AAPG EXPLORER

OCTOBER 2013

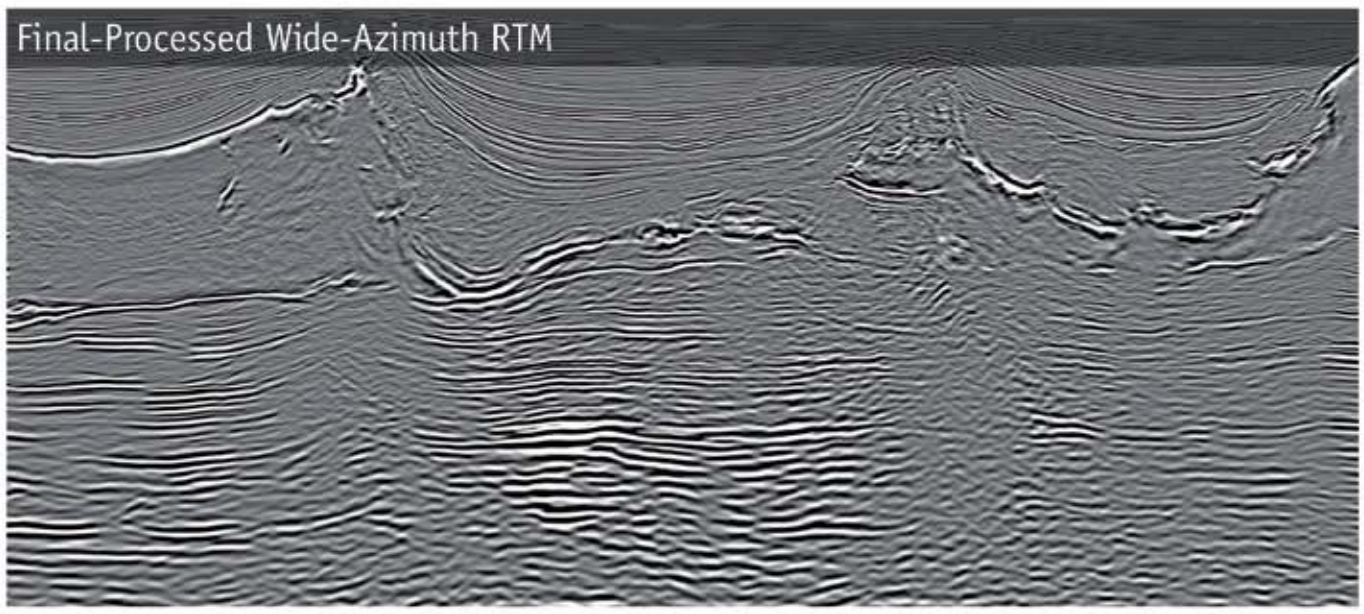
Block Party

Efforts to overcome the Gulf's deepwater and complex geology continues

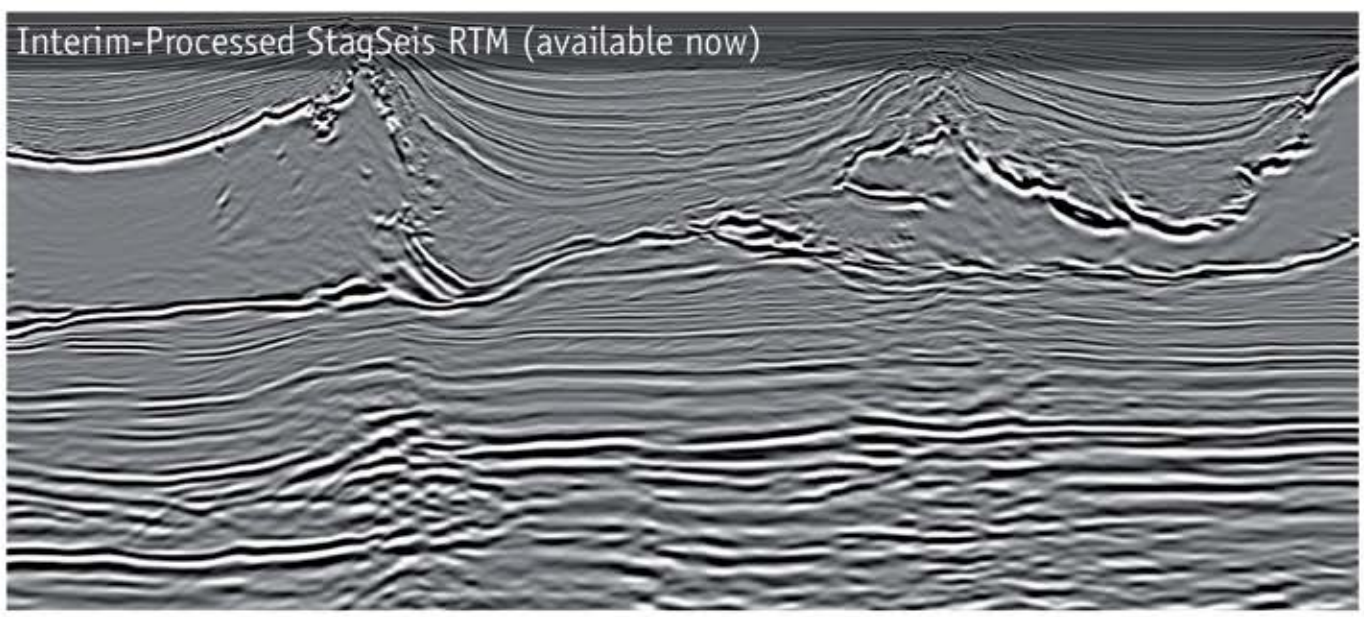
See page 10

StagSeis™

Fast Trax™ results from Gulf of Mexico available now



Final-processed image (above) from wide-azimuth acquisition compared to interim-processed Fast Trax image (below) from the new StagSeis acquisition technique over the same line location.



For more information contact our Houston office
Allie Davis
Allison.Davis@cgg.com

cgg.com/stagseis

CGG
Passion for Geoscience

Vol. 34, No. 10
October 2013

PRESIDENT'S COLUMN

Doing What We Say We Do: Ethics

BY LEE F. KRYSTINIK

This month we continue our series dealing with the reality of doing what we say we do. And this time the question is:

Do we do what we say we do regarding our maintenance of professional ethics at AAPG?


KRYSTINIK

I recently had the opportunity to reappoint a very well qualified member of our Ethics Committee. This was easily done, as the individual is a great person who exceeds all the measures of professionalism and ethics one could ever wish.

A quick review of the Ethics Committee roster (all very accomplished, serious and exemplary AAPG members), however, triggered a question in my mind: I wonder how many complaints have been lodged – and how many scoundrels we have thrown out on their ears – in the last 10, 20, 30 years or more?

In visiting with the Ethics Committee chair, he didn't remember charges being brought recently. So, I did some more checking and it turns out there have been a few folks who have had their memberships revoked. On a percentage basis this number is significantly less than one-tenth of one percent.

This percentage does not, by the way, include the fellow convicted of violence involving his wife, but who retained his membership and thereafter sent in letters to the EXPLORER editor from his prison cell.

* * *

We can look at this in a couple of ways:

▸ First, we might acknowledge that some small few of us could know of a person who might cause us to ponder rather carefully before buying one of their prospects. Geology is an interpretative science, and some folks who are fully ethical can push the data a little further than someone else might.

Of course, one person's optimist might be another person's scoundrel.

If we were to be really honest with ourselves I think we might have to admit that in this litigious time our policing of ethics might not be as rigorous as we all might wish.

The facts of modern life, replete with rampant law suits, effectively prevent us from sending in a letter to AAPG that honor and rigorous ethics could otherwise suggest we should send.

Fortunately, the number of scoundrels all 38,000-plus of us might know is, in aggregate, very small indeed.

▸ Alternatively, we could acknowledge that by most standards, the time and intense effort someone has gone through to gain a geological degree usually weeds out the worst sorts (I'll let you judge what professions those folks might end up pursuing).

As to the possible scoundrels who might slip through, they are a very, very small percentage of our fellow AAPG members, and they are prone to weeding

See **President**, next page

CODE OF ETHICS

From Article IV. of the Constitution of the American Association of Petroleum Geologists

Section 1. General Principles

(a) Geology is a profession, and the privilege of professional practice requires professional morality and professional responsibility.

(b) Honesty, integrity, loyalty, fairness, impartiality, candor, fidelity to trust, and inviolability of confidence are incumbent upon every member as professional obligations.

(c) Each member shall be guided by high standards of business ethics, personal honor, and professional conduct. The word "member" as used throughout this code includes all classes of membership.

Section 2. Relation of Members to the Public

(a) Members shall not make false, misleading, or unwarranted statements, representations or claims in regard to professional matters, nor shall they engage in false or deceptive advertising.

(b) Members shall not permit the publication or use of their reports or maps for any unsound or illegitimate undertakings.

(c) Members shall not give professional opinions, make reports or give legal testimony without being as thoroughly informed as reasonably required.

Section 3. Relation of Members to Employers and Clients

(a) Members shall disclose to prospective employers or clients the existence of any pertinent competitive or conflicting interests.

(b) Members shall not use or divulge any employer's or client's confidential information without their permission and shall avoid conflicts of interest that may arise from information gained during geological investigations.

Section 4. Relation of Members to One Another

(a) Members shall not falsely or maliciously attempt to injure the reputation or business of others.

(b) Members shall freely recognize the work done by others, avoi d plagiarism, and avoid the acceptance of credit due others.

(c) Members shall endeavor to cooperate with others in the profession and shall encourage the ethical dissemination of geological knowledge.

Section 5. Duty to the Association

(a) Members of the Association shall aid in preventing the election to membership of those who are unqualified or do not meet the standards set forth in this Code of Ethics.

(b) By applying for or continuing membership in the Association each member agrees to uphold the ethical standards set forth in this Code of Ethics.

(c) Members shall not use AAPG membership to imply endorsement, recommendation, or approval by the Association of specific projects or proposals.

Section 6. Discipline for Violations of Standards

Members violating any standard prescribed in this Article shall be subject to discipline as provided by the Bylaws.

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REGULAR DEPARTMENTS

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

ON THE COVER:

Shell's Perdido Spar, the world's deepest drilling and production platform, floating in more than 8,000 feet of water in the Gulf of Mexico's Alaminos Canyon area – and an important component of how Shell and its partners once solved production infrastructure problem there. It's also symbolic of the importance the deepwater Gulf continues to play in today's energy picture. Story on page 10. Photo courtesy of Shell Oil.

Left: Crew members setting up the Spar. Photo courtesy of Shell.

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Second Issue of Interpretation Will Be a Free Online Publication

By VERN STEFANIC, EXPLORER Managing Editor

The second issue of Interpretation, the new journal jointly published by SEG and AAPG, is in the final stages of preparation and will be available in November.

The journal will be free of charge and available online to all print recipients of the EXPLORER and The Leading Edge.

Complimentary print copies of the November issue are available by request only, at www.aapg.org/freeissue.

Interpretation is a peer-reviewed quarterly that comprises papers directly related to the practice of interpretation of the Earth's subsurface for exploration and extraction of mineral resources, and for environmental and engineering applications.

The journal aims to accelerate innovation in interpretation. Former SEG Editor **Yonghe Sun** is the publication's editor-in-chief; the deputy editor-in-chief is AAPG Honorary member **R. Randy Ray**, a consulting geophysicist-geologist in Denver and former editor of the EXPLORER's Geophysical Corner.

The November issue, which will include a special section on interpretation for unconventional resources, will be the final free copy. Starting in 2014 the journal will be available by subscription only.

AAPG Members can receive a special introductory price, and subscribe to all four issues of the 2014 Interpretation for the price of $28 for digital-only delivery, and $35 for print delivery.

Information on obtaining a subscription for the 2014 calendar year will be available at www.aapg.org/interpretation/subscriptions.cfm in mid-November 2013.

Papers that will be included in the November issue include:

- Pitfalls Locating Microseismic Events From Borehole Measurements – Practical Observations From Field Applications (Carlos Cabarcas, Hilcorp Energy).
- A Window Into the Proterozoic: Integrating 3-D Seismic, Gravity and Magnetic Data to Image Sub-Basement Structures in the Southeast Fort Worth Basin (Murari Khatiwada, G. Randy Keller and Kurt J. Marfurt).
- Fractured Shale Description Using Isotropic Seismic Analysis (David Cho, Craig Coulombe, Scott McLaren, Kevin Johnson and Gary F. Margrave).
- Seismic Characterization of a Mississippi Lime Resource Play in Osage County, Oklahoma (Benjamin L. Dowdell, J. Tim Kwiatkowski and Kurt J. Marfurt).
- Seismic Attribute Driven Integrated Characterization of the Woodford Shale in West-Central Oklahoma (Nabanita Gupta, Kurt J. Marfurt and Supratik Sakar).
- Reducing Risk and Improving Production in Unconventional Plays (Tony Rebec, Marino Pareja).

President
from previous page

themselves out through their own actions in business.

* * *

We say we are rigorous about ethics in AAPG. We have an AAPG Code of Ethics that all of us promise to uphold – an impressive framed copy of it provided by past AAPG president Pete Rose hangs in the main conference room at our Tulsa headquarters, and I make a point of routinely reading it whenever I come into that meeting room. Thanks, Pete!

Also, all of us have access to it online (http://www.aapg.org/business/codethic.cfm).

So, regarding ethics in realistic terms, are we doing what we say we do?

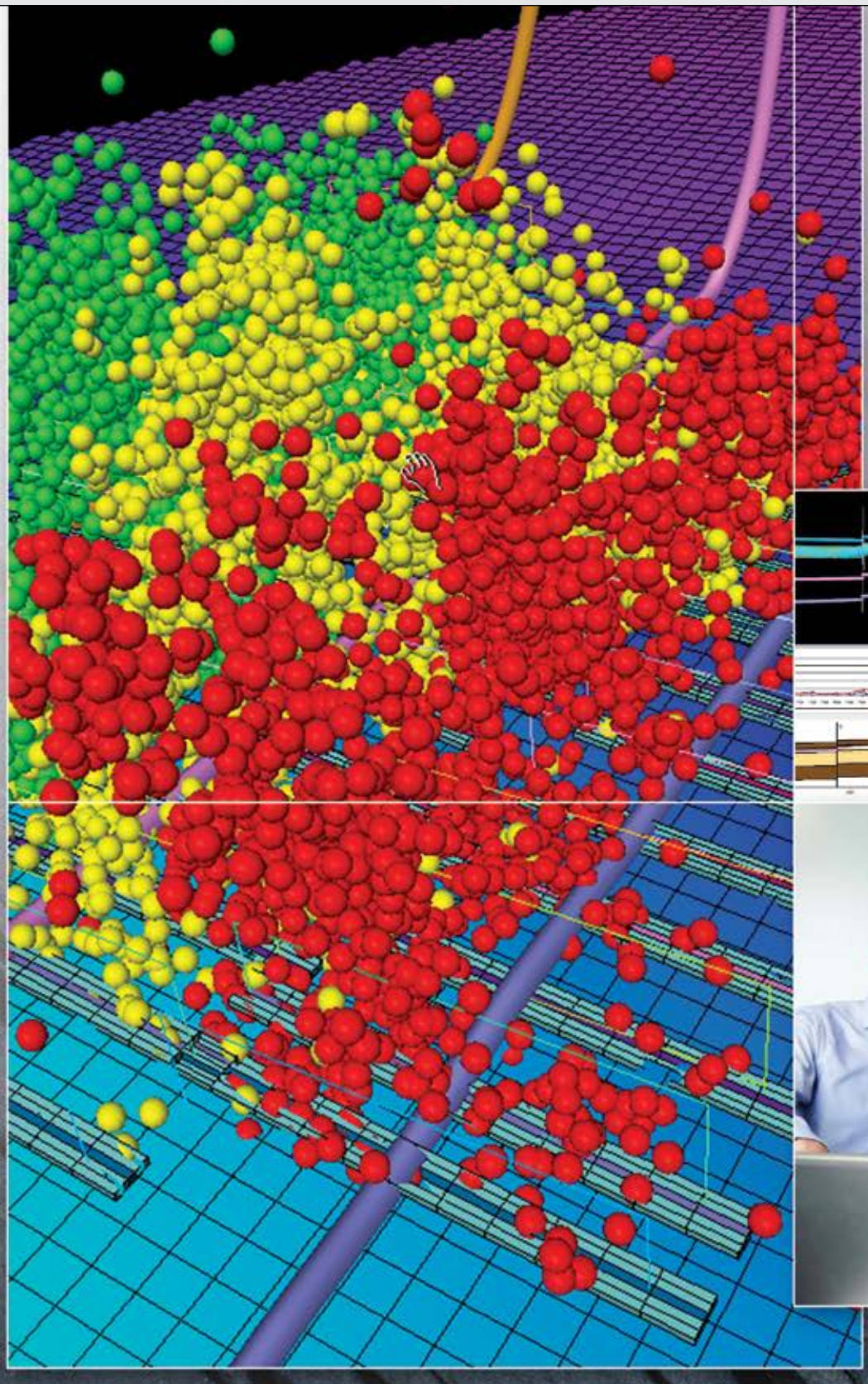
In fact and practice, the phrase "not so much" comes to mind. History tells us that legislating morality doesn't typically work very well (consider the stunning example of Prohibition in early 20th century United States).

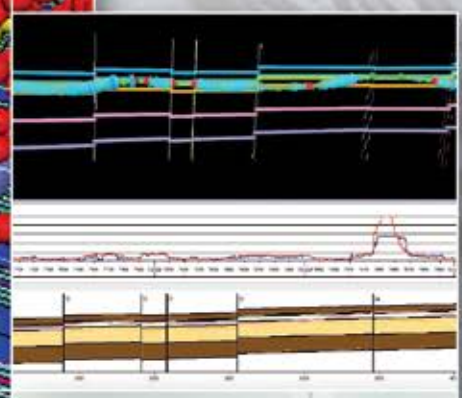
If we truly are going to do what we say we do, we must either become much more draconian in policing that <0.1 percent, or be much more directly honest with ourselves and admit that it is reasonable to trust our geoscience colleagues to be honest and ethical.

I would submit that draconian measures would change things little or not at all. Thus, we may wish to say that our ethical code is clearly stated and all are expected to live by that code when we sign our names to the membership application.

During my 35 years or so as a member of AAPG I have found our members to be genuinely honest and decent, contributing members of society who are worthy of the trust we place in them when they sign our Code of Ethics.

For all of you who send me your comments and would like a copy, AAPG will send you a suitable-for-framing copy of the AAPG Code Of Ethics. Let me hear from you. If I have you all riled up, or (preferably) if you have something encouraging to say, please fire off a note to me at lee.krystinik@aapg.org and help me to understand how AAPG can better do all we say we will do.





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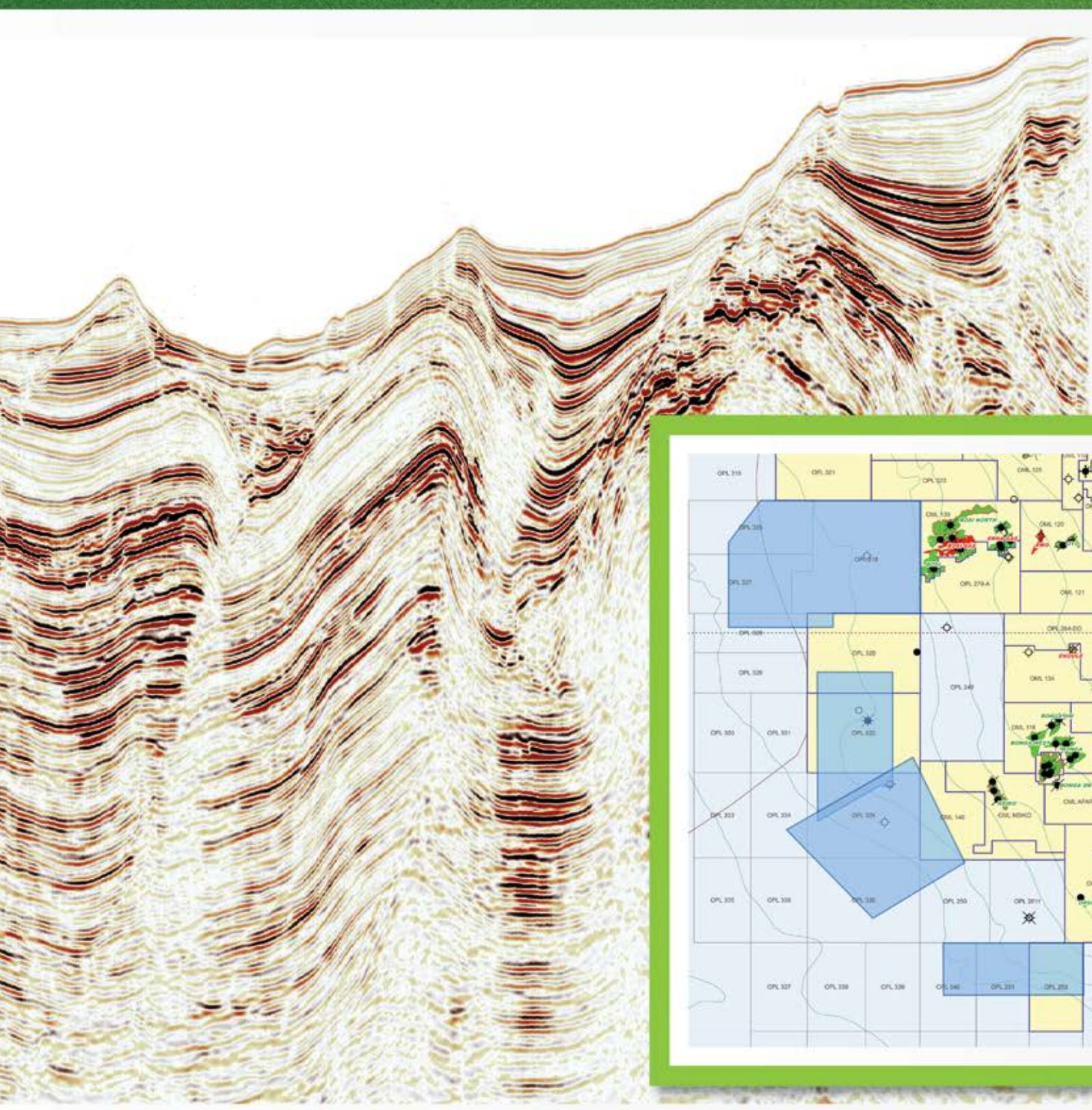

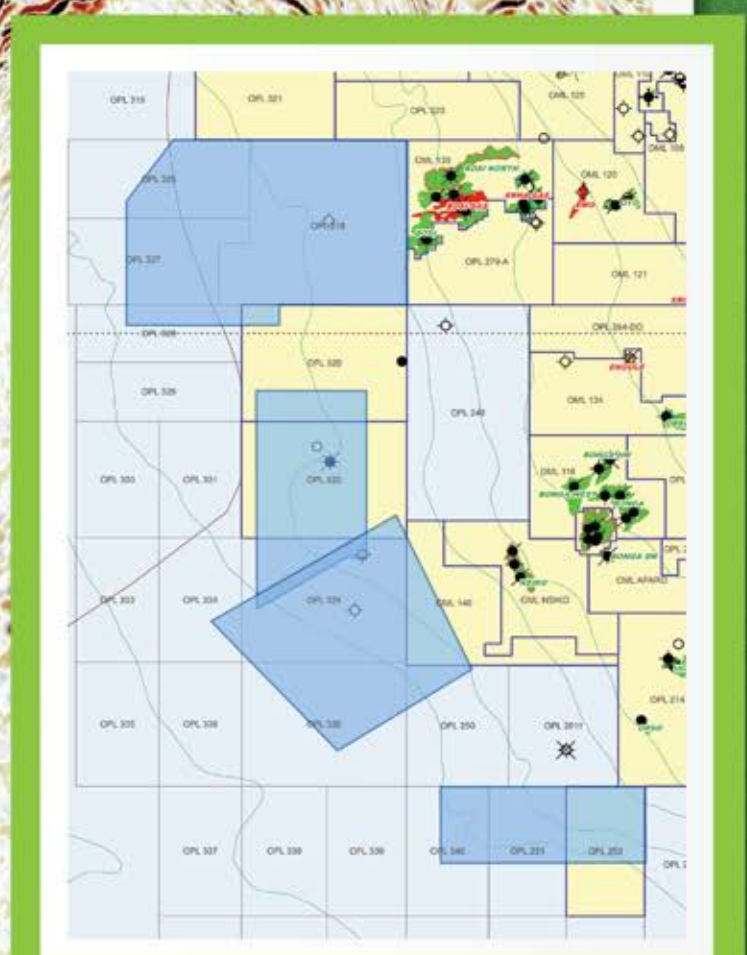

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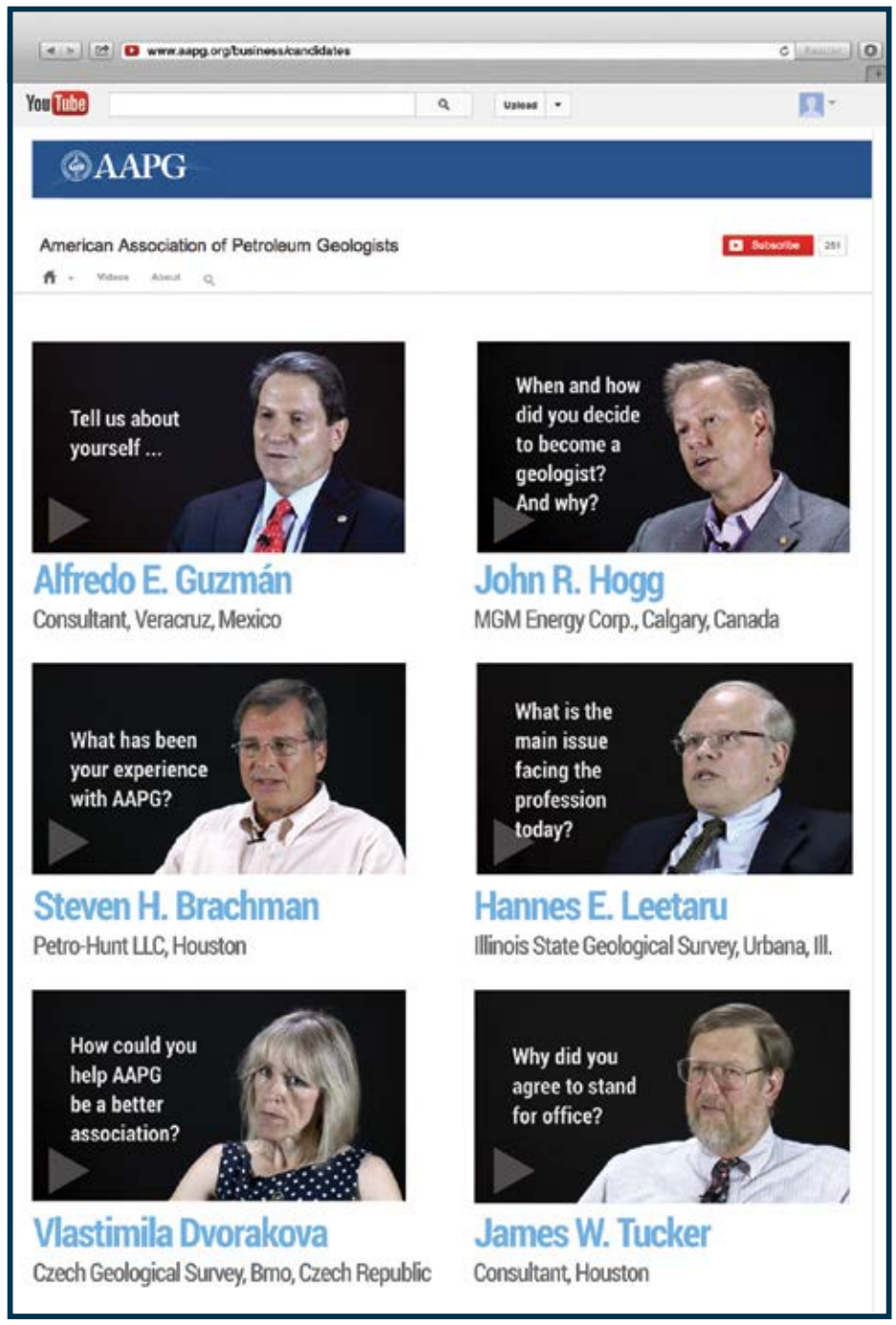


Getting to Know Them – Candidate Videos Online

Videos of all six AAPG officer candidates for the 2013-15 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 candidates were videoed during the recent Leadership Conference in Tulsa. In a new format, all are shown responding to six 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**, Petro-Hunt LLC, Houston.

