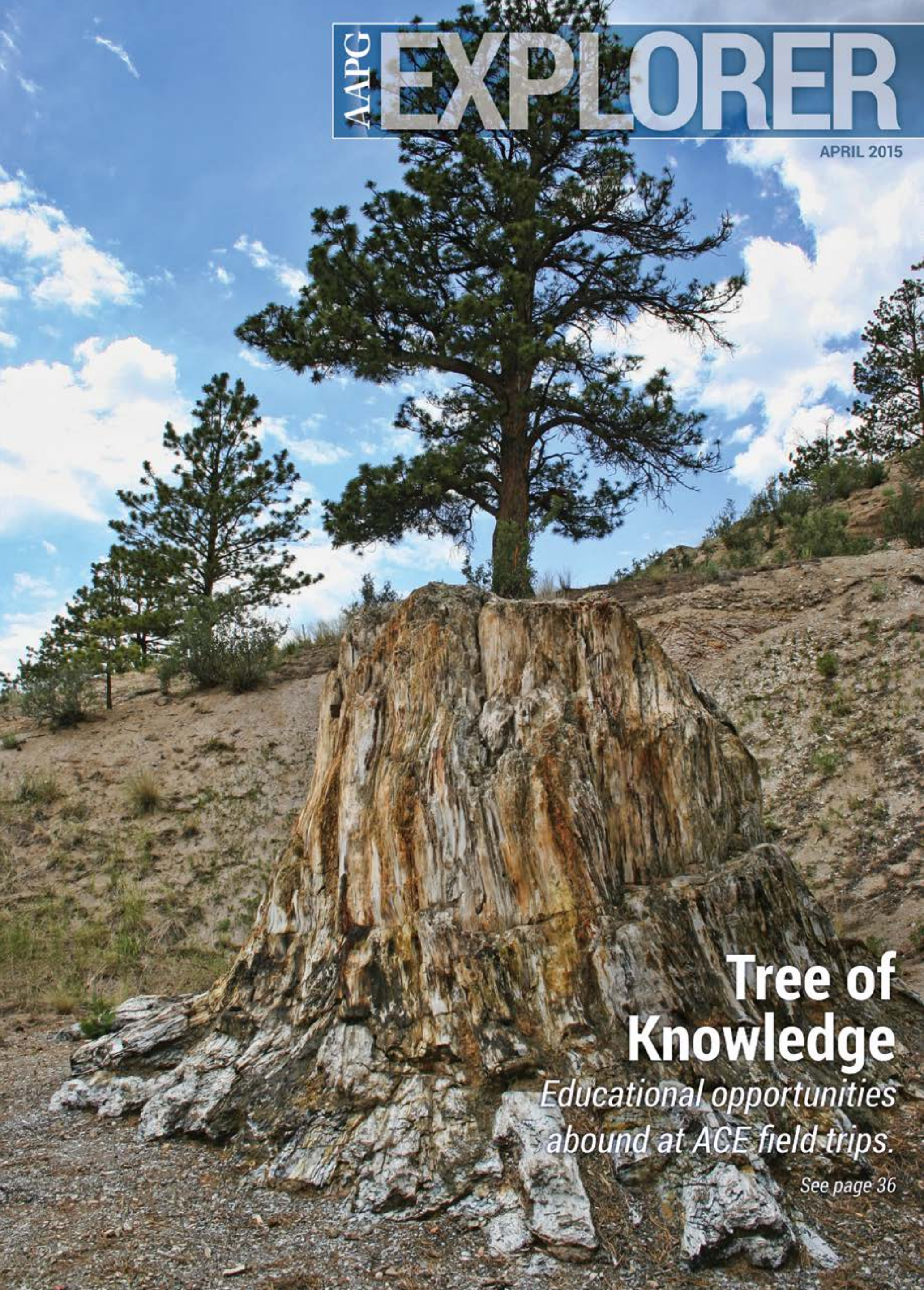
AAPG EXPLORER

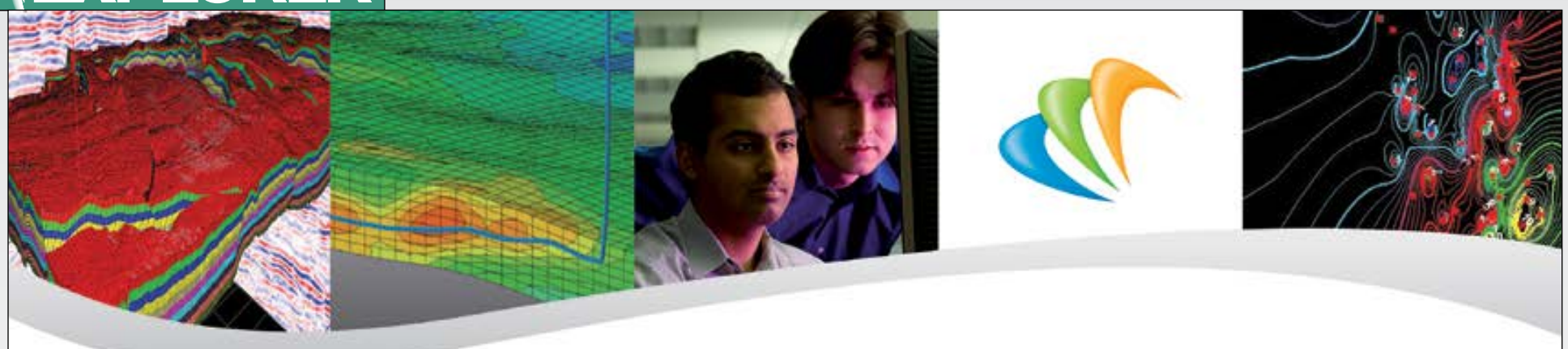
APRIL 2015



Tree of Knowledge

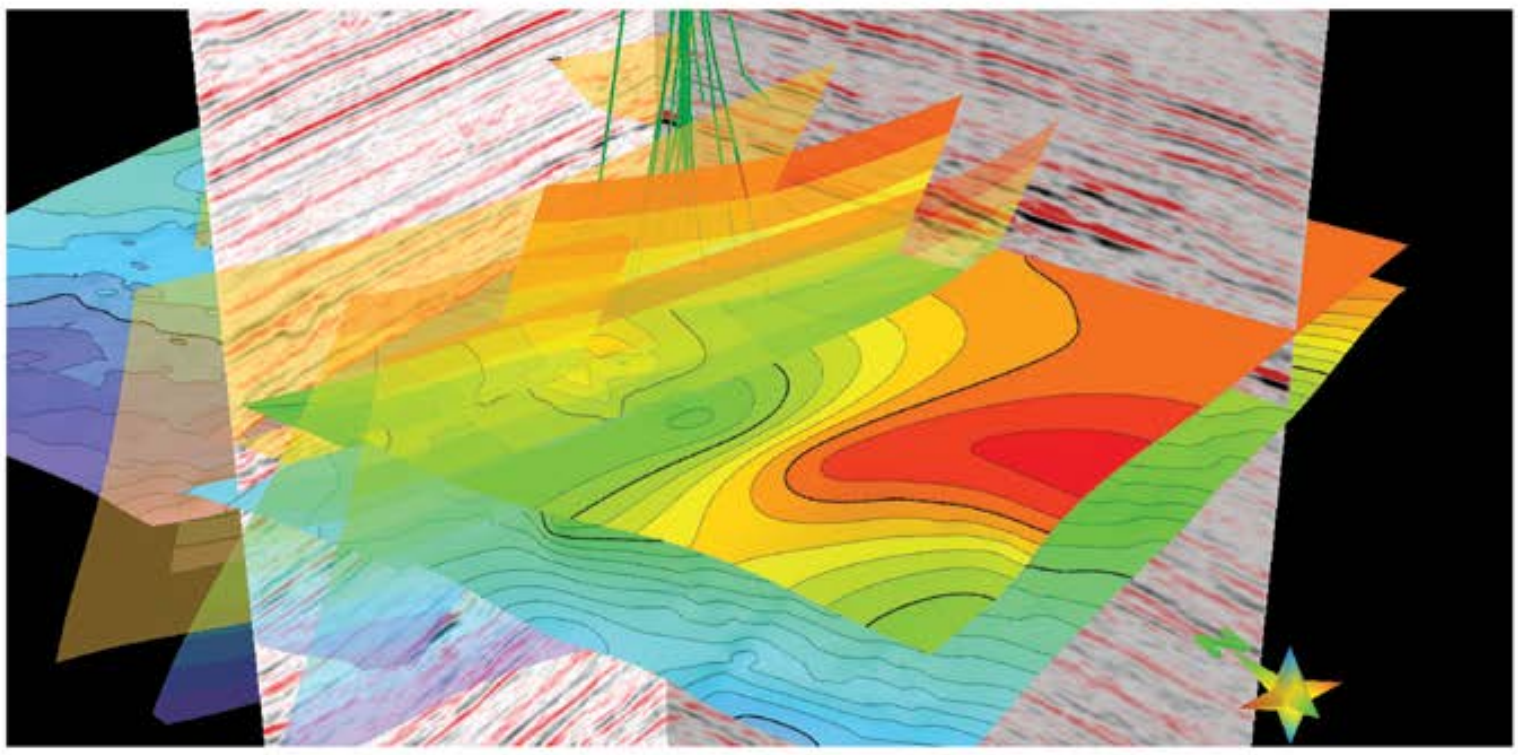
Educational opportunities abound at ACE field trips.

See page 36



Better Data, Better Technology, Better Answers

Geoscience solutions for your E&P challenges



Integrate geoscience to optimize production. Unravel the complexities of your reservoir with our multi-disciplinary expertise, integrated solutions and advanced technology:

- Integrated workflows for a variety of reservoirs - clastics, carbonates, shale and heavy oil
- Full range of seismic and multi-physics acquisition methods for every environment
- Seismic reservoir characterization software for conventional and unconventional resources
- The most recent seismic and geologic data library in the world's key locations
- Expert services including geochemistry, biostratigraphy and sedimentology
- Locally focused R&D to resolve your imaging challenges

From exploration to production, we have the answers you need.
Visit AAPG Booth # 1438 and find out more.

cgg.com

CGG
Passion for Geoscience

Vol. 36, No. 4
April 2015

PRESIDENT'SCOLUMN

Learning from others

During Good Times and Bad

By RANDI MARTINSEN

Recently AAPG Executive Director David Curtiss and I had the pleasure of attending a Young Professionals in Energy (YPE) meeting in Pittsburgh – and what an eye-opening experience it was.

For those of you who are not familiar with YPE, it is a non-profit organization with more than 40,000 members and 40 local chapters worldwide, and its aim is to facilitate the advancement of young professionals in the global energy industry through social, educational and civic service-oriented events.

Two young energy finance professionals in the Houston area started the YPE organization in 2005. Think about it: a non-profit organization (like AAPG) with a very loose organizational structure, that is only 10 years old and has enticed 40,000 members worldwide to join.

Interestingly, you don't have to be a YP to belong to YPE – and based on our Pittsburgh experience, attraction to this group and its events is not limited to YPs.

* * *

What drew and continues to draw my attention to the YPE organization is that it has experienced explosive growth while AAPG's total membership has shown a very modest increase – and the number of our voting Members is actually declining.

Yes, the YPEs have a broader potential member base than does AAPG, but its success begs the question: Why do energy professionals want to belong to this organization?


MARTINSEN

Providing opportunities for interaction and engagement across energy industry professionals might expand employment opportunities for all our members.

Part of the answer may lie in the reality that our profession is increasingly becoming more team-based and cross-disciplinary – geologists and geophysicists working with engineers, landmen and economists.

AAPG member Josh Hickman, founder of the Pittsburgh YPE, asks the question: "If a geologist only does geology and knows only other geologists, how successful can he or she truly be in today's world?"

I would add, how could they be successful *especially* if they work for a small company or are a consultant?

Perhaps to be successful in today's environment it is necessary to integrate the technical disciplines with the other disciplines in the energy supply chain, which means associations that facilitate that dynamic have a lot of appeal.

To be fair, although AAPG's primary focus always has been on our members who are geoscientists, we do have the Associate member category that allows non-geoscientists who are in the petroleum and related industries to join AAPG.

I don't believe, however, we ever have actively tried to recruit them. Over the past few years the Executive Committee and staff had discussions about providing additional services that would be geared toward better serving our Associates and other interested customers, but not about actively recruiting Associates.

* * *

Part of the YPE's success also may be that young people prefer inclusivity to exclusivity, and they join YPE because it is easy yet provides social and professional networking and training opportunities.

According to Stephen Cravens, one of the founders of YPE, inclusivity is required to get true interdisciplinary knowledge and idea sharing.

Also, very interestingly, while jobs for geoscientists during past industry downturns decreased in the E&P sector, they increased in the other sectors, such as banking and investment, because of increased acquisition and divestment opportunities brought on by low oil prices.

Therefore, providing opportunities for interaction and engagement across energy industry professionals might expand employment opportunities for *all* our members – especially during downturns like this.

* * *

As stated in last month's column, AAPG leadership and staff are actively looking at ways that we can most effectively help our members during this downturn.

One good tool already in place is the AAPG Member Registry, which was created to network, foster scientific exchange and showcase your expertise to the entire world. You can read more about it on page 48; I really encourage you to check out the Registry on the AAPG website.

So, AAPG is responding to the needs of our members. It's one reason why belonging to AAPG can be so valuable to your career.

But we'll also continue to brainstorm about other ways we can help our members as we strive to make AAPG an integral part of careers around the world. We'll continue to look for best practices developed by others that might benefit our members.

The Pittsburgh YPE, developed by AAPG members, provided some good ingredients to add to the mix.

STAFF

Managing Editor
Vern Stefanic
email: vstefan@aapg.org

Assistant Managing Editor
Brian Ervin
email: bervin@aapg.org

Communications Project Specialist
Susie Moore
email: smoore@aapg.org

Graphics/Production
Matt Randolph
email: mrandolph@aapg.org

Advertising Coordinator
Steve Praytor
P.O. Box 979, Tulsa, Okla. 74101
Phone: (918) 560-2647 – fax: (918) 560-2636
(U.S. and Canada only: 1-800-288-7636)
(Note: The above number is for advertising purposes only.)
email: spraytor@aapg.org

CORRESPONDENTS

David Brown
Louise S. Durham
Barry Friedman
Emily Smith Llinás
Ken Milam
Heather Saucier

TABLEofCONTENTS

REGULARDEPARTMENTS

Scan this for the mobile version of the current web Explorer.


Photo by K. Tanavsuu-Milkeviciene

ON THE COVER:

The location of one of a dozen field trips scheduled for ACE next month, the Florissant fossil beds of central Colorado are world renowned for their highly diverse assemblage of fossil plants and insects of the Eocene Epoch. As pictured, some of the largest diameter petrified trees in the world occur here. The Florissant Formation formed in a paleovalley where sedimentation was strongly influenced by lahars and volcaniclastic eruptions from a nearby stratovolcano. Photo courtesy of Jeff Kramer.

Left: Another ACE field trip destination, Roan Cliffs outside Rifle, Colo. showing profundal oil shales of Green River Formation (upper white cliffs) overlying red shales and sandstones of the Wasatch Formation.

Vol. 36, No. 4

The AAPG EXPLORER (ISSN 0195-2986) is published monthly for members by the American Association of Petroleum Geologists, 1444 S. Boulder Ave., P.O. Box 979, Tulsa, Okla. 74101-3604, (918) 584-2555. e-mail address: postmaster@aapg.org. Periodicals Postage Paid at Tulsa, OK and at additional mailing offices. POSTMASTER: Please send address changes to AAPG EXPLORER, P.O. Box 979, Tulsa, Okla. 74101. Canada Publication Agreement Number 40063731 Return undeliverable Canadian address to: Station A, P.O. Box 54 • Windsor, ON N9A 6J5 • E-mail: returnsIL@imex.pb.com

Advertising rates: Contact Steve Praytor, AAPG headquarters. Subscriptions: Contact Veta McCoy, AAPG headquarters. Unsolicited manuscripts, photographs and videos must be accompanied by a stamped, self-addressed envelope to ensure return. The American Association of Petroleum Geologists (AAPG) does not endorse or recommend any products or services that may be cited, used or discussed in AAPG publications or in presentations at events associated with AAPG. Note to members: $6 of annual dues pays for one year's subscription to the EXPLORER. Airmail service for members: $55. Subscription rates for non-members: $75 for 12 issues; add $72 for airmail service.

AAPG Candidate Videos Now Online

The first videos featuring those who have agreed to stand for election to serve on the AAPG Executive Committee next fiscal year are now available on the AAPG website.

These are brief biographical introduction videos, intended to allow members around the world to meet the candidates on a virtual basis.

Additional videos will be published on the website in April, which feature a Q&A format that allows each candidate the opportunity to talk about themselves, their experiences and their goals and visions for AAPG.

Also available are individual biographies and written responses where each candidate explains "Why I Accepted the Invitation to be a Candidate for an AAPG Office."

Voting is now open and will conclude May 15. Members will receive ballots in their email and a printed ballot in their mailbox. Membership may vote by mail or electronically – if both options are used, however, the mailed printed ballot will be used as the official vote cast by members.

The person voted president-elect will serve in that capacity for one year and will be AAPG president for the following fiscal year. The terms for vice presidents, treasurer or secretary are two years each.

The slate is:

President-Elect

❒ **Paul W. Britt**, Texplore Inc., Houston.

❒ **Gretchen M. Gillis**, Aramco Services Co., Houston.

Vice President-Regions

❒ **Adebayo O. Akinpelu**, Fixital Ltd., Lagos, Nigeria.

❒ **Peter M. Lloyd**, Asia Pacific Training Ltd., Falicon, France.

Secretary

❒ **Heather L. LaReau**, Noble Energy Inc., Denver.

❒ **Nicole S. Morris**, FireWheel Energy LLC, Fort Worth.

AAPG Governance Under Review by Ad Hoc Committee

A new ad hoc committee focused on AAPG governance has been formed by the Executive Committee in response to recent changes that are impacting the industry and AAPG membership.

The committee's tasks include:

- Reviewing AAPG governance and comparing it to other societies.
- Determining best governance practices, and how they might best apply to AAPG.
- Placing governance within the context of AAPG moving forward as a business and as an organization that serves our members and best supports our mission into our next century.
- Making recommendations for potential changes and suggesting implementation of those ideas, as required.

The committee comprises three members each from the House of Delegates (HoD), the Advisory Council (AC) and the Executive Committee. They are:

- House of Delegates – **David Hawk**, **Laura Johnson** and **Ryan Lemiski**.
- EC – **Richard Ball**, **Steve Brachman** and **John Kaldi**.
- AC – **Lee Krystinik** (chair), **Pete MacKenzie** and **Robert Webster**.

AAPG has made no major changes to its current governance for at least 50 years, despite transformational changes that have occurred throughout the industry and technological advances in communications and information transfer.

An interim report will be made to the EC, AC and HoD at the AAPG Annual Convention and Exhibition in Denver, and again toward the end of the year.

All comments, inquiries and suggestions should be directed to Lee Krystinik, at leekrystinik@yahoo.com.

Kidnapped in Colombia

Geologists Clamor for Freedom in the Field

By EMILY SMITH LLINÁS, EXPLORER Correspondent

In February, geologists Karina Banquéz, Andrés Mauricio Botero, John Elber Ríos and Germán Ayala set out to do geochemical testing for the Colombian Geological Survey in Norte de Santander, in northeastern Colombia.

Little did they know their time in the field would last much longer than planned.

Guerilla fighters from the National Liberation Army (ELN) kidnapped them on Feb. 19 and held them for 20 days.

This was not the first time that geologists were victims caught up in a dangerous game that is part political protest, part lucrative financing.

Andrés Felipe Calle was kidnapped in late June last year while doing cartography work in Colombia's Cesar department. He was held in captivity for two months.

Though Colombia's overall security situation has improved in recent years and the Santos administration's negotiations with the Revolutionary Armed Forces of Colombia (FARC) in Havana, Cuba, has resulted in some progress, demonstrations against the oil and mining sectors are increasing.

According to a report by the Foundation for Peace and Reconciliation, attacks against petroleum infrastructure in Colombia increased from 325 percent between 2011-14. Attacks by the ELN, the group claiming responsibility for the most recent geologist kidnappings, increased from 31 in 2012 to 68 in 2014.

The ELN has been invited but is not yet participating in peace talks with the Colombian government.

ACGGP President Jaime Checa leading fellow geologists in a "March for Life" in Bogotá on March 8.

While both kidnapping cases ended well – all of the geologists were released without physical harm – results are not always so promising.

On Feb. 27, geologist Ricardo Molina was shot by unknown gunmen on his way home from work in San Jose del Guaviare. As an official with the North and West Amazonas Development Corp., Molina's primary job was to combat illegal mining in the country's fertile Amazon department.

Enough Is Enough

Members of Colombia's tightly knit geological community are confronting the difficult news with calls to protect and defend their colleagues and their profession.

The Colombian Geological Society publishes official communications following acts committed against geologists, and the Colombian Association of Geoscientists and Geophysicists (ACGGP) President Jaime Checa has been featured on national media.

Checa led fellow geologists in a "March for Life" held in Bogotá March 8, one of multiple events calling for the kidnapped geologists' release.

Wearing a T-shirt reading "Freedom is Life for Geologists" and holding a banner with the victims' photos, Checa told reporters that enough is enough.

"We're displaying our concern because (geologists) have been captured, and this is something that cannot continue occurring," he said. "We've come to protest and raise our voices because kidnapping geologists is becoming commonplace, and no one protests. By saying nothing, essentially we are accepting it."

Geologists across Colombia responded to the February kidnappings by organizing demonstrations in Bogotá, Medellin, Sogamoso and Manizales – cities whose universities have strong geoscience programs and AAPG chapters.

AAPG member Juliana Ceballos, a former AAPG student chapter president at EAFIT University, attended demonstrations in Medellin.

"We march to show solidarity with our colleagues and their families, but also because our profession is always affected by this situation," she said. "We do not want to keep doing our work with a continual fear that we could be kidnapped at any time."

Too Close To Home

The kidnappings were uncomfortably personal for Ceballos, who works at Gemi, S.A.S., alongside the geologists captured in Norte de Santander. She said news of the kidnappings shocked her.

"The news hit me really hard," she said. "I never imagined that something like this

See **Involved**, page 8

Francisco Trujillo (center, grey shirt) joins fellow geologists at a candlelight vigil at Usaquén park in Bogotá.

Involved
from page 6

would to happen to people so close to me, to my colleagues, not to mention the fear that invaded me when I realized that none of us are exempt from this type of situation."

Ceballos said knowing the geologists personally helped her realize that she had been complacent in the past.

"I started to realize how insensitive I had been other times when kidnappings were present but not personal, when I had believed that would never happen to me or anyone close to me," she said. "That's why I got involved in using social networks and any media that could reach people to spread awareness about the current situation in a beautiful country that has so much to give, but that each day is torn by seemingly endless war."

Participation in the anti-kidnapping movement spread far beyond individuals who knew the geologists personally.

Colombia AAPG Young Professionals (YP) chapter president Alejandro Velasquez helped to organize marches in Bogotá. He said he became involved because he doesn't want kidnapping geologists to become common practice in Colombia's armed conflict.

"We hope to give a message of hope to the victims and their families and also show that we do not accept these practices, Velasquez said.

Velasquez was joined by Francisco Trujillo, former student chapter officer at the National University of Colombia in Bogota.

Trujillo said he felt that, as a geologist and an AAPG member, he had no choice but to be involved in the demonstrations.

"This is a problem that we cannot ignore," he said. "Now we have had five geologists kidnapped in the past two years, as well as the murder of a colleague. I think it is our duty as members of the profession, and more as part of the Association."

