AAPG EXPLORER
JANUARY 2014

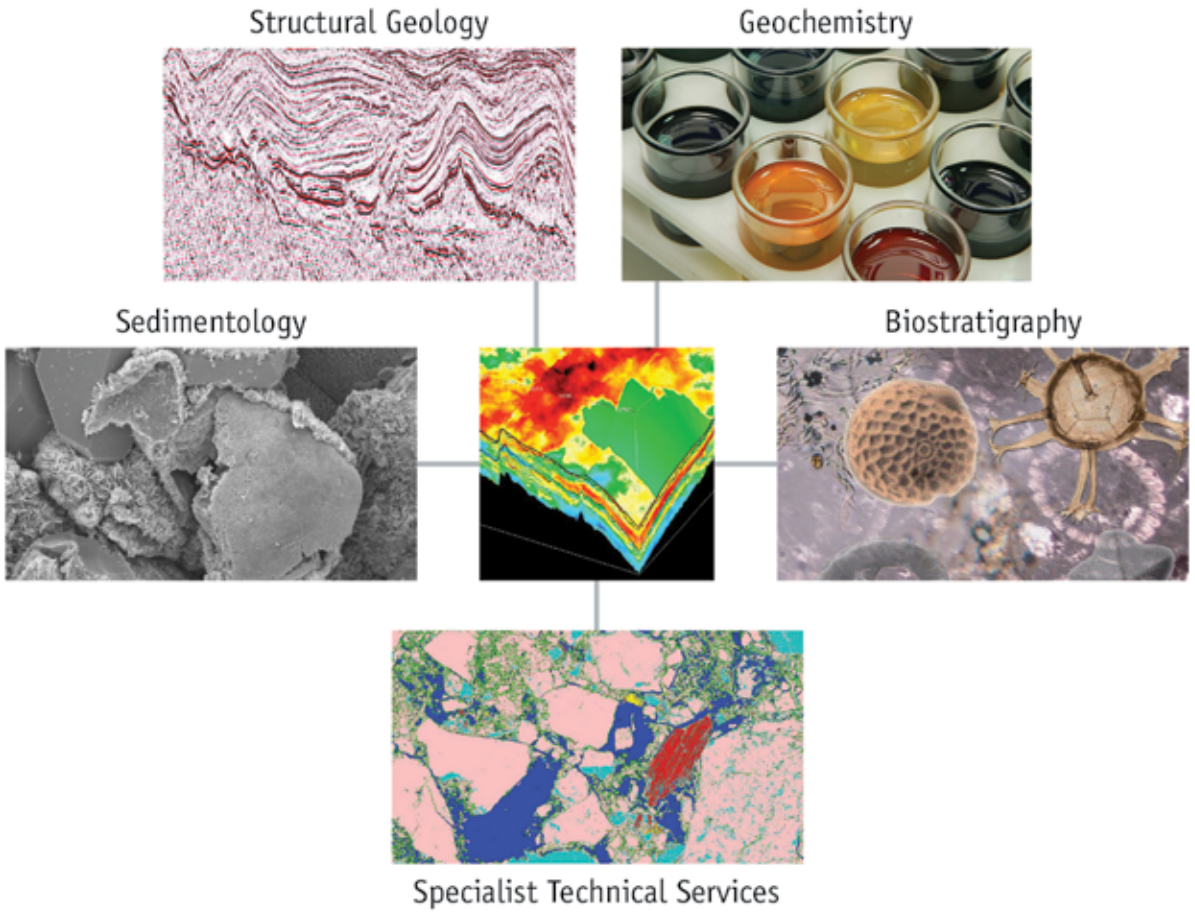
A Good Year?

Quality trumped quantity in 2013

See page 6

Core Strengths

Geological solutions to geophysical challenges



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Vol. 35, No. 1
January 2014

EXPLORER

PRESIDENT'S COLUMN

Six Down, Six to Go: Are We Doing What We Say?

BY LEE F. KRYSTINIK

Are the EC and I doing what we said we would do? And, more to point: What do we say we will do next?

As we near the mid-point in my term I thought it might be helpful to review a few of our priorities with you, as well as to update you on the present status of each objective.

My "to-do" list and those of the AAPG Executive Committee (EC) and our very able staff and management are quite a lot longer, but five of the key objectives are noted below:


KRYSTINIK

We are actively putting flesh on the bones of a three-year Business Plan that will bridge the gap between our annual budgets and Strategic Plan.

▸ **Support the construction of a GIS-based portal into AAPG's publications, to be online by our 100th anniversary**.

This project is well under way and showing excellent promise – our goal is to make our fantastic archive of geoscience more easily accessible as we click or finger-swipe our way through the infospace. We also are looking at external options as a backup while the internal system is built out fully.

▸ **Construct and implement three-year Business Plans, directly linked to our new Strategic Plan**.

Under the guidance of David Curtiss and David Lange, our executive director and deputy executive director, respectively, the AAPG staff is actively putting flesh on the bones of a three-year Business Plan that will bridge the gap between our annual budgets and Strategic Plan.

This effort also entails the process of documenting and streamlining existing business activities and establishing new business activity models.

▸ **Initiatives proposed through the Advisory Council (AC)**.

Although not part of my original goals, both have merit:

✓ Eliminating sponsorship as part of the membership process – This measure was approved by the AC and the EC, has now been approved by our lawyers and soon will be sent to the Membership committees for review and comment and to the House of Delegates for deliberation and what we hope will be approval. This is an important step toward expanding inclusivity within AAPG.

My domestic and international travels for AAPG have shown me that what I might have thought was a non-issue really is an issue, both internationally and, perhaps more surprisingly, in North America. Sponsorship constitutes a major cross-cultural issue around the world. The process of requesting sponsorship is something very different overseas and ranges from a loss of personal business power to being a direct insult. Sponsorship, even by one sponsor, is seen very negatively in other cultures, and this policy is directly preventing people who should be members of AAPG from becoming members.

This issue becomes ever more important as AAPG continues to expand globally (we now have members from 116 countries, comprising over 40 percent of our membership).

An additional eye-opener for me has been similar feedback from fellow North American members with a broad spectrum of experience, from YPs to those nearing retirement, who consider the sponsorship process a needless hassle in the modern world of petroleum geoscience; the issue is not uniquely "international."

✓ Formation of Technical Interest Groups (TIGs) and Special Interest Groups (SIGs) – This measure opens the path for formation of additional groups (potentially technical divisions along the lines of the new Petroleum Structure and Geomechanics Division) to focus on creation of new technical content generation within AAPG.

The measure and a second measure in favor of governance representation of these groups have passed the AC. The formation of TIGs and SIGs has passed the EC, but both related measures will be worked within an ad hoc committee to flesh out implementation and identification of potential unintended consequences.

It is not yet clear whether the recommendations and final EC vote will occur in time to submit the issue to the HoD for its meeting at ACE 2014.

▸ **Fiscal Control Measures**.

We must operate within our fiscal means and manage the possibility of a downturn in our industry. Accordingly fiscal discipline is required. Large ticket items subject to EC focus are:

✓ Imperial Barrel Award program ($750,000/yr) – An ad hoc committee was assigned an overview of the IBA during Ted Beaumont's presidential term and continued into mine. They have made clear recommendations to be implemented to keep the very popular IBA program operational in the event of a severe sponsorship drought that would radically reduce spending.

✓ 100th Anniversary celebration – Planning is well under way, but a lot more planning and information gathering will be required before a detailed budget is in hand. We anticipate establishing clear fiscal targets with the 100th Anniversary Committee before the end of my term.

✓ Datapages – We will be working with the Datapages Board of Directors and staff toward generating royalty revenue back to AAPG for AAPG content.

Our intent is for Datapages, a wholly owned, for-profit subsidiary, to continue to deliver substantive positive net cash flow to our publishing partners and to its owner.

✓ Financial buffer – Our present financial buffer is about nine months of operation in a no-income scenario; we aim to extend this buffer to 18 months. Some anticipated surplus for this year will be directed to the buffer if possible.

▸ **Build new bridges with sister societies, Regions, Sections and local societies**.

AAPG aspires to have productive and mutually benefical relationships with our partner societies. We've still got some work to do.

We are actively involved with sister societies in a number of meetings, of course, URTeC being a good recent example. We plan to engage the Young Professionals in Energy (YPE) to look for new avenues for our YPs in building contact networks.

However, friction or outright conflict still occurs between AAPG and AAPG

See **President**, next page

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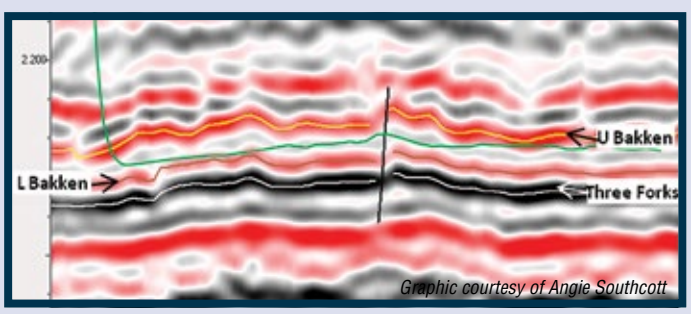

Graphic courtesy of Angie Southcott

ON THE COVER:

A look at Statoil's Ocean Rig Poseidon, which made one of the year's top five discoveries, offshore Tanzania. For Statoil and partner ExxonMobil Corp., it was just one more chapter in a good story that the companies have written – their crews have made a string of gas discoveries in East Africa, where the Tcfs keep piling up. What were the other top discoveries for 2013? See story on page 6. (Hint: Think offshore.) Photo courtesy of Statoil. On this page: Data shows how 3-D seismic is improving geosteering in the Bakken. Story on page 20.

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Get to Know the Executive Committee Candidates

Videos of all six AAPG officer candidates for the 2014-15 Executive Committee – featuring a new question-answer format – continue to be available online, where they will remain through the election season.

Also available on the website are biographies and individual information for the candidates.

The candidate videos are presented in a new format that shows them responding to six specific questions, intended to allow members around the world to have a better introduction to those running for office.

Those questions include:

- When and how did you decide to become a geologist – and why?
- What has been your experience with AAPG?
- What is the main issue facing the profession today?
- How could you help AAPG be a better association?
- Why did you agree to stand for office?

Printed information on the candidates also will be included in an EXPLORER in early 2014. Ballots will be mailed and online voting will begin in spring 2014.

The person voted president-elect will serve in that capacity for one year and will be AAPG president for 2015-16. The terms for vice president and treasurer are two years.

To view the videos, go online to www.aapg.org/business/candidates/.

The slate is:

President-Elect

❒ **Alfredo E. Guzmán**, consultant, Veracruz, Mexico.

❒ **John R. Hogg**, MGM Energy Corp., Calgary, Canada.

Vice President-Sections

❒ **Steven H. Brachman**, Wapiti Energy, Houston.

❒ **Hannes E. Leetaru**, Illinois State Geological Survey, Urbana, Ill.

Treasurer

❒ **Vlastimila Dvorakova**, Czech Geological Survey, Brno, Czech Republic.

❒ **James W. Tucker**, consultant, Houston.

New Website Due This Month

By JANET BRISTER, AAPG Website Editor

A new year is here, and the new look is about to arrive.

As reported, the AAPG website appearance will be dramatically different in January. The exact date was unknown at press time, but when it happens it will be sudden and fast – there will be no gradual move from the current site to the new.

The new design is intended to provide all members with a better website experience – the place for you to begin finding, talking, collaborating and contributing more to your career, this Association and the petroleum geosciences.

AAPG does a lot of things – and the website will be designed to get the information about every single one of them into the hands of our membership and the world.

And beyond the crucial need for information – about the Association, membership, industry and profession – the new design will place a priority on the science of geology that inspired the forming of AAPG.

Science is the star of the new website.

There will be a feature page specific to scientific disciplines. It will feature articles from not only the publicly available EXPLORER but also from the scientific papers presented at meetings, articles published in books and the BULLETIN, and as the discussion forums develop, the content that is being shared there.

All content on the site will be categorized in such a way to cause events, training, information, and even people sort into these disciplines.

The Profile's the Thing

Critical to your experience in using the site will be the login. Members and nonmembers alike are encouraged to register to use the site because your comments and observations within the site will shape it for the world.

Look for the login button and take the time to build your profile.

President

from previous page

Sections and Regions. Local societies, sometimes quite justifiably, see AAPG as an organization that shows up with a list of things that they should do for AAPG, with little in return for the local group.

Improving these relationships will be a multi-year process, but the EC and I will work from an attitude of, "What can AAPG do for you?"

So, this is where we are mid-way through my term – and where we say we are headed. Much remains to be done in a short time.

The great news is that president-elect Randi Martinsen will be taking over the reins when I am done, and I can promise you that Randi knows how to accomplish what she says she will.

Please feel free to "ping" me at lee.krystinik@aapg.org and I will gladly share your comments with the EC as we strive to do all we have said we will do!

'Interesting' developments dominate

No Elephants, But Plenty of Potential for 2014

By DAVID BROWN, EXPLORER Correspondent

If you pay attention to the Chinese zodiac, you'll know that 2013 was not the Year of the Elephant in international exploration.

Heck, it wasn't even the Year of the Big Gorilla.


STARK

As 2013 drew to a close, there had been "no King Kong discoveries" reported from exploratory drilling around the globe, said AAPG Honorary member Pete Stark, senior research director and adviser for IHS in Englewood, Colo.

"We've got some interesting things going on. It looks like this might be one of the first years we'll have less than 400 discoveries outside the United States and Canada," Stark said.

You'd have to go back to the 1970s to find a time when the industry averaged 400 oil and gas discoveries outside North America, he noted.

"In 2008, we had over 700 discoveries outside the onshore United States and Canada," Stark said.

Another problematic trend: No one was finding giant oil fields, fields with more than 500 million barrels of recoverable crude oil.

By early December, the industry had seen only 11.8 billion barrels of oil equivalent in discoveries, including only an estimated 4.9 billion barrels of crude, according to Stark.


Photo courtesy of Cobalt International Energy Inc.

The Petroserv SSV Catarina rig drilled the Lontra #1 well offshore Angola.

Reasons Why

So what was going on?

Think about a couple of things.

First, some big countries that typically report major discoveries just didn't see that much successful exploration activity.

Second, consider the political situation in many of the world's significant oil provinces, where you might expect big discoveries.

Anything political going on in Libya? Iraq? Egypt? Venezuela? Even Algeria got hit with a terrorist attack at a hydrocarbon facility in January. Much of the oil-prone world looked like a political basket case in 2013.

"China is down. The former Soviet Union is way down from what it used to be. Libya is down," Stark said. "There's a lot of geopolitical stuff going on in places in the world that are oil-prone, and that's been impeding investment."

And there's a third trend: Companies did pretty well at finding new reserves of natural gas in 2013. Most of that barrels-of-oil equivalent stuff was gas, and maybe condensate, with only scattered meaningful discoveries of crude.

"If we look at just the oil discoveries last year, the biggest one reported to date is Statoil's Flemish Pass discovery offshore Newfoundland," Stark said. "We give it 425 million barrels."

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Year in Review

from page 6

Here are the top five wells of 2013:

1. Cobalt International's Lontra #1 pre-salt discovery well in Block 20, offshore Angola.

The company initially reported this as an oil and gas find but it looks to be primarily gas/condensate, Stark said.

2. Eni's Agulha discovery in Area 4, offshore Mozambique.

The Agulha structure could hold 5-7 trillion cubic feet (Tcf) of gas, the company estimated.

3. Statoil ASA's Tangawizi-1 well on Block 2 offshore Tanzania.

Statoil and partner ExxonMobil Corp. have made a string of gas discoveries in East Africa, where the Tcfs keep piling up.

> **"That Angola discovery is really a key for Africa. We may see the start of a significant new boom in presalt drilling."**

4. The Ogo-1 discovery on the OPL310 license offshore Nigeria, by Optimum Petroleum Development Ltd., Afren plc and Lekoil Ltd.

Total oil and gas in place is still being evaluated in the Cretaceous Ogo play.

5. The Bay du Nord discovery drilled by Statoil ASA with partner Husky Energy on EL1112, about 310 miles offshore St. John's, Newfoundland.

The find confirmed oil-production potential revealed by Statoil's nearby Harpoon discovery, announced earlier in 2013.

Elsewhere, significant oil discoveries continued in the Kurdish region of northern Iraq.

Africa

Cobalt's exploration project in the Kwanza presalt basin offshore **Angola** was closely watched by the industry, in hopes of seeing an analog to drilling results offshore Brazil.

"That Angola discovery is really a key for Africa," Stark noted. "We may see the start of a significant new boom in presalt drilling."

He also identified oil discoveries onshore Kenya by Tullow Oil plc as a meaningful development in African exploration. Tullow announced a northwestern Kenyan oil find near the Uganda border early in the year.

"That's the first real breakthrough in **Kenya**. There was a follow-up at 60 million barrels, and that was also Tullow," Stark said.

Several companies either discovered or verified major gas accumulations offshore **East Africa**.

In **North Africa**, Sonatrach announced an oil discovery in **Algeria** about 70 miles from Hassi Massaoud, the country's largest oil field.

Far East/Asia-Pacific

The Far East region was the most successful area for a number of new discoveries in 2013, although the average field size was less than 15 million barrels of oil equivalent, Stark noted.

"**Malaysia**, **Indonesia** and **India** are at the top of the pack," he said. "**China** is a distant fourth. A lot of that is natural gas."

In **Australia**, oil discoveries continued in the onshore Cooper Basin, which includes unconventional targets. Explorers landed good wells offshore Indonesia and OMV of Austria continued its success in **Pakistan**.

Latin America

"If you look at South America, it's had surges," Stark observed, "with the big surge being the **Brazil** deepwater."

Onshore northern **Mexico**, the Burgos Basin, the Sabinas Basin and a possible southern extension of the Eagle Ford unconventional play into the country are being eyed.

"The results have been a mixed bag," Stark said. "Wells are IP-ing at one-to-three million cubic feet a day. The costs on the Mexican side are fairly steep."

Drilling continued in the Neuquen Basin in **Argentina**, where tentative, early production from the Vaca Muerta shale began early in 2013. Stark noted that most wells in the basin are still vertical.

In unconventional exploration in **Colombia**, "there are no great signals at the moment whether tight oil will have a breakthrough," he said.

Europe/North Sea

Exploration success offshore **Norway** and in the northern **North Sea** prolonged hope for the area as an oil-producing province.

"Amazingly, it's doing okay," Stark said.

Going into an established field area, Statoil said it sees up to150 million recoverable barrels of oil equivalent in new resources in its Gullfaks license area. Gullfaks is in the North Sea's Shetland group/Lista formation.

"The other thing that's going to be interesting in Europe is what might be the geopolitical fallout from the controversy over fracing," Stark said.

For whatever reason, 2013 brought a lull in international exploration activity. Stark believes geopolitics was a big influence.

"I think it's the uncertainty factor out there," he said. "A lot of companies have shifted away from that uncertainty into North America."

Last year could have been nothing more than a lull. Or it might have been the start of an important transition. Call it a question mark year, not an exclamation point.

"It's an intriguing year," Stark said. "And I think it's one that has a lot of people scratching their heads."

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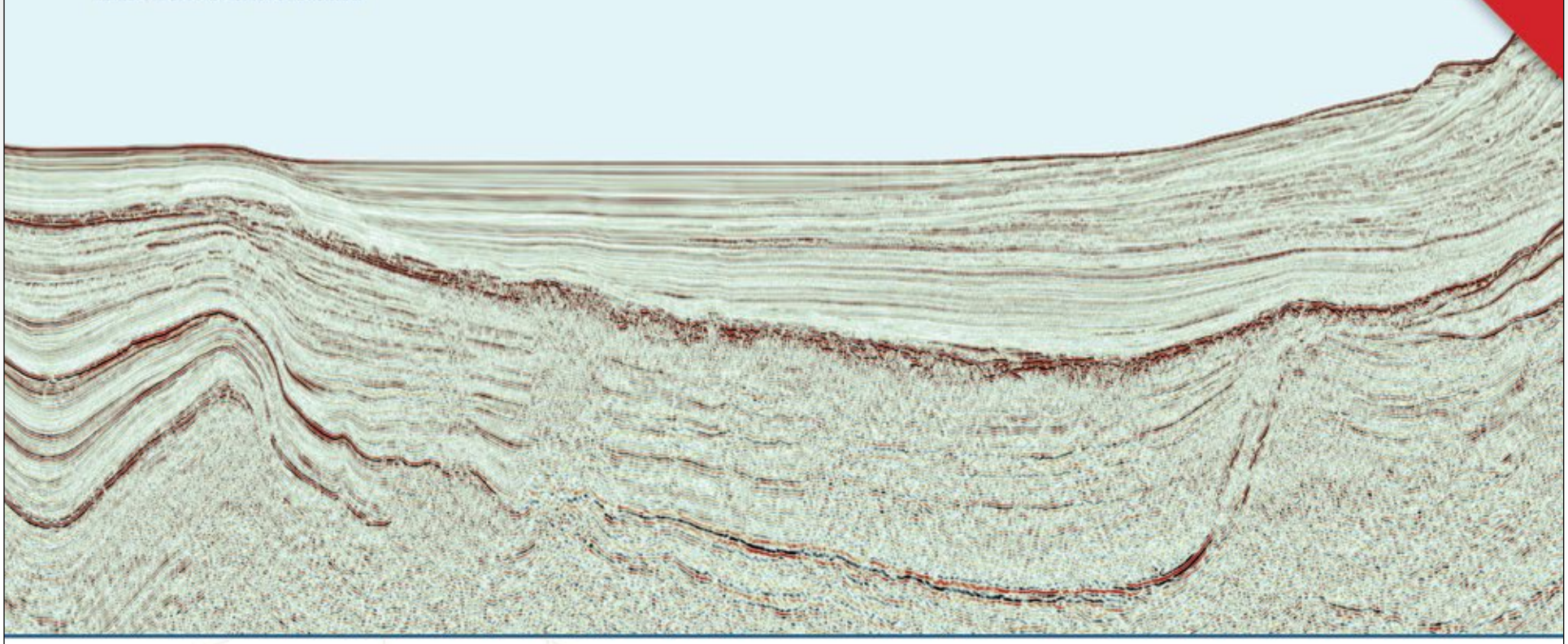

Spectrum is acquiring a truly unique Multi-Client seismic survey offshore Croatia. Only Spectrum are able to license seismic data in this hugely underexplored region which expects to see its first offshore licensing round this year.