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

Treasurer

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

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

A chess game in the Gulf

Players Focus on Deepwater Alaminos Canyon

By DAVID BROWN, EXPLORER Correspondent

Pale moon shining on the fields below,
Folks are crooning songs soft and low.
Needn't tell me so because I know
It's sleepy time down south.
– "When It's Sleepy Time Down South"

It's possible to look at the Gulf of Mexico as the most expensive board game on Earth.

An oil company can spend more than $100 million to control a single lease block, and bidding interest often runs high.

So when the latest leasing round in the Gulf drew bids on only about 300,000 acres out of the 20.7 million acres offered, the industry considered it one of the slowest lease sales in recent memory.

Not so fast.

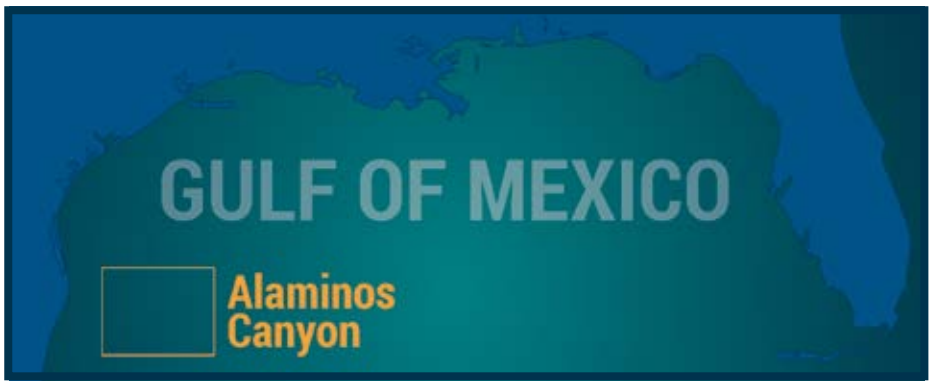
The tame bidding masked another flurry of interest in the ultra-deepwater Alaminos Canyon area, following the previous western Gulf lease sale in November 2012.

In those last two lease sales, more than 70 percent of all bids were for Alaminos Canyon blocks.

Western Gulf of Mexico Lease Sale 233 in late August attracted $102.4 million in high bids for 53 tracts offshore Texas, with 12 companies submitting 61 bids, the U.S. Bureau of Ocean Energy Management (BOEM) announced.

The sale offered all unleased and non-protected areas in BOEM's Western Gulf planning area, including 3,864 tracts from nine miles to more than 250 miles off the coast, in water depths ranging from 16 feet to more than 10,975 feet.

Perdido Spar lying horizontal in the Gulf of Mexico. The Spar had to be moved from a horizontal to a vertical position.



ConocoPhillips submitted the highest bid on a single tract, just under $30.6 million for Alaminos Canyon block 475 (AC475). It also set the highest total amount in bonus bids, $50.3 million on 29 tracts.

Last November, Western Gulf Lease Sale 229 attracted $133.77 million in high bids for 116 tracts covering 652,522 acres, with 13 companies submitting 131 bids.

An Unexpected Boost

This part of the Gulf is known for its Lower Tertiary, Eocene-Oligocene, Wilcox to Frio targets. The Great White field (AC857, 2002), Silvertip field (AC815, 2004) and Tobago field (AC589, 2004) extend over adjacent blocks and produce from Paleogene.

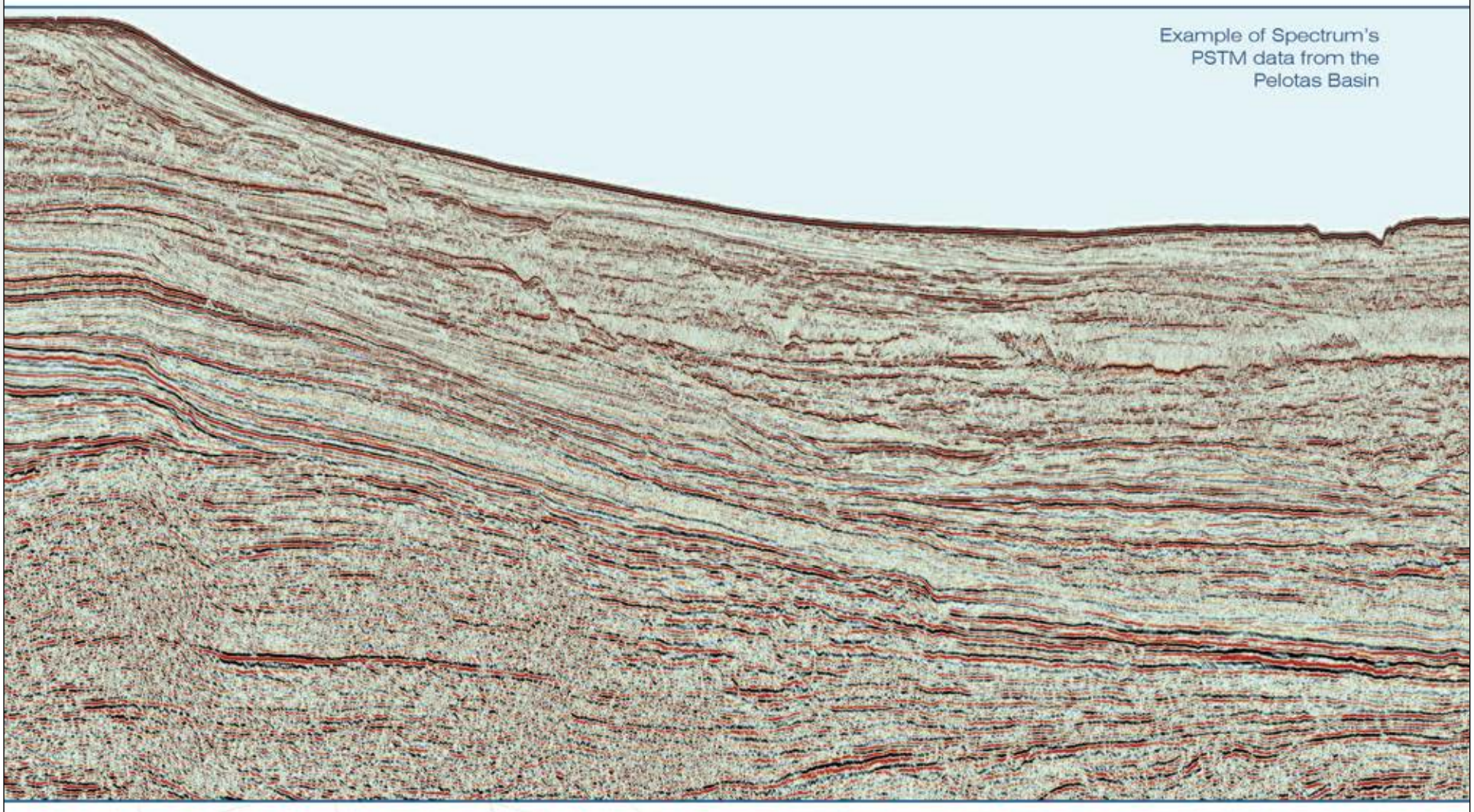
"The Lower Tertiary/ Paleogene was the original target, due to the Perdido Fold Belt discoveries beginning in the early 2000s," said AAPG member John Snedden, director of the Institute for Geophysics at the Jackson School of Geosciences, University of Texas at Austin.

"The play was extended to Walker

See **Gulf**, page 12

Pelotas Basin Brazil

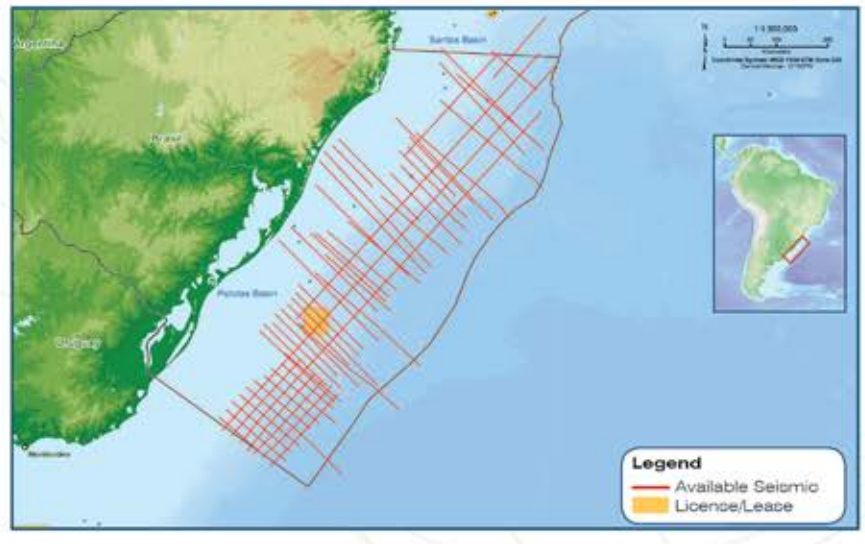
New 2D Multi-Client Seismic Available Q3 2013



Example of Spectrum's PSTM data from the Pelotas Basin

Spectrum has completed acquisition of 7,500 km of new seismic data and is reprocessing an additional 10,000 km of legacy data. PSTM and PSDM stacks will be available for license Q4 2013.

The Pelotas Basin is an untapped hydrocarbon province comprising a 280,000 sq km passive margin located on the southeast coast of Brazil, bordering Uruguay to the south. Recent high quality 2D seismic data has imaged multiple potential reservoirs, traps, source rocks and direct hydrocarbon indicators in the basin.



Spectrum

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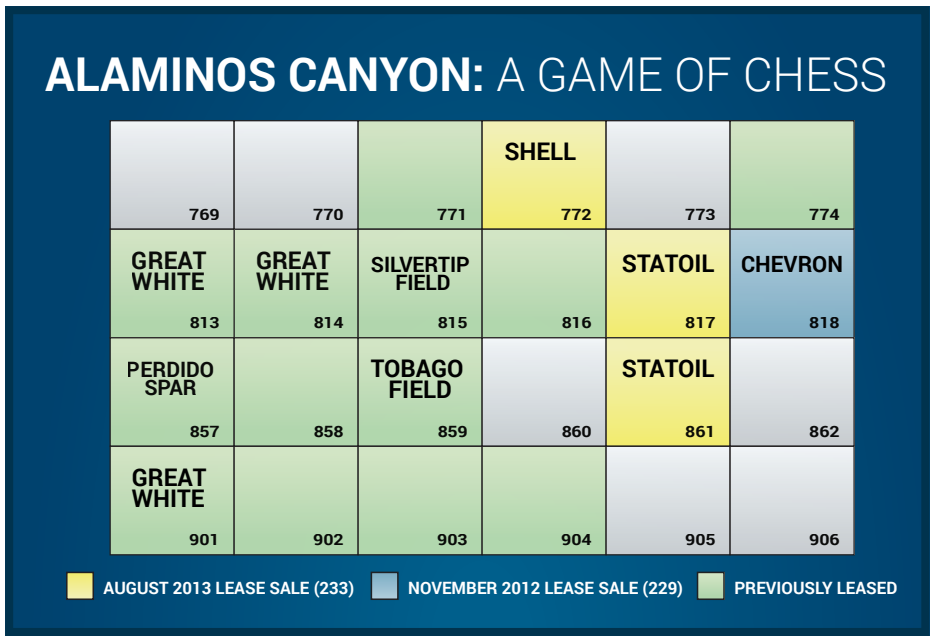
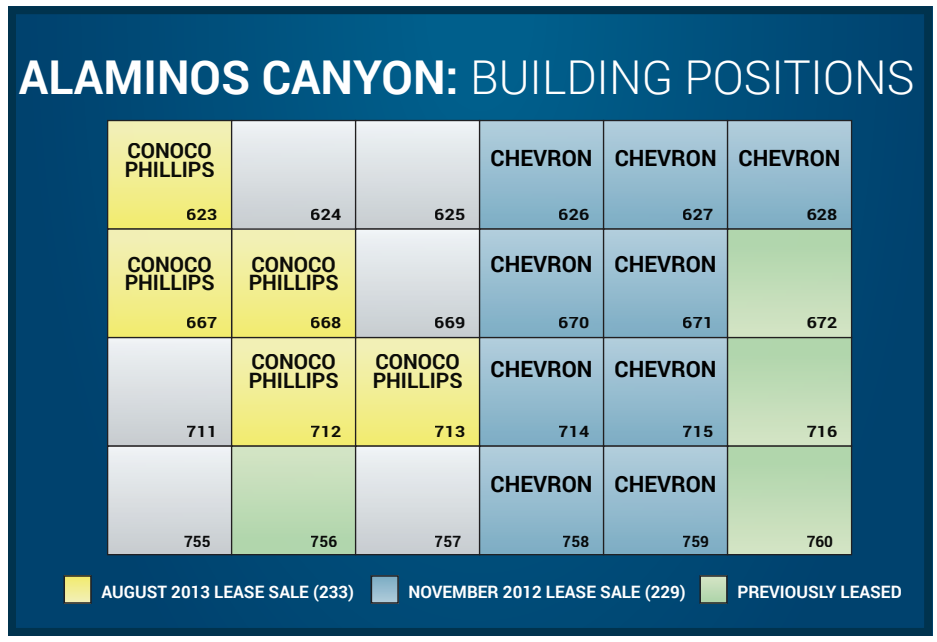
mc-us@spectrumasa.com
www.spectrumasa.com

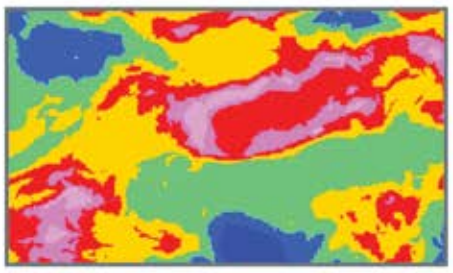




UNLOCK THE POTENTIAL IN YOUR FIELD | #2 IN A SERIES | OCTOBER 2013

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.

AAPG Explorer

neos

Gulf

from page 10

Ridge," he noted, "and is moving inboard into Garden Banks and Green Canyon with the North Platte discovery (Garden Banks 959) and drilling of Ardennes-1."

Perdido Fold Belt geology heavily influences the western part of the southern Alaminos Canyon play area. The limits of the fold belt can be found just northeast of the Shell-operated Great White field, Snedden said.

"The subsalt geology changes considerably, with the high-amplitude folds of the Perdido transitioning eastward to low relief structures typified by the Tiber well location (Keathley Canyon 102), and northward to very deep primary basins with complex interaction with salt and secondary suprasalt basins," he noted.

Exploration in the Perdido Fold Belt area got a further, unexpected boost last year when Mexican state oil company Pemex announced a deepwater discovery with its Trion well.

Trion was a true ultra-deepwater find, drilled to 16,115 feet in 8,200 feet of water in the fold belt area, about 110 miles off the Tamaulipas coast. Pemex later announced additional discoveries with its Supremus and Maximino deepwater wells.

The Lower Tertiary play "now extends into Mexican waters with the discoveries at Supremus-1 and Trion-1," Snedden said. "However, it is not the only play in Alaminos Canyon – the Miocene can be trapped below the salt canopy, either as salt cutoff traps or other trap types."

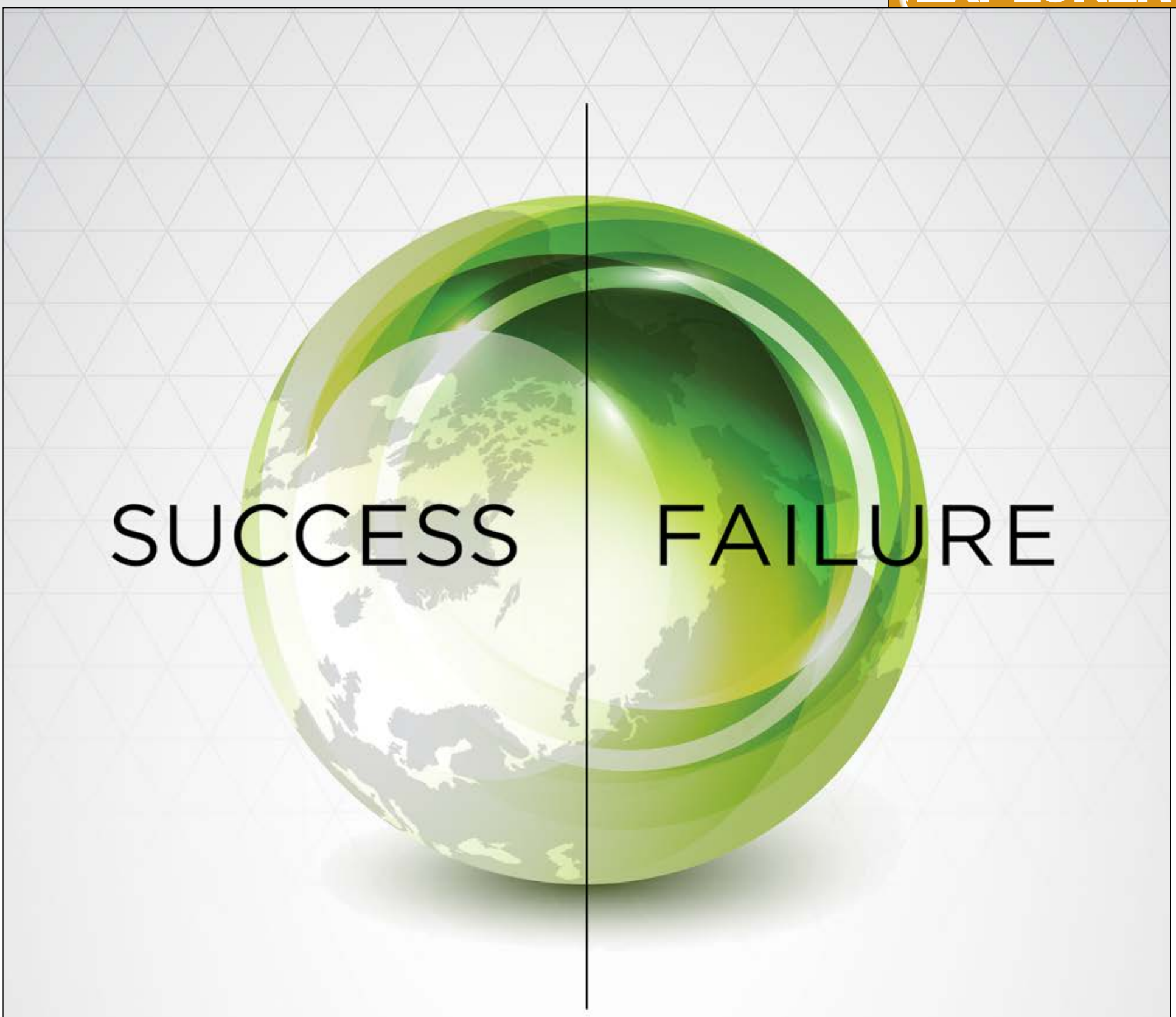
Shell and its partners solved the production infrastructure problem in their Alaminos Canyon complex with the Perdido Spar, the world's deepest drilling and production platform, floating in more than 8,000 feet of water.

In 2012, Petrobras introduced a floating production, storage and offloading (FPSO) vessel, the BW Pioneer, to begin production from its deepwater Chinook and Cascade fields in the Walker Ridge area of the Gulf. This year, Shell announced it will contract an FPSO for the Stones field development project in Walker Ridge.

Serious Challenges

In addition to complex geology and ultra-deepwater targets, western Gulf

See **Alaminos**, page 14



Alaminos

from page 12

of Mexico prospects present serious challenges in subsalt seismic imaging.

"The geology is challenging and the seismic imaging in this subsalt domain is even more challenging," Snedden said. "Wide-azimuth (WAZ) and even full-azimuth (FAZ) seismic data is becoming a requirement for exploration there, although lease blocks are picked up on narrow azimuth data and later shot with WAZ and FAZ.

"It can take two years from seismic acquisition to fully complete processed data. Costs are in the tens of millions of dollars for seismic data, depending on size and complexity of the data," he added.

SNEDDEN

> **"The geology is challenging and the seismic imaging in this subsalt domain is even more challenging."**

Well control in the area is generally very limited, and seismic data can require subtle interpretation. It's not a simple pick-out-the-bright-spot approach.

"The subsalt Paleogene and Miocene is not bright-spot or amplitude-supported territory. It is too deep and imaging too difficult for that. Trap definition remains the challenge, given illumination and imaging below thick and complex salt," Snedden noted.

"The salt canopy thickness and complexity remains the biggest challenge in the Alaminos Canyon and across most of the Keathley Canyon and Walker Ridge protraction blocks," he said.

Challange Accepted

Overall bidding patterns in the last three western Gulf sales seem to correspond to the extent of newly acquired and proposed seismic surveys, according to BOEM.

"Lease blocks may be picked up on seismic alone and it takes as long as five years to mature prospects to drillable status. These are 10-year leases, in most cases," Snedden observed. "The average well testing Paleogene costs $120 million to $150 million – you better believe that most companies will take their time and work the data hard."

One block in the August lease sale, AC475, drew bids from four companies, and adjacent block AC474 drew two bids. The $30.5 million bid from ConocoPhillips was for AC475. This area is covered by salt canopy and has been difficult to map.

New 3-D seismic surveys have been available to the industry for the past year, in particular the WesternGeco E-Octopus program, according to BOEM. Some companies bidding on AC474 and AC475 may have reprocessed new data with proprietary models.

