

# View Masters

*Photographs are making awesome  
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*See page 56*

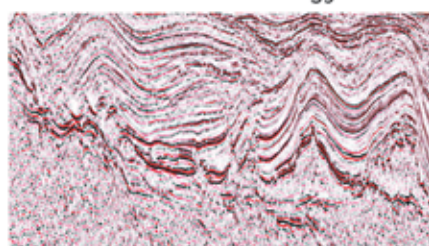




# Core Strengths

Geological solutions to geophysical challenges

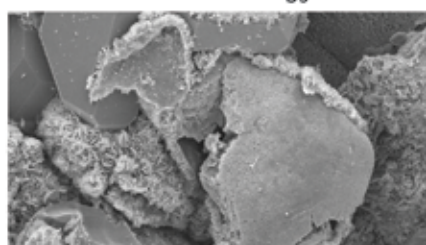
Structural Geology



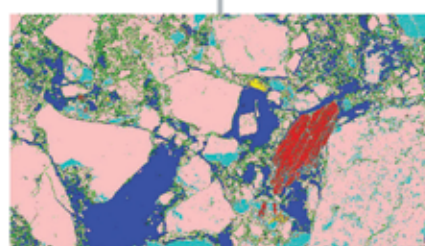
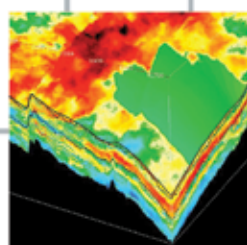
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PRESIDENT'S COLUMN

Doing what we say we do  
Are We Sharing Our Science? Really?

BY LEE F. KRYSTINIK

One of the standard duties that comes with the great honor of this office is public speaking. I don't much enjoy being a master of ceremonies (having my horse drag me naked through a field full of stinging nettles and fresh cow pies sounds like more fun) – however, one of my favorite things is giving technical talks, especially when they might have some bearing on issues that have direct local application for my audience. This is because I almost always gain more insight from the questions asked by my fellow geoscientists in the audience than I feel I have given them. I just finished presenting a little case study on the Mississippian Lime and "Chat" to the local SIPES group in Oklahoma City (basically everyone in the room raised their hand as an AAPG member) and one of the first questions from the audience was:

*"As president of AAPG, can you tell us why we don't see more of these kinds of case studies in luncheon talks or presented at AAPG meetings?"*

My first joking thought was, "Well, AAPG has standards," but as I thought more about his comment that evening I realized that this gentleman had a valid point.

I suppose the real answer to the gentleman's question is that we all are covered up with work and perhaps so busy drilling new wells that we just don't quite get around to sharing what we learned along the way. But my bet is that virtually every single one of us has a case study or two in our



KRYSTINIK

My challenge to each of you is to find a way to share at least one "new idea" or "old mistake" case study this year.

hip pocket that gave us practical and valuable lessons – and that we have never shared publically.

\* \* \*

AAPG has two prime directives (Sounds almost like Star Trek doesn't it?), which, when boiled down to the basics, are to share science and to promote professionalism.

It seems to me that these directives should apply equally as well to each of us as they do to our organization.

So, gentle members, my question for you is:

*How many of us are sharing our science, our learnings and, perhaps most importantly, our mistakes with our colleagues?*

Progress happens when information is shared.

A story I recently heard goes to the heart of this issue. It seems that there was once a fellow who was very successful in acquiring large quantities of land and exploiting these opportunities, to much fanfare. However, he also was known for

making a very visible point of standing up and looking around a room at a technical luncheon talk, just to be sure *none* of his geoscientists were present.

Now, we might correctly infer that his intent was to preserve confidential information.

I suspect, however, he may have overlooked the critical fact that there are a heck of a lot of smart geoscientists on this planet who don't work for him. These good folks all have experiences either similar to or different from his people, who were sitting in the dark and imitating mushrooms while the other folks at the meetings exchanged ideas, learned, changed paths and eventually surged ahead.

How many of us, either by intent or because we are "too busy," are guilty of the same thing?

\* \* \*

My challenge to each of you, my respected fellow AAPG members, is to find a way to share at least one "new idea" or "old mistake" case study this year with your local geological/geophysical society, your Section or Region, at ACE, ICE or

one of our multi-society partner events, such as URTeC, OTC, IPTC, GEO and beyond.

In this era of electronic presentations, most of us have the necessary slides stuffed in a file, gathering virtual photonic dust in some forgotten corner of our computer. For the price of a couple of hours of work (yes, friends, you might have to give up the equivalent of one awesome, action-packed, thrilling episode of Prancing with the Stars), you can have your talk in hand before the re-run comes on in the next hour.

It is, after all, heart-warming to see a long-suffering speaker chair shed tears of gratitude this holiday season.

And for you, our hard-working speaker chairs and/or technical session chairs, thank you for your service to our science and to each of us in the audience!

Fear not, all of you dear "seeker of speakers," AAPG members could soon be at your doorstep with talks in abundance – but then there is that pesky question:

Will they really do what many of them, at this very moment, might be saying that they should do?

\* \* \*

As always, I would love to hear your comments on how AAPG can better do what we say we will do. Please feel free to contact me at [lee.krystinik@aapg.org](mailto:lee.krystinik@aapg.org).



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ON THE COVER:

The awe-inspiring Langkofel is the largest and highest peak of the Langkofel Group in the Dolomites in South Tyrol, Italy – and it's an image you can find and enjoy on the AAPG website via the connection to Pinterest, a great place for sharing or just enjoying magnificent photos like this. Or like the one on this page to the left, another Pinterest photo capturing the dramatic Utah landscape near Moab, Utah. See page 56. Cover photo courtesy of Wolfgang Moroder; Utah photo courtesy of Matthias Kabel.



## Get to Know the Executive Committee Candidates

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

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

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

Those questions include:

- ▶ When and how did you decide to become a geologist – and why?

- ▶ What has been your experience with AAPG?

- ▶ What is the main issue facing the profession today?

- ▶ How could you help AAPG be a better association?

- ▶ Why did you agree to stand for office?

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

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

To view the videos, go online to

[www.aapg.org/business/candidates/](http://www.aapg.org/business/candidates/).

The slate is:

### President-Elect

- ☐ **Alfredo E. Guzmán**, consultant, Veracruz, Mexico.

- ☐ **John R. Hogg**, MGM Energy Corp., Calgary, Canada.

### Vice President-Sections

- ☐ **Steven H. Brachman**, Wapiti Energy, Houston.

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

### Treasurer

- ☐ **Vlastimila Dvorakova**, Czech Geological Survey, Brno, Czech Republic.

- ☐ **James W. Tucker**, consultant, Houston.

## ICE Abstracts Are Sought For Istanbul

Abstracts are being accepted online for the next AAPG International Conference and Exhibition, set Sept. 14-17 in Istanbul, Turkey.

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

The deadline for abstract submission is Jan. 16.

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

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

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

To submit an abstract, or for more ICE information, go to [aapg.org/ice](http://aapg.org/ice).

Remember, the abstract submittal deadline is Jan. 16.

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## URTeC Abstract Deadline Looms

A reminder: The call for papers also is open for the next Unconventional Resources Technology Conference (URTeC), which will be held Aug. 25-27 in Denver. The deadline is Dec. 12.

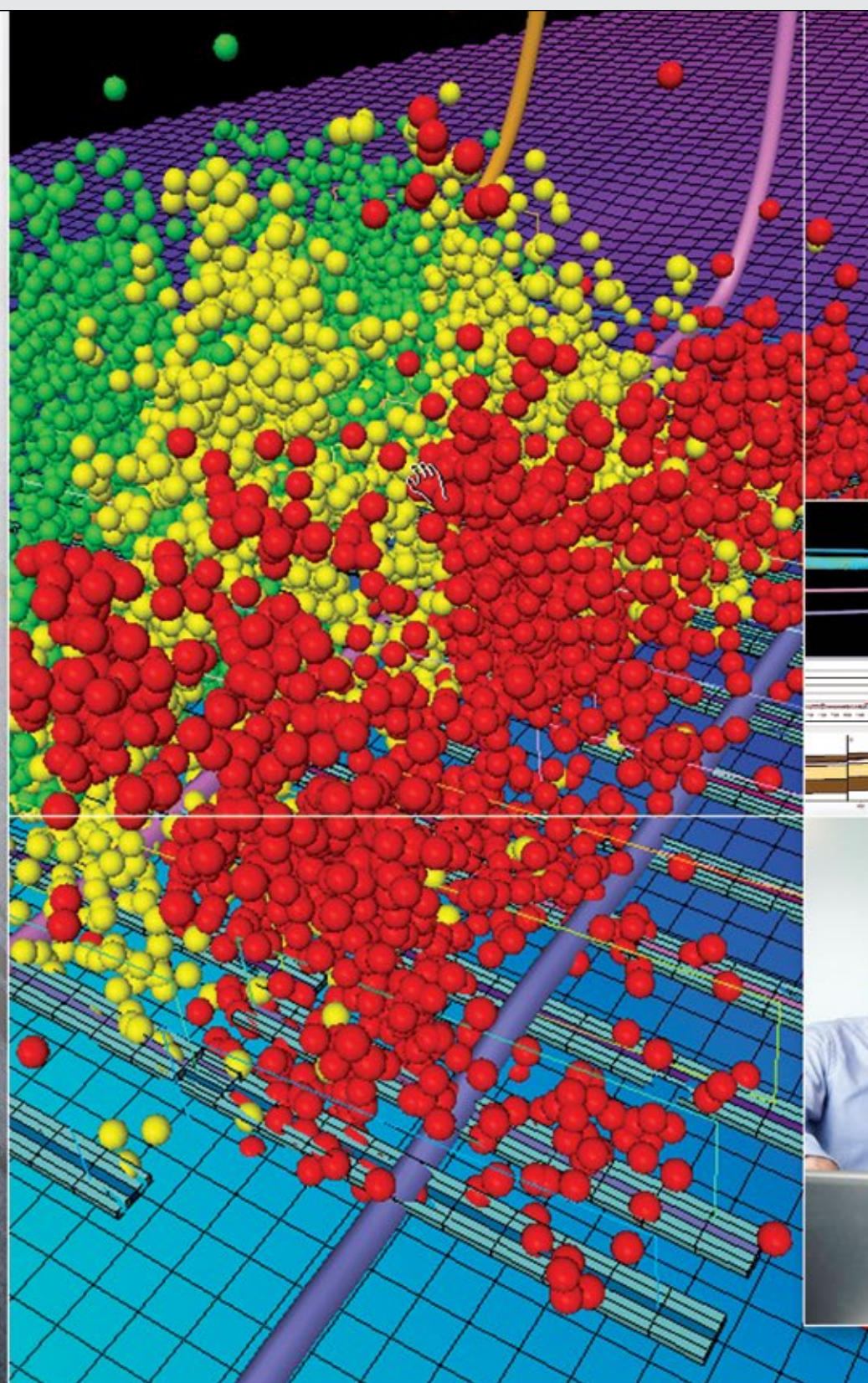
URTeC is a joint venture sponsored by AAPG, the Society of Petroleum Engineers and the Society of Exploration Geophysicists, designed to bring together the key disciplines and technologies engaged in the development of unconventional resources.

The technical program features 11 general themes:

- ▶ Regional Case Studies.
- ▶ Characterization of Unconventional Reservoirs.
- ▶ Application and Integration of Well Data.
- ▶ Understanding Your Petroleum System.
- ▶ Optimizing Recovering from Unconventional Reservoirs.
- ▶ Optimizing Capital Efficiency.
- ▶ Production Performance of Tight Oil and Gas Reservoirs.
- ▶ Social Performance (HSSE).
- ▶ Reserves Forecasting and Estimation.
- ▶ Long-Term Performance.
- ▶ Emerging Unconventional Plays.

To submit an abstract, or for more information, go to [urtec.org](http://urtec.org).





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## Mancini named Powers medalist

# AAPG Announces the Year's Best of the Best

By SUSIE MOORE, Communications Project Specialist

**E**rnest A. Mancini, internationally renowned educator and a leading researcher in stratigraphy and petroleum geology of the Gulf of Mexico, both onshore and offshore, has been named the 2014 recipient of the Sidney Powers Memorial Award – AAPG's highest honor.

Mancini is a distinguished research professor of petroleum geology and stratigraphy at the University of Alabama, Tuscaloosa.

Joining Mancini at the top of this year's AAPG awardees list is past AAPG president Peter R. Rose, retired founder and president of Rose & Associates, Austin, Texas, who has been named recipient of the Michel T. Halbouty Outstanding Leadership Award.

Mancini and Rose lead the list, but they are just two of the 47 award winners who have been announced by AAPG and who will be recognized at the opening session of the 2014 AAPG Annual Convention and Exhibition, set April 6-9 in Houston.

AAPG awards, approved by the Executive Committee, are presented annually to recognize individuals for service to the profession, the science, the Association and the public.

Mancini, when he receives his award in Houston, will become the 67th Powers medalist in AAPG history, first awarded in 1945 to legendary geologist Wallace E. Pratt.

The Powers Award is given annually in recognition of distinguished and outstanding contributions to, or achievements in, petroleum geology.

Sidney Powers himself was a founding member and 14th president of the Association. He died in 1932 at the age of 42. Frank R. Clark, in his memorial to Sidney Powers said, "Sidney Powers will be known by future generations for his able contributions to pure and applied geology, but, important as are his scientific achievements, his character was greater, because it typified service to others."

Mancini began his career with Cities Service Co. as an exploration geologist in 1974. Two years later he became assistant professor in the department of geological sciences at the University of Alabama (UA).

He was appointed state geologist and director for the Geological Survey of Alabama, and oil and gas supervisor and director for the State of Alabama Oil and Gas Board in 1982, where he served simultaneously until 1996.

Mancini founded the UA's Center for Sedimentary Basin Studies, an interdisciplinary geoscience research center, in 1998 and served as interim chair of the Department of Geological Sciences.

Mancini is the recipient of several AAPG awards including the A.I. Levorsen Award in 1980 and the Distinguished Educator Award 2000. He also served as AAPG elected editor in 2004-07.

He was appointed Distinguished Research Professor of the University of Alabama in 2005, was named the Blackmon-Moody Outstanding Professor in 2007, and he received the Burnum Distinguished Professor Award and

became professor emeritus in 2010.

Rose, who is the eighth recipient of the Halbouty Outstanding Leadership Award, given in recognition of outstanding and exceptional leadership in the petroleum geosciences, received AAPG Honorary membership in 2002.

His book "Risk Analysis and Management of Petroleum Exploration Ventures" has been widely referenced by the industry since 2001. He was columnist of the AAPG EXPLORER "Business Side of Geology," 2001-03, and served on the AAPG Executive Committee as president-elect/president from 2004-06.

Interviews with both Mancini and Rose will be published in a future EXPLORER. Biographies and citations of all award winners will be included in a future BULLETIN.

Award winners announced by AAPG and who will be honored along with Mancini and Rose in Houston are:

### Honorary Member Award

Presented to members who have distinguished themselves by their accomplishments and through their service to the profession of petroleum geology and to AAPG.

□ John M. Armentrout, Cascade Stratigraphic Inc., Damascus, Ore.

□ István Bérczi, MOL Group, Budapest, Hungary.

□ Donald D. Clarke, consultant, Lakewood, Calif.

□ Martin D. Hewitt, Calgary, Canada.

□ James S. McGray, Mid-Con Energy, Tulsa.

### Norman H. Foster

#### Outstanding Explorer Award

Presented to members in recognition of distinguished and outstanding achievement in exploration for petroleum or mineral resources, with an intended emphasis on recent discovery.

□ Orion Lea Skinner, Whiting Petroleum, Parker, Colo.

Skinner was responsible for Whiting's Pronghorn Field discovery and his contributions to Bakken exploration in Stark County, N.D.

### Robert R. Berg

#### Outstanding Research Award

AAPG's newest award, presented to honor a singular achievement in petroleum geoscience research.

□ Kevin M. Bohacs, ExxonMobil Upstream Research Co., Houston.

□ Robert G. Loucks, Bureau of Economic Geology, Austin, Texas.

### Distinguished Service Award

Presented to those who have distinguished themselves in singular and beneficial long-term service to AAPG.

This year there are nine recipients of the honor:

□ Hussain M. Al-Otaibi, Saudi Aramco, Dhahran, Saudi Arabia.

□ Donna S. Anderson, EOG Resources Inc., Golden, Colo.

□ William P. Bosworth, Apache Egypt Companies, Houston.

□ Peter Burri, Burri Oil and Gas

Continued on next page



CANICH



COOK



COOPER



FOSSUM



GOOLSBY



CARTWRIGHT



EBERLI



KERANS



## Continued from previous page

Consulting, Basel, Switzerland.

☐ **Michael R. Canich Jr.**, Sylvan Energy, Pittsburgh.

☐ **David R. Cook**, retired, Maldon, England.

☐ **Mark Cooper**, Sherwood Geoconsulting, Calgary, Canada.

☐ **Brett J. Fossum**, ConocoPhillips, Houston.

☐ **Steven M. Goolsby**, Goolsby Brothers & Associates, Lakewood, Colo.

### Grover E. Murray

#### Distinguished Educator Award

Presented for distinguished and outstanding contributions to geological education, both at the university level and toward education of the general public.

☐ **Joseph A. Cartwright**, University of Oxford, Oxford, England.

☐ **Gregor P. Eberli**, University of Miami, Miami, Fla.

☐ **Charles Kerans**, University of Texas at Austin.

☐ **Donald R. Lowe**, Stanford University, Stanford, Cali.

### Public Service Award

Presented to recognize contributions of AAPG members to public affairs – and intended to encourage such activities.

☐ **John B. Curtis**, Colorado School of Mines, Golden, Colo.

Curtis is being honored for his extensive work in educating government officials and the public on matters involving the energy industry.

### Pioneer Award

Presented to long-standing members who have contributed to the Association and who have made meaningful contributions to the science of geology.

This year there are two winners of the award:

☐ **Vincent Matthews III**, Leadville Geology, Leadville, Colo.

☐ **Thomas L. Thompson**, Geo Thompson Discovery Inc., Boulder, Colo.

### Wallace E. Pratt Memorial Award

Presented to honor and reward the author(s) of the best AAPG BULLETIN article published each calendar year.

☐ **Sonja Spasojevic** and **Michael Gurnis**, for “Sea Level and Vertical Motion of Continents from Dynamic Earth Model Since the Late Cretaceous,” which appeared in the November 2012 BULLETIN.

Spasojevic is with BP, Houston, and Gurnis is with the California Institute of Technology, Pasadena, Calif.

### Robert H. Dott Sr. Memorial Award

Presented to honor and reward the author/editor of the best special publication dealing with geology published by the Association.

☐ **John A. Breyer** for Memoir 97 “Shale Reservoirs: Giant Resources for the 21st Century.” Breyer is with Marathon Oil, Houston.

### J.C. “Cam” Sproule Memorial Award

Presented to recognize and reward younger authors of papers applicable to petroleum geology.

☐ **Joseph M. English**, for the paper “Thermomechanical Origin of Regional Fracture Systems.”

English is with Petroceltic International, Dublin, Ireland.

### John W. Shelton

#### Search and Discovery Award

Presented in recognition of the best contribution to the “Search and Discovery” website in the past year.

☐ **Neil K. Basu**, **Gervasio J. Barzola**, **Hector Bello**, **Paul R. Clarke** and **Oswaldo E. Viloria**

for the paper “Integrated Eagle Ford Reservoir Characterization – Which Data is Critical to Collect and Best Describes Well Performance?”

All are with Pioneer Natural Resources, Irving, Texas.

### George C. Matson Award

Presented to honor and reward the best oral presentation at the 2013 AAPG Annual Convention and Exhibition in Pittsburgh, Pa.

☐ **Stephen G. Holtkamp**, for the paper “A More Complete Catalog of the 2011 Youngstown, Ohio, Earthquake Sequence From Template Matching Reveals a Strong Correlation to Pumping at a Wastewater Injection Well.”

Holtkamp’s co-authors are Brian Currie and Michael R. Brudzinski. All are with Miami University, Oxford, Ohio.

(A story on Holtkamp’s work appeared in the September 2013 EXPLORER.)

### Jules Braunstein Memorial Award

Presented to honor and reward the best poster presentation at the 2013 AAPG Annual Convention and Exhibition in Pittsburgh, Pa.

☐ **Satinder Chopra** and **Ritesh Kumar Sharma**, for the poster “New Seismic Attribute for Determination of Lithology and Brittleness.”

Both Chopra and Sharma are with Arcis Seismic Solutions, Calgary, Canada. Chopra also is the current editor of the EXPLORER’s popular Geophysical Corner column.

### Gabriel Dengo Memorial Award

Presented to honor and reward the best oral presentation at the 2013 AAPG International Conference and Exhibition in Cartagena, Colombia.

☐ **Irene Arango**, with Chevron, Houston, for the paper “Evaluating Hydrocarbon Expulsion Efficiency from Shale Reservoirs.”

### Ziad Beydoun Memorial Award

Presented to honor and reward the best poster presentation at the 2013 AAPG International Conference and Exhibition in Cartagena, Colombia.

☐ **Jaime Castillo**, **Victor Castro**, **Alfredo Ramirez**, **Carlos Mora**, **Paola Blanco** and **Claudia Ceballos**, for the poster “Cupiagua Sur XN1Z – Drilling Experience: Response and Uncertainty Management for Unexpected Overburden Sections.”


All of the co-authors are with Equion Energia, Bogota, Colombia.

### Geosciences in the Media Award

Presented for notable journalistic achievement in any medium, which contributes to public understanding of geology, energy resources or the technology of oil and gas exploration. This year there are two awards being presented – one to the author and on-air host of a popular television series, the second to a project/film that enjoyed a major U.S. theatrical release in 2013 and has been seen by millions of people around the world.

☐ **Scott D. Sampson**, author of “Dinosaur Odyssey: Fossil Threads in the Web of Life,” and consultant/on-air host of the Discovery Channel series “Dinosaur Planet.”

☐ **The “Switch” Energy Project**, a documentary film and media outreach initiative that takes a look into the world’s energy future. The Project includes an ongoing website, Facebook page, social media and the Switch Energy Lab.

Accepting the award will be past AAPG president **Scott Tinker**, who served as the film’s co-producer and narrator, and Switch director and co-producer **Harry Lynch**. 



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# *The Flex Trend in full view*

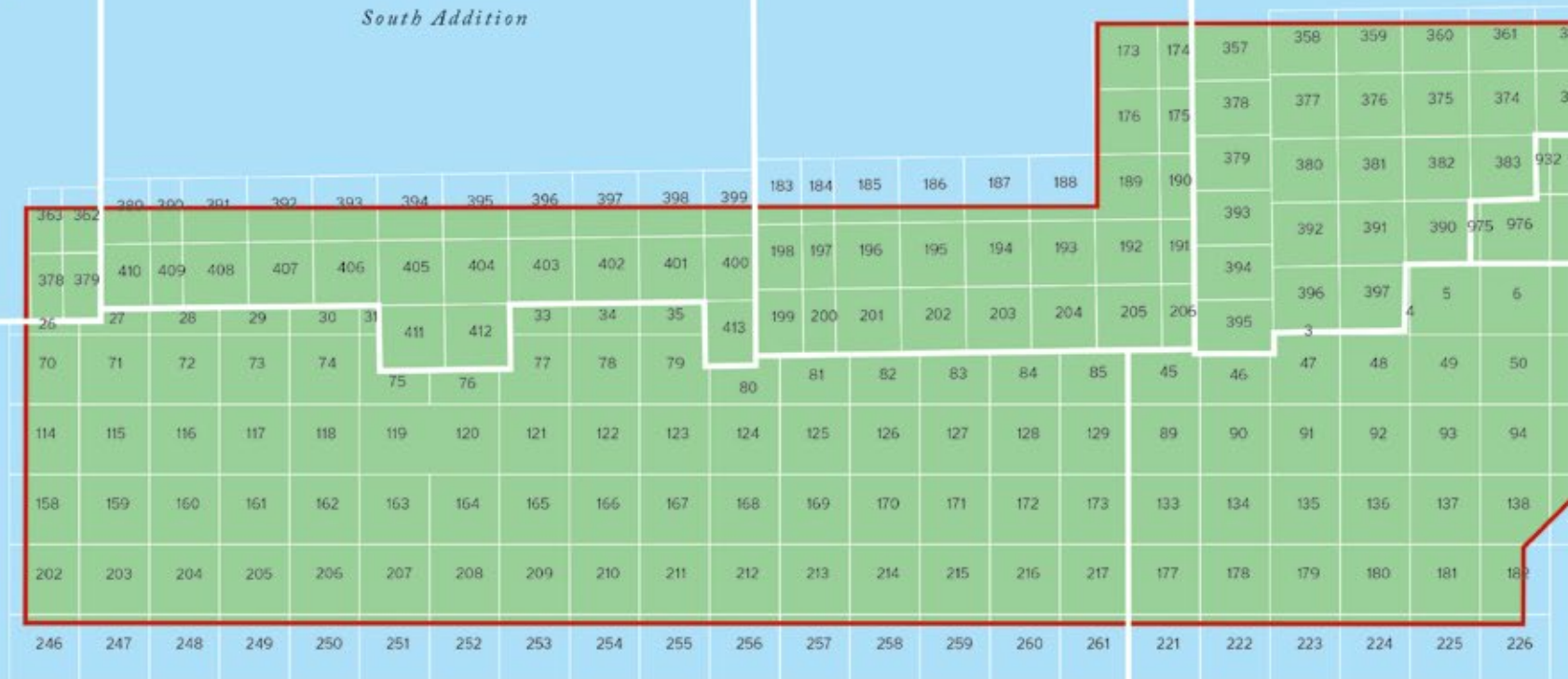
New wide azimuth program  
along the Gulf of Mexico shelf break.

*East Cameron*  
*South Addition*

*Vermilion*  
*South Addition*

*South Marsh Island*  
*South Addition*

*Eugene*  
*South Addition*

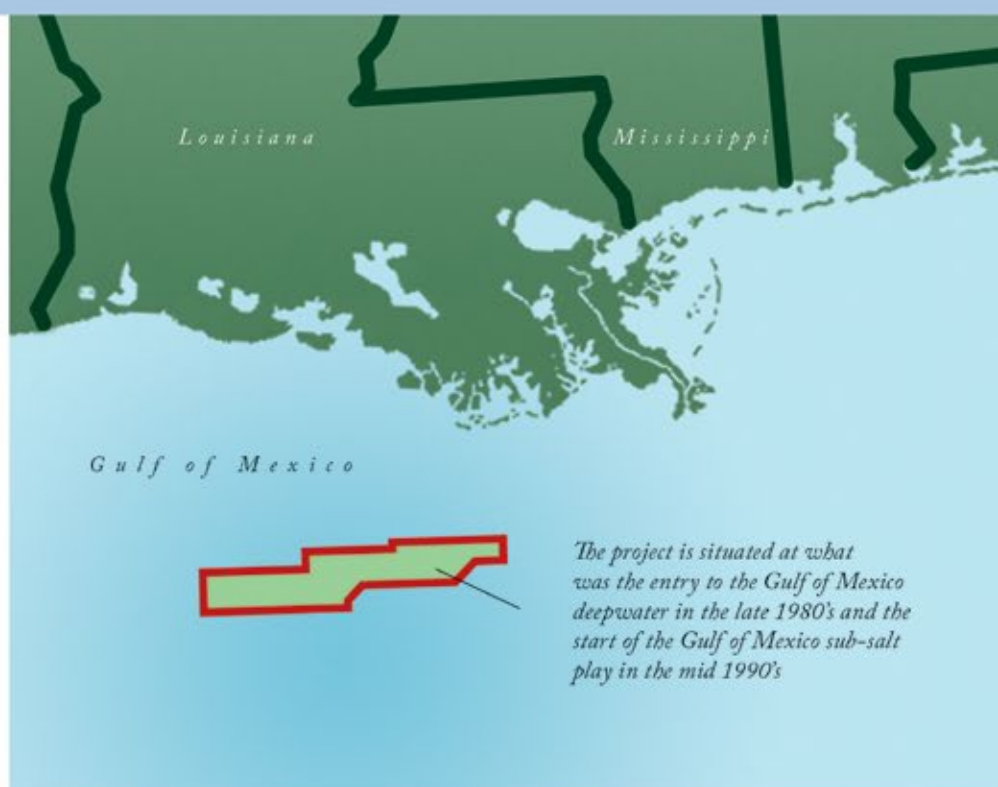




**This September Geophysical Pursuit and WesternGeco have commenced a new wide azimuth program along the Gulf of Mexico shelf break.**

The *Flex Trend WAZ* project covers 266 blocks in an area where no legacy long offset or wide azimuth data exists. Data acquisition is scheduled to complete in January 2014, followed by an initial FastTrack release in March and the final RTM TTI depth products available for delivery by year end.