The survey, acquired under contract to the Ministry of the Economy in Croatia, will cover approximately 14,000 kilometres of long offset seismic data with a 5 km x 5 km grid. It will extend across most of the Croatian Adriatic Sea and connect with Spectrum's reprocessed seismic data covering the Italian Adriatic Sea.

Final processed products will be available by the end of Q1 2014. The Government of Croatia plans to hold an offshore licensing round in 2014.

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Exploration highlights for 2013

Discoveries Made It a Year to Remember

By DAVID BROWN, EXPLORER Correspondent

Some highlights from international activity in 2013:

January

Petroamerica Oil Corp., Calgary, tested the No. 6 oil well in Las Maracas field in the Llanos Basin of Colombia at 600 barrels/day from the Une formation. The well found 100 feet measured depth of pay in the Mirador, Middle Gacheta, Lower Gacheta and Une.

Petroleo Brasileiro SA opened a deepwater postsalt oil reservoir in Marlim Sul field in the Campos Basin offshore Brazil with the 4-MLS-105D-RJS well, also called Mandarim. The Petrobras well cut a 100-foot oil column in Eocene arenaceous reservoirs at 2,965 feet.

Wintershall Norge AS, operator of production license 475 in the Norwegian Sea, made a gas/liquids discovery with wildcat 6407/1-6S. Exploration targets were in Middle Jurassic Garn and Ile formations and Cretaceous Lange formation.

Pan Orient Energy Corp., Calgary, said the L53-DC1 appraisal well on a fault block in L53 D East field in Thailand found 55 meters true vertical thickness of net oil pay in six sandstone reservoir intervals in the A4, A3, A2 and A1 zones.

February

Salamander Energy identified 131 feet of net oil and gas pay in stacked Pliocene channel sandstones with its South Kecapi-1 exploration well in the North Kutei Basin offshore Indonesia. On testing, the well flowed 6,000 barrels of light oil/day and eight million cubic feet/day (MMcfd).

Key Petroleum said it found oil shows in a 141-foot interval in the lower Grant and Goldwyer formations from 3,002-3,143 feet at its Cyrene-1 exploration well in the onshore Canning Basin, Western Australia. The well also targeted the deeper, conventional Willara formation.

ENI reported an oil discovery at its Rosa North 1X well in the Meleiha concession in Egypt's Western Desert. It said the well encountered about 250 feet of pay in multiple sandstones of the Bahariya, Alam El Bueib, Khatatba and Ras Qattara reservoirs.

Chevron Corp.'s Kentish Knock South-1 exploration discovery well encountered about 75 meters of net gas pay in the upper Mungaroo Sands offshore Western Australia.

Harvest Natural Resources, Houston, announced an oil discovery in the pre-salt layer offshore Gabon, West Africa. The Dussafu Tortue Marin-1 was drilled in 380 feet of water to a vertical depth of 11,260 feet. A sidetrack found 65 feet of oil pay in the primary Dentale reservoir.

Gran Tierra Energy Inc. said initial drilling results from the Bretaña Norte 95-2-1XD exploration well in Peru indicated oil-saturated reservoir with a gross oil column of 99 feet.

Tullow Oil plc and Africa Oil Corp. tested a cumulative 2,351 barrels/day of oil from two shallow sands at the Twiga South-1 discovery well in northwestern Kenya. The well produced from two sands in the Auwerwer formation.

Photo courtesy of Eni

A skyward view from the well at Eni's Agulha discovery in Area 4, offshore Mozambique.

Abu Dhabi National Energy Co. hit oil at the new Darwin field offshore Scotland. Two oil columns were discovered next to the TAQA-operated Cormorant South, North Cormorant and Pelican fields in the northern North Sea.

Senex reported an unconventional gas find with the Paning-2 exploration well in onshore permit PEL 90 in the northern Cooper Basin, Australia. Senex said the well was drilled into a 13-square-mile structure estimated to contain 2.1 trillion cubic feet (Tcf) of potential gas in place. It intersected 154 feet of net gas pay in Permian tight sands and 230 feet in Patchawarra Trough deep coals.

Pacific Rubiales Energy Corp. discovered gas and condensate with the Manamo-1X exploration well in the Guama Block in the Lower Magdalena Basin, onshore northern Colombia. Maximum flow was 4.9 MMcfd and 296 barrels of liquids/day. The well targeted low-permeability, Miocene Porquero Medio C and D sands and silts and found a new reservoir in the Medio D.

Bowleven plc said the IM-5 well offshore Cameroon encountered liquids-rich pay in both the Middle Isongo and Intra Isongo reservoir objectives. Additional sands were found below water contact. The well was drilled to 3,430 meters measured depth.

GeoPark Holdings Ltd. announced the discovery of the new Palos Quemados gas field on the Tranquilo Block in Chile. A test in the El Salto formation at about 2,641 feet yielded production of four Mmcfd.

Eni SpA confirmed the potential of the Mamba complex offshore Mozambique with the Coral 3 delineation well. Coral 3 hit 383 feet of gas pay in an Eocene reservoir and added at least four Tcf of gas in place in the country's Area 4.

Hess Corp. drilled its seventh consecutive successful exploratory well on the deepwater Tano/Cape Three Points block offshore Ghana. The Pecan North-1 hit about 40 feet of net oil pay in a Turonian reservoir.

March

Apache Corp. completed an oil and gas/condensate discovery on the north flank of the Khalda Ridge in Egypt's Western Desert. The Amoun NE-1X discovery tested at a combined rate of 3,186 barrels/day of oil and condensate and 11 Mmcfd from two zones in the Jurassic Upper and Lower Safa formations.

DONG Exploration & Production Norge found oil and gas with wildcat well 3/7-8S on production license 147 the southern North Sea, around 1.5 miles south of the Trym field. The Norwegian Petroleum Directorate (NPD) put preliminary estimates at 8.4 million-16.8 million barrels of oil equivalent (boe).

Lundin Petroleum announced a subsidiary discovered oil in the Ara-1 well drilled in Block PM308A offshore peninsular Malaysia. Ara-1 was drilled to13,221 feet in 246 feet water depth and encountered nine thin oil-bearing sands. The target was an extension of Paleogene intra-rift oil sands.

Qatar reported an offshore gas discovery of 2.5 Tcf at the 4-North offshore block near the large North Field. The exploration consortium includes Wintershall AG of Germany and Mitsui Gas Development Qatar.

Ecopetrol reported the presence of heavy oil at the Pastinaca 1 exploratory well within the Colombian town of Puerto Lopez, Meta Province. Initial tests yielded average production of 202 barrels of oil/day with a water cut of 80 percent.

Chevron Corp. made a deepwater oil discovery on the Coronado prospect in the Gulf of Mexico, about 190 miles off the coast of Louisiana in in 6,127 feet of water. The Walker Ridge Block 98 Well No. 1 was drilled to 31,866 feet and logged more than 400 feet of net pay.

Wintershall claimed an oil and gas discovery with the Hibonite-1 well, drilled to a total depth of 14,537 feet in water depth of 170 feet. The Hibonite structure is in the 5/06 license in the Danish sector of the North Sea.

April

Newfield Exploration Co. announced a natural gas discovery in the Block SK 310 production-sharing contract area 50 miles offshore Sarawak, Malaysia, in water depth of about 250 feet. The B-14 well encountered 1,800 feet of gross column and 1,585 feet of net gas pay in the main carbonate objective, the company said.

Petroleum Development Oman labeled its Mabrouk Deep a gas/condensate discovery, with an estimated 2.9 Tcf of gas and 115 million barrels of condensate in place in the northern part of its concession area, 25 miles west of Saih Rawl field.

Lundin Petroleum and partners notched an oil discovery on the western flank of the Utsira high about 10 miles south of Edvard Grieg field in the central North Sea offshore Norway. The 16/4-6S exploratory well on the Luno II prospect in PL359 drilled through almost 660 feet of sand and proved a gross oil column in excess of 130 feet.

Americas Petrogas Inc. of Calgary announced a vertical gas-condensate discovery on the Los Toldos I block in Argentina's Neuquen Basin. The 2012 Aguada Los Loros x-1 well encountered 1,844 feet of Vaca Muerta shale plus other secondary targets. After hydraulic stimulation in 2013, production reached 3.2 MMcfd with 9-18 barrels/day of condensate.

Genel Energy plc hit a significant oil and gas discovery in the Kurdistan Region of Iraq. It said the Chia Surkh-10 well flowed as much as 11,950 barrels/day and 15 Mmcfd of gas. Total depth was 1,696 meters in an Oligo-Miocene section. The

See **Discoveries**, page 12

Discoveries

from page 10

Chia Surkh block borders Iran in the far southeastern Kurdistan Region.

An Apache Corp. Australian subsidiary discovered gas with the Olympus-1 exploratory well in the northern Carnarvon Basin offshore Western Australia. Olympus-1 penetrated gas-bearing sands in the Cretaceous Lower Barrow and Triassic Mungaroo formations.

A Tullow Oil plc-led group tested oil from the lowermost pay zone at the Ngamia-1 discovery well in the Lokichar Basin in Kenya, recovering 281 barrels/day from the Lower Lokhone on Block 10BB. Logs and sampling indicated up to 141 feet of potential pay.

Anadarko Petroleum Corp. and partners identified a new natural gas accumulation near the center of Offshore Area 1 in the Rovuma basin offshore Mozambique. The Orca-1 well encountered 190 net feet of gas pay in a Paleocene fan system in a single large column, Anadarko said.

Statoil established new-pool potential in the Gullfaks oil and gas field in the Tampen area of the North Sea offshore Norway with the 34/10-A-8 production well. It cited new resources in the Lower Paleocene Lista formation of the Upper Cretaceous-Paleocene Shetland group.

P1 Energy Corp., Calgary, and partners made a Mirador oil discovery on the Llanos 32 block in Colombia's Llanos basin. The Bandola-1 tested at an average 3,094 barrels/day. Total depth was 11,594 feet. The well went on production in April 2013 making 2,600 barrels/day, P1 Energy said.

May

Noble Energy Inc. said its Carla South exploratory well on Block I offshore Equatorial Guinea encountered oil in good-quality sandstones. A sidetrack found additional pay zones.

Eni Pakistan Ltd. said its Lundali-1 new field wildcat was a gas discovery on the Sukhpur block in the Kirthar fold belt, about 168 miles north of Karachi, Pakistan. The well struck Paleocene-sequence gas and flowed at 33 Mmcfd.

Statoil Petroleum AS and its partners in the offshore Grane unit attributed 18-33 million barrels of recoverable oil to a discovery well on North Sea license 169 B2. Exploration well 25/11-27 well proved an oil column of 66 feet in the Heimdal Formation in waters about 90 miles west of Stavanger, Norway.

Noble Energy and partners announced gross resources of about 1.8 Tcf in the Karish discovery well offshore Israel, plus derisked resources in an adjacent fault block. The discovery went to 15,783 feet total depth in 5,700 feet of water and encountered 184 feet of gas pay in Lower Miocene sands.

June

Idemitsu Oil & Gas Co. and two Japanese company partners announced a gas/condensate discovery in almost 400 feet of water on Vietnam offshore blocks 05-1b and 05-1c, about 190 miles southeast of Ho Chi Minh City. The discovery well was drilled to total depth early in 2013.

GeoPark Holdings Ltd. and partners put the Tarotaro-1 discovery well on oil production on the Llanos 34 block in Colombia. The well produced 2,239 barrels/day from the Guadalupe formation at 29,965 feet. GeoPark said it has identified several more prospects on the block.

Senex Energy, Brisbane, identified a gas resource of up to 2.9 Tcf in the Mettika embayment of the southern Cooper basin in South Australia. The Kingston Rule-1 and Hornet-1 wells flowed at stabilized rates up to 2.2 MMcfd from a conventional Early Permian tight stratigraphic reservoir.

Statoil claimed a second discovery of light oil in the Flemish Pass basin offshore Newfoundland with partner Husky Energy. Drilling was on the Harpoon prospect in 3,610 feet of water on EL1112, about 310 miles northeast of St. John's, Newfoundland.

July

Pakistan Petroleum Ltd. said its Adam X-1 discovery well flowed 14.3 MMcfd gas and 125 barrels/day of liquids from the Lower Basal sands of the Cretaceous Lower Goru formation in the Sanghar District of Sindh Province, Pakistan, 145 miles northeast of Karachi.

Apache Energy's Bianchi-1 wildcat found gas in retention lease WA-49-R, in 240 meters of water offshore Western Australia. Logs and pressure testing confirmed 112 meters of net gas pay in the Triassic-age Mungaroo formation.

W&T Offshore Inc., Houston, made a subsalt discovery with the Ship Shoal 359 A-14 well in the Mahogany field on the Gulf of Mexico shelf, logging more than 370 feet of net oil pay. Production was 3,030 barrels oil/day and 5.6 Mmcfd gas below 17,200 feet. The company said the subsalt T sands are the deepest sands discovered at Mahogany.

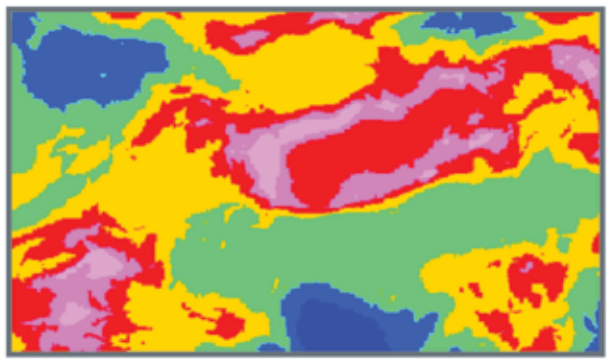
In China, CNOOC Ltd. found oil and gas at its Bozhong 8-4 well and oil at the Kenli 10-4 discovery well in Bohai Gulf. Kenli 10-4 was drilled to 7,860 feet in 50 feet of water on the south slope of the Laizhou Bay sag. Production during testing was around 2,800 barrels/day.

Serinus Energy said it recovered oil and gas from Visean-age formations at the Makeevskoye-3 exploratory well on the North Makeevskoye license in Ukraine. The

See **Highlights**, page 14

The Neuquén you never knew

Uncovering the hidden secrets of one of the world's largest shale plays



Using predictive analytics, NEOS GeoSolutions combined hyperspectral, magnetic, electromagnetic (EM), gravity, and seismic datasets to determine optimal drilling locations. Warmer colors indicate higher prospectivity.

Argentina's Neuquén Basin is one of the world's most dynamic and underexplored hydrocarbon systems. Its two principal shale targets – Los Molles and Vaca Muerta – have been rich source rocks for the conventional reservoirs that have been produced in the basin for more than 50 years. With new technologies available for unconventional asset exploration and development, producers are taking a second look at these extremely thick oil- and gas-charged shales. While several seismic and non-seismic datasets have been acquired, the coverage lacks uniformity, and no one has been able to integrate the data into a single, actionable interpretation — until now.

NEOS GeoSolutions has acquired high-resolution, airborne geophysical data over 30,000 square kilometers of the Neuquén Basin. Using innovative, multi-measurement methodology, the company has integrated these new measurements with existing well, geological, geochemical, and seismic data available in the public domain, from third parties, and from the project's underwriters. NEOS designed the Neuquén survey to provide the project's underwriters with an enhanced basement-to-surface understanding of the basin and its potential.

Initially, high-resolution hyperspectral imaging was acquired to map the regional lithology, the total organic carbon (TOC) of the target shales, and oil seeps and indirect hydrocarbon indicators on the surface. A second work stream generated 3D models constrained by the structural aspects of existing seismic lines, available well data, and newly acquired gravity and magnetic measurements. These models provided useful exploration insights by depicting isopachs, burial depth, depth-to-basement, and proximity-to-intrusives for all target shale horizons.

The team also developed a new hydrocarbon maturation model by combining the 3D model, existing basin TOC models, and surface samples. This analysis identified new areas of opportunity previously considered to be overmature. By interpreting the locations of volcanoes and intrusives from airborne magnetic data, a new thermal gradient model was developed, refuting the misconception that intrusives had terminally degraded regional opportunities.

Finally, NEOS combined all datasets using a geostatistical data mining technique called predictive analytics. By analyzing key attributes – including shale thickness, a set minimum amount of overburden over the objective, a minimum of faults and fractures along the drill path or near the bottom-hole location, the potential for generated and retained liquid hydrocarbons, and a relatively flat topographic area for drilling – NEOS and client geoscientists highgraded acreage to identify optimal drilling locations and reveal the lucrative secrets of the Neuquén.

▶▶▶ To learn more about this project or others in the *Unlock the Potential* series, visit: www.ThePotentialUnlocked.com

HIGHLIGHTS

KEY TECHNOLOGIES:

- MAGNETIC
- GEOCHEMISTRY
- GRAVITY
- HYPERSPECTRAL
- PREDICTIVE ANALYTICS
- SEISMIC REINTERPRETATION

AREA: Neuquén Basin, Argentina

CUSTOMER: Supermajor

FOCUS: Regional Mapping

TYPE: Unconventional

KEY INTERPRETIVE PRODUCTS:

- ↗ Regional 3D subsurface models
- ↗ Horizon-specific isopach maps
- ↗ Estimates of gas-in-place on an areal basis, developed using multi-variate analysis

CUSTOMER BENEFITS:

Reveals new prospectivity in the frontier portion of an established basin by integrating new airborne geophysical measurements with existing seismic, well, and geological and geophysical (G&G) data.

neos

Highlights
from page 12

NM-3 well reached 7,960 feet measured depth after penetrating metamorphic basement.

August

Eni Congo SA said two discovery wells offshore Congo proved a resource of 600 million barrels of oil and 700 billion cubic feet (Bcf) of gas in place. The Nene' Marine-1 well was drilled to 9,886 feet in 80 feet of water, on Marine XII block 11 miles offshore. It found wet gas/light oil in a presaline, clastic, Lower Cretaceous sequence. Nene' Marine-2 confirmed the find.

Total Gabon called its Diaman-1B exploratory well the first deepwater discovery drilled in the presalt play offshore Gabon. Partner Marathon Oil said the well cut 160-180 net feet of hydrocarbon pay. The well went to total depth of 18,323 feet in 5,673 feet of water on the Diaba license G4-223.

Statoil and partners made a gas-condensate discovery in the Smorbukk North prospect at Haltenbanken in the Norwegian Sea. Exploration well 6506/9-3 proved a 130-foot gas/condensate column in the mid-Jurassic Garn formation plus a thinner Ile formation section. Statoil put preliminary recoverable reserves at 25-47 million barrels of oil equivalent.

Canacol Energy Ltd., Calgary, made a conventional-oil discovery in Colombia's Middle Magdalena Valley. The Oso Pardo-1 well in the Santa Isabel contract found 60 feet of oil pay in the Tertiary Lisama sandstone and 28 feet of oil pay in two Umir sandstones. Technical problems prevented the well from being deepened to the Cretaceous La Luna and Simiti unconventional formations.

Orca Energy Ltd. announced an oil discovery in southern Cooper Basin permit PEL 115 with the Burruna–2 oil exploration well, South Australia, which flowed at more than 750 barrels oil/day with no associated water. Logs confirmed a net pay interval in the mid Namur formation of 17.4 feet. The well was drilled to 6,286 feet by operator Senex Energy Ltd.

