* \* \*

Milestones: Our lives are full of them.

We celebrate many of these moments, from birthdays and marriage to graduation and first jobs. But others are painful, when a treasured relationship ends, a poor decision leads to more poor decisions, or when death touches someone close to us.

What is similar about these milestones – both good and bad – is that each requires a shift. They are points in life when



CURTISS

**Opportunities opened to me because I had these new experiences, had acquired new knowledge and was applying it in new ways.**

circumstances are changing and disrupting the norm. And these changes require us to respond, to change. It's a time to reassess, reevaluate and start anew.

We're marking a milestone here at AAPG, too.

In February of this year, we restructured our entire operations at headquarters.

Our new structure is based around teams handling similar job functions and emphasizing cross-training. It's also demanded all of us – myself included – to change how we think about our jobs and how we can be most effective in running the business of AAPG.

Last month we held the 2016 Annual Convention and Exhibition (ACE) in Calgary. It was a great event. An opportunity for geoscientists involved in exploration and production to get together and learn, socialize, and perhaps make that contact or connection that will open up new opportunities.

I can assure you that, for Paul MacKay and Jen Russel-Houston, the general chair and general vice chair, and their entire organizing committee, this experience was

a milestone event in their lives. We owe them a debt of gratitude for taking on the significant responsibility of organizing this convention for all of us. And we also thank our gracious hosts at the Canadian Society of Petroleum Geologists for their significant contributions to the success of ACE 2016.

I am particularly proud of the AAPG staff team, both on the ground in Calgary and at headquarters, for their stellar efforts in difficult circumstances to deliver this event. Thank you, guys. You've demonstrated the impact of teamwork.

This month is also the beginning of a new fiscal year at AAPG with a new Executive Committee (EC) lead by President Paul Britt. The EC will be working closely with us to navigate the uncertain environment in which we presently find ourselves. There will be tough decisions that need to be made, but there will also be opportunities to seize and develop for the benefit of you, our Members.

\* \* \*

At the end of 16 months working in the U.S. Congress I had experienced up

close the devastating terrorist attacks of September 11, as well as domestic terror in the form of anthrax attacks on Congress and two snipers who terrorized the greater Washington, D.C. area.

But my year on the Hill was about much more than violence and terror. I had a chance to see how representative democracy works from the inside. I was a part of it. And over the course of that year, I had a chance to meet people, have new experiences and gain insights that have served me through today. And I made lifelong friends.

As I retraced my steps to the University of Utah to rejoin the Energy & Geoscience Institute, in a sense, I was going back. But I wasn't the same person when I got back. I was actually moving forward into a new job. Opportunities opened to me because I had these new experiences, had acquired new knowledge and was applying it in new ways. It was a milestone experience that shaped my career.

It was one of the great milestones. I've also experienced milestones that were decidedly not great. But good or bad, they have always provided me an opportunity for a fresh start, just as they are today at the beginning of a new year for AAPG – our 100th year.

It's time to begin anew.

## DIVISIONS REPORT: DPA

# Helping Geoscientists Become Leaders

By CHANDLER T. WILHELM, DPA President

When I graduated from college with a degree in geology in 1975, I admit that I did not have a very good understanding of how a person could earn a living as a geologist.

I certainly had no idea that I was about to embark on a lifelong adventure, the scope, breadth and dimensions of which I could never have imagined. During my 35 years as an active AAPG Member, this profession has allowed me to work with some amazingly talented people to solve some very challenging technical and business problems that ultimately have led to the discovery and development of new energy sources to power our world's growing economy. I have had the privilege of working on almost every continent on the globe. I have had my share of both successes and failures. Anybody who works in this business for very long learns that failure comes with the job, and that to be successful over the long term takes a measure of resilience and perseverance.

The rewards and sense of accomplishment from completing quality technical work or delivering successful wells, ventures or business deals outweigh the disappointment of the inevitable failures. At the end of the day, we get the satisfaction of knowing that what we do is vitally important to our world's economy and, ultimately, to the standard of living to which most people aspire. It is a job in which we should all take great pride. It is why I believe petroleum geoscience is one of the world's



WILHELM

**The concept of leadership is inherent in every aspect of the DPA's mission.**

great professions, and one I have been proud to be a part of for 35 years.

### The Year Ahead

With that context, you may be able to better understand why it is such an honor and privilege for me to have been elected president of the AAPG's Division of Professional Affairs (DPA) for the 2016-17 term.

For this honor I can only say thank you to the DPA membership for your vote of confidence, and rest assured that I will work diligently to serve the needs of our organization and membership during this period of enormous economic difficulty for our industry.

Serving with me on the Executive Committee will be a quality team of geoscience professionals. I would like to particularly recognize and thank my predecessor, Mike Canich, for his outstanding leadership of the DPA over the past 12 months, which has certainly

been one of the most difficult economic environments many of us have experienced in our professional careers.

He has been a wonderful partner and example for me as I begin my term. I look forward to working with the Executive Committee as we begin to tackle the challenges facing the DPA in this period of economic hardship.