Most wells drilled in this part of Alaminos Canyon have targeted the Lower Tertiary. Among the nearest are those at Baha (AC557 and AC600/601) and Diamondback (AC739), both within 20 miles of AC475.

In a game of chess, companies continue to pick up blocks in the Perdido complex area. Shell was apparent high bidder on AC772, seen by the media as a strategic acquisition. Shell's bid of more than $4.2 million easily topped a bid of about $2.1 million from Chevron, a partner in the Perdido development.

ConocoPhillips and Chevron have been putting together positions on what appear to be two different trends in an area roughly from AC577 through AC584 down to AC753 through AC760.

WesternGeco has advertised plans to acquire new 3-D seismic in the area, specifically the Revolution IV survey, according to BOEM. Companies may be following a strategy of acquiring a position prior to the release of new survey data.

The southwestern quarter of Alaminos Canyon has had no production and very few wells. Older, shallow wells tested amplitudes analogous to those in the Diana field area and further north in East Breaks. This area is covered by a salt canopy where older, speculative seismic data is very difficult to interpret below salt within the lower Tertiary.

Over the last 12 months, no exploratory drilling permits have been approved in Alaminos Canyon, according to BOEM. The only drilling permits approved in Alaminos Canyon during that period have been development wells in and around the Perdido Spar area.

Someday evaluations will be completed, and at some point, someone will drill an exploration well on one of the recently leased Alaminos Canyon tracts. Will that challenge make a promising prospect look like a frightening prospect?

"Oil companies make large investment decisions all the time. It is not about being scared. It is about reducing uncertainty and mitigating risk," Snedden noted.

"One thing I learned after 25 years in the industry," he said. "Never underestimate the power of technology and the persistence of engineers and geologists to develop large discovered volumes of oil and gas."

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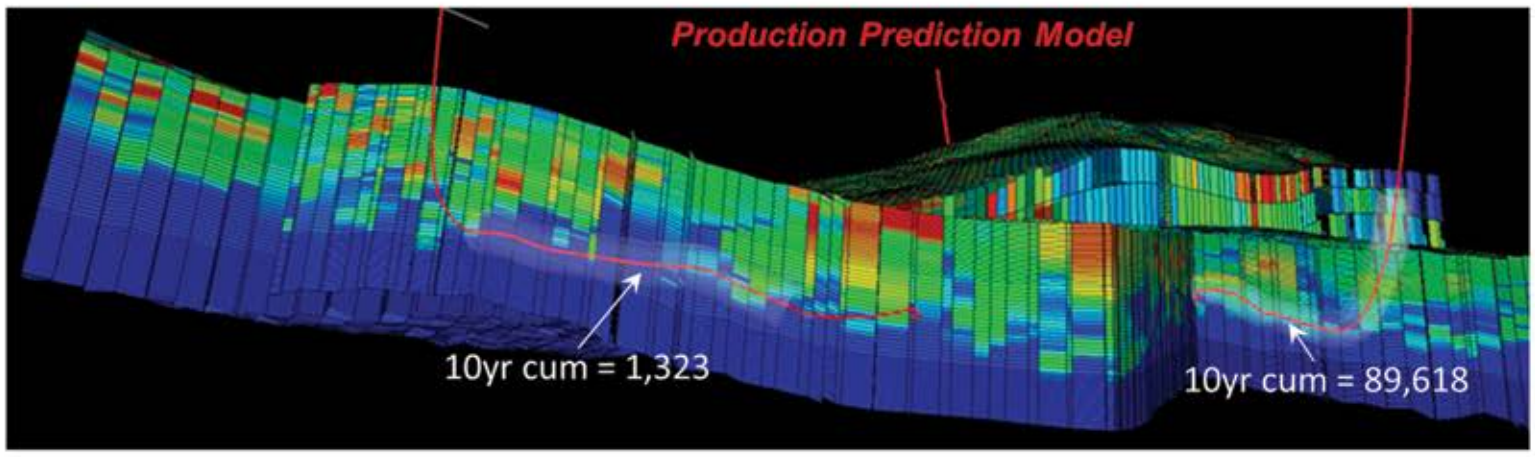

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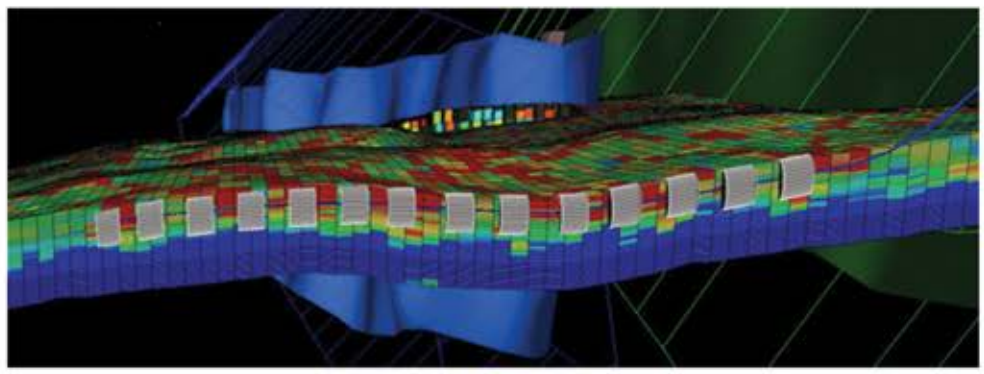

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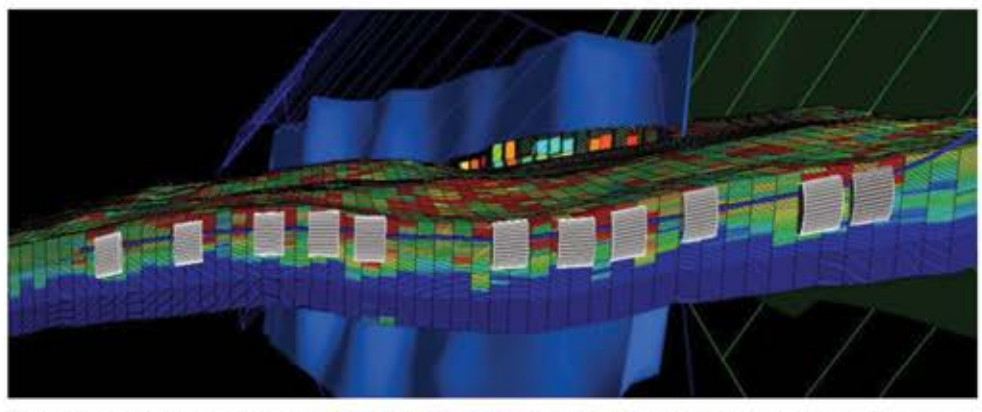

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Water, Water Everywhere? More Data Needed

By LOUISE S. DURHAM, EXPLORER Correspondent

Hydraulic fracturing technology, or "fracking," in today's public use of the word, has been applied in the oil patch for more than 60 years, reportedly being used on more than one million producing wells.

There was nary a raised eyebrow from the public in general for much of this time.

Today, as we all know, it has become a kind of household word – either good or bad, depending on who's talking.

The current brouhaha in California over regulation of hydraulic fracturing versus an outright ban is the latest example of conflict.

(In late September California Gov. Jerry Brown signed into law regulations for the practice that will require permits for those who want to use the technique.)

Controversy aside, it's now widely recognized that the remarkable hydrocarbon production boom from the various "unconventional" shale formations would not have happened without this dynamic technology.

Reservoir stimulation via injecting large volumes of water with the appropriate additives into the target reservoir zone to enable/enhance hydrocarbon flow is essential to acquire commercial production from these complex, dense rocks.

Long before the shale bonanza, the value of hydraulic fracturing was apparent when it successfully enhanced production early on from conventional tight formations, such as the familiar, long-productive Cotton Valley in east Texas.

NICOT

> "But the shales could produce a significant amount of water if they include water bearing intervals."

These type reservoirs continue to benefit from fracturing applications.

One of the most controversial aspects of this technology is the water itself – and the concerns extend beyond the much-hyped but unproven accusations of contamination of drinking water from the injected fluid.

They include the need to learn more about the amounts of water used and its sources, among other issues.

The shale gas boom was birthed in Texas, where the pioneering, now-famous Barnett Shale play in the Fort Worth region continues producing, joined by numerous other shale plays in the state.

Texans are long accustomed to the use of freshwater for waterflooding, particularly in west Texas. The now-commonplace use of hydraulic fracturing uses far greater volumes of water, from various sources.

This relatively dry state has a burgeoning population placing increased demand on its water supply, while its vital petroleum industry activity will depend on more water in order to continue increasing hydrocarbon production.

Water's Importance

A look at the basics of water consumption and use can provide info about what's happening in the Gulf Coast region – and what's to come.

The Texas Water Development Board (TWDB) funded a study about hydraulic fracturing and water resources in 2011. This was followed by an update in 2012, funded by the industry, when more plays were available for added data. The study results were passed to the TWDB.

"We have compiled water consumption and use for the year 2011 (about 82,000 acre-feet used) and compared it to an older analysis done for the year 2008 (about 36,000 acre-feet)," said Jean-Philippe "J.P." Nicot, research scientist at the Bureau of Economic Geology, University of Texas at Austin.

"A private database compiling water use information is complemented by industry data to access freshwater consumption, recycled water use and brackish water use," Nicot noted.

He emphasized that contrasts in climatic conditions (in the state) control the amount of surface water versus groundwater being used (for hydraulic fracturing) and the reliance on non-fresh water and recycling/re-use.

"Generally, toward the east, more surface water is used," Nicot said. "To the south and west, more groundwater is used, with a significant amount of this being brackish.

"The amount of recycled water used for hydraulic fracturing is generally low across the state," he noted.

"An important element on how much recycled water is used for new hydraulic fracturing operations is the amount available for recycling," he said. "The amount is generally low for producing shales.

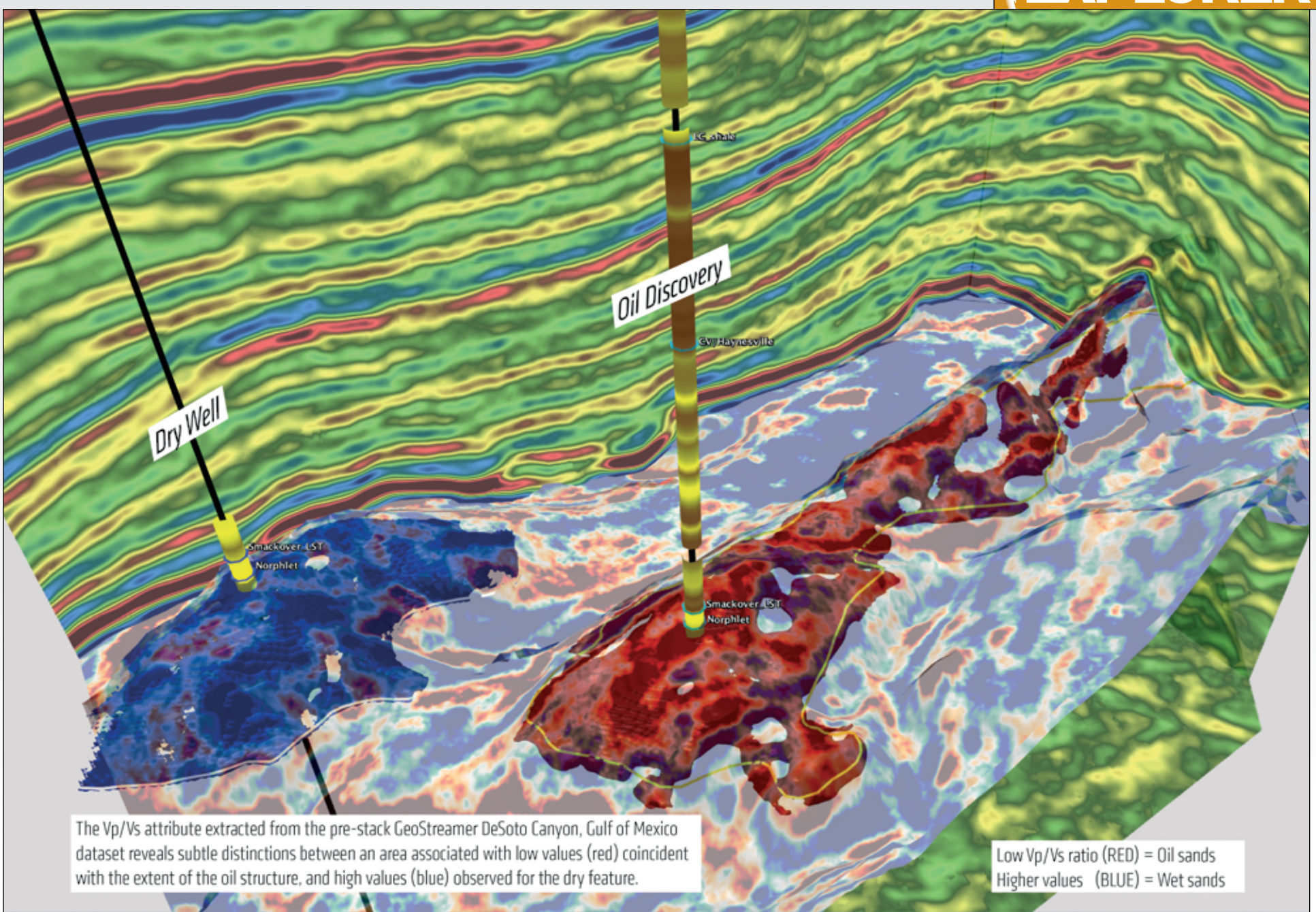
"Pore space of productive shale contains mostly hydrocarbons and little water," Nicot pointed out. "But the shales could produce a significant amount of water if they include water bearing intervals, or if the over- or underlying strata is an aquifer."

Jean-Philippe "J.P." Nicot, research scientist at the Bureau of Economic Geology, University of Texas at Austin, will present the paper "Hydraulic Fracturing and Water Resources: A Texas Study," at 8:55 a.m. Monday, Oct. 7, at the GCAGS annual meeting.

Nicot's paper is part of a session titled "Groundwater Issues."

The GCAGS meeting runs Oct. 6-8 in New Orleans.

See **Texas Water**, page 20



The Vp/Vs attribute extracted from the pre-stack GeoStreamer DeSoto Canyon, Gulf of Mexico dataset reveals subtle distinctions between an area associated with low values (red) coincident with the extent of the oil structure, and high values (blue) observed for the dry feature.

Low Vp/Vs ratio (RED) = Oil sands
Higher values (BLUE) = Wet sands

Louisiana Law Inches Toward Completion

By LOUISE S. DURHAM, EXPLORER Correspondent

A law is a law. Right?

Well, yes – but it might take a few years to put at least one of them involving geologists into action.

Such has been the saga of the Louisiana Professional Geoscience Practice Act.

It passed muster in the Louisiana state legislature in 2010 as SB 788, moving along to become Act No. 974 upon being signed into law by Louisiana Gov. Bobby Jindal.

It is one of three legislative acts governing the Louisiana Board of Professional Geoscientists established for the practice of the geological profession in Louisiana.

The board is set up to implement the licensing of professional geoscientists and administer the provisions of Act No. 974.

Since the Act became effective Jan. 1, 2011, there has been a focused effort to work through a legislative maze of sorts to fine-tune and actually execute it.

It's on track to happen soon – really.

"We're closer to getting the application forms finalized," said AAPG member Madhurendu B. Kumar, chairman of the board and its initial appointed member. "It appears that by the first of October we should be up and running digitally with the website, where we'll post the forms.

"Up to now, the law has been in effect, but it's only being implemented now," Kumar emphasized. "Any professional geoscientist currently is governed by this law, and this sets a fee schedule.

"Those who are supposed to be registered or licensed need to complete the application forms approved by the board," he noted. "The forms (on the website) must be accompanied with a check for the appropriate amount."

A Slow Appointment Pace

The grandfather deadline initially was set to become effective Jan. 1, 2012.

"I was concerned about such a close deadline and began working in mid-October 2011 to extend this with the goal that we must be fair to all," Kumar said.

The result is a new grandfather deadline now pegged at Jan. 1, 2014.

When requesting the extension, Kumar noted the need for seed money given that the board was not set up to be included in the state budget. However, the legislature doesn't address new fees and taxes in even-numbered years. The issue was postponed to this year.

As established, the board is required to have nine members. For whatever reason, member appointments have progressed at the proverbial snail's pace, with the eighth member being selected in August 2013 and the ninth still to be appointed at press time.

Once all is set up and running, Kumar said he anticipates there will be about 1,000 licensees to start, eventually rising to as many as 2,000.

He added that he expects about half of these to come from outside Louisiana.

Texas Water

from page 18

Use Versus Consumption

Industry water use pegged at 82,000 acre-feet (about 80 percent consumed) in 2011 is relatively low compared to state water use of about 15 million acre-feet. In contrast, the state's water consumption tallies about 12 million acre-feet.

Nicot emphasized the distinction between use and consumption.

"If you're fracturing a well and you need five million gallons, then that's used," he said. "If half of that comes from flowback from another well, then that water is not new but has been used elsewhere.

"Consumed means the amount of water that disappears from the system," he noted. "Used is the amount of water the industry needs to run its business.

"Consumed is relative," he said. "The bottom line is, it's water that is lost to the system.

"How much you need for fracking and how much is new water – that's the difference," Nicot stated.

For now, the future annual peak water use is projected as a broad peak that plateaus at approximately 125,000 acre-feet per year during the 2020s. Nicot noted that the addition of other oil and gas industry useage, e.g., waterflooding and drilling, ups the projected maximum water use to about 180,000 acre-feet per year during the 2020-30 decade, with a much lower consumption.

More Work to Do

Nicot and his colleagues continue to work on the water issue overall.

"In this work, we carried out an estimation of water use by the oil and gas industry in Texas as a result of oil and gas produced through hydraulic fracturing," he noted.

"However, access to actual sources of the hydraulic fracturing water, even in broad terms – such as surface water, ground water, recycled – and to water quality is difficult because the regulatory structure was not focused on those aspects until recently," Nicot said.

"Interviews and discussions with operators helped fill in the information gap."

New technology and higher oil prices have helped make the Wilcox sands an inviting target.

Chapter Two: Wilcox Getting a Second Look

By LOUISE S. DURHAM, EXPLORER Correspondent

Mention Tertiary Wilcox sands to almost near anyone who has worked the Gulf Coast region in pursuit of hydrocarbons, and it rings a bell.

The Wilcox Trend extends from south Texas across central Louisiana to the Mississippi border. The formation has been an on-again, off-again moneymaker for the E&P crowd since the early 1920s, according to AAPG member Tim Rynott, owner of Durango-based Ridge Resources.

"Until the 1980s, the Wilcox in southern Louisiana had been a very active exploration play, producing over 180 MMbo and 1.13 Tcf," Rynott said.


RYNOTT

"Insufficient porosities in the Middle/Lower Wilcox and problematical petrophysical evaluations, combined with poor commodity prices, virtually eliminated the Wilcox as an exploration target during most of the 1980s and throughout the 1990s," he noted.

"After the easily identified structures had been drilled, and commodity prices crashed in the mid-1980s," Rynott noted, wryly, "the Wilcox took on the name of 'Won't-cox' in some circles."

Today, it's one of the rejuvenation darlings of the Oil Patch, thanks to high oil prices and technology applications, such as hydraulic fracturing.

"Since 2003, over 180 wells have been drilled in southern Louisiana for the Wilcox formation, with a completion rate greater than 90 percent," Rynott said. "To date, these 180 wells have produced over 13 MMbo and 55 Bcf, with EURs ranging from 100 to 500 Mboe per well (70 to 90 percent liquids)."

It's a popular hunting ground for mom 'n' pop shops, along with smaller-to-midsize independents, in general.

This scenario is a "one-eighty" from the old days.

> **Today, it's one of the rejuvenation darlings of the Oil Patch.**

Treasures Left Behind

A testimony to the Big Boys' interest during earlier times is the Pine Prairie Field in Louisiana's Evangeline Parish. Pine Prairie is a piercement salt dome discovered in 1908 and developed during World War II, for the most part. It's said to harbor 30 productive horizons.

The majors were out in force, drilling away in the 1940s. Trouble was, the structure is relatively small. They each could have a little piece, but not a big chunk.

They soon packed up and moved on to south Louisiana (which the non-native citizens view to be anything south of I-10), where they had begun making lucrative, high production discoveries.

The targets there are deeper, geologically more complex and pricier to drill – but considerably more profitable when the drill bit hits the spot marked "X."

These guys left a lot of black gold

See **Wilcox**, page 26

Tim Rynott, owner of Ridge Resources in Durango, N.M., will present the paper "Wilcox Rebirth: South Louisiana," at 9:20 a.m. Monday, Oct. 7, at the GCAGS annual meeting in New Orleans.

The paper is part of the session chaired by Rynott, Liz McDade and Eric Stromboe, titled "Wilcox – Updip, Downdip and In Between."

The GCAGS meeting, held in conjunction with the SEPM Gulf Coast Section, will be held Oct. 6-8.

A strategy realized

Diverse DL Program Spotlights Science

By BARRY FRIEDMAN, EXPLORER Correspondent

They come from London, England; Bergen, Norway; University Park, Pa.

There is a professor from Brazil and a geologist from Houston; a consultant from Chevron and an environmentalist from Tulane University in New Orleans.

They are this year's slate of AAPG Distinguished Lecturers – a unique, disparate-though-complementary group of scientists, professors, business people and researchers.

They all are those things. And it's why they were chosen.


MARTINSEN

"Recent contributions to the science are very important," says Ole J. Martinsen, an AAPG award-winning researcher and this year's co-chair of the AAPG Distinguished Lecturers Committee, "but competent communicators are prioritized, because they can potentially be elected to travel and hold lectures in various parts of the world and represent AAPG.

"Thus, communication skills are necessary," he said of what the group brings to the table, "in addition to high-quality science."

And that global feel was by design.

Martinsen, who is vice president and head of exploration research for Statoil ASA in Bergen, Norway, says the best candidates to be AAPG Distinguished Lecturers are those who represent various sciences, a cross-section of petroleum and petroleum-related companies, universities and, perhaps most important, different approaches to not only scientific problems but science itself.

In short, he says, this group should represent different schools of thought to get a balanced group of scientists as AAPG Distinguished Lecturers.

Putting It Together

The Distinguished Lecture Committee evaluates the 12 themes from which the elected speakers will be chosen, ranging from general petroleum topics – climate research, the future of energy geology and unconventional resources – as well as more specific disciplines, such as clastic reservoirs, carbonate systems and structural geology.

The DL Committee, along with other AAPG members, then proposes professionals (both academics, independents and energy company scientists) with a proven public record (renowned speakers, people with recent impactful publications) to be nominated for selection.

"Every year," Martinsen said, "the DL Committee then elects one lecturer within each of the 12 themes. Some are chosen as North American DLs and some as

See **Lecturers**, page 26

The 2013-14 AAPG North America and International Distinguished Lecturers are:

North America

❒ **Shirley P. Dutton** (this year's Haas-Pratt Distinguished Lecturer), senior research scientist, Bureau of Economic Geology, The University of Texas at Austin.

❒ **Joseph Carl Fiduk**, chief geologist, Western Geco, Houston.

❒ **Julia Gale**, research scientist, Bureau of Economic Geology, University of Texas at Austin.

❒ **Tim McHargue**, consulting professor at Stanford University and adjunct professor at the University of Missouri.

❒ **Webster Mohriak**, University of Rio de Janeiro State, Rio de Janeiro, Brazil.

❒ **Allie Thurmond** (this year's Allen P. Bennison Distinguished Lecturer), Tour project manager, Statoil, Bergen, Norway.

❒ **Torjborn Tornquist**, professor and chair, Department of Earth and Environmental Sciences, Tulane University, New Orleans.

International

❒ **Alastair Fraser** (this year's Shell Lecturer), EGI Chair in Petroleum Geoscience, Imperial College, Department of Earth Science and Engineering, London, England.

❒ **Terry Engelder** (the Roy M. Huffington Distinguished Lecturer), professor of geosciences, Appalachian Basin Black Shales Group, Department of Geosciences, Pennsylvania State University, University Park, Pa.

❒ **Patrick W.M. Corbett** (the Dean A. McGee Distinguished Lecturer), BG Group, professor of carbonate petroleum geoengineering, University Federal do Rio de Janeiro, Heriot-Watt University.

AAPG Distinguished Ethics Lecturer

❒ **Don Clarke**, consultant, Lakewood, Calif. His topic is "Hydraulic Fracturing and Earthquakes: Ethically, How Do We Move Forward and Do the Right Thing?"

AAPG/SEG Inter-Society Distinguished Lecturer

❒ **Joe Stefani** (the J. Ben Carsey Distinguished Lecturer), senior consultant, Chevron Energy Technology Co., San Ramon, Calif.

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Lecturers
from page 24

international DLs, to visit regions such as Europe and Southeast Asia.

"For 2013-14, we will have a couple of designated DLs for the European Region," he added, "and we may develop the same for some of the other international regions to increase the frequency of DLs traveling to the Regions."

The topics that are chosen reflect those most of interest within the earth sciences, petroleum industry and academic communities.