Beach Energy Ltd. and the Egyptian General Petroleum Corp. reported that the El Salmiya-2 well flowed oil at 3,530 barrels/day and gas at 4.7 MMcfd in the Abu Sennan concession in Egypt's Western Desert. Perforation was between 13,468-13,517 feet, with an oil column in the Kharita sands of 161 feet true vertical depth.

Austria's OMV reported a gas/condensate discovery in the Mehar block onshore Pakistan. The Sofiya-2 exploration well flowed a total of 18 MMcfd with an additional 1,550 barrels of condensate/day in Pakistan's Sindh Province.

September

Eni and partners made a gas discovery on the Agulha structure offshore Mozambique, with initial estimates of five-seven Tcf of gas in place. The discovery well was drilled to total depth of 20,350 feet in 8,180 feet of water 50 miles off Cape Delgado, finding 525 feet of wet gas pay in Paleocene and Cretaceous reservoirs.

CNOOC Ltd. made an oil find the Haute Mer A license offshore Congo. The E-1 exploratory well targeting the Elephant prospect was drilled in about 1,800 feet of water 50 miles offshore. Primary targets were the Tertiary Miocene N5 and N3 reservoir intervals.

OMV (Norge) AS said its 7324/8-1 Wisting Central wildcat oil discovery on PL 537 opened a new play on the previously undrilled Hoop high offshore Norway. The company estimated 60-160 million barrels of recoverable oil and 10-40 Bcf of recoverable gas in middle to lower Jurassic reservoir, calling it the Barents Sea's northernmost oil discovery.

BP Egypt reported a gas discovery with its deepwater Salamat well in the North Damietta Offshore concession in the East Nile Delta. BP hit 98 net feet of Oligocene sands pay and said the well, at 22,970 feet, was the deepest drilled to date in the Nile Delta.

Noble Energy and partners found gas on the Troubadour prospect on Mississippi Canyon Block 699 in the deepwater Gulf of Mexico. Logs identified 50 feet of net pay in a Miocene reservoir. Noble said discovered gross resources were estimated at 50-100 million boe.

A Statoil-led group made a gas discovery at the Iskrystall prospect on PL 608 in the Barents Sea offshore Norway with well 7219/8-2. The well proved a 656-foot gas column in the Sto and Nordmela formations with estimated volumes of 6-25 million boe. A Statoil executive said the goal was crude oil "but unfortunately it did not materialize."

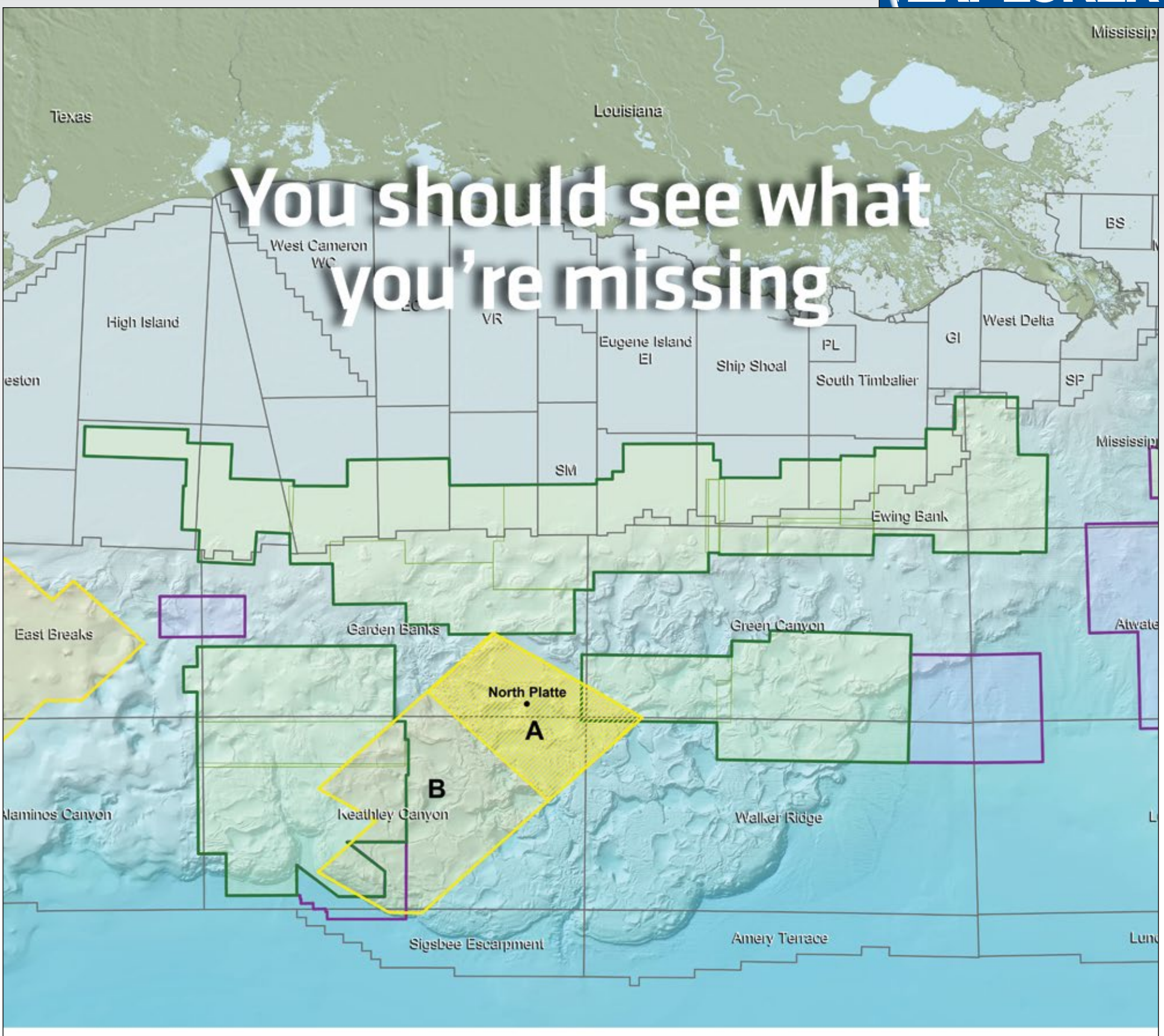
Lundin Petroleum AB tested its Gohta discovery on the Norwegian Continental Shelf in the Barents Sea at 4,300 barrels/day of oil. The 7120/1-3 well in PL492 cut a 82-foot gas column above a 246-foot gross oil column in karstified and dolomitic limestone. The target Triassic sandstone was water bearing.

October

BG Group said its Pweza-3 deepwater gas discovery flowed at an equipment-constrained 57 MMcfd from a Tertiary reservoir. The well is in 4,590 feet of water on Block 4 about 44 miles offshore southern Tanzania.

DNO International said its horizontal Tawke 23 well produced 32,500 barrels of oil/day in the Tawke oil field in the Kurdish region of Iraq, confirming and surpassing Tawke 20. Genel Energy and the Kurdistan Regional Government are partners.

See **Exploration**, page 24



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Technological advances

Explorers Focus on Deepwater Reservoirs

By LOUISE S. DURHAM, EXPLORER Correspondent

Even though shale has become the figurative prima donna in the E&P world, there's action aplenty focused on other types of plays – in widely diverse regions.

Over the past several years a number of successful giant oil discoveries have occurred around the world in conventional reservoirs, no less, in the deep water.

Three of these currently are in the forefront, attracting focused exploration attention along the Atlantic Margin, according to AAPG member John Dribus, global geosciences adviser at Schlumberger.

"In the last 10 years, exploration around the world has discovered there are a couple of really key reservoirs where the big accumulations are being found," Dribus said. "The reservoirs are in pre-salt carbonates underneath salt in Brazil and Angola, and in deepwater turbidites like the Gulf of Mexico and over in Ghana.

"Everyone always talks about how big they are," he noted, "but no one has ever talked about the reservoir characteristics of the rock."

Dribus stepped forward to address that void.

He has assembled an array of info, allowing him to paint the big picture for the E&P community.

He even has condensed his findings into a quick, crisp overview of the three main reservoirs:

- Pre-salt in Brazil.
- Cretaceous Ghana Jubilee abrupt margin turbidite and its equivalents.
- Passive margin turbidites in the GOM.

DRIBUS

AAPG member John Dribus, global geosciences adviser at Schlumberger, will present the talk "Three Important Conventional Reservoirs Receiving Exploration Focus in the Deep Water Today" at this year's AAPG/DPA Playmaker Forum, set Jan. 23 at the Norris Conference Center in Houston.

Dribus' talk will be presented at 3:50 p.m., as part of the session on "Emerging Plays."

(See related story on page 18.)

"It's important to know how the Atlantic Margin opened up and created these particular depositional environments into where these reservoirs were deposited," Dribus said.

"I've looked at how each was formed and what their basic rock properties are and what distinguished them as excellent reservoirs."

Breeds Apart

Dribus, who will be giving a talk on this at the upcoming AAPG/DPA Playmaker Forum in Houston, noted that even though the GOM and Ghana are turbidites, they are breeds apart.

"The one in the Gulf is an unconfined broad passive margin turbidite, and the one in Ghana is a much steeper abrupt margin, higher energy turbidite," Dribus said. "So they create different types of reservoirs.

"The other thing that distinguishes the reservoirs in the Gulf is that many are subsalt reservoirs," he added, "and Ghana doesn't involve any salt."

He goes on to describe Brazil as a completely different environment, noting that Brazil is old salt, so it's actually pre-salt as opposed to subsalt.

Underlying the pre-salt is a special carbonate environment known as microbialites.

Petrobras is long recognized as the big-name in exploration offshore Brazil, where it has found a number of pre-salt carbonate plays in different basins, such as Santos and Campos.

What sets these areas apart is the amount of salt, which acts as an effective seal to the reservoir, allowing large oil columns to accumulate underneath, according to Dribus.

Adding to the unique environment is the exceptional porosity and permeability in the microbialites.

Stand-Alone Region

In fact, Cretaceous microbialite reservoirs and associated facies also are being actively explored across the Atlantic from Brazil along western Africa in Kwanza and Benquela basins in Angola.

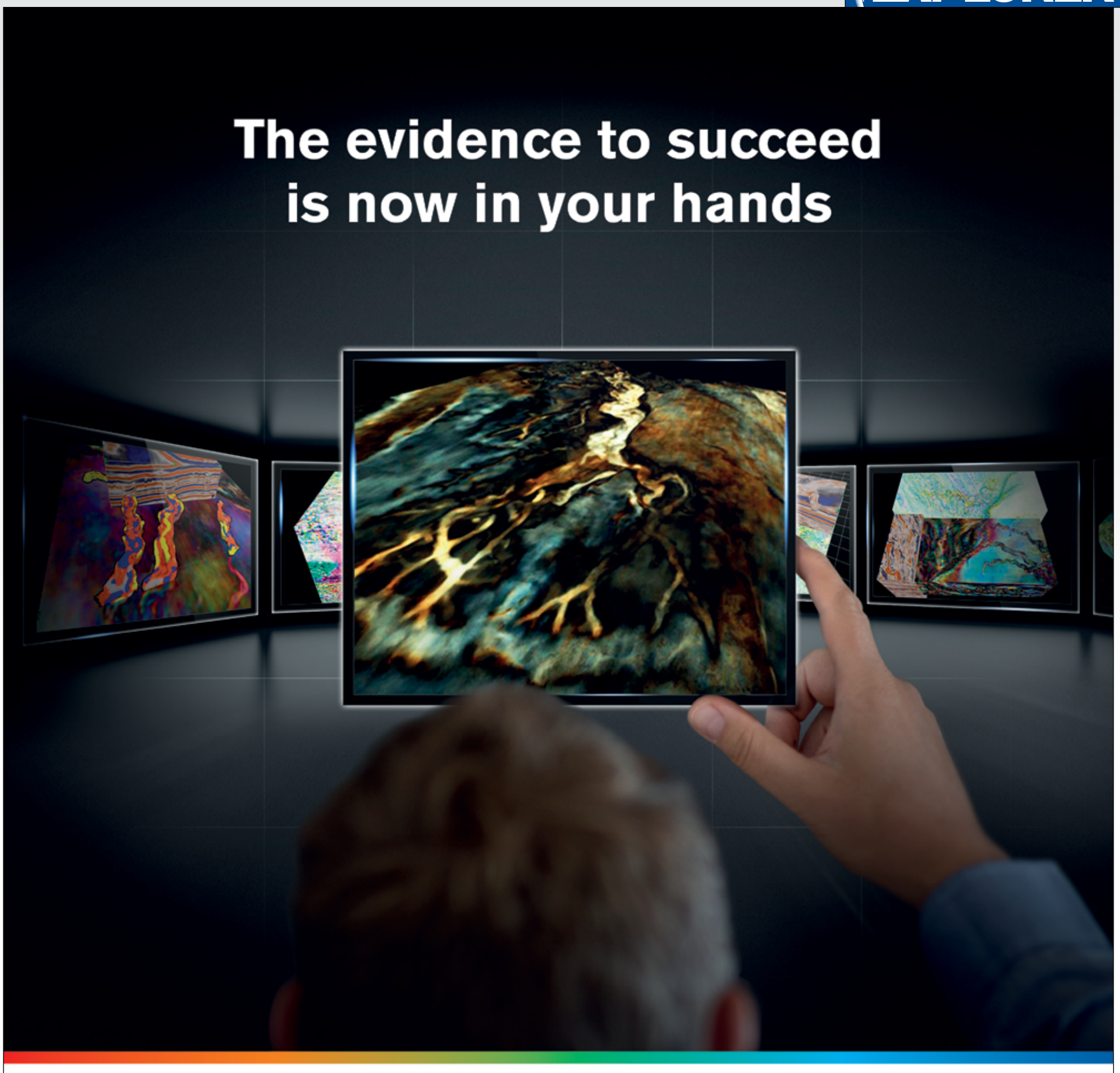
Dribus noted the Cretaceous Ghana Jubilee abrupt margin turbidite and its equivalents are being explored in the deep waters off Ghana, Liberia and across the conjugate margin to French Guiana and equatorial Brazil.

"We found (a reservoir) in Jubilee and followed the transform fault across the Atlantic, where the Zaedyus fan was discovered offshore French Guiana," he said.

"The Gulf of Mexico is different because it stands alone – there's no big conjugate margin like the Atlantic Ocean," Dribus emphasized. "In the Gulf, you're getting these great, vast Lower Tertiary fans sourced from the North American continent and deposited in deep water, later covered by the salt migrating over them and providing part of a seal to the system."

The passive margin turbidites in the GOM include the long-familiar Tertiary Wilcox and Frio formations, currently being produced at Shell's Perdido field and the Petrobras Cascade-Chinook field.

Dribus emphasized that producing these type fields required that the industry develop tools that are at the vanguard of technology.



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Veterans will share success secrets

Popular Playmaker Forum Returns to Houston

By BRIAN ERVIN, EXPLORER Assistant Managing Editor

The second annual Playmaker Forum, sponsored by AAPG's education department and the Division of Professional Affairs, returns this month on Jan. 23 at the Norris Conference Center in Houston.

The one-day "Playmaker 2.0" will feature 16 speakers who are world-class oil finders and industry heavy hitters who will offer their insight and experiences to help empower and inspire budding geologists to emulate their success in the business.

The forum of experts and experienced playmakers will:

- Help geoscientists, landmen, engineers and explorers gain improved understanding of scientific and commercial requirements for successful prospect generation.
- Inspire explorers to see "the big picture" in terms of petroleum systems.
- Teach geoscientists how to cultivate exploration creativity.
- Demonstrate how geochemistry can "seal the deal" and support ideas.
- Show how data integration can identify bypassed pays and bypassed plays.
- Provide improved interaction with the public and landholders.
- Ensure the highest degree of professionalism and ethics in their professional activities.


STERNBACH

> **"I wanted to expand the conversation from discoveries to prospects, the concept is that discoveries are the prospects that work."**

The forum builds on last year's highly successful event, which organizer, moderator and past DPA president Charles Sternbach described as a "gusher" for its high turnout, engaging lecture material and bustling networking opportunities.

"Many traveled far and wide to hear some of the best oil finders in our business talk about prospecting skills, the art of exploration, prospecting work flows, successful plays and emerging plays," he said.

Sternbach, an AAPG Honorary member, said the idea for the forum grew out of the well-attended and popular "Discovery Thinking" forums put on at annual meetings and international conferences by DPA.

"I wanted to expand the conversation from discoveries to prospects," he said. "Discovery Thinking is about discoveries, and Playmaker is about prospecting. The concept is that discoveries are the prospects that work."

Success Breeds Success

Like last year's forum, Playmaker 2.0 will focus on elements – commercial and scientific/technical – needed to successfully proceed from first sight to discovery.

This year's forum will be organized around four sessions:

- The Art of Exploration.
- Prospecting Workflows and Marketing Approaches.
- Established Plays – Discovery of New Fields and Sweet Spots.
- Emerging Plays.

Specific plays that will be used for the topics include the Bakken, Marcellus, Eagle Ford, Barnett, Fayetteville and Haynesville shales, plus emerging plays in Canada and Mexico.

This year's keynote luncheon speaker will be past AAPG president Scott Tinker, director of the Texas Bureau of Economic Geology, who will talk about shale plays, his vision for transforming U.S. energy reserves and what's ahead for future oil finders.

Other headliners include Jim Bob Moffett and Bud Brigham, who will share lessons from their illustrious careers.

The event begins at 8 a.m. and will conclude with an evening "Wildcatter Corner" reception.

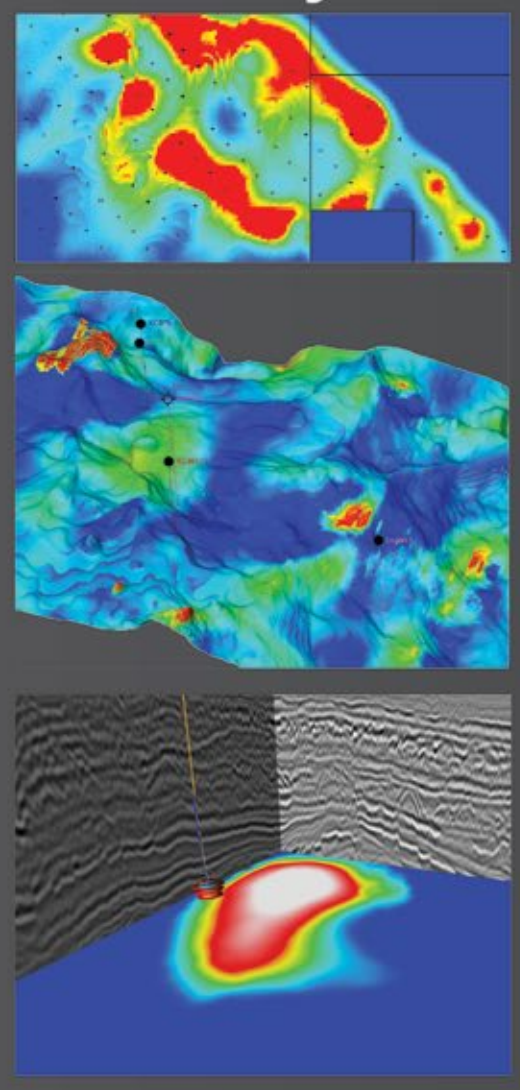
Participation in the forum includes: course notes, "Heritage of the Petroleum Geologist" DPA publication (free), continuing education credit, luncheon, two networking breaks, as well as the aforementioned reception.

To register, or for more information, go to http://www.aapg.org/forum/playmaker/index.cfm.

Alaminos Canyon Daybreak Survey

The Gulf of Mexico | Looking North from Mexican Waters
Data delivered in time for Western GoM Lease Sale 238
Prefunding closes 15 January

Building on years of experience with PEMEX in the Gulf of Mexico, EMGS will acquire multi-client 3D EM data in Alaminos Canyon starting in early 2014. With our knowledge and experience across the border, EMGS is uniquely positioned to provide a holistic view of the Perdido Fold Belt and its petroleum system. The combination and integration of EM and seismic data creates a unique dimension for rock property analysis and improves geologic understanding.



Applications

- Evaluation of combination traps, stratigraphic traps and flank terminations in footwall strata
- EM anomalies on flanks of Trident, Tiger and Drum
- Base salt illumination for refinement of interpretation and improved interpretation of subsalt feeder systems

Deliverables

EM inversion cubes (SEGY)

- Unconstrained 3D EM inversions, Rv, Hv, constrained inversion if working with client data

Resistivity lead maps (shape files, ASCII)

Lead verification and knowledge transfer

- Client peer reviews and two weeks on-site consulting with EM expert

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3-D Seismic Drives Geosteering Advances

BY LOUISE S. DURHAM, EXPLORER Correspondent

The Upper Devonian-Lower Mississippian age Bakken shale play in the Williston Basin in North Dakota and Montana has attained crude oil production levels that could surprise even the most jaded operators in the industry.

Think one million bopd.