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Long time coming

# Seismic While Drilling Moves Closer to Reality

By DAVID BROWN, EXPLORER Correspondent

For years the oil and gas industry put seismic while drilling (SWD) on its wish list.

This year, that wish is coming true.

The benefits of effective SWD are multiple and meaningful. The ability to see ahead of the drillbit while drilling, in real time, helps the driller avoid hazards, increase drilling efficiency and improve well results.

SWD can assist in confirming or configuring basin and reservoir models, and it can be combined with measurement while drilling data for information-rich downhole profiling.

Successful SWD captures seismic data without interrupting drilling operations, saving money and reducing risk. It also provides the ability to predict pore pressure ahead of the bit.

And it's happening now.

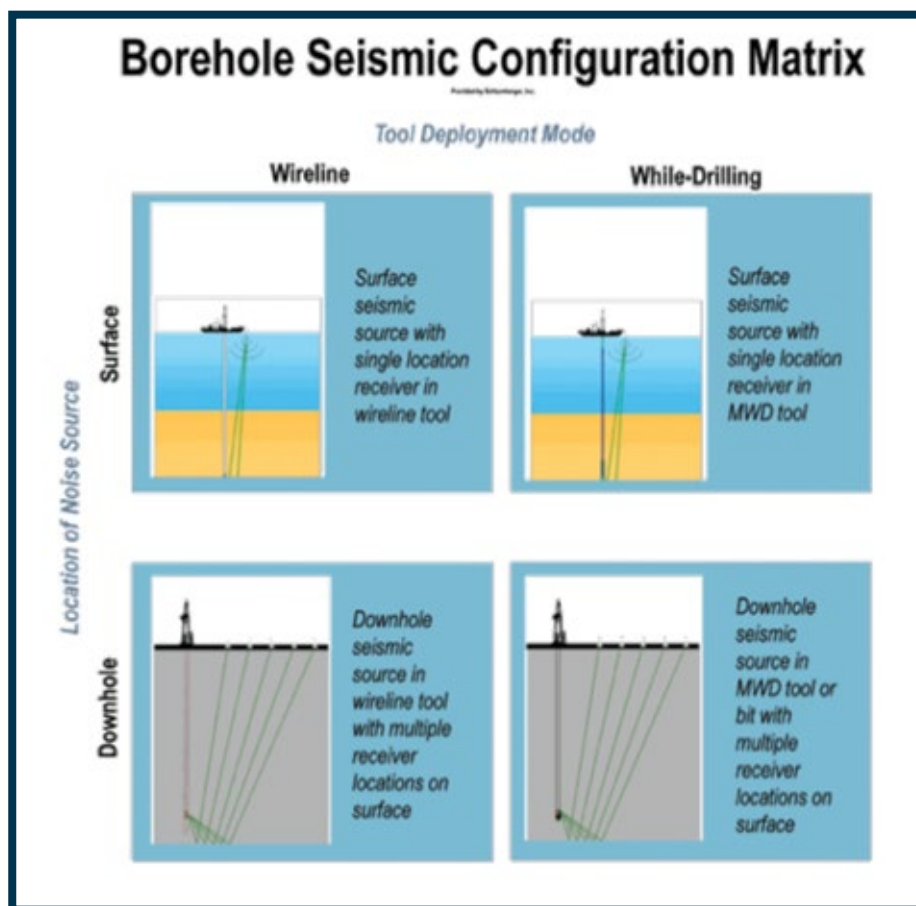
## Shifting Needs

Bob Radtke, president of Technology International Inc. in Houston, has done pioneering work in SWD.

In the 1980s and '90s, an early form of SWD used the energy from roller-cone bits as a downhole seismic source, with surface geophones picking up the seismic waves.

But that source disappeared as the industry began phasing out roller-cone technology, Radtke noted.

"In about 2002, Schlumberger said,



'Ok, we don't have a downhole source so we'll use a surface source,' which is the traditional source for seismic," Radtke said.

As Schlumberger worked on a viable approach to SWD, a series of workshops promoted SWD concepts to specialists in the industry – first in Dublin, Ireland, and

then in League City, Texas, near Houston.

Radtke said a shift in emphasis began to occur as companies viewed SWD primarily as a tool for offshore drilling, with a main benefit of identifying drilling hazards.

"What's interesting is that the benefits to industry have changed over time," Radtke observed.

"The future is deepwater," he said, "and priorities have shifted to avoiding hazards."

Because day rates for contracting an offshore drilling rig can be so expensive, operators hate to suspend drilling operations and idle a rig for seismic work. SWD captures data while drilling progresses, avoiding downtime.

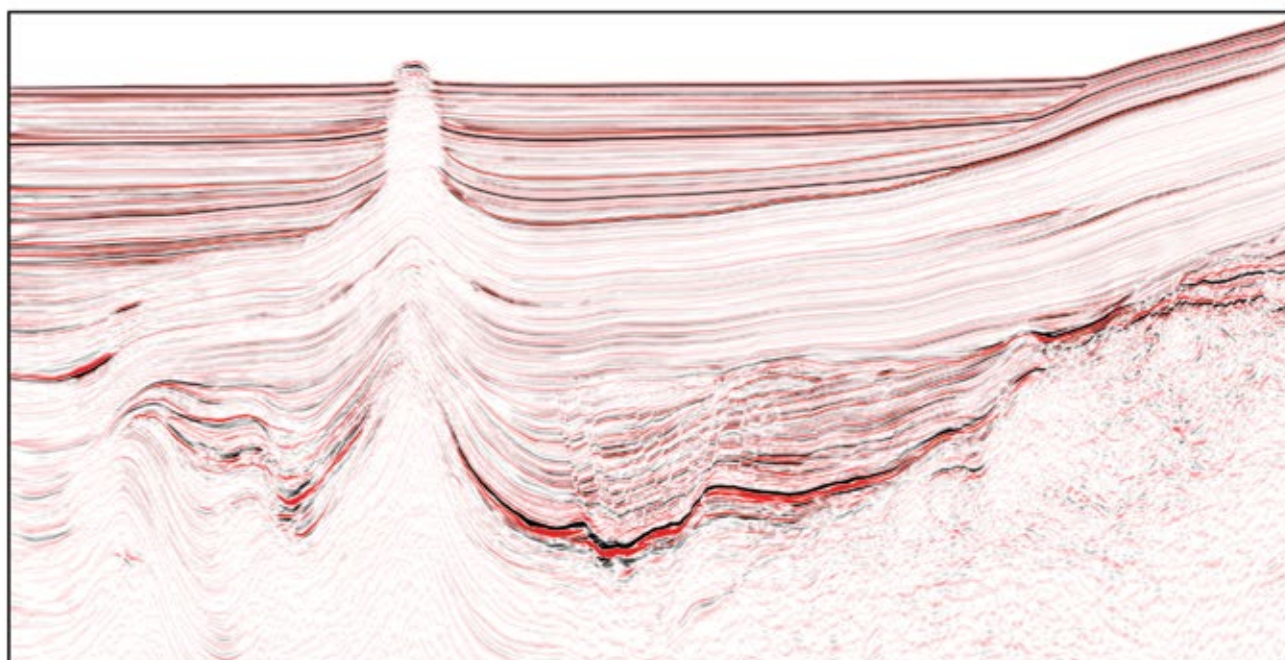
Plus, offshore operators have become more aware of over-pressured zones in deepwater exploration and other drilling hazards for several reasons. Does the name Macondo sound familiar?

By the time of the Society of Petroleum Engineers-sponsored League City workshop in 2007, it was apparent that Schlumberger and possibly other companies were offering offshore SWD services, Radtke said.

"There it became even more obvious that there were more of these being attempted offshore," he explained, "and they were successful."

See SWD, page 12

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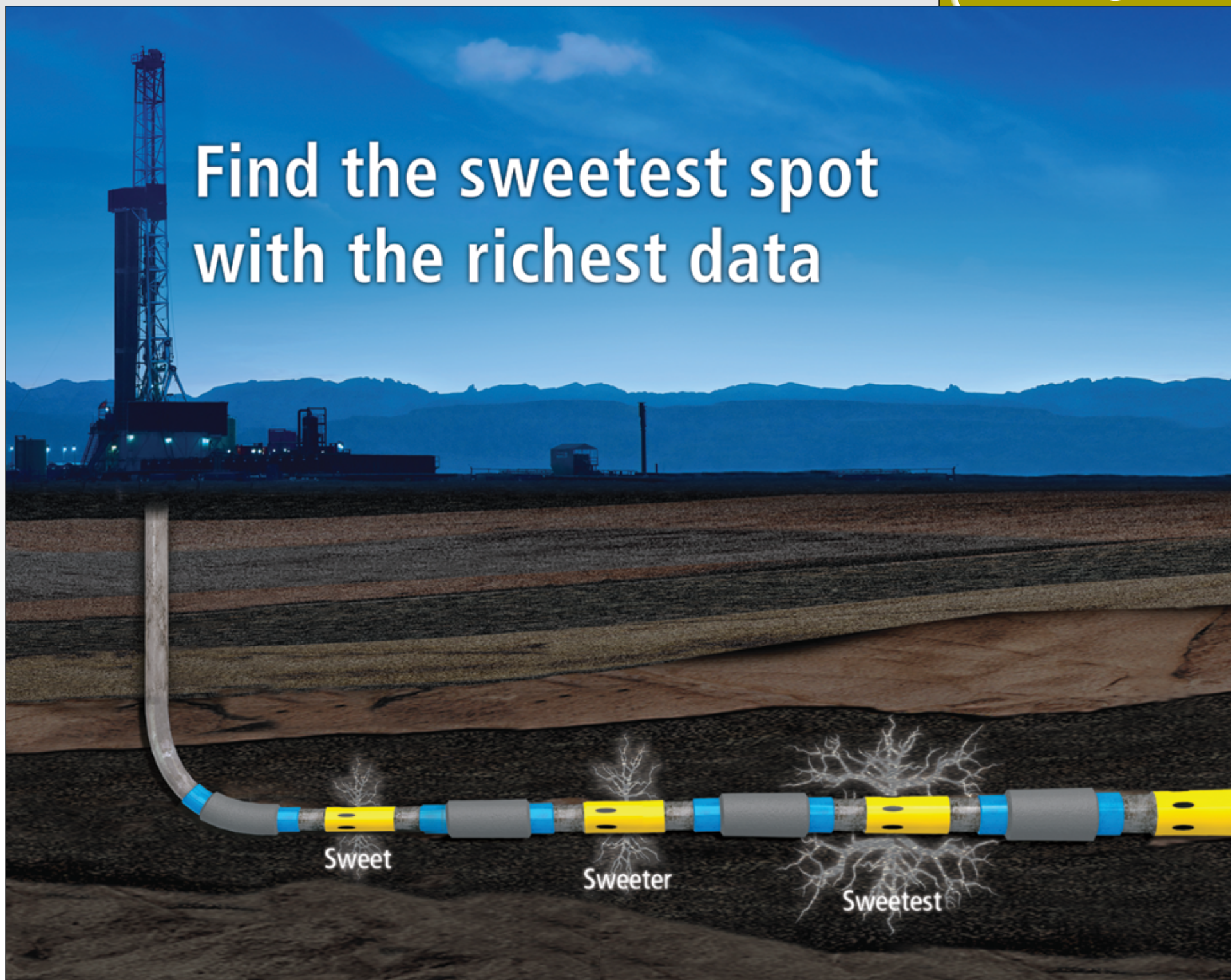
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# Diamonds Were *NOT* His Best Friend

**A**s you know, the advent of polycrystalline diamond bits killed the early success of seismic while drilling.

You didn't know that?

"I was involved in providing TomoSeis technology to the industry from 1988 to 1991 at WesternAtlas. This technology used rotary-cone drill bits as the seismic source," recalled AAPG member Bob Hardage, now a senior researcher with the Bureau of Economic Geology in Austin.

"We got some beautiful data with roller-cone bits," he said. "Then along came diamond bits that totally replaced rotary-cone bits, and TomoSeis died. Diamond bits do not generate effective



HARDAGE

seismic wavefields."

Hardage, a past president of SEG and former editor of the EXPLORER's Geophysical Corner column, was serving as head of the worldwide Western Atlas downhole-borehole seismic division when the TomoSeis SWD application was developed.

"Son of a gun, we got some pretty good quality data," he said. "We commercialized that and we had two crews providing the service. They were

kept busy."

That application relied on the energy and noise of rotary-cone bits grinding through rock as the seismic source for SWD.

The precise scientific term is "grindy noise."

Diamond bits don't make as much grindy noise, so they were no good as a signal source.

Current SWD applications utilize a surface source, typically an air gun. But the search for an effective downhole seismic source for SWD continues.

— DAVID BROWN

**SWD**  
from page 10

## Making Progress

But SWD still seemed to be a work in progress – until May 2013, when SPE and the Society of Exploration Geophysicists (SEG) sponsored another workshop, this one on Galveston Island. At that time, Schlumberger revealed it had already conducted more than 230 SWD jobs worldwide.

Stunner.

"That was new news to many in the industry, that the trend had been so positive," Radtke said.

Not only was SWD a "thing," it was a real thing maturing into commercial reality.

And so began the current scramble to develop and offer SWD services, and to enhance SWD capabilities.

"Some of these efforts are still in their infancies, but as I'm told, this has become a high priority," Radtke said.

What are the service companies saying about SWD? Precious little, other than marketing information. Everyone is looking over their own shoulders.

But companies reportedly are deploying more assets and people to build their SWD capabilities. And for good reason.

"When the requests for quotations are written, especially international, they require seismic while drilling," Radtke said. "Companies that don't have seismic while drilling capability will have trouble bidding on those tenders."

## Coming of Age

AAPG award-winning member Bob Hardage was keynote speaker at the Galveston Island SWD workshop. He's a senior research scientist at the Bureau of Economic Geology at the University of Texas-Austin, former president of SEG and former editor of the EXPLORER's popular Geophysical Corner column.

Hardage thinks some companies still are hesitant to rely on SWD as a drilling input.

"They see the possibility that it could fail and create a fishing problem they'll have to deal with," he said.

With a seismic source at the surface, sensors in the drillstring capture checkshot and interval velocity data for SWD time-depth-velocity detail. The industry has sought a downhole seismic source, both for better resolution and for avoiding some problems with downhole SWD.

"Where we are today is that people are saying, 'We want to do something like that old rotary bit concept,'" Hardage said. "Ideally, it would not require you to make any alteration in your drilling."

Radtke's company has developed a drillstring sparker tool that can generate seismic-friendly, low-frequency waves propagating over a long distance. It's one solution to the downhole source challenge, and Radtke believes seeing 1,000-3,000 feet ahead of bit is possible with the system.

Currently, SWD is deployed almost exclusively for deepwater or highly deviated/horizontal wells. That might not be the ultimate prize.

SWD holds big potential in unconventional resource development. Researchers already are studying SWD for identification of natural fracture clusters, to help identify sweet spots in resource plays, according to Radtke.

The future is definitely out there, and SWD has started to come of age.

"It's a positive trend in terms of application right now," Radtke said. ■

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## Wireless connections

# Deep Data in Real Time

By LOUISE S. DURHAM, EXPLORER Correspondent

**H**ead out to high-cost drilling environments – think deep water, for example – and there's one constant you can always expect to find.

You're facing steep operation costs.

That dynamic sparked industry services company Schlumberger to come up with an innovative technology that has the potential to offer a cost-saving solution to an operator.

The technology entails acquiring and fast-forwarding crucial reservoir data to the operator, thereby enhancing the operators' knowledge of the reservoir response for more efficient and timely decision making during reservoir testing.

The latest buzz centers on the company's recently released Quartet downhole reservoir testing system, enabled by Muzic wireless telemetry. The system provides data in real time for validation, providing critical information needed to meet the well test objectives.

With it, operators can interact with the downhole test tools, manage reservoir events and refine well tests in real time.

Quartet uses wireless bidirectional communication to provide downhole tool status, along with pressure and temperature data. This allows test design modifications and validation of test data while reservoir testing is occurring.

The Quartet system comprises four leading downhole testing tools that deliver accurate pressure measurements and contaminant-free reservoir-representative fluid samples all in a single run, according to John Reddington, marketing and technology manager, downhole testing and tubing-conveyed perforating at Schlumberger.

### Four for One

The four downhole tools making up Quartet are:

► CERTIS – Reservoir test isolation system having a built-in floating seal assembly that eliminates the need for drill collars and slip joints.

► IRDV – Intelligent remote dual valve is the control feature of Quartet, allowing bidirectional communication for tool command and verification. Removes the need for equipment requiring nitrogen pre-charges.

► Signature – This measurement tool is enabled by the new Signature quartz gauges, which provide wireless readout of downhole pressure measurements in real time.

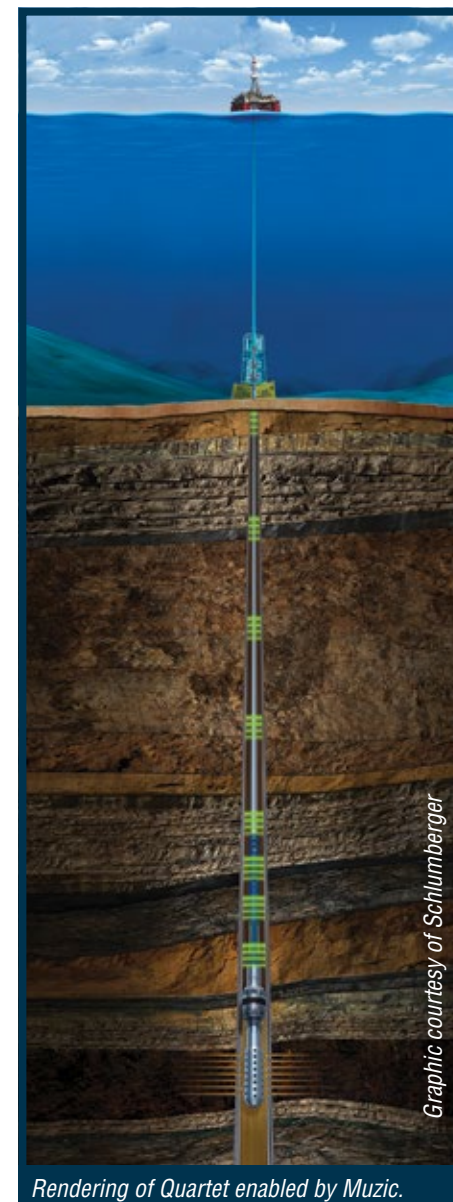
► SCAR – SCAR inline independent reservoir fluid sampling allows independent, redundant sample capture via wireless commands.

"With offshore deepwater well testing you don't want to rotate the string to set the packer, because you have umbilicals and control lines on the string," Reddington said.

"The CERTIS packer system allows the packer to be set just by pressure, without rotations," he noted. "Still, it allows the string to move due to the integrated floating seal assembly in order to compensate for expansion and contraction of the string and other issues."

"When you're finished, you just pick the string up and pull the entire system out of the hole, leaving the well clean and as it was prior to starting the well test," Reddington said.

Because the CERTIS isolation system



Rendering of Quartet enabled by Muzic.

eliminates the need for certain equipment, such as drill collars and slip joints, it simultaneously reduces the number of connections required.


Reddington emphasized the Signature quartz gauges are a central element in the Quartet system and also with any well test.

"All four technologies are crucial to perform the well test," he noted. "But the reason to perform this test is to get the data from the reservoir, and all of the equipment is run to convey the gauges to get the data with respect to the reservoir."

Considering the potential hazards to be encountered in getting a handle on accurate, timely reservoir data in challenging circumstances, even the most jaded of industry players likely will acknowledge the Wow Factor.

"In the very challenging deepwater environment, we're now transmitting data in real time while performing the test," Reddington enthused. "Once the data are at the surface, they can be transmitted to the client's office anywhere in the world, so they can make decisions in real time regarding the well and the reservoir."

Advantages of the Quartet system versus conventional strings include:

- Bidirectional wireless communication.
- No drill collars or slip joints.
- Fewer seals and connections.
- Multi-cycle flexibility.
- Single-trip efficiency.
- Less nitrogen.
- Lower operating pressure.
- Premium connections.
- Shorter string design. 



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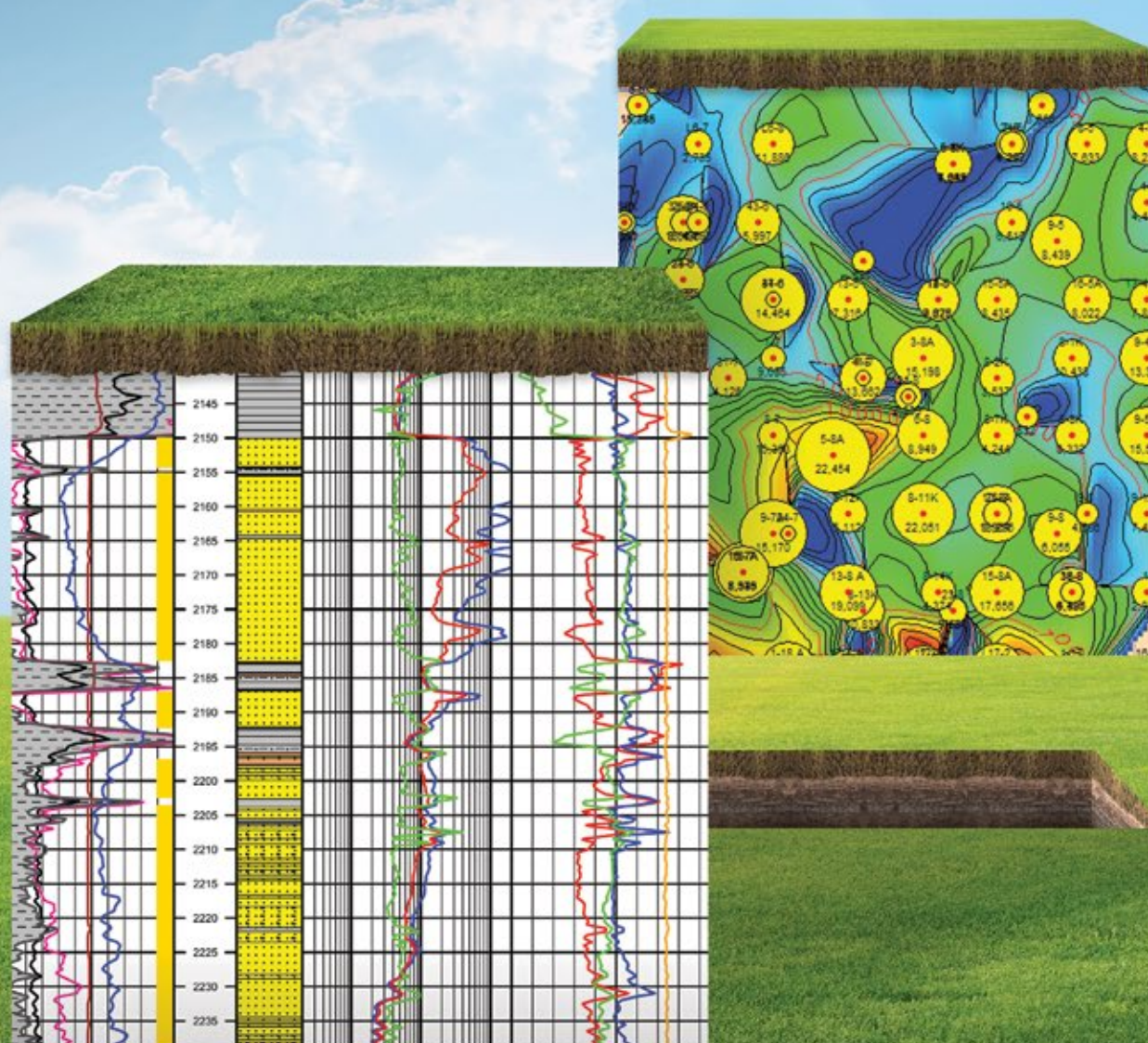
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## Global case studies

# Wireless Tool Gets Tested Around the World

By LOUISE S. DURHAM, EXPLORER Correspondent

The Quartet downhole reservoir testing system, enabled by Muzic wireless telemetry, was only recently commercialized by Schlumberger in 2013.

Already, reports indicate the innovative system has more than proved its value in the field.

Quartet has been deployed in 22 field trials in locales around the world, including Egypt, Indonesia, Qatar, Brazil and Angola, in locales ranging from onshore to deep water.

The trials registered a 100 percent communication success rate in transmitting

data from downhole to surface.

Quartet technology enabled by wireless telemetry was applied in Indonesia to meet a straightforward challenge: implement real time pressure transient analysis of bottomhole pressure (BHP) data to optimize well test operations conducted in a deviated offshore exploration well.

"The client sought a testing solution that would optimize operations because reservoir uncertainties and rig rates were high," said Bengt Nilssen, testing services marketing communications manager at Schlumberger. "Wireless transmission of

BHP and temperature data in real time was fundamental to attaining this goal.

"We proposed using Signature quartz gauges, which deliver high resolution pressure data, augmented even further with wireless telemetry," Nilssen said. "This integrated approach enables bidirectional communication between the surface and downhole.

"Repeaters, installed at intervals in the test string, transmit wireless commands downhole and pressure and temperature data to the surface," he noted. "Each gauge can be queried independently for

both real time and historical data."

Signature is one of four tools comprising the Quartet system. Each tool is considered to be equally applicable – yet not always required – in all environments.

Because the Indonesia field trial was not in deep water, a conventional packer was run instead of the CERTIS reservoir test isolation system, which eliminates the need for drill collars and slip joints.

"The Signature quartz gauges enabled by Muzic wireless telemetry successfully transmitted uninterrupted real time BHP and temperature data to the surface for seven days," Nilssen said. "This helped the client truly understand what type of reservoir they were looking at."

### Brazil Case Study

Halfway around the world in offshore Brazil, the Quartet system was used to do its thing in a whole different environment.

We're talking the ultra-deep water, pre-salt, which is known to test the skills and knowledge of the most seasoned operators.

"The challenge there was to quickly acquire real time well test data in the deepwater environment, while ensuring high data resolution and accuracy," said Schlumberger's John Reddington.

To enable the client to optimize its deepwater well operations, Schlumberger proposed a real time communication solution on a well in the pre-salt Santos Basin, more than 150 miles offshore Brazil, according to Reddington.

Water depth exceeded 6,500 feet.

"This is an excessively costly market," he emphasized. "The ability to deploy the CERTIS system with wireless telemetry means we could run this system much quicker than a conventional string, retrieve it quicker and have access to the data in real time much faster to be sure the objectives were reached."

Deploying the wirelessly enabled Signature gauges on the pre-salt well test allowed the client to interact with downhole equipment, manage wellbore events and refine the test in real time.


Running the wireless system in this well required less than six hours of rig time versus 20-24 hours when using a standard wireline system, according to Nilssen.

"We saved rig time by visualizing downhole data during flow periods," he said, "and eliminating the need to rig up a conventional surface readout system."

### The Results Are In

The Signature quartz gauges transmitted wireless downhole data continuously for 568 hours to provide the data necessary to optimize the well test operations in real time.

Reddington noted that the optimized test enabled the client's engineers to:

- ▶ Observe perforating guns' effect on pressure and confirm dynamic underbalance.
- ▶ Compute productivity when the well was flowing.
- ▶ Validate that sufficient data were acquired during the initial and main buildup periods to end them earlier.
- ▶ Eliminate the need for a wireline run.
- ▶ Establish reservoir pressure after the initial post-perforating flow period. 