"It is absolutely important," he said, "that AAPG and its lecturers stay in line with the advancement of the science."

"Right now, the future of the energy industry – not the least, unconventionals – is a hot topic, so we seek speakers to cover those themes."

The Agenda: Science

And of the hottest topics, the hottest at the moment is hydraulic fracturing.

"'Fracing,' or in more general terms, production techniques in unconventional reservoirs, is a theme we have many candidates for," Martinsen said.

Controversial topics such as hydraulic fracturing, while discussed, are not what the AAPG Distinguished Lecturers are all about.

"We shy away from politically-colored talks and choose speakers who stay within the scientific side of things," he said.

When asked about the teaching of science itself, specifically the pushback in some quarters these days that wish to de-emphasize or minimize its importance, Martinsen said he knows its out there, but maintains it doesn't affect either the central goal of the DL program or its DNA.

"To some degree, yes," he admitted, "but we emphasize sound, scientific analysis with speakers with different views from different backgrounds and schools on both classic as well as new and controversial topics.

"Like one of the founding ideas of AAPG, we argue that the best scientific debate comes from sound, empirically-based analysis," he continued, "and that the DLs elected every year should represent a spectrum of views and interpretations within a range of fields – and communicate in a balanced way to those who listen to them speak."

Wilcox
from page 22

behind for the likes of independents such as publicly-traded Mid-States Petroleum Co., which has re-entered Pine Prairie and several other south-central Louisiana Wilcox fields where target depths range between 9,000 and 17,000 feet.

Production from the myriad zones at Pine Prairie can be commingled, as opposed to the early days when this was prevented by state regulations.

The company's results: significantly revved-up production via modern-day horizontal drilling and multi-stage fracturing technology.

These applications can be crucial to tapping production in that the upper, middle and lower Wilcox sands are known to be made up of considerable shale and clay content, being classified as "dirty sands."

Other companies working the Trend include Halcon Resources, Hilcorp, Swift Energy and EP Energy, according to Rynott.

'Oil and Gas Farming'

Some explorers prefer to take a stab at it pretty much on their own, even if they're not actually present in the neighborhood.

Louisiana-native Rynott doesn't let his current far-away domicile in Colorado hinder his Wilcox activity.

"With all the communications available today, it's really effortless," he emphasized. "I'm now on the third 3-D I'm selling in the Wilcox, and through these I hope to see anywhere from 50 to maybe a couple hundred wells drilled.

"The three of these seismic sets combined add up to 450 square miles of 3-D," he said.

"Louisiana, and south Louisiana in particular, is a very oily area," Rynott continued, "where you have the luxury of drilling deep tight sands and serendipitously finding some shallower conventional sands. You have so many stacked layers of prospective formations in south Louisiana, and it's just ripe for the pickings because of that.

"It's for those small and medium independents who have not gotten into the sweet spots in resource plays," Rynott noted. "A lot of people in south Louisiana don't want to get into resource plays, so this is where they need to go.

"Also, the lease terms are better than the hot resource plays where you're drilling in a grid – doing oil and gas farming, as I call it."

Working for a Living

If you're convinced to join the other believers, be prepared to work long hours and contribute plenty of sweat equity in the quest to identify prospects. This is a region of mature basins that are picked over fairly well, leaving behind smaller accumulations.

You have to unravel all the secrets to make sure you have a drillable prospect, according to Rynott.

He was upbeat about the production possibilities from acquiring 3-D surveys in areas of Louisiana that have not been shot.

"You can take advantage of the 3-D technology, the fracturing technology and at the same time hope it could turn into a horizontal play in the near- to intermediate future," he said.

"You have the potential for the perfect combination of the three big technologies."

What goes up must come down

Science and 'Slogging' Meet in Antarctica

By SUSAN R. EATON, EXPLORER Correspondent

Earlier this year I received an AAPG certificate in the mail, congratulating me on 30 years of AAPG membership. "Time flies," as they say.

Inspecting the certificate, I reflected upon three decades of personal and career accomplishments and recounted many of the amazing geologists I had met along the way. While many fellow AAPG members (of my vintage) are contemplating retirement, I find myself charting a path forward, growing my international oil and gas consulting practice and exploring far flung places around the planet, with a particular focus on earth science research being conducted in polar regions.

During the past three years, Antarctica has represented a dynamic platform – my outdoor laboratory, if you will – to study planetary processes, climate change and ocean change in action. Traveling to the Bottom of the World, I've participated in three international science-based expeditions.

This journey has been an inspirational one, both professionally and personally. And, as a geoscientist in Antarctica, I've had the profound privilege of following in the esteemed footsteps of Sir Ernest Shackleton, 100 years later.

Jody Bourgeois of the University of Washington, at Deception Island (an ocean-filled volcanic crater and a smaller cinder cone are in background) in Antarctica – during the "Shackleton Slog," Bourgeois, a Shackleton history buff, led the glissade charge downhill to Stromness.

Editor's note: During the past three years, AAPG member and EXPLORER correspondent Susan R. Eaton has participated in three science-based Antarctic expeditions. Funded in part by the AAPG Foundation, Eaton has blogged from the Bottom of the World, enabling AAPG members to experience, in real time, these voyages of exploration and discovery.

Translating lessons from Antarctica, Eaton has reached out to AAPG's diverse stakeholders (K-12 students, university students and the general public), empowering them to formulate scientifically driven global solutions for today's social, economic, energy and global sustainability challenges.

In last month's EXPLORER Eaton reported on her most recent stay in Antarctica, describing the expedition's mission and offering a glimpse of some of the scientists who participated. This month, the second of a three-part series, she reports on one particularly memorable day for her and her fellow explorers.

The Shackleton Slog

On Jan. 4, 2013, the Geological Society of America (GSA)-led expedition retraced the final leg of Shackleton's epic trek across the island of South Georgia. In the process, our group of intrepid explorers (which included one very determined woman in her 80s) shared, in a very small measure, some of the sights, sounds and emotions that Shackleton and his men experienced a century ago.

Symbolic in nature, the 5.5-kilometer-long hike – known as the "Shackleton Slog" – from Fortuna Bay to Stromness Harbour represented a pivotal chapter in Shackleton's story of survival against all odds.

On May 19, 1916, Shackleton and two of his men set out under a full moon – without tents or sleeping bags – on a non-stop crossing of the largely unmapped island. Equipped with ice crampons fashioned from screws wrenched from their lifeboat, they arrived in Stromness, a Norwegian whaling settlement on the northeast coast of South Georgia, some 36 hours later.

In an effort to save time and energy during their 51-kilometer-long crossing of South Georgia, Shackleton and his hiking companions formed a three-man toboggan chain, glissading down uncharted mountainsides.

Our GSA-led hike from sea level to the 300-meter mountain pass was slow and measured. But, the toboggan ride down

See **Shackleton Slog**, page 30

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A joint publication of SEG and AAPG

Interpretation™

A journal of subsurface characterization

Society of Exploration Geophysicists

AAPG

Visualizing and predicting the integrated earth

Interpretation will have a special section sharing the theme with the 2013 IQ Earth Summer Forum: Visualizing and Predicting the Integrated Earth. The editors of *Interpretation* invite papers on this topic for publication in the February 2015 issue to supplement the journal's regular submissions of technical papers.

The IQ Earth Project is an SEG initiative to promote integration of earth-science data and knowledge to provide quantitative interpretations. The goal is to help stimulate a fundamental change in visualizing and predicting subsurface structure, rock and fluid properties quantitatively along with estimates of uncertainty. The IQ Earth Summer Forum and the *Interpretation* special section contribute to that goal.

For this *Interpretation* special section, additional contributions are invited on sharing new ways of working, new types of data, and new relationships to provide insights into integration that are driving some of the most innovative and exciting changes occurring in our industry. These will serve as the basis for future improvements in safety, efficiency, and effectiveness in our recovery of more difficult and diverse reservoirs of hydrocarbons.

We invite additional interpretation contributions on

- Interpretation case studies on integration of seismic, well, and core data, or integration of seismic and potential field data such as CSEM or gravity
- Reservoir characterization and reservoir property uncertainty
- Quantitative risk reduction and structural uncertainty
- Inclusion of microseismic data with production and other data
- Multidisciplinary visualization
- Interdisciplinary prospecting
- Geoinformatics
- Integrated G&G modeling

Interested authors should submit their manuscripts for review no later than 15 March 2014. In addition, the special section or supplement 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 *IQ Earth Special Section* option in the manuscript type dropdown box. The submitted papers will be subject to the regular peer-review process, and the contributing authors also are 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:	Special section editors:
Submission deadline 15 March 2014	Rocco Detomo Jr. Rocco.Detomo@Shell.com
Peer review complete 1 September 2014	Carmen C. Dumitrescu Carmend@terra-iq.com
All files submitted for production 15 September 2014	Huw James huwejames@gmail.com
Publication of issue February 2015	

INTERPRETATION special section

CALL FOR PAPERS

Photo courtesy of Mindy Kimball

It wasn't all about the slog: AAPG member and EXPLORER corresopondent Susan R. Eaton near Argentina's Base Esperanza, which is located in Hope Bay, on the Western Antarctic Peninsula. Hope Bay is home to approximately 125,000 breeding pairs of Adélie penguins.

Shackleton Slog

from page 28

the backstretch was wild and lasted mere seconds.

Jody Bourgeois is a GSA Fellow and professor at the University of Washington's Earth and Space Sciences Department. Seattle-based Bourgeois specializes in sedimentology, stratigraphy and paleotsunamis.

A history buff, Bourgeois said that she'd always been captivated by Shackleton's epic survival story. Channeling the spirit of Shackleton, Bourgeois led the sitting glissade charge down a steep snow-covered slope toward Stromness.

AAPG student member Hunter Carr from Tyler, Texas, followed Bourgeois downhill. In fact, Carr had so much fun that he climbed back up the mountainside to glissade yet a second time. A geology student at the University of Georgia, Tyler said: "I wasn't going to miss out on doing that, again."

Moment of Truth

And then it was my turn to hurtle myself downhill.

After a hurried session of perfecting my skills at arresting – or, at the very least, impeding – my trajectory down the snow-covered mountainside, I held my breath and plunged, feet first, over the precipice.

Although my backpack acted as a speed retardant, my Gortex™ pants turned into a potent accelerant ...

On fire, I raced down the slope.

In my left hand, my walking pole pointed skywards; in my right hand, I gripped my monopod-mounted video camera, recording the wild ride for posterity.

Transported back to my childhood tobogganing days, I hurtled down a slope that resembled – after a reassessment from below – a double black diamond ski run. My high-pitched screams belied the exhilaration of glissading down the steep slope.

All too soon, the 250-meter-long snow chute came to an abrupt and rocky end. Applying the human brakes before crashing into the rocks, I narrowly missed hitting Scott Davis, one of the expedition's photographers, who was strategically situated at the end of the snow pack.

I was sorely tempted to climb back up the mountainside like Carr and the other young geologists had done – but a sense of decorum ensued, and I continued the historic hike toward Stromness.

'By Endurance We Conquer'

The view from the mountain pass was spectacular: Nestled amongst the icebergs in Stromness Harbour was the Akademik Ioffe, our 117-metre-long, ice-strengthened expedition vessel. The rusting remnants of Stromness, complete with industrial whale oil rendering facilities and storage tanks, stood as a stark reminder of a bygone era when whale oil occupied the same energy niche as petroleum does today.

On the opposite side of Stromness Harbour I identified the sensationally folded, "Z-shaped" sedimentary strata of the Lower Cretaceous age Cumberland Bay Formation. During the island crossing, Shackleton had spied – from a distant mountaintop – these dramatically folded beds, which guided him, like a compass, to Stromness. When Shackleton and his men heard the whistle blast, signaling the daily crew change at the whaling station, they knew that safety was finally within their grasp.

In November 1915, Shackleton's vessel, the HMS Endurance, was crushed by ice and sank, precipitating one of the world's greatest survival stories. Shackleton's family crest states "by endurance we conquer," a motto which rang true during the two-year ordeal.

Decamped for seven months on an ever-shrinking ice floe, Shackleton and his men set off in three life boats, eventually landing on the inhospitable shores of Elephant Island.

Within a week of arriving at Elephant Island, Shackleton and five of his men set sail for South Georgia in the James Caird, a seven-meter-long lifeboat that was jury-rigged with sails and a canvas deck. Navigating by sextant, they sailed 1,300 kilometers in 17 days, battling towering waves and hurricane force winds in the Scotia Sea.

Heavy sea ice blocked Shackleton's attempts to rescue his 22 men marooned on Elephant Island; three months and four attempts later, all 27 men under his direct command returned home alive.

A Reason to Smile

My toboggan ride was neither monumental nor was it dangerous.

Nonetheless, it represented a piece of unfinished business for me: Three years earlier, while participating in the 2010 Elysium Visual Epic Expedition (also supported by the AAPG Foundation), I bowed out of hiking the Shackleton Slog. Exhibiting decidedly non-Shackleton-like behavior, I chose the warmth and comfort of the ship over the historic hike from Fortuna Bay to Stromness Harbour – it was raining that day, at lower elevations, and snowing at the pass.

The wild toboggan ride through history was an emotional experience for me, and one that was long overdue.

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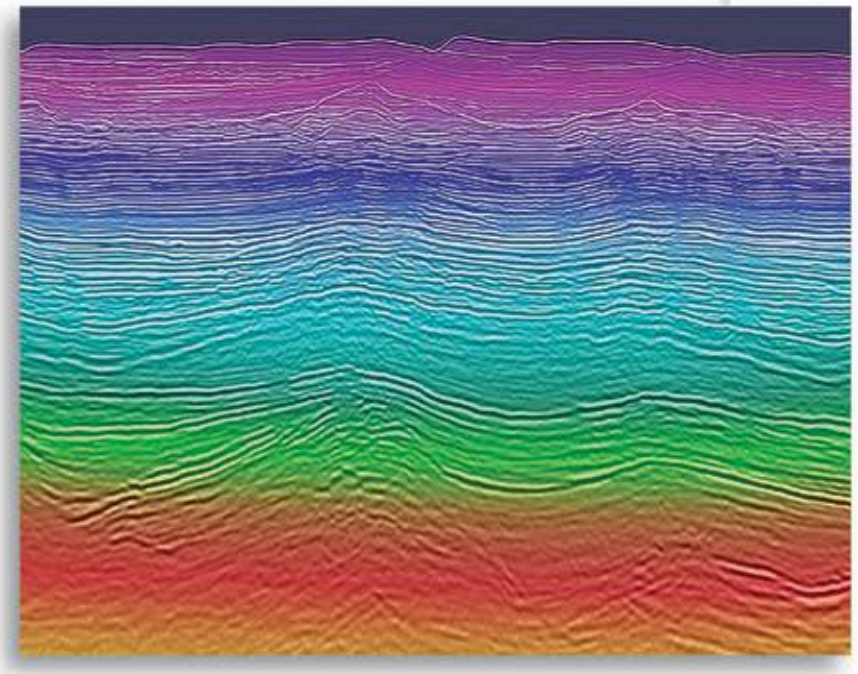
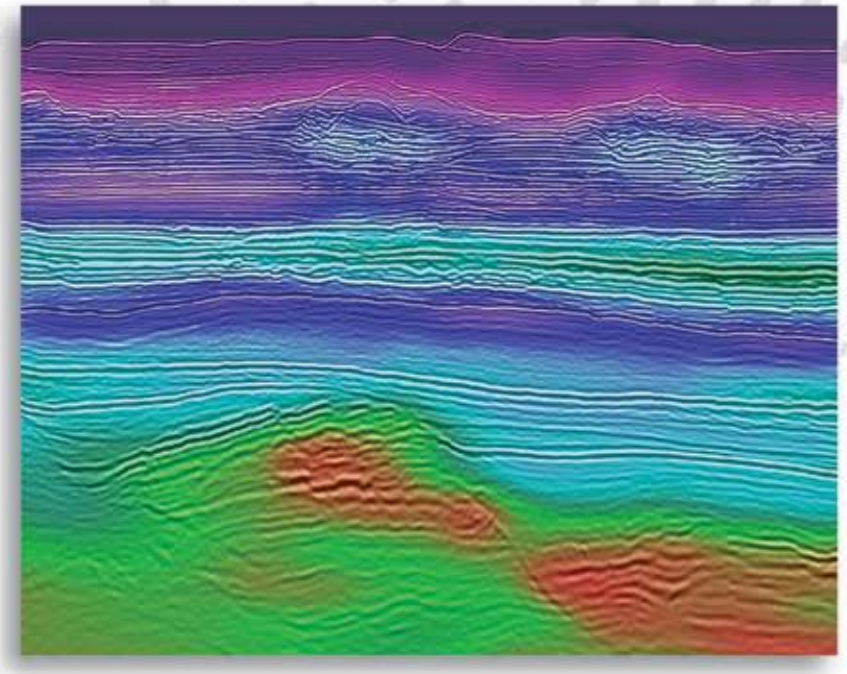


Velocity model before application of general move out tomography.



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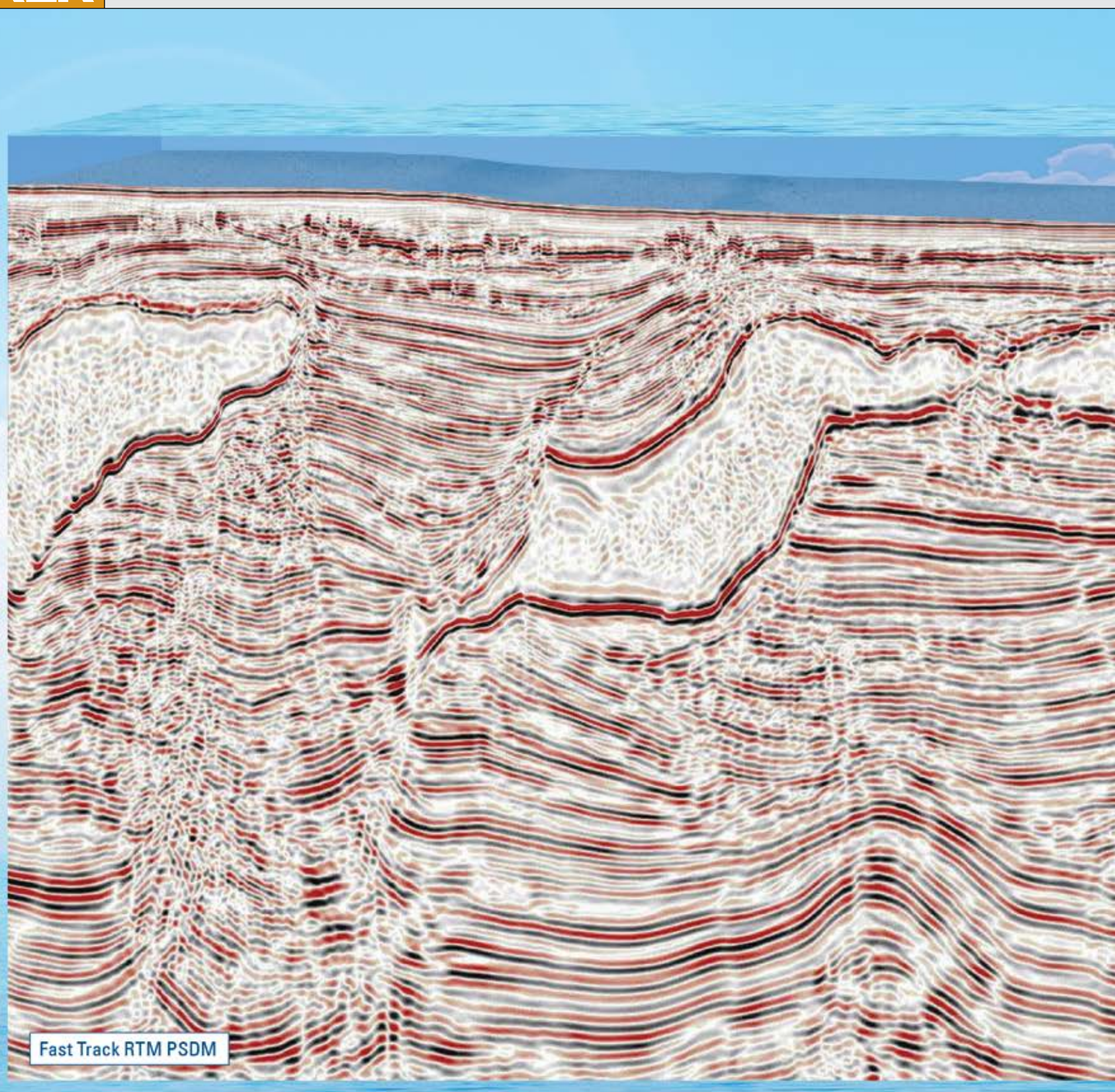


SEE THE ENERGY

FINAL PATRIOT DATA AVAILABLE DECEMBER 2013

TGS gives you a clearer view of the Gulf of Mexico with the Patriot M-WAZ 3D project, an orthogonal wide azimuth survey to the Freedom WAZ 3D project.

Processing highlights include:

- TTI model building
- Tomography using six azimuthal migration outputs
- Pre-stack merge with Freedom WAZ 3D data using 5D data regularization
- Detailed salt interpretation
- RTM DIT scans for improved subsalt imaging

Geoscience Helps Solve Dayspring Mystery

By KEN MILAM, EXPLORER Correspondent

A simple question about finding water provided the seed.

The result was a project with branches in cutting-edge science and old-fashioned volunteerism.


WEBB

"I was having a conversation with one of our computer support people and he was asking about how to find water," said Susan J. Webb, University of the Witwatersrand, Johannesburg, South Africa.

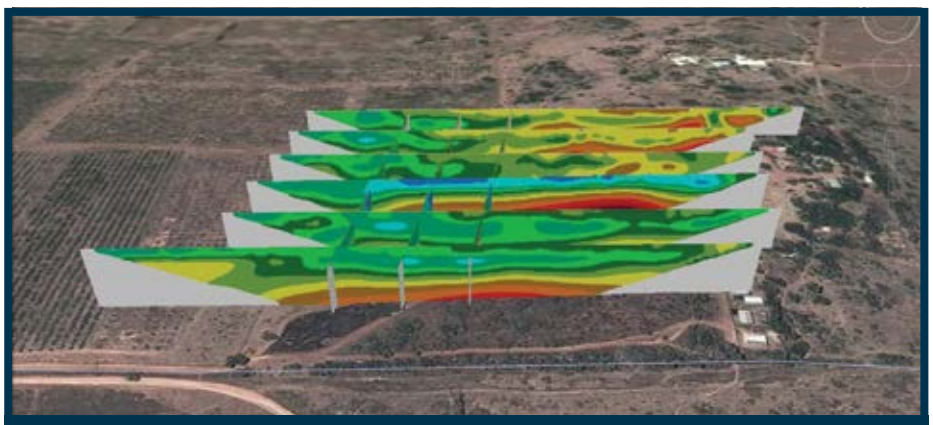
"He told me about Dayspring (Children's Village), which he had been volunteering at for a number of years, and how their water had been drying up and sometimes they had to send the children away as they had no water."

Dayspring Children's Village was established by the Rev. Charles and Wendy Paine to equal education opportunities and care for the disadvantaged. It was birthed in the 1980s during apartheid and was one of the few integrated boarding schools of its time.

Wanting to learn more about the applications of geology and geophysics in groundwater exploration and monitoring, Webb was intrigued.

Upon visiting the school about two years ago, "The first thing that struck me was a large stand of trees on the property," she said. "I had been hearing about the work 'Working for Water' (a government-funded program) had been doing, clearing out non-indigenous trees and bringing back surface water.


Geoscience and humanitarian efforts to provide water united – successfully – at South Africa's Dayspring Children's Village.


The way it looked to the geoscience crews, who were able to use their technology to examine the hydrology of two very different aquifers.

"I immediately thought maybe the trees were part of the problem," she said. "These are the huge blue gum, eucalyptus trees that are from Australia."

New Use for Technology

Having spotted the possible root of the problem, Webb and her colleagues and students went to work.

"We are lucky to have a large amount of equipment and lots of enthusiastic students," Webb said. "The main method we used was resistivity, and David Ngobeni used this in his master's project."

Specifically, he used a novel application of time-lapse resistivity.

"In addition we used magnetics – both methods discovered an unknown pipe," she said. "The magnetic work was done by (AAPG member) Obone Sepato as part of his honors project.

"We also used refraction seismic as part of several honors projects, and the first 4-D gravity survey in the country," she said. "We also tried Ground Penetrating Radar GPR to delineate the tree roots.

"It was novel in that we are able to apply a lot of techniques – you wouldn't ever be

See **Dayspring**, page 36

Finding helpers was never a problem for the geoscience team; students at Dayspring proved to provide excellent support for their efforts.

Dayspring
from page 34

able to do that on a commercial scale," she added.

The group also did some hydrology studies.

"We were able to run the isotopes at Itemba labs and found that the near surface aquifer (the one that runs out and that they depend on) is readily recharged, but the deeper aquifer has old water – no indication of deuterium, therefore the water is old. That is a significant result for the region.