That's the number set forth by the U.S. Energy Information Administration (EIA) in November, when it estimated the total wellhead output from the area in December would actually top this projection.

The rich Bakken petroleum system had been subject to a lot of poking and prodding by explorers over the years. Its ascendancy into the spotlight is said to date back to 1995 when explorer and AAPG member Richard "Dick" Findley determined there was good porosity and a likely oil zone in the fractured dolomitic middle section of the shale.

This "A-ha" moment ultimately led to development of the giant Elm Coulee field in the Bakken in eastern Montana. In the midst of the excitement that ensued, Findley was tapped to receive the AAPG Outstanding Explorer of the Year award.

But even giant discoveries can pose giant challenges when it comes to determining how best to efficiently drill and economically produce the trapped hydrocarbons.

To help to reach these goals, lengthy laterals and multi-stage hydraulic fracturing quickly became de rigueur.

Unfortunately, there's no one-size-fits-all when it comes to these applications.

SOUTHCOTT

"The 3-D helps to predict what's up ahead of the bit, and we try to position ourselves optimally to reduce dog legs."

For example, the now-common and seemingly straightforward practice of geosteering the drillbit along the lateral to stay in zone can be highly challenging.

We're talking about guiding that bit deep beneath the surface along, say, a 10-foot lateral for perhaps a one-mile journey.

Finding the Right Path

New tools to help with this are being used, yielding improved geosteering performance, which has been hailed publicly by Bakken player WPX Energy management as a key driver in achieving lower well costs in the Williston Basin.

"Geosteering errors in the basin were reduced by 90 percent from mid 2012 to early 2013," said AAPG member Angie Southcott, geology team lead at WPX in Golden, Colo. "This impressive improvement is in part attributable to the use of advanced processing of 3-D seismic data."

Southcott noted how "using 3-D seismic data for geosteering applications requires:

- Resolving the Bakken interval, which is a well documented challenge in the Williston Basin.
- Accurately converting seismic surfaces to depth – "an easy task filled with hidden problems."

Southcott emphasized the Bakken ordinarily is a very difficult section to properly image because it's so thin and because of the velocity contrasts that are there.

"A shop in town did some frequency enhancement processing on the data for us," she said. "With that high frequency extender (HFE) processing they were able to bring out frequencies such that it's almost like we gained a whole other octave level in frequency content of the data.

"With that, we were able to image and map the Upper and Lower Bakken shales," she added.

With regard to HFE processing, Southcott noted that even though the workflow falls within the normal spectrum of 3-D seismic processing, there is a need for more focus on conditioning the gathers carefully for a cleaner stack. This results in geologically meaningful frequency enhanced volume.

They are using a combo of approaches to get a better handle on the wells.

"We're using the 3-D to help predict the structure but also running the gamma ray while drilling the lateral and making correlations as we go along," Southcott said.

"The 3-D helps to predict what's up ahead of the bit, and we try to position ourselves optimally to reduce dog legs," she emphasized. "Resolving the Bakken interval goes back to the frequency enhancement processing done for us.

"We started using the data and questioned how good it was until we started crossing faults we were drilling that we were able to map in that frequency enhanced volume, and we began to say 'this is actually really good.'

"Also, when we cored a well last year, we cut a small fault that was imaged with the 3-D seismic volume," she added.

"With those couple of things," Southcott emphasized, "we were really able to hang

See **Geosteering**, page 24

AAPG member Angie Southcott, geology team lead at WPX Energy in Golden, Colo., will be one of the speakers at this year's RMAG-DGS 3-D Seismic Symposium, set Feb. 14 at the Sheraton Hotel in Denver.

This year marks the event's 20th anniversary (see related story, page 22).

Next event: Feb. 14

3-D Symposium Hits Its 20-Year Milestone

By LOUISE S. DURHAM, EXPLORER Correspondent

Meetings, forums, symposia and such have long played a key role in educating petroleum industry members in an array of topics.

Some of these get-togethers are a one-shot event, while others have staying power.

The RMAG/DGS 3-D Seismic Symposium on tap for Feb. 14 is a notable example of the latter.

This year's event marks the 20th anniversary of the meeting, held annually in Denver since 1995.

"I was encouraged by the RMAG to put it on that first year to help sell guidebooks on 2-D and 3-D seismic," said symposium co-founder and AAPG Honorary member Randy Ray. "RMAG runs field trips with guidebooks, and we like to have symposia where those who wrote the articles can give talks.


RAY

"That's why it started, and because it was about geophysics and not just geology, I said let's include the geophysical society," Ray said. "I called my friend, Bill Pearson, who was past president of the Denver Geophysical Society, and he agreed to co-chair the meeting with me."

Three-D seismic sage (and renowned AAPG author, speaker and past editor of the EXPLORER's Geophysical Corner) Alistair Brown served in the role of keynote speaker at the inaugural event.

"We were worried if anyone would show up, and when we drew in 500 attendees, we were shocked," Ray remarked. "So we said, let's do it again."

The twosome continued their official co-chair responsibilities for 17 years – a long volunteer gig.

Co-chairs for this year's 20th anniversary milestone event are AAPG members Mary Sue Purcell and Jim Thorson.

A 'Mystical' Quality

Not surprisingly, the initial team's 17-year stint had its share of moments, so to speak, ranging from good to bad to funny.

Ray recounted a few of these, such as speaker slides burning up during a presentation, fire alarms triggered during a keynote address and live workstation presentations gone awry.

"One of the most memorable meetings we had was the use of 3-D glasses to look at 3-D data on a 3-D workstation," he quipped.

Then there was the "Blizzard Symposium" in 2009, so named when the event coincided with an unexpected major snowstorm. Some speakers were stranded at the Denver airport, while many other speakers/attendees couldn't get even that close.

Still, the show went on, thanks to near-heroic efforts on the part of many folks.

Ray pinpointed the secrets to success for the phenomenal run of this annual confab.

▸ For starters, he gives major kudos to the committee.

"Everyone on the committee has an active voice in all aspects of the job, from recruiting potential speakers to submit their abstracts, determining the final program and gathering sponsorship funds," he noted.

▸ A broad audience base is essential to success. This entails ensuring there are not too many talks that are overwhelmingly technical in geophysics, while simultaneously including geology and case histories needed to retain the interest of not only the geoscientists but also engineers, landmen and management.

▸ A final secret to success: "The theme of each presentation is presented by the person who actually did the work," Ray said. "This is not a meeting where the audience is subjected to professional sales talks."

He also attributes part of the longevity of this series to the "mystical" Denver Snowballs, awarded to all speakers.

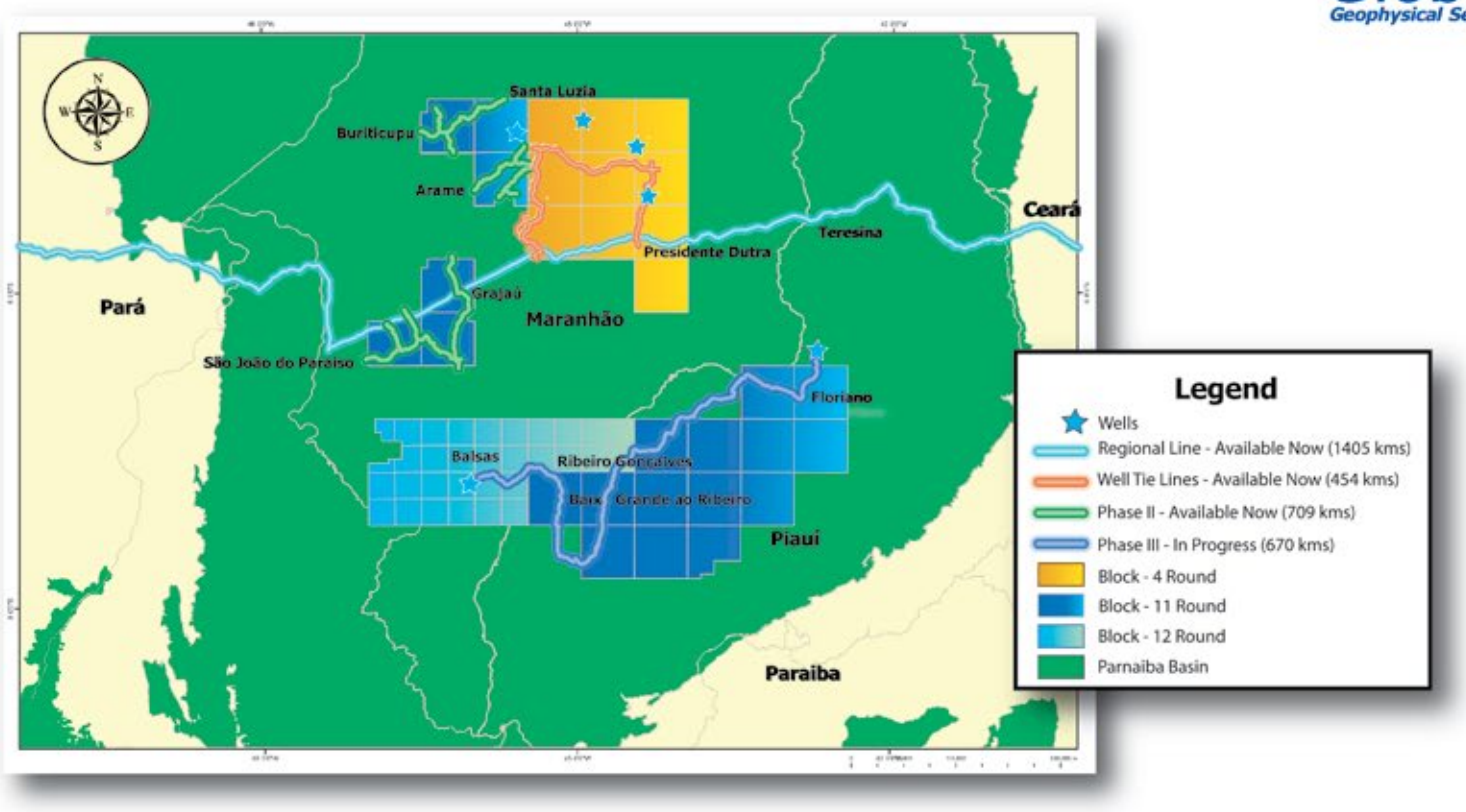
"The Denver Snowballs are paperweights hand-made by Bill Smith at RMAG, and they're only made for these symposia," Ray said. "I joke that they have mystical qualities, thinking about the Houston speakers picking up a Snowball in Houston in August and feeling a fresh, cold breeze from the Rocky Mountains to remind them of their talk."

Joking aside, the case can be made for a very basic foundation supporting the success of this long-running show.

"I feel that the underlying strength of the symposium is its obvious homegrown nature," Ray asserted, "and that the Denver geosciences community uses the meeting as an opportunity to showcase its depth of activity in so many categories.

"These include seismic acquisition, processing, interpretation, geology and the wealth of natural resources in the Rockies," Ray said.

Global Geophysical Services



Brazil's Parnaiba Revealed

Global Geophysical's Parnaiba InSight 2D Program basin-scale geoscience study illuminates the architecture and evolution of the Parnaiba Basin in northeast Brazil with ultra-deep imaging coupled with high-resolution images of the sedimentary basin providing deep insights into the hydrocarbon potential of this relatively unexplored basin.

Global's Parnaiba Program provides:

- Integrated geologic and geophysical understanding of the driving mechanisms involved in the formation of the basin
- Dynamic structural and thermal history, ultra-deep seismic profiling through the center of the basin
- Detailed sedimentary profiles encompassing the basin
- 2D seismic imaging and characterization of the deep structural elements and of the overlying sedimentary layers

Program Details

Data acquisition of the Parnaiba Program utilizes Global's revolutionary AutoSeis 32-bit recording system, commences with a control line through the center of the basin that is designed for ultra-deep imaging of both the crust and upper lithosphere. Subsequent lines have been designed to provide a more detailed understanding of the sedimentary components of the basin including the proterozoic basement and pass through and connect a number of exisiting wells.

For a copy of the white paper, contact:

Global Geophysical Services, Inc.
13927 South Gessner Road
Missouri City, Texas 77489 U.S.A.
tel +1 713-972-9200

Global Serviços Geofisiços Ltda.
Rua Jornalista Ricardo Marinho, 360/106
Rio de Janeiro, RJ Brazil 22631-350
tel +55 21 3344-7662

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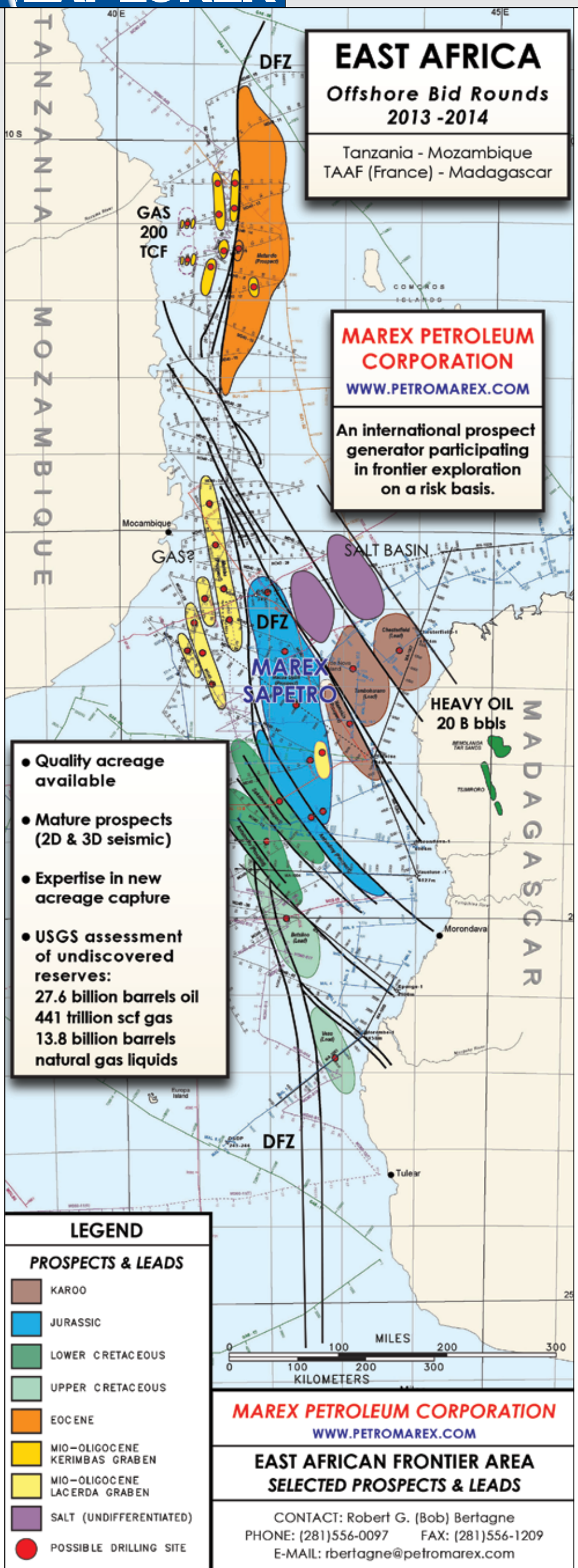

Exploration
from page 14

A Repsol consortium made a light oil discovery onshore Libya. The discovery well went to 6,020 feet on Block NC115 in the Murzuq Basin about 500 miles south of Tripoli. Reported initial flow was 513 barrels/day. Repsol holds a 40 percent interest in the block; OMV and Total have 30 percent each.

Gas2Grid Limited, Sydney, perforated and flow-tested two oil-bearing sandstones in its Malolos-1 well at depths of 7,280-7,308 feet and 7,152-7,207 feet. Indicated production rate was 100-200 barrels/day. Productive zones are on the eastern limb of the Malolos anticline in SC44 onshore Cebu, Philippines.

Horizon Oil Ltd., Sydney, reported log data and pressure measurements confirmed a significant gas/condensate discovery in the Elevala Sandstone with its Tingu-1 exploration well in Petroleum Retention License 21, Western Province, Papua New Guinea (PNG).

Orey Petroleum Co., Calgary, made a potentially commercial Jurassic crude/sour-gas discovery at Ain Al Safra, Iraq, its second oil discovery on the Hawler license. Drillstem tests of the Alan and Mus formations yielded up to 850 barrels/day.

A Marathon Oil Corp. subsidiary hit a discovery in the company-operated Harir Block in the Kurdistan Region of Iraq. The Mirawa-1 found stacked Jurassic and Triassic reservoirs from 5,800 feet to well total depth of 14,000 feet. Flow rates totaled more than 11,000 barrels/day.

DNO International's Salsala-1 exploration well on Block 32 onshore Yemen flow tested 5,900 barrels/day. The well encountered oil shows in the Shuqra formation after being drilled to a total depth of 13,600 feet.

November

Statoil said its exploration well 6407/8-6 and sidetrack 6407/8-6A showed several oil columns in formations dating from the Jurassic at the Snilehorn prospect in the Norwegian Sea. Estimated volume was 55-100 million barrels of recoverable oil.

Allied Energy plc confirmed the presence of oil in the Miocene with the Oyo-7 well on Nigeria's OML 120, said partner CAMAC Energy Inc., Houston. Drilling of a horizontal section and completion were set for first quarter 2014. The Oyo field is 75 miles off southern Nigeria.

Petrobras said a test well had confirmed a 1,300-foot oil column in the Franco field in the South Atlantic, about 125 miles southeast of Rio de Janeiro. Petrobras expects to start production at Franco in 2016.

Tullow Oil reported its Agete-1 exploration well on Block 13T, onshore Kenya, discovered an estimated 330 feet of net oil pay in sandstone reservoirs. Agete-1 was drilled to a total depth of 6,330 feet.

Senex Energy Ltd. of Australia made an oil discovery with its Worrior-8 well at the Worrior field in the Cooper Basin, South Australia. The well flowed 700,000 cubic feet of gas and 670 barrels of oil per day during production testing, after intersecting 59 feet of net pay across the McKinlay member, Namur sandstone and Patchawarra formation.

Dana Petroleum made an oil discovery in a Lower Cretaceous captain sandstone reservoir in the Moray Firth. Dana drilled the 13/23d-8 well on the Liberator prospect in license P1987.

December

Noble Energy Inc. found oil in the Gulf of Mexico on Mississippi Canyon Block 782 with its Dantzler exploration well, drilled to 19,234 feet in 6,580 feet of water. Noble said Dantzler encountered over 120 net feet of oil pay in two Miocene reservoirs. The company plans at least two more deepwater Miocene attempts in 2014.

Statoil and ExxonMobil made their fifth gas discovery natural on Block 2 offshore Tanzania with the Mronge-1 well, adding two-three Tcf to block resources. Statoil raised estimates of total Block 2 in-place volumes to 17-20 Tcf.

Statoil reported an oil discovery of 20 million to 50 million recoverable barrels at the Skavl prospect in Norwegian production license 532 in the Barents Sea. Well 7220/7-2S proved a 72-foot gas column and a 76-foot oil column in the Jurassic Tubåen formation, and a 436-foot oil column in the Triassic Fruholmen formation.

Geosteering
from page 20

our hats on this, knowing it was a really good product and not some black box voodoo where it looked pretty, but maybe you can't trust it."

Where Did It Go?

Converting seismic surfaces to depth with HFE pinpointed one of the several challenges in creating accurate geosteering surfaces: well tops and their accuracy.

"Examples can be shown that this issue is more the culprit for depth conversion inaccuracies than uncertainties in seismic velocities," Southcott said.

Imagine having to take the time required to examine every log in your project in order to re-evaluate them on an individual basis.

"Everyone is always using the gamma ray in the Bakken to stay in zone and sometimes resistivity tools as well," Southcott said. "We're building on that and enhancing with 3-D."

She noted the Bakken presents unusual issues for geosteering.

"Everyone says it's just flat and not changing often or suddenly, but we can see dramatic thinning across the course of a lateral," she said. "Ten to 15 feet of Bakken mid-section can suddenly be gone.

"The fault may not be huge, but it could fault enough feet so you're confused," Southcott noted. "If you see the fault on the seismic – and you do – your correlation is exact.

"Those are the sort of things that have stepped up our game to fix our geosteering," she emphasized.