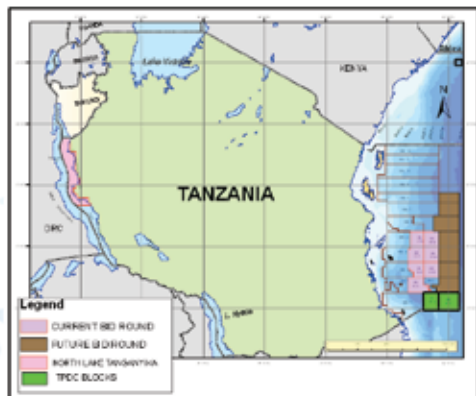
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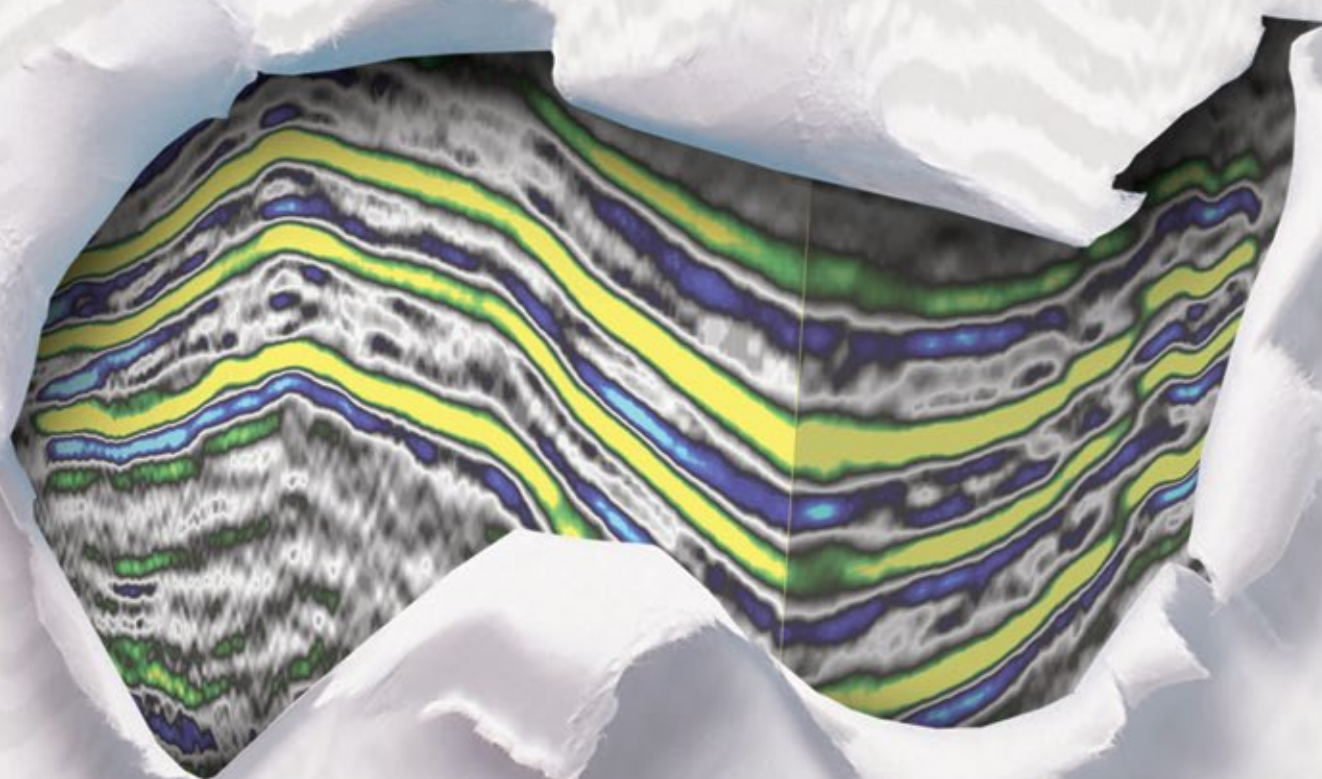
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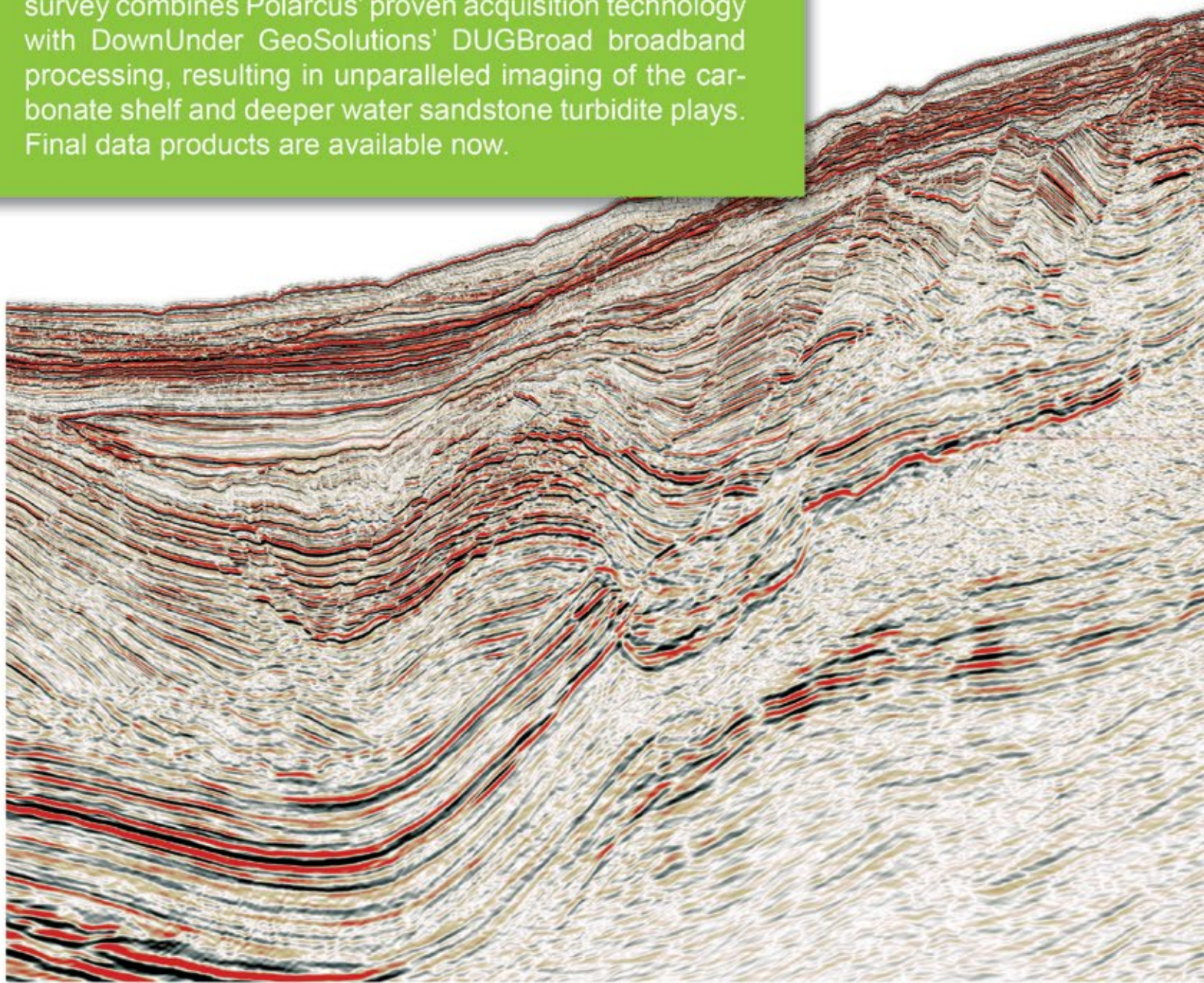
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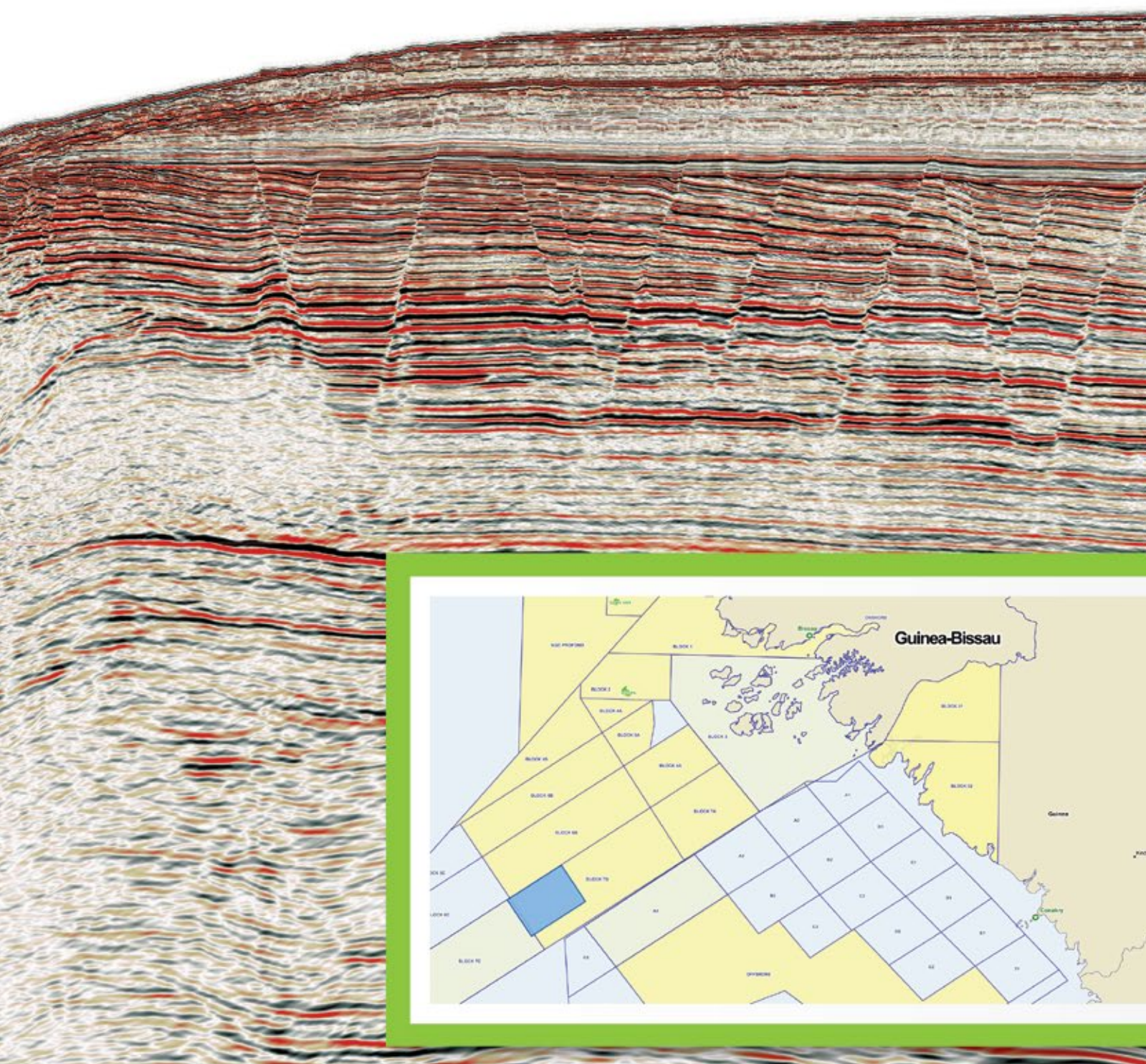
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How sweet it is

# Horizontal 'Fracs' Yield Stratigraphic Surprises

By LOUISE S. DURHAM, EXPLORER Correspondent

It often appears as if the majority of the population worldwide is yakking about hydraulic fracturing.

There's good talk and bad talk.

But despite all the chatter about hydraulic fracturing, which typically is done in horizontal wellbores, there's not yet been any fanfare about some pretty cool stuff going on that can impact application of this technology.

The general thinking is that you drill a well down to a determined hydrocarbon-bearing zone and head out laterally with the drill bit with the idea that everything is the same along the sideways leg.

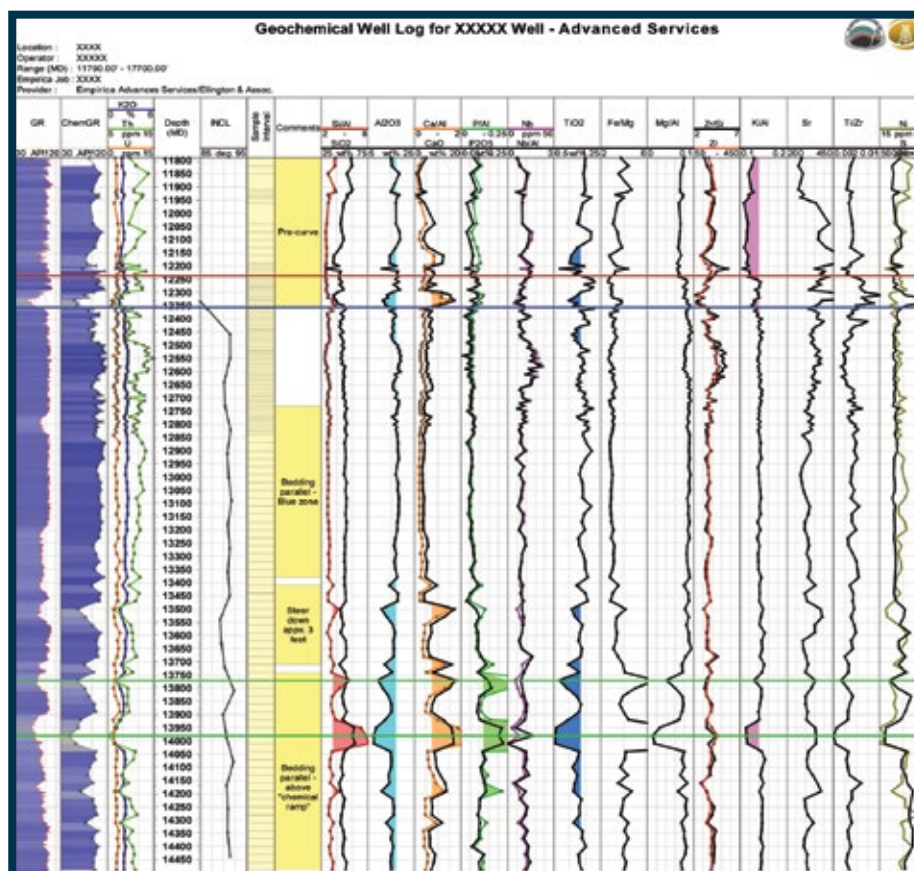
"Frac" jobs are implemented at specific intervals.

Sometimes that's a good idea, sometimes not.

It's now been shown that the "sweet" aspect of an identified sweet spot can change – not only stratigraphically, but also laterally within the zone itself.

"Sweet spot is a term that is loosely defined," said AAPG member Stephen Grimes, senior staff geologist at Empirica, a division of ALS Oil and Gas. "This is due to many contributing factors, such as TOC, payzone thickness, thermal maturity, fracture density and spacing, brittleness, clay content, nature of porosity and so on."

The common method of fracturing throughout a lateral, where the zone is actually heterogeneous, yields production that is a concoction of different



The essential idea of geosteering is to use some unique dataset to identify target vs. non-target stratigraphic horizons. Shown here is part of the resulting geochemical log from the new well. The red, blue and green lines note specific marker beds defined from the offset well. Note the relatively monotonous gamma and "chemical gamma" (computed from the elemental data) curves at left.

geochemical components.

"We can show evidence that horizontal wells commonly show significant heterogeneity through the lateral, for whatever reason," Grimes noted.

"This is seen in the gases liberated by drilling, as measured by direct quadrupole mass spectrometry (DQMS)," he said. "The clear differences observed enable laterals to be zoned in terms of prospective oil, condensate, gas, water-saturated or non-productive zones."

The implications here are heavy duty.

If you determine that a lateral "mini-zone," so to speak, is non-productive, then you can eliminate a frac job in that section, saving considerable time and perhaps a quarter of a million bucks, give or take.

On the other hand, if you're after, say, oil and maybe condensate, the frac jobs can be limited to only these potentially rewarding zones identified in the lateral.

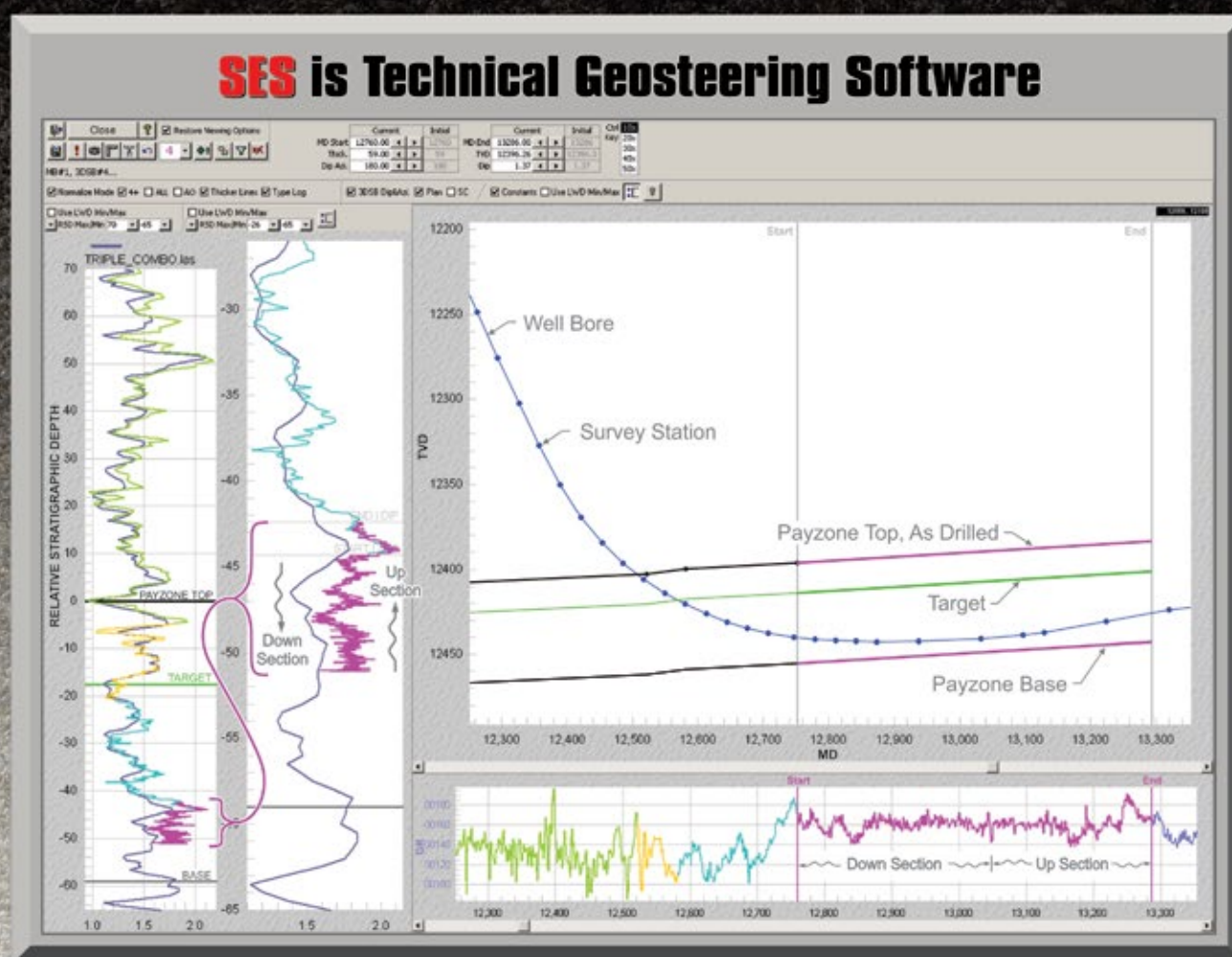
## It's a Gas

Grimes is quick to note that many laterals are pretty much homogeneous, with the targeted zone emitting essentially the same geochemical signal throughout.

Where heterogeneity enters the picture, it's essential to rule out that it's due to a change in stratigraphic levels owing to geosteering issues.

See Sweet Spots, page 24

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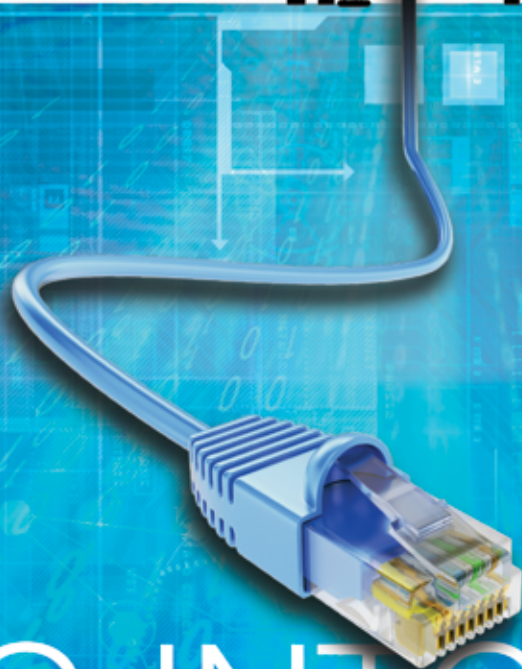
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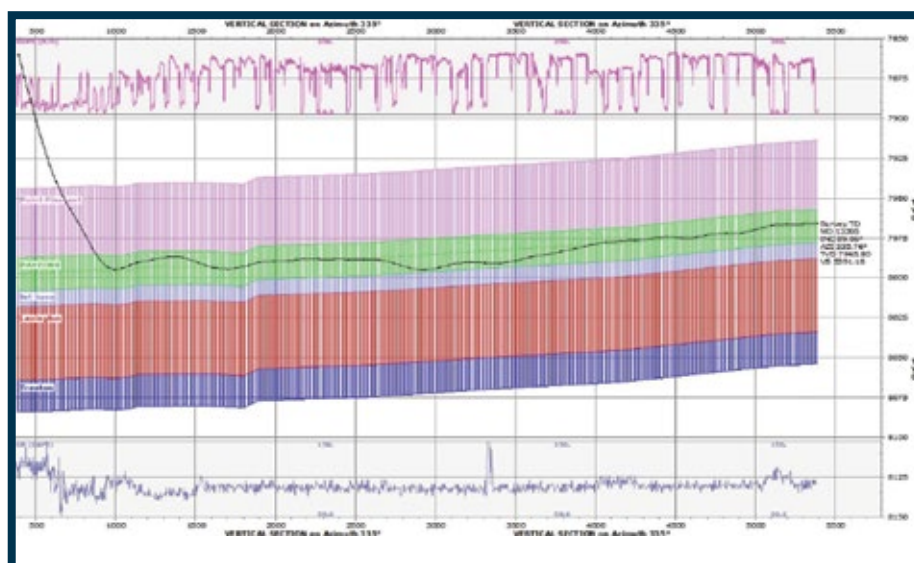
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Displaying the final data for a geosteering project; here's how it looked for a Utica Shale operation in Ohio. Data, graphic courtesy of Empirica.

## Advanced data analysis

# Geosteering as Research

By LOUISE S. DURHAM, EXPLORER Correspondent

**B**oth geosteering and horizontal drilling essentially became household words during the Austin Chalk drilling boom beginning in the late 1980s.

Lateral wellbores became the “in” method to tap production in the long-challenging chalk.

But drilling sideways deep within the earth while remaining in a specific zone can be tedious, to say the least. Imagine, for instance, navigating the bit within a 10-foot lateral for a distance of a few thousand feet.

To do this required geosteering technology, which basically is a means of steering the drill bit with reference to geologic markers. The markers often are the top and bottom of the pay zone, frequently defined via gamma ray or resistivity data.

Subsurface data are interpreted in real time to enable steering decisions on the fly.

“The essential idea of geosteering is to use some unique dataset to identify target versus non-target stratigraphic horizons,” said AAPG member Stephen Grimes, senior staff geologist at Empirica, a division of ALS Oil and Gas. “Usually gamma radiation is used, but also geochemical data and any other type of stratigraphic data.”

Even though geosteering continues to be used mainly for horizontal well placement, there's change afoot.

Operators are beginning to use geosteering as a research tool to help with exploration and more advanced data analysis.

“We are evaluating the use of other technologies for geosteering, such as mass spectrometry, which analyzes mud gases in great detail,” Grimes said, “or X-Ray Diffraction (XRD), which determines mineralogy of the cuttings.”

### On Your Mark(er) ...

Along with the array of data now being used to optimize well placement, operators in some areas are using multiple data sets to subdivide zones and create sequence stratigraphy maps.

Empirica recently used X-Ray Fluorescence (XRF) to geosteer a horizontal well. This method bombards a powdered sample with X-rays, causing each element in the sample to emit energy at characteristic wavelengths and energy levels, according to Grimes.

“By analyzing the spectrum produced, the machine is able to determine the relative

abundance of elements in the sample,” he said.

**“People are interested in what they can do to maximize economics out there as to horizontal drilling.”**

In this instance, fresh cuttings at the drillsite were analyzed using the XRF. Prior to drilling, cuttings from a vertical offset well were analyzed using the same machine and methods. Various marker beds in the play having specific major and trace-elemental properties were identified.

“As drilling and XRF of the new well advanced, we were able to identify the marker beds and guide the client to steer the well to stay in the pay zone,” Grimes said.

The result: The operator managed to stay within 13 feet of the well's target line.

“Additionally,” Grimes added, “our onsite mass spectrometry of the mud gases helped ensure the beds being drilled were actually productive zones.”

### Science to the Rescue

The industry is waiting on the next big breakthrough for horizontal wells, according to AAPG member Josh Dill, remote operations manager at Empirica.

He mentioned the Permian Basin as being a kind of experimental locale.

The Permian is a happening place for operators these days, and there's burgeoning interest in horizontal drilling in this old oil patch jewel, where vertical wells have traditionally been drilled.

“People are interested in what they can do to maximize economics out there as to horizontal drilling,” Dill said.

“It seems to be a sort of testing ground to see how that goes,” he added. “The work there seems to be using a lot more science to maximize profitability.” ■





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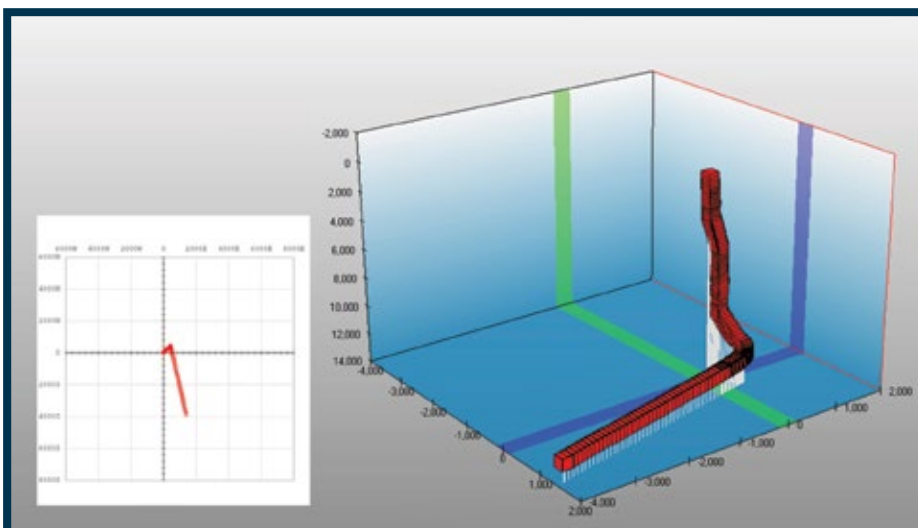
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Different views can better help you understand what the drill string is actually doing. Plan view (left) can be combined with an acreage map and then given 3-D treatment (right) to monitor lease lines and assist in communication during the completion process.

## Sweet Spots from page 20

It becomes a matter of determining how much of the zonation actually correlates to geochemical zonations.