Joining our Executive Committee is a team of 15 councilors from around the globe, representing DPA members in almost every Section and Region.

The DPA is that community within AAPG that focuses on the professional practice of energy resource geoscience, upholds the AAPG Code of Ethics, provides continuing education and certifies the credentials of geoscientists. As such, the DPA is what makes AAPG not just a scientific society, but a professional society as well. The DPA community consists of geoscientists who are committed not only to standards of competence, but also to ethical behavior and professionalism. Our division members

want to help improve the overall standards of professional practice, to represent our community in government affairs and to provide guidance to all AAPG members on how to improve their technical knowledge and professional practice.

### Competence and Accountability

To advance this goal, I have selected as the theme for my term "Helping Geoscientists Become Leaders."

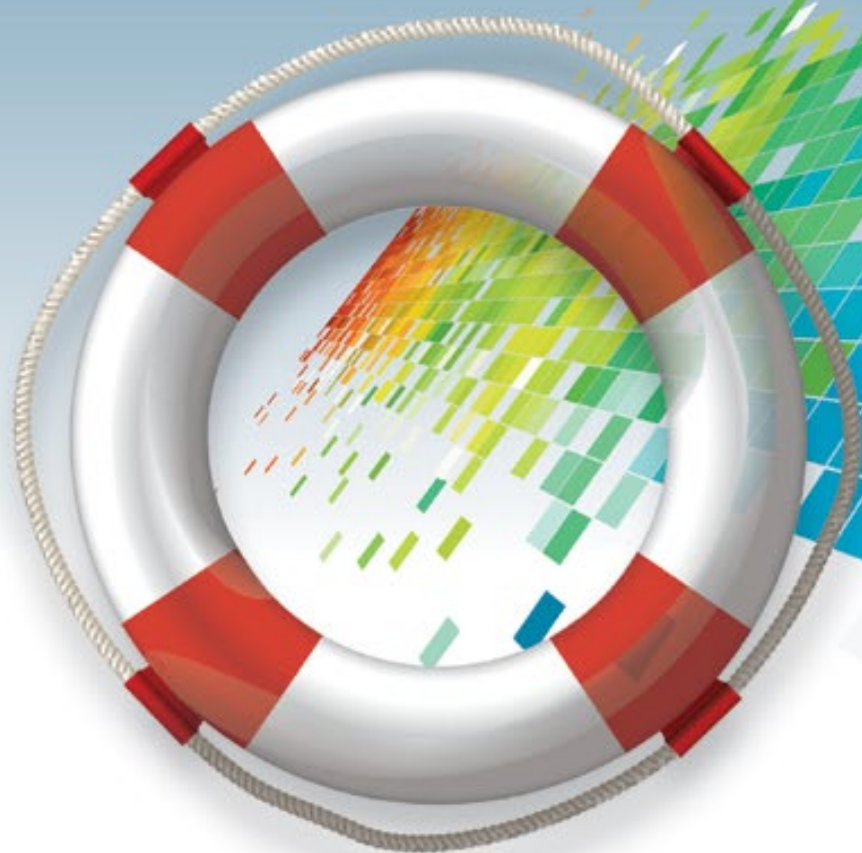
The concept of leadership is inherent in every aspect of the DPA's mission. One night several years ago, I had the privilege of hearing Gene Kranz, retired NASA flight director for the Gemini and Apollo missions, give a lecture at Rice University on the 50th anniversary of the start of the space program.

His simple statement "leadership is competence and accountability" has stayed with me ever since. Geoscientists working in all types of organizations and roles, including multinationals, small startups, consulting firms and government or academic institutions, become leaders when they have attained the technical and business competence and standard of professional conduct to cause other people to value their contributions, act upon their recommendations and place trust in their judgment.