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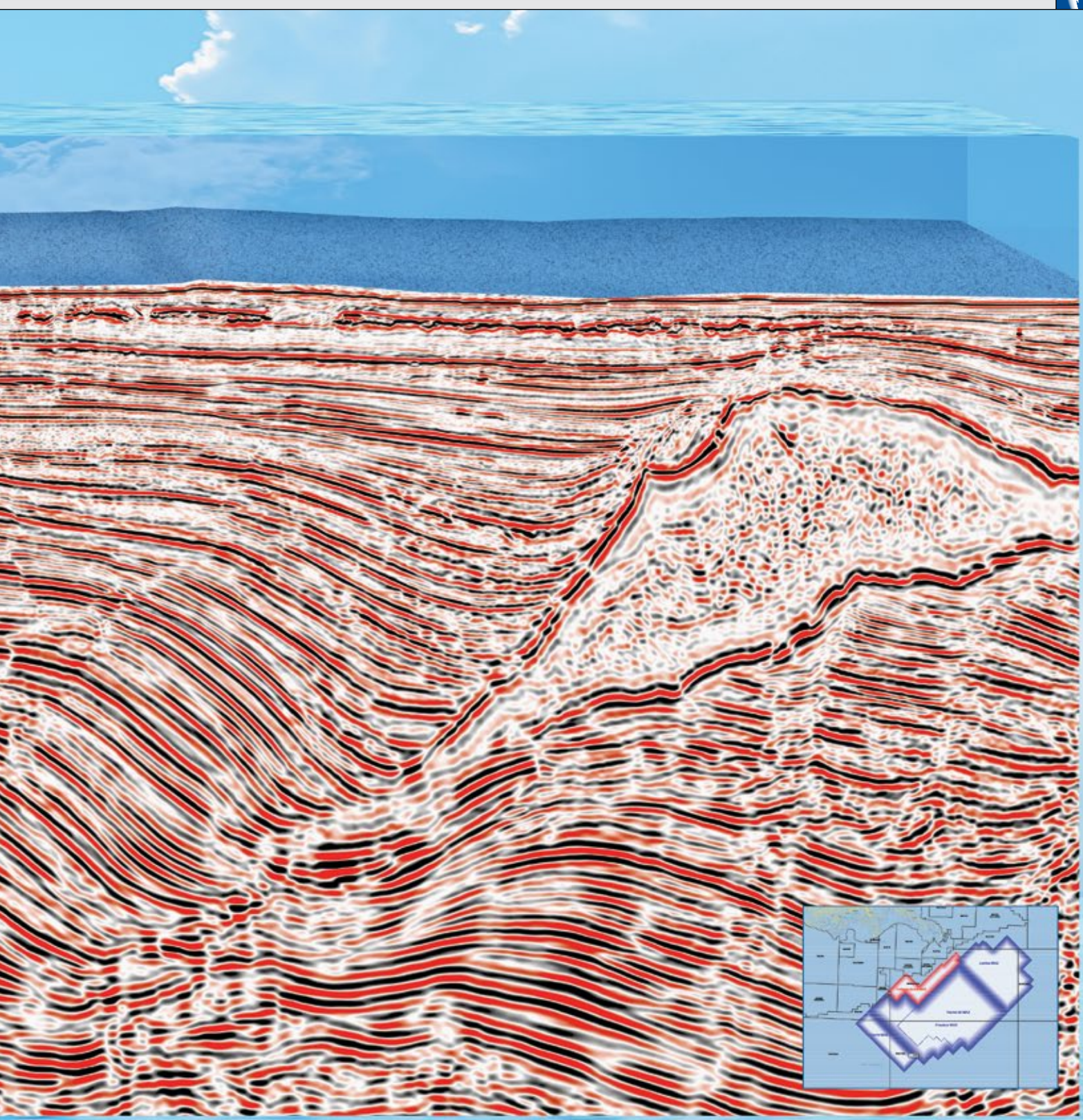

AAPG member Robert Pledger, a Houston-based independent geologist, will present the talk "Marketing Your Prospect at Prospect Expos" at this year's AAPG/DPA Playmaker Forum, set Jan. 23 at the Norris Conference Center in Houston. Pledgers' talk will be presented at 10:30 a.m., as part of the session on "Prospecting Workflows and Marketing Approaches." See related story on page 18.

Prospect marketing

Selling? Get Smart

By LOUISE S. DURHAM, EXPLORER Correspondent

Oftentimes, generating a prospect can be far less challenging than actually touting it to potential buyers.

Marketing your "baby" requires considerable moxie, in addition to the necessary geological smarts.

This is especially true at the many prospect expos that have proliferated in different areas. This fairly rapid growth in numbers was no doubt encouraged in large part by the highly successful NAPE, which debuted in Houston in 1993 and has since expanded to other regions of the country.


PLEDGER

Such events provide wide audiences for your sales pitch – but intense preparation is more essential than ever to justify the expense of setting up shop.

Independent Houston-based geologist and AAPG member Robert Pledger has spent a number of years generating, marketing and selling prospects. He noted that NAPE, for example, costs on average $75 for each showing of a prospect if you're "in town" and $165 or more if you're traveling.

"Make sure you get your 'bang for the buck' at NAPE," Pledger encouraged.

For starters, keep in mind that you will be addressing a variety of audiences at an expo.

According to Pledger these can include:

- An oil company seeking deals in a specific area.
- An oil company trying to feed its own knowledge base.
- Business people with money looking for someone with whom they want to conduct business.
- Friends who want to see what you're doing.

"Each has a different purpose and a different view of what you're trying to do," Pledger noted. "Each has their goals, which aren't always yours, and you have to talk to those goals – you have to try to get an understanding of what they're looking for."

Rules of Engagement

Once you complete a presentation of your prospect, Pledger suggests that you watch eyeballs and listen to what your audience is saying.

"You may be giving them a story that doesn't fit where they want to go," he said. "For instance, they may be looking for development deals in an unconventional resource base and you're selling a wildcat in the Hackberry – you're wasting time.

"Get the presentation to where it's succinct, there's no fumbling and the key information can be seen from the floor because there will be a crowd around the booth," he noted.

"They have to see what the idea is."

He emphasized the advantageous approach he acquired from reading the Milo Frank book about getting your point across in 30 seconds or less, or else lose your audience.

"I have a 30 second spiel I give to someone," Pledger said, "and if it fits what they're looking for, then we go into the five minute spiel – and then likely on to more detail.

"I don't present the actual prospect in the booth," he commented. "But I do give out the executive summary – it's likely better to get together in an uninterruptible environment to really get into it."

He noted that when dealing with a financial person, the executive summary shows the cost up front, net revenue, ROI and amount of reserves. This enables the money person to risk the deal, price the reserves or whatever else is necessary toward that end.

Including maps with the executive summary is a must-do, lest someone recall an interesting prospect but remember little about it.

You Must Remember This …

Pledger emphasized the rules of ethics when it comes to marketing prospects:

- Your audience has faith in you to properly and fairly represent your prospect to them. Make sure they clearly understand the technical risk – as you understand it – of your prospect.
- Do not withhold or understate the risk on your prospect in order to satisfy your desire to get your prospect drilled.

He followed this with a somewhat sobering reminder, saying:

- We don't always generate "good" prospects.
- Sometimes we generate "average" prospects that in our opinion may not have the qualities of a "good" prospect but still should be drilled from an economic and risk/reserve viewpoint.
- "Good" prospects can end up dry holes.
- "Average" prospects can find oil and gas.
- Beauty is in the eye of the beholder.

Record number of teams

IBA Season Arrives – Let the Games Begin

By BRIAN ERVIN, EXPLORER Assistant Managing Editor

The applications are in for this year's AAPG-AAPG Foundation Imperial Barrel Award (IBA) competition – the world's premiere geoscience contest for graduate students around the world.

There will be 134 schools competing for the top prize this year – the largest number of competitors in the program's illustrious and growing history.

The IBA program is a global basin evaluation competition that taps students' knowledge and skills for creative thought in exploration scenarios, using real-world datasets.

It tests the teams' collective knowledge in geology, geophysics and other geoscience disciplines as they determine the hydrocarbon potential found in the dataset.

To capture the top prize, teams from around the world compete in an eight-week process that includes Region and Section semi-final contests and then culminates in a finals competition at the AAPG Annual Convention and Exhibition, set April 6-9 in Houston.

The winning team receives the Imperial Barrel Award, individual medals plus $20,000 for the school's geoscience department.

Second place winners receive the Selley Cup, individual medals and $10,000 for their school, and third place winners receive the Stoneley Medal, individual medals and $5,000 for their school.

The remaining finalist teams earn $1,000 in scholarship funds for their schools plus individual medals for themselves as IBA finals participants.

The IBA and the other awards are presented in a colorful ceremony that's held immediately before the opening session at the AAPG Annual Convention and Exhibition, emceed by IBA Committee co-chairs David Cook and Chuck Caughey.

Last year a total of 107 teams from 30 countries, involving at least 535 students, competed in the program.

Since its adoption by AAPG and the AAPG Foundation, the IBA has awarded more than $300,000 in scholarship funds.

The IBA awards presentation will be held immediately before the opening session at the AAPG Annual Convention and Exhibition.

The 133 schools that will be competing this year are:

A brief break: Teams were able to relax for a moment at the 2013 IBA luncheon in Pittsburgh.

Africa Region

The field will be narrowed at the Africa Region Final on Feb. 28 at a venue to be decided.

Enugu State University
University of the Western Cape South Africa
University of Nigeria
Faculty of Sciences of Tunis
Federal University of Technology Owerri
Makerere University
Federal University of Technology Akure
University of Lagos
Nnamdi Azikiwe University
University of Benin
University of Ibadan
Benha University
Ecole Nationale d'Ingenieurs de Sfax
Al Azhar University
Helwan University
Ain Shams University
University of Port Harcourt
Suez University
Cairo University
El Minia University
Faculty of Science Damanhour University
Alexandria University

Asia Pacific Region

The Asia Pacific Region final will be online.

Curtin University, Department of Applied Geology
Indian Institute of Technology Bombay
University of Delhi
Brawijaya University
China University of Petroleum
University of Adelaide
Indian School of Mines
University of Indonesia
Institut Teknologi Bandung
China University of Petroleum, Beijing
Padjadjaran University
Peking University

Canada Region

The Canada Region final will be March 7 at a venue and city to be determined.

Dalhousie University
University of Calgary
McMaster University
University of Alberta
Memorial University of Newfoundland

Eastern Section

The Eastern Section final date and location are yet to be determined.

University of Kentucky
West Virginia University
Indiana University
Penn State University
Boston College
University of Wisconsin-Madison
University of South Carolina
Kent State University

Europe Region

The Europe Region final will be March 6-8 at a venue and city to be determined.

University of Stavanger
University of Manchester School of Earth Atmospheric & Environmental Sciences
National Taras Shevchenko University of Kyiv
Utrecht University
University of Coimbra
Institut Polytechnique LaSalle Beauvais
University of Southampton
Royal Holloway University of London
Lomonosov Moscow State University
Lisbon University
Ecole Nationale Superieure de Geologie
IFP School
University of Aberdeen
Heriot-Watt University
Delft University of Technology
University of Bucharest
Adam Mickiewicz University in Poznan
University of Leoben
VU University Amsterdam
University of Zagreb
Gubkin Russian State University
University College Dublin School of Geological Sciences
Novosibirsk State University
Eotvos Lorand University
Ivano Frankivsk National Technical University of Oil & Gas

Gulf Coast Section

The Gulf Coast Section final will be March 20-21 at SLB Information Solutions Theater in Houston.

The University of Texas at Austin
University of Louisiana at Lafayette
University of Alabama
University of Houston
Texas A&M University
Mississippi State University
Tulane University
University of Texas – San Antonio
Rice University
Louisiana State University
Stephen F. Austin State University
Auburn University
University of New Orleans

Latin America Region

The Latin America Region final date and location are yet to be determined.

Federal University of Sergipe

In action: Sultan Qaboos University makes its case at the 2013 finals. (And won the Stoneley Medal.)

Universidad Industrial de Santander
National University of San Marcos
Pedagogical and Technological University of Colombia
National University of Columbia
Universidad de Buenos Aires
National University of Colombia-Medellin (Unalmed)
EAFIT University
University of the State of Rio de Janeiro UERJ
Universidad Nacional de Ingenieria
Universidade Federal Fluminense
The University of the West Indies
University of La Plata
Universidad Simon Bolivar
National Autonomous University of Mexico
Universidad Central de Venezuela

Mid-Continent Section

The Mid-Continent Section final will be March 8 in Oklahoma City.

University of Kansas
Kansas State University
Oklahoma State University
University of Arkansas
University of Tulsa
University of Oklahoma
Wichita State University
Missouri University of Science and Technology

Middle East Region

The Middle East Region final will be March 8 at GEO 2014 in Manama, Bahrain.

United Arab Emirates University
King Saud University
Tikrit University
King Abdulaziz University
Kuwait University
Sultan Qaboos University
King Fahd University of Petroleum & Minerals

Pacific Section

The Pacific Section final will be March 21 at Aera Energy in Bakersfield, Calif.

California State University, Long Beach
San Diego State University
California State University, Bakersfield
University of Alaska Fairbanks
University of California
California State Polytechnic University, Pomona

Rocky Mountain Section

The Rocky Mountain Section final will be March 1 at the GEM program facility at the University of Colorado-Denver.

University of Wyoming
Colorado School of Mines
Brigham Young University
Montana State University
University of Utah
New Mexico Institute of Mining and Technology
Utah State University

Southwest Section

The Southwest Section final date and location are yet to be determined.

Texas Christian University
University of Texas at El Paso
University of Texas at Arlington
University of Texas-Dallas

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"ProTracks" is an ongoing feature of the EXPLORER, offering news and information pertinent to getting started or getting better in your career. Nick Lagrilliere is chair of the AAPG Young Professionals Committee.

Need a Job? YPs Help Make the Connections

By JOE BAUMAN, Southwest Section YP

For young geologists about to start their career, choosing an employer – or getting chosen by an employer, perhaps – and determining a career path can be a daunting task.

Questions regarding this topic abound:

- How important is an internship?
- To work in the oil and gas industry, does my thesis need to be petroleum-related (or do I need a thesis at all)?
- How should I prepare for an interview, and what are employers looking for?
- What can I expect for salary and benefits when I start? What about training?
- How do I go from a new hire to where I want to be in 10 years (and beyond)?


BAUMAN

The two most pressing questions young geologists face are: How do I get my foot in the door? After that ... what then?

However, the two most pressing questions young geologists face are:

- How do I get my foot in the door?
- After that … what then?

From 5-8 p.m. on Tuesday, Jan. 21, the Dallas Geological Society (DGS) will hold a panel discussion to address these questions and help put young geologists at ease.

The discussion will be moderated by DGS president Joe Davis, and the panel will comprise individuals from a range of backgrounds:

- **Eric Potter**, the Bureau of Economic Geology.
- **James Quick**, dean of graduate studies at Southern Methodist University.
- **Rick Davis** of Stanton Chase (executive level search and recruitment).
- **Louis Goldstein**, VP of corporate geoscience and chief geologist for Pioneer Natural Resources.
- **John Wagner**, chief geologist for Venari Resources and a research professor at SMU.

While the panel discussion itself is primarily geared toward young geologists, veteran geologists – especially those with a desire to provide answers and mentorship, or those just curious to see what today's crop of young geoscientists bring to the table – also are strongly encouraged to attend.

The panel discussion will be preceded by a social hour to enable students and YPs to meet with panelists and veteran geologists in an informal setting. Also, a handful of students from local universities will exhibit posters displaying their graduate research during the social hour.

Panelist bios and registration for the event can be found on the Dallas Geological Society website, www.dgs.org.

Students and YPs wishing to submit a question for the panel or those interested in presenting a poster during the social hour may email dgsyoungprofessionals@gmail.com.

* * *

The Dallas Geological Society boasts an active YP group that continues to build steam.

This fall DGS instituted its local YPs (DGS YP) to operate under the "umbrella" of Southwest Section YP at a scale that can directly serve our local YPs. The Careers in Geology Panel Discussion will be the third Dallas-area YP event held this season.

In August, DGS YP held its inaugural membership drive social, which was attended by more than 50 YPs. In October, the AAPG Division of Professional Affairs hosted a DGS YP event featuring speaker Bob Shoup of Subsurface Consultants & Associates that also was well-attended and well-received.

Events in the works for this winter and spring include additional YP socials, a "pro-am" format (pairing veteran members with YPs) at our annual society golf tournament and community service events in cooperation with area AAPG student chapters and geology clubs.

In our experience, local YP groups benefit local societies – not just YPs – by encouraging YP attendance at society luncheons and seminars, and by providing leadership roles to YPs.

I assume other member organizations face the same dilemma as DGS: How do you prepare younger geologists to fill officer roles within the society?

See **ProTracks**, page 36

Regions and Sections is a regular column in the EXPLORER offering news for and about AAPG's six international Regions and six domestic Sections. Contact: Emily Smith Llinás, programs manager for AAPG's Latin America Region, at + 571-485-2338; or email to ellinas@aapg.org.

Enter the Young: Latin America Feels the Beat

By EMILY SMITH LLINAS, Programs Manager, Latin America Region

Latin America is known for its young population, and the Latin America Region of AAPG is no exception.

As a result, the Region leadership team is capitalizing on its demographics by supporting activities for students and young professionals throughout the Region.

Imperial Barrel Award participation grew from one team in 2010 to 13 teams in 2013, and 15 universities from seven countries were represented at the Student Chapter Leadership Summit held at ICE Cartagena. In the past six months alone, four new student chapters formed and four chapters moved from inactive to active status.

But Region leadership does not want students' AAPG involvement to end at graduation.

"It is gratifying to see so many students involved with AAPG," said Victor Ramirez, AAPG Latin America Region president, "but our ultimate goal is to keep people involved with the Association throughout their careers. YP (Young Professional) chapters can help them make that transition from student to professional."

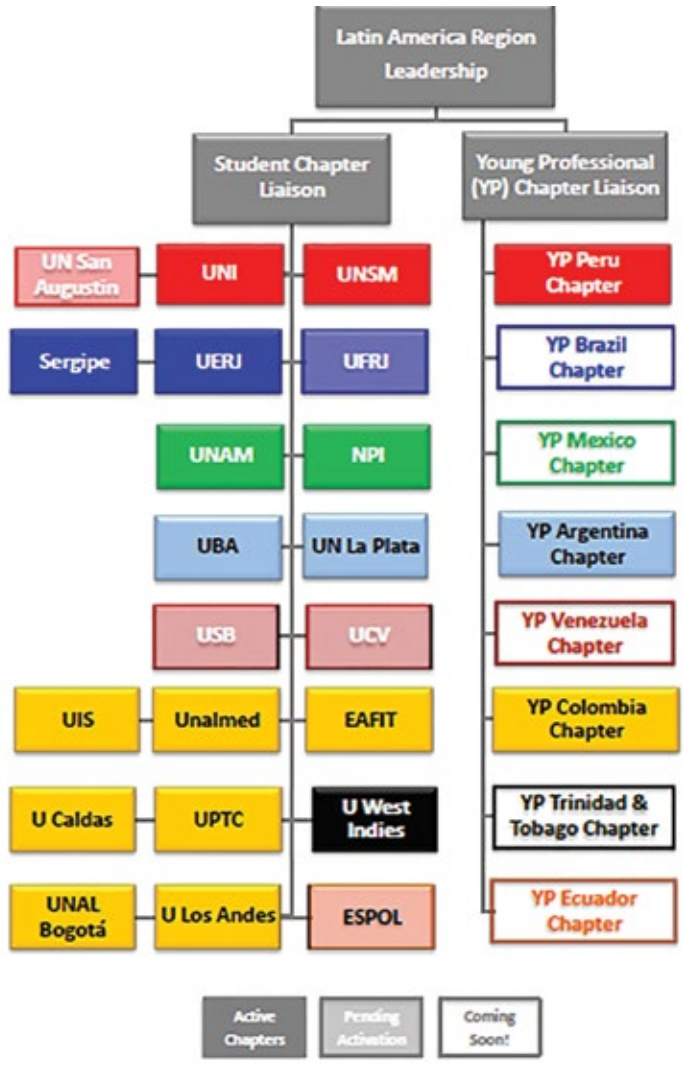
* * *

At Leadership Days 2013, the Latin America Steering Committee worked with student and YP leaders to develop a Student-YP chapter leadership structure for the Region (see accompanying diagram). The structure reflects the Region's goal of establishing an active YP chapter in each country that has AAPG student chapters.


QUINTO


GALVÁN


VELÁSQUEZ



Six months later, the Region is on its way to achieving that goal: Today, Peru, Colombia and Argentina have YP chapters with executive committees comprised mostly of individuals who became involved with AAPG as students and now work in the energy industry.

Antonio Velasquez, YP liaison for the Latin America Region, said local YP chapters represent a great step forward in helping individuals stay involved with AAPG.

"This is the beginning of the implementation of the strategy focused on spreading the leadership to a local level, which we hope will allow the student chapters to be closer to their YPs and to drive a significant growth of the YP population in the next few years," he said.

Velasquez explained that, in addition to a president, vice president, secretary and treasurer, each YP chapter executive committee has an education liaison tasked with providing guidance to student chapters and helping them to access lecturers and industry experts.

"Undoubtedly, the education liaison will foster the continuity of the leadership from the student chapters into YPs," Velasquez said.

Education liaison **Flover Rodriguez** said working on the Colombia YP committee is a natural step for him after serving two years as student chapter president of the Universidad Industrial de Santander (UIS).