"The main criterion refers to the heaviness of the population of gases we're analyzing in the mass spectrometer," Grimes said. "For instance, if we start getting a lot of heavier alkanes, like C-7 through maybe C-10, then it begins to look like an oil-bearing zone.

"We also look at different ratios of methane or propane to other gases," he noted. "This is kind of an extension of methods used successfully since the '80s, using gas chromatography data to figure out if it's oil or gas."

He emphasized they interpret what they're in from gases coming up through the drill stem, which is basically the same idea as mudlogging and clarifying the gas.

"On our main test well, the geosteering image shows how we traversed the section through the lateral and tied that to the mass spec data, showing that some heterogeneity is going on from a lateral well scale," Grimes noted.

### Something on the Light Side

Along with the gases being measured from the drilling mud, the team also is looking at some of the lighter elements and inorganic compounds in the vertical pilot well, especially for questions related to permeability or seal quality.

"We're looking at helium mainly because that's the smallest element that's going to be an indicator of seal quality, but also hydrogen and carbon dioxide," said AAPG member Josh Dill, remote operations manager at Empirica.

"In geosteering, we prefer to have data from a pilot well for comparison so we see things in stratigraphic order and know that from this different horizon we're getting this sort of chemical signal and this kind of gamma ray signal," Dill noted.

"A lot of our work on mass spectrometry is more for vertical pilot wells when they're cutting through stratigraphy, and this gives us ideas on geochemical changes as they go from bed to bed," Dill said. "If working on laterals, we have some basis of what to expect in that part of the formation.

"Since we're dealing with heterogeneity at the small scale of well versus basin scale, it's important to have a pilot hole and kick off from there to do the lateral," he emphasized.

"We have all different types of data related to just that well, so we're studying to tie those together and see the geosteering/gamma ray data in conjunction with mass spec," Dill said. "When Steve started to do that, he came up with some good theories and questions about heterogeneity."

### The Homogeneous Zone

The old method for using mass spectrometry and geosteering is that they are run independently and analyzed separately. The geosteering effort assumes that what is seen on the pilot hole is correct throughout the lateral – in other words, the zone is homogeneous.

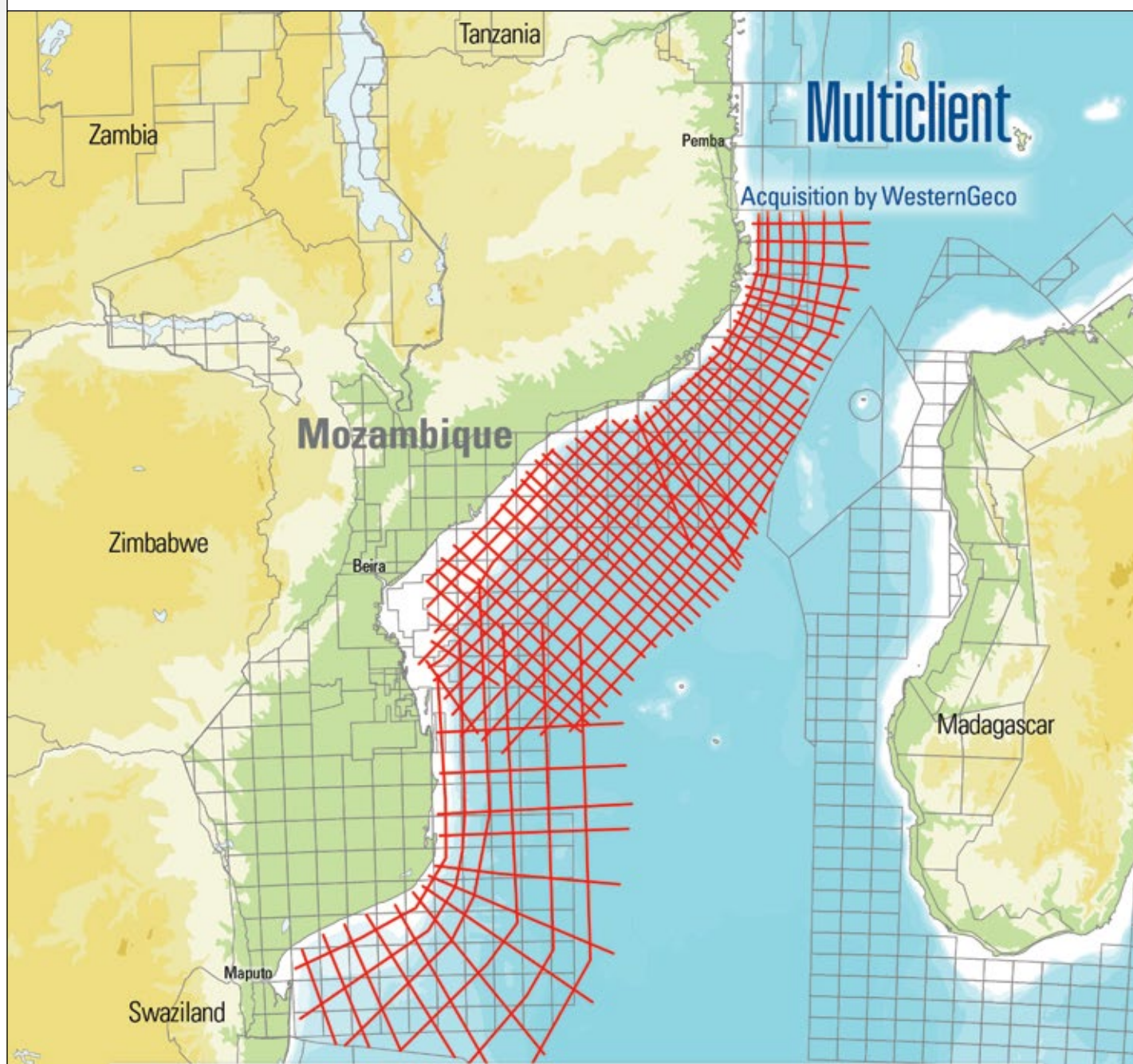
"The new style is what can we do, what can we improve," Dill said. "That's what we're seeing by using mass spectrometry data while actually doing the well and merging the two sciences rather than analyzing them both at the end."

He noted several examples of wells illustrating lateral zonation, one of them being the Cretaceous Tuscaloosa Marine Shale (TMS) in Mississippi.

"The well is strongly zoned for indicators of condensates and oil," Dill noted. "In order to verify that these zones reflect actual lateral differences within the target strata and not movement above or below the target, we re-geosteered the TMS lateral to see how much it had cut up- or down-section."

They verified that despite some movement of the bit, the zone contacts rarely correlate with expected stratigraphic contacts, and the zonation doesn't correlate with stratigraphic order.

"In other words," Dill said, "the hydrocarbon zoning is at least partly non-stratigraphic." ■



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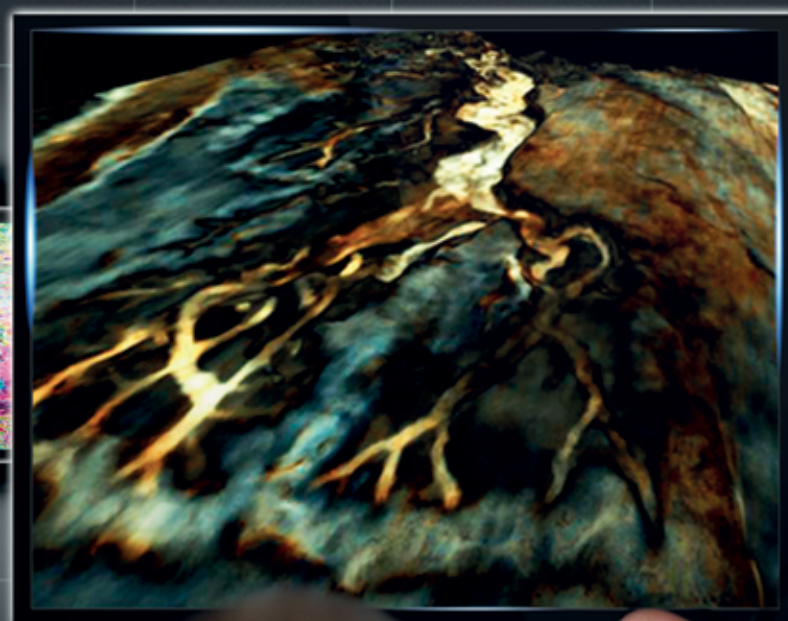


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*Fault finding***Tool Aids Interpretation**

By LOUISE S. DURHAM, EXPLORER Correspondent

The oil and gas industry is heavily populated with creative, forward thinking individuals working earnestly to find solutions to the varied challenges indigenous to this highly complex business.

This ensures a steady, seemingly unending flow of both brand new and improved technologies coming into the marketplace in response to demands posed by such diverse, challenging entities as the Arctic, the deep water, the always-complex shale plays – and a multitude more.

The ubiquitous use of seismic technology, for instance, keeps the industry players on their collective toes looking for new, more efficient approaches to data use and interpretation. After all, the value of seismic data lies within the information the data contain.

A recent study focused on interpreting complex structural information from 3-D seismic by using novel “Geological Expression” techniques instead of conventional manual picking methods offers a unique example of industry ingenuity.

A post-stack 3-D seismic dataset acquired from the Exmouth sub-basin of the Northern Carnarvon basin offshore the northwest shelf of Australia was used to test the techniques. The study was conducted



WOOLTORTON

by geoscientists at ffa-GeoSciences, which is headquartered in Aberdeen, Scotland.

According to ffa: “The idea behind Geological Expression is to strike a balance between enabling the interpreter(s) to bring all of their experience to help guide the process of extracting useful information from seismic data, while simultaneously harnessing the processing power of fast GPU processors to provide objective data analysis.

“This dramatically speeds up the interpretation process,” the company claims, “as the data can be manipulated quickly to extract real geological features.”

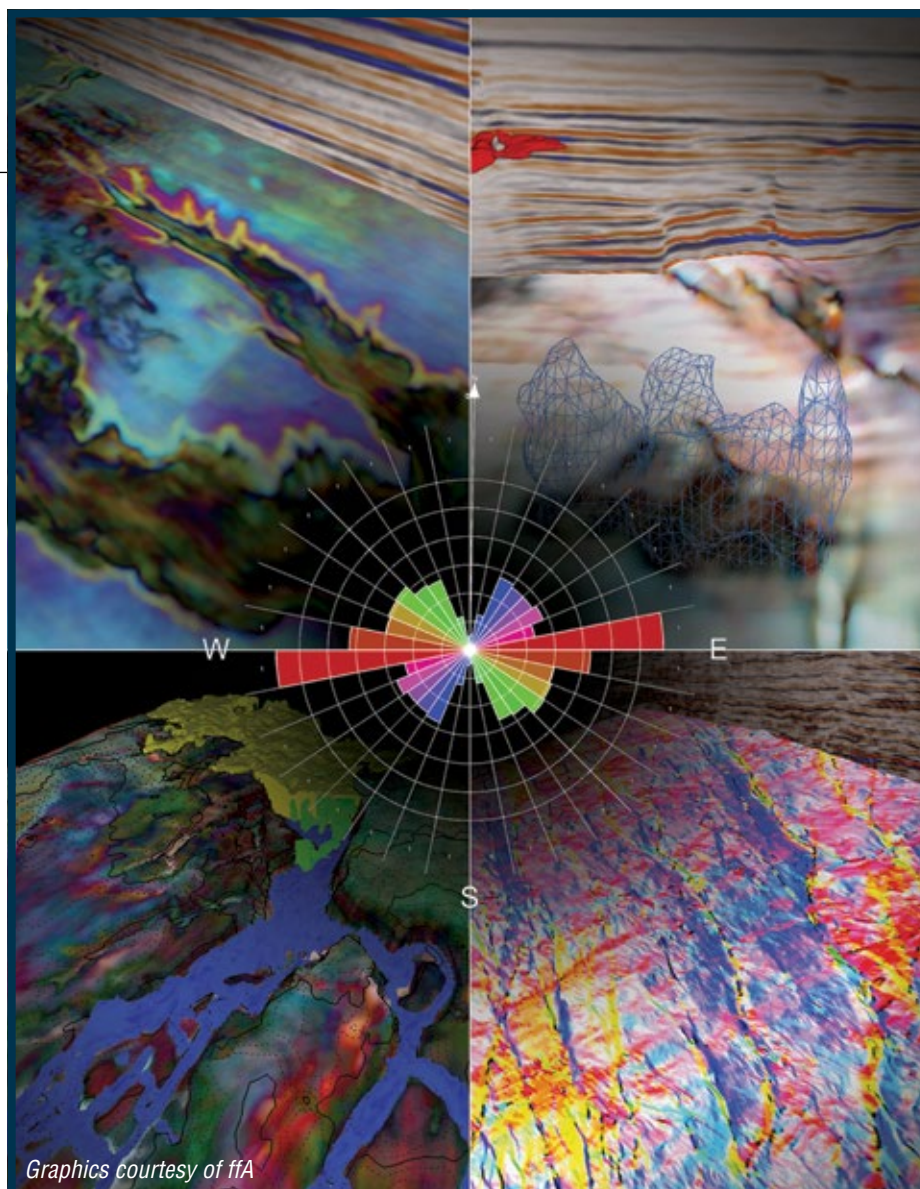
**Australian Case Study**

AAPG member Tom Wooltorton, sales support geoscientist in the ffa Houston office, presented a paper on the Geological Expression technique at the recent annual meeting of the Gulf Coast Association of Geological Societies (GCAGS), and afterward provided a succinct look at drawbacks of the commonly used manual interpretation approach.

“Structural interpretation of 3-D seismic is achieved principally through manual picking of faults on inlines and crosslines and then defining the geological context of the results,” Wooltorton said.

He noted that this can be inefficient for several reasons:

**See Australia Study, page 28**



Graphics courtesy of ffa

Geological expression technology adds another optional tool – and a lot more dramatic color and images – for the fault finding process.

## PROFESSORIAL AWARD MADE POSSIBLE BY GENEROUS DONATIONS

James Evans, Ph.D., teaches Structural Geology at the Utah State University College of Science in Logan, Utah. He is the recipient of the 2013 AAPG Foundation Professorial Award. The award was presented at the AAPG Rocky Mountain Section meeting.

The Professorial Award is given annually to a college professor within the United States who has demonstrated exceptional leadership in the field of geoscience instruction. The winner receives a \$1,000 cash award for his or her achievement.

### Congratulations, Dr. Evans!

This annual award is largely funded by a generous contribution from Jerry Namy, Trustee Associate for the AAPG Foundation.

Additional contributions will enable the Foundation to recognize more worthy individuals.



James Evans, Ph.D.







## Société Nationale des Hydrocarbures National Hydrocarbons Corporation

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Head Office : P.O.BOX 955 Yaoundé, Cameroon - Tel : (237) 22 20 19 10 - Fax: (237) 22 20 98 69

**INTERNATIONAL CALL FOR EXPRESSION OF INTEREST N°03/AMI/SNH/13 OF \_\_\_\_\_ FOR THE PRESELECTION OF CONSULTANTS WILLING TO PARTICIPATE IN THE LIMITED CONSULTATION RELATING TO FEASIBILITY STUDIES ON THE CREATION OF A PETROLEUM EXPLORATION AND PRODUCTION DATA PROCESSING CENTRE FOR THE PETROLEUM INFORMATION CENTRE OF THE NATIONAL HYDROCARBONS CORPORATION, IN CAMEROON.**

### 01. SUBJECT

The National Hydrocarbons Corporation (SNH) launches a Call for Expression of Interest to consultants willing to participate in the limited consultation for the selection of a Consultant to carry out Feasibility Studies on the creation of a petroleum exploration and production Data Processing Centre (DPC) in Cameroon.

### 02. CONTEXT (JUSTIFICATION OF THE STUDY)

The National Hydrocarbons Corporation (SNH) intends to create a petroleum exploration and production Data Processing Centre (DPC).

The project for the creation of any Data Processing Centre is unique and needs proper planning: an elaboration of the project scope; an appropriate definition and selection of facility requirements; and an outline of a detailed budget for the project. The project's budget depends on its scope and the scope is defined by the market. The target market is mainly the central African sub-region.

A Feasibility Study will help to understand the market potential and define the scope of the project. SNH is therefore seeking the assistance of a Consultant to carry out a Feasibility Study which will serve as the basis for defining the requirements for creating a petroleum exploration and production Data Processing Centre in Cameroon.

### 03. PARTICIPATION

Participation in this Call for Expression of Interest shall be opened to Consultants who fulfil the following conditions:

- Should have an experience in the building and/or running of a data processing centre;
- Should have knowledge and/or experience in the petroleum activities in countries of the Central African Economic and Monetary Community (CEMAC);
- Should be available immediately for the study; and
- Shall not participate in the bid for the selection of a technical partner to set up the Data Processing Centre in order to ensure that the results of the feasibility study are unbiased.

### 04. COMPOSITION AND PRESENTATION OF FILES FOR THE EXPRESSION OF INTEREST

The file for the Expression of Interest shall comprise two envelopes marked as "Envelope A" and "Envelope B":

#### a) Envelope A: Administrative File

- **Company Name and Profile:** The Bidder shall state its full legal name (including full address, telephone, fax, e-mail, etc.), registered number, and registered office as well as list the names of the executive officers responsible for its activities;
- **Undertaking of Availability:** The Bidder shall provide an Undertaking to certify immediate availability for the Study if awarded the contract;
- **Undertaking of non-participation as Technical Partner:** The Bidder shall provide an Undertaking to certify non-participation in the invitation to bid as a Technical Partner in case the Feasibility Study is conclusive; and

#### b) Envelope B: Technical File

- **Technical Experience:** The Bidder shall provide documentary evidence regarding the relevant work experience, personnel etc., required to provide the services. This shall include exhibits of the bidder's knowledge of issues related to Petroleum Data Processing, in general, and include proof of technical competence (Verifiable Catalogue of relevant work history, to be attached) in the successful execution of similar feasibility studies or creation of Data Processing Centres, knowledge and/or experience of petroleum activities in the countries of the CEMAC zone.
- **Key Project Personnel:** The Bidder shall list names with detailed curriculum vitae (qualification, professional experience) of the key staff he intends to assign to carry out the study.
- **Financial capacity:** The Bidder shall confirm and indicate its financial capacity to carry on with the Feasibility Study, with respect to the payment schedule mutually agreed upon in the Service Agreement to be executed.

The above mentioned envelopes A and B, presented separately and marked as such, should be put in another envelope sealed externally with the following inscription:

"To the attention of the Executive General Manager of the National Hydrocarbons Corporation:

**CALL FOR EXPRESSION OF INTEREST N°03/AMI/SNH/13 OF \_\_\_\_\_ FOR THE PRESELECTION OF CONSULTANTS WILLING TO PARTICIPATE IN THE LIMITED CONSULTATION RELATING FEASIBILITY STUDIES ON THE CREA-**

**TION OF A PETROLEUM EXPLORATION AND PRODUCTION DATA PROCESSING CENTRE FOR THE PETROLEUM INFORMATION CENTRE OF THE NATIONAL HYDROCARBONS CORPORATION IN CAMEROON - CONFIDENTIAL - TO BE OPENED ONLY AT THE TENDERS OPENING SESSION**

### 05. EVALUATION OF FILES

#### ❖ Elimination criteria

- Incomplete Administrative File or false statements;
- Lack of experience in the building and/or running of an exploration/production data processing centre;
- Technical File scores less than seventy five on one hundred (75/100).

#### ❖ Essential Criteria

N°	Criteria	Points
1	<b>Bidder's professional references in the domain of Petroleum Data Processing, Data Processing Centre Set up and Management:</b> <ul style="list-style-type: none"> <li>• Number of justified references <math>\geq 5</math>: 30 points</li> <li>• <math>3 \leq</math> Number of justified references <math>&lt; 5</math>: 25 points</li> <li>• <math>1 \leq</math> Number of justified references <math>&lt; 3</math>: 15 points</li> <li>• No references: 0 point</li> </ul>	30
2	<b>Bidder's professional references in the knowledge and/or in the petroleum activities in the countries of the Central African Economic and Monetary Community (CEMAC):</b> <ul style="list-style-type: none"> <li>• Number of justified references in at least 4 CEMAC countries: 15 points</li> <li>• Number of justified references in 2 or 3 CEMAC countries: 12 points</li> <li>• Number of justified references in 1 CEMAC country only: 5 points</li> <li>• No references in a CEMAC country: 0 point</li> </ul>	15
3	<b>Cumulative turnover of the bidder in petroleum activities and projects over the past five years</b> (copies of contracts and acceptance reports should be attached) <ul style="list-style-type: none"> <li>• Cumulative turnover <math>\geq 250</math> million CFA francs: 30 points</li> <li>• <math>150 \leq</math> Cumulative turnover <math>&lt; 250</math> million CFA francs: 20 points</li> <li>• <math>100 \leq</math> Cumulative turnover <math>&lt; 150</math> million CFA francs: 10 points</li> <li>• Cumulative turnover <math>&lt; 100</math> million CFA francs: 0 point</li> </ul>	30
4	<b>Qualification and experience of the Company's key staff assigned to carry out the Study</b> (CVs should be attached) <ul style="list-style-type: none"> <li>• Presence of a Computer Expert: 06 points</li> <li>• Presence of a Geosciences Expert: 04 points</li> <li>• Presence of a petroleum E/P Data Processing Expert: 07 points</li> <li>• Presence of a Project Management Expert: 03 points</li> </ul>	20
5	<b>Presentation of the technical file</b> <ul style="list-style-type: none"> <li>• Presence of chapters related to the 4 essential criteria mentioned above: 3 points</li> <li>• Presence of a summary: 0.5 point</li> <li>• Pagination of document: 0.5 point</li> <li>• Binding/Folder of document: 0.5 point</li> <li>• Page make-up/Formatting: 0.5 point</li> </ul>	05
<b>Total score for the technical file</b>		<b>100</b>

### 06. SUBMISSION OF FILES

The files, drafted in French or English, in six (06) copies comprising one (01) original, must be submitted in a sealed envelop at the Secretariat of the General Management of SNH, P.O. Box 955 Yaoundé - Cameroon, Tel : (00) 237 22 20 98 64, Fax: (00) 237 22 20 98 69 not later than 12 noon prompt local time on 02 January 2014.





## Trying to Speed the Future's Arrival

**G**eological Expression is a data-driven, interpreter-guided approach for understanding and defining the 3-D morphology of the geological elements imaged within the seismic data, according to Chris Cottam, a Houston-based ffa vice president.

He elaborated further.

"Geological Expression is designed to improve the effectiveness and efficiency with which seismic data can be used to give as detailed an understanding as possible of the geology of the subsurface," he said. "It is founded on sophisticated image processing techniques that are made simple to apply through their application within a highly intuitive, data-driven, interpreter-guided workflow."

"The Geological Expression approach

embedded in GeoTeric (Geological Expression software) improves returns on expensively acquired seismic data," he said. "GeoTeric makes intuitive, real-time interpretation of the 3-D morphology of geological elements imaged within seismic data a reality. This enhances the in-depth understanding of the subsurface required for increased confidence in well planning."

"The future of seismic interpretation involves more comprehensive use of the information contained within the seismic data," he added.

"Achieving this means giving the interpreter the power to interactively analyze the data and make intuitive decisions based on what is being revealed from the seismic to evidence the imaged geology."

— LOUISE S. DURHAM

## Australia Study from page 26

▶ Manual interpretation is highly time consuming, and it's difficult to process more than a portion of the data by the eye.

▶ There is a high risk of subjectivity, especially with poor quality or ambiguous data.

▶ Commercial pressures may mean the work may be rushed.

These limitations are in stark contrast to the advantages afforded via the data-driven, interpreter-guided Geological Expression workflow approach to understanding and defining the 3-D morphology of the geological elements within the seismic data, according to Wooltorton:

▶ Significant reduction in time required to generate geologically meaningful results.

▶ Transforming the data into a form relative to structural interpretation enables rapid access to the information.

▶ Enhance the value of the original seismic data by ensuring full information content is utilized.

"The particular advantage of the data-driven method in the instance of the (Australia) study is the richness of information present in the seismic data," Wooltorton emphasized.

The Geological Expression workflows applied to the Australian shelf seismic cube adequately demonstrated the wealth of knowledge of the structural geology that can be obtained without resorting to manual interpretation.

"Using volumetric interpreter guided data analysis and extraction methods, based on 3-D seismic attribute analysis, a structural history was interpreted and supported by statistical information," Wooltorton said.

"To determine the broad structural trends of the seismic reflections, volumetric dip and azimuth cubes were computed from the conditioned data," he noted. "The dip and azimuth cubes also were combined in one volume that displayed the results in a two-dimensional color map."

Wooltorton commented that upon visual interpretation, the DipAzi-combined volume immediately provided contextual information.

For example, a clear change in structural trend is shown across an angular conformity.

### Hope for the Future

When all was said and done, the study analysis revealed "fault system activity and movement that occurred over several tectonic phases, including evidence suggesting a loss of integrity in a known sealing lithology."

The effort required only a few days, including processing of the post-stack seismic data.

"One of the most striking things about this study is the amount of interpretive information that can be obtained in such a short amount of time," Wooltorton exclaimed.

He noted also that the geological setting of the particular part of the area studied is well known and explored. This enabled the end results of the study to be validated via known data.

The study overall was designed to reach beyond the technology itself.

"Over and above the technical objectives, the aim of this study was to evaluate how the potential of 3-D seismic can be exploited in a way that goes beyond the 2-D mindset that still dominates most facets of seismic interpretation," Wooltorton said.

"Considerable effort has been expended in recent years on improving technology and hardware for interpretation tools," he noted. "But relatively little effort has gone into innovating new techniques that aren't subject to historical limitations."

If more studies similar to the test case can be implemented and translated to real world commercial value, then the next generation of seismic interpretation techniques may be innovated in a variety of other capacities, according to Wooltorton.

"Often," he said, "the impression is that while there are plenty of creative minds in seismic interpretation looking at new techniques, the constraints of time and commercial pressure prevent these from being explored." ■

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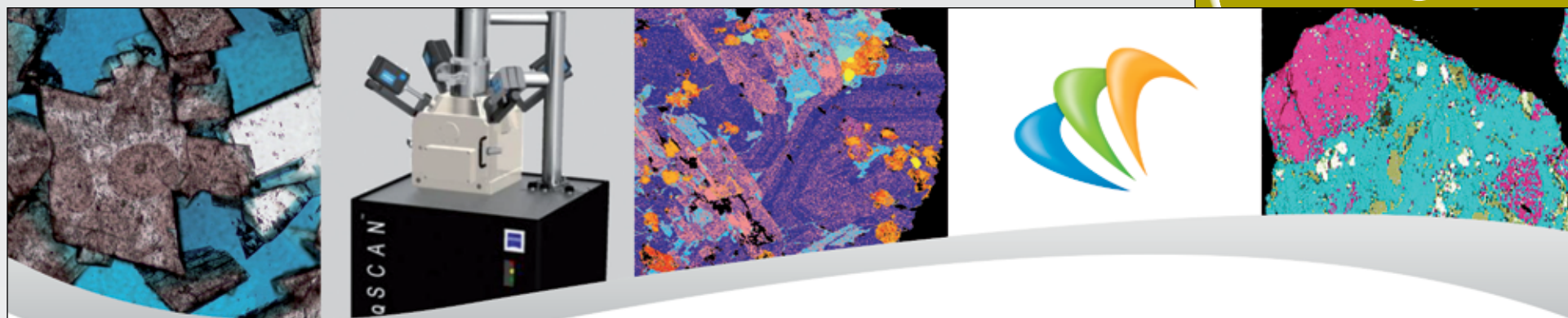
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\*Hodenfield, K. 2012. Operators seek Fracture Consistency, The American Oil & Gas Reporter.



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*Visualizing and mapping  
 channels with 3D seismic*

There is no more iconic image than that of a channel imaged by 3D seismic data. It illustrates the value of three-dimensional imaging to map the shape and volume of an erosional channel scoured into surrounding country rock. It was the way geophysicists and geologists could first see and comprehend the ability to create geobodies and to separate them out from surrounding rocks. It was the geometry recognized with the first coherency images.