The February kidnappings brought back frightening memories for AAPG member Eliana Gomez, University of Caldas graduate who was a friend and classmate of AAPG member Andrés Felipe Calle, captured by the ELN in June 2014.

"When I found out Andrés had been kidnapped, it was terrible, horrible, indescribable," she said. "A friend called and told me, and, with the phone in my hand I started crying. My friend cried too.

"I felt profound sadness, anger," she continued. "The first few days were the worst. I'd start to eat something and then think about how Andrés couldn't eat. It was awful."

Gomez channeled her angst into action. She worked with friends to organize marches and candlelight in the university and in the city of Manizales. While the marches did not reach the scale of the demonstrations held in multiple cities, the support was still important for Calle and his family.

Gomez and a group of four friends, including Calle's sister, formed a Facebook group, "Quiero que liberen a Andrés Felipe Calle" ("I want Andrés Felipe Calle Released") late at night a few days following the kidnapping. Within four days the page had 5,000 followers.

The girls started another page, "#Sin cadenas" ("without chains"), to support other families whose relatives have been kidnapped.

"We've noticed that in Colombia, there's not much information about people who are deprived of their freedom. Many times

See **ELN**, page 10

ELN
from page 8

their parents are older and don't know much about media or how to mobilize people," Gomez said.

Social media played an important role in the February activities as well.

The Twitter feed "#liberenlosgeologos" ("free the geologists") featured posts from geoscientists throughout Colombia and across the globe and was one of the first sites to announce the geologists' release on March 10.

Geologists participating in the marches and social media campaigns said they hope their efforts will help give the ELN and the society at large an improved image of geologists, who in many cases are viewed as extensions of the mining or petroleum industry.


CEBALLOS

> **"I would venture to say that since many people associate geology with the mining and petroleum industry, geologists became political and/or economic targets."**

Rebels Without a Clue

Ceballos said a lack of understanding about what geologists do makes them more likely to be victims of kidnapping.

"I would venture to say that since many people associate geology with the mining and petroleum industry, geologists became political and/or economic targets. These groups think that holding geologists will help them put pressure on the government or generate the revenue they need to subsist," she said.

Ceballos stressed the importance of teaching society that not all geologists are involved with petroleum or mining, that they are members of civil society who have the same rights as everyone else to make a living.

Trujillo agreed.

"We are just doing our jobs. We are not part of the conflict, and we have the right to work and to be free," he said.

Gomez, who works for a company that conducts environmental impact studies, said that if she could speak to the ELN personally, she would tell them that most geologists have no interest in being part of the conflict and that geologists work to protect the earth and the community.

"(The ELN) should understand that our geologists' work is not to attack the country or to attack them. There are other forces charged with that task. We work for the community and community safety," she said. "We do not just work to get oil out of the ground. We work to protect our natural resources. Sometimes we do extract commodities that are the result of exploration and development, but we can do so in a sustainable way."

Gomez said understanding goes both ways, adding that, while she does not excuse the ELN's tactics, she can understand their actions.

"I do not share their ideology, and I never support depriving people of freedom," she said. "However, I do not judge them. There are many young people in the ranks, and they know nothing else. They've never had the opportunity to study and learn."

When asked what can be done to improve understanding and end the conflict, few geologists have solid answers. Most concur, however, that they are determined to continue their work despite the risks involved.

In Spite of All the Danger

Shortly after his kidnapping, Calle returned to the Cesar department, and he currently works in safe urban areas.

His friend Eliana recently completed fieldwork in the same area where he was captured.

"Going to that area definitely made me nervous. There I was working 20 minutes from where they kidnapped Andrés," Gomez said, admitting that fieldwork in certain parts of the country continues to be risky.

"I think twice about working in the field, but I won't give it up. Geologists working at a desk can't do much. In the office you can't see what you see in the field," she said.

Gomez is currently pursuing a master's degree at the National University of Colombia, and she is determined to stay in the country after graduation.

"I want to work in Colombia," she said, noting that despite the challenges the country is a beautiful place with opportunities for geologists.

"There are some bad people, but we are not all that way. We speak out about kidnappings and our problems, but do not want the country's image to suffer. Not all of Colombia is unsafe. People can move about peacefully in most parts of the country," she said.

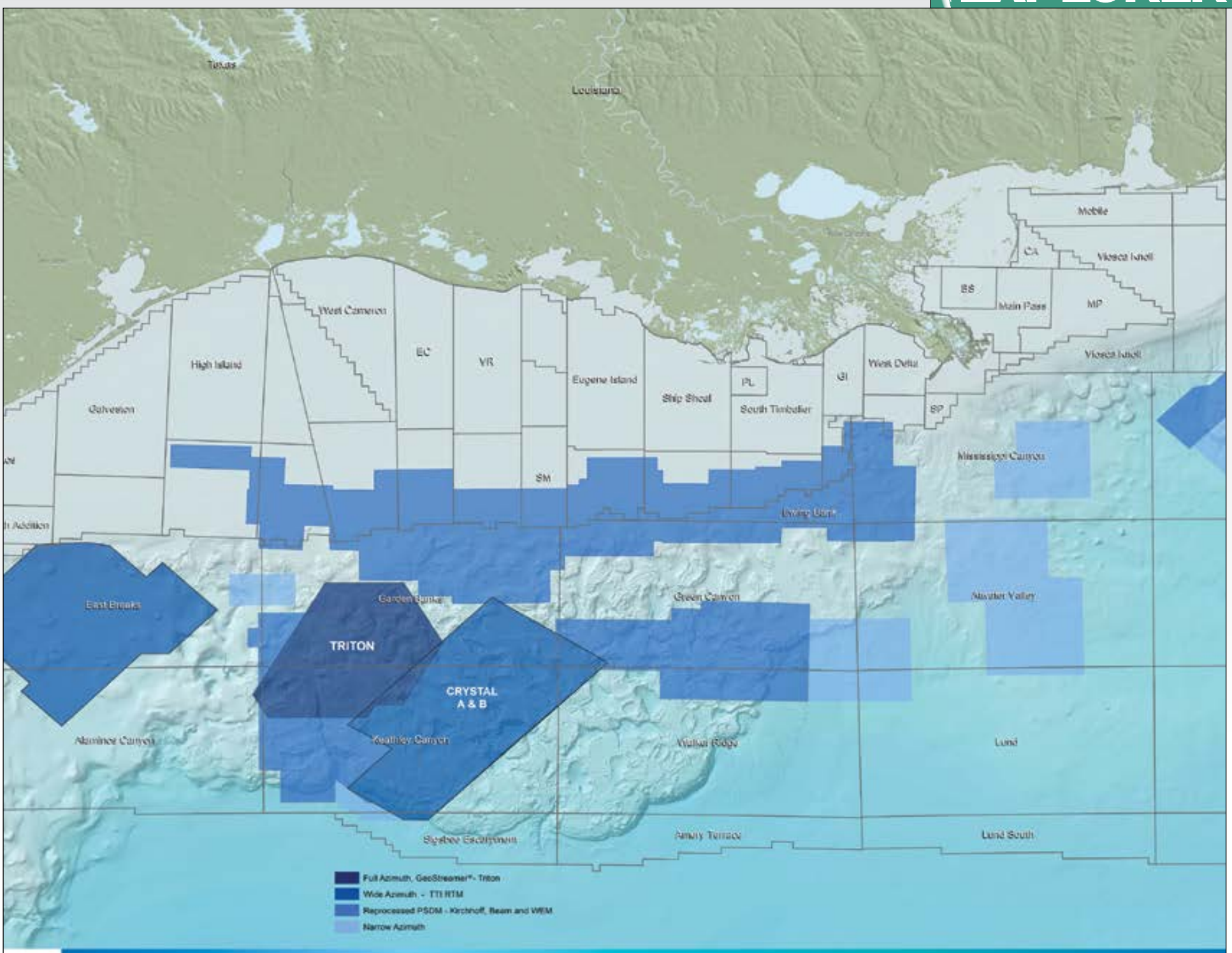
Gomez said a long-term goal of hers is to work with colleagues to promote "geological tourism" in Colombia.

"We want geologists from other parts of the world to come see Colombia's geology. The country has very beautiful areas, very nice outcrops. We have lots of access to streams and biodiversity. It is a great place to study geology," she said.

For Trujillo, Colombia's geology helped him fall in love with the profession.

"What I like about my job is the opportunity to study the earth from a variety of fields, not only be in laboratories or in front of a computer. Geology has led me to meet people, exotic places, unforgettable experiences," he said.

Those exotic places and unforgettable experiences help bring geologists back to the field, as do their colleagues who embrace them and accompany them along the way.



Keathley Canyon and Garden Banks:

- **MC3D GeoStreamer® Triton survey;**
  - Covering 390 OCS blocks with large open acreage access
  - Full Azimuth (FAZ), long-offset, Broadband data
  - Acquisition completed in August 2014
  - Early images available
- **26,000 sq km new MC3D data, Crystal A&B RTM Wide Azimuth (WAZ) survey**
  - Covering 580 deepwater OCS blocks
  - Sub-salt imaging greatly enhanced utilizing:
    High Resolution geologically-constrained PGS hyperTomo and TTI RTM

Please contact your PGS Account Manager today +1 281 509 8000 or gominfo@pgs.com

A Clearer Image

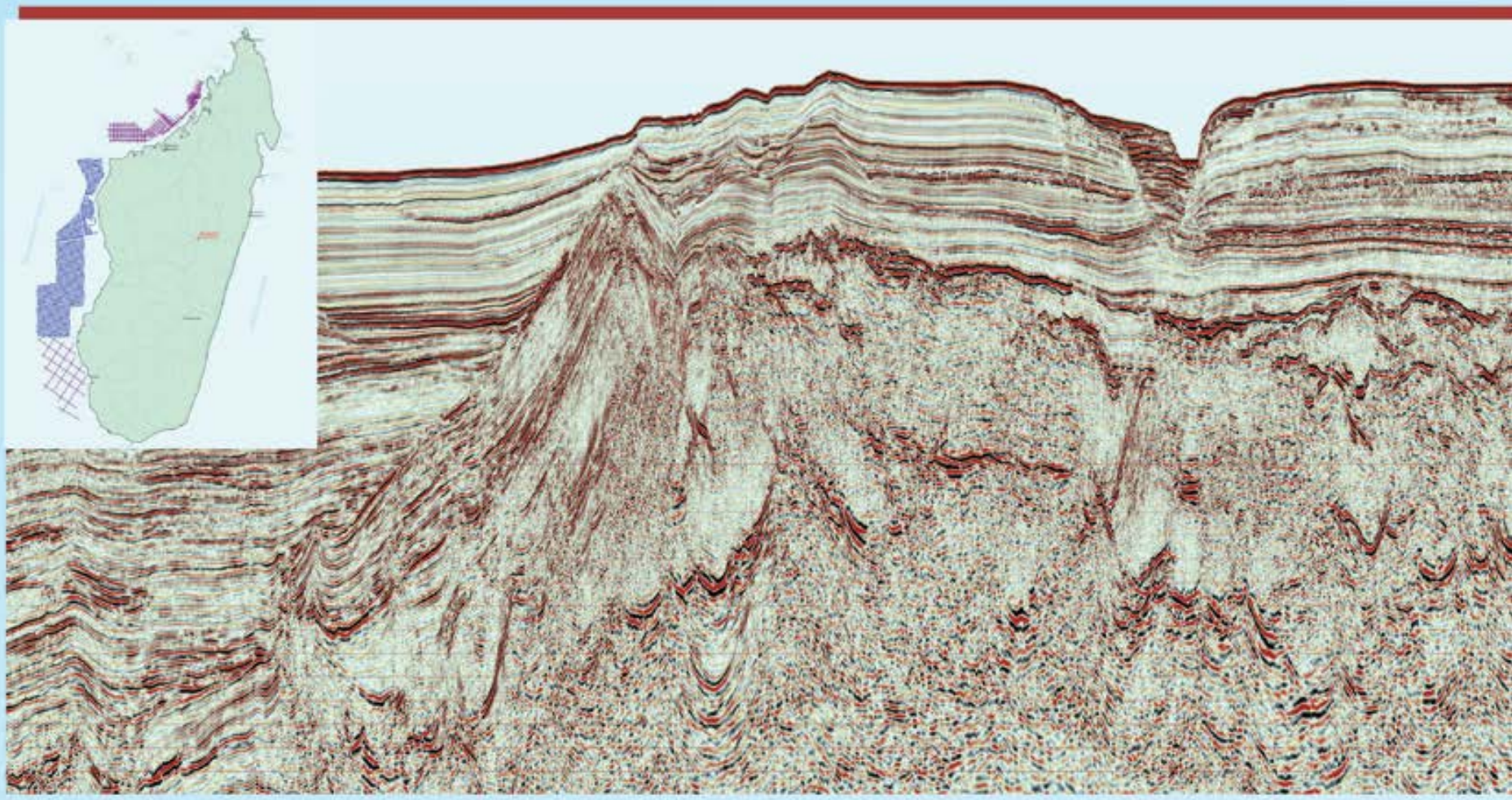
www.pgs.com

MultiClient
Marine Contract
Imaging & Engineering
Operations

PGS

BGP Multi-client Upcoming Data Set

- Libya SPAN 2D, in association with ION, ~7000 km, final deliverables: Q2, 2015
- Namibia SPAN 2D, in association with ION, ~10288 km, final deliverables: Q2, 2015
- West Australia Bilby 2D, in association with Searcher Seismic, adjacent to Phoenix Sourh-1, final deliverables will be ready in Q3, 2015
- West Australia Group Seis 2D & 3D, cooperate with Searcher Seismic, Final data set: Q3, 2015



CNPC BGP

Contact us for more information:

Tel : +86 22 6622 5013
Email: multiclient@bgp.com.cn
Fax: +86 22 6622 5058
Web: www.bgp.com.cn

BGP Marine Capability

As subsidiary of BGP, BGP Multi-client has strongly support from BGP Marine, which has worldwide capability for marine seismic data acquisition, and is able to acquire high-quality 2D, 3D, 4D and OBC marine seismic data with the state-of-the-art equipment, outstanding employees, strict HSE and organizational management.

BGP PROSPECTOR, Up to 12 * 8 km

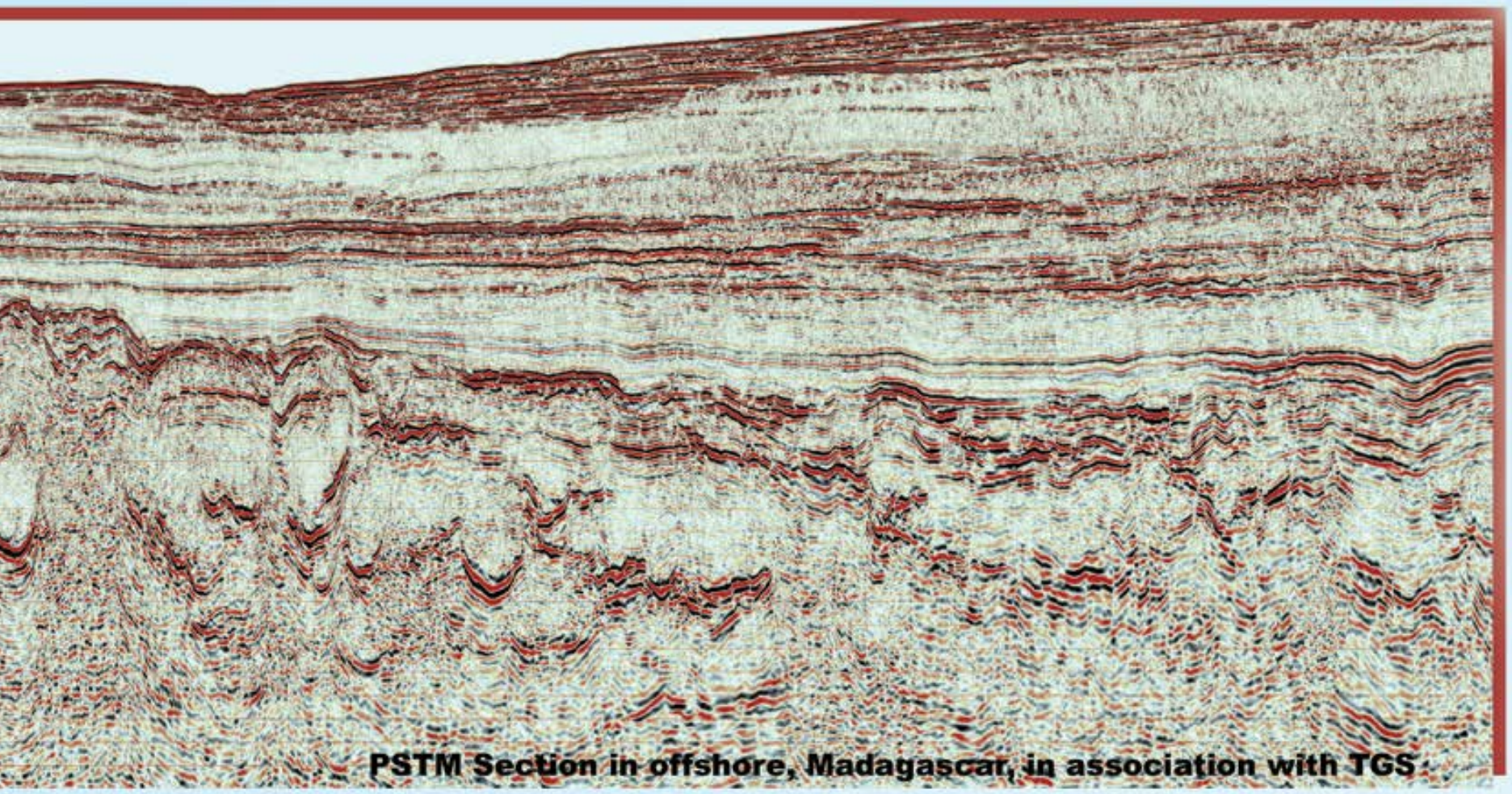
BGP PIONEER, Up to 6 * 6 km

BGP CHALLENGER, 1 * 12 km/2 * 6 km

BGP EXPLORER, 1 *12 km/2 * 8 km/3 * 6 km /4 * 4.5 km

DONG FANG KAN TAN NO.1, 1 * 12 km

DONG FANG KAN TAN NO.2, OBN



PSTM Section in offshore, Madagascar, in association with TGS

Add: 5th Floor, Building E5C1, Finance Street, 3rd Ave, TEDA, Tianjin, 300457, China

Tel: +86 22 6622 5050 Fax: +86 22 6622 5058 Email: marine@bgpintl.com

Visit us at:
AAPG ACE 2015
Booth # 439

80-90 percent of major discoveries

Deepwater Is the Future of Exploration

By DAVID BROWN, EXPLORER Correspondent

Is there a place for deepwater exploration in today's lower-oil-price environment?

The oil and gas industry had better hope so.

Most of the recent success in global exploration has been driven by deepwater finds, said AAPG member Bob Fryklund, chief upstream strategist for IHS in Houston.

"For the bulk of them up to last year, for the past five years or so, 80 percent of the major discoveries were in deep water," Fryklund said.

If you look at new basins opened for production, that number rises to 90 percent, he observed.

Fryklund will discuss the future of offshore as the speaker for the topical luncheon "Deepwater Exploration: A View Forward" on Monday, May 4 at the 2015 Offshore Technology Conference in Houston.

He'll talk about where deepwater exploration is headed, not only in terms of operations and technology, but also in terms of geography.

A dozen significant new offshore plays have appeared in areas that include east Africa, Brazil, the Barents Sea, East Coast Canada and Angola, Fryklund said. The future deepwater hunt could extend into the Mediterranean, the Atlantic, the Arctic and other places, he noted.

"Deep water is definitely not dead," he said. "It's definitely part of the future. And it's going to grow."

FRYKLUND

> **"The discoveries are in deeper and deeper water. They're in remote areas. They're in harsher conditions."**

Down Times

While Fryklund emphasized the ongoing importance of deep water to the world's exploration picture, he cited some uncertainties raised by recent trends.

"There are a couple of big questions about deep water, and about exploration" in general, he said.

One trend affecting the industry offshore over the past two years has been a shift toward smaller per-well or per-play resource numbers.

"Even though we're making a large number of these new play discoveries, they're smaller," Fryklund noted. "There's a bit of a disconnect between the number of new plays and the size of the resources."

Offshore discoveries come in cycles, and for deep water "the cycle of those from peak to trough is in the neighborhood of seven years," he noted. "We are definitely in that trough."

From a longer-term exploration perspective looking at all years since 1980, the past two-year slump in deep water has been significant, with reduced resource numbers in both liquids and natural gas, Fryklund noted.

"It's noticeably lower on the graph. One of the questions is, 'Is that the new norm?' That ties back more to the geology," he said. "Many of these offshore plays are not the mega-deltas."

A Lot of Cents

Fryklund said new geological thinking will be needed to improve the reserves-to-discoveries ratio, and that might mean considering a different type of reservoir target.

"Instead of hunting clastics all the time, maybe we should switch back to targeting carbonates," he suggested.

He mentioned Zagros carbonates in the Middle East and also carbonate play potential "in the Arctic, when you think about the Universitetskaya-1 discovery by Rosneft. And there's a lot up there in the Kara Sea."

Another question for deep water is the future effect of a nosedive in offshore seismic, Fryklund said.

"While the drilling of wells is down, the shooting of seismic has just fallen off the map, down somewhere between 50 percent and a third," he said. "The bright spot is, even before the price drop, in deep water we were overbuilt on rigs and overbuilt on seismic."

That has brought a decline in day rates for offshore rigs and portends lower deepwater exploration costs for the industry. A company's nickel should buy more as expenses come down.

Make that about six billion nickels, per well.

"You can't drill too many dry holes at $300 million, no matter how big you are," he said. "Getting better than that requires a lot of imaging, a lot of processing."

Technology also is bringing down the cost of deepwater exploration, combined with geophysical advances like wide-azimuth and full-bandwidth seismic and a climb up the learning curve that's cut some offshore drilling times by 25-30 percent.

"Another area that's helped to reduce costs," he commented, "is the automation side of things."

Much work remains to be done in offshore technology, however.

"One of the frontiers," he said, "is, 'How do we get enough power on the seafloor to

See **Frontier**, page 18

Offshore Technology Conference

Making the Impossible Possible

By HEATHER SAUCIER, EXPLORER Correspondent

Page through the 11,481 technical papers presented at each Offshore Technology Conference (OTC) since its 1969 inception, and the history of exploration and development primarily in the Gulf of Mexico unfolds in one long narrative – replete with human ingenuity, perseverance and accomplishment.

For those who have dug into the OTC archives and watched the technology of offshore drilling evolve alongside plays in increasingly deeper waters, a common theme leaps from the pages:

At some point in time, the impossible becomes possible, and science moves forward yet another step.

"It's a story about engineering challenges in an environment where one would think, 'That's just not feasible,'" said AAPG member Dan McConnell, the 2015 OTC Program Committee chairman and BDT director for the Americas at Fugro GeoConsulting Inc.

"You can see in the evolution of the technical papers how we've gone from drilling on the shelf into deep water," he said. "The cradle of invention has been in the deepwater Gulf of Mexico. You can literally see that in the OTC technical programs."

Ranking as one of the largest tradeshows in the nation – having drawn more than 76,500 exhibitors and more than 2.3 million attendees, both new and repeating – OTC has created a collaborative environment that has allowed industry players to advance their knowledge and their first steps into the depths of the Gulf and other waters.

The exhibition floor of the 1992 Offshore Technology Conference. Photos courtesy of OTC.