"In addition the resistivity data partially mapped the near-surface aquifer – we need to see a little deeper – a geological contact and fractures within the lithologies, which are likely to be hosting the water," she continued. "The current borehole appears to be at the intersection of a contact between the metamorphosed shales and the pyroxene rich sills.

"The time-lapse resistivity indicates a measureable change in water content for a significant distance away from the blue gum trees – however, we need to probe slightly deeper to be sure of this importance," she said.

"We found an old pipe that may be the source of the contamination in the second borehole, as that is likely to be caused in the near surface."

Win-Win Situation

The school is close to Johannesburg, where the university is located, allowing fairly frequent day trips to continue the research. The school has begun clearing the trees and results are promising, she said.

Besides the benefits to the school, the project has had positive side effects at the university as well.

"We have been able to examine the hydrology of two very different aquifers," she said, "document the variations in resistivity in the near surface throughout the seasons and its relationship with the trees, and develop techniques for using 4-D gravity.

"The biggest difference has been the number of students we have been able to involve," she said. "Many students become interested in the project because of the humanitarian aspect, and we are able to take a large number of volunteers out to work on the project for short periods of time as it is only a short drive away. Several of these students have become interested in geophysics because of this experience.

"We have had a number of honors projects (similar to U.S. undergraduate research projects) and a master's project hosted at Dayspring," Webb said.

"Over the course of the project we were able to involve well over 30 students directly in the geophysics – many of who had never heard of geophysics, as a lot of our students come from a physics background," she said.

"We even had participation from an overseas student and a number of staff members."

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Open enrollment is now open for guaranteed-issue health insurance plans with an effective date of January 1, 2014 without exclusions for pre-existing conditions.

Biospheric origins?

Offering a Third Theory

By BARRY FRIEDMAN, EXPLORER Correspondent

For AAPG member Vladimir Serebryakov, a Utah resident but also a member of the Russian Academy of Natural Science, the nature of the oil and gas business is the business of nature itself.

"The question of oil and gas origin is a fundamentally unresolved phenomenon," he says, "and the world's energy future depends on it."


SEREBRYAKOV

And he believes the conversation needs to continue.

"Over the last hundred years," he says, perhaps anticipating the obvious response from many – most? – of his peers, "this problem has not been solved in the debate between supporters of the 'organic' and 'inorganic' hypotheses."

In fact, most scientists believe in the organic theory; as such, industry leans in that direction – as does the money.

There have been others in the industry, though (Russian scientists and the late Cornell University physicist Thomas Gold, to name a few), who believed there was much to be learned about and ultimately extracted from the inorganic.

Serebryakov, along with partners Azary A. Barenbaum, Alexander V. Serebryakov, Ernest S. Zakirov and Sumbat N. Zakirov, has been among them.

But, he insists, he's not siding with Gold and the others in the abiogenic camp in the traditional "how is oil formed" question.

He is suggesting – and working toward proving – something completely different.

And the results of his research on this, he feels, are promising.

"The work," he said of his research, "points to the conclusion that oil and gas formation is not a lengthy geological process but rather a natural phenomenon dependent on geochemical circulation of movable carbon and water through the earth's surface."

The bottom line: "The biospheric concept scientifically substantiates that oil and gas are 'renewable' mineral resources."

Just Add Water

Serebryakov came to the United States in 1991, at the invitation of the University of Wyoming, to research abnormal formation pressures in oil and gas reservoirs. Since 1994 he has worked with oil companies in Wyoming's Powder River Basin and the Republic of Dagestan, Russia.

In 1997 he was elected as a Foreign Member of the Russian Academy of Natural Sciences for his scientific advances in the oil and gas industry.

"In contrast to Gold and the Russian scientists – the (debate between) biogenic and abiogenic hypotheses – the biosphere concept considers oil and gas as necessary products occurring by carbons moving through the earth's surface via meteogenic waters."

Here, Serebryakov says, is the difference in what the abiogenic proponents preach and what he believes:

▸ The abiogenic hypothesis suggests that oil and gas originated from the depths of the earth as a result of the evolution of the Earth and deep degassing from the deep subsurface by deep faults – "where water and magma synthesizes petroleum hydrocarbons," he said.

▸ The biosphere concept, in contrast, suggests that oil and gas are necessary products created by the transfer of movable carbon through the earth's surface via meteogenic waters.

"This process is associated with the geochemical cycling of carbon and water moving through the earth's surface," he said. "For example, water and CO_2 (carbonated water) starts above earth's surface and moves down through the earth while encountering metals/minerals.

"The laboratory experiments have shown that this synthesis can initiate at even normal (room) temperature and pressures," he said.

His belief: The formation of oil and gas is not only a geological process that occurs very slowly in geologic time, but also a more rapid biospheric process related to the circulation of water and carbon through the earth's surface.

The Shorter Fuse

Serebryakov has published four books and over 100 articles on subjects of oil and gas, including the concept of climatic cycle of pore water in the interior of the earth's crust associated with the migration and accumulation of hydrocarbons.

"As carbon moves through the earth's surface – coming in contact with living organisms and mineral components – its chemical form and isotopic composition changes," he said. "Above the earth's surface, which plays the role of geochemical barrier, carbon circulates predominantly in the form of carbon dioxide (CO_2), and under it, through polycondensation reaction (catalytic synthesis), it is reduced to hydrocarbons."

Because of their low solubility in water, hydrocarbons form a separate phase, he said, which accumulate as oil and/or gas in their own geological structures or traps.

"In accordance with the biospheric cycle, the estimated time for carbon to move through the earth's surface within the boundaries of continents is as rapidly as 40 years," he said.

It is possible, then, for hydrocarbons to begin accumulating during this timeframe.

That, according to Serebryakov, should give some in the industry pause.

"Since oil and gas accumulates in geological structures or traps, it would suggest that using fracing, which can destroy these traps, notwithstanding time value of money, would not be beneficial in the long term," he said.

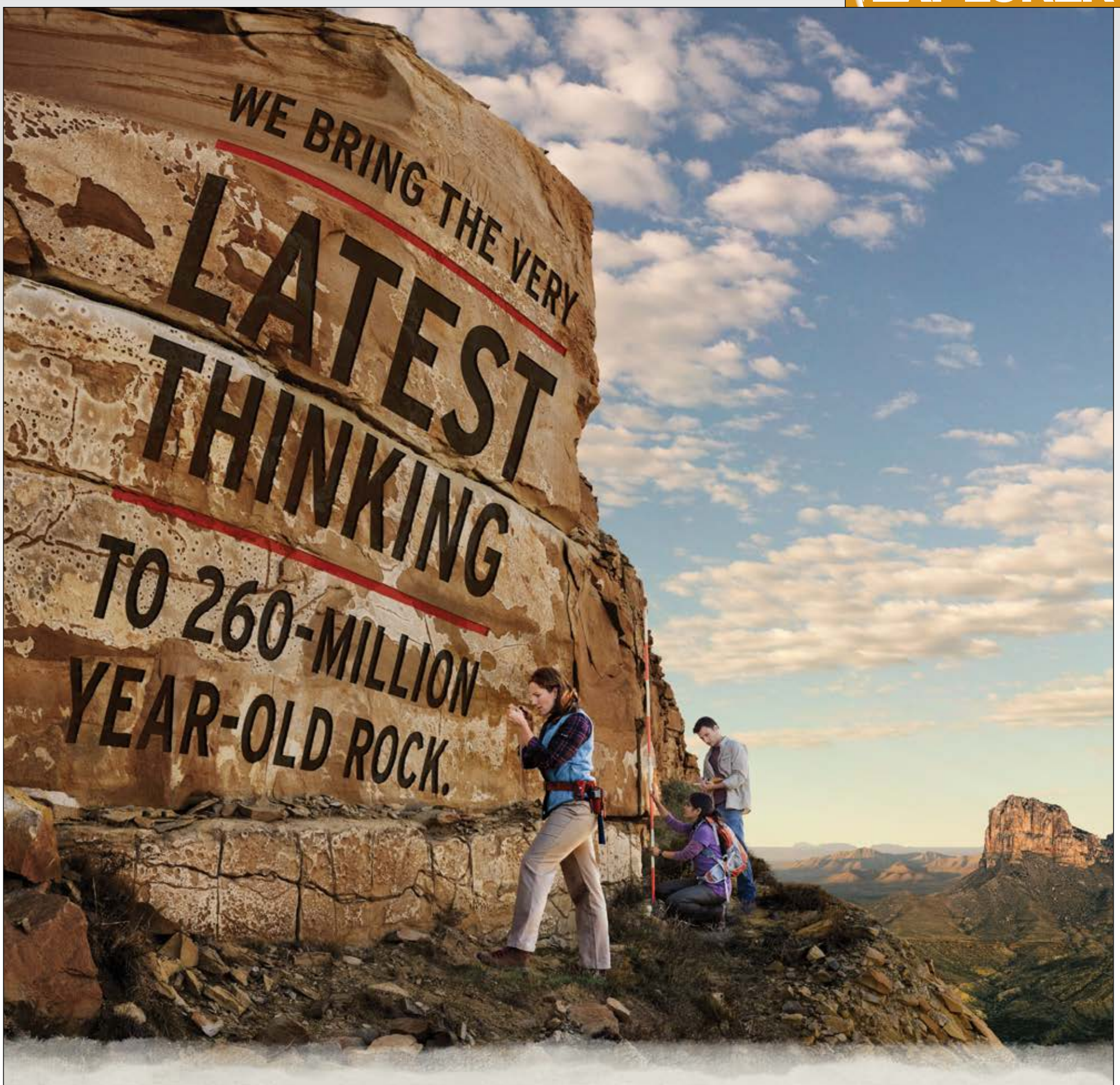
Of course, the use of hydraulic fracturing is like the third rail of oil and gas production – and Serebryakov just jumped up and down on it.

Further, he knows that full implementation and testing of his theory – not to mention the industry's cost of shifting its present focus – will only get more expensive as the work progresses.

And don't even begin to ask about the criticism his theory will receive from the "peak oil" crowd.

But Serebryakov is undeterred – led by his son, Alexander "Sasha" Serebryakov, he and his colleagues have secured patents this year for their company, Galadigma, "Method of Hydrocarbons and Hydrogen Production From Water and Carbon Dioxide."

Their work continues. Enthusiastically.



"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.

Enter the Young: YPs Making an Impact – NOW

By MEREDITH FABER, Young Professionals Committee Vice-Chair

Even with its 100th birthday just around the corner, AAPG is looking younger every day.

This fact is no more evident than within AAPG leadership, where YPs Helen Cromie, secretary for the European Region; Richard Ball, AAPG secretary; and Catherine Campbell, secretary-treasurer for the Rocky Mountain Section, are working hard to help keep our soon-to-be centenarian Association looking spry.

I recently caught up with these YPs-in-charge to discuss careers in the geosciences, the importance of getting involved and their thoughts on leadership.


FABER


CROMIE


BALL


CAMPBELL

Unsurprisingly, they had a lot to say.

Faber: *What led you to a career in the geosciences?*

Cromie: Geography was my favorite subject in high school. I was not quite so inspired by the human geography side of the subject, so when I spotted a degree course called "Physical Geography and Geology" at Edinburgh University, I jumped at the chance.

My undergraduate thesis was in glacial geomorphology, but it seemed I would need a Ph.D. to move forward in that field – something I was not keen to do. So I decided to apply for a summer internship at a local oil company.

I enjoyed this switch to industry immensely and made the decision at that point to move toward a career as a petroleum geoscientist.

Campbell: Earth science piqued my interest the first time I learned there was an explanation for what happened in the natural world.

In college, I took "Intro to Geology" and was immediately hooked. I remember reading the text late one night and then hearing birds chirping. If a textbook can keep you engaged for that long, it means something!

Faber: *Why did you first become involved with AAPG?*

Cromie: I was a member of the University of Aberdeen team in the first AAPG Imperial Barrel Award Competition in Long Beach, Calif., in 2007. After the competition I was approached by Connie Mongold, the IBA Committee Chair at that time, who asked if I would like to join the IBA organizing committee.

Ball: I attended the 2003 ACE in Salt Lake City, and right then and there, I figured out that I belonged with such a passionate group of scientists.

Campbell: The University of Wyoming has an active student chapter, and upon entering the master's program there students are encouraged to join AAPG. Randi Martinsen was our fearless leader, eventually leading our IBA team to the first international contest in 2007.

Faber: *How did you arrive in your current position?*

Cromie: I served on the global IBA Committee for two years. When the program really started to take off, my colleague, Charlie Hamilton, and I were asked if we could co-chair the rapidly expanding European competition. In this role, I got to know the European Region leadership team well, so when they asked if I would consider running for secretary it seemed like a good idea.

I was initially skeptical that I would make it through the election, but I'm now into my second term.

Ball: I started out as the student chapter chair at Stephen F. Austin State University. When the YP Committee was reactivated, I served as vice chair of the Student Chapters Committee (SCC)/YP Committee. During that time, I started the Student Chapter Leadership Summit program and eventually became chair of the SCC. I currently serve as the AAPG Executive Committee secretary.

Campbell: Two words: Randi Martinsen. After graduating in 2007, Randi called and said the memorable words, "You'll thank me later." Suddenly the phone started ringing and committee chairs were thanking me for volunteering to help out with various events.

I ended up as a volunteer co-chair for the 2009 ACE in Denver, chair of the RMS IBA Committee (and ultimately, a member of the global IBA Committee), chair of the RMS Young Professionals Committee and a co-

See **YP Value**, page 44

EAGE/AAPG WORKSHOP 2013

BASIN-MARGIN WEDGE EXPLORATION PLAYS

20-22 November 2013 - Lisbon, Portugal

In recent decades, the exploration of continental margins has proven successful around the world principally by drilling closures either in extensional provinces (rift or deltaic gliding systems) or in compressive basins (wrench margins or thrust fronts of deltas). In recent years, several significant discoveries have been made in the South Atlantic margins in a new so called "Basin-Margin Wedge Play" which is not controlled by local structural closures but by large scale stratigraphic traps. The aim of the workshop is to promote discussions on the strengths and failings of such a concept and about the risks associated with each component of the petroleum system: charge, reservoir occurrence and quality, vertical and lateral seals and traps.

TOPICS:

1. Exploration trends and case-studies
2. Geodynamic and petroleum contexts
3. Associated traps
4. Reservoir challenges

Call for Papers deadline:
6 October 2013

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Editor's note: Regions and Sections is a regular column in the EXPLORER offering news for and about AAPG's six international Regions and six domestic Sections. Contact: Carol McGowen, AAPG's Regions and Sections development manager, at 1-918-560-9403; or e-mail to cmcgowen@aapg.org. this month's column is written by the GTW Canada conveners, Ross Clark (Kallisto Energy), Michael Abrams (Apache) and Joe Curiale (Chevron).

Wanted: Posters to Add to GTW Program in Canada

By ROSS CLARK, MICHAEL ABRAMS and JOE CURIALE

Concepts and technologies developed for liquid-rich unconventional plays in North America are on the verge of being exported worldwide. An "A list" of geoscientists from Canada, Europe and the United States are joining forces with AAPG Canada Region to offer GTW Canada, Nov. 3-5 in Vancouver, B.C.

Liquid-rich unconventional petroleum systems, defined as "fine-grained rock acting as both hydrocarbon source and reservoir, or a low permeability reservoir with inter-bedded or juxtaposed organic-rich shale with liquid hydrocarbon potential," have become significant worldwide exploration targets.


CLARK


ABRAMS


CURIALE

Understanding the hydrocarbon charge system (source, maturity, hydrocarbon phase, burial history and retention) and production capabilities (rock properties, flow rates and resource potential) are critical for a liquid-rich unconventional play to be technically and economically successful.

Today, when it is particularly critical to address and improve our current understanding of these key plays, AAPG's novel GTW format of interdisciplinary presentation and discussion offers an environment to discuss, debate and share knowledge.

GTW Canada will offer 16 invited presentations divided across four oral sessions. Each oral session will be followed by discussion, with a focus on "where we are headed."

GTW Canada organizers are actively soliciting poster abstracts for the event. Poster sessions will be on display throughout the workshop, and poster presenters will be given time on the program to introduce their poster to the entire GTW audience. Poster sessions will highlight several additional aspects of the workshop theme, including commercial technologies available across the disciplines.

- The four principal workshop sessions will begin with presentations on the development of liquid-rich unconventional reservoirs, with a focus on qualifying key reservoir engineering elements of an unconventional oil play.

  Presentations will include specific data needed to rank prospects in terms of importance, early development assessment of an unconventional play and evaluating reservoir fluid properties required for low permeability oil reservoir analysis.

- A session on liquid-rich source units follows, with a focus on specific organic and inorganic characteristics of liquid-rich plays, plus source rock case studies and geochemical characteristics.

- The third session, on analytical and upcoming technologies, presents current and future analytical methods used to assist the evaluation of liquid-rich unconventional plays.

  Presentations will include an overview of current approaches, discussions of microstructure and the ongoing concerns over porosity development, and applications of organic petrography.

- The final session will focus on worldwide case studies of successful liquid-rich plays, and will include presentations focusing on specific active oil rich plays, including the Eagle Ford, Niobrara, Utica and Duvernay.

Canada's Hot Activity

Excitement and global attention continues to build around the economic potential of Canada's liquid-rich unconventional resource plays. To date more than $2.5 billion has been spent on land in and around the two play areas – one northern play area near Kaybob, the other just south of Pembina.

Among the 17 different operators that have licensed horizontal wells, Shell is most active with 17 wells, and ExxonMobil is next with 15 wells. Shell's activity appears mostly in the northern play area, but has two wells in the southern play area; ExxonMobil is only in the northern play after buying Celtic Exploration.

One of the hottest liquid-rich unconventional shale plays, the Duvernay, has seen more than 100 horizontal wells licensed since the play's inception approximately 30 months ago. As of this writing, there are more than 40 wells currently on production from the Duvernay.

Although production data is publicly available, interpreting the early production history of the wells is difficult for numerous reasons. Provincially reported liquid yields for C3+ vary from 40 bbls/mmcf to over 110 bbls/mmcf with operators reporting yields of

See **GTW Canada**, page 44

Editor's note: "Professional News Briefs" includes items about members' career moves and the honors they receive. To be included, please send information in the above format to Professional News Briefs, c/o AAPG EXPLORER, P.O. Box 979, Tulsa, Okla. 74101; or fax, 918-560-2636; or e-mail, smoore@aapg.org; or submit directly from the AAPG website, www.aapg.org/explorer/pnb_forms.cfm.

FOUNDATION UPDATE

Foundation Gifts Provide Geoscience Education Support

By NATALIE ADAMS, AAPG Foundation Manager

According to CNN Money's "Best Jobs in America," petroleum geologists rank number 73.

Why start a Foundation Update column with that kind of information?

Because the largest programs that the Foundation maintains help geology students through school – we provide grants and scholarships, we recognize outstanding educators and we enable students to participate in activities that build their knowledge, their network, their leadership skills and much more.

Petroleum geology is an amazing field; it's like a "best kept secret." And we're doing our part to help students who have chosen this career path – and enlighten those who are yet to decide.

Foundation funding means a great deal to its many grant recipients. Here's one example (addressed to the donor, Mrs. Marta Weeks-Wulf) from Andrew Hutsky, president of the University of Nebraska-Lincoln AAPG Student Chapter:

On behalf of the University of Nebraska-Lincoln AAPG Student Chapter, the officers would like to thank you for your generous contribution and support for the L. Austin Weeks Undergraduate Grant.

With this grant, we will continue to sponsor chapter activities that will help advance our student member profiles both professionally and educationally. Such events include attendance to regional petroleum geoscience job fairs, industry-related field trips, hosting future industry professionals for short courses and attending the AAPG annual conferences.

It is the ultimate goal of our organization to assist our members in obtaining a successful career in the petroleum industry, which would be rather difficult without your contribution to the L. Austin Weeks grant.

Your support of the AAPG Foundation enables us to reach farther. Consider a gift today.

* * *

The AAPG Foundation recently established a Military Veteran's Scholarship Program to provide much-needed funding to military veterans who are pursuing a college education in the geosciences.

Considerable appreciation is extended to John F. Bookout Jr. for establishing the program's first scholarship. His $50,000 gift will provide an ongoing, annual scholarship in the amount of $2,000.

To join Mr. Bookout and others, donate to the AAPG Foundation today.

* * *

This past month, the Foundation's general fund, the L. Austin Weeks Memorial Grant Fund and the James A. Hartman Student Chapter Leadership Summit Fund all received double funding because of Chevron Humankind's matching gift program.

If you haven't already, please check with your employer to see if they offer a matching fund program. It could make your gift twice as valuable.

GTW Canada
from page 42

up to 400 bbls/mmcf.

Production from a few wells, however, stands out. One, the Trilogy HZ Kaybob 3-13-60-20 (W5), is producing in excess of 800 mmcf and 70,000 barrels of liquids in about a year. Another is a recent Encana well announced April 24, 2013 with IP30 rates of 4 mmcf and 1,400 bbls per day.

With these results, the play has become one of the most exciting high-liquids-yield shale gas plays in North America.

Data interpretation is one of many challenges that GTW Canada conveners, presenters and participants alike will attempt to crack during the 2 1/2-day workshop. Registration, hotel room reservations and full program details are available at www.aapg.org/gtw/2013/vancouver.

PROFESSIONAL newsBRIEFS

Jeff Aldrich, to vice president, MHA Petroleum Consultants, Denver. Previously portfolio manager, Dart Energy International, Singapore.

John F. Allen has retired as senior staff geologist, Shell, Warrendale, Pa. Allen resides in Ringoes, N.J.

Patrick Allman-Ward, to chief executive officer, Dana Gas, Sharjah, United Arab Emirates. Previously general manager, Dana Gas Egypt, Cairo, Egypt.

Geoffrey T. Davis, to managing director, Morgan Stanley, Houston. Previously director, Barclays, Houston.

Kenneth Daniel, to senior geologist, Rosewood Resources, Dallas. Previously geologist, Encana Oil & Gas, Plano, Texas.

Peter Dorrins, to president and chief executive officer, Junex, Quebec City, Canada. Previously president and chief operating officer, Junex, Quebec City, Canada.

L.G. "Joe" Eubanks, to geologist, Newfield Exploration-onshore Gulf Coast, Houston. Previously exploration manager, Preston Exploration, The Woodlands, Texas.

Alan R. Gensamer, to consulting geologist, Newport, Va. Previously consulting geologist, Houston.

Dennis Giovannetti, to senior geoscientist, Talos Energy, Houston. Previously senior geoscientist, Dynamic Offshore Resources/SandRidge Energy, Houston.

Charles "Chip" Groat has joined Texas Rare Earth Resources Advisory Board, Sierra Blanca, Texas. Groat currently is president and chief executive officer of The Water Institute of the Gulf, Baton Rouge, La.

Tony Hayward has been awarded an honorary Doctor of Technology degree by Robert Gordon University, Aberdeen, Scotland. Hayward is the chief executive of Genel Energy, London, England.

John C. Hoffmann, to West Papua exploration team leader, Chevron Indonesia, Jakarta, Indonesia. Previously senior geophysicist, Chevron Upstream Europe, Aberdeen, Scotland.

Jay Mitchell, to director oil and gas, CSG Investments, Plano, Texas. Previously vice president-geosciences, Netherland, Sewell & Associates, Dallas.

Dwight "Clint" Moore, to vice president and corporate secretary, GulfSlope Energy, Houston. Previously vice president-corporate development, ION Geophysical, Houston.

Brian D. Nicoud, to senior petrophysicist, EXCO Resources, Dallas. Previously senior geological and petrophysical adviser, William M. Cobb Associates, Dallas.

Victor Ogunmola, to senior geoscientist, ExxonMobil, Houston. Previously principal consultant-geosciences, Landmark/Halliburton, Houston.

Robert "Bob" Phelps, to principal geologist, ATHI, Calgary, Canada. Previously senior exploration adviser, Rock Energy, Calgary, Canada.

David L. Risch has retired as staff geophysicist, BHP Billiton, Houston. He resides in Katy, Texas.

Sandy Rushworth has retired as senior geologist-new ventures, Marathon Oil. She resides in Katy, Texas.

Berry H. "Nick" Tew Jr. was awarded the E.W. Marland Award by the Interstate Oil and Gas Compact Commission (IOGCC) – its highest honor – for dedicated service as a leader and innovator in resource development and environmental protection. Tew is Alabama's State Geologist and Oil and Gas supervisor.

Steve Tobias, to global manager of exploration excellence, Hess Corp., Houston. Previously vice president, South Bay Resources, Houston.

Brad Watts, has retired as exploration manager-unconventional capture from Hess Corp., Houston. He resides in Kingwood, Texas.

YP Value
from page 40

editor of the Outcrop.

Looking back, I absolutely thank Randi for encouraging me to take on leadership roles within AAPG and other organizations such as RMAG.

Last year, Bob Suydam, past president of RMS, nominated me to start the track to become RMS president, thus bringing me to my current role as RMS secretary-treasurer.

Faber: *What is the value of being a YP in leadership?*

Cromie: Networking! Through AAPG, I have grown a global network of oil industry professionals at different stages of their careers, working different basins and different reservoirs, and with an outlook that is inherently different from my own.