These early step changes in using 3D techniques and visualizing geobodies are now mature, so what now is the state of our knowledge and ability to refine this unique geologic pattern? With a plethora of seismic attributes at our fingertips and increased geologic understanding of channels, incised valleys caused by sea level changes, and thousands of square miles of global 3D and 4D seismic data, what new insights to mapping channels can we show?

Channels as depositional systems are a unique and prolific stratigraphic deposit which entrap hydrocarbons around the world. The timing and formation of sinuous and stratified layers associated with scoured channel deposits make them ideal conduits for hydrocarbon migration across deep water, shelf, and shoreline depositional systems. They are the internal fiber that weaves the fabric of depositional system patterns, much like a brightly colored thread weaved within a textile cloth.

The editors of *Interpretation* ([www.seg.org/interpretation](http://www.seg.org/interpretation)) invite papers on the topic **Visualizing and mapping channels with 3D seismic** for publication in a February 2015 special section to supplement the journal's regular technical papers on various subject areas.

- Show global channel geometries found within ancient nonmarine, shoreline, shelf, and deep water depositional systems.
- Illustrate examples of channel systems imaged by 3D seismic and explain their acoustic properties which allow them to be seen or transparent along their pathway.
- Show workflows and techniques which help map and evaluate channel geometries.
- Show better ways of mapping and visualizing the channel geobodies as they cut through the surrounding country rock, with emphasis on characterizing unique internal depositional components which form the channel system.
- Present case studies which demonstrate hydrocarbon traps associated with channel geometry, both within the channel and alongside the channel, as well as the surrounding structural shapes which influence the hydrocarbon trapping.
- Use 4D seismic surveys which characterize channel reservoir properties as demonstrated by reservoir fluid movements through time.

Interested authors should submit their manuscripts for review no later than **15 April 2014**. In addition, the special section editors would like to receive a provisional title and list of authors as soon as possible. Authors should submit via the normal online submission system for *Interpretation* (<https://mc.manuscriptcentral.com/interpretation>) and select **Visualizing and mapping channels with 3D seismic** in the manuscript type dropdown option. 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:

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

Special section editors

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*Interpretation* special section

# CALL FOR PAPERS



The Heriot-Watt University campus in Edinburgh, Scotland. A new research center dedicated to earth and marine science technology will open there in 2015.

*Lyell's namesake*

## New Research Center Planned in Scotland

By SARAH HAVILAND, EXPLORER Correspondent

Currently in the planning stages with many geoscientific ideas on the table, a \$27 million research center dedicated to earth and marine science and technology will open its doors on the campus of Heriot-Watt University (HWU) in Edinburgh, Scotland, in 2015.

It will be the result of a new partnership between the university and the British Geological Survey (BGS).

Named after Britain's foremost 19th century geologist who also had strong links with the university, the Sir Charles Lyell Centre will stand out for its strong focus on serving both the public and private sectors through adoption of:

- ▶ A holistic, A-to-Z approach to research in global change and ecosystems.
- ▶ Seafloor-mapping, using advanced robotic vehicles.
- ▶ Earthquake and volcanic risk and monitoring.
- ▶ Energy security.

With the United Kingdom's and Europe's eyes fixed on the emerging industries of shale oil and gas and deep sea metal mining, the center will concentrate on the further pursuit of these ventures and tackling the environmental and logistical issues that inevitably arise with them, according to BGS executive director John Ludden.

It also will delve into ways of safely storing captured carbon in offshore basins, among with many other areas of research, he added.

Bringing science and technology together, the center will align HWU's strengths in exploration geoscience, petroleum engineering, environmental monitoring and marine science with the BGS's highly respected expertise in field mapping, volcanic and seismic hazard and risk assessment, petroleum systems evaluation, and structural analysis, said AAPG member John Underhill, chair of exploration geoscience at HWU.

Underhill also is a past AAPG Distinguished Lecturer, Matson Award winner and the 2013 recipient of the AAPG

Grover E. Murray Memorial Distinguished Educator Award.

"The new center represents a perfect marriage between earth and marine science, between pure and applied geosciences and between survey and academia," Underhill said. "The result will be a new, integrated approach to both pure and applied earth and marine science in the United Kingdom."

### Academia-Industry Collaboration

The Lyell Centre will be a three-story, modern L-shaped building with an office-free, open-concept design that will serve as the impetus for the interaction of approximately 300 scientists and researchers. Its laboratories will be equipped for sensor testing and volcanology and include aquariums for robotic modeling.

Funded by the Natural Environment Research Council (NERC), the Scottish Funding Council, HWU and United Kingdom and Scottish government funders, the center will be located adjacent to and linked to the university's renowned Institute of Petroleum Engineering.

The proximity is intended to encourage the collaboration between scientists and students needed for continued exploration for and production of unconventional oil and gas from newly discovered reservoirs, Ludden said.

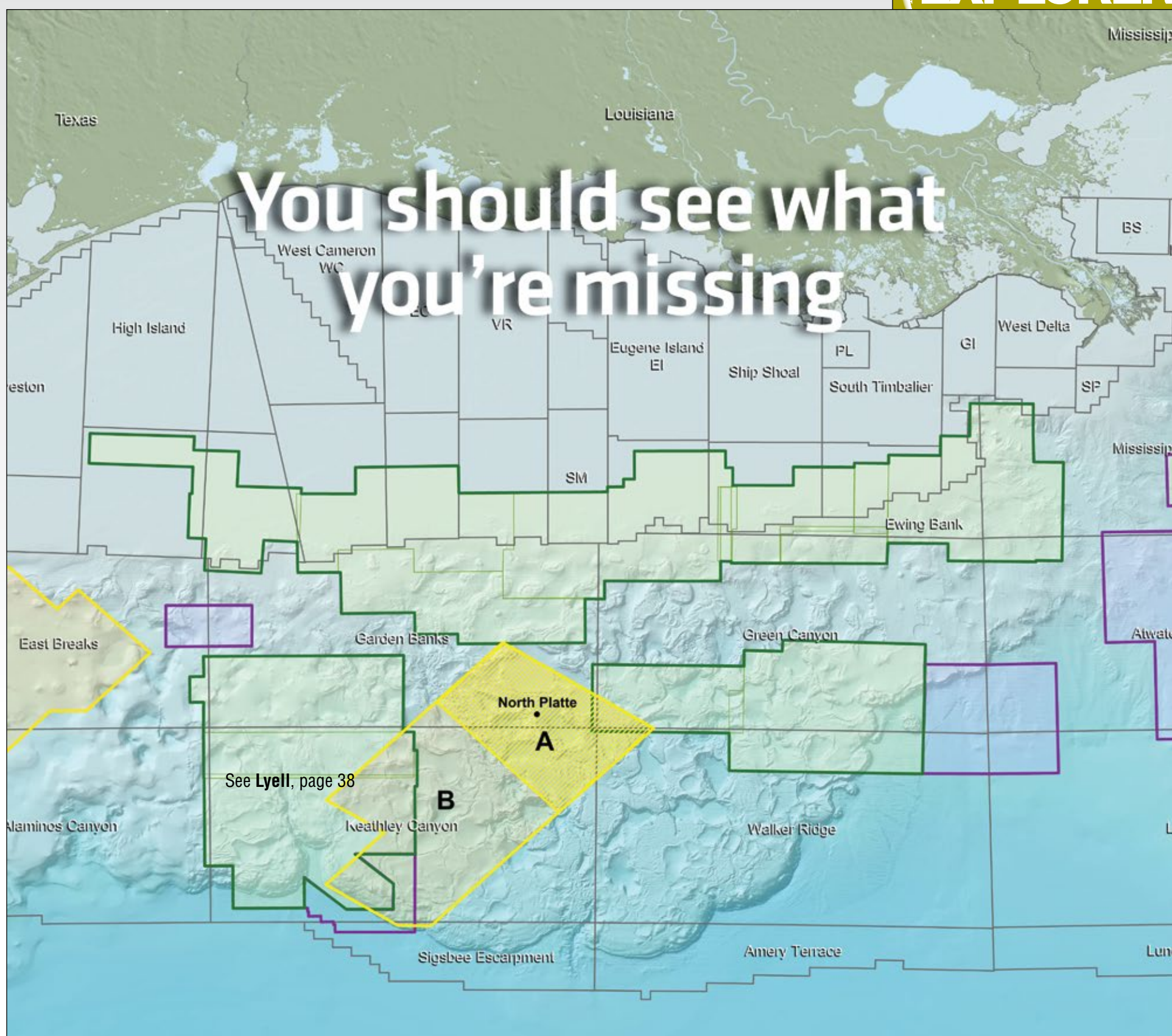
"The BGS recently completed a resource assessment on shale gas for the United Kingdom government in northern England," Ludden said. "We think there is a significant resource potential, even though England and Scotland are small countries. Some of our deposits are exceedingly thick – several kilometers thick."

"We will provide data for the industry," he said. "We give them an indication of what might be there, and they take it over from there."

HWU is a known leader in robotic design, where autonomous vehicle guidance provides divers with remote assistance during subsea research and exploration activity. Such devices could possibly lead to

See Lyell, page 32





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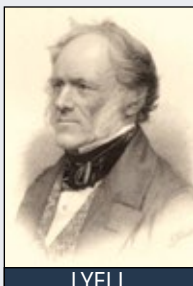


## Sir Charles Lyell: His Principles of Geology Live On

**S**ir Charles Lyell (1797-1875) was born in Kinnordy, Scotland, and is considered the leading geologist of his generation.

He is best known for authoring "Principles of Geology," which made popular James Hutton's concepts of uniformitarianism – the idea that the Earth was initially shaped by the same geological processes that occur today.

As close friend of Charles Darwin, Lyell was one of the first scientists to support his work, "On the Origin of Species." Lyell's wife, Mary Horner, was daughter of Leonard Horner, the founder of Heriot-Watt University in 1821.



LYELL

Lyell was the first geologist to appreciate how studying relatively modern marine biological activities provided a deeper understanding of the Earth's geological processes.

His studies of the Roman Macellum, or "Temple of Serapis," in Pozzuoli (near Naples), Italy, in 1828 reveal his understanding of the significance of modern

marine and geological processes.

There, he observed a horizontal line of marine mollusks on three columns of the temple that represented a former shoreline. He realized that the site had been submerged for a long period after Roman times and then lifted again.

His conclusion: Whatever the geological

cause – we now know it to be underground ballooning and deflation of a magma chamber – it had been on a relatively rapid time scale (2,000 years).

The present elevation of the shoreline on the columns shows the site has risen even more since Lyell's day.

He began to appreciate that geological processes were not always gradual, as many, himself included, had previously presumed and came to understand the time scales on which some operated. This deduction prompted him to revise his "Principles of Geology" multiple times.

Some say his willingness to be intellectually flexible when new data and evidence presented themselves is a large part of his scientific legacy.

– SARAH HAVILAND

## Lyell from page 30

extracting metals, such as copper and zinc, from the ocean floor, Ludden said.

Furthermore, the BGS is collecting data that might allow for the eventual, safe storage of captured carbon in offshore areas, he added.

Referring to recent CO<sub>2</sub> gas discoveries in the North Sea, Underhill said they provide a "robust, unifying and testable structural model" that can be used to assess and design carbon sequestration traps where CO<sub>2</sub> storage over geological time has been proven.

"The results turn the exploration risk of finding unwanted CO<sub>2</sub> into a carbon storage opportunity," Underhill said. "They are the first proof of the concept that traps containing Leman Sandstone Formation reservoirs have a CO<sub>2</sub> storage potential.

"This opens up the possibility for carbon sequestration in the basin," he said, "something that will be investigated at the new center."

The benefits of the BGS and HWU partnership also can be seen in the current International Ocean Drilling Project (IODP), in which the United Kingdom has been involved through BGS participation. Cores taken in the Arctic last year are helping environmental scientists better understand oceanographic circulation during glacial events as well as the industry's need to calibrate seismic data in an undrilled frontier basin, Underhill said.

"The environmental scientists gained new insight into global change, while the industry benefitted from stratigraphic knowledge without having to drill a high-cost well," he said. "This reduces the risk and uncertainty associated with exploration well drilling."

### A Holistic Approach

The Lyell Centre's official agenda is being determined by a joint committee between the university and the BGS that is chaired by Steve Chapman, principal and vice chancellor of Heriot-Watt.

While all areas of research have not yet been decided, the committee has agreed that the research will follow a holistic approach.

For example, petroleum engineering research will begin with identifying and mitigating risks from drilling. It will include reservoir characterization and environmental baselines that will constantly be monitored to reduce environmental casualties. Lastly, it will dive into finding ways to safely decommission expired wells, Ludden said.

"Decommission will potentially be a big problem in the North Sea in the next 30 years or so with some rigs," Ludden said. "We need to learn how to decommission the rigs and put the environment back to where it was."

Also important are the introduction of new master's programs in applied geosciences that will be offered through the Lyell Centre. Specific programs of study are still being determined.

"The co-location of the country's foremost authority on British geology with an applied academic center of excellence will lead to new research synergies and training opportunities in existing fields of interest," Underhill said. "It also presents the chance to cooperate and advance understanding in areas such as unconventional resources, extending the life of mature basins, like the North Sea,

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See Research Centre, page 38





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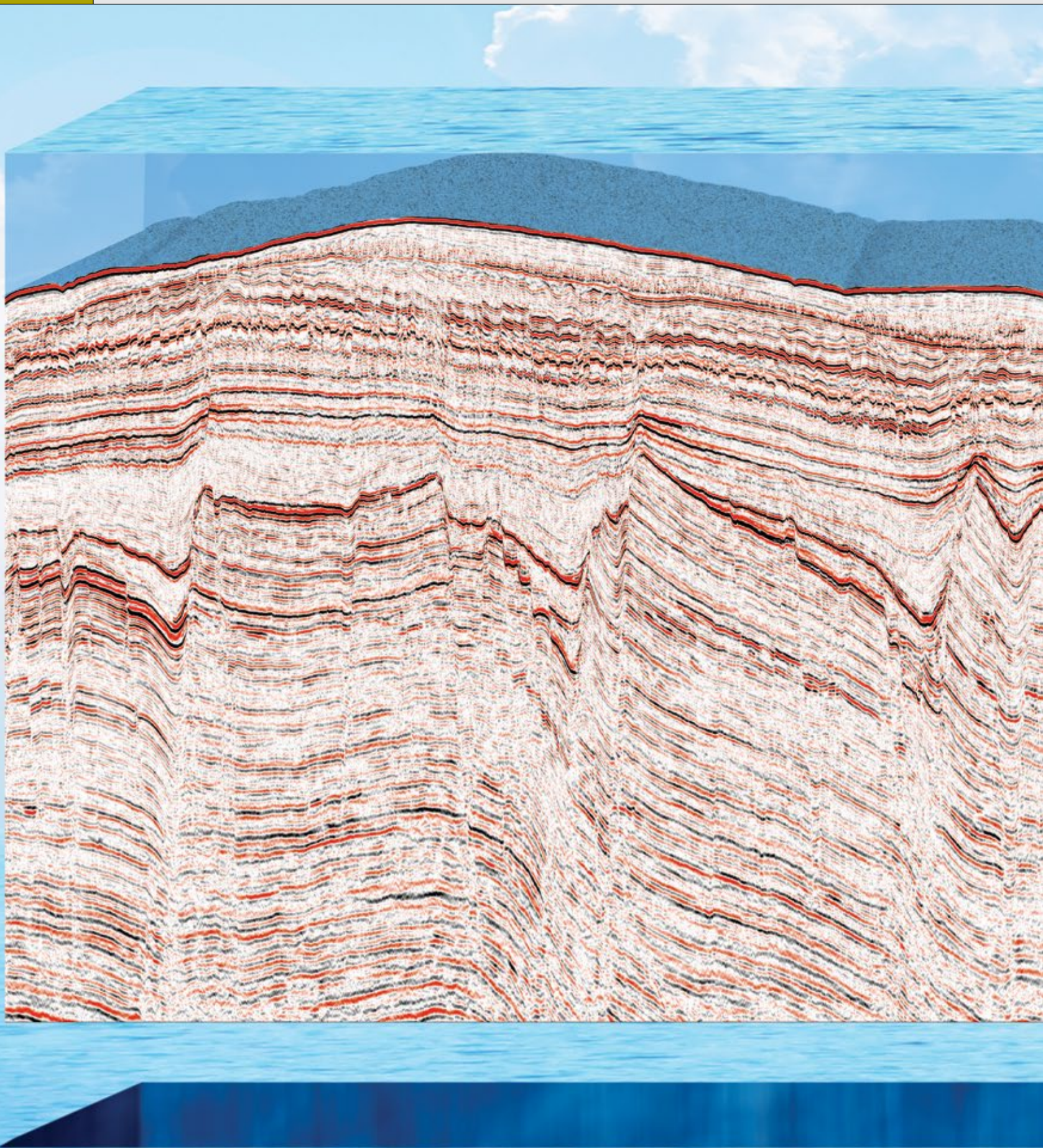
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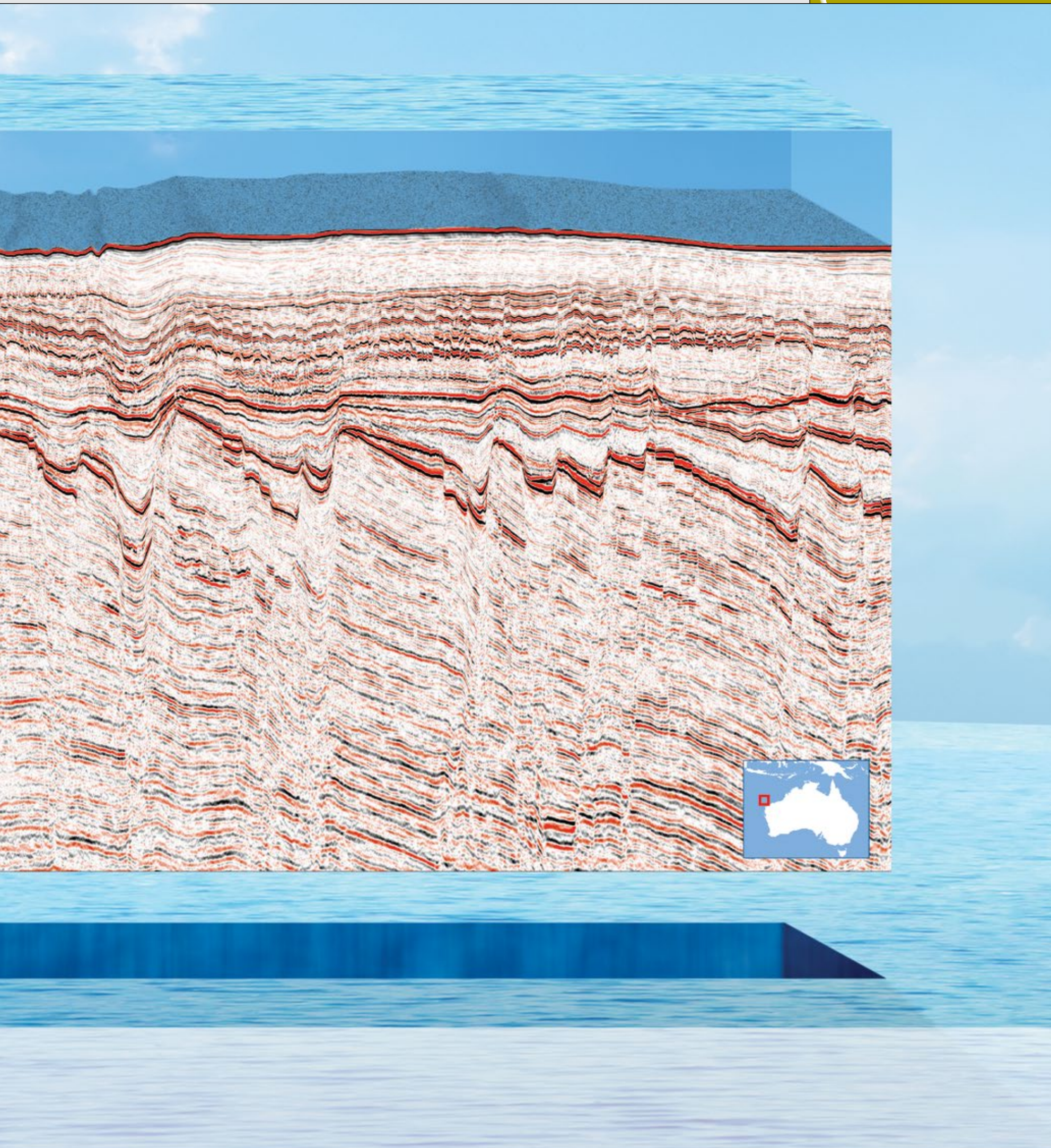
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## AAPG's Distinguished Ethics talk

## Clarke, Induced Seismicity Draw Spotlight

By DAVID BROWN, EXPLORER Correspondent

AAPG member Don Clarke served on a National Research Council committee studying "Induced Seismicity Potential in Energy Technologies."

After the committee issued its report last year, Clarke agreed to prepare a talk about the study and its findings.

The response to the talk took him by surprise:

"They liked it," he said. "As part of this we were asked to give a number of talks, and I didn't think anything would come of it. But the talk was very well received."

In fact, Clarke's talk proved so popular that he was invited to become AAPG's 2013-14 Distinguished Ethics Lecturer, to describe the NRC report and the realities of induced seismicity.

Clarke, a geological consultant in Lakewood, Calif., and recently named AAPG Honorary member, knew that induced seismicity isn't the sexiest topic in the world. And he never intended to develop a lecture on ethics.

"Everyone sees it as an ethics talk, and I never saw it like that," he said.

As for the popularity of the seismicity lecture, Clarke thinks he has an explanation.

"My personal feeling is that the general public is very interested in anything that has to do with hydrofracturing," he said.

When Clarke presents his talk, "the conversations afterward have



CLARKE

"The discussion is really much more interesting than the talk, because everybody has an opinion."

been absolutely incredible," he noted. Sometimes the discussion sessions last longer than the lecture itself.

Clarke recalled a recent presentation to an industry group.

"The talk goes on for an hour, and we must have gone on for an hour to an hour and a half afterward. It elicited that much thought," he said.

"The discussion is really much more interesting than the talk, because everybody has an opinion," he added.

## Cause and ... Effect?

Induced seismicity is the term commonly used for seismic events, usually tremors or minor earthquakes, caused by human activity. Examples of induced seismicity have been documented and studied since at least the 1920s.

The 11-member NRC committee examined the potential for induced seismicity from the use of multiple

energy technologies, including shale gas recovery, carbon capture and storage, geothermal energy production and conventional oil and gas development.

Because the factor most directly correlated with induced seismicity is a change in underground fluid pressure caused by fluids being injected or removed, hydraulic fracturing also was considered as a possible cause.

In its findings, the committee report said:

*"The process of hydraulic fracturing a well as presently implemented for shale gas recovery does not pose a high risk for inducing felt seismic events."*

*"Thirty-five thousand wells have been hydraulically fractured for shale gas development to date in the United States. To date, hydraulic fracturing for shale gas production was cited as the possible cause of one case of felt seismic events in Oklahoma in 2011, the largest of which was M (magnitude) 2.8."*

*"The quality of the event locations was not adequate to fully establish a direct causal link to the hydraulic fracture treatment. Hydraulic fracturing for shale gas development has been confirmed as the cause of induced seismic events in one case worldwide – in Blackpool, England (maximum M 2.3)."*

Induced seismicity "turned out to be the least controversial part of hydrofracturing," Clarke noted.

Waste-fluid injection wells have gotten the most attention for changing underground fluid pressures and causing seismic events. However, energy technologies do carry the potential for induced seismicity, the NRC committee found, and it recommended steps for further study.

Most induced seismicity produces very small events. Typically, quakes with a magnitude of less than 3 cause no surface damage and are rarely felt by humans, or are felt only slightly.

"At what point does it become a bad thing?" Clarke asked. "I talk about that."

## So Far, So Good

With so much public controversy surrounding hydraulic fracturing, and considering the scientific debate over induced seismic events, Clarke thought

See Clarke, page 38

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## Clarke from page 36

someone might stand up at one of his lectures to attack or challenge the committee's findings.

"I've given the talk at least a dozen times, and no one has tried to do that," he said.

Clarke said Congress was the primary audience for the NRC study, sponsored by the U.S. Department of Energy. Findings also were presented to the White House and presidential staff, and thanks in part to Clarke's own efforts the report results now have reached a much wider audience.

"I've talked with politicians, regulators, everybody. I change the talk as conditions change and other events happen," he said.

The committee recommendations included steps for government to more closely monitor and assess induced seismicity. Clarke said his lecture audiences usually expect the government to lag in those efforts.

"Actually, quite the contrary," he noted. "Government has been very good in addressing that."

As an example, he mentioned efforts in Oklahoma, which at one time had relatively few seismic monitoring stations. The state has acquired new seismographs and is upgrading its seismic monitoring capabilities and adding stations.

### A Matter of Trust

As an AAPG Distinguished Lecturer, Clarke presents his talk on induced


seismicity by invitation across the United States.

"Right now, I'm booked up to give probably 10 talks," he said.

But what really needs to happen is for the industry to communicate better about oil and gas activities, in a balanced, open and informative way.

"Our industry needs to talk to the general public to let them know what's going on," Clarke said. "The industry itself needs to be as transparent as possible and to be honest in what we say. Trust is involved here."

Petroleum geologists and others in the industry shouldn't be afraid to address public concerns, even when controversy is involved, he observed.

"We've got to take some risks," Clarke said. "We're a risk industry." 

## Research Centre from page 32

through the deliberate search for subtle stratigraphic plays, safe exploration in challenging environments – such as deep water, high-pressure-high-temperature or new frontiers – and in the assessment of environmental monitoring and impact."

Michael Russell, the Scottish government minister for Education and Lifelong Learning, said the Scottish Funding Council's support is recognition that the center will be one of Europe's top research facilities.

"It allows the delivery of a unique post-graduate student experience based on cutting-edge collaboration between industry and universities," he said. "This will help to ensure better educated, more skilled and more successful individuals and help increase sustainable economic growth."

### Hazards and Risks

The BGS and HWU partnership also has prompted change within the BGS, Ludden noted. For some time, the BGS has focused on pinpointing hazards. It now plans to take another step forward and analyze risks associated with the pursuit of energy, metals and urban development.

"The BGS and agencies like us have done lots of research on the hazards of volcanoes and earthquakes," Ludden said. "Now we feel the need to think about the risk of these hazards and how we can mitigate them."

He is expecting research from the Lyell Centre to potentially change the ways infrastructure is built in the United Kingdom and in Europe, especially given the known volcanic activity in Iceland and the consequences for nearby countries.


Just as research is important to new discoveries and solutions, so is keeping the public informed. Acknowledging how wary the public and media have become over hydraulic fracturing, both Ludden and Underhill support prompt and transparent communication to the public that both science and industry support safe and environmentally friendly advancement.

"There is a real need to have a better and more informed dialogue with the public, politicians and policy makers so they are receiving the best, well-informed, accurate and independent advice from geo-experts with no bias or vested interests," Underhill said.

The BGS and HWU partnership was prompted by BGS's need for a new building, which is currently located on the campus of the University of Edinburgh in the country's capital. While discussing rebuilding its headquarters, the BGS received an invitation from HWU for a unique partnership.

Ludden said the BGS will continue to keep its existing partnerships with more than 40 universities, including the University of Edinburgh.

HWU is located on a former Brownfield site just west of Edinburgh. It moved onto the site in the 1960s, performed remediation and made it an environmentally attractive and spacious campus. Having restored the grounds so well, Underhill said the university retains planning permission for new buildings, which will allow the center to be constructed with few obstacles.

The Lyell Centre is expected to open in November 2015. 