Begun 46 years ago in its permanent hometown of Houston by 12 engineering and scientific organizations, including the AAPG, OTC has become an avenue for sharing ideas and new technology during a period of unprecedented global demand for oil.

"It's important for people working in the industry to see the latest technology and to present the work they are doing," McConnell said. "Often you are doing something that hasn't been done before. You're solving new problems related to the extraction of oil and gas in deeper and deeper waters."

Unlike other conferences in which attendees leave with the presenters' abstracts and their own notes, OTC has provided from Day One full technical papers that are often used as foundations for academics and professionals in their own disciplines, said AAPG member Buford Pollett, chairman of the AAPG technical subcommittee for OTC and Legal and Corporate Affairs manager for ENI.

"These papers have been critical to the expertise of OTC," Pollett said.

As some have said about the conference, "No paper, no podium."

An Unfolding of Papers

Going back to year 1973, McConnell dusted off a technical paper by Ben Burke of Chevron Oil Field Research Co. discussing for the first time the feasibility of deepwater marine risers – devices used to connect subsea oil wells to surface drilling facilities.

"Since then, the design, construction and performance of deepwater marine risers has been a constant at OTC," McConnell said. "This year is no exception. There will be seven papers presented regarding their continued advancement."

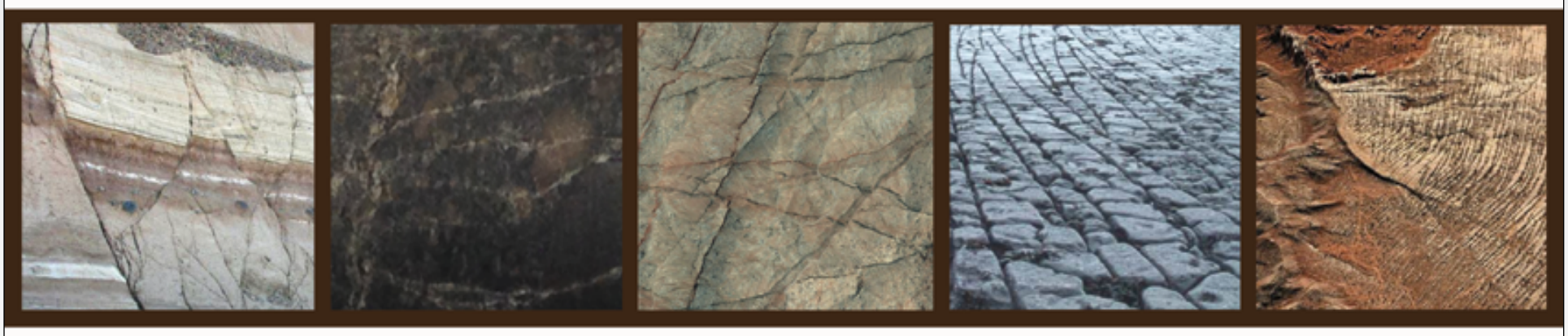
Also in 1973, a paper titled "A Simulated Dive at 2,001 Feet," by Christian Agarate and Alain Jegou, revealed the possibilities of human exploration in the deep sea.

"Two professional divers were progressively pressurized with an oxy-helium mixture to 2,001 feet, which they reached on May 24 at 1:20 a.m., where they stayed for 80 minutes before decompression," the authors wrote.

During the experiment, the divers underwent numerous physiological investigations. Although the test subjects fared well, it was ultimately determined that humans cannot work at such depths.

See **ROVs**, page 18

Applied Geoscience Conference



WESTIN MEMORIAL CITY • 945 GESSNER ROAD • HOUSTON, TX 77024

May 18th, 2015

Geomechanics in Unconventionals

Please join us for the Houston Geological Society's premier one day technical conference, focusing on geomechanical integration and advancement in the assessment of unconventional reservoirs.

The program will highlight field examples of geomechanical workflows, with sessions focusing on Unconventional Geology & Geophysics, and Integrated Workflows & Engineering Design.

Sponsorship Opportunities	Platinum[1] Sponsor $7,500	Gold Sponsors $5,000	Silver Sponsors $2,500	Bronze Sponsor $1,000
Premium booth location	✓			
Advertisement in Program Book	Full Page	1/2 Page	1/4 Page	1/8 Page
Complimentary Full Registrations	2	2		
Complimentary Vendor Booth or Technical Poster*	✓	✓	✓	
Recognition in Program Book, onsite signage, thank you in HGS Bulletin	✓	✓	✓	✓
Recognition in conference announcements and website with logo hyperlink	✓	✓	✓	✓
*Booths/Posters	Assigned on first come, first serve basis with confirmation of payment			
1	Exclusive title of Main Conference Sponsor, also included in the advertisement			

TRICAN Trican Geological Solutions · BAKER HUGHES · THUNDER EXPLORATION, INC. · devon · Global Geophysical Services

For more information please visit: www.hgs.org or contact Andrea Peoples: andrea@hgs.org

Frontier
from page 14

do the pumping and to do the separation down there?'"

'Less Room for Error'

Fryklund noted that some of the smaller companies working the Gulf of Mexico are reducing the size of the window from discovery to first oil.

Part of the improvement comes from experience, part from bringing in vendors and others earlier in the process, he said.

"In some cases, they've done (deepwater projects) three or four times now," he said. "They've built a model that's sustainable, that's repeatable."

Deepwater's success story might have been overlooked somewhat as everybody seemed to be talking about unconventional resources, and everybody seemed to focus on North America.

"Everybody had shale fever," Fryklund said.

That obscured the importance of deepwater efforts in the world's exploration picture, where challenges loom in the future.

"The discoveries are in deeper and deeper water. They're in remote areas. They're in harsher conditions," Fryklund noted.

And the industry is struggling with the after effect of a major decline in oil prices, a challenge to essential but expensive deepwater exploration programs.

In March, the U.S. Bureau of Ocean Energy Management's lease sale for the central Gulf of Mexico demonstrated the effect of significantly lower product prices on the offshore industry.

The total number of bids declined to 195, compared with 380 in the 2014 central Gulf round. The total amount of all bids was $583.2 million, compared to $1.1 billion a year earlier.

Bids were made on 169 tracts, compared to 326 in the 2014 lease sale, when 277 fever tracts were offered, the high bid total showed less of a decline but still dropped to $538.8 million from $850.8 million a year earlier.

Deepwater exploration might have an exciting long-term outlook, but its immediate future is still clouded by uncertainty over the direction of the price of oil.

"At today's prices, things are challenged," Fryklund acknowledged.

"It's getting tougher with mistakes, with cost overruns," he said. "You have less room for error."

ROVs
from page 16

As a result, the push for technology to replace the human diver began.

Fast forward to 1982 and the concept of Remotely Operated Vehicles (ROVs) makes its OTC debut in a paper titled, "Specialized Deep-Water Drilling Support Remotely Operated Vehicle," by Peter Nellessen of Oceaneering International Inc. Gathering exposure and momentum over the years, the company is one of the world's largest operators of ROVs today.

The OTC library of technical papers, which can be found at onepetro.org, is not short on industry firsts. In 1984, the concept of the tension-leg platform was introduced. In 1997, the floating Spar platform made its debut. Following that were the first subsea production systems.

And the list goes on …

"OTC," McConnell said, "through its technical program archive, really does present the technical history of the offshore oil and gas business."

More Milestones

Just as industry has recorded milestones at OTC, so has the conference itself.

Begun in the midst of a furious demand for hydrocarbons, OTC hit its first record attendance in 1982 with 108,161 people – a significant jump from the 4,200 who attended the first conference.

Last year saw 108,300 people, a testament to the amount of offshore interest and plays made possible by ever-evolving technology that has enabled industry to operate in deeper and deeper waters.

In fact, as deepwater prospects become increasingly possible, more countries are exploiting their resources and attending OTC to present their findings and learn about new technology, said Stephen Graham, OTC's executive director.

Countries not typically associated with offshore exploration in the past, such as Ghana, India, Sri Lanka, Mozambique, Tanzania and Israel, have become new to the attendance roster, Graham added.

"OTC has always been a worldwide draw," McConnell said. "Saudi Arabia has been known for its onshore operations for some time, but now they are venturing into their own waters in the Red Sea."

Ever Expanding

As offshore technology has advanced over the years, Graham said, so has the need for exhibition space. With the exception of 1984, the year that oil prices crashed and just 2,773 people – a record low – attended OTC, a prominent exhibition for new technology has been a staple at every conference.

In fact, when the NRG Center (then Reliant Center) was practically busting at the seams in the early 2000s, OTC officials came up with a way to expand the exhibit space to include the NRG Arena and use the outdoor space between the two venues an effective go-between, Graham explained.

Although OTC uses a combined space equivalent to more than 10 football fields, the event still has a waiting list of exhibitors each year.

"We're always sold out," Graham said, noting that he is expecting approximately 2,500 exhibitors this year compared to the 200 exhibitors who participated in the first conference.

While roughly 130 countries have participated in OTC over the years,

See **Educators**, page 24

AAPG Brings Cross-Discipline Appeal to OTC

By HEATHER SAUCIER, EXPLORER Correspondent

AAPG plans to hit the ground running at this year's Offshore Technical Conference (OTC).

With technical sessions designed to have cross-discipline appeal across the industry, Buford Pollett, chairman of the AAPG technical subcommittee for OTC, said this year's topics were specifically chosen to attract a broad spectrum of professionals.

"The most important part of AAPG being at OTC is the fact that traditionally, OTC has relied on the expertise of all societies. Engineers, geophysicists and geoscientists – everybody has something to bring to the table," Pollett said.

"It's our professional responsibility as geoscientists to contribute in a way that not only benefits our professional societies," he said, "but OTC at large."

AAPG's technical program extends well beyond topical discussions, Pollett added. It is technically sound in all respective disciplinary areas.

"The expertise of the people who help build these programs is unsurpassed," he said. "They are at the top of their fields in the industry."

Some of the highlights include:


POLLET

▸ "Geoscience Technology in Offshore Projects: Emphasis on Pore Pressure Prediction," will cover the direct application of geoscience technologies and analysis and is directly attributable to the overall economic and technical success of offshore oil and gas exploration and production projects.

This session will present a focused overview of this aspect of technology that involves pore pressure detection.

▸ "Well Integrity: Planning, Management and Assurance," will discuss the criticality and demands on wellheads that have increased in recent years, as drilling has moved into deep water, involved high pressure wells, and met more challenging environmental conditions. This session will present an overview of key technologies related to the design, load prediction, analysis, monitoring and operational aspects of wellhead integrity.

▸ "Advanced and Integrated Geophysical Interpretation" will give a sampling of some of the most effective recent advances in interpretation and integration of geophysical data, including seismic and electromagnetic input. These presentations will exemplify the power of emerging techniques such as principal component analysis, self-organizing maps, broad data integration, interferometry, controlled source electromagnetic probing and optimization of constraints on large inversions.

▸ "Broadband Seismic – Recent Advances, Current Pitfalls and Future Promise" will discuss how broadband seismic data collection and processing have contributed substantial improvements to the accuracy and uniqueness of seismic interpretation and inversions, both conventional velocity and impedance inversions, as well as full waveform inversion.

The presentations in this session exemplify the recent impact on automation, resolution, AVO, well-tie accuracy, reservoir characterization, velocity model building and a glimpse into future tools that may contribute much more.

▸ "Advances in Quantitative Geohazard and Georisk Assessment" will bring together geological and geotechnical practitioners and researchers to share advances in quantitative geohazard and georisk assessment that are especially relevant to challenging projects in which site conditions are difficult to characterize and there is little room for error.

A slate of speakers drawn from industry and academia will offer expertise ranging from theory to practice, with emphasis on innovative approaches to the integration of both geoscientific and geotechnical engineering concerns.

▸ "Caspian Sea Site: Integrated Geohazards Assessment" will discuss methodologies and strategies to assess geohazards in the Caspian Sea. The southern Caspian is one of the most geohazardous areas in the world in which the oil industry operates with a variety of issues superimposed atop, and interacting with, one another.

This session will provide a variety of reviews of industry findings over the past 20 years as well as state-of-the-art integrated studies of geohazard issues from ongoing operations.

▸ "Reservoir Evaluation and Reservoir Management" will showcase a series of papers from industry and academia that demonstrate how a multidisciplinary approach is critical in optimizing field development in which various complementary and analytical methods are required.

This session will highlight innovative approaches to reservoir evaluation and management.

10TH ANNUAL

Fundamentals Education Conference

HOUSTON, TEXAS
NOVEMBER 9-13, 2015

Courses Include:

- Subsurface Contouring: The Secrets to Optimizing Your Maps for Oil & Gas Exploration
- Concepts, Models and Case Studies of Dolomitization, with Applications to Hydrocarbon Exploration and Development
- The Petroleum System: An Investigative Method to Explore for Conventional and Unconventional Hydrocarbons
- Fundamentals of Siliciclastic Sequence Stratigraphy
- Rock/Fluid Interactions and Natural Fracture Development and Alteration
- RQ Toolkit: Using Rock Data for Reservoir Quality Assessment
- Reservoir Engineering for Petroleum Geologists
- Quick Guide to Carbonate Well Log Analysis
- Clay Minerals in Reservoir Evaluation
- Risk Reduction for Plays & Prospects Using Quantitative Show

Hosted by:

Norris Conference Center
816 Town & Country Lane, Suite 210
Houston, TX 77024

Phone: 713-590-0950
Fax: 713-590-0961

Registration and Information
Call AAPG toll free in the U.S. and Canada at 888.338.3387 or 918.560.2650
F: 918.560.2678 • E: educate@aapg.org
W: www.aapg.org/career/training/in-person/education-conference

AAPG | Fundamentals Education Conference 2015
November 9-13, 2015 - Houston, Texas

Upcoming Education Courses

2015 Courses:

LAST CHANCE

Basic Well Log Analysis	**April 20-24, 2015** Austin, TX
Petrophysical Analysis and Integrated Approach to Carbonate Reservoirs	**April 21-23, 2015** Austin, TX
E-Symposium: An Analytical Model for Shale Gas Permeability	**April 23, 2015** 2:00 pm CDT, Online
Modern Terrigenous Clastic Depositional Systems Field Seminar	**April 29 - May 6, 2015** S. Carolina
Sequence Stratigraphic Facies Architecture & ReservoirCharacterization of Fluvial, Deltaic and Strand-Plain Deposits Field Seminar	**May 1-8, 2015** Utah

SHORT COURSES

Basic Well Log Analysis	**July 13-17, 2015** Golden, CO
Assessment, Forecasting and Decision-Making in Unconventional Resource Plays (with URTeC meeting)	**July 18-19, 2015** San Antonio, TX
Geomechanics for Completion Optimization in Unconventionals (with URTeC meeting)	**July 18, 2015** San Antonio, TX
Introductory Geochemistry for Condensate-Rich Shales and Tight Oil (with URTeC meeting)	**July 19, 2015** San Antonio, TX
Fractured Reservoir: From Geologic Concepts to Reservoir Models	**August 24-28, 2015** Casper, Wyoming

FIELD SEMINARS

Fractures, Folds and Faults in Thrusted Terrains	**July 13-18, 2015** Montana
Seismic Interpretation in Fold- and Thrust-Belts	**July 19-25, 2015** Canada
Geology in Montana Along the Missouri River: Canoeing with Lewis & Clark	**August 17-21, 2015** Montana
Devonian Reef Facies Models, HydrothermalDolomitization, and Tight-Carbonate Reservoir Analogues	**August 31-September 4, 2015** Canada

www.aapg.org/career/training/

AAPG Education

Grover E. Murray Award

A Course in 'Childlike Wonderment'

By BARRY FRIEDMAN, EXPLORER Correspondent

"I never saw teaching as anything but a priority and a privilege."

You would expect AAPG member Victor Paul Wright, one of this year's AAPG Grover E. Murray Memorial Distinguished Educator Award winners, to say that, to take the teaching of geology seriously – it comes with the territory.

WRIGHT

What's fascinating about Wright, though, who is professor emeritus of Earth Science at Cardiff University in Wales, is how personally he takes both the challenges and the disappointments.

"My opening sentence to my first year classes in Paleo was, 'If you find the history of life on Earth boring then it is my fault, not yours.'"

If Wright's name sounds familiar, it should. Along with Maurice Tucker, he co-authored the 1990 book "Carbonate Sedimentology," a bible of sorts to many in the industry and academia – but a bible from which, somewhat surprisingly, he no longer worships.

"I never thought it would still be selling well today," he said.

At the time, it was the first major review of the subject since the 1970s.

"It went from a postgraduate reference book to more of an undergraduate textbook as the discipline progressed, and I am disappointed no one has attempted the task of a new book," he said. "The problem is that the subject has, of course, moved on so quickly that a similar book would now require a large team."

Photos courtesy of Paul Wright

Wright (right) with Rick Sarg of the Colorado School of Mines standing on a pavement of microbial bioherms at Bridger Bay, Great Salt Lake, Utah.

To underscore just how much that's needed – when asked how the book fits into his curriculum today, he is succinct.

"I no longer use it."

Yesterday and Today

A man who eschews his own work has a special affinity for his profession – and a unique modesty of his own place in the scheme of it all.

He can still pinpoint when the connection with earth science seemed right.

"I have been lucky to never lose the sense of wonderment I felt when I found my first fossils – 27 October, 1968, a Sunday afternoon," he said, "and I get that feeling whether looking at the Gooseneck incised meanders on the San Juan River, or seeing the beautiful textures in thin sections from the Santos Basin Pre-Salt."

Former students and colleagues talk about his ease in the classroom, how approachable he is, how his mind is almost encyclopedic.

But Wright, who recently retired, feels fortunate just to have done it – even to this day.

"When in the Houston Museum of Natural Science last April, just after the ACE, I was as much awed by the dinosaurs on display there as I was when I first learned about them as a child," he said. "Some would think that very naïve, but I think never losing that childlike – *not childish* – sense is being lucky."

Wright credits his early education for his successful career – an education he now says students are not getting – something about which he's passionate.

And he wants this award to draw attention to what he considers is a crack in the geologic academic fault line.

"The changes to larger classes and in the levels of resourcing for teaching have created huge pressures on core skills training. It is this decline in providing such

Continued on next page

Continued from previous page

skills that I see as the biggest change."

And the results have immediate and lasting effects.

"I am most concerned about the decline in the skills base of many young geologists – of course I have to be as objective as possible as there is a tendency to think that "standards are falling" as simply a generational problem, unfounded or not.

"However, I think there is a widespread feeling that there is a skills deficit now in the UK," he said – adding that the deficit can be felt globally.

"And this matters to the industry," he continued, "because even if geoscientists do not need to collect the data they manipulate, they do need to understand how it is collected and the limits on its interpretation."

Specifically, he worries about the increased demands for frequent student assessments, which he said takes up valuable time and motivates students for the quick means of completing assignments; the trend who see "geology as a non-existent subject" with the appointment of non-geologists to earth science departments; the focus on research versus actual teaching; the larger and larger sizes of graduate classes; and, ultimately, the final examinations that lack little if any direct tests on skills, instead focusing on testing memory.

His experience was different, better.

"I graduated from a class of less than 30 students and often had lab classes where there were less than 10 of us," he recalled. "Teaching was intense, and we left the university with a strong set of skills."

Wright (in the blue hat) speaks to a group of Brazilian geologists at Bridger Bay.

Thanks for the Memories

Wright, who has more than 130 peer-reviewed articles to his credit, knows he wouldn't be receiving this award, wouldn't be where he is today, without the help of many from those days, particularly some professors at Bristol University.

"Brian Williams showed me that enthusiasm was infectious and how important it was to be approachable to students," he said. "David Speedyman demonstrated the importance of a clear structure to a lecture and to make sure that the students were provided with the clearest notes possible.

"And the late Bob Savage," he said, "had a gift for turning a dull practical for final year students into an event by getting the students to discuss ideas."

He wants that type of mentorship to return.

"We urgently need to wean the younger generation of graduates away from seeing geology as something that is solely done at the screen-scale and back to appreciating the spatial reality and complexity of geological problems," he said.

"We need to ensure our students have the numeracy skills they need to move the science forward, both in academic research and in industry, especially more appreciation of statistical techniques," he added. "We need to better use new technology, and not as a substitute for engaging with geological materials or fieldwork."

But then a word of caution.

"Science is done by people, and people are not always objective and young scientists need to be aware of this," he said.

Finally, Wright said that successful teachers, in any field, never underestimate their students.

Students will thank those who do – sort of.

"I remember one student saying to me, 'We don't like your lectures. You make us think.'"

The 1971 Offshore Technology Conference's exhibition floor.

Educators
from page 18

attendance has grown so that additional conferences under the OTC umbrella have been created in a global outreach of sorts, said Dana Otillio, senior marketing manager for OTC.

In 2011, OTC Brasil and the Arctic Technology Conference made their debuts in areas where offshore activity has piqued much interest. Then, in 2014, OTC Asia was introduced.

As the conference has become a growing source for educators, particularly those who teach science, technology, engineering and mathematics (STEM subjects), OTC executives added the Energy Education Institute to its program in 2007. The full-day workshop for Houston-area science teachers provides energy-related topics that can be taken back to the classroom as well as hands-on energy lessons from the National Energy Education Development project, Otillio said.

Technical Agenda

Priding themselves on their history of putting on an interdisciplinary conference, OTC organizers design its technical programs through the collaborative input of scientists from a broad range of backgrounds, including geology, engineering and geophysics, Pollett said.

"It's a sense of collaboration and not competition," he said. "We all work to find topics that many people are interested in. If it's not collaborative, it's not successful."

For example, this year's AAPG technical program includes sessions on reservoir evaluation and management, put together in conjunction with the Society of Exploration Geophysicists and the Society of Professional Engineers.

"It will be conducted in a setting that offers many different perspectives rather than the perspective from your own particular specialty," Pollett explained.

Another session, titled "Advances in Quantitative Geohazard and Georisk Assessment," also was put together from a collaborative point of view, appealing to geologists, petroleum engineers, naval architects and others who develop offshore facilities, Pollett said.

Not only are technical sessions developed in the truest sense of sharing, so are the exhibits.

"Those who created OTC really brought clients and contractors together in a way that they could understand and share technology that in other instances they might not have wanted to share," Pollett added. "But people have been willing to share their technology. They are giving enough of a taste of the technology yet not disclosing any trade secrets."

Rounding 'Em Up

Over the years, a key factor in the success of OTC has been the desire of all participants to congregate in one place: to learn, to share and to network.

"OTC has become a polyglot of people from around the world," McConnell said.

"Every year, it's like a reunion of sorts," Graham added. "Networking has always been ranked highly on our surveys."