Also, I think entering a leadership role in AAPG has helped me gain confidence in my own organizational abilities and communication skills in a different forum than my technical work. Since AAPG is a volunteering role, I have had to learn to manage my time efficiently to ensure my day-to-day job is not impacted by AAPG commitments.

Ball: For me, it exemplifies that YPs are a ready, capable and dedicated group that will take the reins of this organization in the next decade.

Campbell: You get volunteered to put on meetings in Vegas. Check out our joint RMS-Pacific Section Meeting in 2016!

Faber: *What can the Association gain from a "YP perspective" in leadership?*

Cromie: I hear often that AAPG struggles to attract and retain younger members while other societies, such as SPE, do not. Who better to suggest potential improvements that will attract the YP demographic than the YPs themselves?

Ball: When I was a student the AAPG invited me to a Leadership Days (LD) to understand what students "wanted." So I spent five years attending LD working to convey students' needs. As YPs, our role is different. YPs will be the membership and fill the leadership ranks over the next decade or so. Each of us brings a unique set of ideals and goals. Many of these align with those of our predecessors. A few are different. However, all should be seriously considered as we design this organization for the next 100 years.

Campbell: The Young Professionals are the future of AAPG. With the current bimodal age distribution in membership, we are bringing a new perspective on the science and technology that is the core of AAPG. By engaging young leaders, AAPG is ensuring its success as long as it is able to change and grow with the changing world around it. We are the key to making that happen.

Faber: *What advice do you have for YPs interested in leadership?*

Cromie: Start by joining a committee that interests you. Meet as many people as you can.

Ball: The bumper sticker on my truck reads, "People who say it can't be done should not interrupt those who are doing it" (G.B. Shaw). I firmly believe the only way to truly enact change is to get involved.

Campbell: I'll take my lead from Randi and pay it forward; just send me your email!

Honestly, the doors that have opened because of my leadership roles have been tremendously helpful to my career success. I have made countless lasting friendships and it really is a lot of fun.

Because answers are rarely on the surface.

Our history can be traced back more than 100 years. While some companies might use that as an excuse to rest, we use it as an inspiration to work even harder to deliver energy in a safe, environmentally and socially responsible manner.

You will:

- Play an active role in determining your career path, working in a rewarding, collaborative environment
- Maintain a positive work-life balance at a company that encourages working hard and playing hard
- Have opportunities for continuing education and professional development, supported by proactive mentorship
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Houston-area available positions include:

- ***Domestic L48 Unconventional Exploration Geoscientist***
- ***Gulf of Mexico Exploration Geologists/Geophysicists***
- ***Gulf of Mexico Operated Assets Geologist/Geophysicist***
- ***Gulf of Mexico Pore Pressure Geologist/Geophysicist***
- ***Gulf of Mexico Exploration Maturation Geologist/Geophysicist***
- ***Gulf of Mexico Operated Assets Shallow Hazards Specialist Geologist/Geophysicist***
- ***International Unconventional Exploration Geologist/Geophysicist***
- ***Development Geophysicists***
- ***Senior Processing Geophysicist***
- ***Microseismic Interpretation Geophysicist***
- ***Development Geologist***
- ***Operations Geologist – Horizontal Drilling/Unconventional Focus***
- ***Exploration Petrophysicists***
- ***Senior Research Scientist – Pore Scaling Imaging Laboratory***
- ***Rock Mechanics Subject Matter Expert***
- ***Reservoir Engineer – Subject Matter Expert, Core Lab Studies***
- ***Geomechanical/Reservoir Engineer***
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- ***Senior Carbonate Sedimentologist/Stratigrapher***

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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.

Self-Compliance Joins 'Best Practices' List

By EDITH ALLISON, GEO-DC Director

As shale gas development has boomed over the past decade and public concern about its safety has swelled, both regulatory agencies and operating companies have accelerated their efforts to improve environmental safety.

This month's column is only a small sampling of the evolution of best practices, voluntary compliance, self-certification and regulation.

One noteworthy trend is government incorporation of best practices and self-compliance techniques into government regulations.

Best practices are not new. In fact, the American Petroleum Institute (API) has been developing standards for safe and efficient oil and natural gas operations since 1924 – and their standards cover hundreds of upstream to downstream technologies and procedures.

* * *

Two state-based organizations are leading the effort to improve the environmental safety of oil and gas development through voluntary disclosure of hydraulic fracturing fluid chemicals, using **FracFocus**, and a new initiative to improve state regulation, **States First**.

They are:

▸ The Interstate Oil and Gas Compact Commission (IOGCC), an association of the governors of oil producing states, chartered in 1935 to regulate the oil and natural gas industry.


ALLISON

▸ The Ground Water Protection Council (GWPC), an association of state ground water regulatory agencies, was chartered in 1983 to ensure use of best practices and fair but effective ground water protection laws.

FracFocus, a joint effort of the IOGCC and GWPC, provides the public access to reported chemicals used for hydraulic fracturing, and provides objective information on hydraulic fracturing, the chemicals used and the means by which groundwater is protected.

The FracFocus website, launched in 2011, includes over 50,000 registered well sites.

Twelve states now use FracFocus as a means of official state chemical disclosure, and seven other states are in the process of rulemaking to adopt the site – thus, best practices become regulations.

The first phase of the IOGCC **States First** initiative will focus on increasing state oil and gas regulatory coordination, including:

✓ Establishing underground injection control guidelines.

✓ Developing state inspector certification classes.

✓ Expanding the Risk Based Data Management System (RBDMS).

RBDMS is used by 23 oil and gas regulatory programs, for managing and analyzing oil and gas program data, and water resources management. The web-based system provides information about well locations, permitting and production to industry owners and the public.

Under the States First initiative, RBDMS will be integrated with FracFocus.

* * *

In the area of self-certification, the **Center for Sustainable Shale Development** is developing a voluntary system for third-party certification of compliance with rigorous performance standards.

The Center is a collaboration of environmental organizations, philanthropic organizations and energy companies in the Appalachian basin. Initially the organization has established 15 performance standards in the areas of air emissions and groundwater protection.

The procedures for third party auditing are being developed.

* * *

Natural Gas STAR is another voluntary program in which companies that commit to adopt proven, cost-effective technologies that reduce methane emissions are recognized by the Environmental Protection Agency (EPA).

Recommended technologies cover all sectors of the industry, from exploration and production through gathering, processing, transmissions and distribution of natural gas.

One technology, reduced-emissions completions, or green-completions, captures oil and natural gas that is co-produced with the fluids flowing back after hydraulic fracturing, significantly reducing gas flaring.

This technology is cost-effective in many reservoirs, but is complex and evidently expensive to implement in low-pressure reservoirs.

* * *

Reduced-emissions completions are another example of a voluntary activity that is now required by regulation – Wyoming and Colorado already require green completions, and the EPA issued air regulations in 2012 that require reduced-emissions completion by 2015.

As evidence of the growing trend for best practices to be adopted as regulations, API reports that 200 of its standards are cited in state regulations and 100 are cited in federal regulations.

The Bureau of Land Management's (BLM) plan to regulate hydraulic fracturing on federal lands is an example of the influence of industry best practices

See **Policy Watch**, page 50

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The Geophysical Corner is a regular column in the EXPLORER, edited by Satinder Chopra, chief geophysicist for Arcis Seismic Solutions, Calgary, Canada, and a past AAPG-SEG Joint Distinguished Lecturer. This month's column deals with reduction in seismic bin size for superior definition of geologic features.

Let's Get Small: Benefits of Reduced Bin Size

By SATINDER CHOPRA and KURT J. MARFURT

Ideally, seismic data should be acquired at high spatial and temporal sampling, so that the small subsurface features of interest can be clearly seen on the seismic display.

Such interpretation is easiest when the geological features of interest are uniformly illuminated, which in turn is possible by recording the scattered seismic wavefield on a uniform surface grid. The "nominal grid" is defined by the source-to-source spacing within a shot line and the geophone-group-to-geophone-group spacing within a receiver line.

One also can increase the trace density by reducing the spacing between shot lines and between receiver lines.

CHOPRA

Once acquired, data processing workflows are designed to retain the highest possible lateral and vertical resolution of the geologic target. Because of the different ray paths, dense acquisition (closer source and receiver lines) provides greater leverage against backscattered ground roll and interbed multiples, as well as decreased migration artifacts.

MARFURT

Uniform acquisition results in increased lateral continuity of amplitudes that otherwise may be contaminated by acquisition footprint.

* * *

In reality, economic, permitting and physical access constraints result in 3-D seismic data that are not uniformly sampled in all directions.

Vibrators require access along roads or open country, while geophones easily can be placed in forest or cultivated farmland. For this reason, "shot lines" may be more coarsely spaced than "receiver lines," resulting in rectangular rather than square bins. Obstacles such as ponds, road, buildings and archaeological sites give rise to holes in an otherwise uniform acquisition grid.

Such non-uniformity in offsets and azimuths introduce additional artifacts in the final image. This non-uniformity also affects the performance of the processing algorithms – and so could lead to sub-optimally processed data, affecting subsequent data interpretation.

In principal, any processing algorithm can be modified to handle sparse data. In practice, it is much easier to write an accurate 5-D interpolation algorithm, and thereby precondition the seismic data such that well-calibrated (and perhaps more complicated) algorithms such as prestack migration and prestack inversion work well.

* * *

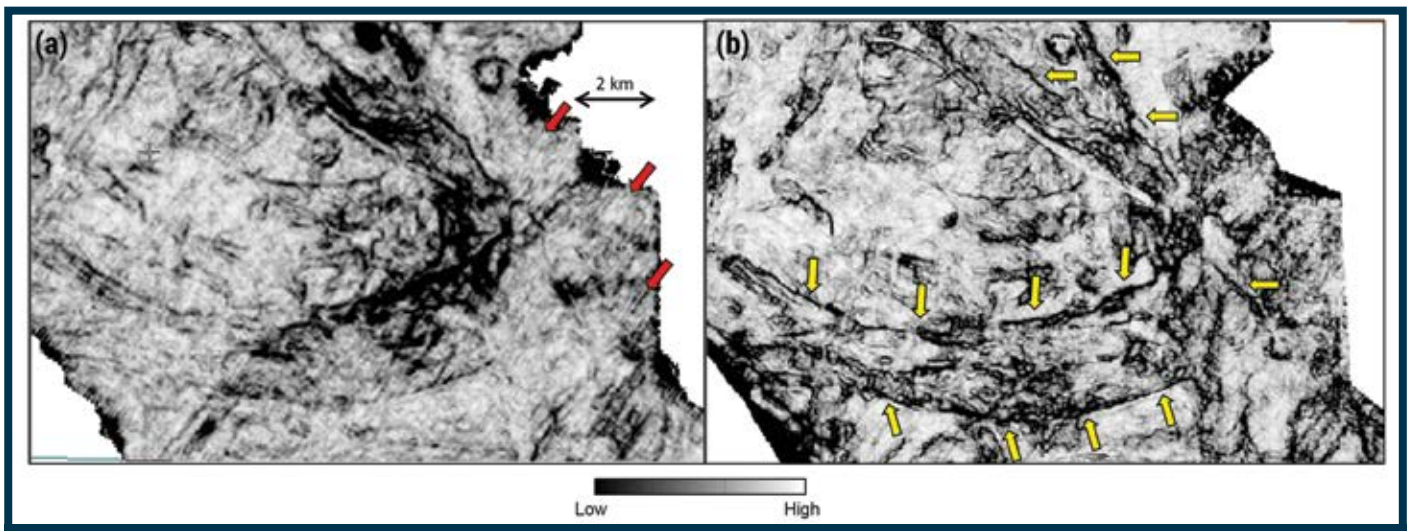

Figure 1 – Stratal slices through coherence volumes close to a shallow marker horizon at t=600 ms generated from 5-D interpolated data at (a) nominal 20 m by 20 m and (b) finer 10 m by 10 m bin size. Red arrows indicate a pervasive footprint. Yellow arrows indicate features at higher resolution.

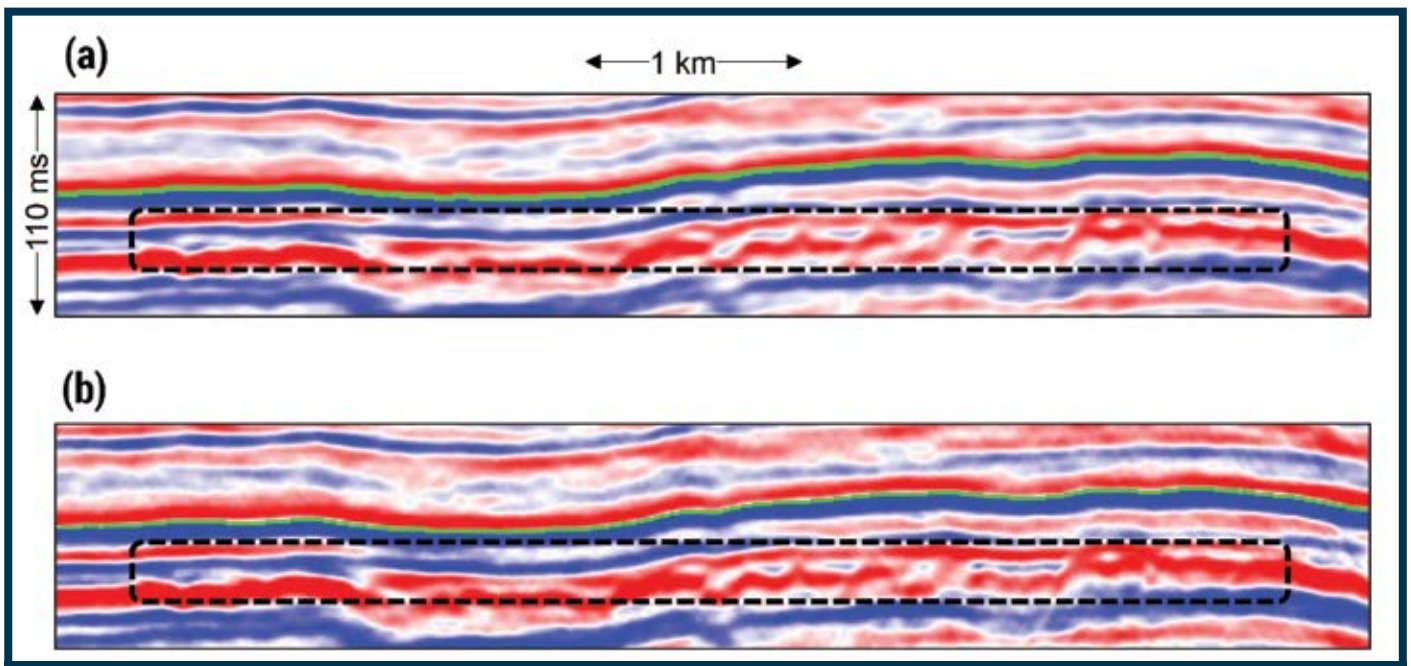

Figure 2 – Vertical slice corresponding to the blue dotted line shown in figure 3 through seismic amplitude volumes generated using 5-D interpolation generated from 5-D interpolated data at (a) nominal 20 m by 20 m and (b) finer 10 m by 10 m bin size. Black box indicates channels delineated by coherence in figure 3.

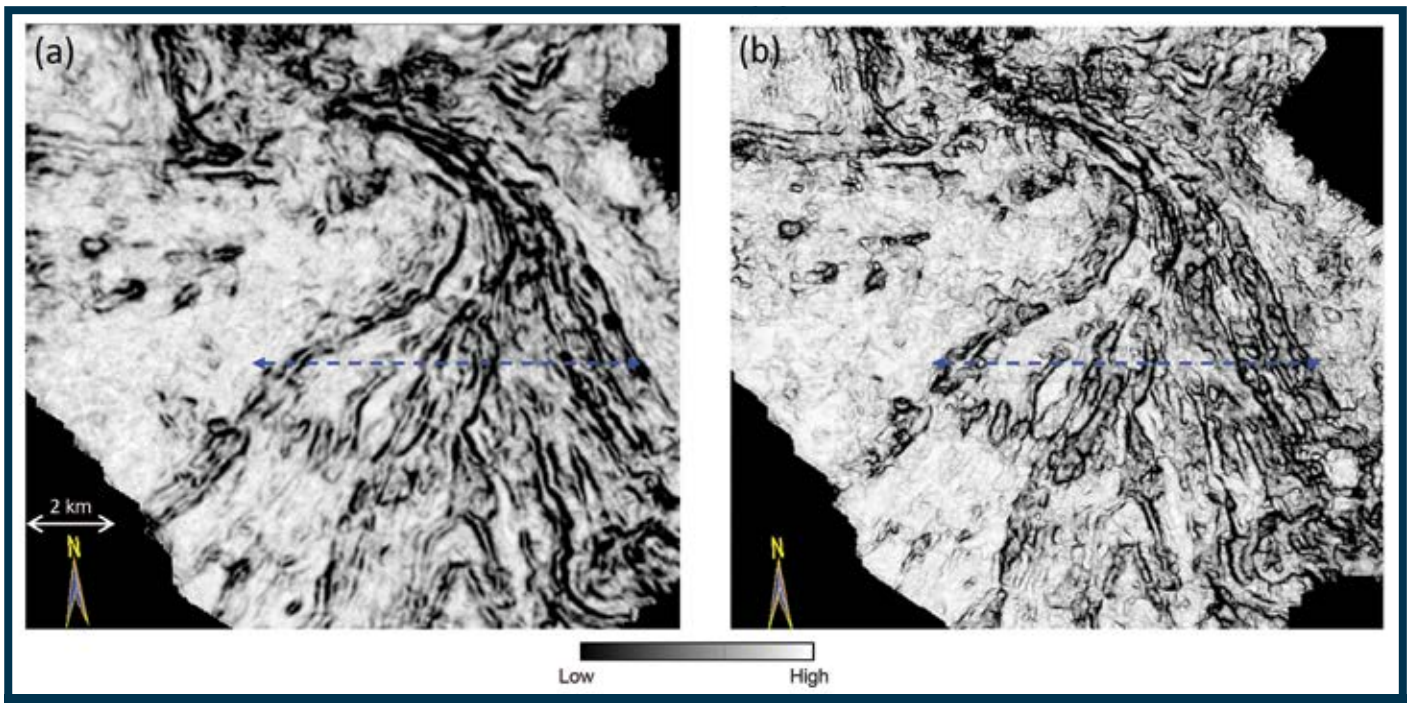

Figure 3 – Phantom horizon slices 20 ms below the green horizon shown in figure 2 through coherence volumes generated from 5-D interpolated data at (a) nominal 20 m by 20 m and (b) finer 10 m by 10 m bin size. Blue line corresponds to vertical slice shown in figure 2. Notice the crisp definition of the limbs of the distributary channel system.

While there is no substitute for acquiring good quality seismic data that has the above-mentioned qualities, it is possible to mimic or address some of the problems that crop up due to the sub-optimum parameterization used in the acquisition, during processing of the data.

In the June 2013 EXPLORER, we described the advantages of regularizing the offsets and azimuths of the input seismic data during processing by way of 5-D interpolation, which then aids the computation of seismic attributes.

Regularization of seismic data has proven to be a successful method – not only for superior imaging of post-stack data but for prestack analysis as well, such as AVO (amplitude versus offset) or AVAz (amplitude versus azimuth). The advantages accrue from the enhanced spatial and azimuthal sampling of the 3-D seismic data.

See **Geophysical Corner**, page 50

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Policy Watch
from page 46

on regulation. In fact, BLM praised the sophisticated and effective oversight of state regulators and sought consistency with API standards.

The initial (2012) draft of BLM's proposed hydraulic fracturing rules included a requirement to submit a cement bond log before hydraulic fracturing, and required publication of hydraulic-fracturing fluid chemistry.

After thousands of comments were submitted, BLM revised its proposed rules to ones that more closely mirror – industry would say needlessly duplicate – industry best practices.

The revised draft rules allow an expanded set of cement evaluation tools for demonstrating well bore integrity for "type wells," or wells that exemplify many wells in an area. Other wells would be subject to monitoring of cementing operations.

The revised rules are generally consistent with the API technical report on "Cement Sheath Evaluation," which observes that a cement bond log is only one of several evaluation tools that should be used in connection with other well and cement data to evaluate zonal isolation.

In addition, the BLM draft rules also would use FracFocus, the industry standard for disclosure of chemicals used in hydraulic fracturing.

* * *

But this is not the end of the story. The comment period for the proposed rules ended Aug. 25, and BLM has reported that it received over one million comments, enough to require months of analysis and probably lead to additional modifications in the draft rule.

It should be noted that government adoption of some industry best practices does not address industry concerns about some other regulations that complicate or conflict with industry best practices.

The major industry and state complaint is the imposition of an additional layer of federal regulations on top of state regulations.

API commented that the BLM "… proposed rule on hydraulic fracturing would impose an added regulatory layer that would be costly and provide little or no environmental or safety benefit." EE

Geophysical Corner
from page 48

After doing the trace edits, amplitude recovery, refraction statics, preliminary velocity analysis and trim statics, one can run 5-D interpolation to "regularize" the data to have a uniform coverage of offsets and azimuths, thereby conditioning them for more detailed velocity analysis, noise rejection, prestack time migration and prestack impedance inversion.

In our June 2013 article we showed how such 5-D interpolation reduced artifacts in amplitude as well as in coherence and curvature attributes, but somewhat reduced the lateral resolution.

* * *

In this article we demonstrate the results of reducing the bin size of the seismic data as part of the 5-D interpolation process.

The source and receiver spacings are both 40 meters, giving rise to a nominal bin size of 20 meters by 20 meters. The primary use of 5-D interpolation is to fill in missing shots, receivers, offsets and azimuths corresponding to the nominal grid.

However, there is nothing preventing us in postulating a denser 10-meter by 10-meter grid and interpolating the corresponding unmigrated surface data. This smaller bin size is the interpolated equivalent of a (four times) more densely acquired survey.

We then use the same processing and prestack migration procedure applied to the interpolated data on the 20-meter by 20-meter grid.

The results we show are from a land seismic data volume from western Canada. We used 5-D interpolation to build missing traces for both 20 by 20 and 10 by 10 bin sizes.

▸ In figure 1 we show a comparison of coherence horizon slices generated from data with 5-D interpolation at the nominal 20-meter by 20-meter bin size and at the "dense survey" 10-meter by 10-meter bin size.

Notice the enhanced resolution of the faults and the suppression of the NE-SW trending acquisition footprint.

▸ A comparison of the seismic amplitude data before and after bin size reduction is shown in figure 2.

In the dashed box we notice somewhat clearer seismic signatures corresponding to the channel features that can be seen on the coherence phantom horizon slices comparison shown in figures 3.

Although the distributary channel system seen on the coherence slices is well imaged at the nominal grid size, the interpolated surface data provide much sharper individual channel limbs. Such enhanced quality imaging of data in terms of suitable seismic attributes helps squeeze out more information from the seismic data – and contributes in a generous way to the overall interpretation of the data as well.

* * *

We thank Arcis Seismic Solutions and TGS for encouraging this work and for permission to present these results. EE

(Editor's note: AAPG member Kurt J. Marfurt is with the University of Oklahoma, Norman, Okla.)