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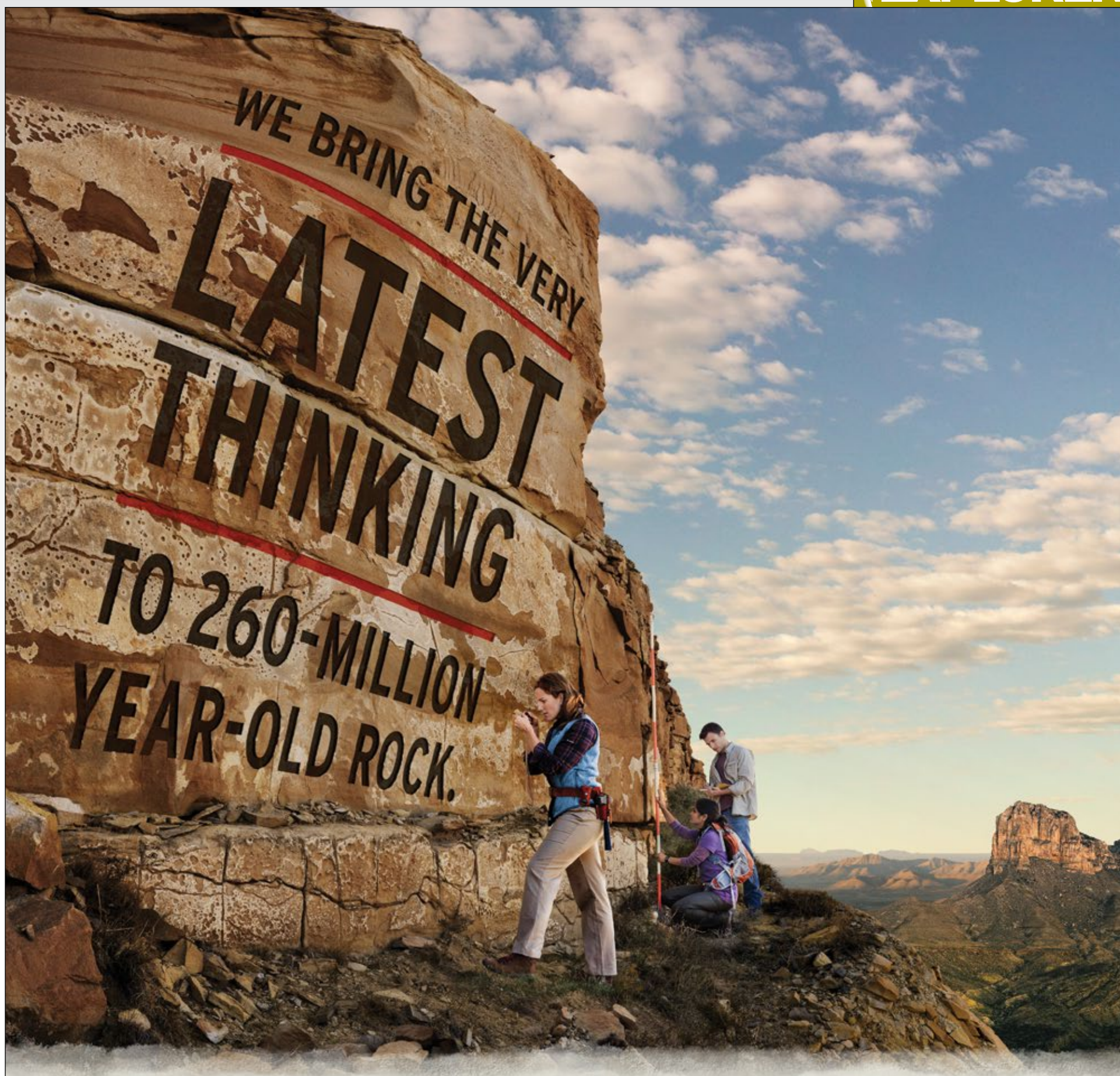


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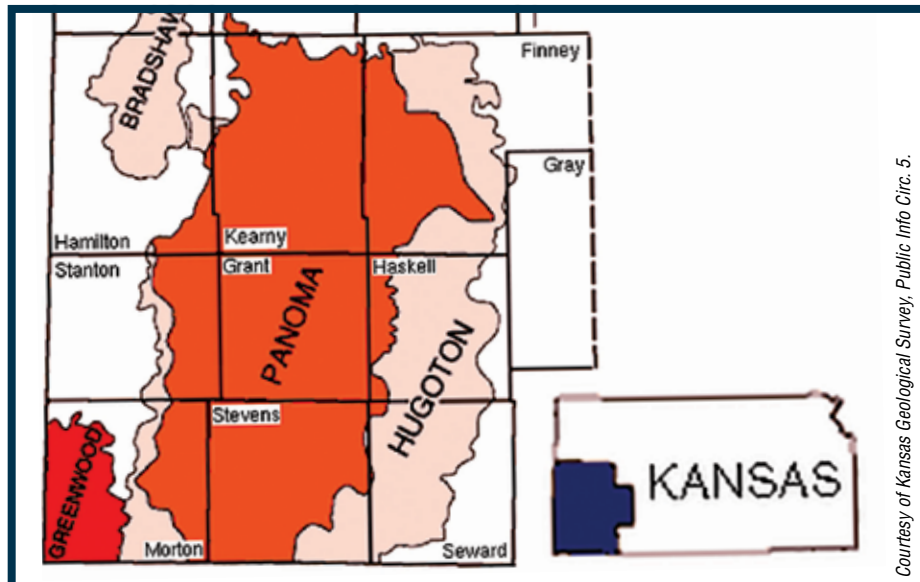
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Map of Hugoton and Panoma gas areas, southwest Kansas.

Courtesy of Kansas Geological Survey, Public Info Circ. 5.

## Quietly going strong Hugoton's Rich History

By LARRY SKELTON

The presence of natural gas in Kansas was known in pre-territorial time, as it was escaping from “oil springs” in Miami County in the region’s northeast part – there is some evidence that it was collected and used by local American Indians before any easterners settled in what would become the Sunflower State.

Exploration for oil grew after the Civil War, and frequently encountered gas generally was looked upon as a nuisance.

During the 1890s, the Iola gas field, then North America’s largest, was discovered in eastern Kansas. Its result was a boom in regional brick, glass and cement plants, foundries and zinc smelters. But because of profligate use and lack of reservoir management, the giant east Kansas area was nearly depleted by 1910-12 and the industries were shutting down. A few switched to the plentiful coal resources of eastern Kansas.

Some communities used local natural gas and some used manufactured “coal gas” for the next several years. Neither gas nor oil had been found west of Kansas’s Sixth Principle Meridian until sometime after World War I, and one Wichita geologist had predicted, “Nothing would be found west of Wichita.”

However there always seems to be those who ignore prophecies.

Those in this story were members of the Defenders Petroleum and Traders Oil and Gas Company, usually referred to as “Defenders and Traders.”

### First Steps

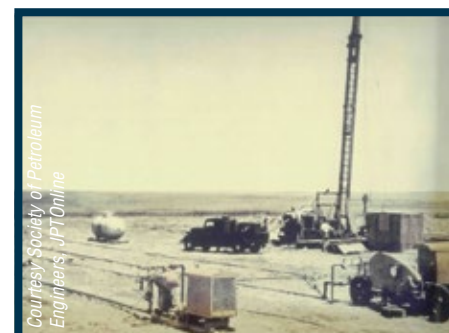
What possessed Defenders and Traders to wildcat in southwestern Kansas in March

of 1919 is lost to history. There was not yet that degree of demand, for gas and oil would not be found in the state’s West Range for four and a half more years.

A big gas well had been completed the preceding December in Potter County in the Texas Panhandle and more successful wells were under way there; perhaps the Panhandle success inspired Defenders and Traders.



SKELTON



Stanolind’s first hydraulic fracturing test, 1947, Grant County, Kansas.

At any rate, they spudded a well, the Number 1 Boles, on March 15, 1919, in Seward County, Kansas, in Section 3, Township 35 South, Range 34 West, about 2.9 miles north of the Oklahoma border and 1.75 miles west of the present city limits of Liberal.

By that summer, the Boles was completed at depth of 2,919 feet. There was an up hole gas show in the Permian age Chase Group strata (which defines the Hugoton field as such) but the well remained idle until late in 1922, when it was plugged back to 2,795 feet and completed as a gas well with open flow between five and 10 million CFGPD.

That was the discovery well for the Liberal gas field, which would become the Hugoton field.

[See Hugoton, page 42](#)

Lawrence “Larry” Skelton, now retired and residing in Wichita, Kan., had a 25-year career with the Kansas Geological Survey as an assistant director managing its Wichita operations. He is a past president and an honorary member of the Kansas

Geological Society; past president and treasurer of the Kansas Academy of Science; and was awarded the Rocky Mountain Federation of Mineralogical Societies Distinguished Achievement Honorary Award in 2001 and the AAPG Public Service Award in 2002.





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Photo by Kansas Geological Survey

Helium plant, Grant County, Hugoton Gas Area.

## Hugoton from page 40

### The Namesake

There were yet no pipelines in the area and no demands for gas. The area remained idle for five more years until late 1927, when W.M. McNab and the Independent Oil and Gas Company completed the Number 1 Crawford, located 2.8 miles southwest of the little town of Hugoton in Stevens County, Kansas.

The Crawford initially produced about six million CFGPD at IP of 435 PSI, about average virgin pressure for the entire future gas area encompassing the total Texas and Oklahoma Panhandles and southwestern Kansas Permian-age gas field.

The area of the Crawford well was designated the Hugoton field for the nearby

town, which was so-named for the French author, Victor Hugo.

By the start of 1929, five more gas wells had been drilled and gas was being locally marketed. That year, Argus Pipeline Co. (a subsidiary of Northern Natural Gas Co.) began constructing an eight-inch line to Dodge City in Ford County. By the end of 1930, six-inch lines were connected to several other small towns in the area.

During the 1920s, seamless pipe was developed and made available to the market and pipeline construction techniques improved. The first large diameter (24-inch) pipe became available in 1925 and radiographic weld testing began in 1931. By then, big cities were losing interest in coal gas manufacturing since reliable quantities of natural gas at a cheaper cost seemed to be available in the Hugoton area.

Not everything was rosy in the 1930s. Severe dust storms caused problems throughout the Great Plains, and the growing Hugoton area was in the thick of it. One such storm excavated a half-mile of buried pipeline near Elkhart in Morton County. A crew from Meade, 95 miles away, was called to inspect and re-bury it.

### Boom Town

The gas well and the desire to find oil brought in more people, and Hugoton grew from a town of 644 in 1920 to 1,368 in 1930.

At the end of 1929, there were only four gas wells in the Hugoton Field. However, some trunk lines were being constructed into the area and 1930 ended with 111 wells.

During 1931, only 29 new wells were drilled and well numbers remained constant at 140 for the next four years as the nation wallowed in the Great Depression.

Increased drilling in 1937 resulted in 235 wells at year's end. Forty of the increase came in Grant County to meet anticipated gas demand for a new carbon black company, the first in the state.

Hugoton drilling remained surprisingly low during the first few years of World War II. At the end of 1945, there were 554 gas wells in the Hugoton and the economy was primed to boom from pent up civilian demand. At the end of 1950, the Hugoton had 2,216 wells; 3,869 by 1958.

By 2012, 10,042 wells had been drilled of which 7,612 were yet producing gas. Field pressure has dropped from around 435 psi in the early days to less than 100 pounds at present and production is declining commensurately. Production during 2011 was 129.4 million MCF, a far cry from 1930's 716,213 MCF but a substantial drop from the peak year of 1968 that saw 684.9 million MCF.

Hugoton gas, initially consumed locally, eventually made its way by later pipelines as far west as Los Angeles and as far east as Lebanon, Pa., 87 miles west of Philadelphia.

The Hugoton gas area's Grant County is the location of the first experimental hydraulic fracturing test performed in the oil and gas industry.

In early 1947, Stanolind re-entered its Klepper Gas Unit No. 1 that had been completed the previous November and fractured the Chase strata at the depth of 2,400 feet. A thousand gallons of napalm mix were used with sand from the Arkansas River as a proppant.

No particular gain in production was noted, but Stanolind was sufficiently satisfied to patent the process in 1949 and grant an exclusive license to the Halliburton Well Cementing Co., which proceeded to capitalize it.

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See Helium, page 44



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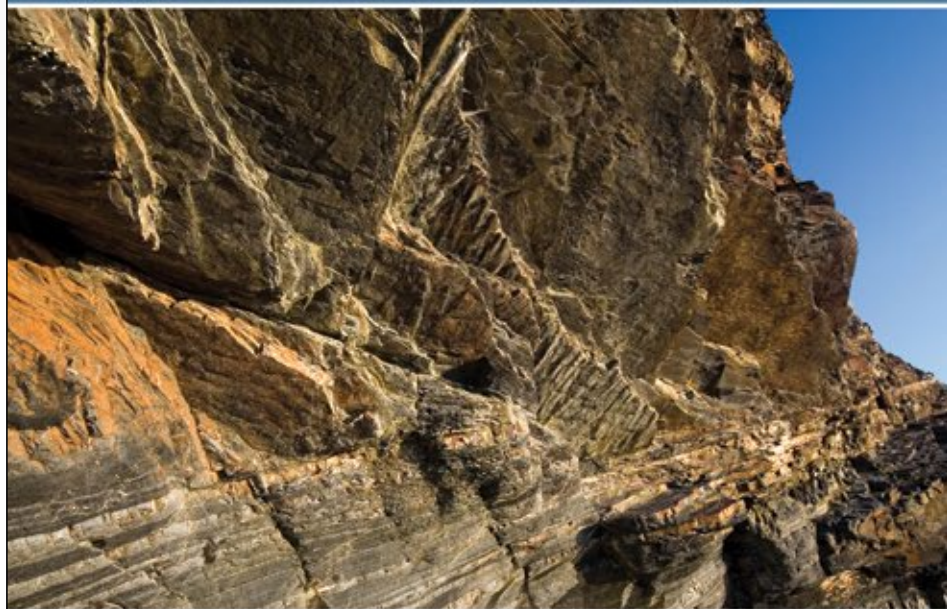
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## BP Seeks to Raise Profile Via Aggressive Recruiting

By KEN MILAM, EXPLORER Correspondent

**B**P is putting its money where its money is.

As the largest investor in the Gulf of Mexico over the last 10 years, the company is continuing to push its employment recruiting efforts, both worldwide and especially in the Gulf, according to Simon Drysdale, BP's head of Upstream Human Resources.

"BP recruited more than 11,000 employees in 2012, and this year recruiting has continued to play an important role in our global business development," Drysdale said.

"BP directly employs more than 2,300 people in the Gulf of Mexico business and supports tens of thousands of additional jobs in the region," he said.

Last year, BP announced it expected to invest on average US \$4 billion each year in the Gulf of Mexico over the next decade.

"According to BP's Global Energy Outlook 2030, the global demand for energy is expected to rise by 36 percent between 2011 and 2030. Now, more than ever, we need talented people to help us solve one of the biggest challenges the world faces – finding and producing responsible energy. We plan to lead that growth by hiring and developing the best and most talented people in the industry," Drysdale said.

Potential employees seem to be responding to the company's efforts.

BP experienced "record levels of applications" from college students in 2012, with more than 10,000 applicants for 700 full-time, intern and co-op roles, according to the company.

### Looking Long

BP is hiring across many areas of skill and expertise, including for international deepwater operations and U.S. operations. However, the company's two areas of greatest need are for specialist engineers and specialist geoscientists – particularly for enhanced oil recovery, Drysdale said.

BP takes a proactive approach to recruiting, with its geoscientists and

engineers active in professional societies and workshops.

"Additionally, we have found our Challenge Program to be very appealing to recent graduates," he added. "The Challenge Program is a global initiative ... (that) focuses on developing the careers of these new recruits, and providing opportunities to gain practical experience through formal, on-site learning and helps to build a strong foundation in upstream disciplines."

**BP "begins with anticipating where we'll be operating 30 years from now."**

Program participants rotate through each of BP's various business units and receive extensive coaching and mentoring throughout their two to three years in the program. The goal is to produce fully competent, independent professionals ready to meet the challenge of supporting the upstream business, he said.

"We are also increasing our outreach directly to students at our target schools and universities through ongoing partnerships and programs," Drysdale said. "We feature internships that give undergraduate students an opportunity to gain a feel for the company, the scale of available projects and the work they could accomplish while at BP."

Drysdale said the company's focus is long term, "which begins with anticipating where we'll be operating 30 years from now. Our geographic spread is constantly widening, and so must our recruitment efforts."

"We don't want to hire based on 'location rather than vocation,'" he said, "nor do we want to restrict well qualified applicants from countries where we are not currently operating." ■

## Helium from page 42

### Helium, Too

A by-product of the Hugoton (and its southern end, the Panhandle in Texas) is helium. Natural gas produced within bounds of the Hugoton contains from 0.3 percent to 1.9 percent of it depending on location within the area.

It was the primary source for America's and much of the world's helium supply for many years. Until 1995, the production and sale of helium gas was a federal government monopoly. At that time, changes in public law turned helium facilities over to private industry.

In 2011, helium was produced by fractional distillation at five plants in Kansas. Minerals Yearbook (2010) reported Kansas' helium production to be slightly over a billion feet<sup>3</sup> valued at \$356.7 million.

While helium continues being extracted and well pressure declines, an end is in sight. The 2011 Minerals

Yearbook reported:

"The Hugoton and (associated fields in Kansas, Oklahoma and Texas) are depleting fields from which most U.S.-produced helium is extracted. Reserves of the rare gas contain an estimated 140 BCF."

### Still Going, and Going ...

In May 1541, Francisco Vásquez de Coronado entered southwestern Kansas and trekked through the Hugoton area. One of his party recorded (in Spanish): "I am of the belief that it will be productive of all sorts of commodities."

Helium, trillions of cubic feet of natural gas, millions of tons of carbon black – not to mention multi-billion dollar beef, dairy and grain industries – have proved the prophetic skill of that conquistador.

The Hugoton gas area likely will make it to the century mark before becoming uneconomic. Improved production and engineering methods will recover a few more trillion cubic feet of gas while this historic giant moves toward a century of operations. ■



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## PROFESSIONALnewsBRIEFS

**Katharine Lee Avary** has been elected Member-at-Large to the AGI leadership team. Avary is a consulting petroleum geologist, Morgantown, W.Va.

**Marc Bond**, to head of geophysics, BG Group, Reading, England. Previously subsurface assurance manager, BG Group, Reading, England.

**Clarence P. Cazalot Jr.**, has elected to retire as chairman, president and chief executive officer of Marathon Oil, Houston, effective Dec. 31.

**William Haskett** has been awarded the Decision Analysis Practice Award by Decision Analysis Society of the Institute for Operations Research and the Management Sciences. He previously was awarded the International Management and Information Award by the Society of Petroleum

Engineers. Haskett is with Decision Strategies, Houston.

**William Knebusch**, to vice president geology, Excalibur Resources, Dallas. Previously owner, Calvary Consulting, Keller, Texas.

**Terry Leyenberger**, to vice president-geoscience, Goldman Sachs and Company, Houston. Previously senior geoscience adviser, Apache Corp., Houston.

**Jennifer Melster**, to senior staff geologist, Fieldwood Energy, Houston. Previously senior staff geologist, Apache Corp., Houston.

**Steve Meyer**, to exploration geoscientist-new play development team, Shell International, The Hague, Netherlands. Previously exploration evaluation learning adviser, Shell Global Solutions, Rijswijk, Netherlands.

**Bonnie Milne-Andrews**, to senior business developer-Americas, Repsol, The Woodlands, Texas. Previously manager geological operations-deepwater West Africa, Hyperdynamics Corp., Houston.

**Eric M. Riggs** has begun his one-year term as president-elect for AGI, and will assume presidency when his term has ended. Riggs is with Texas A&M University, College Station, Texas.

**Tom Sperr**, to senior geologist, Robert L Bayless Producer, Denver. Previously geologist, Prima Exploration, Denver.

**George Zemlicka**, to project geophysical adviser, Anadarko Petroleum, The Woodlands, Texas. Previously staff geophysicist, BHP Billiton, Houston.

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The conference is built around five themes: Geology and Geophysics; Exploration and Production; Physical Environment; Ice Loads; Logistics Marine and Transport; and Regulatory Environment and Social Responsibility.

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To register or for more information go to [arctictechnologyconference.org](http://arctictechnologyconference.org).

## IN MEMORY

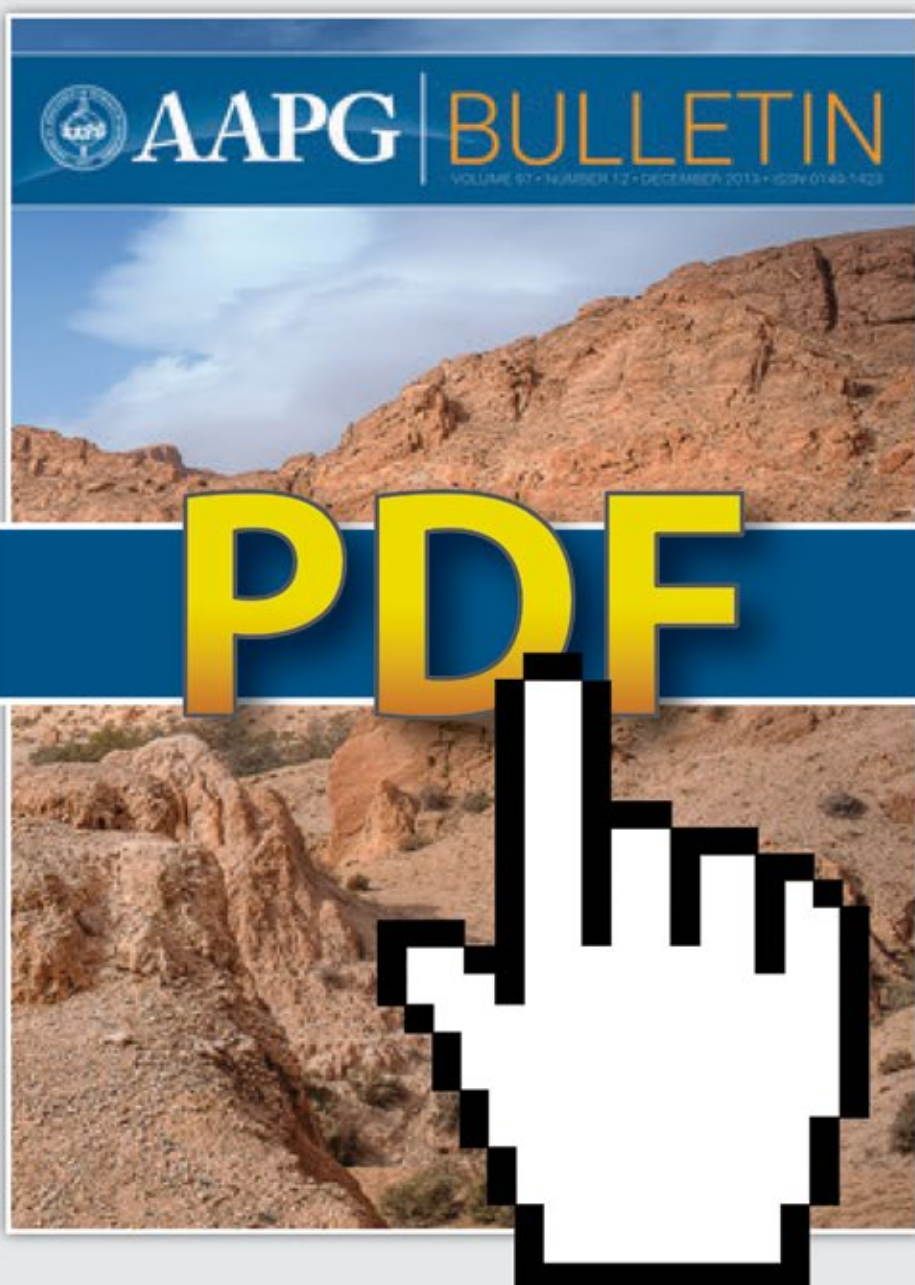
**Ernest Raymond Bush**, 92  
Milford, Pa., Oct. 17, 2013  
**Eugene R. Douglas**, 91  
Midland, Texas, Sept. 21, 2013  
**Charles Krohn**, 60  
Alex, Okla., Jan. 1, 2013  
**Alfred Carl Spreng**, 89  
Rolla, Mo., Oct. 19, 2012  
**Richard W. Stump**, 82  
Midland, Texas, Oct. 7, 2013  
**Arthur E. Wuckert**, 90  
Jackson, Mich., Sept. 25, 2012  
**Robert Eugene Bearth**, 85  
Coldspring, Texas, Oct. 18, 2013

(Editor's note: "In Memory" listings are based on information received from the AAPG membership department.)



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## MODELING POROSITY LOSS

Maryam A. Mousavi and Steven L. Bryant

Porosity reduction by plastic deformation and cementation is studied by means of a geometric model, which provides insight into transport properties. The model predicts, to within a factor of five, the permeability of samples of tight-gas sandstones having little intragranular porosity.



## THREE-DIMENSIONAL MODELING OF THE MARCELLUS SHALE

Guochang Wang and Timothy R. Carr

Marcellus Shale lithofacies can be defined by the mineral composition, amount of clay and organic matter, and the ratio of quartz, carbonate, and TOC content. The three-dimensional modeling approach may help optimize the design of horizontal well trajectories and hydraulic fracture stimulation strategies.



## ANALOGS IMPROVE FRACTURE CHARACTERIZATION

Arthur P. C. Lavenex, Juliette Lamarche, Arnaud Gallois, and Bertrand D. M. Gauthier

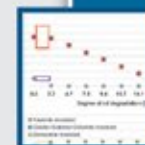
Current methods for determining fracture network parameters for better fluid flow comprehension and modeling are insufficient to define the three-dimensional distribution. This study integrates structural and sedimentological data through the use of a surface analog to improve fracture network characterization.



## OIL DEGRADATION AND MODELING

Wolfgang van Berk, Hans-Martin Schulz, and Yunjiao Fu

Hydrogeochemical modeling of inorganic equilibrium reactions reproduce the proven alteration of mineral assemblages in the Gullfaks oilfield reservoir triggered by oil degradation. These processes caused high CO<sub>2</sub> partial pressure and release of sodium into the formation water.





# Budget Cuts Threaten Industry Research Efforts

By EDITH ALLISON, GEO-DC Director

**B**asic research – the source of innovative technology – has experienced significant cuts in the past three years as the House and Senate have disagreed on spending priorities and “sequestration” has become the default budget process.

Sequestration refers to the across-the-board cuts in discretionary federal spending dictated by the Budget Control Act of 2011. Social Security and Medicare are mandatory, not discretionary – and are not impacted.

Federal research provided a foundation for horizontal drilling and hydraulic fracturing, supercomputing and GPS – all essential to the recent oil and gas production increases. Degradation of America's research capability endangers the future – if currently unclear – technology directions of our industry.

This column is based on two recent analyses and focuses primarily on the Department of Energy, the largest supporter of basic and applied physical science research and research facilities in the United States:

► In early September, the American Association for the Advancement of Science (AAAS) issued an analysis of the impact on federal appropriations on research and development (R&D).

► On Oct. 30 the House Committee on Science, Space and Technology Subcommittee on Energy held a hearing titled, “Providing the Tools for Scientific Discovery and Basic Energy Research:



ALLISON

**Degradation of America's research capability endangers the future technology directions of our industry.**

The Department of Energy Science Mission.” This hearing explored the benefits of the Department of Energy basic research and ways to improve management of the program.

This hearing also served to gather information in advance of reauthorizing the America COMPETES Act that expires in early 2014.

AAAS reports that federal R&D expenditures declined 16.3 percent between FY 2010 and FY 2013 (including the sequestration cuts); FY 2010 is the fiscal year from Oct. 1, 2009, through Sept. 30, 2010.

As a share of gross domestic product, federal R&D is now 0.82 percent of gross domestic product (GDP). This is significantly less than the almost 2 percent of GDP for federal R&D in the mid-1960s.

The DOE-Office of Science funding for basic research went down from \$4.463

billion in FY 2012 to \$4.239 billion in FY 2013, including the sequestration cuts.

For FY 2014, the House would provide a 1 percent increase in the office's funding, with a 33 percent increase in fusion-energy research and a 15 percent cut in environmental research. The Senate would provide an almost 12 percent increase, with the largest increases for fusion-energy research.