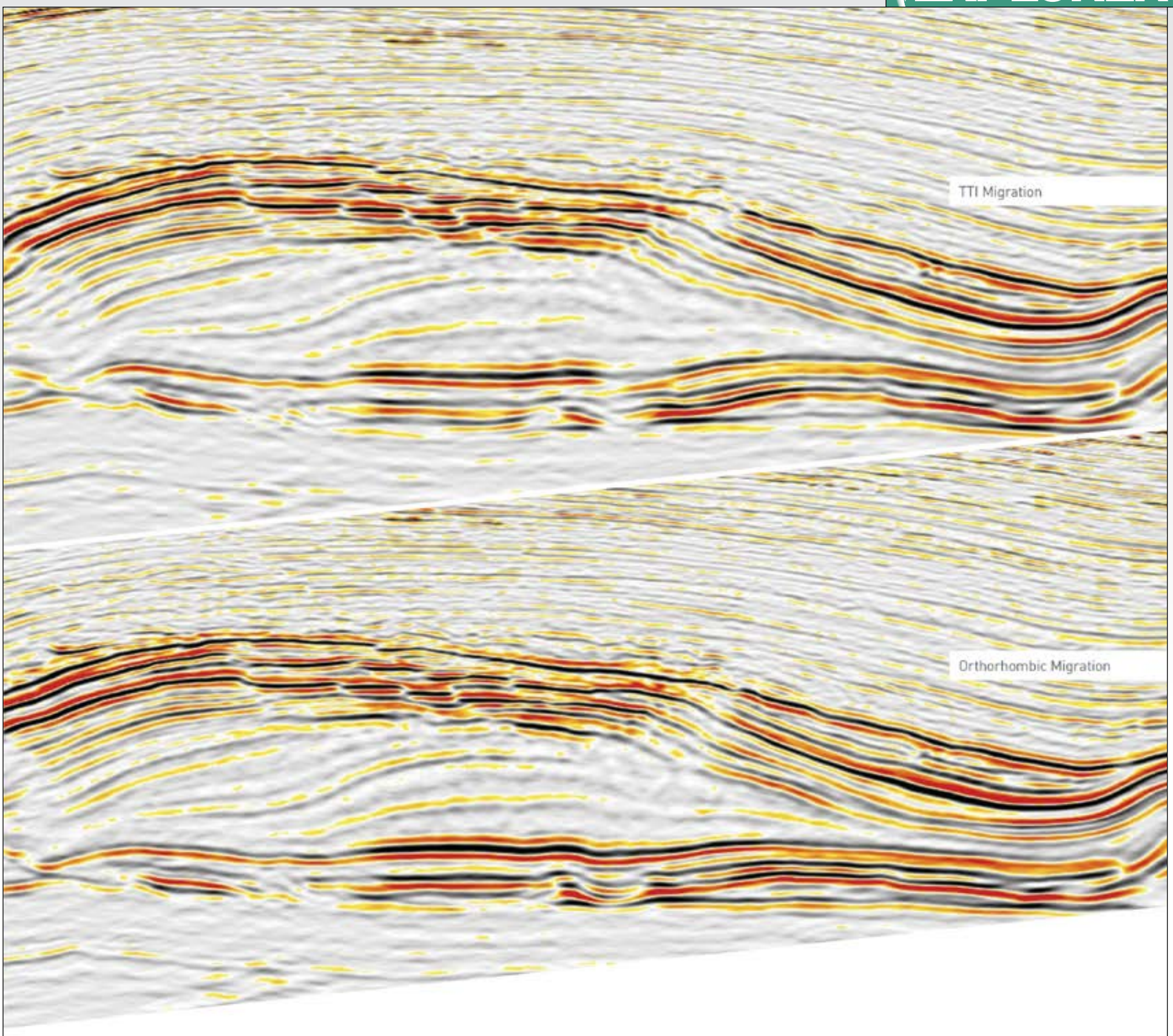
After the Macondo incident in April 2010, OTC became a gathering point for local and national media as well. Knowing the world's offshore experts who represented every facet of the industry were gathered at the NRG Center, reporters planted themselves at the venue for answers, sound bites and quotes.

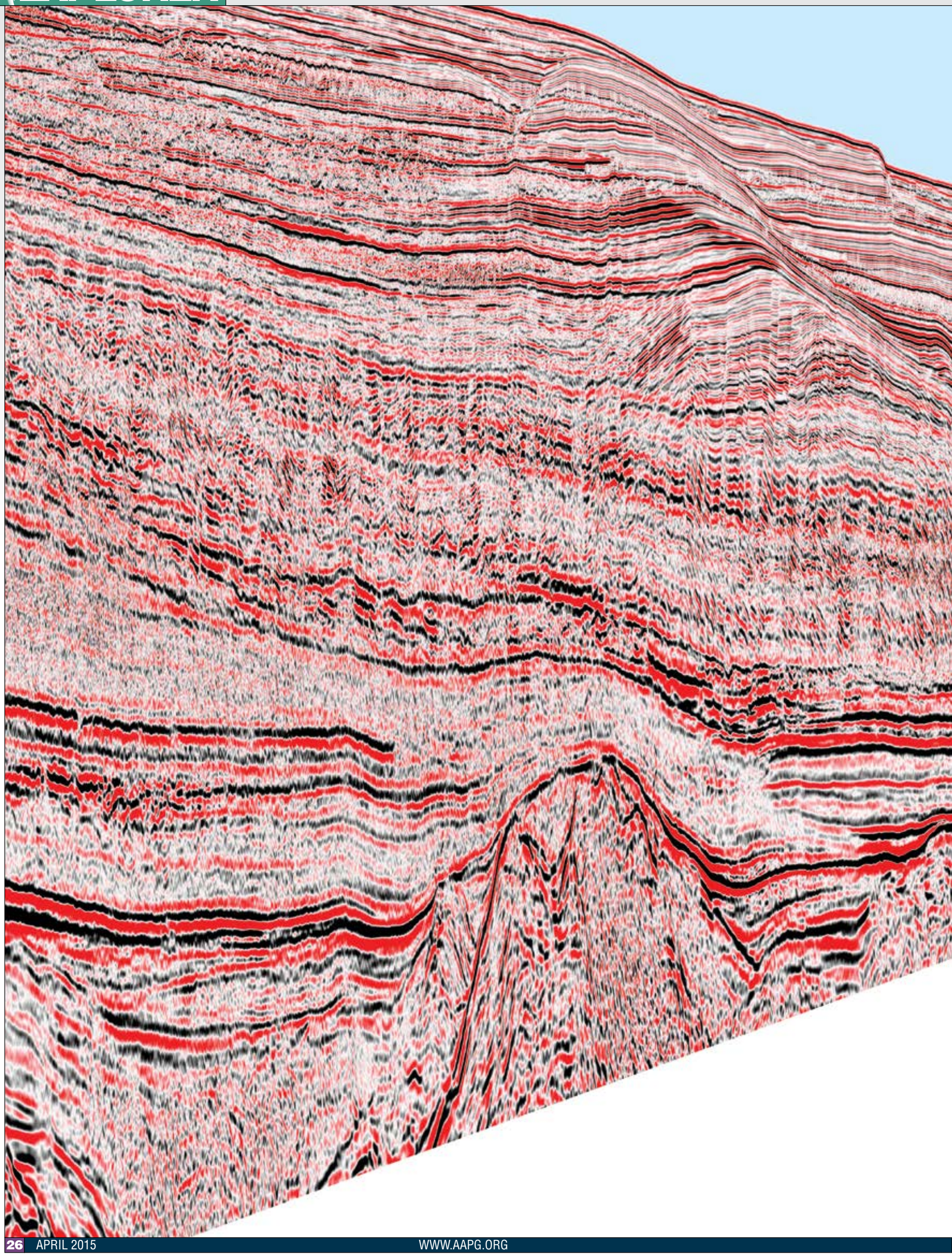
OTC officials played the opportunity wisely, using the limelight to inform the press about best practices of offshore well design and drilling, and putting into perspective loss of well control versus successful operations, Graham said.

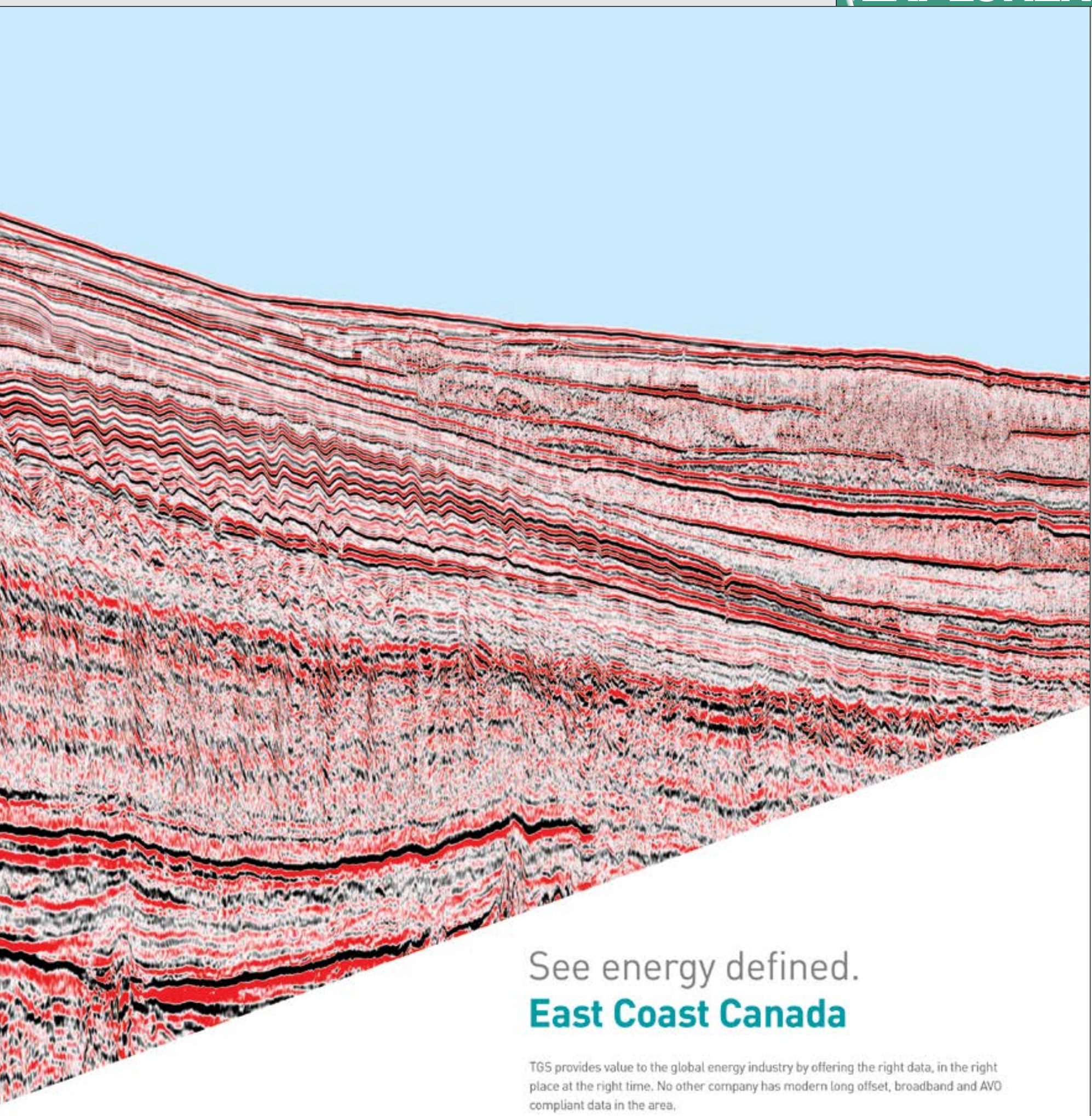
While 2014 set a record with the greatest OTC attendance, it is not likely that 2015 will set another. As Graham and others frankly point out, attendance has typically mirrored the price of oil, and it's no secret that 2015 has started out as a down year.

Nevertheless, as deepwater exploration becomes more feasible and pervasive worldwide, the draw to OTC remains magnetic. This year, OTC received 1,313 paper proposals, the highest in the event's history. OTC's story continues to unfold.

And, as McConnell said, "People are still creating the future."







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

Yemen: The Final Frontier

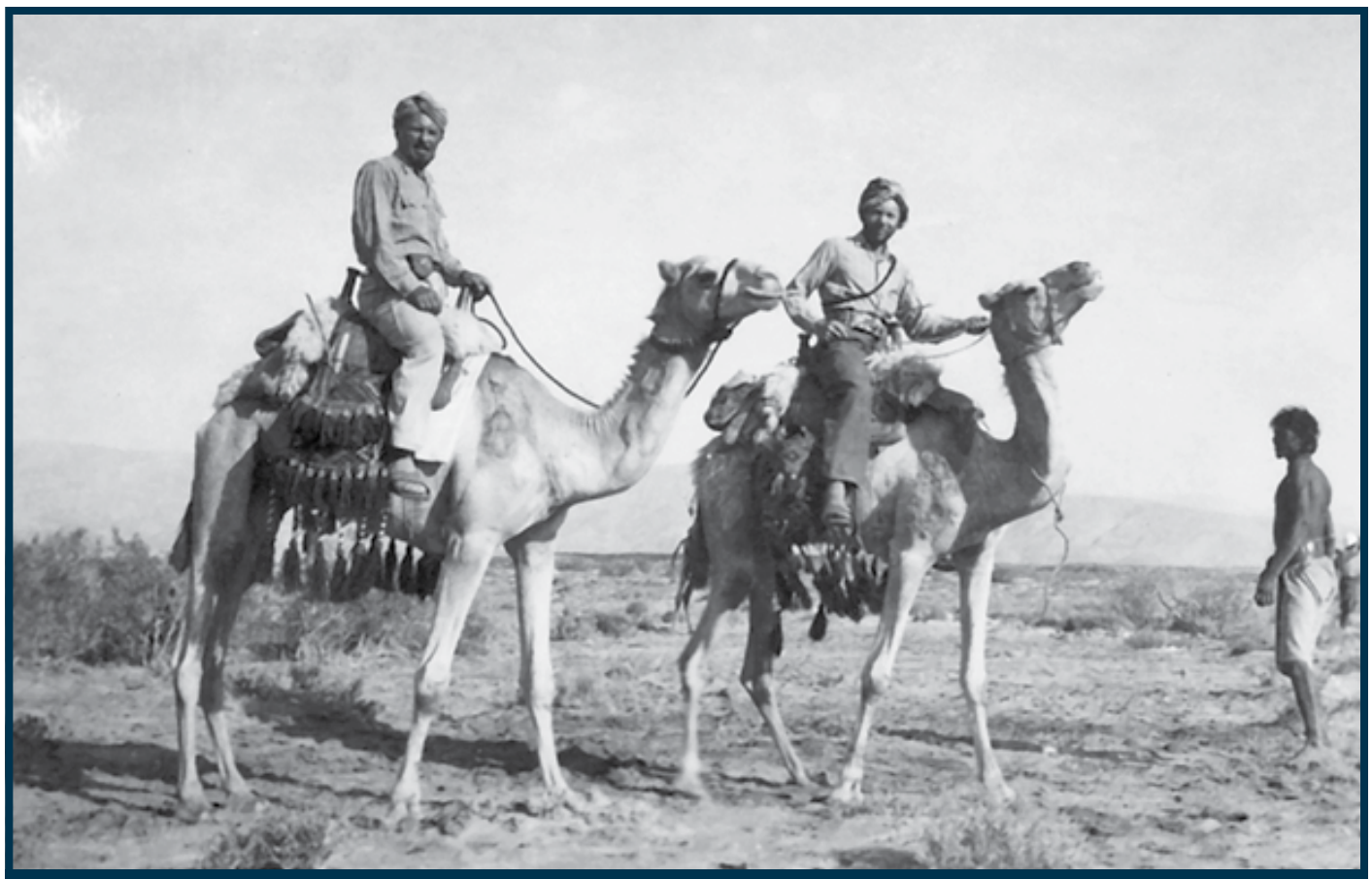
By MICHAEL QUENTIN MORTON

Although Yemen is a single country today, it once consisted of three separate political entities.

There was Yemen proper, an ancient country once under Turkish rule that became an independent country and was ruled by a succession of imams after the collapse of the Ottoman Empire in 1918.

The second element was the colony of Aden, established by the British in 1837 as a coaling station for the London-to-India route via Suez. Aden also would become an important military base until the British withdrew in 1967.

The third element was the southeastern hinterland known as the Aden Protectorate, a loose conglomeration of small emirates.



Geologists René Wetzel and Mike Morton during their expedition to Mahra country, 1947. Photo courtesy of D.M. Morton.

'There Is No Oil in Arabia'

The territory's first geological survey took place aboard the HMS Palinurus in 1862, when Henry Carter of the Geological Survey of India made a series of observations of the coastline; but the region was rarely visited and was considered as a poor oil prospect in the first decades of the twentieth century.

Indeed, geologists were pessimistic about finding oil anywhere on the Arabian Peninsula, leading a Shell geologist to remark, "there is no oil in Arabia."

In comparison with Iraq and Iran, Arabia had few oil seepages and its geology did not appear to reflect the oil-bearing structures of those oil-rich countries. And yet in 1921 rumors of oil seepages in Yemen led the British officials to report that there was evidence of petroleum at several points in the interior of the country.

Among those who believed that the region was worth investigating, the Qu'aiti Sultan of Mukalla and Ash Shihr on the southern coast showed a keen interest.

This resulted in surveys around the port of Al-Mukalla – in 1918, geologists Beeby Thomson and John Ball reported on coal and oil "prospects," and in the following year Dr. O.H. Little of the Geological Survey of Egypt described the stratigraphic and paleontological features of the area.

Indeed, even Shell discussed a concession for Ash Shihr, only for their partners in the Turkish Petroleum Co. (the forerunner of IPC) to rule it out.

Attitudes changed in 1932, when BAPCO struck oil on Bahrain Island and Standard Oil of California acquired the oil concession for eastern Arabia a year later. A British-led consortium, the Iraq Petroleum Company (IPC), took an interest in Qatar, the Trucial Coast (today's UAE), Oman and Yemen as part of an overall strategy to pre-empt American oil companies from obtaining concessions themselves.

In 1936 an associate company of IPC, Petroleum Concessions Ltd., obtained an exploration permit for the Aden Protectorates.

In 1937, an IPC survey party working in neighboring Saudi Arabia obtained the imam's permission to survey to the north of Hodeida, but the results were unpromising.

In1938, geologists Pike and Wofford conducted aerial surveys for PCL. They also did some structural mapping of the Hadhramaut and around Al-Mukalla – but otherwise, tribal disturbances prevented full access to the territory.

Sultans, Siyarra and Surveys

The geographical challenges faced by the early geologists were formidable.

Yemen itself is largely a mountainous country, edging the great sand desert of the Rub al-Khali and fringed by the Red Sea and the Arabian Sea. It also includes a number of islands, of which Socotra is the largest.

From a modern satellite picture, the most prominent feature visible is the Hadhramaut, a deep and wide river valley that was of immediate interest to geologists because they could easily access the rock formations that were exposed in its flanks.

In the early days of exploration, geologists had to rely on local transport (in other words, camels) to visit the remoter areas.

Local tribesmen provided security in the form of the siyarra system, whereby a tribe would provide a token number of escorts to guarantee safe passage through their tribal lands. To pay for this service, the geologists would use Maria Theresa dollars – a silver coin minted in Arabia that was derived from the eighteenth century Austrian thaler and used as a form of local currency well into the modern age.

In 1947, two IPC geologists – D.M. "Mike" Morton and René Wetzel – plus a doctor and wireless operator arrived in Aden with liaison officer Maj. Tony "Tadeus" Altounyan, who acted as interpreter and guide. They travelled in a wide circle through the heart of Mahra country before returning to the coast along the Wadi Masila.

Geological mapping was based on astro-fixes, and plane table mapping and rangefinders were used. The task was to gain enough knowledge of the stratigraphy and structure of the area in order to evaluate the local oil possibilities, and to form a broader view of conditions in the region as a whole.

They carried out detailed studies of the stratigraphy, which was accessed along the sides of deeply cut gorges and coastal cliffs. Their work would provide a valuable foundation for future investigations.

MORTON

Editor's note: Quentin Morton grew up in Qatar, Bahrain and Abu Dhabi in the1950s 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 the1950s. His father, D.M. "Mike" Morton, was an exploration geologist with the Iraq Petroleum Co. Morton previously wrote for Historical Highlights in February 2014, "A Gusher at Baba Gurgur."

'The Closer the Bullets …'

In late 1949, the appearance of an IPC survey party in the western protectorate triggered great excitement in neighboring Yemen.

News of the party's arrival quickly spread – and a Yemeni radio station announced that a Nasrani invasion was under way.

In the field, driving along the dusty camel tracks, the geologists – isolated from the diplomatic storm that was gathering over the border – could do little more than tap the rocks and hope for the best.

They visited Shabwa and arrived at Beihan al-Qasab in November. Here they were met by the traditional *feu de joie* when rifles were fired in the air in welcome.

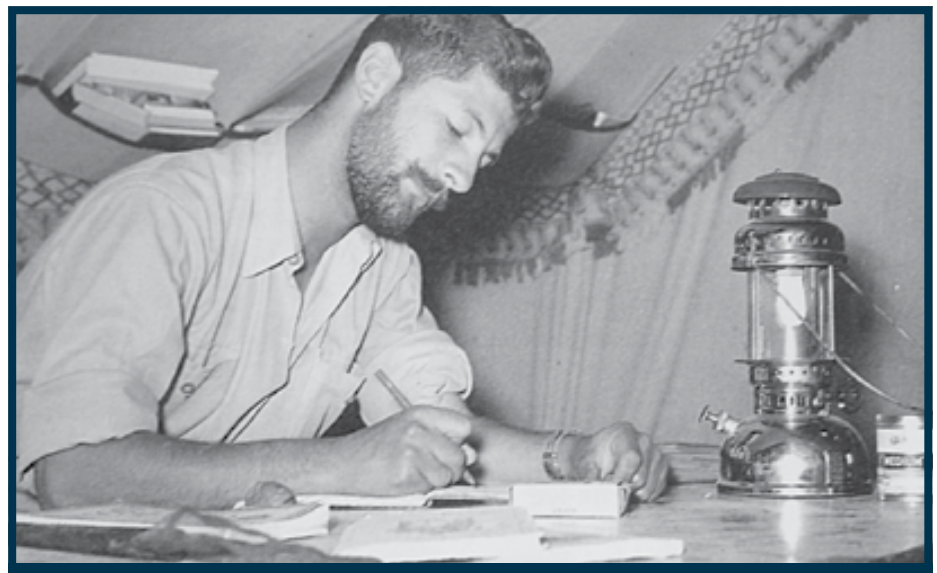
"The closer the bullets, the greater the affection," observed one of the geologists.

Perhaps encouraged by stories of oil wealth emanating from Saudi Arabia, the Emir of Beihan and his entourage took a close interest in the geologists' work, accompanying them on their outings.

However, Beihan's granite surroundings did not offer an extensive work program and, after a brief tour, the survey party

Continued on next page

René Wetzel (right) with a guard, range finder and plane table. Photo courtesy of D.M. Morton.



Ziad "Don" Beydoun at his desk in the desert with the necessities of exploration: a Tilley lamp, Players' Navy Cut cigarettes and asprin. Photo courtesy IPC Newsletter.

Continued from previous page

visited a salt mine at Leyadim. Here they witnessed an activity that dated back to ancient times: workers chipping away lumps of salt from the rock face and packing them into bags for camel caravans to transport elsewhere.

The geologists also visited a reporteded oil seepage exposed by an RAF bombing mission against the tribes the previous year. A salt mine hit by a bomb had given off an unpleasant and persistent smell, which the British authorities thought might have been a "gusher" of oil, but the geologists dismissed it as oil prospect.

In fact, the hinterland generally lacked enough rock exposures to justify further geological work, yet left open the possibility of geophysical surveys around the northern border.

Although the imam across the border in Yemen continued to denounce the foreign "incursion," IPC carried on investigating the Aden Protectorate for several more years.

In 1953, Mike Morton established a geological base near the Bedouin well at Thamud. Ziad Beydoun led a series of geological surveys, which were complemented by geophysical surveys. Between 1953 and 1959, there were four seasons of gravity surveys and an airborne magnetometer survey, followed by a short seismic survey in April 1960.

Beydoun achieved many things – as well as conducting a one-man survey of Socotra, he wrote extensively about the geology of southwestern Arabia. In 1968, he co-authored a special report in which the geological nomenclature of the region was formalized. In 1994 the Geological Society of London awarded him the William Smith Medal for his "outstanding achievement in petroleum geology."