"My time as a student chapter president

See **Latin America**, page 36

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STRATIGRAPHIC SEQUENCES IN BASINAL SETTINGS

Nikki T. Hemmesch, Nicholas B. Harris, Cheryl A. Mnich, and David Selby

The Upper Devonian Woodford Shale of the Permian Basin, west Texas, was studied in order to define criteria for recognizing stratigraphic sequences in black shales. The Woodford Shale exhibits a number of sedimentological and stratigraphic features that serve this purpose.

ESTIMATING HYDRODYNAMIC PROPERTIES

Charlotte Garing, Linda Luquot, Philippe A. Pezard, and Philippe Gouze

The control of three-dimensional geometry and morphology of pore networks on electrical and flow properties in heterogenous carbonate rocks is evaluated. Small heterogeneities strongly influence the macroscopic physical parameters used to evaluate the hydrodynamic properties of the rock.

EXHUMATION AND PROSPECTIVITY

David R. Tassone, Simon P. Holford, Ian R. Duddy, Paul F. Green, and Richard R. Hillis

Many of the world's important hydrocarbon provinces have been affected by exhumation, which can have both negative and positive impacts on prospectivity. In the Otway Basin, magnitude and timing of exhumation is essential for defining prospectivity.

A PREDICTIVE RESERVOIR MODEL

Daria Tetyunkina, Stefan M. Luthi, and Dries Gisolf

Non-linear acoustic full-waveform inversion of pre-stack seismic data was successfully tested on a realistic geological and petrophysical model based on outcrop data. This is a first step and sufficient for the purpose of demonstrating the feasibility of the inversion approach.

The AAPG Bulletin is a technical journal that is recognized in the industry as the leading peer-reviewed publication for information on geoscience and the associated technology of the energy industry.

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ProTracks
from page 32

I believe the answer to this is in bridging veteran members and YPs.

A local YP committee serves both aspects: YP committee members develop and demonstrate leadership by planning, organizing and obtaining sponsorship for YP events, and they receive exposure and recognition for their work through the society website and by presenting event proposals to the society board.

* * *

So, how does one kick-start a local YP group?

The first step in starting a local YP group is alerting your local society officers and your AAPG Region/Section YP lead that there is a need for a local YP group.

The DGS officers and Nikki Morris, our Section YP lead, were instrumental in getting the ball rolling by assisting with organizational structure, initial funding and the promotion of DGS YP events. I also can assure you the enthusiasm for our local YP group is as high with veteran DGS members and SWS AAPG as it is with our YPs!

And the enthusiasm seems to be contagious, as the West Texas Geological Society also recently initiated a local YP group in Midland, Texas.

So keep a close eye on the Southwest Section YPs. We're expanding – and big things are yet to come.

Interested in starting or joining a local YP group in your area? Visit our website at aapg.org/youngpros and contact your Section/Region representative.

APPEX Regional Draws Big Response, Rave Reviews

By DAVID COOK, AAPG Europe Region Past President

Very positive comments were received from both delegates and exhibitors at the recent APPEX Regional Prospect and Property Expo, held Nov. 5-7 in Athens, Greece, under the auspices of the Greek Ministry for Environment, Energy and Climate Change.

Minister Ioannis Maniatis welcomed delegates at the opening session and said that it was an auspicious time for APPEX to be in Greece because of the forthcoming offshore acreage round in early 2014. There has been little exploration in Greece in the recent past and the government is providing new incentives to encourage activity.

Delegates were treated to an excellent program of presentations on prospects and basins in Europe, Africa, the Middle East, Southeast Asia and South America. Not only did the speakers cover E&P issues, but also more business-related topics.

Among the many interesting presentations covering the Caspian region, Mike Simmons (Neftex) gave an excellent review of E&P opportunities and Alex Jackson (Menas) discussed political risks.

Speakers from Hellenic Petroleum included Yannis Grigoriou and George Zafiropoulos, who described the new environment for exploration and the prospectivity of offshore western Greece.

Exhibitors comprised service companies, consultants and companies offering deals on prospects and acreage – and plenty of time was provided for delegate networking.

A gala dinner was held at the Acropolis Museum, where Maniatis presented a very informative review of exploration opportunities in Greece.

Hellenic Petroleum was the premier sponsor and was heavily involved in the program and provided most welcoming hosts. Other sponsors were Energean Oil and Gas, PGS, Prospectiuni, EZ Dataroom, Global Pacific and Partners, Envoi and Blackbourn Geological Services Ltd.

Mike Lakin (Envoi) chaired the conference in his usual proficient manner and Jeremy Richardson, director of the AAPG Europe office in London, and his staff provided excellent support.

Next on the calendar is APPEX Global in London March 11-13, followed by the APPEX Regional later in the year.

Latin America
from page 34

has come to a close, but my AAPG experience has just begun," Rodriguez said. "Why am I going to keep working with AAPG as an YP? For one reason – my work is not done."

Peru YP chapter president **Juan Carlos Quinto** served as vice president of the National University of San Marcos Chapter in 2002-03, and Argentina chapter president **Melisa Galván** participated in La Universidad Nacional de La Plata's IBA team in 2013.

"Geoscientists who were involved in student chapters are very grateful for the experiences AAPG gave them," Ramirez said. "Working with YP chapters is a way for them to give back."

Flover Rodriguez agrees.

"AAPG gives me the opportunity to keep learning, to keep meeting people, to keep growing as a person and a professional, all while enjoying every minute," he said. "I am committed to finding new challenges and new projects, and to helping others benefit in the same ways I have."

Velasquez said he expects continued YP chapter growth in 2014.

"We have identified several candidates from Brazil, and YPs from other countries have expressed interest in starting chapters as well," he said.

* * *

Latin America YP activity also is catching the attention of the global AAPG YP Committee, which promotes the formation of YP chapters across the world.

"The Young Professionals Committee strongly believes that delivering the right services is what will encourage geoscientists to join AAPG," said Nick Lagrilliere, AAPG YP Committee chair. "We therefore see the further development of our YP chapter network internationally as a crucial step in bringing these services to the membership at a local level.

"It is very encouraging to see the YPs in Latin America rapidly building their Regional network."

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AAPG Members	$1795	$1995
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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.

In the Beginning: The Legends of Venezuela

By GUSTAVO CORONEL

The story of geology and exploration in Venezuela has been written by dozens of geologists who made a difference in that country.

By extension and through mentorship and writing, their impacts continue today.

Gustavo Coronel, one of the pioneer explorationists in Venezuela, wanted to make sure that their names, while now largely confined to the history books, are not forgotten by today's oil finders.

* * *


CORONEL

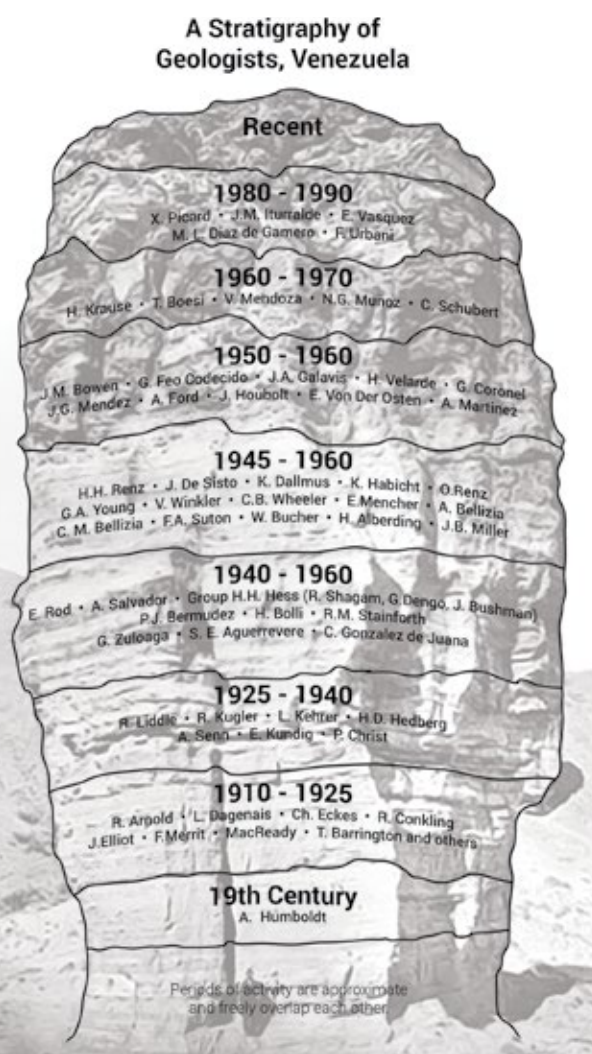
Alexander Von Humboldt arrived in eastern Venezuela just before 1800 and traveled to the Orinoco river region, where he collected fossils as he went and made geomagnetic measurements.

Arriving in Venezuela in the early 1900s, a group of young geologists coordinated by Ralph Arnold made a remarkable regional survey of its petroleum prospects, delineating most of the oil regions in the country.

A second wave of geologists followed the Arnold Group, hired by the oil companies to conduct oil prospecting in the Maracaibo basin – among them, P. Christ, E. Kündig and H. Kugler.

Alfred Senn explored the state of Falcon, contributing to the zonation of Tertiary sediments with the use of foraminifera. Ralph Liddle produced the first geological map and stratigraphic chart of the country and in 1927 wrote his "Geology of Venezuela and Trinidad."

In the 1930s the first Venezuelan geologists became active. First, Guillermo Zuloaga and Santiago E. Aguerrevere studied the stratigraphy of the Venezuelan northern mountain range.



At that time Venezuela also was host to three exceptional micro-paleontologists:

- Pedro Bermudez was a Cuban scientist who built up a most complete collection of Caribbean microfossils, now in the hands of the Venezuelan government.
- Hans Bolli excelled in the study of microforaminifera and fossil pollen.
- R.M. Stainforth was a pioneer in the study of planktonic foraminifera as a tool for worldwide stratigraphic correlation.

The Princeton Caribbean research group, led by Harry Hess (Gabriel Dengo, Reginald Shagam and Jeff Bushman) studied the northern Venezuela Caribbean mountain in the context of plate tectonics – a concept pioneered by Hess. Amos Salvador and Emil Rod also were active at this time.

Salvador was Spanish-born but received his geological degree in Caracas, while Rod was a Swiss geologist who did valuable work on the structural patterns of Western Venezuela ("Strike-slip faults of Western Venezuela", AAPG BULLETIN, Vol. 40, March 1956).

I hold wonderful memories of Karl Dallmus, Konrad Habicht and Otto Renz, the first with Exxon and the other

Continued on next page

Taylor Fellowship Set Jan. 27

By BRIAN ERVIN, EXPLORER Assistant Managing Editor

The second annual meeting of the AAPG Charles Taylor Fellowship, featuring a keynote address by AAPG award winning geoscientist Joe Macquaker, will be held Jan. 27 at the Norris Conference Center in Houston.

The gathering, which provides an opportunity for face-to-face interaction among members of the AAPG editorial board, features a reception and dinner.


SWEET


MACQUAKER

The Charles Taylor Fellowship comprises current and all former members of the Association's editorial boards.

More than 200 people have been invited to the Fellowship meeting.

The Charles Taylor Fellowship was established by the AAPG Executive Committee as a way to help ensure that the BULLETIN remains the premier scientific journal of energy geoscience. It is a "special committee" chaired by the AAPG elected editor, who is currently Michael L. Sweet.

A big goal of the night is to get all of the editors to discuss and understand the criteria and approaches used in selecting the best papers.

"Publication awards are the big thing, and this is a time to get everyone together," Sweet said, "and the big advantage we got (last year) was a wider selection of opinion on how we choose the best paper.

"We actually sat down," Sweet recalled of last year's inaugural meeting, "a group that had looked at the criterion for the selection process and what makes for a best paper: Is it the science, or how the science is presented?"

That discussion concluded with a straw poll, and recommendations were presented to then-elected editor Steve Laubach.

"From that perspective, it was really useful," Sweet said. "The way we foresee the Fellowship is to help the editor by providing input into future publications of the AAPG."

Other priorities for the group include improving editorial board operations, identifying suitable board and reviewer performance metrics and standards, monitoring of BULLETIN performance (including time-to-decision and other efficiency measures) and updating the reviewer database.

The Fellowship also takes an active role in identifying and soliciting topics for theme issues and may recommend review articles to be commissioned.

In addition, the preliminary meeting agenda is:

- Current Overview of AAPG Publications.
- AAPG Publication Award Selection.
- Journal of Data Discussion.
- BULLETIN Manuscript Review Process.
- AAPG Wiki Demo and Discussion.
- Search and Discovery.
- Interpretation Journal.

Macquaker, now with ExxonMobil Research Co., is a former AAPG Distinguished Lecturer and co-winner (with Andrew C. Aplin) of the 2013 Wallace E. Pratt Memorial Award, presented each year to honor the authors of the best AAPG BULLETIN article.

His talk in Houston will be titled "Early Diagenesis in Fine-Grained Sediments: Cement Precipitation as a Modifier of Fabrics and Porosity Systems in Fine-Grained Rocks."

Charles Henry Taylor was AAPG's first editor, serving from 1917-19, and he was hailed as being a key figure in AAPG history.

His 1964 obituary called him the "father of AAPG."

Fellowship members can attend the working sessions and dinner free of charge; a limited number of tickets to the dinner and Macquaker's talk will be available to the public on a first-come, first-served basis.

To request tickets, or for more information on the Charles Taylor Fellowship meeting, contact Tonia Greening at (918) 560-2437, or tgreening@aapg.org.

Continued from previous page

two with Shell.

I remember Dallmus as a great admirer of simple solutions to complex geological problems, always quoting Ocam's razor. Otto Renz was an exceptional stratigrapher, notable for his knowledge of Cretaceous ammonites.

And Konrad Habicht was my dearest friend and mentor, an exceptional geologist and human being. He and his wife once traveled eight hours to my camp, in the middle of nowhere, to bring me a birthday cake.

I also admired the work of Venezuelan geologist Alirio Bellizia at the Ministry of Mines and Hydrocarbons. Bellizia was not only a very prolific author but a superb organizer of geological and mining associations in the country.

During the 1950s and the 1960s I worked next to several excellent Venezuelan geologists: Jose Mendez, Gustavo Feo Codecido, Erimar Von der Osten, Jose Antonio Galavis and Hugo Velarde.

Geologist Anibal Martinez wrote his "Chronology of Venezuelan Oil" in 1969 and developed into an international expert on the terminology of petroleum reserves. Feo Codecido and I worked in the geology of the Gulf of Venezuela and Galavis and Velarde in the geology of the Orinoco belt.

During these years J. Myles Bowen (recipient of the AAPG Pioneer Award in 2011) arrived in Venezuela, doing work in the Perija region, near the Colombian border.

* * *

Finally, I remember a group of bright, young Venezuelan geologists arriving after all of the other greats – Franco Urbani, Carlos Schubert, Hans Krause, Daisy Perez de Mejías, Enrique Vasquez and Lourdes de Gamero, among others.

They are now relative old timers, from the "Pleistocene," teaching to the new what they learned from the old.

That is good, because in Venezuela, the story of geology and exploration is far from finished.

AAPG EXPLORER
GEOPHYSICAL CORNER

The Geophysical Corner is a regular column in the EXPLORER, edited by Satinder Chopra, chief geophysicist for Arcis Seismic Solutions, Calgary, Canada, a past AAPG-SEG Joint Distinguished Lecturer and winner of this year's AAPG Jules Braunstein Memorial Award. This month's column deals with spectral decomposition.

Some challenges, but also advantages

Finding the Value in Spectral Decomposition

By RONGFENG ZHANG

When we see a rainbow, it is visually appealing – and the natural tendency is to appreciate its aesthetic qualities rather than study it on an analytical basis, as frequency sub-bands decomposed from white light.

In a similar vein, geoscientists studying seismic waves can derive results from the data as a composite signal, as well as gain insight by studying the data decomposed into frequency component parts.

Spectral decomposition has been employed in seismic interpretation for more than two decades, evolving from a niche technique to a commonly used approach due to its advantages in channel delineation, gas reservoir detection and thin-bed interpretation.

Since it was formally introduced, several methods of spectral decomposition have emerged, from the popular short time Fourier transform (STFT) and continuous wavelet transform (CWT), to less frequently used methods such as matching pursuit, S-transform, chirprit transform and wavelet packet transform.

Each approach has its advantages and disadvantages, but most of these approaches have in common some kind of operation between the seismic data and serial kernel functions with closed form expressions (figure 1):

- In STFT, sine, cosine and window functions are used.
- In CWT, a mathematic wavelet is used.
- In S-Transform, the Gaussian function is used.

In geophysical terms, these operations are designated as convolution, essentially some kind of multiplication and summation carried out in a running-window manner.

* * *

Seismic data is a collection of reflection events from the subsurface. There are diffractions, refractions and noise, but these are minor considerations when used for oil and gas exploration and reservoir characterization.

These subsurface reflection events can overlap, partially or completely, depending on frequency and depth, making some geologic features indistinguishable. However, when seismic data is decomposed into individual frequency components – as done in spectral decomposition – some subsurface events can be distinguished at certain frequency components, such as the channels in figure 2.

Sometimes, it is not just one particular frequency component that reveals the geological features – several frequency components can reveal different parts or aspects of the subsurface features.

In this case, color blending is often used to put several frequency components together into one map and let us see them simultaneously.

In figure 2(b), RGB color blending is used to put three frequency components together by designating a low frequency component as red, and with middle and high frequency components as green and blue, respectively. The high frequency components are more responsive to the narrow and thin parts of channels, while lower frequency components are more responsive to wide and thick parts of channels, such as point bars.

Combining these frequency components together not only makes the overall morphology of the channel system clearer, but also makes it possible to analyze the heterogeneity of the individual channel. For example, the detailed internal variation of the large north-south channel in figure 2(b) can be seen.

* * *

In conclusion, this column has shown the advantages of spectral decomposition in methodology and practice – but it does have drawbacks that sometimes challenge even the experienced practitioners.

One of the most significant problems in spectral decomposition is the side-lobe effect: a fake event created by spectral decomposition that has nothing to do with the subsurface geology.

We'll describe this effect in an ensuing article – and introduce a new spectral decomposition method developed to address the problem.

This month, I would like to thank Les Dabek, AAPG member Mohammed Al-Ibrahim, Chris Earle and John Sherman for their help in this article.

I also would like to thank Geomodeling Technology Corp. for its support.

(Editor's note: Rongfeng Zhang is a senior geoscientist with Geomodeling Technology Corp.)

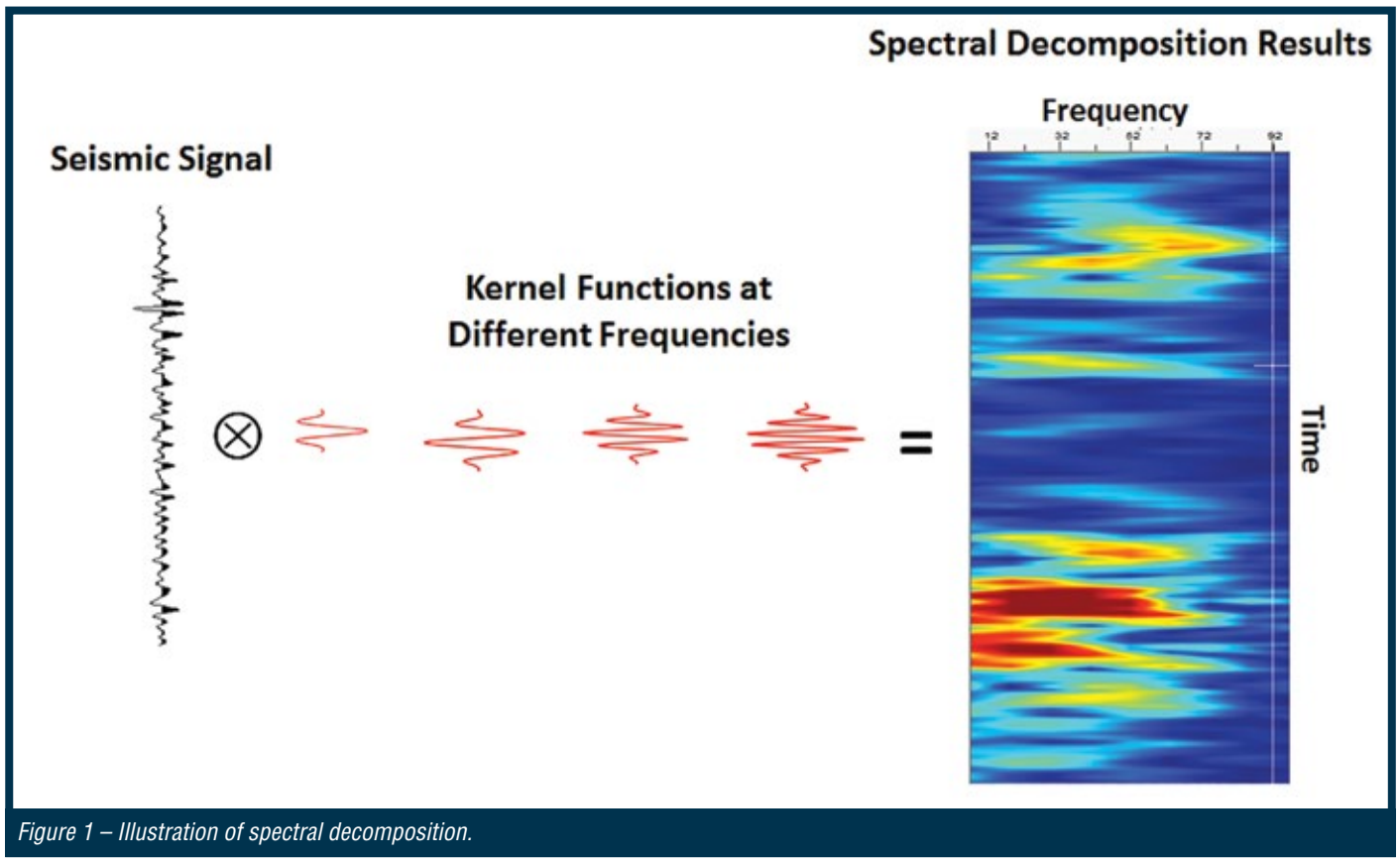


Figure 1 – Illustration of spectral decomposition.