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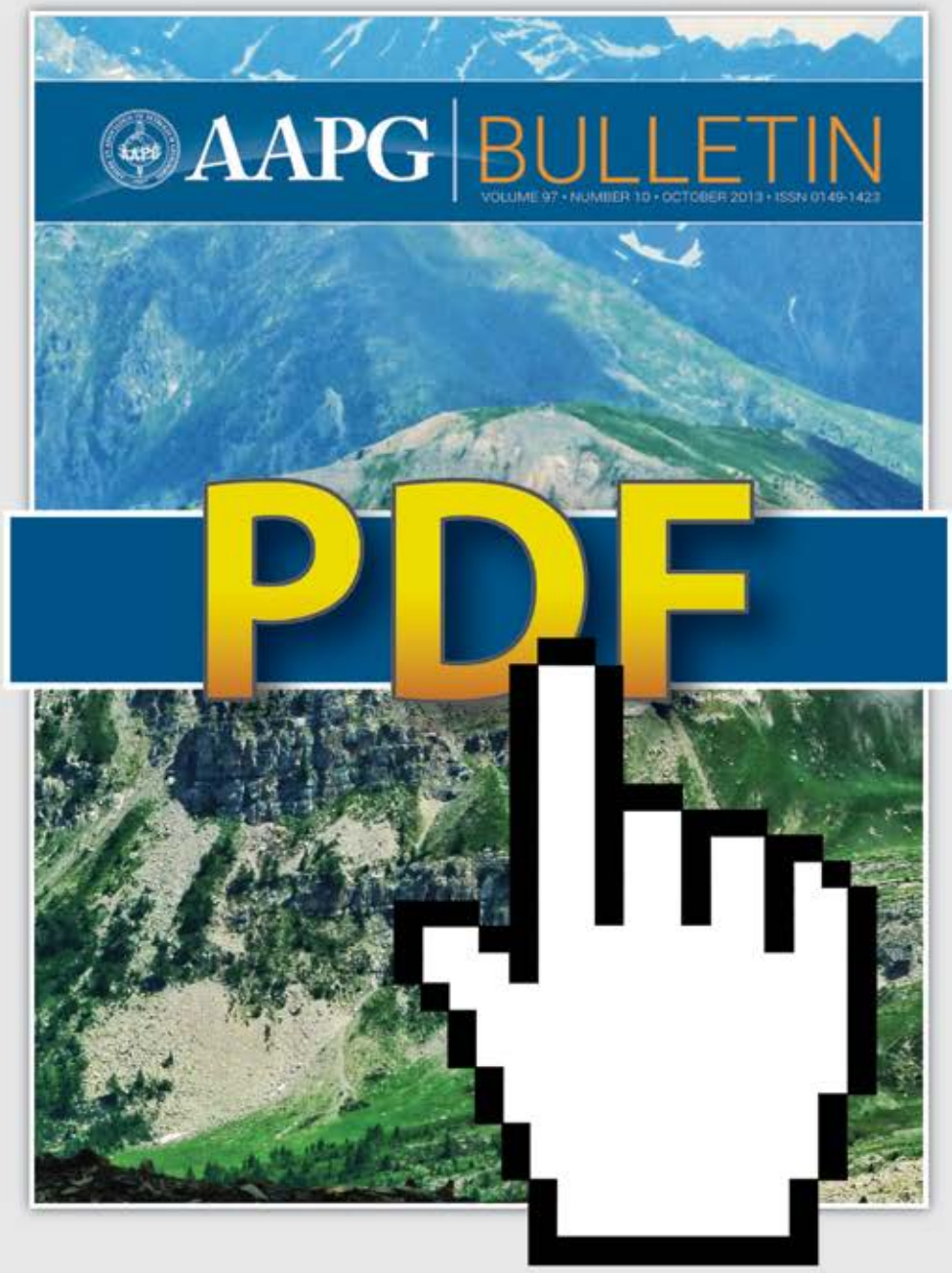
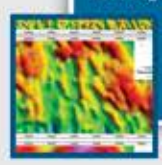


AN INTERPRETATION OF GEOLOGICAL STRUCTURE

E&P Note

Peter Kovac, Sharon Lowe, Tony Rudge, Carlos Cevallos, Jurriaan Feijth, and Lynsey Brett

This study provides an integrated three-dimensional geological interpretation of sedimentary basin infill and basement architecture at King Sound Canning Basin, western Australia. Three principal lithologic units in the basin infill have been identified based on their gravity response and two-dimensional forward modeling.



CALCICLASTIC SLOPE FANS

Hui Rong, Yangquan Jiao, Liqun Wu, Rui Wang, Yuan Gu, and Xiaomei Wang

The purpose of this study is to improve the understanding of the calciclastic slope fans of the Lianglitage Formation of the Bachu area in the western Tarim Basin in order to interpret the fine architecture, spatial arrangement, and depositional process in these deposits.

THE GULF OF MEXICO

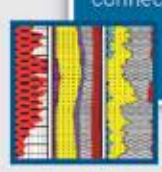
Michael R. Hudec, Tim P. Dooley, Martin P. A. Jackson, Ian O. Norton, and Frank J. Peel

A trio of papers study the Gulf of Mexico. Topics include a new hypothesis for the Jurassic plate-tectonic evolution; the influence of basement structure and rift-related salt distribution; and the impact of Cenozoic uplift and exhumation

TURBIDITE MAGNITUDE AND FREQUENCY

Jesús Ochoa, Jeannette Wolak, and Michael H. Gardner

Distinguishing between pelagites and hemipelagites has implications for the determination of turbidite magnitude and frequency. This distinction affects vertical connectivity and continuity of sand deposited from turbidity currents and provides a better understanding of mudrock reservoir architecture.



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Members Get Access to New Insurance Exchange

By MICHAEL STRUNK

The Executive Committee has approved GeoCare Benefits' new AAPG members' Private Medical Insurance Exchange, a private health insurance exchange or marketplace for members and employees of members.

This online resource will help members shop for medical insurance from multiple insurance companies, allowing members to compare available medical plan options based on price, benefits and services.

The plans offered on the AAPG Members' Private Medical Insurance Exchange will be exchange-certified qualified health plans available in your state, and provide the essential health benefits, limit cost sharing and much more as required by the Patient Protection and Affordable Care Act (PPACA).

These plans have been carefully chosen, so members can purchase coverage with confidence.

Selection of the exchange/marketplace itself also was an important element. Rather than just leave members to their own devices and the intricacies of their state or federal insurance exchanges, the AAPG Committee on Group Insurance directed AAPG's insurance broker to search for a private exchange where members would receive the quality service from highly qualified advisers.

The public exchange/marketplaces becoming available from some states and the federal government most likely will be staffed by guides or navigators with little or no experience. For example, according to the Aug. 3, 2013, edition of the New York Times article titled "Colorado Pushes for Uninsured to Enroll," Colorado will train 400 new guides to help individuals find their way through and enroll in the new state exchange/marketplace.


STRUNK

> **The new coverage will be issued on a guaranteed basis without exclusions for pre-existing conditions.**

Diametrically opposite, the Members' Private Medical Insurance Exchange available through AAPG's GeoCare Benefits is staffed by licensed and highly experienced agents who are experts in the medical insurance field.

AAPG members and their employees, if under age 65 on Jan. 1, 2014, will be able to enroll for new major medical insurance under individual policies during the open enrollment period beginning Oct. 1, 2013, and ending March 31, 2014.

Applications received by Dec. 15 will provide coverage with a Jan. 1, 2014 effective date, while applications received after Dec. 15 will have an effective date of the first or second month following enrollment.

The new coverage will be issued on a guaranteed basis without exclusions for pre-existing conditions.

Members and their employees may also use the exchange now to shop for coverage to become effective prior to Jan. 1. However, the plans available prior to the open enrollment are of different designs and are fully medically underwritten, meaning the insurance companies can exclude coverage for pre-existing conditions or exclude coverage altogether.

Members with individual health insurance policies, not part of the GeoCare plans can use the marketplace to explore options and enroll in a new plan. Members can discover if they can get lower premiums and reduce their out-of-pocket expenses.

All marketplace plans offer minimum essential benefits.

Important Dates

Members who are or will be 65 prior to Jan. 1, 2014, need to purchase a Medicare Supplement Plan endorsed by AAPG. Enrollment for the Medical Supplement Plans can be done by mail, on-line or even by telephone while your questions are being answered. Find the available plans on www.geocarebenefits.com, or call 800-247-1771 and speak with an enrolling agent. It is surprisingly easy.

Members who have left or are leaving a job and are insured under COBRA are usually required to pay the entire premium plus a small administrative fee themselves without employer subsidization. Beginning in 2014, members may change from COBRA to one of the plans available through the Members' Private Medical Insurance Exchange at any time.

Loss of COBRA coverage qualifies members to purchase medical insurance even if it's not during open enrollment. This is true whether the coverage runs out or the member chooses to end it.

Three important key dates to remember are:

- Oct. 1, 2013 – Open enrollment begins. Members can compare and select from plans available in their state from the Members' Private Medical Insurance Exchange. They will be able to choose a plan that fits their needs and budget.

- Jan. 1, 2014 – If members enroll in a plan through the Members' Private Medical Insurance Exchange anytime between Oct. 1 and Dec. 15, and make

Continued on next page

IN MEMORY

AAPG Honorary member and award-winning geologist **David G. Roberts** died July 5. He was 70.

Roberts, who spent much of his career at BP, was considered a world-class explorer and a recognized expert in marine geology, tectonophysics and petroleum geology.

He was active in several AAPG initiatives, serving as president of the AAPG Europe Region and as an important member of the AAPG International Regions Committee.

He received AAPG honorary membership in 2001. He also received an AAPG Certificate of Merit, Special Commendation Award, Robert H. Dott Sr. Memorial Award and, in 2006, the AAPG Distinguished Service Award.

* * *

AAPG award-winning educator **Eugene Fritsche** died July 7. He was 76.

Fritsche was a longtime professor at California State University, Northridge, twice serving as chair of the school's department of geological sciences.

He received the AAPG Grover E. Murray Memorial Distinguished Educator Award in 2007.

* * *

Walter Edwin Baker, 89
Perrysburg, Ohio, July 22, 2013
Stewart Jopling Carlson, 84
Calgary, Canada, July 2, 2013
R. Jan Cook, 79
Houston, May 29, 2013
Marvin E. Doss, 80
Littleton, Colo., May 21, 2013
Raymond John Forbish, 78
Spring, Texas, Aug. 1, 2013
A. Eugene Fritsche, 76
Winnetka, Calif., July 7, 2013
J.M. Frost III, 98
Houston, June 20, 2013
Cesar Fernandez Garrasino, 75
Quilmes, Argentina, Dec. 15, 2012


ROBERTS


FRITSCHE

Robert William Hickman, 85
Rancho Mirage, Calif., Aug. 2, 2013
Howard Albert Kepple, 83
Lebanon, Mo., Nov. 26, 2012
Carl Patterson Lathan Jr., 90
Grand Junction, Colo.
March 21, 2013
Robert Irving Levorsen, 90
Novato, Calif., Nov. 17, 2013
Thurman Ralph McClellan, 77
Benton, La., July 2, 2013
Lawrence C. Menconi, 77
Metairie, La., Nov. 28, 2012
Millis Henry Oakes, 84
Canyon Lake, Texas, Dec. 1, 2012
Sidney A. Parkans, 91
Overland Park, Kan., June 23, 2013
Craig Jonathan Peck, 53
Edmond, Okla., May 2, 2013
Richard Blake Powers, 89
Evergreen, Colo., July 16, 2013
*** David G. Roberts**, 70
Combloux, France, July 5, 2013
Tatum Michael Sheffield, 56
Missouri City, Texas, Aug. 2, 2013
John Henry Skinner, 86
Shreveport, La., Sept. 18, 2010
James L. "Jim" Smith, 86
Houston, June 19, 2013
David Tronvig Threinen, 78
Beloit, Wisc., June 20, 2013
Richard Alvin Upton, 84
Baton Rouge, La., July 28, 2013
Miguel Valenzuela-Samper, 87
Denver, July 13, 2013
Adam Bennett Whitman Jr., 86
Missouri City, Texas
March 23, 2013
James Allen Wood, 72
Delta, Colo., July 17, 2013
Phillip L. Work, 79
Spring, Texas, June 3, 2013
John Henry Wright Jr., 87
Gulfport, Miss., Nov. 16, 2012

(Editor's note: "In Memory" listings are based on information received from the AAPG membership department. An asterisk denotes an Honorary member.)

Continued from previous page

their first premium payment, their new health coverage starts.

▸ March 31, 2014 – Open enrollment for 2014 health insurance coverage closes on March 31. After March 31, new health insurance for 2014 will be available only if the member has a qualifying life event.

Examples of qualifying life events are moving to a new state, change of job, loss of prior coverage and changes in your family status (marriage, divorce, having a baby or becoming pregnant).

For more information about the plans now available through the Members' Private Medical Insurance Exchange now, please check AAPG's Insurance Program website at www.geocarebenefits.com, or call the Exchange at 877-739-7845.

Information on the new plans and rates for coverage on or after Jan. 1, 2014, will not be available until mid-September. In the meantime, those questions should be directed to our insurance broker, Creekmore Livingston.

Please call 866-335-0990, and talk with Michael Strunk, Melissa Hughes or Ginny Thaemert.

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.

Venezuela's Onado-51:

Wellsite Geologist Puts His Job – and Chin! – On the Line

By ORLANDO MÉNDEZ

Exploration geologists are scientists and dreamers, observers and analysts. Our minds wander in the dark, underground worlds of ancient and deeply buried rocks where, in slow motion, sediments were broken, bent and twisted to form traps for oil and gas.

Even though we may be unsure where these traps are hidden, we've been tasked with finding them – but knowledge of earth science is not sufficient to find them. We also need experience, judgment, a certain philosophy and intuition.

We are used to taking professional risks – and sometimes we may have to take more personal ones.

The Onado Area in the Eastern Venezuela State of Monagas.

The Concession and the Well

The Onado-50 Block lies 30 kilometers northeast of the Aguasay Field in the Maturin Sub-basin in Venezuela's Eastern Basin. In 1971 the concession block was held 50/50 by Mobil Oil Company de Venezuela, the operator, and Texaco de Venezuela.

That year the concessionaires decided to drill the block's first well – a wildcat that at a planned total depth of 14,500 feet would be Mobil's deepest in the country.

The site had been selected on rather poor seismic that showed a possible, interesting reflector at depth, interpreted as the acoustic boundary between the massive sands of the Oligocene Merecure Formation and the overlying, much shalier Miocene Oficina Formation.

The nearest wells were tens of kilometers away.

That seismic and those distant wells were the information available to predict the geological section to be encountered in the new well – nothing unusual for an exploration well in a new area.

The main objective was the "U" sand of the Merecure Formation; the Basal Sands of the Oficina Formation were the secondary objective.

Drilling took place between June and September of 1971.

At that time I was Mobil's only geologist at its eastern Venezuela office in the town of Anaco, and thus I found myself appointed wellsite geologist for wildcat well Onado-51. Three well-checkers, with whom I had worked before and I trusted, would assist me – Victor Arias, "Pachico" Figuera and Ramon Azocar.

Orlando Méndez is a geology professor at Universidad Central de Venezuela. He was an exploration and development geologist for Mobil Oil de Venezuela (1965-76); PDVSA LLanoven S.A. (1976-78); PDVSA Lagoven S.A. (1978-85); and PDVSA Public Affairs (1985-98).

A Dry Hole?

We drilled for three months essentially without problems, except for the usual minor ones plus the occasional sticking

Continued on next page

Méndez (left) and well-checkers by his Onado trailer.

Continued from previous page

of the drill pipe in the thick shales of the Freites Formation.

I did the mud logging in the field lab, looked at the forams and kept the customary geological penetration graphs – and whenever there was no drilling, such as when the drill bit had to be changed, I would relax by drawing or playing the guitar, an instrument I had always kept close by.

By mid-July 1971 we had reached the planned total depth of 14,500 feet. We had drilled through the Mesa, Las Piedras, Freites-La Pica and Oficina formations; their lithologies and thicknesses we encountered were not the typical ones of the Eastern Venezuela Basin.

We had found a very shaly Oficina Formation and the few sands that were encountered bore no oil. And we had not found the Merecure Formation, our primary objective.

The Mobil and Texaco exploration departments in Caracas met and discussed the situation. According to the seismic interpretation the Oficina-Merecure contact should have been found at a depth of 14,000 feet, well above the depth we had reached by then.

What had happened to the shallow marine to deltaic Merecure sands? Had they not been deposited here?

Were we dealing with a shalier facies in the deeper part of the basin?

Abandon the Well!

The well cost had been more than planned, and Texaco, which paid for half the costs, didn't want to invest more money in what they had decided was a dry hole. Both companies agreed on abandonment.

Meanwhile at Onado – unaware of the decision taken in Caracas, and for the umpteenth time – I looked at all my information: the stratigraphic column made with ditch cuttings, the list of microfossils, the drilling time log, the seismic sections, the electric logs and my basinwide stratigraphic sections.

Once more, in my mind, the data I had confirmed my suspicion: We had *not* reached the Merecure Formation.

Why not? Very likely because the basement was deeper than envisaged and the rock units in Onado were thicker than elsewhere in the basin.

I was reminded of a quote I had read in Ellen Sue Blakey's book, "Oil on Their Shoes:"

"If you see a man walking down the street with oil on his shoes, where it shouldn't be, and no oil on his hair, where it should, that's an oil man. If he has a faraway look in his eye and seems to be contemplating the depth of the first Jurassic sandstone in Persia, that's a geologist."

At that moment I felt that I had oil on my shoes, and that I was contemplating the first sands of the Oligocene Merecure Formation. I felt sure that the Merecure was there, close by; we just had to drill more.

Shortly thereafter the toolpusher walked into my trailer and told me that he had been ordered to abandon the well. I immediately called exploration in Caracas on the radio, emphatically disagreed with that decision and explained why.

Another Five Hundred Feet!

I don't remember how, but I won the first round and Mobil's management decided to postpone abandonment and circulate the mud.

Texaco in Caracas considered this ill-advised and sent Jose Ortega, one of

See **Onado**, next page

The author as artist: Mobil managers M.C. Parsons and Foster Smith at the time of the Onado well.

Onado
from previous page

their best geologists, to look at my data. Ortega left convinced but he was unable to convince his bosses. I insisted with my stand, "We have to continue!"

Mobil and Texaco disagreed. What? Spend another million dollars? Why should we trust a young geologist with only six years experience?

M.C. Parsons, Mobil's exploration manager in Venezuela, ordered his deputy, Foster Smith, to go urgently to Anaco. As soon as he landed I showed him and Mobil's Anaco manager my data and explained why I was pushing for further drilling. They agreed and accepted my recommendation. I had won the second round!

While all this was going on, the rig continued on standby, circulating the mud and, of course, spending money.

At noon Smith boarded the company's DC-3 and returned to Caracas. In the afternoon he talked it over with Parsons and convinced him the company should accept my recommendation.

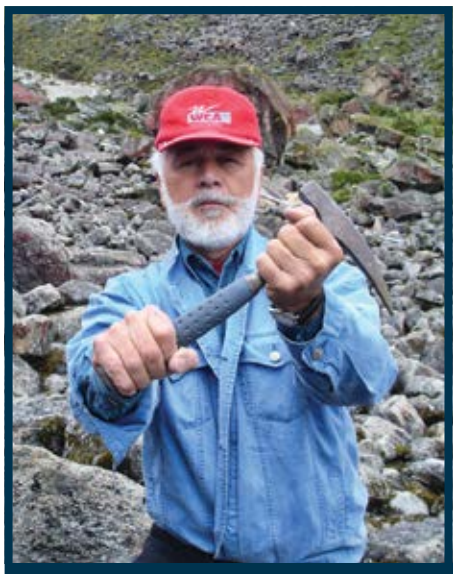
Taking a Risk

Later that same afternoon Parsons phoned me from Caracas and, without much greeting, told me, "You convinced Foster and Foster convinced me."

He then asked, "Are you prepared to put your job on the line? You realize that if we fail, you will have cost the company a great deal of money."

I swallowed hard and answered, "Yes!"

He then replied, "Go ahead! I'll take care of Texaco," and hung up.



Méndez nowadays, still a pick-in-hand geologist.

A few minutes later the Anaco manager told me that Caracas had decided to continue drilling and ordered me back to the well. I went by my house, explained to my wife, Luisa, what had happened and that I was risking my job now, but that I felt I had to do it, kissed her and my young son and got ready to leave.

Just before driving off I told her, "I will make a promise. I'll let my beard grow, and if we find oil, I'll never shave it off."

That night I returned to Onado, a distance of 140 kilometers from Anaco, and when I arrived at the wellsite I heard the unmistakable engine hum that confirmed that we were once again drilling – drilling slowly, about five to ten feet an hour, but drilling.

I decided to catch ditch cuttings every foot instead of the usual every five feet, and hour after hour sat glued to the microscope and the fluoroscope. My guitar stayed discreetly silent.

We drilled on and kept finding shale, shale and more shale! Every now and then a few sand stringers. Good, porous sand but invariably without oil shows.

I could only wonder whether I had been reckless in risking my job and my career.

Finally!

Gradually we approached the agreed-upon extended depth of 15,000 feet finding more shale and just a few sand stringers, all water-bearing. My morning "no shows" radio reports to the Caracas head office were like buckets of cold water for Mobil and Texaco and optimism kept sinking as we drilled on.

✓ 14,650 feet: no sands, no shows.
✓ 14,700 feet: no sands, no shows.
✓ 14,750 feet: shale and more shale.

A beard started to darken my face, a beard that I didn't want to have to shave away soon. I could feel the disappointment and tension – not only that of my bosses both in Anaco and Caracas, but also among the drilling crew with which I shared my days. I'm sure that more than one thought, "We shouldn't have listened to the wellsite geologist!"

Suddenly, in the early morning of the fifth day, while drilling at 14,850 feet, things turned around completely.

At 3:30 a.m., Victor Arias came to my trailer shouting, "Orlando, Orlando! We have oil!"

His trembling hands stained mine as he handed me oil-bearing sand that he had brought from the shale shaker. I looked at it and there was no question: It was sand with shiny, dark oil! What a beautiful sight!

Victor and I ran to the shale-shaker and the happy drilling crew surrounded us, shouting, jumping and hugging each other.

Dawn never seemed further away than on that morning as I counted the passing minutes. After what seemed like a century the clock struck six, the time to submit my morning radio report:

"Caracas, this is Onado 51. Over."

"OK, Onado 51, come in. Over."

"Caracas, this is Orlando Méndez reporting from discovery well Onado 51."

I don't remember what else I said, but I know that at the other end they were jumping with joy!

Three hours later the excited Anaco managers arrived at the well. There were many calls to Caracas. We had drilled only 30 feet into the oil-bearing section and, of course, management authorized us to keep on drilling.

A few days later we had gone through the Merecure Formation and then stopped at a total depth of 15,383 feet. The well was logged and completed. On tests it flowed 500 b/d of 26-degree gravity oil, and on Sept. 4, 1971, it was officially completed as a producer.

Aftermath

Fourteen appraisal and development wells were drilled in the months and years ahead and the total oil reserves were calculated to be 100 million barrels.

Forty-two years later I still have my beard and the Onado Field is still producing – but time has taken its toll and we've both aged: My beard is now gray and the wells are on pumps.

Letters to the editor should include your name and address and should be mailed to Readers' Forum, c/o AAPG EXPLORER, P.O. Box 979, Tulsa, Okla. 74101, or fax (918) 560-2636; or e-mail to forum@aapg.org. Letters may be edited or held due to space restrictions.

READERS' FORUM

Groningen Gas

I read with great interest AAPG Sidney Powers Award winner Ken Glennie's article on the Groningen gas field in the September EXPLORER, but was surprised that he attributes the origin of the term "Turbidite" to Arnold Bouma (another Sidney Powers winner).

Granted, Arnold made major and seminal contributions to turbidite studies, but the term originally was proposed by Phillip H. Kuenen (Arnold's Ph.D. adviser) in 1957. I recall that as a graduate student in the late 1950s, we discussed, mapped and read about turbidites before my contemporaries and I heard of, or met, Arnold Bouma.

Here's the critical reference:

Kuenen, P.H., 1957, Review of marine sand-transporting mechanisms: Journal of the Alberta Society of Petroleum Geologists, v. 5/4, p. 59, 62.

It also was cited in Search and Discovery Article number 30214.

George Devries Klein
Katy, TX

Other Reasons

"The article "Eppo Oomkens and the Discovery of Groningen Gas" in the September EXPLORER "Historical Highlights" column would seem to give an uniformed reader the impression that a desert facies of the Permian Rotliegend Formation is essential if not critical for the presence of the 100 TCF gas field of Groningen, Netherlands.

The fact is that Groningen is located on the most positive regional gravity anomaly, as an indication of a prominent regional structural high at deep levels.

Another large positive gravity anomaly in the region is the site of the large Permian Zechstein Formation carbonate gas play in northwest Germany.

A third positive gravity high underlies the city complex of Hamburg and may be difficult to explore.

In other words, regional structural highs as expressed by regional gravity data show the power of these regional structural high anomalies as center areas for gas migration and entrapment from underlying Carboniferous source rocks in surrounding basinal lows.

Permian sands and carbonates are just local reservoirs. Regional structural exploration is essential to define major exploration targets early in an exploration cycle in any basin-structural high setting.

Johann-Christian Pratsch
Houston

Models: Garbage In, Garbage Out

Some years ago I worked with a talented geomodeler who began every presentation he made with a slide saying "all models are wrong but some are useful." It was his way of telling the audience that making a 3-D geomodel is fraught with challenges, limitations and includes a lot of subjective interpretation on the part of the modeler.

Even with the best modelers, the model will always be just a best-case representation of the area it is trying to describe and visualize – it will always have some degree of inaccuracy.

In my 30-plus years in the oil business I have seen geologists and managers rely more and more on these models and less and less on basic, sound geological interpretation. The tests of "geological reasonableness" often are not applied, so when the static geomodel is upscaled and used as input to a dynamic model – which then has to be "tweaked" using various often ill-defined factors and multipliers in order for it to make sense – the end result is often highly unsatisfactory.

This dynamic model in turn is used to generate production and economic forecasts on which important business decisions are made.

As with most things in life, if you put rubbish in then you will likely get rubbish out!

It is time that we, as teachers and mentors to the new generation of geoscientists, re-emphasize the importance of sound geologic interpretation; the importance of actually looking at the rock at every opportunity either in outcrop or core; and the fact that if we put poor or incorrect data into a 3-D model the product may well look impressive to management but could be geologically unsound.

Our model is only as good as the data we input and the geological judgment of the modeler.

As an AAPG member for 20-plus years I would like to encourage the organization to address these issues with training, mentorship programs and EXPLORER articles to let those of us with experience in both the pre- and post-3-D model worlds to help the next generation of geoscientists to make the most of the powerful technology they have available to them.

Dianne Tompkins
Stavanger, Norway

Editor's note: Lagrilliere and Ray plan to continue their conversation – and they invite you to join in. Send your comments to vstefan@aapg.org, and they'll be forwarded to both Ray and Lagrilliere. We all are part of an improving professional Association.