He remarked light-heartedly that it was good to receive the award while he was still alive.

Also in recognition of his achievements, the AAPG created the Ziad Beydoun Memorial Award in his honor, presented annually to the author(s) of the best AAPG poster session paper presented at the AAPG International Conference and Exhibition.

Abandoned in the Sands

This was a time when borders – and therefore, concession areas – were ill defined, and this could and did lead to misunderstandings.

There were rumors of Aramco survey parties pressing further south in the Rub al-Khali towards the Aden Protectorate. In October 1955, a patrol of Arab levies led by a British officer challenged an Aramco party, claiming it was trespassing. After a brief contretemps, the party abandoned its camp and left its mobile rigs in the desert.

The equipment remained in situ for many years and provided a popular tourist attraction for visiting IPC geologists.

And the episode also had a humanitarian aspect – an abandoned bulldozer from the camp later found its way to the Hadhramaut Valley for use in irrigation projects there.

Although IPC geologists laid the foundations for later exploration, the company's search for oil in southwest Arabia was ultimately fruitless.

In 1960 the company relinquished its

See **First Steps**, page 31

Arctic Technology Conference

Shining the Spotlight on Oil Spill Prevention

By HEATHER SAUCIER, EXPLORER Correspondent

It's understandable that oil spills attract a glut of media attention when they occur. After all, images of oil gushing from drill pipes and oozing across the sea are practically, and sadly, made for the cameras.

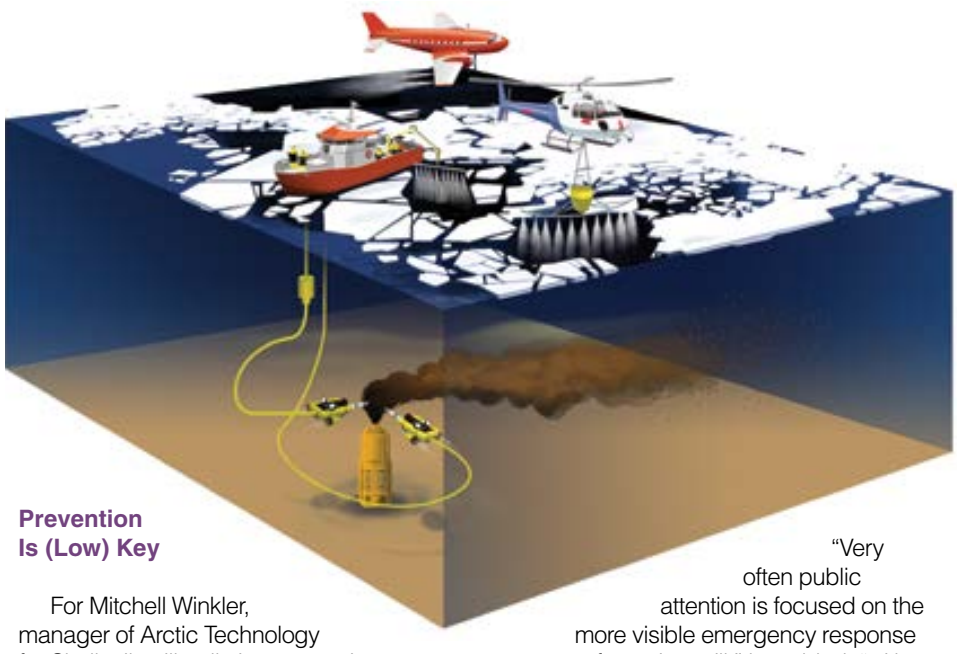

WINKLER

Yet the behind-the-scenes efforts to prevent and respond to spills in increasingly effective ways receive little attention on the international stage.

And here, perhaps, is where the truly riveting stories lie.

As more offshore areas become open to exploration – largely as a result of government policies – highly vulnerable areas such as the Arctic have prompted operators to band together and tailor traditional oil spill prevention and recovery methods to more hostile environments as well as develop new methods.

Battling sea ice, cold temperatures, darkness and remote locations, they have their work cut out for them. But along the way they have learned that while an oil spill in the Arctic would be detrimental to some of the most diverse species of marine mammals in the world, certain aspects of the Arctic environment can actually make a recovery operation more feasible.



Prevention Is (Low) Key

For Mitchell Winkler, manager of Arctic Technology for Shell, oil spill pollution prevention is an area that deserves more of the spotlight.

Winkler presented some of the industry's latest oil spill prevention and recovery methods at the Arctic Technology Conference in Copenhagen, Denmark, in March.

"Incident prevention is one of the primary priorities of oil and gas operators through exploration and production. But effectiveness of prevention is hard to show other than through the use of statistics, which are not always intuitive," Winkler said.

"Very often public attention is focused on the more visible emergency response aspects of a major spill," he added, "without consideration of the risk-based approach the industry takes to ensure that the likelihood of such an event is very low."

While incidents such as the Macondo blowout in the Gulf of Mexico and the Montara oil spill in the Timor Sea stand out in most people's minds, few realize the industry successfully drills approximately 80,000 onshore and offshore wells every year without much ado.

This, in large part, is the result of all operators' desire to avoid oil spills and to collaborate with each other to do so.

"The oil and gas industry does not compete when it comes to health, safety and the environment," Winkler said.

All adhere to best practices, which include:

- Safe and reliable drilling equipment, including rig and support vessels.
- Primary controls and barriers, including mud, casing and cement.
- Monitoring by competent and trained individuals.
- Secondary controls and barriers, including blowout preventers.

On the recovery side, best practices include:

- Source control measures, including capping stacks and subsea isolation devices.
- Oil spill response plans.

Arctic Application

Exploring in the Arctic is really no different than any other place in the world in terms of commitment to prevention and preparedness for response, Winkler said.

"However, specific Arctic challenges can significantly affect equipment selection and logistics," he said. "In some cases, Arctic-specific controls and barriers may be required to supplement the best practice offshore well design."

See **Challenges**, page 32

First Steps
from page 29

concession areas. The low price of crude oil had made exploration of peripheral areas less attractive, and the IPC partners had decided to develop their interests elsewhere in the Middle East.

The two American partners had joined Aramco in Saudi Arabia, and IPC itself was on the verge of finding oil in Abu Dhabi.

The Discovery of Oil

By the mid 1960s, with the Trucial Coast and Oman producing oil, Yemen became the final frontier of Arabian oil exploration.

In time, exploration would reveal the existence of some deep localized rift-related Jurassic basins linked to the breakup of the Gondwana supercontinent. The associated restricted basinal conditions had produced good quality oil source rock that was buried deeply enough to generate hydrocarbons, which in turn had migrated into accessible reservoir rocks.

Younger Tertiary rifts in the Gulf of Suez also proved of interest to geologists, as did the NW-SE trending grabens that continue to the coast and across the rifted Gulf of Aden to northern Somalia, thus providing a geological link between Arabia and Africa.

The search for these hydrocarbons was a lengthy one.

In 1961, amid much local excitement, the Mecom group spudded in a wildcat well at Salif, a coastal town north of Hodeida. In 1964, Pan American (Amoco) drilled a number of dry holes in the Aden Protectorate.

In the later 1970s, Shell carried out a drilling program along the Red Sea shore. Algerian and Russian groups also showed an interest, with the latter making some promising findings in the Shabwa area.

In 1982, the Italian firm Agip made a marginal offshore discovery some 170 kilometers ENE of Mukalla. But, in the event, none of these efforts uncovered oil on a commercial scale.

The breakthrough came in the early 1980s, after Hunt Oil had instituted a seismic program. This was at the instigation of Syrian geophysicist Moujib al-Malazi, and predicated on aeromagnetic indications of a rift in the northeastern part of North Yemen.

Field indications of Jurassic instability, together with the presence of petroliferous shales, added significantly to the area's attraction.

Based on al-Malazi's analysis of the seismic data, four prospects were drilled in the Ma'rib-Al Jawf Basin in 1984. Hydrocarbons were found in well-developed sands below a salt formation in three of those prospects.

The Alif No. 1 well tested at 7,800 bopd – the first discovery of commercial oil.

Since Beydoun's outcrop studies had described Jurassic outcrops on the western flank of the Al-Mukalla high, there was a good possibility that the Jurassic rifting extended farther to the east. This prompted CanadianOxy and its original partner, Consolidated Contractors International, to acquire the 37,200-square-kilometer Masila Block.

In 1991, the existence of a second petroleum basin, the Masila-Jeza basin, was confirmed when CanadianOxy struck oil at Sunah No. 1.

This was soon followed by more discoveries at Heijah, Camaal and Hemiar.

Postscript

Yemen had proven oil reserves of around three billion barrels as of Jan. 1, 2014, and petroleum accounted for roughly 25 percent of GDP and 63 percent of government revenue.

However, the country's infrastructure – particularly its pipelines – has suffered from sabotage, leading to serious interruptions to the flow of oil.

Piracy has curtailed offshore activity.

The U.S. Energy Information Administration estimates that Yemen's crude oil production has dropped from a high of 440,000 bbl/d in 2001 to about 100,000 bbl/d in March 2014.

With a difficult political situation – and little prospect of stability in the near term – the immediate future of the oil exploration in the country looks uncertain.

(Editor's note: The author would like to thank Peter Morton and Ian Maycock "for their kind assistance.")

Production test at Alif No. 2, in September 1984. Photo courtesy Ian Maycock.

The Arctic Slope Regional Corp.'s region of operation. Graphic courtesy of ASRC.

Challenges
from page 30

(It has been widely reported that Shell has had to alter its exploration plans in the Chukchi Sea after a lawsuit filed by concerned environmental groups against the U.S. Department of the Interior resulted in a supplementary environmental impact statement from the U.S. Bureau of Ocean Energy Management.)


GLENN

If not properly addressed, sea ice features pose one of the greatest dangers when it comes to Arctic exploration, Winkler said. While moving surface ice can damage exploratory wells not protected by fixed platforms, ice keels, which can be 30- to 100-feet deep, also pose a threat to critical parts of the well, including the wellhead and blowout preventers.

To avoid sea ice-related risks, exploration is often conducted during open water seasons. If ice incursions are a threat, they are appropriately planned for, Winkler said. Surface detection, forecasting and taking protective measures for critical parts of the well are methods used to keep drilling rigs safe.

Production wells, on the other hand, are designed for year-round operation.

"As the Arctic environment grows warmer, sea ice actually becomes more dynamic as overall ice cover in the area is reduced," explained Richard Glenn, a geologist and vice president of Lands and Natural Resources for the Arctic Slope Regional Corp. (ASRC), established in 1972 to manage native Alaskans' lands and resources.

Ironically, more icebreakers are needed to facilitate vessel mobility in the Arctic Ocean, Glenn said.

The ability to predict weather changes, ocean currents and ice movement patterns can play a significant role in prevention, Winkler said. Critical operation curtailment plans include understanding where ice is located in relation to the drilling sites and the time it takes to temporarily plug and abandon a well to make it safe before the ice reaches the drilling location.

Furthermore, by putting the critical parts of a well in mud-lined cellars, they are protected from deep field ice features that could cause damage, Winkler said.

Permafrost, which is soil at or below the freezing point of water for two or more years, also can be an issue, as it can melt during drilling operations and jeopardize the integrity of a well. Insulating drill pipes or chilling the drilling mud mitigates this risk, Winkler said.

"No private or industrial activity is entirely risk free," Winkler reminded. "But at every stage of an Arctic project's planning and operations, operators embed spill prevention practices and procedures, conduct exhaustive risk identification and implement comprehensive risk management plans."

Ramping Up Arctic Response

The Chukchi and Beaufort seas are home to a broad range of marine wildlife, including ice seals, walruses, polar bears and baleen and toothed whales, according to the U.S. Geological Survey. For endangered species, such as the bowhead whale, any oil pollution could further jeopardize their survival.

Understanding the fragility of the Arctic environment, operators and academics have researched the area for decades in experimentation of oil spill response technology, Winkler said.

Oil spill response methods for application in ice are based on decades of research that have provided a strong science-based understanding of the environment, which is essential to assessing impacts and designing mitigations.

"Wherever the industry operates, safety of people and protection of the environment takes priority over all else in the business," he said.

After the Macondo incident, the International Association of Oil and Gas Producers established a global forum to improve and extend safe practices. The forum, called the Global Industry Response Group, was charged with sharing experiences, analyzing incidents, advocating harmonized standards and communicating good practice, and promoting continued research and development.

After being delayed by the Macondo oil spill, the Arctic Oil Spill Response Technology Joint Industry Program (JIP) hit the ground running in 2012 tailoring conventional oil spill response practices to extreme environments.

The JIP is sponsored by nine operators, including Shell.

In fact, lab and field experiments have shown that Arctic conditions can aid in the response to a spill, Winkler said.

"The benefit of the Arctic is the ice can act as a natural boom and prevent oil from spreading," he said. "The challenge with oil is that it has a low viscosity and spreads very quickly. It's a major impediment to

Continued on next page

Continued from previous page

mechanical recovery, or the skimming of oil from the water's surface.

"That's why booms are used," he added. "They increase the thickness of the oil and make skimming more efficient.

"Broken ice conditions are the best," he added, "because they trap the oil and increase the encounter rate."

If mechanical recovery efforts are not feasible, industry must resort to in situ burning – the burning of oil on site to reduce water pollution, or dispersants – which can dissipate large amounts of oil from the sea surface.

In such cases, cold temperatures can actually slow the evaporation rate of lighter oil and lengthen the "window of opportunity," which is defined as the period of time from when the oil hits the water to the time it can be burned or addressed with dispersants, Winkler said.

The JIP currently is exploring cutting-edge alternatives that act as chemical booms. Chemical surfactants, known as herders, can be rapidly spread across a water surface.

When surfactants reach the boundary of an oil slick, they cause the oil to contract to a new, thicker equilibrium state. The slick thickness produced by herders provides favorable conditions for effective burning without the need for containment booms.

The JIP currently is looking at conditions under which herders are most effective and will be testing them in a 300-foot by 300-foot manmade basin just outside of Fairbanks, Alaska at the end of April, Winkler said. Just three feet deep, a simulated ice field will be created for the purpose of spilling oil in the basin's center. Manned and unmanned aircraft will be used to spray the herder and ignite the oil.

"We know conditions in which mechanical booms can be susceptible to ice damage," Winkler said. "The herder would provide another tool to address that damage risk and increase the overall robustness of operation repair."

> **"For Alaska, it's unprecedented in terms of preparedness ... we have the equipment and people in place to mount a response."**

All Aboard

Drilling in Arctic seas poses more than technical challenges. Indigenous people, primarily Alaskan Inupiat, living and subsisting on Alaska's North Slope, have a vested interest that the Chukchi and Beaufort seas remain unpolluted.

Although Glenn said the Inupiat who occupy the villages along the state's northern coast have concerns about oil spills, they are forming alliances with companies such as Shell to galvanize an oil spill response team.

Since 2006, Shell has hosted more than 600 meetings with Alaskan communities on the North Slope to share exploration plans, answer industry-related questions and train citizens to actively aid in a response operation.

Shell entered into an unprecedented partnership last year with the ASRC and six of the villages it represents. The Arctic Inupiat Offshore LLC gives participating Inupiat the option to acquire an interest in Shell's acreage and activities on its leases in the Chukchi Sea, Glenn said.

Balancing their interest in Shell's potential petroleum plays with a need to protect their environment, some Inupiat have participated in oil spill training and learned how to deploy booms at certain drilling sites.

Furthermore, by storing onshore and offshore vessels and other equipment on the North Slope, Shell's response time during an oil spill has been significantly reduced.

"The skimming capabilities on vessels and the stockpiles of dispersants are all local. Maritime assets are specifically assigned for oil spill response," Winkler said.

"For Alaska, it's unprecedented in terms of preparedness," he added. "If we had an incident, unlike other parts of the world where you would fly equipment in, we have the equipment and people in place to mount a response starting at hour one."

URTeC 2015 Set for San Antonio

The technical program is now in place and registrations are being accepted for the third annual Unconventional Resources Technology (URTeC) Conference, which will be held July 20-22 at the Henry B. Gonzalez Convention Center in San Antonio.

URTeC, hosted jointly by AAPG, the Society of Petroleum Engineers (SPE) and the Society of Exploration Geophysicists (SEG), is the industry's only integrated event for unconventional resource teams.

The technical program boasts more than 300 papers from geologists, geophysicists, petroleum engineers and other energy professionals presenting on innovations, best practices and experiences in integrated approaches for North American unconventional resource plays.

There also are five field trips, nine short courses and more than 180 exhibitors expected so far.

The event has been designed to fill the unique need for a peer-reviewed, science-based unconventional resources conference that will take an asset team approach to development of unconventional resource plays – similar to how oil and gas professionals work in today's market.

Last year's URTeC drew more than 5,000 geoscientists, petroleum engineers and other energy professionals, which was more than 20 percent more than 2013's inaugural event.

For more information go to URTeC.org website.

Offshore Technology Conference

Governors Confer on Coastal Exploration

By KEN MILAM, EXPLORER Correspondent

Several governors and elected officials will be on hand to discuss the future of coastal energy exploration during a panel discussion at the Offshore Technology Conference in Houston next month.

"This is about the outer continental shelf and offshore exploration, which is a vital part of the 'energy revolution' in this country," said David Holt of Consumer Energy Alliance, co-chair of the OTC policy panel.

HOLT

> **"The coalition was formed to improve coordination between coastal state governors and the federal government."**

KNOBLOCH

Speakers will include North Carolina Gov. Pat McCrory, chairman of the Outer Continental Shelf Governors Coalition.

Other members, their representatives and other elected officials are expected to participate, Holt said.

"This year, I'm especially excited to hear their assessment of the interaction between state and federal government and the states' role in finding balance between reward and risk," said session co-chair Charles Knobloch, technology law partner at Arnold, Knobloch & Saunders in Houston.

Formation of the Governors' Coalition was announced at the 2011 OTC. The group has expanded to include nine coastal state governors who support policies that encourage an expansion of American energy, particularly offshore energy resources.

"The coalition was formed to improve coordination between coastal state governors and the federal government," Holt said.

He said the group has made some progress and he feels conditions are "continuing to improve."

They are expected to discuss how states need to "better understand what resources are available and what they can mean for state revenues. They also want to continue to be good stewards for wind, tidal and oil and gas resources," he said.

Holt said the national security aspects of offshore exploration will be among likely topics of discussion.

"The U.S. is now the No. 1 oil producer in the world," he said. Energy independence encourages "less involvement in foreign wars ... grows jobs in all sectors ... and low energy prices spur economic growth," he added.

He said the coalition has encouraged states to be aware of and be involved in the Interior Department's and Bureau of Ocean Management's Outer Continental Shelf five-year development plan.

The plan, now in the draft proposal stage, would be in effect for the years 2017-22.

Possible revisions to the plan are examined about every three years, with a multilevel public comment process that takes about two years, he said.

"Each step now has a winnowing effect – they can't add areas, but they can maintain or take off areas," Holt said.

The Governors' Coalition "would appreciate as expansive a plan as possible," Holt said.

The current "Draft Proposed Program" for oil and gas leasing includes 14 potential lease sales in eight planning areas – 10 sales in the Gulf of Mexico, three off the coast of Alaska, and one in a portion of the Mid- and South Atlantic.

On the Coalition website, McCrory called the plan a "step forward," but expressed concern over the fact that the 50-mile coastal buffer in the Mid- and South Atlantic lease sale at this stage unnecessarily limits the opportunity for further examination of the resource potential and identification of environmentally sensitive areas.

The Coalition has advocated expanding revenue sharing to all coastal states with oil and gas production off their shores to compensate local communities for additional infrastructure, environmental protection and other coastal management needs generated by the new economic

Continued on next page

GeoLegends Theater, Presented by the 100th Anniversary Committee

By ED DOLLY and PAUL WEIMER

Coming soon to an AAPG Annual Convention and Exhibition near you – a chance to hear stories, insights and historical accounts directly from some of the greatest geologists to ever hunt for oil and gas.

Videos that celebrate some of the greatest discoveries in the profession's history, told by the geologists who helped make it happen, will have their national premiere at the upcoming AAPG ACE in Denver.

The videos, produced by AAPG and the 100th Anniversary Committee, have been created to celebrate and promote AAPG's centennial in 2017.

Anchoring the collection are interviews by committee chairs Ed Dolly and Paul Weimer of top explorers, research geologists and professors who pioneered geology and exploration during the past 60 years.

Add to those videos several more contributions from AAPG Honorary members Charles Sternbach and Will Green, and the collection boasts more than 50 interviews conducted worldwide to preserve this invaluable information for posterity.

The stories these individuals tell are dramatic; the discoveries and the geologic lessons are unforgettable.

Some of the videos have been seen at various Section (or smaller) meetings, and eventually all interviews will be posted on AAPG's website for both members and the public to observe.

But 13 of the interviews will be appearing before an international audience for the first time at the Denver ACE.

Thanks to the wonders of technology and some first-class filmmaking and editing done by Pax Harris of MEDIUM Films in Boulder, Colo., the videotaped interviews will be presented in the GeoLegends Theater beginning at noon Sunday, May 31, and continuing on a specific rotating schedule through Wednesday.


DOLLY


WEIMER

The program will start at 8 a.m. Monday, Tuesday and Wednesday.

The specific rotation of interviews to be shown each day may be found in the AAPG Convention and Exhibition program.

Interview videos with the following GeoLegends set for Denver include:

- Sidney Powers Memorial Award medalists Bob Weimer (Patrick Draw play, Wyoming), Ken Glennie (multiple international projects) and Fred Meissner (Bakken Shale play, North Dakota and Montana).

- Norman H. Foster Outstanding Explorer Award winner Dan Steward (Barnett Shale play, Texas).

- Legendary explorers John Masters, Jim Gray and Larry Meckel (Elmworth Field play, Canada); Richard Stoneburner (Eagle Ford play, Texas); Don Todd (exploration and discoveries in the Java Sea, Indonesia); John Martin (Jonah Field play, Wyoming); Mike Johnson (Parshall Field play, North Dakota); Harry Jamison (Prudhoe Bay Field play, Alaska); Joe Gifford (discoveries in Algeria and West Texas); and Frank Royse (Thrust Belt discoveries, southwest Wyoming and northeast Utah).

Continued from previous page

activity. In 2014, the federal government collected more than $7.3 billion in tax receipts from offshore royalties, rents and bonuses, according to the Coalition.

The newest members of the Governors' Coalition are Alaska Gov. Bill Walker and Maine Gov. Paul LePage.

Holt said Texas Gov. Greg Abott also renewed that state's role with the group.

Other members of the coalition include Govs. Robert Bentley of Alabama, Phil Bryant of Mississippi, Nikki Haley of South Carolina, Terry McAuliffe of Virginia, and Bobby Jindal of Louisiana, who served as the group's founding chairman.

Holt has served as president of Consumer Energy Alliance since 2006. CEA has corporate and individuals members in regional and state chapters in 20 states. The group's stated purpose is "to help shape a broad consensus in support of sensible, pro-economic growth energy policies utilizing an 'all of the above' approach."

Knobloch also is Program Committee vice chair for the 2016 Offshore Technology Conference and Oversight Committee member for Offshore Technology Conference Asia 2016. He also is past chair (2013-15) of the Texas Board of Professional Geoscientists.

'World-Class Exposures' Offered in ACE Field Trips

By BARRY FRIEDMAN, EXPLORER Correspondent

It's good to be reminded of this one simple industry fact:

"As a rule, geologists love to get out in the field to see classic and interesting outcrops that provide a better understanding of depositional facies, hydrocarbon reservoir systems, and anything related to geology."