The differences between House and Senate are larger for applied research (energy efficiency, renewable, nuclear and fossil-energy research):

► For FY 2014 the House would cut applied research by 32 percent; the Senate would boost funding by 30 percent.

► ARPA-E (Advanced Research Projects Agency-Energy), which invests in short-term research projects that can have transformational impacts but not basic or incremental research, would be cut 73 percent by the House and increased 48 percent by the Senate.

For FY 2014, which started Oct. 1, the government currently is operating under a continuing resolution that continues the FY 2013 funding levels, including the sequestration cuts, through Jan. 15.

As part of the legislation that reopened the government on Oct. 17, the House and Senate established budget negotiations to resolve their differences in funding the government. Despite their differences, neither chamber would increase overall government R&D funding.

As the starting point for negotiations the proposed House funding level for non-defense R&D is 11.6 percent below the Senate level and 5.3 percent below FY 2012, the last pre-sequestration budget.

The Senate number is also down – 2 percent from FY 2012.

How the two chambers will resolve this large discrepancy is impossible to predict.

If a budget agreement is not reached, the most likely scenario is continued funding at the FY 2013 level with additional across-the-board sequestration cuts of 2.57 percent taking effect on Jan. 15.

As mentioned in the March 2013 Policy Watch column, there is a compensatory element: non-federal R&D is a larger share of all U.S. R&D – about 70 percent, up from about 35 percent in the early 1960s.

**Continued on next page**



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## Hearing Raises Funding Concerns

At the House Oct. 30 hearing on "Providing the Tools for Scientific Discovery and Basic Energy Research: The Department of Energy Science Mission," committee chairman Lamar Smith (R-Texas) stated the Office of Science research "provides the foundation for innovation that drives long-term economic growth and serves as a valuable investment in America's future."

Energy Subcommittee Chairman Cynthia Lummis (R-Wyo.) emphasized the need to improve the efficiency of the Department of Energy National Laboratories in order to continue to foster innovation. To achieve this goal the committee will be working on the "Enabling Innovation for Science, Technology, and Energy in America Act" or EINSTEIN America Act.

The EINSTEIN America Act would address one element of the America COMPETES Act (America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education and Science Act), which expires in January. It would fund basic research at the DOE at \$4.7 billion, a 1.7 percent increase above FY 2013 funding levels.

The bill also would reduce funding for climate science.

Hidden beneath the made-for-television debate about the budget and plans for reauthorization of America COMPETES are

the ongoing cuts in government-funded basic research.

High-tech industries like oil and gas owe their success to past government research. We should all be concerned whether the research funding cuts put our industry's future innovation at risk.

Both the House and Senate are preparing numerous bills to deal with the expiration of America COMPETES. Preliminary reports suggest that the two chambers will have very different approaches and consensus will be difficult.

This will be a topic of a future Policy Watch column.

— EDITH ALLISON

### Continued from previous page

Industry R&D focuses more on applied research and development rather than long-term basic studies, so the government cuts are significant for long-term innovation that develops from basic research.

\* \* \*

What does this mean to the United States for global competition?

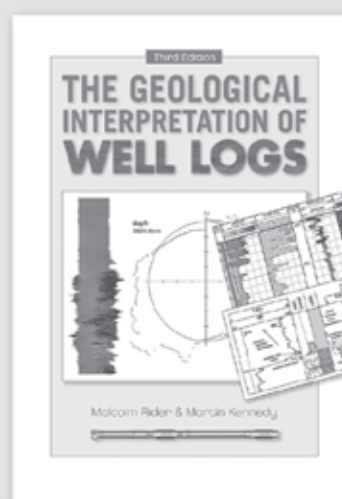
The global balance of basic research also is changing. All U.S. R&D is about 2.7 percent of GDP, a level higher than the European Union but lower than Japan (over 3.4 percent) and South Korea (about 3.5 percent). China currently devotes 1.6 percent of its GDP to R&D, but is expected to increase its R&D investment by \$22.9 billion in 2013; this represents annual R&D growth of 11.6 percent, significantly greater than the country's expected GDP growth of 8.2 percent (Battelle 2013 Global R&D Funding Forecast).

It was the National Academies 2005 report, "Rising Above the Gathering Storm," highlighting the U.S. decline in physical science R&D, that prompted the American COMPETES Act and an increase in federal R&D funding. The report stated:

"Federal funding of research in the physical sciences, as a percentage of gross domestic product (GDP), was 45 percent less in fiscal year (FY) 2004 than in FY 1976."

In 2004 U.S. R&D was 2.55 percent of GDP, a level that concerned the National Academies panel in light of the commitment of other countries to increase science and technology education that supports scientific research. U.S. R&D reached a high of 2.91 percent of GDP in 2009 before falling back. ■

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# Spectral Decomposition's Analytical Value

By SATINDER CHOPRA and KURT J. MARFURT

Stratigraphers use seismic data in two major ways:

- ▶ Defining boundaries associated with sea level and topography between important depositional packages or sequences.

- ▶ Mapping individual components or "architectural elements" of a given depositional system.

Using modern and paleo analogs as well as well control, the interpreter uses such boundaries and features to map seismic facies, which in turn can be related to lithology. The interpretation of discrete stratigraphic features is limited by both the bandwidth and the signal-to-noise ratio of the seismic data.



CHOPRA



MARFURT

Unfortunately, well-resolved reflections from the top and base of subtle stratigraphic geologic boundaries occur only for thick features imaged by broadband data.

Seismically thin stratigraphic features approaching a quarter wavelength thickness give rise to composite, or "tuned," seismic reflections. Direct estimation of stratigraphic thickness is more difficult, with the definition of many of the features of interest, such as channel systems becoming more muted.

Fortunately, the tuning phenomena also can help delineate such unresolved features – specifically, the composite amplitude of a thin layer is strongest (and usually has the highest signal-to-noise ratio) at the quarter wavelength tuning frequency.

Thus, if we "probe" the subsurface with the correct frequency, we can better delineate our target.

\* \* \*

A previous Geophysical Corner article (Bob Hardage, September 2009) showed how low frequency components (specifically that part of the data < 16 Hz) had a higher signal-to-noise ratio.

Over the last decade or so, spectral decomposition has become a well-established tool that helps in the analysis of subtle stratigraphic plays and fractured reservoirs.

As the name suggests, spectral decomposition decomposes the seismic data into individual frequency components that fall within the measured seismic bandwidth, so that the same subsurface geology can be seen at different frequencies. Thick beds or features will be tuned and have relatively higher amplitude at lower frequencies, while thin beds will be tuned and have relatively higher amplitude at higher frequencies.

Spectral magnitude highlights features that are tuned, and spectral phase components enhance subtle fault and channel edges that can be used as input to subsequent seismic attribute analysis, such as coherence.

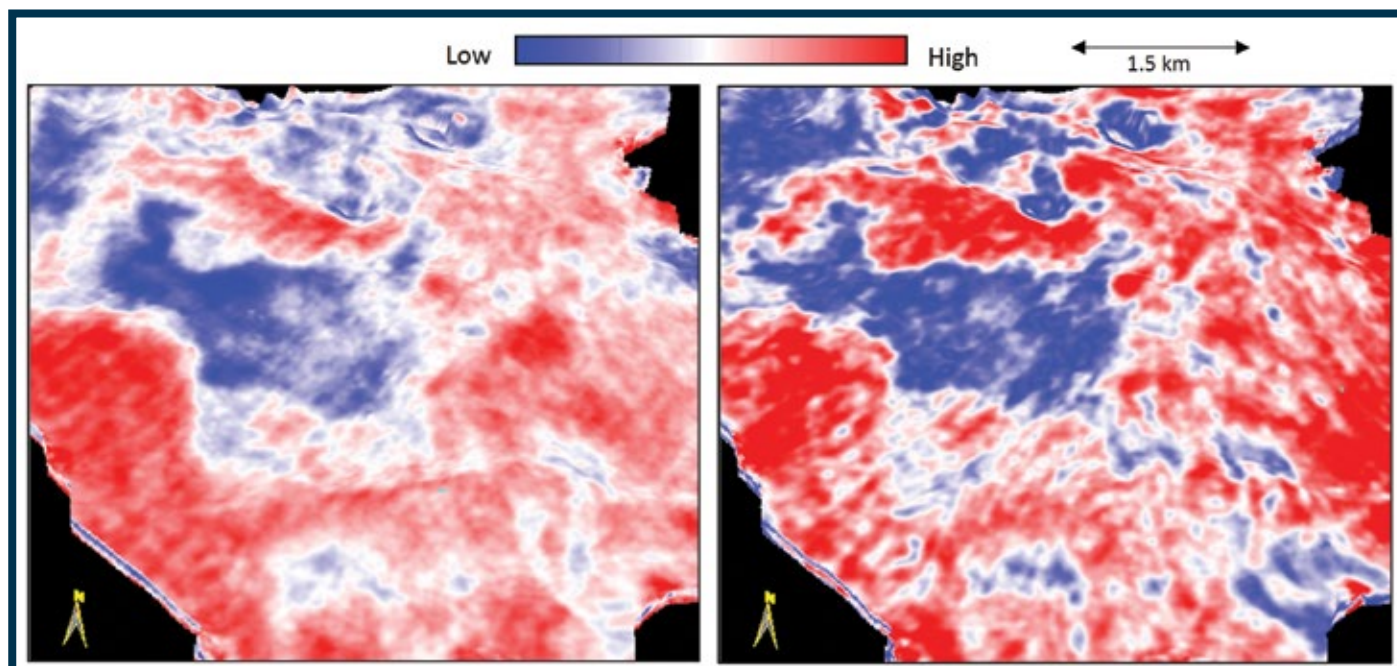


Figure 1 – (a) Strat-slice 16 ms below a marker horizon at 950 ms from a seismic volume after 5-D interpolation. (b) Strat-slice 16 ms below a marker horizon at 950 ms from a 40 Hz seismic volume after 5-D interpolation and spectral decomposition.

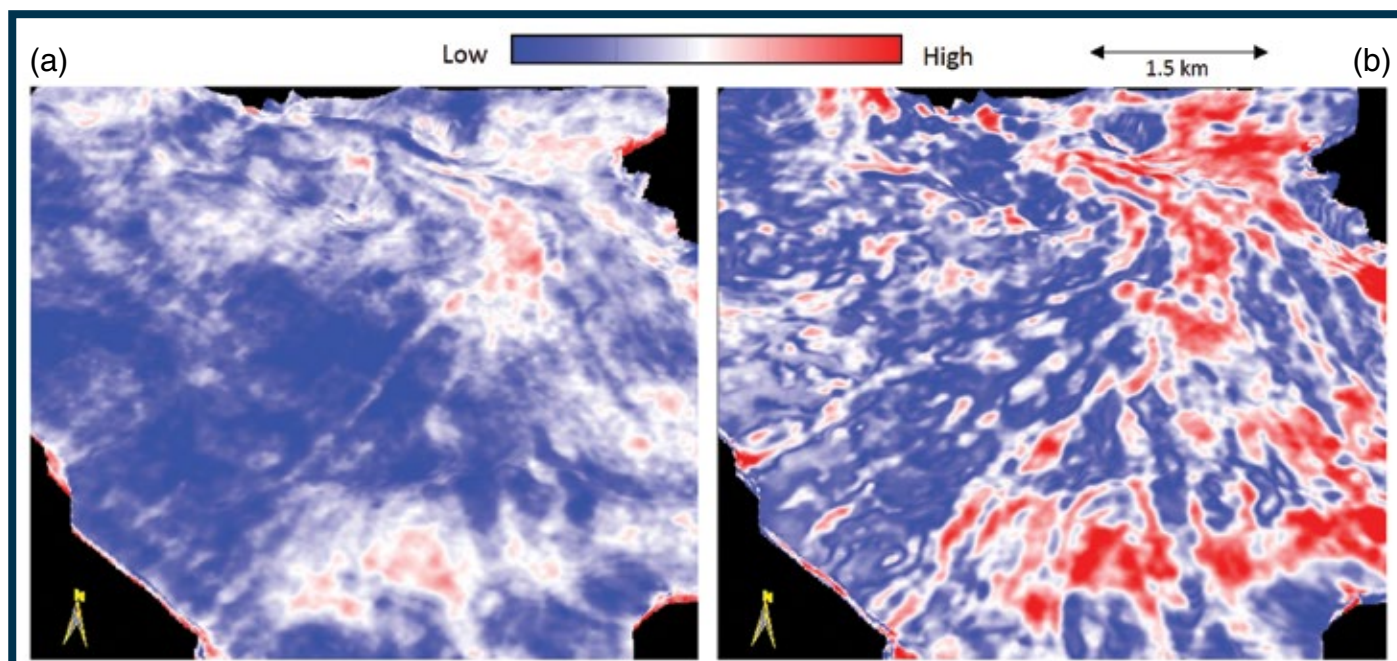


Figure 2 – (a) Strat-slice 20 ms below a marker horizon at 950 ms from a seismic volume after 5-D interpolation. (b) Strat-slice 20 ms below a marker horizon at 950 ms from a 40 Hz seismic volume after 5-D interpolation and spectral decomposition.

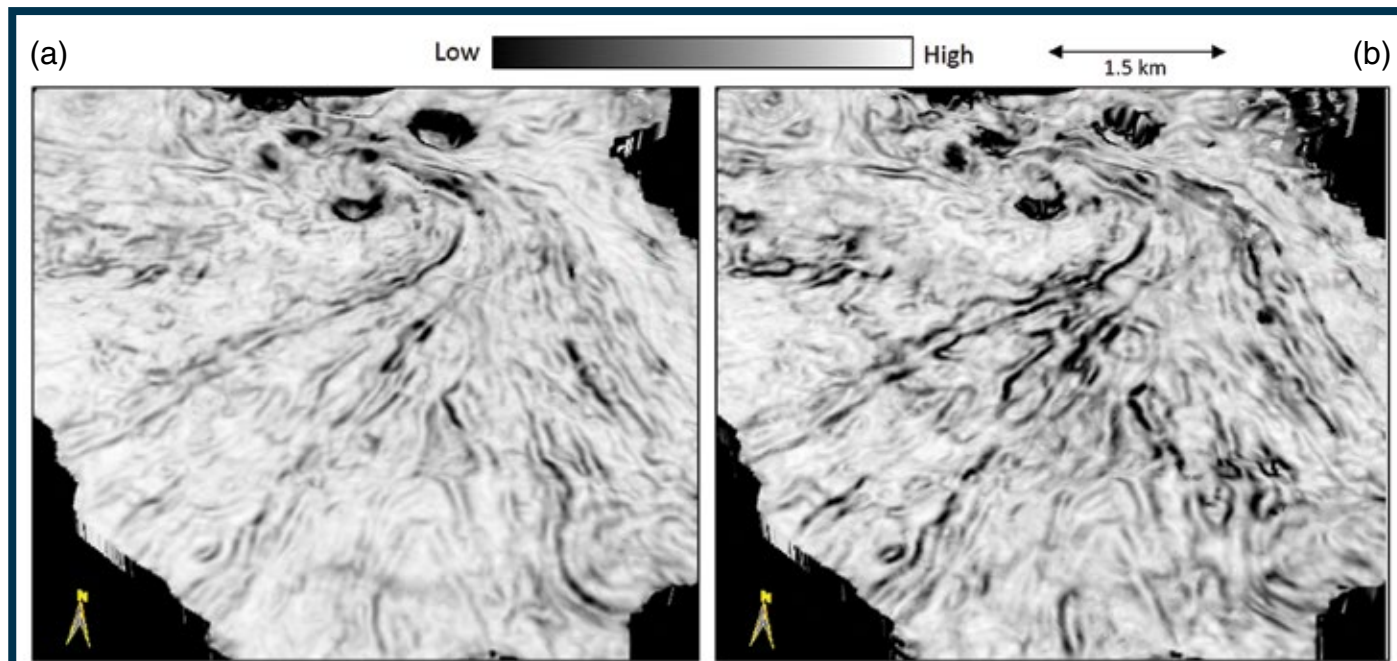


Figure 3 – (a) Strat-slice from coherence volume run on seismic data after 5-D interpolation. (b) Strat-slice from coherence volume run on 40 Hz seismic volume after 5-D interpolation and spectral decomposition.

Continued on next page



## Continued from previous page

\* \* \*

Spectral decomposition is done by transforming the seismic data from the time domain into the frequency domain; this can be done simply by using the discrete Fourier transform.

There are also other methods that also could be used for the purpose, such as:

- ▶ The continuous wavelet transform.
- ▶ The S-transform.
- ▶ The matching pursuit decomposition.

Each of these methods has its own applicability and limitations, and the choice of a particular method also could depend on the end objective.

For example:

▶ The discrete Fourier transform uses a time window for its computation, and this choice has a bearing on the resolution of the output data.

▶ The continuous wavelet transform depends on the choice of the mother wavelet, and usually yields higher spectral resolution but reduced temporal resolution.

▶ The S-transform method can be regarded as an extension of the continuous wavelet transform method when a Morlet wavelet is used as the mother wavelet, where the temporal window size is inversely proportional to the frequency being analyzed.

The S-transform method is better than the continuous wavelet transform method, as it yields good temporal and spectral resolution. Matching pursuit method does not need any windowing and so yields both good temporal and spectral resolution.

It is, however, computationally more expensive.

There are a number of commercial or proprietary implementations of spectral decomposition that are routinely used in the industry and are based on some variation of the above methods. Using any of the above spectral decomposition methods, the input seismic data volume can be decomposed into amplitude and phase volumes at discrete frequencies within the bandwidth of the data.

These discrete frequency volumes are sometimes also referred to as common frequency volumes.

\* \* \*

Here, we illustrate the S-transform application of the spectral decomposition method to a case study from western Canada.

In figure 1 we show a comparison of stratal slices through the seismic data (figure 1a) and 40 Hz spectral decomposition volumes (figure 1b). The stratal slices were chosen 16 ms below a marker seismic reflector close to 950 ms on seismic data processed with 5-D interpolation used to regularize offsets and azimuths.

By design, the original broadband seismic data volume can be reconstructed by a weighted average of the individual component volumes, including the 40 Hz volume shown in figure 1b.

Note, there is greater lateral variation in seismic amplitude in figure 1b, which in this case is directly related to tuning effects associated with a distributary channel.

The comparison of the stratal slices just 4 ms below these slices is shown in figure 2, where a channel system is seen clearly on the 40 Hz spectral slice (figure 2b), which is not as clearly seen on the seismic amplitude slice (figure 2a).

Finally, the coherence attribute comparison on the two volumes is shown in figure 3, where the definition of the

individual channels is seen very clearly on the spectral slice.

\* \* \*

Conclusions: Spectral decomposition is an effective way of analyzing the seismic response of stratigraphic geologic features.

Because of tuning and the variation of the signal-to-noise ratio with frequency, alternative spectral components can provide significant insight into the stratigraphic interpretation.

We have shown how channel features are seen clearly on a 40 Hz spectral display. Coherence attribute run on spectral data yields much better definition of the channel features.

We will illustrate the use of spectral decomposition for obtaining clearer definition of the subtle fault features in a future article. ■

## Playmaker Forum Set in Houston

The 16 speakers are selected and the technical program is in place for the next Playmaker Forum, a one-day event designed to help empower geologists to have exploration and business success.

"Playmaker 2.0," put on by the DPA and the AAPG education department, will be held Jan. 23 at the Norris Conference Center in Houston.

As with last year's highly successful inaugural event, the forum will focus on elements – commercial and scientific/technical – needed to successfully proceed from first sight to discovery.

This year's keynote luncheon speaker will be past AAPG president Scott Tinker, director of the Texas Bureau of Economic Geology, who will

talk about shale plays, his vision for transforming U.S. energy reserves and what's ahead for future oil finders.

The day will be organized around four sessions: The Art of Exploration; Prospecting Workflows and Marketing Approaches; Established Plays – Discovery of New Fields and Sweet Spots; and Emerging Plays. The program will end with a "Wildcatter Corner."

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

For more information go to [aapg.org/forum/2013/playmaker/index.cfm](http://aapg.org/forum/2013/playmaker/index.cfm).

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## New YPs on the block

# Change at the Top: Meet Some New YP Leads

By MEREDITH FABER, YP Committee Vice Chair

The seasons are changing – and so is the Young Professionals Committee.

First, the reason for our changes: For the past several years we have enjoyed the participation of Middle East Region YP Lead **Anwar Al-Beaiji**, Africa Region YP Lead **Tunbosun Afolayan** and Rocky Mountain Section YP Lead **Cat Campbell**. As they move on to other roles within the Association we thank them for their service to AAPG and unwavering commitment to YP initiatives.

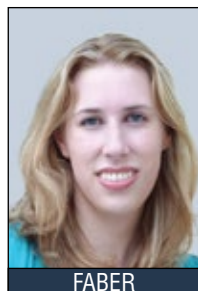
As part of this transition, we're also happy to welcome to the committee **Aisha Bulushi** of the Middle East Region; **Akintunde Okuboyejo** of the Africa Region; and **Julian Abbott-Whitley** of the Rocky Mountain Section.

I recently had the opportunity to get to know our new YP leads and discuss their plans to boost YP involvement in AAPG in their respective Regions.

Judging from their responses, the mantle of YP leadership has been placed on some very capable shoulders.

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

**Bulushi:** I chose to be a geophysicist because I always loved physics and natural sciences at school. I received a bachelor's degree in geophysics from Sultan Qaboos University (SQU) and then advanced my studies by completing a master's degree in petroleum geophysics at Imperial College,



FABER



BULUSHI



OKUBOYEJO



ABBOTT-WHITLEY

"Being a part of a group such as the Young Professionals provides that stream of regular communication."

London. After that, I could not wait to apply my knowledge to real world problems, so I eagerly joined the QI team at Petroleum Development Oman Company.

**Okuboyejo:** To be perfectly honest, my journey into the geosciences started as an accident.

In my family, in order to be looked upon as human, you either had to be an engineer or a doctor. So, as the last of seven children (all engineers and doctors, of course), my career was pretty much a done deal even before I was born. True to form, my favorite subjects in high school were mathematics and physics, and when I graduated I applied and took the tests for a degree in mechanical engineering.

While awaiting my results, an old professor friend of my father's (a strange bearded man who always referred to rocks as if they were living things) convinced him to allow me to take an undergraduate-level geology course in the state university where he lectured, just for the fun of it.

Fate had intervened and yanked me from an inevitable world of numbers and decimal points and plunged me into the unbelievably exciting world of discovery known as earth sciences. It was love at first sight, and I haven't looked back since.

The fact that I could make a living doing what I loved only served as an added bonus.

**Abbott-Whitley:** I always have been

interested in math, science and computers. My undergraduate degree in environmental science had an emphasis on GIS, which I found to be an amazing application of the three disciplines.

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

**Bulushi:** At SQU, I first learned about AAPG when I was an active member in the AAPG-SEG Geo Group and we had membership campaigns in the department. Then, in 2010, I participated in the first Middle East IBA (Imperial Barrel Award) competition and received second place in the Region.

**Okuboyejo:** I became a student member of the AAPG while studying for a master's degree in petroleum geosciences at Imperial College, London. I moved back to Nigeria and joined Shell immediately afterward. Since then, I have been participating in AAPG activities.

**Abbott-Whitley:** I have been attending events hosted by AAPG for about three years in order to expand my knowledge of the oil and gas industry while extending my professional network.

**Faber:** How did you learn about the Young Professionals Committee?

Continued on next page

## Come See What's New

### Fifth Annual AAPG-SPE Deepwater Reservoirs Geosciences Technology Workshop

28-29 January 2014 • Houston, Texas  
Norris Conference Center – CityCentre

Determining reservoir connectivity, calculating pore pressure, understanding the structural subtleties, identifying hazards, and developing accurate images (including subsalt), are deeply affected by new multi-disciplinary discoveries in science and technology. While new discoveries in the Gulf of Mexico, West Africa, East Africa, Brazil, and the Mediterranean grab headlines, what is going on behind the scenes affects everyone who works in deepwater offshore.

Exciting developments in our understanding of deepwater structure and reservoirs, along with new developments in technology, have helped propel the industry to a new level.

[www.aapg.org/gtw/2014/houston/index.cfm](http://www.aapg.org/gtw/2014/houston/index.cfm)

## Are Shales Still Exciting?

### Third Annual AAPG/STGS GTW: Eagle Ford + Adjacent Plays and Extensions

February 24-26, 2014 • San Antonio, TX

This workshop focuses on prospectivity and producibility, with an emphasis on the conditions and characteristics of successful wells, and the technologies and techniques used in achieving success.

The productive extent of the Eagle Ford has expanded, thanks to new information and understanding of the factors that make the formation producible in a particular prospect or location. The same is true of adjacent formations such as the Buda and the Austin Chalk, along with Cretaceous extensions of the Eagle Ford, which extend from the Eaglebine to the Tuscaloosa Marine Shale.

#### Topics:

- Geophysics, regional geology, and Eagle Ford Extensions
- Sweet spots, reservoir quality, and the Eagle Ford
- Petrophysics
- Geomechanical considerations
- Drilling the "new" zones: Lessons learned and "Must-Know" facts
- Completions: Hydraulic fracturing, proppant selection, understanding reservoir behaviors
- The right kind of frac: How can geologists help? What can engineers explain?
- Decline curves: Seeking and finding answers

[www.aapg.org/gtw/2014/houston/index.cfm](http://www.aapg.org/gtw/2014/houston/index.cfm)



# AAPG

## Geosciences Technology Workshops 2014



## GEO 2014 Boasts YP Emphasis

Young professionals will be an important part of the program for GEO 2014, set March 9-12 at the Bahrain International Exhibition and Convention Center.

GEO 2014 is the largest geosciences technical event in the Middle East. Organized by AAPG, EAGE and SEG, this year's theme is "Taking Geoscience Beyond the Conventional."


GEO's emphasis on young professionals stems from the first steps of the event's planning – each partnering society nominated a young professional to help create a program and events that would be useful and of interest to YPs.

This resulted in a plethora of professional development opportunities.

One example of that is the YP Meet-n-Greet, set for March 10, which will give YPs a chance to meet and network with industry veterans.

Another YP event will be a guided tour of the exhibits hall, offering specific opportunities to meet with companies interested in hiring new geoscience talent.

More details about these events and the entire GEO program can be found online at [geo2014.com](http://geo2014.com).

Also online registration open – and those who register before Feb. 7 can receive for "early bird" discounts. 

### Continued from previous page

**Bulushi:** It all started with an invitation from Said Al-Hajri (current AAPG-MER president) and Anwar Al-Beaiji (YPSS chairman and IBA coordinator) to attend AAPG Leadership Days in Tulsa in July 2013.

**Okuboyejo:** I learned about the exciting work the Young Professionals Committee have been doing within and outside Nigeria from the outgoing Africa Region YP Lead – Tunbosun Afolayan. She also is a colleague at Shell Nigeria, and introduced me to several committee members, from whom I have learned a great deal from in a very short time.

**Abbott-Whitley:** I have been working with Cat Campbell for about a year now. She introduced me to the group.

**Faber:** *Why did you volunteer for this committee position?*

**Bulushi:** Becoming the YPSS co-chair and YP lead will allow me to build confidence and communicate with all levels of geoscientists in my Region and worldwide.

**Okuboyejo:** My time in Shell has afforded me the opportunity to liaise with geoscience undergraduates and young professionals in the industry in Nigeria. While attending the various workshops, seminars and student outreach programs I recognized the need for a platform upon which YPs could share ideas and network. When I heard that the position of YP Lead would soon be vacant, I jumped at the opportunity to lead and champion the YP cause.

From a personal standpoint, a leadership role in a recognizable and prestigious organization like the AAPG would further enable me to develop my leadership skills,

expand my knowledge, establish new networking relationships and improve my organizational skills.

**Abbott-Whitley:** I want to become more involved within my professional network, and I feel that networking is an essential part of career development. Being a part of a group such as the Young Professionals provides that stream of regular communication.