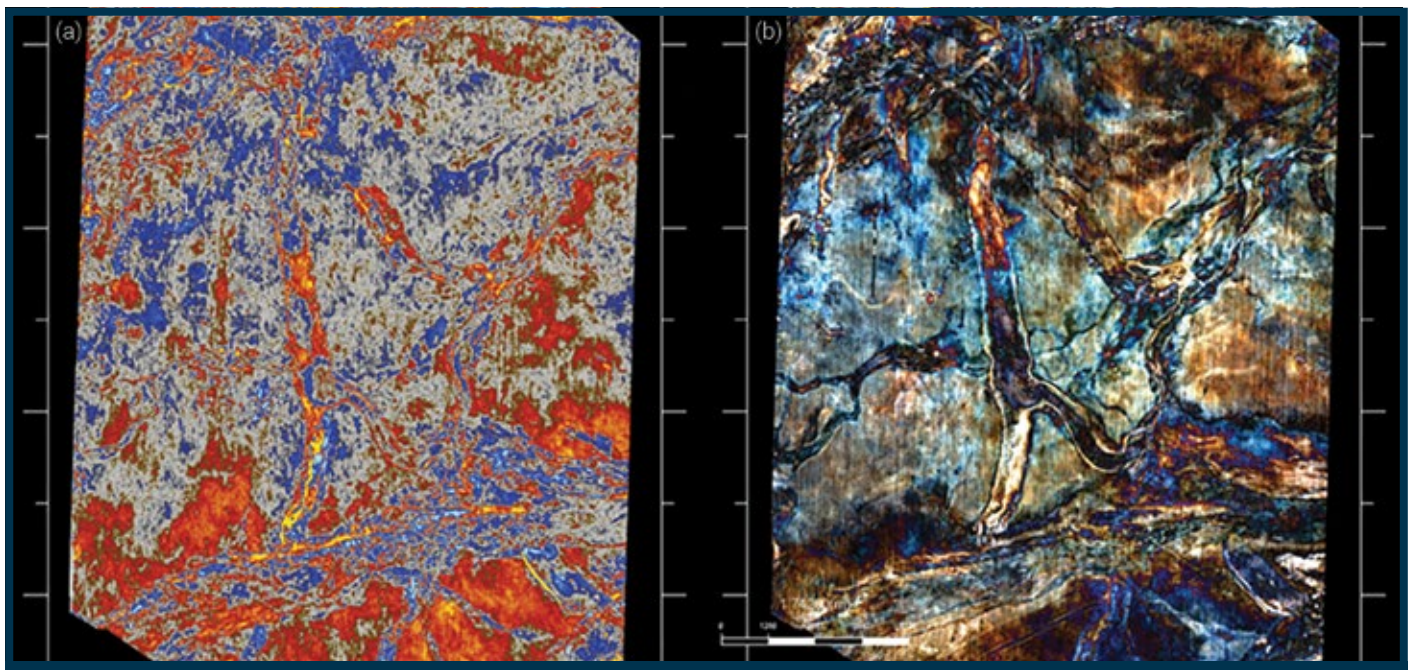
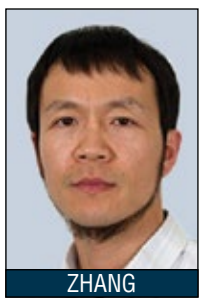


Figure 2 – (a) Horizon slice of original seismic data (b) Color-blend of three spectral decomposition components



ZHANG

When seismic data is decomposed into individual frequency components, some subsurface events can be distinguished at certain frequency components.

Edith Allison, director of AAPG's Geoscience and Energy Office in Washington, D.C., can be contacted at eallison@aapg.org; or by telephone at 1-202-643-6533.

Report Shows Need for Data in Health Debate

By EDITH ALLISON, GEO-DC Director

The recent National Academies' Institute of Medicine (IOM) report on its late-April 2012 workshop, "Health Impact Assessment of Shale Gas Extraction," describes many potential health impacts of shale gas development and identifies the data gaps – especially the lack of baseline health data – that keep scientists from differentiating real from potential health risks.

The workshop was organized by the IOM Roundtable on Environmental Health Sciences, Research and Medicine.

The National Research Council, also part of the National Academies, defines a health impact assessment (HIA) as a systematic, but mostly qualitative, process that uses an array of data sources and analytic methods, and considers input from stakeholders to determine the potential effects of a proposed policy or project on the health of a population.


ALLISON

Some of the concerns stated in the workshop are now out of date because extraction technology, industry best practices and baseline data collection are rapidly changing.

Aaron Wernham, project director of the Health Impact Project at Pew Charitable Trusts, noted that HIAs are widely used in the oil, natural gas and mining industries, where companies recognize that HIAs protect workers and communities, reduce risk and lower business costs.

Expert Perspectives

The IOM workshop provided observations from many experts, but did not provide recommendations on monitoring and managing the health impacts of shale gas extraction.

The workshop did identify potential risks from: drinking-water contamination, air pollution, climate change from greenhouse gas emissions, noise, changes in land use and community impacts related to an influx of workers, changes in traffic and economic changes to individuals and governments.

In three areas, little-publicized data were presented:

✓ Declining ozone levels in the area of Barnett shale development.

✓ Unhealthy levels of worker exposure to silica dust and diesel particulates.

✓ The volumes of increased truck traffic in shale gas development areas.

Air pollution, ozone in the Dallas-Fort Worth area.

Michael Honeycutt, director of the toxicology division of the Texas Commission on Environmental Quality (TCEQ), reported that ozone was the only criteria pollutant associated with oil and gas activities for which the Dallas-Fort Worth area was in violation.

However, as the number of Barnett shale wells grew from almost zero in the mid-1990s to over 14,000 wells in 2011, ozone levels declined from 106 parts per billion (ppb) in 1995 to 86 ppb in 2010. The area standard for compliance is 85 ppb.

TCEQ continues to regularly monitor emissions using fixed-site, airborne and hand-held monitors and detectors. High readings often reflect faulty equipment that can be quickly repaired.

Worker exposure to silica dust and diesel particulates.

Eric J. Esswein, senior industrial hygienist at the National Institute for Occupational Safety and Health (NIOSH), reported on worker health data collected through partnerships with five companies – at 11 hydraulic fracturing sites in five states. NIOSH found that 50 percent of the breathing-zone, silica dust samples exceeded the OSHA permissible exposure limit, and 68 percent were greater than the NIOSH recommended exposure limit.

These elevated levels of silica dust were higher than levels suitable for the respirators used by most workers.

NIOSH has recommended equipment changes that can reduce the silica dust levels and worker impacts. NIOSH sampling showed that diesel particulate at well sites also is a likely health hazard.

Increased truck traffic in shale gas development areas.

Timothy Kelsey, professor of agricultural economics and state program leader for Economic and Community Development at Pennsylvania State University, reported

Continued on next page

Continued from previous page

that Pennsylvania's economic experience through March 2012 includes hiring, lower unemployment and higher average wages in Marcellus counties, as well as economic disparities between those profiting from development and those that are not.

His detailed statistics on traffic in Bradford County, Pa., show truck traffic increased more than 10-fold between 2005 and 2010.

Some of the concerns stated in the workshop are now out of date because extraction technology, industry best practices and baseline data collection are rapidly changing.

For example, a peer-reviewed study by N.R. Osborn and others (2011) showing a correlation between methane in drinking water and Marcellus shale wells is cited in this workshop as evidence that hydraulic fracturing results in methane in drinking water – but a more recent, peer-reviewed report by Lisa Molofski and others (Groundwater, May/June 2013) provides evidence that methane in drinking water in some areas of Marcellus shale production does *not* come from the Marcellus formation, and its occurrence better correlates with topographic and hydrologic features rather than shale gas extraction.

Research Recommendations

Several speakers suggested areas for additional research:

David Carey, director of the Weis Center for Research at Geisinger Health Center, located in the Marcellus shale development area, reported that since 2004 the center has been collecting digital data on hundreds of thousands of patients. This data could be the basis for various analyses of health impacts.

Bernard D. Goldstein, professor emeritus, Department of Environmental and Occupational Health at the Graduate School of Public Health, University of Pittsburgh, noted – several federal and state advisory committees on shale gas development have lacked members from the public health sector and little public health research has come from these committees' recommendations.

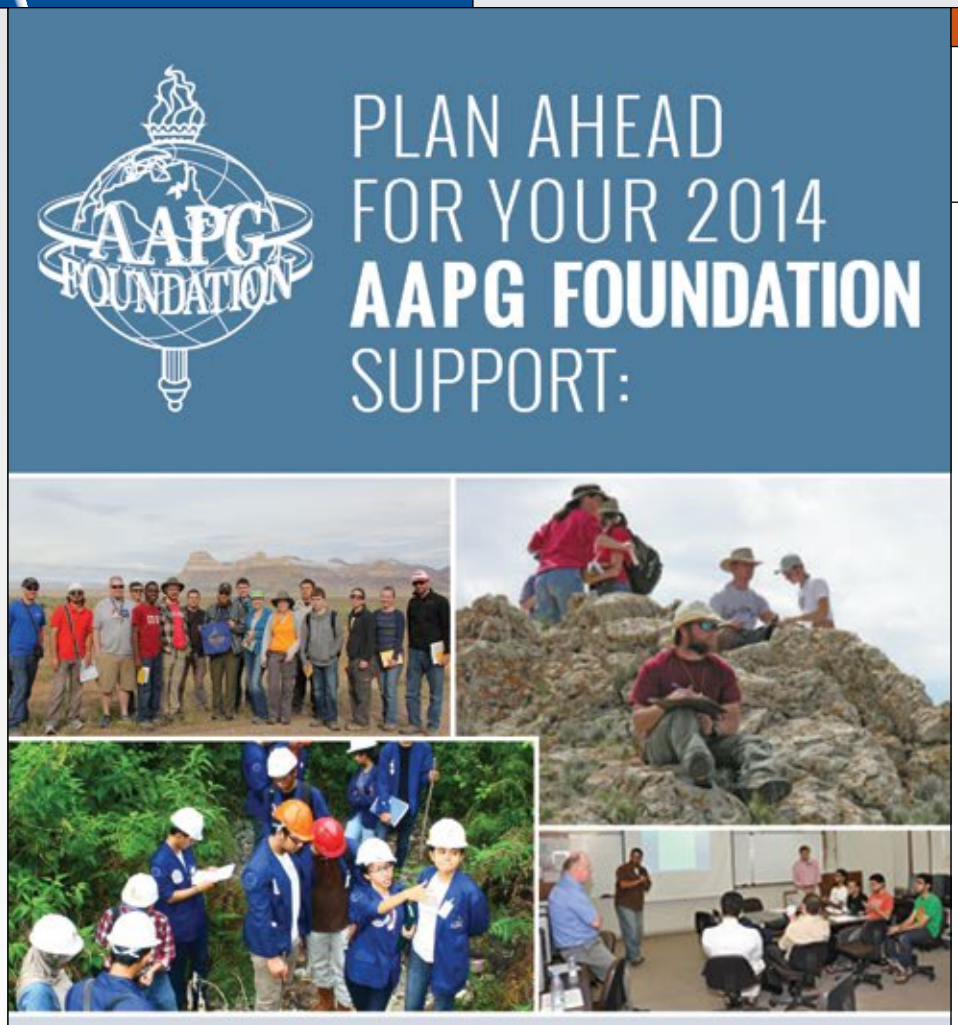
Goldstein stated a need for clinical health data that is tied to location information in order to detect hotspots for further investigation.

Roxana Witter, assistant research professor of Environmental and Occupational Health at the Colorado School of Public Health, recommended pre- and post-development collection of data on sexually transmitted infections, crime and substance abuse – health conditions that tend to rise with rapid population increases.

Witter also recommended collection of data on heart rate, cortisol and C-reactive protein, which are potential markers for stress.

Rob Donnelly, vice president of health for Royal Dutch Shell, recommended that industry create partnerships with affected communities and other stakeholders to define the research questions.

The complete workshop report can be downloaded as a free PDF file or purchased in hard copy at the National Academy of Sciences website, www.nas.edu.



FOUNDATIONUPDATE

Then and now

Supporting the Mission

By NATALIE ADAMS, AAPG Foundation Administrative Manager

As you may know, the AAPG Foundation continues to demonstrate considerable progress in achieving its mission to support educational, charitable and scientific programs and activities for the benefit of the geologic profession and the general public.

I developed a comparison to its activities of 30 years ago, and as you can see on the accompanying table and the information below, our Foundation has done well in supporting our mission.

* * *

Some of the larger programs that the AAPG Foundation supports annually include the Distinguished Lecture and Visiting Geoscientists Programs, the Imperial Barrel Award, the BULLETIN, Grants-In-Aid and the L. Austin Weeks Undergraduate Grant program.

New for 2013, the AAPG Foundation Trustees approved proposals for funding:

- The James A. Hartman Student Chapter Leadership Summit ($25,000).
- The Santa Barbara Museum/Dibblee Geology Center ($45,000).
- Young Professionals and student field trip during the AAPG-RMS meeting ($2,000).
- AGI's Earth Science Week ($35,000).
- Animations of the Geological History of Colorado ($50,000).
- Boy Scouts of America Geology Merit Badge Program ($5,600).
- Charles H. Taylor Fellowship ($5,000).
- Teacher of the Year award increase ($1,000).

Since 1983, annual support also is given for the Halbouty Lecture, the Professorial Award, Teacher of the Year, Teachers Day at ACE, student field trips, the Michel T. Halbouty Endowed Fellowship, and the Holland Professorial Award.

Trustee Associate membership has grown from 230 in 1983 to 275 in 2013 – and the group continues to provide considerable financial support for AAPG Foundation programs.

Also, in 2013 the AAPG Foundation supported initiatives in the following countries: United States, Canada, Colombia, United Kingdom, Poland, Ukraine, Italy, Egypt, Armenia, Romania, Austria, Pakistan, Malaysia, Indonesia, Australia, New Zealand, China, Uganda and Nigeria.

* * *

Because of your contributions, thousands of people are touched by the outreach of the AAPG Foundation. To find out more, visit foundation.aapg.org.

	1983	2013
Total Assets	$23,000,000	$42,300,000
Annual Revenues	$1,700,000	$2,690,000
Annual Contributions	$787,000	$2,700,000
Annual Awards and grants	$798,000	$1,330,000

Foundation Contributions for November 2013

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In memory of Bob Ottmann and Bernie Burford

Wallace Pratt BULLETIN Fund
Bill Deward Holland
In memory of Bob Ottmann and Bernie Burford

L. Austin Weeks Undergraduate Fund
Frank J. Adler

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

INMEMORY

Arthur Forbes Jr. (EM '60)
Butler, Pa., May 19, 2013
Frederick Fowler, 86
Midland, Texas, Oct. 9, 2013
Hugh Hanagan, 89
Roswell, N.M., Nov. 10, 2013
* Arne Nielsen, 87
Calgary, Canada, July 2, 2013
Rex Ulricksen, 90
Highlands Ranch, Colo.
Nov. 5, 2013

(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. Asterisk denotes AAPG Honorary member.)

HELPING VETERANS ENTER THE GEOSCIENCES

MILITARY VETERANS SCHOLARSHIP PROGRAM

NEW RECRUITS

With a goal of getting specific, highly talented individuals who are trained in the armed forces into the geosciences, the AAPG Foundation's Military Veterans Scholarship Program was created to promote educational advancement and career opportunities in geoscience support these men and women in the pursuit of their degrees, enabling them to gain employment within the oil and gas industry.

"Speaking as a veteran of the U.S. Armed Forces, it is an honor to be recognized for the services we (veterans) have provided to our country through veteran specific grants and scholarships. I would encourage all veterans to take advantage of any grant/scholarship affording them an advantage in continuing their education."

Chad W. Carlson
Ph.D. Candidate, University of Nevada, Reno/
Nevada Bureau of Mines and Geology

TODAY'S U.S. MILITARY SERVICE MEN AND WOMEN

United States military veterans access to higher education falls short for many veterans, as it has only been provided through their military service with the availability of educational benefits such as the GI Bill and limited tuition assistance. The GI bill often is not enough, and this program will provide the additional financial assistance needed to keep our vets in class and providing geoscientists for the future.

"As a veteran, I know firsthand the challenges associated with transitioning from the military to a career as a petroleum geoscientist. The AAPG Foundation's Military Veterans Scholarship seeks to make the transition a little easier, and to help meet our industry's future challenges by bringing these outstanding young men and women into our ranks."

Earl Wells
Deepwater GOM/JI
ExxonMobil US Production

"Veterans are underrepresented within the geosciences, and support for former service members to pursue their educational and research goals is lacking. The AAPG Foundation's Military Veterans Scholarship program fills a need to encourage and support veterans in the geosciences and offer assistance to those who served our country."

Matthew McKay
Previous AAPG Foundation Grant recipient

CONTRIBUTE TO THE FUND

Your donation will leave a lasting impact on veterans who share your passion for the geosciences.

AAPG Foundation ▪ P.O. Box 979 ▪ Tulsa, OK 74101-0979 USA
foundation.aapg.org ▪ Toll Free 855.302.2743

A joint publication of SEG and AAPG

Interpretation™

A journal of subsurface characterization

Society of Exploration Geophysicists

AAPG

Shale paleoenvironments

The processes that deposit mud, and the environmental conditions under which the mud is deposited, are the primary controls on the composition (i.e., mineralogy, organic content) and texture (laminations, bedding, etc.) of mudstones ("shales"). Together, these and other factors (e.g., diagenesis, subsurface stresses) control or affect geomechanical properties, anisotropy, porosity, permeability and other factors that are fundamental controls on whether a mudstone can act as a hydrocarbon source rock, seal, or reservoir.

The editors of *Interpretation* invite papers on the topic of **Shale Paleoenvironments** for publication in the February 2015 special section to supplement the journal's regular technical papers on various subject areas. We seek papers that can advance our understanding of mudstone paleoenvironments in several ways. For example:

- by defining or illustrating novel ways of reconstructing paleoenvironments
- by integrating several different techniques for paleoenvironmental analysis
- by illustrating how paleoenvironmental analyses have contributed to making better economic decisions in the petroleum industry or elsewhere
- by providing reviews or tutorials of existing approaches and technologies (e.g., sedimentology, geochemistry)

Interested authors should submit manuscripts for review no later than **15 May 2014**. In addition, the special section editors would like to receive a provisional title and list of authors as soon as possible. Authors should submit via the normal online submission system for *Interpretation* (https://mc.manuscriptcentral.com/interpretation) and select the **Shale Paleoenvironments** option in the manuscript type dropdown box. The submitted papers will be subject to the regular peer-review process, and the contributing authors are also expected to participate in the review process as reviewers.

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

The submissions will be processed according to the following timeline:

Submission deadline 15 May 2014	All files submitted for production 9 October 2014
Peer review complete 26 September 2014	Publication of issue February 2015

Special section editors

Bruce Hart bhart@statoil.com	Gilles Hennenfent ghft@chevron.com
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Interpretation special section

CALL FOR PAPERS

Ms. Cox goes to Tallahassee

Energy Expertise Shared

By DENISE COX

Agreeing to speak at a state government briefing is daunting at first – but in the end, a very satisfying experience.

The request to speak at a Florida Legislature Energy Briefing on hydraulic fracturing came from Edie Allison, AAPG's GEO-DC director, one week before the event.


COX

My initial response was, "NO! I'm too busy and have limited experience with Florida petroleum basins."