That's AAPG member Mark Longman, this year's field trip chair for the upcoming AAPG Annual Convention and Exhibition, set May 31-June 3 in Denver, who believes there's great value in bringing together thousands of geologists from around the world and turning them loose in such a rich environment.

"They get to see outcrops they might otherwise never get to visit," he said, alluding to the number of spectacular locales in the area, like the Denver area's easily accessible Front Range and adjacent Rocky Mountain states, as well as trips in both Utah and Wyoming to name just a few.

Longman said there is ample opportunity to visit "some world-class exposures" that should have something of interest to almost everyone in the geologic community.

But it's not just the quality of the trips.

True, ACE 2015 offers 12 field trips – a typical number for an ACE gathering – but a big difference for Longman is, as they say in real estate, "location, location, location."

To him, it's easy to sing the praises of "the quality of outcrops in the Rocky Mountains near Denver."

It clearly is a source of pride.

Field trip participants discussing reservoir development in the Tensleep Sandstone at Alcova Reservoir in Wyoming. Photo by Peter Henning

"We here in Colorado are particularly blessed with superb exposures that can provide geological insights and experiences unmatched in many other parts of the country."

Interested in participating in one – or more?

Easy to do, Longman said. In fact, you can order off the menu or do the buffet. Trips are offered both before and after the meeting.

"The ACE field trips offer something for everyone," he added, "because the topics to be covered range from gaining insight into the structural geology and depositional history along the Colorado Front Range, to Tertiary (Green River Formation) source rocks in the Uinta Basin."

Something for Everyone

Longman is a petrographer and staff geologist at QEP, a Denver-based energy company, which means he gets to study rocks anywhere his company is actively exploring.

"I'm provided with a variety of rock material ranging from tiny drill cuttings to continuous cores hundreds of feet long, but even the best of cores provides only a narrow window into the geologic record," he said. "By integrating the data gleaned from study of cores and cuttings with geologic models developed for outcrops that may extend over several square miles, I try to help improve QEP's understanding of subsurface geology in order to optimize its success in exploring for and developing a wide range of hydrocarbon reservoirs."

It is at these conventions where he sees wonderful possibilities.

"They provide me an excellent way," he said, "for improving my insights and understanding of depositional, structural and diagenetic models for better understanding any reservoir intervals in which QEP may be interested."

As for the conference, he won't admit to looking any more forward to one trip than another – and that is the point.

"The success for the field trip program," he said, "is to offer something for everyone."

A few of those trips include:

- One led by Peter Hennings and Jon Olson to the outcrops around Casper, Wyo.
- A trip by Tim Ruble, Mike Lewan and others to the Uinta Basin.
- A visit to Florissant fossil beds in central Colorado, led by Herb Meyer.
- Structural geology field trips to the Colorado Front Range led by Eric Erslev and Ned Sterne.

"Paradise," though, "comes with its own hazards," he said, which is why safety is stressed for all leaders.

"It's sad that geologists can't simply go out into the field to study rocks and at the same time assume responsibility for their own actions," he said, acknowledging potential trips are sometimes canceled over "simple issues like access to outcrops and potential liability."

Continued on next page

Save Now On ACE Registration

There's still time to save by registering in advance for this year's AAPG Annual Convention and Exhibition, which will be held May 31-June 3 at Colorado Convention Center in Denver – and reduced registration fees are still available for those who act quickly.

Those who register on or before April 6 can still save up to $210, but if you miss that deadline, registering before May 11 can save up to $105.

Student fees and one-day pass payments also are available.

"Exploring the Summit of Petroleum Geosciences" is this year's theme, and organizers have compiled a program that features more than 900 technical presentations, 18 short courses and 13 field trips to present a comprehensive experience.

Other highlights include:

- GeoLegends Theater, featuring videos produced by AAPG and the 100th Anniversary Committee celebrating the greatest discoveries and the pioneering figures who made them (see story on prevous page).
- Hundreds of feet of core from major petroleum plays will be on display at the core poster sessions.
- Author Simon Winchester celebrating the 200th anniversary of "The Map That Changed the World" will be featured at the All-Convention Luncheon.
- Former U.S. Geological Survey senior scientist (and AAPG member) Tom Ahlbrandt will be presenting this year's Halbouty Lecture, "From Petroleum Scarcity to Abundance: Opportunities and Implications for the U.S. and the World."
- Several special technical sessions will be held, including the next two installments of AAPG's "Discovery Thinking" forum series – one on Global Discoveries, and one on North America Discoveries.
- Three Division luncheons are planned, offering topics such as Alberta's Oil Sands, the "Evolution of Unconventional Oil Plays" and "Can Unbiased Science Prevail?"
- The opening session and awards ceremony, where the best of AAPG will be honored. Among the honorees will be veteran geologist Paul "Mitch" Harris, who will receive the AAPG Sidney Powers Award, AAPG's highest honor, and Alfredo Guzmán, winner of this year's Michel T. Halbouty Leadership Award.
- An exhibit hall featuring more than 250 companies who will display the latest in technology, science and services.

To register or for more information, go to ace.aapg.org/2015.

Continued from previous page

That said, the challenge of planning and leading a field trip remains one of his joys.

"I was filled with concern and apprehension when I was initially volunteered by Donna Anderson to chair the 2015 ACE field trip program," he said, "but my fears were somewhat alleviated when I drafted Greg Gromadzki to be my co-chair."

"It was actually rather fun to watch the field trip program evolve and to have many well-known geologists step forward with ideas to lead various trips."

Professionals from industry and academia, from the classroom and the field all will be sharing their observations, insights and interpretations – so, as it turned out, the difficulty was not finding enough trips, but narrowing them down to a workable number.

"In the end, it proved hard to limit the number of trips to just 12," he said, "but I fully believe that the program Greg and I put together has something for almost everyone with an interest in getting out into the field to visit some of the best outcrops that the United States has to offer."

House of Delegates annual meeting

Elected or Appointed Editor?

By KEN MILAM, EXPLORER Correspondent

A proposal to change the AAPG elected editor's position to an appointive will be among the items considered when the House of Delegates gathers for its annual meeting May 31 in Denver, House Chair David Dolph said.

The proposal is one of four suggested bylaws changes the 223-member House will consider along with other business, including:

- The voting for House chairman-elect and secretary-editor.
- Recognizing delegates for honors and awards.
- Hearing various committee reports.


DOLPH

Dolph, however, called the editor question "the most interesting and most important" item on the agenda.

According to current AAPG Bylaws, the editor has general supervision and final authority in soliciting, accepting and rejecting all material on technical subjects for publication. The editor has policy oversight and responsibility for editorial content of all technical and peer-reviewed publications.

The proposed change would allow the Editorial Committee to recommend one or more nominees to the Advisory Council to pass on to the AAPG Executive Committee, which could approve one or more candidates to be placed on the ballot, Dolph said.

If only one candidate emerges, "It would still be on the ballot – and we're hoping that doesn't happen," Dolph said.

Write-in candidates still could be considered if nominated by a petition signed by at least 50 supporters, he said. Dolph said that process could be modernized by allowing email or other means of submitting petitions instead of the current single-page paper requirement.

Dolph said a main argument for the change is that the position is very time consuming, and it is often difficult to find two or more candidates willing and able to make the three-year commitment.

The duties can take a considerable chunk of time from the editor's workday, and "it's hard to get employers to approve that sort of commitment," he said.

"It takes a lot of effort" just to get to the candidate stage, and unsuccessful candidates often don't seek the office again, he said.

On the opposing side, "It's looked at as potentially undemocratic," Dolph said.

"Some people view it as potentially allowing the Executive Committee to stack the process of get a candidate who supports its views," Dolph said. "Some people don't like that – they're seeing all the other positions with two or more candidates."

With both arguments in mind, "We're bringing it forward. It will be discussed and voted on," Dolph said.

The proposal would require a two-thirds majority vote of the delegates to pass.

While the change would become effective immediately, it would not affect the current election.

Regarding the House election, delegates will vote on candidates for two offices. They are:

Chair-Elect

❒ **Jim McGhay**, Tulsa (Mid-Continent Section).

❒ **Dwight "Clint" Moore**, Houston (Gulf Coast Section).

Secretary/Editor

❒ **Mike Allison**, Gainesville, Texas (Mid-Continent Section).

❒ **Steve Levine**, Houston (Gulf Coast Section).

Dolph said other proposed bylaws changes to be considered in May are simpler, "housekeeping" changes.

- On change would allow technical

Continued on next page

US offshore policies

Changes on the Horizon

By LOUISE S. DURHAM, EXPLORER Correspondent

Petroleum industry players expend considerable energy, money and time adhering to federal government dictates.

Additionally, they are constantly on the alert for newer policies and restrictions that might affect them – particularly in the U.S. offshore environment.


RADFORD

"We have a number of decisions coming up in the next few months and years that will shape offshore energy policy for the next 10 to 20 years probably, considering what's at stake," said Andy Radford, senior policy adviser offshore at the American Petroleum Institute.

"For the Atlantic, there will be decisions made over the next few years involving the five-year plan, like whether to offer leasing in the Atlantic or not," Radford said. "Those decisions are now in a comment period.

"A proposed plan has been out that contains lease sales off the coast of Virginia, North and South Carolina and Georgia," he noted. "The government will take a look at the comments received and the environmental analyses."

And all of that takes time, of course.

"This is for a lease sale that is not until 2021," Radford said. "It won't even be the next president to decide if there will be a lease sale but the one after that."

Long-Term Planning

The decision to keep the Atlantic in the proposed plan, which is now merely a draft proposal, is expected to be made sometime in the 2015-16 time span. Following this, there will be another round of comments and public hearings before a final plan is sent to Congress for review.

The focus of the initial proposed offshore plans is typically narrowed as they move down the line of the various reviewers.

"This is a long-term process with a lot of hurdles left before we get to potentially leasing in the Atlantic," he emphasized. "Coupled with this is the ongoing saga of whether to allow seismic surveys in the Atlantic.

"We need seismic data, and the data we have is old and incomplete," he noted.

Already, nine seismic permit applications have been made to the government. It's another multi-step process and one that includes the individual states on the coast from Delaware down to Georgia, according to Radford.

They all have input based on the Coastal Zone Management Act.

"The BOEM (Bureau of Ocean Energy Management) is doing an environmental analysis that is site-specific to each survey, so they will make a decision soon whether to permit seismic surveys," Radford said. "But they can't do this until the states have their say, and also the National Marine Fisheries Service, which grants incidental harassment authorization for potential harassment or behavioral disturbances to marine mammals."

The Future of Alaska, GOM

The Atlantic action is only one of many uncertainties hovering over the offshore industry.

For instance, decisions must be made about Alaska, which will be critical to the future of Arctic exploration.

To date, Shell has spent about $6 billion and a few years trying to right their drilling program in Alaska. A few accidents in this challenging region failed to curtail the company's commitment here, which has triggered much industry interest in the Chukchi and Beaufort seas.

"It must be decided whether to let Shell drill their wells there this year," Radford said. "A decision probably will be this spring so they can mobilize their equipment to get up there and finish the wells they started a few years ago.

"Lease sales are scheduled in the Chukchi in 2016, and (the government) must decide to hold that or not," he commented. "If Shell drills the wells this year, their performance may determine if the lease sale occurs.

"The recent five-year plan took a lot of areas out of the Chukchi, which we didn't expect."

The federal government recently issued new Arctic-specific regulations, which likely won't be finalized for a while yet.

"The conditions are particularly onerous, but maybe there's some flexibility," Radford noted. "We're looking through them closely as they will certainly impact the government's decisions on legislation."

Far to the south in the longtime offshore industry workhorse, the Gulf of Mexico, the operators are awaiting issuance of new regulations on blowout prevention. It remains to be seen if the new regulations increase safety or introduce more risk.

It's a given that they will increase costs to the companies operating there.

"In the offshore you need a long-term focus," Radford said. "Anything that decreases certainty and predictability impacts the companies' willingness to invest in the U.S. offshore."

Continued from previous page

or special interest groups – such as young professionals, geochemistry or structural geology – to be created. The Executive Committee would have authority to establish, maintain and dissolve the groups.

▸ Another proposal would standardize Region names in the bylaws to those in common use. Examples include changing references to "Canadian" and "European" Regions to "Canada" and "Europe." The current Latin America Region to "Latin America and Caribbean Region."

▸ The third proposal would "change some wording" dealing with delegate honors and awards. Dolph said the cleanup will not remove the one-year post-service waiting period before a member can be nominated, although that issue had been discussed.

In other business, honors and awards to be presented include honorary House members, distinguished member and length of service awards.

Dolph said he hopes to streamline the agenda, perhaps including some reports in a consent agenda for approval by a single vote without discussion to make more time for considering bylaws and major business.

The Geophysical Corner is a regular column in the EXPLORER, edited by Satinder Chopra, chief geophysicist for Arcis Seismic Solutions, Calgary, Canada, and a past AAPG-SEG Joint Distinguished Lecturer. This month's column deals with mapping a porous sand trend by integrating well logs and seismic attributes.

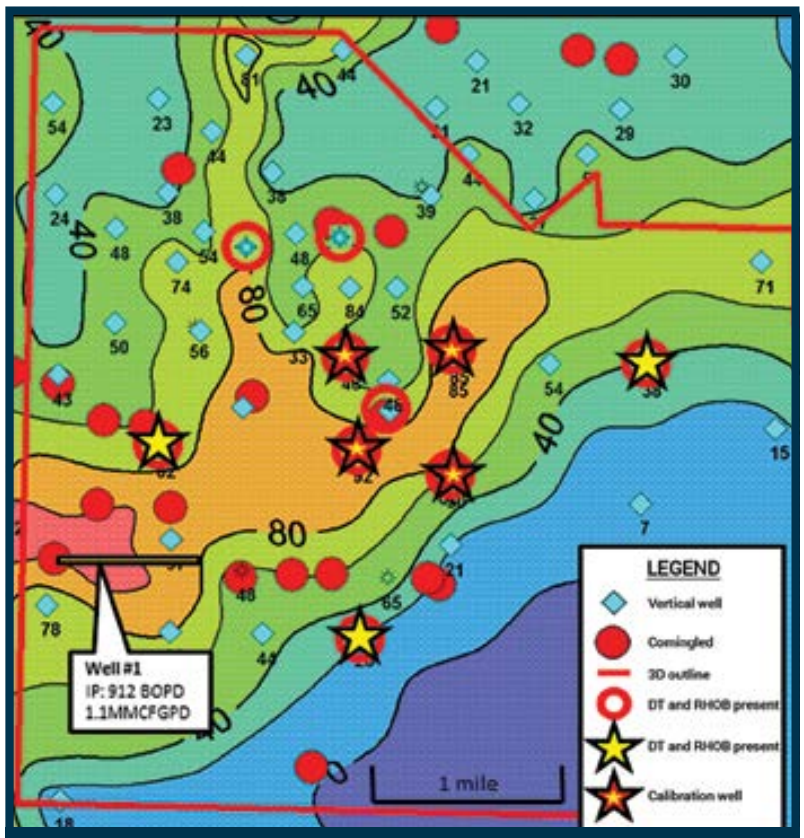


Figure 1 – Sand isopach of target derived from well control.

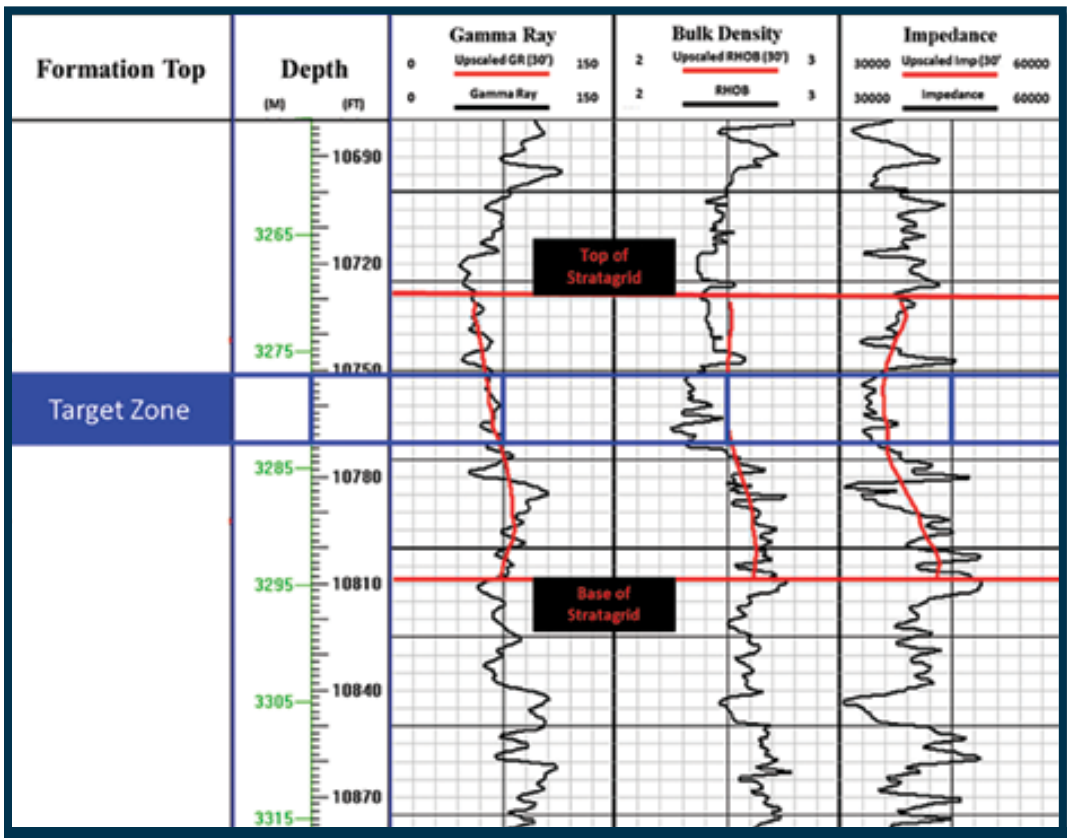


Figure 2 – One of four wells used in calibration. The upscaled version of each log is overlain in red. The target zone bracketed in blue was defined for each well. Properties from within this zone will be highlighted in cross-plot space to aid in geobody creation.

Attribute Analysis of Mid-Continent Washes

By RYAN FAIRFIELD and RENJUN WEN

The Anadarko Basin granite wash play has been considered difficult to interpret both geologically and geophysically. Consequently, the application of seismic attribute analysis to mid-continent washes has not been widely published.

SM Energy's mid-continent granite wash asset covered a portion of a prolific Missourian age wash trend. In 2010, a competitor drilled a successful horizontal well, Well #1, in the interval with excellent initial production rates (figure 1). Adequate well control existed to generally map the trend across the acreage – however, some uncertainty remained regarding the extent of the sand trend in areas that lacked well control.

In order to gain insight into these areas, a seismic attribute study was conducted over a 14-square-mile portion of SM Energy's 3-D seismic holdings.

Background

The mature, oil and gas-producing Anadarko Basin granite wash play is a series of stacked fanglomerate reservoirs with sands of varying mineralogies derived from the erosion of the Wichita-Amarillo Mountain Front.

The reservoir, which is the focus for this study, is a Missourian age wash.

Petrophysical properties from local well control suggest that the reservoir sand in the study area consists of a more traditional mineralogical makeup (quartz and carbonate) rather than the feldspar rich, arkosic sands which exist in a deeper portion of the play.

For the purpose of this study, low acoustic impedance and low gamma ray are assumed to indicate clean, porous sand within the reservoir. Thicknesses of the sand trend range from seven feet at its thinnest recorded location to over 90 feet in the heart of the trend.

Average porosities of the target sand (estimated from neutron/density porosity logs) are 10-12 percent.


FAIRFIELD


WEN

Method

Here is a summary of the workflow used to predict critical rock properties through the application of statistical analysis of 3-D seismic attributes:

- Generate post-stack seismic attributes from 3-D seismic.
- Interpret top and base of target, tied by synthetic seismic traces.
- Build strata-grid from interpreted time horizons conformable to target area and extract each attribute to the strata-grid.
- Upscale well logs similar to the seismic scale.
- Correlate attributes to upscaled well logs to find those with a statistically significant correlation.
- Apply neural network prediction to combine the statistically significant attributes and generate a predicted property grid representing the property of the correlated log.
- Use cross-plots and define the target sand.
- Generate geobodies to compare seismically derived sand thickness estimation to well logs.
- Visually compare morphology of geobodies to well log derived sand thickness map.

Application of Workflow

✓ Generation of Post Stack Seismic Attributes.

The 3-D seismic data used for the attribute analysis were excellent in quality with a 2 ms sample rate, neutral phase and 110 feet x 110 feet bin spacing.

Numerous post stack attributes – including spectral decomposition – were generated from the input 3-D seismic data set. Although there are some redundancies when calculating attributes, measuring stratigraphic changes was the primary goal as opposed to the measure of structural changes.

✓ Attain an Accurate Synthetic to Seismic Tie.

Thirty-eight vertical well penetrations with digital logs existed within our study area. Only 11 of those contained compressional sonic and bulk density logs.

Of those, eight were of sufficient log quality to create a reliable synthetic tie.

A wavelet was extracted at each well location and was then convolved with the reflectivity coefficient series for the respective well. For a majority of the wells, a 60 percent or greater correlation

Continued on next page

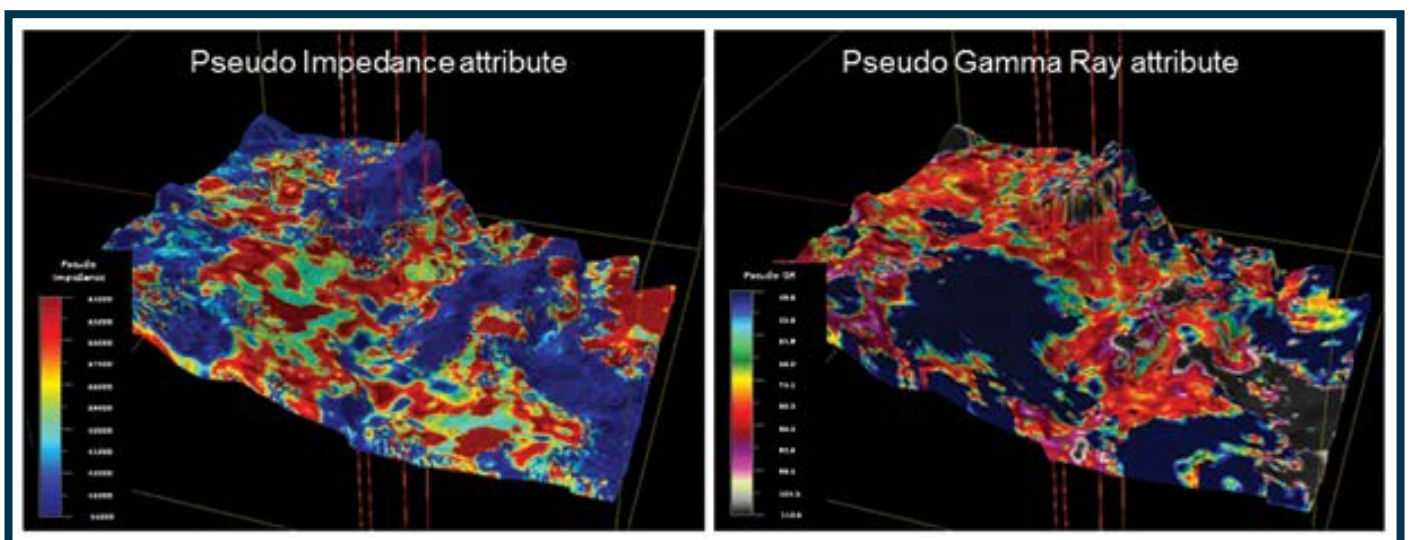


Figure 3 – Attributes have high correlation to the upscaled impedance log and upscaled gamma ray log are input to neural network prediction resulting in a predicted property grid emulating the property of the subject log. Data courtesy CGG.