The DPA's mission during my term

See DEG, page 28





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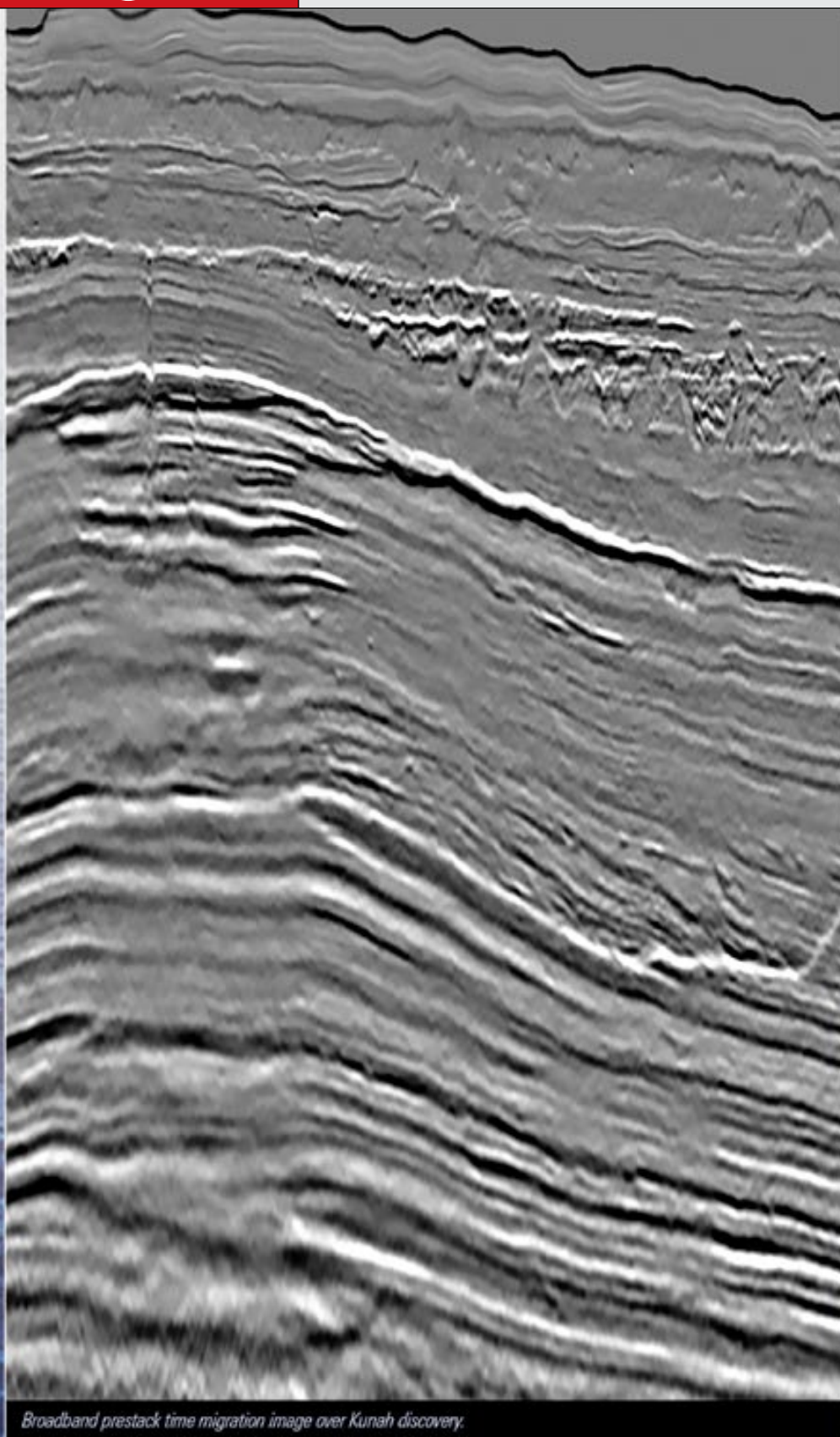
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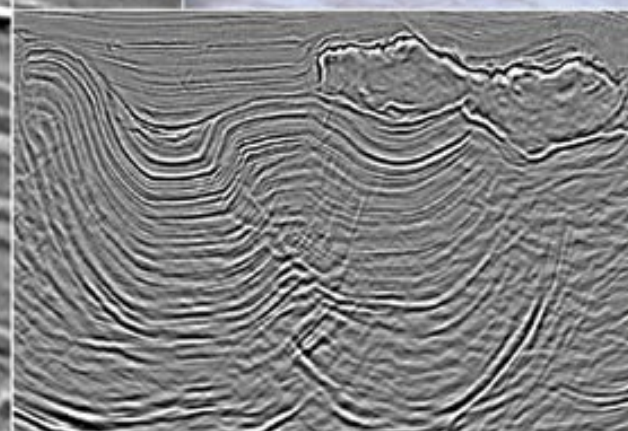
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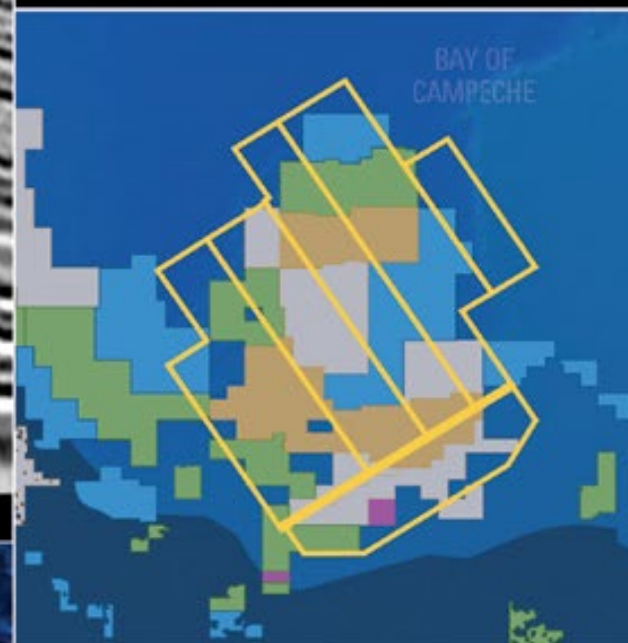
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Reverse time migration showing three- and four-way salt body closures.



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