On a personal level, it also crossed my mind that I am a Legacy member of the Nature Conservancy, and residing down the street from me is the former chair of the board of trustees for the Florida chapter.

In the end, realizing I am a knowledgeable petroleum geoscientist *and* an environmentalist, I knew I had to step up to the challenge.

* * *

The energy briefing was arranged by the Consumer Energy Alliance (CEA), described on its website as "the voice of the energy consumer." They promote an all-of-the-above energy policy, focused on increasing production of U.S. domestic energy to create jobs, lower energy prices and expand our economy. AAPG is a CEA founding member, through the efforts of past GEO-DC director Don Juckett, and continues to be an active affiliate today.

Michael Zehr (HBW Resources) who advises the CEA on federal policy issues, made preparations for the briefing relatively worry-free by clearly defining the expectations.

"The role we are looking to fill would address what hydraulic fracturing is," he said, "and some of the key issues to keep in mind regarding the process as states seek appropriate regulatory guidelines to ensure exploration occurs in an environmentally responsible fashion."

He listed the expected audience of legislators, staff and CEA Florida members. He even provided the link to past DEG president Tom Temples' talk on hydraulic fracturing.

I contacted Temples to send the presentation he co-authored with Michael Young (Bureau of Economic Geology) as a PowerPoint so I could modify it as needed. AAPG member Pete MacKenzie, Ohio Oil and Gas Association (OOGA) VP of operations, also provided two presentations and talked me through some of the possible questions that could be asked.

Preparation helps you to listen and answer questions objectively.

To make sure I was up-to-date on Florida geology and resource development I contacted Harley Means, Florida assistant state geologist, to get information on their projects and state regulatory issues.

It took about a day of Internet research to find and read through the references cited in the AAPG and OOGA presentations. I also did an Internet search on both "hydraulic fracturing" and "fracking." The dual Internet search was one of the most informative steps in preparing to speak to the public, as it reveals the data sources, surface and subsurface perceptions of scale, and rhetoric from both sides.

It also helps numb you to emotional arguments so you can listen and answer questions objectively.

* * *

The presentation room and number of attendees at the energy briefing were

Continued on next page

Some Tips for Public Interaction

Here are my tips for speaking to the public on energy issues.

- **Ask for help.** There are AAPG members who have full PowerPoint presentations that you can modify. They also can prepare you for the type of questions you might get.
- **Research both sides of the discussion.** It will give you a flavor of how questions will be asked and what data is effective.
- **Contact your state Survey.** They have knowledge of the geology and state regulatory issues.
- **Make it real.** Make it personal. Find a way to connect the complexity of the petroleum business to the audience or community.
- **Be a Certified or Licensed Petroleum Geoscientist** and a member of the AAPG **Division of Environmental Geoscience** to help be perceived as qualified and neutral.
- **Make your first presentation a panel discussion**, with a moderator to control the presentation and questions.
- **Bring business cards** to exchange so you can follow-up with attendees and send a follow-up email with a link to your presentation.
- **Take your talk on the road.** Local civic organizations always are looking for speakers. Contact the CEA and see if they have or can arrange an event at which you can present.

– DENISE COX

Deadline Looms for ICE Abstracts

The deadline for submitting abstracts for the next AAPG International Conference and Exhibition, set Sept. 14-17 in Istanbul, Turkey, is about to arrive.

The deadline for abstract submission is Jan. 16.

The event will be held at the Istanbul Congress Center. The general chair is scientist-writer Volkan S. Ediger, who since 1998 has worked as energy adviser to the presidents of the Turkish Republic.

This meeting will mark the first time an ICE has been held in Istanbul, and the technical program is structured to provide the latest science and concepts of not just regional plays but also covering topics and geological advances from around the world.

The technical program will comprise 11 general themes (and dozens of sub-themes). The main technical themes are:

- New and Emerging E&P Provinces.
- E&P in Mature Basins.
- Regional Geology and Tectonics.
- G&G Integration.
- Unconventional Resources.
- Conventional Resources.
- Petroleum Systems and Geochemistry.
- Siliciclastics and Carbonates.
- Structural Geology and Traps.
- Health, Safety, Environment Geology and Hydrogeology.
- History of Petroleum Geology.

To submit an abstract, or for more ICE information, go to www.aapg.org/ice.

Continued from previous page

much larger than I anticipated. I also was a little unnerved to see a video camera and press in the front row.

Kevin Doyle, executive director of the Florida CEA made the introductions of my co-panelists Natalie Joubert and Micheal Zehr, CEA, and our state legislature hosts, Jose Felix Diaz, chairman of the Florida House Energy and Utilities Subcommittee, and state Rep. Ray Rodrigues, the sponsor of Florida's proposed hydraulic fracturing legislation.

I was introduced as an AAPG Certified Geoscientist and a member of the Division of Environmental Geosciences. We could see in the audience body language that the combination did cause some confusion.

Doyle also had the audience state their names and affiliation, so we could judge the effectiveness of the presentations by looking to different parts of the room.

The presentation went off with no interruptions. The "Ah-ha" moments I recognized in the audience were:

- The difference in industry's definition of hydraulic fracturing as a process and the public's definition, which includes all aspects of drilling and completing the well.

- The sense of scale from the surface to the actual interval that is being hydraulically fractured.

- The high-technology aspects of drilling and completion.

Zehr and Joubert commented they saw heads in the audience – including the environmental representatives – unconsciously nodding in agreement with many points that were made in the presentation.

The presentation ended by time constraint, but many participants remained behind to exchange cards and ask questions.

I followed up with an email that included links to the presentation and a reminder to do their homework and review a six-and-a-half minute YouTube video that most closely represents my understanding of the hydraulic fracture process.

* * *

The only surprise I had from the presentation occurred after the event.

The Florida Current wrote an article on the presentation (thefloridacurrent.com/article.cfm?id=35188760) – they had recorded the presentation, and the word translator caused a point that was made from a slide citing two scientific studies to read, "Geoscientist says groundwater contamination via fracturing 'physically impossible.'"

Fortunately, I received a preview copy and was able to correct it to, "physically not plausible."

(Editor's note: Cox is senior technical adviser for Storm Energy, Panama City, Fla. She also is a past AAPG elected secretary.)

South Florida's Shale Potential

The South Florida Basin has a potential shale play in the Cretaceous Sunniland formation that could affect up to six predominantly rural counties (U.S. Geological Survey, 1995).

The target is the slightly over-pressured, lower Sunniland formation at about 11,500 feet.

The play is believed to be a liquids-rich shale play, based on private geochemical studies and Humble Oil and Refining Company's 1960's completion in the lower Sunniland, which produced about 300,000 BO.

New leases for the shale play have been recorded in an interpreted core area in parts of Collier, Lee and Hendy counties. Recent activity along the Sunniland Trend has focused on improved production in mature fields from horizontal wells drilled in the porous limestone of the Upper Sunniland formation.

Drilling to test the shale play could start as early as 2014.

In advance of any potential shale development that will involve hydraulic fracturing, Florida state Rep. Ray Rodrigues, R-Estero, sponsored House Bill 743 – dubbed the Fracturing Chemical Usage Disclosure Act – to require the state to keep an online registry of the chemicals used during hydraulic fracturing.

The bill passed 92-19, and was modified with a later amendment to require companies to report the total volume of water, each chemical ingredient and the chemical concentration by mass.

– DENISE COX

CLASSIFIEDADS

POSITION AVAILABLE

United States based Survey Company Seeks South America Area Manager

Successful and highly regarded United States based company providing precision navigation, geophysical and Autonomous Underwater Vehicle (AUV) survey services is expanding operations and service offerings with a new regional office in South America. We are currently seeking area professional(s) for the role of South America Area Manager.

Ideal candidates should hold a graduate level degree in business administration and or university level technical degrees in qualified marine and earth geosciences, such as geophysics, geology, marine archeology, or hydrographic surveying. Applicants should have a minimum of 10 years of experience working in offshore oil and gas exploration or production related services firms. Verified professional registrations and certifications from recognized qualification boards related to the marine geosciences, engineering or offshore surveying fields will be given prime consideration for employment. Knowledge of and experience with bid tender structures and methodologies, employment, and corporate tax regulations for performing services for companies such as Petrobras, etc. is essential,

Applicants must be able to read, write, and fluently converse in the English, Portuguese, and Spanish languages to assure full understanding of project documentation (e.g. tender requests, qualification responses) and associated legal documentation (e.g. contracts), in order to clearly convey vital information between regional and head offices. Preferred applicant will establish working relationships with local attorneys and other professionals as needed to help in accomplishing company objectives.

Some of the duties required for this position will be locating, hiring, training and managing local staff members for participation in both regional office and area field operations for the full range of company provided services within the region. The successful candidate's current area of residence may be used as one consideration in the evaluation and selection of ideal office locations, depending on company sales and marketing objectives and client servicing considerations.

Candidate responses should consist of comprehensive curriculum vitae (CV) and multiple applicable professional references.

Respondents should reply in confidence via e-mail or registered post to Tesla Offshore, LLC attn. Mr. Randal P. Bergeron, President.

Please include comprehensive curriculum vitae (CV) and attach in good faith a list of verifiable professional references.

www.teslaoffshore.com
bergeronr@teslaoffshore.co

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Executive Director American Institute of Professional Geologists

The American Institute of Professional Geologists is accepting applications for the position of Executive Director. The successful candidate will succeed the current director who has announced his intent to retire. Applications will be accepted until the position is filled. Details can be found at http://www.aipg.org/AIPGExDirSearch.pdf.

****

We invite applications for a tenure-track, assistant professor in the Department of Geology & Geophysics. We seek applicants whose research integrates geological and geophysical data to investigate tectonic processes that govern the structural evolution of basins in a variety of settings that could include rift and passive margin basins, orogenic belts and foreland basins, intra-cratonic basins, among others. We welcome applicants whose research interests and expertise complement and broaden existing strengths in the Department of Geology and Geophysics. Applicants should demonstrate a strong record of scholarship and the potential for developing an internationally recognized research and teaching program. The candidate will be expected to teach effectively at the undergraduate and graduate levels in his or her specialty and to supervise undergraduate, MS, and PhD research. In addition, the candidate will have the opportunity to collaborate with colleagues in the Berg-Hughes Center for Sedimentary and Petroleum Systems and the Center for Tectonophysics. For more information about TAMU, the College of Geosciences and the Department of Geology & Geophysics, see http://geoweb.tamu.edu.

A Ph.D. is required, and the appointment may begin as early as August, 2014. Review of applications will begin January 15, 2014, and will continue until a suitable candidate is found. Applicants should submit a PDF including a letter of application, curriculum vita with details of published work, a statement of research and teaching interests, and contact information (including email) for a least four references to: Carlson@geo.tamu.edu; questions may be directed to the same email address.

Texas A&M is a land-, sea- and space-grant university located in a metropolitan area with a dynamic and international community of - 200,000. Texas A&M is an affirmative action/ equal opportunity employer committed to excellence through the recruitment and retention of a diverse faculty and student body and compliance with the Americans with Disabilities Act. We encourage applications from minorities, women, veterans, and persons with disabilities. Texas A&M University also has a policy of being responsive to the needs of dual-career partners.

http://employees.tamu.edu/jobs/careers/dcsdetails.aspx.

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THE UNIVERSITY OF TEXAS AT EL PASO
College of Science
Department of Geological Sciences
Department Chair and Professor

POSITION DESCRIPTION: The Department of Geological Sciences at The University of Texas at El Paso (UTEP), the first national research university serving a 21st-century student demographic, seeks a Chair at the tenured Professor level to lead the Department into the University's second century. The Chair will be expected to build upon existing strengths, add new capabilities, facilitate the development of multidisciplinary research, lead his or her own externally-funded research program, and help fulfill the Department's teaching mission.

ABOUT THE DEPARTMENT AND UTEP: The Department of Geological Sciences has a faculty of 15 and more than 150 M.S., Ph.D. and undergraduate students. More information about the activities and facilities in the Department can be found at: http://www.geo.utep.edu. The Department also participates in interdisciplinary Ph.D. programs with Engineering and Computational Science. UTEP is a national research university with an enrollment of over 23,000 students, the majority of whom are Mexican-American.

REQUIRED QUALIFICATIONS: Applicants must

Continued on next page

DPA
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Scott W. Tinker will present the keynote luncheon on shale gas production and forecasting of major plays.

I hope to see you there; you can sign up online at www.aapg.org/forum/2014/playmaker/index.cfm

Last year's inaugural Playmakers event was hugely successful and established a high bar for one-day forums, which are being replicated by the DPA and partners in the Canada Region (Calgary) in May and the Southwest Section (Midland) in April.

Last month's Reserves Forum, also presented in Houston, was very well received and will be repeated next year.

* * *

I've been enjoying the book "Strategic Intuition, the Creative Spark in Human Achievement," by William Duggan.

It's a slow read for me – it's engaging, but it is so thought provoking that I keep pausing to absorb.

The author draws upon works by Thomas Kuhn on scientific revolutions, Joseph Schumpeter on entrepreneurial leaps of progress and Carl von Clausewitz on military strategy, and draws them all together to try to explain what happens in the mind when one has a blinding idea.

I recommend it.

Tell me, what's on your night table?

Continued from previous page

have a Ph.D. or equivalent degree in a discipline appropriate for the Department of Geological Sciences. Candidates should have attained the rank of tenured Professor or tenured Associate Professor at an academic institution or Manager of a successful geosciences technology program in an industry or government research organization.

APPLICATION PROCEDURE: Candidates who wish to be considered are asked to electronically submit (in PDF format) a letter of interest and curriculum vitae to the Search Committee Chair, Dr. Aaron A. Velasco (aavelasco@utep.edu), with the subject line: "UTEP Geological Sciences Chair Search." Nominations are also welcomed. Review of applications and nominations will begin immediately and will continue until the position is filled.

The University of Texas at El Paso is an Equal Opportunity/Affirmative Action employer. The University does not discriminate on the basis of race, color, national origin, sex, religion, age, disability, genetic information, veteran status, or sexual orientation in employment or the provision of services.

DIRECTOR'S CORNER

A Busy Year Gives Way to New Possibilities

By DAVID K. CURTISS, AAPG Executive Director

Welcome to 2014, where here at AAPG we look forward to a new year of advancing the world of petroleum geosciences.

As you can see from this issue of EXPLORER, focused on world developments, there is a lot happening in the oil and natural gas sectors. And that is notwithstanding the announcements by several companies late last year that they would be curtailing investment activity in 2014.

Global demand for oil remains strong.

The International Energy Agency, in fact, increased its demand forecasts for 2013 to 91.2 million barrels per day in its December monthly market report. And it forecast an additional increase in demand of 1.2 million barrels per day in 2014.

The new annual energy outlook published by ExxonMobil last month also projects significant demand growth in coming decades, driven by increased urbanization and a burgeoning middle class particularly in the developing world.

"By 2040, the proportion of people living in urban settings in non-OECD [i.e., less developed] countries is projected to rise to about 60 percent, up from 45 percent in 2010 and 30 percent in 1980," according to the ExxonMobil report. "OECD [developed country] urbanization rates are likely to rise to 85 percent, from about 75 percent."

The demand growth isn't unchecked, though. In fact, ExxonMobil reports that while total demand is increasing, the growth in demand is actually slowing down. Energy efficiency is a key driver of this trend. And as societies develop and become richer, such as the OECD and now happening in China, the rate of demand growth flattens and stabilizes.

Developing and developed economies alike need energy from all different sources, but oil remains the backbone of transportation and natural gas demand for electricity generation continues to accelerate – it is expected to nearly double between 2010 and 2040, according to ExxonMobil's report.


CURTISS

Geopolitical developments – both positive and negative – can quickly affect oil markets and the operating environment.

* * *

It's not all smooth sailing, of course.

Industry leaders are concerned about accelerating costs, both offshore and onshore. I've recently been in conversation with several senior executives who are concerned with the industry's return on equity – the amount of profit the industry is able to generate, in percentage terms, with the money invested by shareholders.

The oil and natural gas industry always has been capital-intensive, but pushing into ever-deeper waters and fully developing new unconventional plays requires a lot of investment. And delivering a return on that investment is essential to attracting additional capital.

Global geopolitics always plays a role in our industry. And developments – both positive and negative – can quickly affect oil markets and the operating environment:

✓ The on-going civil war in Syria continues to destabilize the eastern Mediterranean.

✓ Negotiations with Iran about its nuclear program could result in the lifting of some (or all) of the sanctions currently in place against this oil and gas producer, or …

✓ The talks may collapse and raise tensions in oil markets.

There are other policy forces at work that could affect oil and natural gas prices. As a Washington Post article on the ExxonMobil forecast indicates:

"Exxon expects governments to impose costs on fossil fuel consumption and subsidize renewable energy in an effort to reduce emissions of gases that scientists say are causing climate change. Exxon expects those costs to be roughly $80 per ton of carbon dioxide – a price that may be explicit in the form of a carbon tax or baked in to the cost of new technology and equipment needed to meet stricter emissions limits."

Such additional costs are not assured everywhere, but "in one way or another governments will put in place policy that will increase the cost of hydrocarbons, whether it's on supply or consumption," says Ken Cohen, ExxonMobil's vice president of public and government affairs, in the Washington Post article.

* * *

These are just a few of the headwinds that our industry may experience in 2014. And without a doubt there will be other, unforeseen issues that emerge in the year ahead and challenge oil and gas operators around the globe – this is not a business for the timid.

But bear in mind this fundamental truth: The world needs the energy that we find and produce.

"Energy is a critical part of boosting prosperity and eradicating poverty," says World Bank President Jim Yong Kim in the ExxonMobil forecast.

Billions of people around the world need this energy to raise their standard of living. And this demand for energy, particularly oil and natural gas, will be supplied – it will, by someone.

"Wow, it really snowed last night! Isn't it wonderful?

Everything familiar has disappeared! The world looks brand-new!

A New Year…a fresh, clean start! It's like having a big white sheet of paper to draw on! A day full of possibilities!

It's a magical world, Hobbes ol' buddy … let's go exploring!"

– Calvin and Hobbes (Dec. 31, 1995)

It's time to pull out those maps, sharpen those colored pencils and let's get busy supplying that demand.

Best wishes for happy and successful exploring in 2014!

DIVISIONS REPORT

Change By Any Name Brings New Challenges

By VALARY SCHULZ, DPA President

Is it a sea-change or a c-change?

Have you ever heard a phrase in conversation or through the media and thought that you had a vague understanding of the meaning – but carried on with your misunderstanding?

I have been struck by the phrase "sea-change." Or is it "c-change?" Or even "C change?"

With a little help, (thank you again, Google) I think I've sorted out they are not the same thing.

I am a Shakespeare enthusiast, so I was delighted to learn the provenance of the phrase "sea-change," meaning a radical change or transformation where the form is retained but the substance is altered, came from his play "The Tempest," written in 1610. In it, the spirit Ariel, who was the catalyst for Prospero's transformation, sang out to the shipwrecked and orphaned Ferdinand:

Full fathom five thy father lies;
Of his bones are coral made;
Those are pearls that were his eyes:
Nothing of him that doth fade
But doth suffer a sea-change
Into something rich and strange.
Sea-nymphs hourly ring his knell:

So what, then, of the other change, the "c-change" or "C change?"


SCHULZ

The likelihood that the shale spring will bring improved standards of living to far-flung parts of the globe is a certainty.

This is a once-in-a-century change, like a hundred year flood. The C Change happens when the C level executives are rearranged.

* * *

I am thrilled to be observant and working in our industry, which has undergone a major sea-change in less than a decade – the form of our industry is the same, but the radical changes in the past several years have transformed our business in unconventional ways.

I like the symmetry of Shakespeare's definition; it is fitting.

But what of Darwin and adaptation of the species?

Companies have embraced the new world out of necessity and a healthy profit motivation. Years ago when I was working in Mexico, the average well there IP'ed at 600 BOPD, but in the United States new oil wells had an average potential of only 30 BOPD.

Our industry has done such a remarkable job of responding to the market place that we have developed more natural gas than we can use, and as much oil as we import in the United States. The geopolitical ramifications for the global economy are remarkable, and the likelihood that the shale spring will bring improved standards of living to far-flung parts of the globe is a certainty.

Truly something "rich and strange."

* * *

Apart from musings about change, some things are constant, such as the DPA mandate to educate.

Past DPA president **Charles Sternbach** has again assembled a remarkable group of speakers, with **Rick Fritz** as co-chair, to address the second annual **Playmakers Forum** on Jan. 23 in Houston at the Norris Conference Center (see related stories on pages 16, 18 and 28).

There are 16 confirmed speakers who will be addressing exploration and prospecting tools and descriptions of active and emerging plays in the United States and western hemisphere, providing all you need to know to participate or follow the current activity.

Legendary speakers **Jim Bob Moffett** and **Bud Brigham** will share lessons from their illustrious careers and will receive prestigious DPA Heritage Awards at the event.

See **DPA**, page 49