Continued from previous page

coefficient was achieved over the full length of the logs, while a few wells approached 70 percent correlation. These were considered good correlation values for the study area.

It was from these wells that the location of the target sand was identified within the seismic trace, allowing time horizons that bracket the sand to be mapped in the seismic section.

Four of these eight wells contained excellent examples of the target sand and would serve as the calibration wells.

✓ Generate a Strata-Grid, Extract Attributes and Upscale Subject Well Logs.

A "strata-grid" was created using the interpreted horizons to encompass the target sand. Each of the post stack attributes (in addition to the original stacked amplitude volume) was extracted to the strata-grid.

Several well logs from each well were upscaled at multiple window sizes, followed by correlation of the attributes to these logs.

An appropriate upscaling window size was finally adopted after testing the sensitivity of the size to the correlation coefficient between seismic attributes and the upscaled well logs (figure 2).

After the sensitivity analysis, gamma ray and impedance logs were selected as "subject" logs that will be emulated in future steps due to their capability of discriminating porous sand from shale in cross-plot space.

✓ Correlate Attributes to Upscaled Logs, Perform Neural-Network Prediction and Generate Predicted Property Grids.

Generated seismic attributes were correlated to each subject log. The set of attributes, which correlated highly to an upscaled log, were then input to neural network prediction.

The resulting predicted property grid emulates the subject log (figure 3).

✓ Cross-Plot of Predicted Property Grids, Refinement of Cross-Plot Polygon and Geobody Extraction.

First, the target zone within the predicted gamma ray and impedance grids were cross-plotted (figure 4) with samples from the calibration wells highlighted. Upper-range sand cutoff values from the upscaled gamma ray and impedance logs were estimated, allowing for a polygon to be drawn around the sand points.

The polygon shape and size was further refined by plotting extracted predicted property grid values at blind well locations. By highlighting those values on the cross-plot, we interactively QC'd the shape of the cross-plot polygon by turning on the wells with no known sand, which should fall outside the sand polygon.

A geobody map was generated from this polygon, representing the sand properties defined by the subject logs.

✓ Attempts to Avoid Spurious Correlations.

Spurious correlations are a constant concern in attribute analysis.

If seismic attributes are to be correlated with logs from several calibration wells with the intention of generating predicted property grids and cross-plotting for geobody generation, it is important that the logs satisfy the following criteria.

First, at least two logs need to be chosen that can discriminate porous sand in cross-plot space by themselves.

Second, the morphological shapes of these chosen logs should be different to avoid redundancy in correlated attributes for each predicted property grid.

Third, as many wells as feasible should be used in calibration in order to sufficiently sample the reservoir and capture some measure of reservoir variability.

See **Sand Variability**, page 43

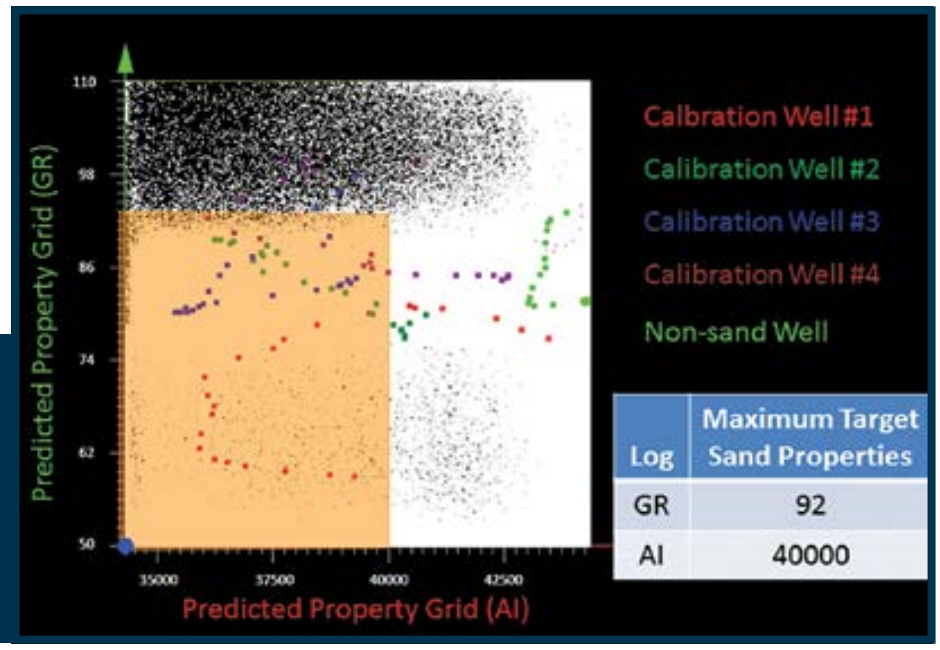


Figure 4 – Cross-plot of the predicted property grids with sand values of calibration wells and a non sand well plotted in color. White dots represent every strata-grid cell value (reservoir and non-reservoir) within the interval throughout the 14 sq. mi. study area. The upper range values of the reservoir were estimated from upscaled logs of calibration wells and served as the limits for the shaded polygon. The polygon was used to generate the final porous sand prediction map.

Editor's note: Regions and Sections is a regular column in the EXPLORER offering news for and about AAPG's six international Regions and six domestic Sections. Middle East Region contact: Abeer Al-Zubaidi, AAPG Middle East Region director, azubaidi@aapg.org.

Middle East Region

A Petroleum Geology Powerhouse

By ABEER AL-ZUBAIDI, AAPG Middle East Region Director

Petroleum geology's advancement as a source of prosperity and a driver of human industry and progress around the world is the essence of AAPG's mission – and nowhere is the ground more fertile for that mission to bear fruit than in the Middle East.

As we all know, the Arabian Plate has been blessed with an enormous endowment of oil and gas.

This relatively small plate, which occupies less than 4 percent of the earth's land surface, contains more than 50 percent of the world's known oil reserves and more than 40 percent of the natural gas reserves, according to BP's 2012 Statistical Review of World Energy.

The richness in natural hydrocarbon occurrence in the Middle East can be attributed to many favorable geological factors.

- From a geographical perspective, its position in the north facing of the Gondwana margin allowed the deposition of prolific cycles of reservoir, seal and rich source rocks. Large areas of the continental passive margin of the different phases of the Tethys Ocean were covered by extensive reservoirs, seals and source rocks.
- Extremely rich, oil-prone extensive source rocks blanketed the passive margins during the Paleozoic and Mesozoic times.
- The position around the equator during the Proterozoic yielded excellent carbonate reservoirs and exceedingly high organic richness.
- The trap formation in broad gentle structures preserved these resources and has benefitted ancient cultures of the Middle East and today's modern global industrial societies alike.


AL-ZUBAIDI

There are a number of factors that have caused the emergence of the Middle East to be a petroleum geology powerhouse.

* * *

Knowledge and use of hydrocarbons in the Middle East date back 4,000 years. In these times, asphalt, oil and gas seeps from underground hydrocarbons were used by ancient civilizations for lighting oil lamps and for heating and cooking (when mixed with camel dung).

Also, the "eternal fire" at Baba Gurgur, Iraq, has burned for more than 4,000 years and is one of many spiritual sites in the Middle East that has been used for worship over the millennia.

In recent years the large-scale development of the oil and gas reserves have transformed many Middle East countries from emerging to far-reaching global industrial economies.

Petroleum geology has played a key role in this transformation up to now, and will play an increasingly more important role in the future as Middle Eastern countries strive for the highest recovery rates in the world.

Achieving these high recovery rates requires a greater understanding of the subsurface, which calls for an even greater role for petroleum geology.

In fact, this role has caused the Middle East to become the global center of excellence for petroleum geology.

* * *

There are a number of factors that have caused the emergence of the Middle East to be a petroleum geology powerhouse, but four key pillars will support the growth and advancement of petroleum geology:

- As mentioned, the Middle East has the world's largest oil and gas, and as these fields benefit from the latest technical innovation to ensure maximum recovery, they'll continue to produce well into the future.
- The Middle East has outstanding sedimentary geology and a complete geologic column. Much of this column is exposed in surface outcrops that are mostly free of feature-covering vegetation.
- The Middle East has extremely prolific carbonate reservoirs. These difficult-to-understand reservoirs have provided – and will continue to provide – the rest of the world with marvelous opportunities for learning.
- The transition of many Middle East countries to knowledge-based economies has seen an extensive investment into post-secondary education. New universities in the Middle East bring new facilities through which to grow the instruction of petroleum geology.

The advancement of petroleum geology, which is at the heart of the AAPG organization mission, will continue to bring prosperity to humanity around the world. The Middle East is well positioned to lead this advancement in the coming years and decades ahead.

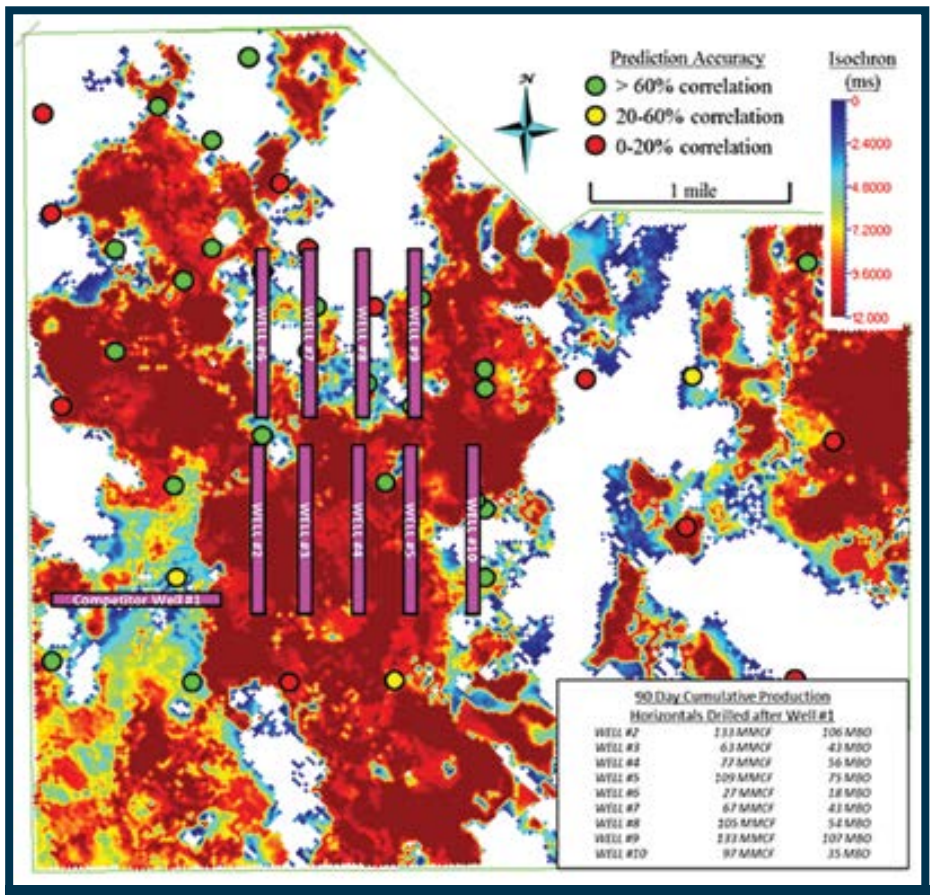


Figure 5 – An isochron of the predicted sand trend is shown above. Locations of vertical wells are shown color coded by prediction accuracy. Horizontal well activity is also shown with their accompanying 90-day cumulative production.

Sand Variability

from page 41

Criteria 1 and 2 were addressed in the discussion on upscaling window size selection. Rather than using one well for calibration, which may not capture the variability of the target sand in the study area, a total of four wells with good quality logs and great examples of the target sand were used, which meets criterion 3.

Not all variability of the sand was captured – but, as previously mentioned, due to log quality in other wells only these four input wells could be used.

It also is important that the target reservoir be sufficiently sampled to make the correlation coefficients statistically significant. A statistical sample of points was able to be attained from within the sand zone itself. A minimum of 15 is necessary, while greater than 50 were attained in this study.

✓ Validating the Results Through Reliability Analysis of Blind Wells.

Recall, the primary focus of this study was determining morphology more so than the absolute thickness of the reservoir. However, a blind well analysis was conducted to assess reliability of the prediction.

A sand isochron was extracted at each well location that was used in the original well log derived sand thickness map. Using a well-derived conversion velocity of 12,000 feet per second, an isopach of the attribute derived sand was estimated.

Of the 38 wells used in the study, 23 wells had a 60 percent or better prediction to the log derived sand thickness (figure 5).

Many of the wells that correlated poorly were near predicted edges of the sand trends, which may end abruptly; thus under-or over-estimating.

✓ Activity and Results.

SM Energy completed its first horizontal producer in the play, Well #2, with 90-day cumulative production of 133 MMCFG and 106 MBO.

Well #3 was completed several months after Well No. 2 and likely underperformed due to depletion.

Wells #4 and #5 followed with production improving to the east.

Five additional horizontal wells were drilled by other operators with outcomes that appear to correlate to the predicted sand map generated by this workflow. Four wells were drilled to the north with mixed results – however, the best well does lie in a predicted sand trend.

Additionally, Well #10 was proposed to SM Energy and this attribute work was instrumental in the decision to not participate in the well.

Conclusions

Using commercially available seismic attribute analysis software, a porous sand trend was derived using combined post stack attributes calibrated to well control.

Although reliability suffered in some portions of the study area, 60 percent of the blind wells had greater than a 60 percent match to log-derived sand thickness measurement.

Furthermore, when doing a simple visual comparison of the attribute derived porous sand map to the log-derived sand map, there are undeniable morphologic similarities. This demonstrates the ability for analyses of this type to extrapolate desirable sand trends away from existing well control.

In conclusion, this workflow shows the potentially valuable information that standard, full stack 3-D seismic data, coupled with the right reservoir characterization tools, can yield to act quickly in areas that are sparsely drilled.

(Editor's note: The authors thank CGG for permission to use its data in this study, as well as well as the input of AAPG member Matt Stone of Petro-Hunt LLC.

Ryan Fairfield is with SM Energy Mid-Continent in Tulsa; Renjun Wen is with Geomodeling Technology Corp. in Calgary, Canada. Both are AAPG member.)

New Federal Energy Policies in the Works

By EDITH ALLISON, Geoscience and Energy Policy Office Director

Is 2015 the year for comprehensive energy legislation?

Many in Congress are considering new, comprehensive energy legislation, which would be the first such measures since the 2005 Energy Policy Act and the 2007 Energy Independence and Security Act – laws that aimed to improve U.S. energy independence and security, assuring an affordable and reliable energy supply.

Those laws, you'll recall, provided tax incentives, regulatory changes and research programs to stimulate production of all types of energy and energy efficiency – and there certainly seemed to be a need for such legislation eight to 10 years ago: oil and natural gas production was in decline, peak oil was the talk of the day and liquefied natural gas (LNG) imports were projected to provide 20 percent of demand by 2020.

The energy portfolio of the United States is radically different today – in 2005 the United States imported about 30 percent of its energy, but as a result of the shale boom, net imports are now 16 percent of our energy consumption.

Wind also has made spectacular progress, from supplying 0.1 percent of U.S. energy in 2004 to 1.6 percent today.

With this energy evolution, some of the 2005-07 legislation is out of date or ineffective.

For example:

- Renewables Fuel Standard (RFS) – the 2005 law helped ethanol replace methyl tertiary-butyl ether (MTBE), which was considered a dangerous pollutant when it leaked into aquifers. The 2007 law increased the ethanol and other biofuel usage requirements.

  Today the RFS requirement to mix an increasing volume of renewable fuels with a declining volume of gasoline consumption is up against the 10 percent ethanol limit.

- The 2005 law streamlined aspects of the permitting process for LNG import terminals.

  In the past year many have been calling for accelerated permitting for LNG export terminals.


ALLISON

The energy portfolio of the United States is radically different today.

Rep. Fred Upton (R-Mich.), chair of the House Energy and Commerce Committee, and Sen. Lisa Murkowski (R-Alaska), chair of the Senate Energy and Natural Resources Committee, are leading the effort to adopt comprehensive energy legislation.

Democratic legislators certainly also will be involved; although both the House and the Senate have Republican majorities, comprehensive energy legislation requires more than two influential committee chairs or even members of one party.

Previously introduced, bipartisan legislation also will be a part of any future comprehensive bill. A couple of likely candidates would be:

- In 2009, Sen. Cantwell and Sen. Susan Collins (R-Maine) introduced the Carbon Limits and Energy for America's Renewal (CLEAR) Act that proposed a market-oriented approach, rather than Environmental Protection Agency regulations, for reducing carbon emissions.
- Several versions of the Energy Savings and Industrial Competitiveness Act has been introduced to broad bipartisan support over the past three years by Senators Jeanne Shaheen (D-N.H.) and Rob Portman (R-Ohio). The bill would improve energy efficiency in residential and commercial buildings and schools.

Murkowski's planned legislation will focus on four areas – strengthening supply, modernizing infrastructure, supporting efficiency and ensuring federal accountability – and echoes her 2013 report, "Energy 20/20," which included hundreds of recommendations for updating cumbersome regulations in order to stimulate production of renewable as well as fossil energies.

Murkowski has a particular interest in loosening the ban on crude oil exports and expediting the government approval process for LNG exports.

Upton's legislative framework, titled the "Architecture of Abundance," has four goals:

- Modernizing infrastructure (including reducing regulatory delays for new infrastructure).
- Expanding a technologically savvy workforce open to underrepresented minorities and low-income communities.
- Energy diplomacy, including facilitating energy exports and improving energy coordination among Canada, Mexico and the United States.
- Improving energy efficiency and accountability.

Upton plans to release discussion drafts on the four topics in the spring and introduce comprehensive legislation later in the year.

See **QER**, page 47

PROTRACKS

Riding out the Bust

By MANDI GUERRERO, Southwest Section YP


GUERRERO

Until recently, most young professionals (YPs) in the petroleum industry had yet to experience what more senior geologists call "a downturn."

Now, it appears we're getting our first taste.

I have heard several students graduating with their bachelor's degrees tell me they are having a hard time finding a job. Most will go back to school for master's degrees to wait it out; others will find alternative positions that allow them to use their degrees. And some will change career paths altogether.

For those already in the industry, friends and colleagues may have been laid off, companies near us may have closed and the fortunate are grasping tight to their current positions.

* * *

Being in the oil industry for only three years now, this is the first time I have experienced such a dramatic drop in oil prices.

For someone who has never been through a downturn, it can be a little unsettling, especially since YPs are usually the most recently hired and have the least amount of experience. Not only are we trying to start, grow or advance our careers, but many YPs have personal goals they are trying to achieve, too.

With an uncertain future in the petroleum industry, many young professionals may think twice before paying off student loans, getting married, having children or buying a house.

Even though this is a time of uncertainty, there are many things you can do as a young professional to prepare your career for a "downturn."

▸ Get involved.

If you are reading this that means probably you are a member of AAPG – but are you involved, or "just" a member?

Do you attend meetings? Do you try to help out with local events?

I know many of us have alot on our plate. However, those who are involved are more likely to get their name out there by networking. Networking can come in handy when it comes to changing jobs, getting your foot in the door or even collaborating on a project. You will never know when these connections will be helpful.

YP events are held year-round in all Regions and Sections. Contact the YP Lead in your area to learn more.

▸ Continue your education.

As a young professional, many of us fail to see the importance of continuing education. I am not just talking about week-long courses. I'm also talking about poster sessions, free webinars, short courses, meetings.

Making yourself a valuable asset by becoming more educated and better trained will help you develop the skills necessary to keep your current positon or obtain a new career.

▸ Know the industry.

Keep up with current technologies, new techniques, active areas, company mergers, owned acreage blocks – anything and everything you can learn about the industry is important.

By staying current on industry activity, you will be able to act quickly if new opportunities arise when the price environment changes.

It is a volatile industry – but by being involved, continuing your education and knowing the industry, you will be poised for career success.

Even in a downturn.

Contribute with membership dues

Build a Better Foundation for the Geosciences

By APRIL STUART, AAPG Foundation Programs Coordinator

Join your fellow AAPG Members in building a better Foundation for the geosciences.

It's easy to do by making a contribution to the AAPG Foundation when you pay your dues in 2015. Simply locate the AAPG Foundation Contribution line and add in your donation. You also may easily donate to your favorite program by visiting the Foundation website at foundation.aapg.org. All donations given by mail will be designated to the General Fund.

Thanks to your generosity, the AAPG Foundation continues to provide significant support for educational, charitable and scientific programming advancing the geologic profession and subjects of geoscience for the benefit of people around the world.

For more than 46 years, supporters of the Foundation have promoted innovation in the geosciences by funding undergraduate and graduate scholarships and grants, endowing university subscriptions to Datapages Archives, providing support for the highly esteemed Distinguished Lecture Program, funding grants for geologic projects and more – all to benefit science and impact the public.

Learn more about how you can make a contribution in support of the program of your choice by visiting foundation.aapg.org.

Brent Campbell, recipient of the 2014 Barrett Family Named Grant.

The AAPG Foundation is a 501(c) (3) public foundation, qualified to receive contributions in support of educational and scientific initiatives or projects related to the geosciences.

(Contributions to the AAPG Foundation are tax deductible for U.S. taxpayers. Tax laws may vary in other countries. Check with your tax professional for advice.)

* * *

It's true that we live in a digital age. With enormous amounts of information available at our fingertips, oftentimes we can feel as if we are swimming through oceans of data just to find the information we are looking for. That said, hardcopy materials like books and publications to advance knowledge, particularly in the geosciences, are still relevant.

While the digital age has advanced geoscience research methods in many ways, it also has encouraged a newfound appreciation for hardcopy materials, particularly when (as often it does) technology fails or falls short.

University-level students still rely on hardcopy materials to complete their studies. Their respective university libraries not only are expected to provide electronic information, but also to archive hardcopy sources that may or may not have electronic counterparts.

Providing both kinds of publications can strain budgets. Geology libraries are no exception, especially with rising publication costs.

In 2011, to help with this need, AAPG Foundation created a new program to offsets those costs and enables new data to be added continually to university geology library shelves.

Donors who have already supported this new program include Ken Macho, who graciously set up a Newly Released Publications Fund for Kansas State University, and Lawrence Funkhouser, who has generously set up funds for three schools: Oberlin College, Stanford University and Wooster University.

To set up a Newly Released Publications Fund for a university of your choice, contact the Foundation at 1 (855) 302-2743.

QER
from page 44

* * *

In addition, the Obama administration plans to recommend a suite of legislative actions to improve the nation's energy infrastructure in its Quadrennial Energy Review (QER), which is expected in March – after this article was written but before you read it.

Energy Secretary Ernest Moniz recently described the infrastructure issues that will be addressed in the QER. They include:

- Modernizing the country's Strategic Petroleum Reserve.
- Expanding energy storage and distributed microgrids to ease the country's reliance on centralized power plants and to make the grid more resilient to attacks or disasters.
- Upgrading infrastructure that's critical to the nation's energy security.
- Improving infrastructure overall.

This report will focus on mid-stream infrastructure: transmission, distribution and storage. Next year QER 2 probably will look at generation and end-use infrastructure.