Commentary

Generational Perspectives on AAPG's Future

By R. RANDY RAY and NICK LAGRILLIERE


RAY

The future success of our organization relies on our ability to develop a strategy that effectively bridges the generational gap within the industry.


LAGRILLIERE

Editor's note: AAPG Honorary member R. Randy Ray and YP Committee chair Nick Lagrilliere had a number of discussions at this year's Annual Convention and Exhibition in Pittsburgh, in which they tried to reach a deeper understanding of the different perspectives they each held on the future of AAPG.

Being representatives of the two big demographic groups in the Association – and the industry in general – they decided to share some of their views in this joint EXPLORER article.

Seeking Value

Nick Lagrilliere: Through the Young Professionals Committee's polling, it is apparent that the value proposition of the AAPG to its YP members is far from clear – yet, despite this lack of clarity, YPs are deriving value from AAPG through the networking opportunities initiated by the YP Committee.

The latter's success has been demonstrated by the large crowds drawn to the YP reception at the AAPG Annual Convention and Exhibition in Pittsburgh, as well as to many similar activities organized locally by the worldwide network of YP chapters.

In order to demonstrate the value proposition of AAPG to the YP population, we must acknowledge and address the changing face of our membership. The future success of our organization relies on our ability to develop a strategy that effectively bridges the generational gap within the industry.

R. Randy Ray: There is a lot of discussion about the value proposition of AAPG to YPs. As a volunteer-driven organization, the more you invest yourself in AAPG activities, the more valuable the return.

Why? Because it is a multi-faceted experience.

Of course, there are monthly publications targeted to petroleum science, and educational events and webinars focused on improving skills necessary for success. But there also are technical sessions and networks to industry experts at all our meetings, access to perspectives from the global community – not limited to a single corporate viewpoint.

There is no replacement for working with experienced professionals as part of your career development. I hope AAPG membership helps to make that connection for our YPs. Personal mentorship is beyond any value proposition – it's priceless!

Being active in AAPG also provides perspectives of the greater issues beyond the science – like the world energy equation, governmental regulations and a general business sense to recognize petroleum geology in a global context.

As a geologist's experiential knowledge reaches maturity, performance elevates to activities like Discovery Thinking when working in new play areas. I doubt there is a computer app for this.

The Social Network

RRR: The YPs are a powerful emerging force as AAPG heads toward the second century mark in 2017. Although they currently represent about 10 percent of AAPG's membership, they are a growing and energetic part of AAPG.

Since they are linked-in to instantaneous communication via the Internet and social networks, they can exercise a disproportionate influence in a positive way. In my mind this is the real distinction between YP's and older professionals-their connectedness.

NL: The Young Professionals bring a perspective that differs from that of some of the more experienced members of the Association.

For many of us, our career needs are being met by our companies, either through internal training courses or by external training providers. Publications are available through corporate subscriptions and countless other technical resources exist online.

Our generation's intimate link with social media and technology sets us apart from previous generations. We are constantly "linked in."

All of these factors result in the feeling that the AAPG is neither relevant for the YPs nor necessary to further our careers.

This feeling, when combined with the perception of the AAPG as a bit of an "old boys' club," results in the inability to attract and retain younger members.

RRR: If you are not at your computer screen daily, even hourly, you are not

Continued on next page

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connected to the YP generation.

They are generally masters of computer technology, since they grew up with a computer from the beginning. They have the ability to handle large datasets, perform interpretive actions, create valuable maps and reservoir simulations while simultaneously receiving an email or text message during the workflow – to which they can respond immediately and then continue working.

They do not need to make telephone calls – too slow, too unreliable, too expensive.

Remember when we said, "Being there is 90 percent of life"? Today, being connected is 90 percent of life – whether you are actually there or not.

Rules of Engagement

NL: It was quite baffling to us that attempts to give the YPs a stronger identity as a group in order to make the AAPG more welcoming were perceived as divisive. This was a main reason our previously proposed "special designation" was not considered by the House of Delegates.

Consequently, we will now be pursuing the approval of Technical Interest Groups (TIG) and Special Interest Groups (SIG) by the HoD.

A Young Professional SIG would allow us to achieve our goals, being a "softer" way of creating a community.

It is not our aim to be exclusive – but the reality is that the YPs right now feel excluded; not being provided with the tools necessary to attract and serve our younger members; and hence, do not join the AAPG.

RRR: Although recognizing a YP with a colored ribbon on the nametag at events is helpful, they need to become an integrated part of the whole program – and *not* isolated as a separate demographic group.

In some ways, being specifically designated as a YP can be counter-productive to full participation.

There are many arranged activities for YPs, but we need to make certain they do not become barriers to their involvement with the rest of the members.

As for myself, I thought it might be inappropriate for me to attend a YP event because of the age gap. Similarly, I might guess from their view a YP might be hesitant to be part of some AAPG committees or groups.

In fact, YPs are participating on committees at all levels – including those of the highest level, like in the House of Delegates and on the Executive Committee – and are making their voices heard.

AAPG has helped launch them. Now let them continue to increase their involvement in an organic way, growing in number and influence.

NL: It is true that we have seen increased involvement of YPs in the day-to-day running of the Association. YPs currently serve as HoD delegates, committee chairs and on Section/Region leadership.

While we celebrate these successes, these individuals are a small subset of the total YP population.

The harsh reality is that most young people are hesitant about volunteering – and want to see value for their investment of time. That is where AAPG sometimes finds itself, in stark contrast to our peer societies. For instance, the Society of Petroleum Engineers have well-developed and well-funded YP programs, and the Young Professionals in Energy (YPE) provide a forum for networking and career development for young professionals, primarily non-petrotechs, in the global energy industry.

A Two-Way Street

RRR: If you want to be part of the conversation in any or all of these aspects of AAPG, join and maintain AAPG membership and participate.

Nick and I both would like to see more mixing of the membership age groups in all of AAPG's activities. It is happening now and will continue with the passing of time.

You do not want to be left out of the bright future that geologists are creating for an environmentally responsible, energy-driven world!

NL: We are keen to help this Association thrive, grow and be relevant in its second century. We believe there is a wealth of experience and resources in the AAPG we can harness.

However, if the AAPG wants to embrace the younger generation, then respecting the differences between generations has to go both ways.

We respect how things were done in the first 100 years of AAPG. In return, we ask that members of AAPG be flexible and open to changes in the next 100 years. The AAPG has to evolve into an organization that the younger generation also can identify with and make its own. Otherwise, the YPs in the industry will find other organizations that serve their needs – and many already are doing so.

We therefore hope that the AAPG membership will embrace upcoming reforms, simplify its membership criteria and modernize its governance structure. By doing so, it can evolve to be an open association with an international outlook, focused on being a career partner.

Only that will result in a growing membership.

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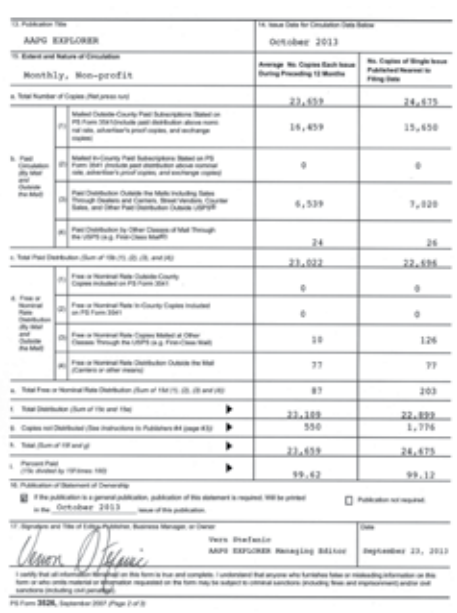

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PS Form 3526, September 2007 (Page 2 of 3)

CLASSIFIED ADS

You can reach about 37,000 petroleum geologists at the lowest per-reader cost in the world with a classified ad in the EXPLORER. Ads are at the rate of $2.90 per word, minimum charge of $60. And, for an additional $50, your ad can appear on the classified section on the AAPG web site. Your ad can reach more people than ever before. Just write out your ad and send it to us. We will call you with the word count and cost. You can then arrange prepayment. Ads received by the first of the month will appear in the subsequent edition.

POSITION AVAILABLE

Pevehouse Chair in Geosciences Texas Tech University

The Department of Geosciences at Texas Tech University invites applications for the Pevehouse Chair in Geosciences. The purpose of this endowed position is to support innovative research and education that are broadly aligned with petroleum geosciences and may include geophysics, structural geology, geomechanics, sedimentology, petrophysics, and organic geochemistry. A Ph.D. in geosciences or closely allied field is required, as is a record of research as demonstrated by professional publications. The chair holder will conduct a vigorous, externally-funded research program, direct graduate student research, and teach undergraduate and graduate courses in his/her specialty. The position is expected to be filled at the tenured Full Professor level.

Texas Tech is a state-supported, graduate research-oriented university with over 32,000 students. The Department of Geosciences consists of twenty-four tenured/tenure-track faculty, with teaching and research emphases in solid earth geosciences, atmospheric science, and geography. It offers degree programs in solid earth geosciences at the BS, MS, and Ph.D. levels. The chairholder will join a dynamic, growing Department with more than 200 undergraduate majors and more than 60 graduate students. Texas Tech is committed to growth in disciplines aligned with hydrocarbon geology through addition of at least one junior faculty position.

The Department computer labs are equipped with GIS, geologic mapping/modeling, and seismic processing/interpretation software packages. Available experimental/analytical facilities include a stable isotope laboratory, XRD, XRF, analytical SEM, TEM, laser ablation ICP-MS, a heat flow lab, and remote sensing spectroradiometers In addition, the Department of Petroleum Engineering maintains experimental and analytical facilities in petrophysics, drill fluids, cement, enhanced recovery, and reservoir simulation, as well as X-ray CT/nuclear magnetic resonance imaging lab.

Lubbock is located on the Southern High Plains in close proximity to the Permian Basin. The city has a population of over 225,000 and the semi-arid climate is conducive to outdoor activities. Cultural amenities include musical, theatrical, and sports events, and the city offers numerous options for shopping and dining. The city also offers the best healthcare facilities in the region, including the university's Health Sciences Center. The cost of living is low compared to national norms.

Applicants must first go to the employment website of the university at http://jobs.texastech.edu. There, go to "Search Postings", search for requisition number 87107, and fill out necessary forms in applying for the position on-line. Then, applicants should submit a letter of application, curriculum vitae, a statement of teaching and research interest, names and contact information (including e-mail address) of at least 3 professional references. These documents should be uploaded to the employment website and we request that copies by emailed or sent directly to: Dr. Calvin Barnes, Pevehouse Chair Search Committee, Department of Geosciences, Texas Tech University, MS 1053, Lubbock, TX 79409-1053.

Additional information on the department can be found at website http://www.depts.ttu.edu/gesc/. E-mail questions regarding the position are received at cal.barnes@ttu.edu. Review of applicants will begin immediately and continue until the position is filled.

Texas Tech University is an affirmative action/equal opportunity employer, committed to excellence through diversity. Texas Tech welcomes applications from minorities, women, veterans and persons with disabilities.

Assistant Professor in Geophysics

The Department of Earth & Environmental Sciences at the University of Iowa invites applications for a full time tenure-track position in the broad area of geophysics. Requirements for this position are a Ph.D. in a geophysical discipline at the time of appointment and research interests that include the environmental and sustainability aspects of the geophysical sciences. The ideal candidate will have a significant record of publication and other achievements that demonstrate a strong potential to develop a nationally and internationally recognized, externally funded research program. Post-doctoral experience and demonstrated effectiveness in college-level teaching are desirable attributes. The successful candidate will be expected to attract and mentor graduate students as well as teach an introductory geophysics course and other undergraduate and graduate level courses.

Candidates should submit applications online at http://jobs.uiowa.edu/ (requisition #63146).

In addition to curriculum vitae, the application should include a cover letter, a statement of teaching interests, evidence of teaching ability, and a statement that describes current and future research activities. Three letters of recommendation should be mailed to:

Dr. Christopher Brochu
Search Committee Chair
Department of Earth & Environmental Sciences, University of Iowa
Iowa City, IA 52242
(1-319-353-1808; chris-brochu@uiowa.edu).

Screening of applications begins November 15, 2013 and will continue until the position is filled. Questions regarding this position can be directed to Dr. Brochu or Dr. Mark Reagan (EES Department Chair; 1-319-335-1820; mark-reagan@uiowa.edu).

The Department and the College of Liberal Arts & Sciences are strongly committed to gender and ethnic diversity. Women and minorities are encouraged to apply. The University of Iowa is an affirmative action/equal opportunity employer.

OSU BOONE PICKENS SCHOOL OF GEOLOGY TWO ASSISTANT PROFESSOR POSITIONS GEOCHEMISTRY AND HYDROGEOLOGY/GEOFLUIDS

The Boone Pickens School of Geology at Oklahoma State University seeks two tenure track assistant professors: one in sedimentary geochemistry and another in hydrogeology/geofluids. These positions will be effective August 2014 contingent on funding. The applicant should have a Ph.D. degree in geosciences or a related field at the time of appointment.

For the sedimentary geochemistry position, we are seeking candidates with strengths in one or more of the following areas: organic geochemistry, low temperature metals geochemistry, biomarkers as applied to petroleum systems, environmental systems, and paleo/climate change.

For the hydrogeology/geofluids position, we are seeking candidates with strengths in one or more of the following: simulation of subsurface flow and solute transport, variable-density or multiphase fluid modeling, reactive transport modeling in porous/fractured media, and hydrogeophysics as applied to sedimentary basins, biogeophysics, petroleum, hydrodynamic systems, and environmental change.

The successful candidates will complement School strengths in stable isotope geochemistry, petroleum geology (conventional and unconventional), paleoenvironment, biogeochemistry and biogeophysics. We seek candidates who will develop vigorous and innovative research programs and who will contribute to School teaching at both undergraduate and graduate levels. The candidates will be expected to supervise M.S. and Ph.D. students and develop courses in their areas of expertise.

Continued on next page

Continued from previous page

The successful candidates will join a faculty of fourteen geoscientists in a department that has close ties to the petroleum and water resource industries. The School's teaching and research facilities include state of the art geochemistry laboratory facilities and equipment, geophysical field and laboratory equipment and software, the Devon Visualization Laboratory, and a wide range of petrographic and hydrogeological instrumentation and field equipment. The School operates a field camp facility near Cañon City, Colorado.

Candidates should submit an application package that includes a cover letter; curriculum vitae; reprints of three published papers; contact information for three referees; and separate statements of research and teaching vision. Candidates should include in their research vision a brief description of how their research will interface with that of existing faculty. All application materials should be submitted to: Assistant Professor Search, Boone Pickens School of Geology, 105 Noble Research Center, Oklahoma State University, Stillwater, Oklahoma 74078-3031. Screening of candidates will begin on November 15, 2013 and continue until the position is filled.

More information about the Boone Pickens School of Geology can be found on the web at http://geology.okstate.edu. Inquiries may be directed to Dr. Todd Halihan (todd.halihan at okstate.edu) or Dr. Jay Gregg (jay.gregg at okstate.edu). Committed to health and safety, Oklahoma State University maintains a tobacco-free work environment. Oklahoma State University is an Affirmative Action/Equal Opportunity/E-Verify employer committed to diversity.

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Sklar Exploration Company L.L.C.

(www.sklarexploration.com) is an independent exploration and production company with offices in Shreveport, Louisiana and Boulder, Colorado whose primary business focusses on finding and developing crude oil, condensate, natural gas and natural gas liquids. Sklar is seeking qualified applicants for positions in its Engineering and Geoscience Departments.

Sklar's reserves are located in the lower 48 United States, includingplaces Sklar has historically been active, such as the Lower Gulf Coast basins, and the Interior Gulf Coast basins of East Texas, North Louisiana, South Arkansas, South Mississippi and South Alabama, as well as other places in which Sklar is expanding its presence, such as the Delaware, DJ and Williston basins. The nature of Sklar's reserves also vary as many of Sklar's legacy assets are conventional oil and gas properties, but Sklar is actively exploring and developing unconventional resources. The means of finding and extracting those reserves also vary.

Sklar has traditionally focused on exploration as a means of finding reserves. While it continues to do many exploratory projects, Sklar also evaluates acquisition and development opportunities to complement its exploration portfolio. Further, although Sklar has been a leader in hydraulic fracture stimulation in the industry for some time, it now leverages that experience and combines it with horizontal drilling to extract reserves. Sklar is also currently active not just in primary production, but in a number of secondary recovery projects. In conclusion, Sklar is a growing company and that growth demands that it expand its talent base with valuable people skilled in a variety of disciplines.

The qualifications set forth below are mandatory minimum requirements without which a candidate will not be considered. The responsibilities include a broad range of job functions and are described for illustrative purposes. It is unlikely that an employee would perform all the described functions, and the final job description will be tailored toward the skillset of the candidate and the needs of the company. The position will be filled in Sklar's Boulder, Colorado office. Candidates must have strong interpersonal skills with the ability effectively to work within a multidisciplinary team to achieve project-related goals.

The benefits include:

- Competitive compensation
- Medical, dental, vision, life and disability insurance
- 401(k) with company match up to 3%
- Gym Membership Program
- Company paid parking
- Company furnished cell phone
- Computer and vehicle for business use
- Company paid continuing education.

Geologist Responsibilities:

- Work in an integrated team environment with Geoscience, Engineering and Land Departments to develop drill well, workover and recompletion proposals
- Work with Geophysicists to integrate geological and geophysical data
- Work with Accounting Department to develop schedule of operations and budget
- Generate exploratory oil and gas prospects, create prospect brochures and make prospect presentations
- Screen and supervise third party generated exploratory oil and gas prospects
- Evaluate reserve acquisition opportunities
- Assist in preparation of year-end and semi-annual reserve reports
- Assist in third party engineering reserves audits and production forecasts

Qualifications:

- At least 10 years of oil and gas industry experience working
- Bachelor of Science degree in Geology required; Masters or PHD preferred
- Substantial work experience in upstream oil and gas industry
- Strong computer and analytical skills. Competent in use of PETRA geological software.
- Demonstrated proficiency in both open-hole and cased-hole log analysis
- Demonstrated proficiency in creating cross-sections, structure maps, isopach maps and key exhibits for brochure and prospect presentation
- Demonstrated use of economic principles to evaluate decisions

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DIRECTOR'S CORNER

Let's Talk: Finding Paths To Effective Solutions

By DAVID K. CURTISS, AAPG Executive Director

I am writing to you from high above the Caribbean, on my way home from Cartagena, Colombia, site of the 2013 AAPG International Conference and Exhibition.

That historical city provided a beautiful backdrop to a conference that several attendees remarked was "buzzing" with energy. And they were right:

- A robust technical program drew attendees from around the globe to learn from each other.
- There was a large contingent of students whose enthusiasm was infectious.
- Our exhibitors showcased new data, technologies and an International Pavilion with countries offering investment opportunities.

Victor Vega, the conference general chair, and his organizing committee have been working tirelessly over the past several years to make ICE 2013 in Cartagena a reality. And as AAPG members we owe them a debt of gratitude for their dedication and hard work.

Agencia Nacional de Hidrocarburos (ANH), the Colombian hydrocarbon agency, Ecopetrol and Pacific Rubiales were our principal sponsors for ICE. They led a group of companies whose support for the conference was essential. Thanks to each of you for making ICE 2013 possible.

I also want to thank the AAPG staff for their efforts to make this meeting a success, especially Alan Wegener and the convention team. These folks have been running hard this summer with ACE in Pittsburgh in May, the Unconventional Resources Technology Conference in Denver in August and ICE in September.

Their dedication and professionalism contributed significantly to the success of all three of these events.


CURTISS

Through direct and honest conversation you begin to build the trust necessary to operate successfully, both in good times and bad.

* * *

The technical program at ICE had a special session devoted to the topic of hydraulic fracturing, and particularly how to address the public and regulatory concerns.

Tom Temples, past president of the Division of Environmental Geosciences (DEG), and Michael Young, associate director for environmental systems at the Texas Bureau of Economic Geology, gave a joint presentation on the fact and fiction around hydraulic fracturing. They talked about the technology, the use of water resources, and concluded with best practices and suggestions for how best to engage regulators and the public.

It's an important discussion, because while the technology of hydraulic fracturing has been used for decades, the growth of unconventional resource development has brought it fully into the public's consciousness – but the public doesn't really understand what it is, and frequently believes that everything associated with oil and gas operations is "hydraulic fracturing."

Tom and Mike emphasized the importance of engaging directly with policymakers, regulators and the communities where you're working. Through direct and honest conversation you begin to build the trust necessary to operate successfully, both in good times and bad.

And DEG President Doug Wyatt observed, in response to another attendee's question, that you have to speak to the public in language and using information that they can understand and that is meaningful to them.

AAPG is very interested in facilitating these types of conversations and working to ensure that decision-makers and the public have information about oil and gas operations that they can use to make good choices. That's why we created our Geoscience & Energy Office in Washington, D.C. (GEO-DC), back in 2005.

Edith Allison, director of GEO-DC, led a group of AAPG members in mid-September as they visited with legislators and staff in Washington, D.C., talking about a host of geoscience issues – including hydraulic fracturing – during the annual Geosciences Congressional Visits Days.

But it's important that AAPG expand the scope of these outreach activities and work cooperatively to bring science and expertise to policymakers and the public across the globe. And in Cartagena there were several such discussions:

- The first was a meeting of AAPG leaders, including members of the Executive Committee, Region leaders and DEG leaders, to discuss ways in which the Regions and Divisions could better cooperate. And one issue they decided to focus on was hydraulic fracturing.

- This was followed by a second meeting of Latin America Region leaders, leaders from various affiliated societies in the Region and DEG leaders about the topics of concern from the perspective of policy, regulation and public acceptance.

What was remarkable were the similarities of the issues that our members are facing across the Region – and many of them are related to the environment.

* * *

Fostering this dialogue among associations, across Regions, across the many facets of oil and gas activities is one way that AAPG is seeking to bring good science to policy makers and the public.

There is no shortage of opportunities and needs to do so – and AAPG is pushing to meet that need.

DIVISIONS REPORT

DPA Offers Inaugural Reserves Forum

By VALARY SCHULZ, DPA President

Our principal goal for the DPA is to increase our relevance to our members – and by extension to our AAPG community, which in turn ought to make the Division attractive to new members.

A number of programs have been developed and offered over the past 45 years of our existence, the principal one being the peer review certification process, which grants the CPG designation I proudly display on my business card.

The Board of Certification is chaired by past DPA president **Rick Ericksen** (2009-10), who along with **Debra Rutan** (secretary 2007-09) and past presidents **Mike Party** (2005-06), **Steve Sonnenberg** (1999-2000), **Marty Hewitt** (2011-12) and me as current Division president review each certification application, make investigations as necessary and then approve or disapprove each applicant for certification.

The qualifications are based upon experience; a member of AAPG with a degree in geology and eight years of experience with a sustained record of the highest professional and ethical standards is eligible. Three sponsors who are CPGs must attest to an applicant's professional and ethical ability.


SCHULZ

We are following through with our determination to provide resources to our members.

There are nearly 2,400 certified geologists, coal geologists and geophysicists, and we enjoy reciprocal relationships with The Geological Society, SIPES and the AIPG. We also are recognized by the Canadian Securities Administrators as Qualified Reserve Evaluators under CI 51-101.

If you are an AAPG member who meet the qualifications but haven't applied you may do so through our website. We are in the process of and hope to receive the same recognition by the Australian Securities Exchange.

* * *

Education is another of our purposes, and we are following through with our determination to provide resources to our members.

In this light we are presenting the First Annual Reserves Forum: Evaluating the Prize, on Oct. 31 at the Norris Center in Houston. Our Continuing Education Chair **Bob Shoup** (past president, 2004-05) has worked with JCORET and the Education Department of AAPG to put together a stellar line up of speakers who all are pre-eminent in their fields.

Come on out and listen to **Pete Rose**, **Ron Harrell**, **John Lee**, **Cindy Yeilding**, **Creties Jenkins**, **Scott Rees** and **Richard Nehring**, among others, who will address the processes of making the most accurate possible reserves estimations from the geologic and engineering perspectives, and how these estimates must comply with the SEC reporting requirements.

I look forward to seeing you there.

Following this one-day forum, **John Lee** will offer a one-day JCORET Certified Evaluator Training Course on SEC Reserves Rules and Unconventional Resources.

(JCORET is the Joint Committee on Reserves Evaluator Training Committee, comprising five sponsoring organizations: SPE, AAPG, WPC, SPEE and SEG.)

* * *

What's on your night table: Kindle/iPad?

I've been stuck lately with little time for focused reading, so magazines and TEDs Talks have held my attention.

Like AAPG Executive Director David Curtiss (see September "Director's Corner"), I also disagree with the recent article in The Economist that portends the end of "Peak Oil Demand." Through enhanced efficiency fuel use and crossover to natural gas, they anticipate lower prices as a result of falling demand.

Perhaps, in a recessionary environment – but we are gradually pulling ourselves out of the doldrums in the United States with a modest 1.7 percent growth rate.

What do you think?