While the report is in review by the White House, a few hints about its contents have leaked out. For example, SPR can move oil to refineries along the Gulf Coast. However, there is now a glut of oil along the Gulf Coast, so SPR will require new facilities in order to move oil overseas to meet its official objective to protect the U.S. economy from oil disruptions.

Check the AAPG Energy Policy blog for more information about the QER after its release.

Foundation Contributions for February 2014

General Fund
Cecil O. Basenberg
Dudley and Marion Bolyard
In memory of Thomas L. Thompson and G. Allan Nelson
John M. Cockrane Foundation of the Columbus Foundation
In memory of John M. and Anne H. Cochrane
John R. Cockbill
William R. Edwards
EOG Resources Inc.
Matching gift given by Bruce Wiley
James L. Eymann
John M. Kapchinske
Wayne Lebsack
Mark and Carol Lester
Jay G. Marks
Donald P. McGookey
In memory of Gerald Mendenhall and Leo Merle "Mick" Denny
National Fuel Gas Company Foundation
Matching gift given by Jianli Yang
Olukayode J. Samuel
George D. Severson
David Roger Steele
Melanie T. Stephens
Jianli Yang
Oscar Yepes

Education Fund
Donald W. and Susan E. Lewis
QEP Resources
Matching gift given by Mark Longman
Vinton Hubbard Sholl

Grants-in-Aid Fund
Andrew L. Brill
Carlos Rivero

David W. Worthington Named Grant
David and Beverly Worthington

Harry and Joy Jamison Named Grant
Dan and Jeanne Jamison
In memory of Joy Jamison

James A. Hartman Student Leadership Summit
Chevron Matching Employee Fund
Matching gifts given by Richard Ball

Imperial Barrel Award Fund
Adedayo Adebulehin
Arthur H. Johnson
Chesapeake Operating Inc.
Chevron Matching Employee Fund
Matching gifts given by Afton Van Zandt

Military Veterans Scholarship Fund
John and Kae Armentrout
In memory of Clem Bruce
John Avila
Andrew L. Brill

Chevron Matching Employee Fund
Matching gifts given by Charles Rubins
Stewart L. Henry
Chase S. Reid
Sarah Springer and Rusty Riese
In memory of Walter H. Riese
Dayna J. Salter
George C. Sharp
Ronald E. Tepley
In memory of Ruth M. Tepley

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

INMEMORY

Austin D. Brixey Jr., 96
Deltona, Fla., Nov. 1, 2014
Joseph E. Brown, 91
Tucson, Ariz., Jan. 21, 2015
Howard W. Green, 89
Lubbock, Texas, Nov. 14, 2014
Gerald V. Mendenhall, 83
Midland, Texas, Dec. 30, 2014
Holmes P. McLish, 87
Denver, Feb. 3, 2015
David E. McRee, 71
Houston, Jan. 26, 2015
G. Allan Nelson, 92
Boulder, Colo., Jan. 21, 2015
Thomas W. Olsen, 62
Ardmore, Okla., Feb. 21, 2015
James N. Reeves, 89
Estes Park, Colo., Jan. 12, 2015
John J.W. Rogers, 84
Durham, N.C., Jan. 14, 2015
Ormon E. Shewmaker, 90
Henderson, Kent., Jan. 21, 2015
Glenn E. Sorensen Jr. (Member 1960)
Evergreen, Colo., Jan. 3, 2015
Russell A. Stephens, 88
Denison, Texas, Jan. 25, 2015
Thomas Luman Thompson, 87
Boulder, Colo., Jan. 22, 2015
Albert N. Ward Jr., 81
Grove City, Pa., Jan. 20, 2015
Robert S. Williams, 87
Bakersfield, Calif., Oct. 20, 2014
Harvey Charles Young, 82
Castle Rock, Colo., Jan. 28, 2015

(Editor's note: "In Memory" listings are based on information received from the AAPG membership department. Age at time of death, when known, is listed. When the member's date of death is unavailable, the person's membership classification and anniversary date are listed.)

Member Registry Service

AAPG: Your 'Career Partner for Life'

Present conditions in the industry are resulting in increasing competition for jobs and consulting opportunities. Geoscientists are facing career hurdles that are reminiscent for some and new for others.

At times like these, even a small advantage can assist their career future.

Our Member Career Services Committee, now more than ever, wants AAPG to be your "Career Partner for Life."

AAPG is ready to assist its members by offering the exclusive Member Registry Service.

Found through the AAPG homepage under the Career tab, this searchable electronic database allows you to showcase your expertise and allows our members an international, public platform to feature his/her individual area of professional expertise and years of experience.

Members are able to list all of their qualifications for review by potential clients and market themselves for their dream job – or, just build valuable networks of colleagues to meet with at meetings and reach out to when your current employer is in search of like-minded quality geoscientists.

It's a great way to foster scientific exchange, and an excellent way to seek out new colleagues in the areas and interests you care most about.

Sign up today to be part of this influential global network of professional colleagues and friends.

* * *

Another great way to network and get involved with other geoscientists in AAPG is to join a committee.

(Soon you also may want to join one of the new Technical Information Groups – TIGs – or Science Information Groups – SIGs – that will be forming in AAPG soon. In fact, if you have an idea for a TIG or SIG, now's the time to let AAPG President Randi Martinsen know about it.)

Regarding committees: Your input is definitely needed and valued, and any member of AAPG may ask to join a committee by contacting the committee's chairs.

The term of service is usually three years starting at the beginning of the fiscal year, July 1, and is subject to AAPG president's approval.

The list of all of the committees is below – or go to the AAPG committee website page, at www.aapg.org/about/aapg/overview/committees.

Find something you are passionate about and become engaged today!

- Academic Liaison
- Astrogeology
- Distinguished Lecture
- Education
- Field Safety
- Geophysical Integration
- GIS Publications
- Grants in Aid
- Group Insurance
- History of Petroleum Geology
- Imperial Barrel
- Investments
- Membership Career Services
- Membership Coordination and Communication
- Membership Recruitment
- Preservation of Geoscience Data
- Professional Women in Earth Sciences (PROWESS)
- Public Outreach
- Publications
- Publications Pipeline
- Research
- Reservoir Development
- Resource Evaluation
- Student Expo
- Visiting Geoscientist Program
- Young Professionals
- Youth Educational Activities

(Editor's note: The article was compiled by members of the Member Career Services Committee, chaired by Clint Moore.)

Emeritus Members

Long-term AAPG members with 30 or more years of cumulative membership who are 65 years of age or older may request to be reclassified as an Emeritus member.

Not only do you receive recognition for your longevity within AAPG, your annual membership dues are reduced by 50 percent. For those who are certified in any specialty within the Division of Professional Affairs, certification dues will also be reduced by 50 percent (maximum of one specialty reduction allowed).

Emeritus members also save 50 percent off on ACE/ICE meeting registration, both for themselves and their spouse/guest.

AAPG is proud to be able to offer these significant savings to those who have supported our organization, our science and our industry for so long.

In accordance with Association bylaws, members must request this change and it requires staff confirmation of eligibility.

Find out today if you qualify by contacting Member Services. Our staff is ready to assist you with any membership need. We welcome the opportunity to help you take advantage of these opportunities and answer any questions or offer any other assistance that may enhance the value of AAPG in your career.

Please contact us today at (918) 584-2555 or email us at Members@aapg.org

2015 Eastern Section AAPG Annual Meeting

September 19–23, 2015
Crowne Plaza Hotel and Union Station Conference Center
Indianapolis, Indiana

The Professional Geologists of Indiana invites you to attend the 43rd Annual Meeting of the Eastern Section AAPG, this September in Indianapolis. The theme for the meeting is **"Crossroads of the East"**, a reference to Indianapolis being centrally located between the Illinois, Michigan and Appalachian basins, and within the classic Trenton Field. The meeting will be held at the historic Union Station and adjacent Crowne Plaza Hotel in the heart of downtown Indianapolis.

Abstract deadline is June 1

Proposed Session Topics Include:

Devonian Shale Exploration and Development
Utica/Point Pleasant Exploration and Research
Trenton-Black River: Historic and Current
Basement Structure and Lithologies
Regional Tectonics, Gravity, Magnetics & Seismic
Regional Basin and Arch Geology
Carbon Sequestration
Coal and Energy Minerals
Environmental Aspects of E & P
Oil and Gas Regulation and Policy

Topical Seminars and Regional Field Trips are planned for before and after the meeting.

Exhibitors and Sponsors are welcome at the 2015 AAPG Eastern Section Meeting. We look forward to your support and attendance in September.

Go to **www.ESAAPG2015.org** for additional details.

Submit abstracts to Zak Lasemi, Technical Chair, at *zlasemi@illinois.edu*

Catch the Energy Wave!!

At the 2015 Pacific Section Convention

May 3-5, 2015 at Mandalay Beach Embassy Suites

Oxnard, California

The convention's setting on the southern California coast is a glorious spot to appreciate geology via two full days of technical talks and posters along with field trips and short courses both before and after the meeting. *Come partake of all the 2015 PSAAPG Convention offers!*

- The All Convention Luncheon will feature author and industry advocate ***Alex Epstein*** speaking on delivering an effective message of the value and importance of fossil fuels; his writings on energy have been published in the Wall Street Journal, Forbes, and Investor's Business Daily and he has spoken at dozens of universities, including Stanford, Duke, Rice, and UCLA.
- DEG Luncheon speaker ***Steve Bohlen***, California State Oil & Gas Supervisor will address new regulations for groundwater monitoring, public notification, and well integrity stemming from the use of well stimulation techniques, such as hydraulic fracturing.
- DPA Luncheon speaker ***Charles Sternbach*** will discuss the "Heritage of Discovery: Resources for Explorers", providing insight on playmaker case studies and discovery thinking forum presentations available online and making those part of an ongoing learning process for geoscientists everywhere.
- A special session on Mexican Energy Reforms will provide up-to-the-minute oil and gas law information.
- Guest trips to the Reagan Presidential Library and Historic Ventura and an evening harbor cruise on the paddlewheeler Scarlett Belle are part of the social schedule along with the Icebreaker and camaraderie in the Exhibit Hall.

Registration and reservation information is available at www.PSAAPG.org/2015convention
Contact: General Chair Joan Barminski at Joan.Barminski@boem.gov
Hosted by the Coast Geological Society www.coastgeologicalsociety.org

Coast Geological Society
Established 1948

READERS' FORUM

Geology

Regarding the March EXPLORER article, "Seismic Killed the Paleo Star": Older geologists have this quaint idea that geology has something to do with rocks and fossils. If a geologist does not believe this, they will soon lose their perspective into the maze of a 100-foot amplitude.

William Feathergail Wilson
Bandera, Texas

(Editor's note: Wilson is a graduate of the University of Texas, Austin, and a geologist of 55 years' experience.)

Re: Geology

William Wilson's comments are well taken. I read the article "Seismic Killed the Paleo Star" with great interest because it seems that paleontology, even geology, has taken a back seat to seismic in many exploration companies. I suppose that it is a form of natural selection and that companies have made the determination that less geology and more seismic works for them.

Those of us who believe that an understanding of the rocks is one of the most important attributes an explorationist can have are just seen as (and perhaps are) "old fashioned." Even the AAPG EXPLORER seems to have the attitude that everything is all about seismic. For some time I have lamented what seems to me to be the domination of geophysics articles in the AAPG EXPLORER.

Take a look at the main articles (in the March issue): "Downturn Offers Opportunity to Reprocess Seismic"; "Seismic: Moving Forward"; "Oil Prices, Other Factors Affecting Seismic"; "Geomechanics – New Opportunities for Seismic"; "Getting More Bang For Your P-Wave"; "Mexico Invites Seismic Exploration"; "A Delicate Balance: Seeing Faults More Clearly."

Perhaps this is the reason that advertisers in the EXPLORER also are dominated by companies selling or processing seismic data. Or could it be the other way around?

Stephen Franks
McKinney, Texas

(Editor's note: The March issue of the EXPLORER was our annual Seismic Advances issue, hence the emphasis on seismic.)

My Personal Experience

Regarding the March EXPLORER article, "Seismic Killed the Paleo Star": Some younger geologists, when not playing video games, seem to think geology has something to do with color scaling other peoples data thinking they can find "sweet spots" in warmer hues ... my 40 years in the oil patch started with hands-on micropaleontology in the Gulf of Mexico and the "thinking" behind the meaning of what I was doing through the boom and bust cycles of a successful and satisfying career.

Francis Bifano
Hummelstown, Pa.

CLASSIFIED ADS

POSITIONS WANTED

Department Description

The Petroleum Institute (PI) was created in 2001 with the goal of establishing itself as a world-class university and research center in engineering and applied sciences in areas of significance to the oil, gas and the broader energy industries. The PI's sponsors and affiliates include Abu Dhabi National Oil Company and several major international oil companies. The Petroleum Geosciences department currently has 16 faculty, and utilizes modern instructional laboratories and classroom facilities. A major research center is currently under construction and will be operational in late 2015. For additional information, please refer to http://www.pi.ac.ae/PI_ACA/pge/index.php.

Brief Posting Description

The successful candidate will work in the Petroleum Geoscience Department laboratories within the Petroleum Institute Research Centre.

Detailed Description

The candidate will be responsible for core and rock sample preparation with a particular focus on the production of petrographic thin sections. The successful candidate must have demonstrable experience in the production of high-quality mineral and rock thin sections for petrographic study; making impregnated thin sections and staining thin sections for feldspar and carbonate mineral identification. Other duties will include operation and general maintenance of relevant laboratory equipment and management of the laboratory inventory. In addition to this candidates should understand and keep current with all aspects of laboratory health, safety and sample preparation techniques.

Job Requirements

Candidates with a B.Sc. degree in geosciences, chemistry, biology, material science or closely related sciences are preferred, but outstanding, experienced candidates with a B.Sc. in other relevant subjects will also be considered. Demonstrable experience in the production of high-quality petrographic thin sections is essential. Strong oral and written communication skills in English are critical. The ideal candidate will be a highly motivated individual, who is a team player and possess strong computer and organizational skills.

Additional Details

Successful applicants should be available to take up the post in the 2015 academic year. The deadline for applications is 30th April 2015. Only shortlisted applicants will be notified.

The Petroleum Institute (PI) was created in 2001 with the goal of establishing itself as a world-class institution in engineering education and research in areas of significance to the oil and gas and the broader energy industries. The PI's sponsors and affiliates include Abu Dhabi National . Oil Company and several major international oil companies, namely Shell, BP, Jodco and Total. The campus has modern instructional laboratories and classroom facilities and is now in the planning phase major research centers on its campus. For additional information, please refer to the PI website: www.pi.ac.ae.

Salary/Benefits: Salary and benefits will be commensurate with qualifications and experience. The total compensation package includes a tax-free 12-month base salary, and a benefits allowance that covers relocation, housing, initial furnishings, utilities, transportation (automobile purchase loan), health insurance, child(ren) education, end-of-service benefit and annual leave travel. Applicants must be in excellent health and will be required to pass a pre-employment physical examination.

How to Apply

Interested candidates should submit all materials online at www.pi.ac.ae/jobs.

MISCELLANEOUS

SAMPLES TO RENT

International Sample Library @ Midland – Formerly Midland Sample Library.

Established in 1947. Have 164,000 wells with 1,183,000,000 well samples and cores stored in 17 buildings from 26 states, Mexico, Canada and offshore Australia. We also have a geological supply inventory.

Phone: (432) 682-2682
Fax: (432) 682-2718

* *

StarSteer – the Premier Geosteering Software Solution for the Oil & Gas Industry. Scientific, Modern and Interactive. Integrates all your data for ideal well placement.

www.rogii.com

* *

SES — more companies CHOOSE SES v5 over the other 15+ commercial geosteering software options on the USA market; browse its features/pricing/evolution online to see why. SES is niche 3D technical geosteering software TRUSTED by geologists everywhere. Free trial, online training, and class training available.

www.makinhole.com
Stoner Engineering LLC.

* *

BIG PAYOFF, SMALL OUTLAY

Mislead by: Sensitive clays? Conductive minerals? Bound water? Are you sure? Expert and Quick SEM Analysis $75

stolpergeologic.com

DIRECTOR'S CORNER

Putting Petroleum Geology in Layman's Terms

By DAVID CURTISS

It's hard to read a newspaper these days without seeing an article about oil.

The dramatic slump in oil prices since late 2014 and its effect on prices at the pump has received significant coverage. And here in North America the derailments of several trains transporting hydrocarbons, resulting in large fires, have focused attention on safety measures and further heightened the debate surrounding the Keystone XL pipeline.

Add to these topics the subjects of earthquakes, climate change and clean air initiatives and there is no end to the opportunities to provide our friends and neighbors with factual scientifically accurate information.

* * *

Recently I was speaking with **Rebecca Dodge**, chair of the AAPG Public Outreach Committee, about how we can best prepare our members to engage in these types of conversations.

Dr. Dodge is an associate professor of geosciences at Midwestern State University in Wichita Falls, Texas, and has a diverse background in petroleum geology, environmental sciences and remote sensing. She also is passionate about communicating good geoscience and broader energy issues with the general public, starting in the classroom.


CURTISS

Petroleum and geoscience are fundamental building blocks of modern society. Many people don't know that.

One of the things Rebecca and I discussed was the fact that there are a lot of resources already available to support these conversations. And rather than creating additional material, she and her committee are working to identify and evaluate these resources and post links to them on the committee's Web page at www.aapg.org for AAPG members and others to use.

Most of the petroleum-related issues currently in the news require a foundational understanding of how oil and natural gas fit into global energy consumption, and they're rarely presented with that context.

The resources currently posted online come from SPE's Energy4Me program, the AGI's Earth Science Week and the National Energy Education Development project. They're focused on the K-12 audience – some for younger children and some for older kids.

But that doesn't mean they're simplistic.

In fact, in my experience, if you can convey energy and science information at an eighth grade level you're probably going to communicate effectively to a general audience.

That is much tougher than it sounds, particularly for trained professionals such as AAPG members. We sprinkle a remarkable amount of jargon into our conversations about energy and geoscience. And we take for granted that our neighbor has ever really thought about the ground under his or her feet. It's dirt and rock, right?

But then you start talking about drilling for oil, and their mental image is of a straw poking into an oil-filled underground cave.

* * *

In a sense we've got to "un-train" ourselves and then retrain ourselves to clearly convey these basic energy and science principles so that our audience can understand. But it is possible – and emulating someone who does it well is a good way to learn this new approach to communicating.

By now most of you have either seen or at least heard of "Switch," the award-winning energy documentary by **Harry Lynch** and past AAPG president **Scott Tinker**.

But the film was just the beginning.

If you surf over to www.switchenergyproject.com you'll find a host of additional Energy 101 videos discussing energy issues and resources. They have also released a new series of Energy Lab videos. These videos are publicly accessible and they've developed a program to support educators with the ability to download curricula and the videos to use in the classroom.

You may never make your own documentary or develop your own outreach materials about energy and geoscience. But there are a lot of resources already out there.

Do you have any particular favorites?

If so, please reach out to Rebecca and the public outreach committee with your recommendations.

Petroleum and geoscience are fundamental building blocks of modern society. Many people don't know that.

It's up to us to help our family and friends understand.

DIVISIONS REPORT: DPA

DPA Offers Professional Support, Long and Short-Term

By RICK FRITZ, DPA President

The Italian sculptor Agostino d'Antonio worked diligently on a large piece of marble; unable to produce his desired masterpiece, he lamented, "I can do nothing with it."

Other sculptors also worked this difficult piece of marble, but to no avail.

But Michelangelo discovered the stone 25 years later, left degrading in an open courtyard, and saw the possibilities. He visualized David and began sculpting.

Michelangelo had vision and made things happen.

* * *

We have a good council this year for the Division of Professional Affairs (DPA), and I appreciate the "make-it-happen" attitude that we have experienced.

This year, for example, we have focused on providing education and building Web content. We also are working to make sure DPA has a presence in AAPG meetings. Mike Canich, DPA president-elect, is working to coordinate and schedule DPA activities in Section meetings and at AAPG's annual ACE and ICE conventions.

A key new DPA project is the AAPG DPA Playmaker program guided by AAPG Honorary member and past DPA President Charles Sternbach as chair of DPA forums and meetings. Recently we had a great Playmaker program in Midland, Texas, with Mike Party as chair – almost 300 attended this meeting due to the excellent program.

We also had a great program in London on March 2; however, the price of oil hit us pretty hard and we had low turnout, but those who attended loved the product.

Our most recent Playmaker was just held at the end of March in Calgary, Canada. John Hogg put together a great program, and you'll be able to read about it in an upcoming EXPLORER article.


FRITZ

The good news is by far the majority of our members are gainfully employed this time around. It's up to us to provide support to those who are temporarily caught in this current downturn.

Also in late February we held our annual Reserves Forum in Houston. Eleazar J. Benedetto-Padron and his volunteers worked hard to develop a good program. Registrations were down, but we still had 80 attendees– and 26 attended a following class by John Etherington.

* * *

It's not surprising that the price of oil and gas has a direct effect on attendance to AAPG and DPA programs. Like you, I hope this downturn is not too deep or too wide, and we can make adjustments and continue to grow.

Most of the recent layoffs were accompanied by decent to generous severance packages or transfers. Still, there have been the abrupt layoffs with a few minutes to grab your stuff and "get out of dodge."

I was at a meeting in Midland when a company laid off staff within a one-hour window, and met several young professionals who were in shock and were asking, "What do I do now? All my personal contacts are in my computer in the office!"

So what do we do now?

What is our responsibility as a professional society?

As professionals?

* * *

DPA is following several paths to provide support for our members and young professionals.

- Our first step was to ask the AAPG Executive Committee to be part of any action they plan to take regarding support of the membership. As a result we met in March with David Curtiss and several interested AAPG committees to discuss action items and possible joint programs.

The Membership Career Services Committee chaired by Clint Moore is taking the lead and they have several good programs that DPA can help support.

- Our second step was to develop a strategy for DPA action. It is a two-fold strategy – short term "triage" support and longer-term career management.

For short-term support we are developing a toolbox that everyone should prepare in the event of a layoff. The toolbox should contain items such as personal contacts, updated résumé and other private information such as agreements.

We also will provide a legal definition of "intellectual property."

Longer-term support is primarily developing a personal strategy for our careers. The reality is most of us will change jobs several times during our careers, and we should define our goals so we are prepared to adjust.

DPA has a tremendous knowledge base from which to draw in these areas.

For example, we have a great asset in a publication written by Jim Gibbs titled "Becoming an Independent Geologist: Thriving in Good Times and Bad."

DPA plans to provide career support information online and through webinars.

We also are working on a strategy for students. Primarily we are asking our members to reach out and provide personal support to students and advice to the universities. It is important to inform students of job opportunities and various career pathways.

The good news is by far the majority of our members are gainfully employed this time around. It's up to us to provide support to those who are temporarily caught in this current downturn.

* * *

DPA is designed to provide professional support in good times and bad. If you are not a DPA member, this is a great time to join – to find the professional support through our network of wise council.

Please talk to any DPA member if you are interested.

clearer views.

See Seismic Data in your future projects to maximize productivity.

call Seitel. drill Smart.

Make Seismic part of your vision for success by licensing data from the largest onshore library in North America. Our services will broaden your view and assist in providing the insight you need to ensure smart drilling decisions. Partner with us on your new venture and see the difference for yourself.

- Quality 2D and 3D seismic
- Acquisition management
- Fast-track processing
- Pre-stack depth migration
- Azimuthal analysis
- EarthStudy 360
- Multi-Component Processing
- 5D Interpolation

seitel.com

Visit seitel.com often to see our acquisitions in progress, and seize the competitive edge by being the first to license our latest data.

SEITEL