**Faber:** *What do you hope to accomplish during your tenure as Region/Section YP lead?*


**Bulushi:** It is my goal to see the Middle East shine as a Region with a reputation for capable geoscientists. Through my roles as YPSS co-chair and YP lead, I will strive to accomplish this goal because I believe in the abilities of young professionals and students in the Region.

**Okuboyejo:** During my time as the Africa Region YP lead, I would like to see the number of YPs in AAPG in my Region equal (and possibly surpass) that of other established organizations (like the SPE) by generating interest in our activities.

This will not be an easy task because the catchment area of the SPE is far wider than that of the AAPG.

However, I do believe with targeted and focused activities, including direct engagement with universities, colleges and the industry, we can achieve this goal.

**Abbott-Whitley:** I hope to generate continued interaction among Young Professionals in the Denver community and in the Rocky Mountain Section.

*Have a question for the YPs – or want to get involved with YP activities? Visit our website at [aapg.org/youngpros](http://aapg.org/youngpros), and/or email your Section or Region representative. *

## Interpretation™

A journal of subsurface characterization



### *Abnormal pore pressure and associated environmental and geohazards: Detection, quantification, interpretation, and analysis*

The editors of *Interpretation* ([www.seg.org/interpretation](http://www.seg.org/interpretation)), copublished by SEG and AAPG, invite papers on the topic of **Abnormal pore pressure and associated environmental and geohazards: Detection, quantification, interpretation, and analysis** for publication in the February 2015 special section to supplement the journal's regular sections of technical papers on various topics.

Numerous hydrocarbon fields have been discovered in abnormally high pore pressure (geopressure) basins, where pore pressure analysis and wellbore stability issues are challenging tasks. These challenges are especially daunting in deep water environments where prospect risks are affected by both the magnitude and the 3D distribution of pore fluid pressure in abnormally pressured formations. These conditions are intimately related to the geology and the rock and fluid properties. Drilling through these overpressured zones, whether in the overburden or at the reservoir level, poses serious risks to operations, personnel, and the natural environment. The ability to safely drill through overpressured zones requires a multidisciplinary approach in understanding geopressure mechanisms, difficulties in accurately predicting the distribution of geopressured formations, and the associated interpretation uncertainties.

The purpose of this special section is to provide a comprehensive snapshot of the state-of-the-art in abnormal pore pressure and related geohazards issues. Contributions include, but are not limited to, the following topics:

- case histories related to habitats of geohazards, and abnormal pressure detection, quantification, and interpretation
- geohazards in the shallow stratigraphy, such as shallow gas, shallow aquifer pressured sands, gas hydrates, etc.
- challenges associated with geohazards in complex/poorly imaged geologic areas such as subsalt and subbasalt basins, subbasalt targets or complexly deformed and overthrust sediments
- shallow and deep drilling challenges in abnormally pressured intervals and mitigations
- state-of-the-art seismic techniques for geohazards detection, quantification, interpretation, and analysis
- geohazards associated with high pressure and high temperature (HPHT) basins
- tutorials that review the state-of-the-art interpretation techniques

Interested authors should submit their manuscripts for review no later than **15 April 2014**. In addition, the special section editors would like to receive a provisional title and list of authors as soon as possible. Authors should submit via the normal online submission system for *Interpretation* (<https://mc.manuscriptcentral.com/interpretation>) and select this topic in the manuscript type dropdown option.

The special section editors would like to receive a provisional title and list of authors as soon as possible. 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:

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

#### Special section editors

Nader Dutta <a href="mailto:NDutta@slb.com">NDutta@slb.com</a>	Mark Tingay <a href="mailto:mark.tingay@adelaide.edu.au">mark.tingay@adelaide.edu.au</a>
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## Abstract Submission Open

GeoConvention 2014: Focus will be held May 12-16 at the Calgary TELUS Convention Centre in Calgary, Alberta. Conference themes will focus attention on the most significant facets of an operation, refining evolving workflows, and sustaining effective practices.

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# Her Brilliant Career: Marie *Still* Loves Geology

By COURTNEY CHADNEY, EXPLORER Correspondent

**M**arie Gramann, a 65-year member of AAPG, decided at the young age of 13 that she was going to be a geologist.

The reason why, to her, isn't important. In fact, it no longer is a part of who she is.

"I don't know why," she said recently about a decision that would define her career, and her life. "I just said, 'I'm going to become a geologist.'"

What's important, instead, is the fact that geology and her AAPG membership remain her passion – even at an age when most people think only about enjoying a life of ease.

Graduating from the University of Texas with a bachelor's degree in geology in 1936, Mrs. Gramann began her career as a draftsman for the Oil and Gas Division of the Texas Rail Road Commission, and then went on to work for Stanolind Oil and Gas (which decades later would merge into Pan American, which eventually through a merger became now-defunct Amoco).

Gramann, who now resides in Brownwood, Texas, recalled being one of very few women in the program at UT, and stated that most of the time she was the only female geologist in the companies where she worked.

She hardly seemed bothered by that fact.

"I never thought too much about being the only woman," Gramann said. "I felt like I was one of the guys."

Gramann stayed motivated and



GRAMANN

**"I never thought too much about being the only woman. I felt like I was one of the guys."**

determined throughout her career by her passion for geology – and her belief that being a good geologist was not determined by gender.

"You either do what you do, or don't," she explained.

## A Career to Remember

Though Gramann has been retired for a while and significant changes have been made, women remain a minority in petroleum geology. Still, Gramann could only recall two major times she felt this disadvantage.

Interestingly, those moments form the bookends that frame her career.

The first challenge, perhaps not surprisingly, was simply finding a job at the beginning of her career.

"It was hard to get a job as a woman in the industry," she said. "Women just worked where we could get a job."

And then there was the time at the end of her career when she actually left her job due to an unpleasant work environment she

attributed to fellow male colleagues.

"It was not a good situation, because the men from the office resented me," she explained. "Several people who didn't have the seniority that I had, it didn't sit well with those people, and after a couple of years I decided it wasn't worth it to stay there."

But with the exception of those two examples, Gramann found it difficult to really describe a time she felt impacted by her gender.

Finding reasons to smile about her career is a lot easier.

One of her highlights actually came shortly after she left the company described above, when she was asked by a friend to become a professor of geology at Howard Payne University in Brownwood, Texas.

The opportunity came as a complete shock, and Gramann felt crazy at first for accepting the offer.

"Teaching geology was one thing I never wanted to do," she said with a laugh, "but I was asked, and then that next Saturday I signed the contract."

It was to be the beginning of a beautiful

relationship that lasted nearly 20 years on a daily basis, and much longer as a connection – Gramann remains Assistant Professor Emeritus of Geology at the school.

Gramann described the beginning of what would lead to nearly 20 years of teaching.

"It was hard because I didn't have anything to start with," Gramann recalled. "I didn't even have a textbook until the middle of the semester."

During this time she also enjoyed being part of many societies like the Abilene Geological Society – and loved participating in field trips. In both of these situations, again, she recalls being usually the only female, but not letting that deter her.

"It never bothered me being the only woman," she said. "I was a geologist, and I was there to learn and meet other geologists from all over the world."

## The Connection Remains

Although not being able to actively participate in the industry due to health reasons, Mrs. Gramann remains determined to maintain her connection – and her love – of geology.

Testament of that came at the recent AAPG Southwest Section annual meeting, when she tracked down AAPG personnel and wanted an update on her membership status.

"If you're a geologist, you're a geologist

**Continued on next page**

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Registration now open

## Reducing Subsurface Uncertainty & Risk Through Field-Based Studies

*The Value of Outcrops and Analogues in Hydrocarbon Exploration, Development and Production Implications for Global Exploration and Production*

**4-6 March 2014**

The Geological Society, Burlington House, Piccadilly, London



This meeting will provide a timely revisit and reappraisal of the value and impact of outcrop based fieldwork in hydrocarbon exploration, appraisal, development and production. In recent years we have seen a refreshed focus on frontier exploration, in increasingly difficult settings, and the challenges of new developments such as deepwater clastics and carbonates. This has led to the resurgence in the appreciation, use and need for outcrop based studies as analogues and benchmarks for the subsurface. This applies both to the overburden and the reservoirs. Digital technologies such as remote sensing and digital data capture have revolutionised field-studies, however traditional methods (e.g. mapping, logging and sampling) remain at the very core of any field study.

This meeting offers an exciting opportunity for key researchers and users of these datasets to come together, learn from recent advances and look forward to future directions and needs. A key objective is to engage industry groups and academia in a dialogue and knowledge sharing that reflects the current status and future potential of this important area.

### Themes:

- Exploration: Reconnaissance-scale fieldwork
- Structural Analogues - regional to reservoir scale
- Applications to Reservoir and Field Appraisal, Development and Production: Outcrop-scale fieldwork
  - Clastics
  - Carbonates
- Unconventional Hydrocarbon Resources
- Health, Safety & the Environment and field studies
- Looking to the future

### Keynote Speakers:

Andy Whitam, CASP  
Dave Hodgson, Leeds  
Dave Sanderson, Southampton  
Art Donovan, bp  
Caroline Gill, Shell  
John Howell, Bergen

For more information please contact: Laura Griffiths, Events Co-ordinator, The Geological Society, Burlington House, Piccadilly, London W1J 0BG. T:020 7434 9944 F:020 7439 8975



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## And a beautiful relationship

# Memoir a Lasting Tribute

By WILLIAM MORGAN

For Del Wilson, seeing the publication of AAPG Memoir 98, "The Great American Carbonate Bank: The Geology and Economic Resources of the Cambrian-Ordovician Sauk Megasequence of Laurentia," was a further tribute to her late husband, renowned carbonate sedimentologist, paleontologist and educator James Lee Wilson – and a reminder of the partnership they shared during their 58 years of marriage.



WILSON

The book was published earlier this year and dedicated to Jim Wilson, but its beginnings go back to 1997, when Jim and (future executive director) Rick Fritz first conceived of the idea for the volume as they were completing a consulting project on the Ordovician Arbuckle Group of the U.S. midcontinent.

The seeds of Jim Wilson's interests in the Sauk Megasequence, however, were planted long before.

His fascination with Cambrian carbonates began during his research on Cambrian and Ordovician trilobites of the Marathon region, Texas, for his master's thesis at the University of Texas, Austin (1942), and during his doctorate dissertation on Cambrian stratigraphy of the Appalachians at Yale University (1949).

Jim Wilson had several illustrious careers:

- ▶ He was a member and director of Shell Oil Company's pioneering carbonate research group in the 1950s and '60s.
- ▶ In 1966 he moved from industry to Rice University in Houston, where he was professor of geology until 1979, serving as chairman of the department of geology from 1974-77.
- ▶ In 1972, while at Rice, he was appointed to the university's Harry Carothers Wiess Chair of Geology.
- ▶ In 1979 he accepted a professorship at the University of Michigan, where he taught until 1986, retiring as professor emeritus.

After retiring from the University of Michigan he consulted for many years for various petroleum companies.

His work earned him many accolades, including the highest recognition from AAPG and SEPM (Sidney Powers Medal in 2002 and Twenhofel Medal in 1990, respectively). He also served as SEPM president from 1975-76 and received AAPG's Distinguished Educator Award in 1995.

Because of his interest in young scientists, Jim and SEPM established the Wilson Award to honor an early years geoscientist.

But he may be best known for his 1975 book, *Carbonate Facies in Geologic History*, in which he synthesized a considerable amount of data on carbonate facies and depositional environments through



Del Wilson and AAPG Memoir 98.

time, culminating in generalizations and carbonate facies zonations that are still widely applied today.

Throughout his career, behind the scenes was his wife and partner, Del. When asked how he sustained such a long and fruitful career his answer was always the same: "Del."

Throughout their marriage she worked alongside her husband – typing and retyping, editing manuscripts, answering the phone, keeping the books, chauffeuring him to and from the field, acting as camp cook and nurse and, while Jim was a professor at Rice University, even cutting his students' hair for free – all while keeping house, moving often and raising three boys.

Jim Wilson once laughingly told colleagues that he was a little nervous about having traveled alone to a consulting job because "anytime I leave Del behind, she goes out and buys a new car."

One cold day in 2001, while Rick Fritz was driving through the Arbuckle Mountains of Oklahoma on his way to Dallas, he spotted Jim measuring an outcrop. When Fritz stopped to talk, Jim said that he "just wanted to make sure he understood the cycles in this section of the Arbuckle Group" – a reflection of Jim's geological curiosity and love of geology.

As Fritz drove on, a bit farther down the highway he spotted Del, roadside, reading comfortably in a shiny new vehicle.

\* \* \*

Upon publication of AAPG Memoir 98, the editors of the volume sent a copy to Del, inscribed inside with their well wishes, recognizing her important contribution to Jim's career and scientific accomplishments.

It wasn't a new car, but it was another recognition and reminder of the loving and successful relationship and partnership that Jim and Del Wilson shared for 58 years.

In fact, she was excited to reference an issue just a couple of months that really sprung her interest, as it covered geology of the hills of Texas, where she had worked a long time ago.

Even now, she still knows – just *knows* – that she wants to be a geologist.

### Continued from previous page

your whole life," Gramann said. "I never want to get away from it."

One of the ways she stays connected to the geological world is by reading the EXPLORER each month.

## 64<sup>th</sup> Annual GCAGS Convention 5-7 October 2014 | Lafayette, LA

### CALL FOR PAPERS!

Submission Deadline  
06 January 2014

[www.GCAGS2014.com](http://www.GCAGS2014.com)

Seeking Abstracts for both the traditional GCAGS *Transactions*, vol. 64, and the GCAGS *Journal*, vol.3, (our new, fast track, full peer-reviewed journal of Gulf Coast geoscience).

#### Session Themes:

Conventional Plays	Deepwater Plays
Energizing Shelf Plays	Resource Plays
Renewable Energy	Water Resources
Salt Tectonics	Environment
Technology	Politics, Ethics and Security
Education	Economics

**Transactions Submissions:** An **abstract** of not more than 250 words should be submitted no later than 06 January 2014. Please email abstracts to the Technical Program Chair, Bill Finley at ([wfinley@rocmendo.com](mailto:wfinley@rocmendo.com)). Notification of acceptance will be sent by 20 January 2014. Oral and poster presenters must submit a paper of 10–12 pages or an extended abstract with key figures for review by 17 March 2014. Detailed instructions to authors for manuscript submission will be provided upon acceptance of abstracts.

**Journal Submissions:** An **extended abstract** of at least 600 words, including 1–2 representative figures recommended, should be submitted no later than 16 December 2013 via email to the Journal Editor, Tucker Hentz ([tucker.hentz@beg.utexas.edu](mailto:tucker.hentz@beg.utexas.edu)). With acceptance, a full manuscript must be submitted for fast-track peer review by 24 March 2014. Detailed instructions to authors for manuscript submission will be provided upon acceptance of abstracts. Note that all Journal authors are required to present their results at the 2014 GCAGS Convention.

## A Century of Innovation from Exploration to EOR



### 2014 Pacific Section AAPG / Pacific Section SEPM / Pacific Coast Section SEG Annual Meeting

Bakersfield, California, April 27-30, 2014

Please follow this link to the PSAAPG 2014 Convention Page:

<http://psaapg.org/2014-convention/>





Eternal Balance - The Toadstools Grand Staircase-Escalante National Monument, Utah.

by James Marvin Phelps

## Pinterest Provides Online Gallery

Like to look at pretty and dramatic photos of the Earth's beauty? Like to have other people look at *your* pretty and dramatic photos? If so, AAPG's Pinterest site is the place for you.


Over the past year a growing number of members have discovered our connection to Pinterest connection, a website where people can share great photos from all over the world.

And as every geologist knows, the Earth is a beautiful place filled with wonders that defy descriptions.

Some of you have used the AAPG Pinterest boards to enjoy the photos found there. Others have contributed to our "Crowdsourced Geology" board – and to those who have contributed your photos to our board, thank you!

On these pages are some photos you can find on our Pinterest page.

So whether you're a sharer or simply a browser, check out the site.

Either scan the QR code or go to [www.pinterest.com/aapgweb](http://www.pinterest.com/aapgweb) to view or contribute. 



Hoodoo - Page, Arizona

by Guy Schmickle



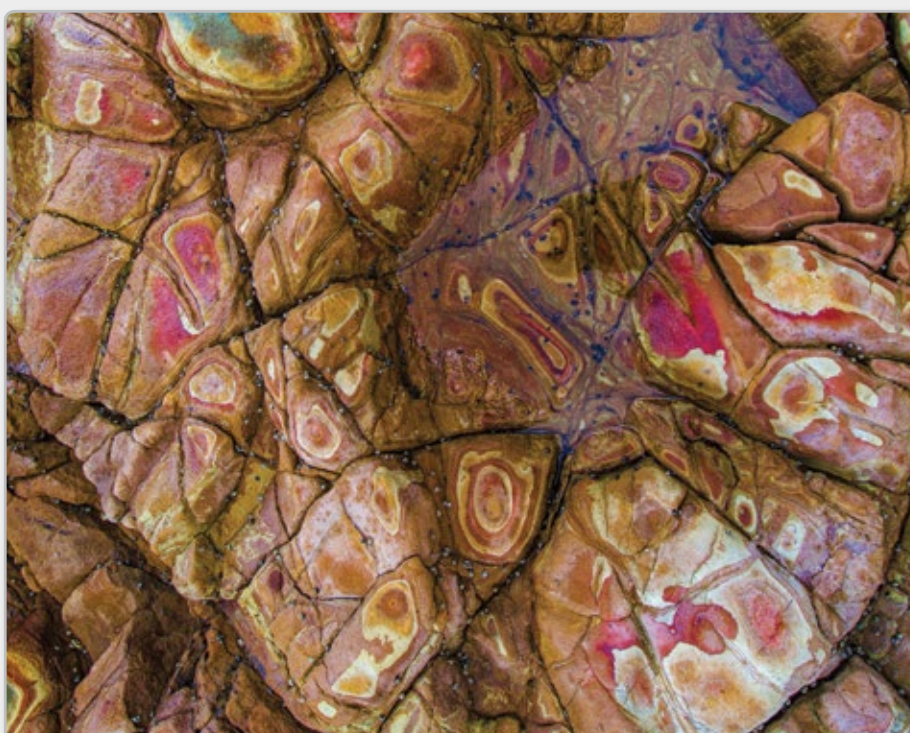
Looking down in the Grand Canyon.

by Sandra Westbrooks



Spring bloom at Cathedral Rock in Sedona, Arizona.

by Guy Tal



Rocks at Sacred Cove, Palos Verdes, California.

by Ted Gore



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Painted Wall on the north side of the canyon. It is the tallest sheer cliff in Colorado at 2,250 feet (690 m). Lighter-colored pegmatite dikes are clearly visible.

by Jesse Varner



Jemez Mountains, New Mexico

by Jlaszlo Ilyes

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His Royal Highness Prince Khalifa bin Salman Al Khalifa  
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*AAPG Foundation programs reach around the world. I am particularly pleased that we support bright young minds and attract them to our science.*



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*For 60+ years, AAPG has meant a great deal to me in my career. It is my wish that someone will be helped by my contribution to have as successful a career as I have in my years of work.*

*We wanted to give back to the profession that has given so much to our family. The diverse programs of the AAPG Foundation provide both opportunities to contribute and a track record of tangible results, like Grants-in-Aid, Scholarships, and the Switch Energy Education film.*



Scott Cameron and Penny Bowen



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*I donate to the AAPG Foundation to support continuation of the technical programs that have been so important to me in my career. Over the years, I have participated in AAPG publications, Distinguished Lecture Tours and continuing education courses. I want the AAPG Foundation to continue to support these and other important technical functions in our industry to support us all.*



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### FOUNDATION UPDATE

## Gifts to help others Programs for All Preferences

By NATALIE ADAMS, AAPG Foundation Manager

You may be pondering which worthy organizations you'd like to support in your end-of-the-year giving. If so, we truly hope you include the AAPG Foundation in your plans.

The AAPG Foundation has been providing grants, publications, lectures, education, leadership opportunities and many other resources since 1967. No doubt, these initiatives are important to you – together, we're supporting the geosciences profession as well as the general public.

Your support of AAPG Foundation programs is crucial to our success and reflects your personal commitment to fulfilling our mission.

We know you may wish to support a specific program or support the Foundation's work in a more general way. Whatever your desire, we are proud that 100 percent of your contribution will go to the program(s) that you designate. You may designate your contribution to many AAPG Foundation funds.

Or, if you choose not to designate a specific fund, your gift will be placed in the General Fund.

Please consider a program or two that personally speaks to you. Some of our programs are:

#### Education

► **Grants-in-Aid Graduate Program** – The overarching goal of the AAPG Foundation's Grants-in-Aid program is to promote research in the geosciences. Grants provide financial assistance to graduate students (currently enrolled in master's or doctorate programs) whose thesis research has application to the search for and development of petroleum and energy-mineral resources and/or to related environmental geology issues.

There currently are 90 grants available, but more are needed. In 2013, we were only able to award 18 percent of the students who applied.

A gift of any size will help build the award amounts; a gift of \$25,000 will ensure an annual grant of \$1,000 for a student for years to come.

► **James A. Hartman Student Chapter Leadership Summit** – This event is held annually during AAPG Leadership Days. During the summit attendees participate in training, collaborate with other leadership throughout AAPG and establish mentoring relationships.

This program encourages and supports the future leaders of the petroleum geoscience community.

#### Awards

► **Excellence in Teaching Awards** – The AAPG Foundation offers two teaching awards acknowledging teachers who excel in geoscience education (one at the K-12 level and the other at the collegiate level), to individuals who shine in their respective fields.

► **The Imperial Barrel Award** – This joint program between AAPG and the AAPG Foundation is a celebrated annual prospective basin evaluation competition for geoscience graduate students from universities around the world. University teams compete to win scholarship funds for their geoscience department and the international recognition that comes from competing or winning in the competition.

The program is rigorous and contributes to AAPG's mission of promoting petroleum geoscience training and advancing the careers of geoscience students. The IBA is a hands-on opportunity for students to experience the creative process and the high-tech science that is required in today's energy industry.

#### Lectureships

► **The Distinguished Lecture Program** – This program supports lecture tours

See Foundation, page 63

#### Foundation Contributions for October 2013

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



# WE ARE CONTINUALLY AMAZED ...

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# It Was a Very Good Year for Europe Region

By JEREMY RICHARDSON, AAPG Europe Region Director

Oh, to be a landlord in central London at this time; it seems to be the time for them to begin cashing in on their property assets.

What has this to do with petroleum geology, you ask? Well, at this moment, for us in the AAPG Europe office in London, quite a lot.

We have had a proper AAPG Europe office in London for five years, and the lease on our premises expires at the end of December – we have now far outgrown the office space, we are bursting at the seams so we have to find new premises.

We really want to stay in the same area of London – it's very central and handy for members to pop in for a visit. We have found a few nice office spaces over the past three months, but the rents are rising rapidly and the landlords are being very cagey and playing a waiting game – and we have been unable to seal a deal.

The waiting game is frustrating, as we have to vacate our offices by Christmas. It will be all right in the end, of course, and by the time you read this I am sure we will be organized and looking forward to the move – and we look forward to welcoming you to our new AAPG Europe office in the new year.

\* \* \*

We have had a very busy and eventful last 12 months, which most recently culminated in the appointment of our new Europe Region President **Keith Gerdes**



Participants on the field trip to the Kartli region held after the successful Tbilisi conference on Petroleum Systems of the Paratethys.

from Shell, who took over from **Vlasta Dvorakova**.

Vlasta has had a great and very influential presidency in Europe. She is never slow in volunteering her time and ideas and helping in all areas of the Europe Regions operation. Thank you, Vlasta, from all at AAPG in the London office.

We now welcome Keith, who brings with him a wealth of experience; we look forward to sharing his huge compendium of contacts and friendships in the industry.

\* \* \*

Within the last year there have been some excellent events produced in Europe, from Educational Weeks in

Lisbon, Budapest and Aberdeen to our established E&P conferences and exhibitions, our monthly Oil Finders Lunches in Aberdeen and a variety of topical GTWs and conferences distributed widely around Europe – as well as all our student activities and the AAPG-AAPG Foundation Imperial Barrel Award program.

► The first of the APPEX Regional conferences was launched in Istanbul in November 2012, and it was followed up this year with the second of these Regional events in Athens in November 2013.

► 2013 started with a London conference on "Carbon Capture and

Storage," chaired by **Stuart Haszeldine** and organized jointly with the Geological Society of London. It was a busy two-day conference (attracting more than 25 speakers from all over the world) that looked at the economic and regulatory context of CCS, current and near-future research and developments, as well as an update on projects and studied utilization, storage and monitoring.

► Next up in February was a unique event on "Induced Seismicity," under the chairmanship of **Peter Styles** – a very topical subject for Britain and Europe that attracted 24 speakers and nearly 100 delegates.

Global demand for energy has spurred development and deployment of technologies, such as hydraulic fracturing and other forms of well stimulation, to extract this energy from the ground. This energy production is now frequently occurring in populated areas, prompting public concern about whether extracting and injecting fluids can generate seismic events.

This was a very interesting and thought-provoking event, and will be followed up in February with the second in this series.

► APPEX Global, our E&P conference and exhibition held in March in London, was the biggest and best ever; 85

**Continued on next page**



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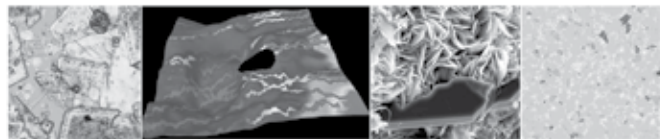
Richard Worden  
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Call for Abstracts Deadline: 17 January 2014

## Reservoir Quality of Clastic and Carbonate Rocks: Analysis, Modelling and Prediction

28-30 May, 2014

The Geological Society, Burlington House, Piccadilly, London



Porosity and permeability exert a fundamental control on the economic feasibility of a petroleum accumulation and need to be quantified from basin access to mature production. Quantitatively reporting the mineralogy and pore space characteristics of reservoir rocks is vital in establishing the controls on reservoir quality. Only by doing so it is possible to build predictive capability, essential to successful geological modelling and cross-disciplinary integration. This issue is becoming ever more critical with exploration and production of petroleum in increasingly challenging conditions and from less conventional reservoirs.

Despite the importance to the industry of understanding the controls on porosity and permeability of reservoirs, fundamental issues lack consensus. Reservoir quality is controlled by interdependent sedimentary and diagenetic factors, including sediment provenance and weathering, depositional environment and climate, compaction, recrystallisation and dissolution, authigenic mineral growth, petroleum charge and structural deformation.

This conference seeks to address the factors and processes controlling rock properties of clastic and carbonate rocks as well as showcase novel analytical techniques and demonstrate diagenetic modelling capability. Delegates from both academic institutions and industry are encouraged to attend and contribute in order to represent the range of current reservoir quality research.

### Themes

- Provenance and environment of deposition
- RQ in the sequence stratigraphic framework
- Clay mineral diagenesis in clastic and carbonate rocks
- Quartz diagenesis in clastic rocks
- Carbonate diagenesis in clastic rocks
- Near surface diagenesis as a control on reservoir quality in carbonate systems
- Porosity modification in the burial realm
- Fluid-rock interactions
- Petrophysical RQ characterisation and upscaling
- Application of RQ analysis for petroleum exploration and production
- Porosity upsidet – predicting anomalously good reservoirs
- RQ of unconventional reservoirs
- Computer modelling of diagenesis
- Experimental approaches to understanding RQ
- Analytical techniques
- Geomechanical and structural controls
- Using RQ to improve rock physics models
- Modern environment, outcrop and subsurface analogues

### CALL FOR ABSTRACTS:

Please email paper and poster contributions to [laura.griffiths@geolsoc.org.uk](mailto:laura.griffiths@geolsoc.org.uk) and copy to [Jenny.Omma@gmail.com](mailto:Jenny.Omma@gmail.com) by 17 January.

For further information please contact:

Laura Griffiths, The Geological Society, Burlington House, Piccadilly, London W1J 0BG.  
Tel: +44 (0)20 7434 9944 Fax: +44 (0)20 7439 8975

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## AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS

### 2014 Southwest Section Annual Meeting

Midland, Texas

May 11–14, 2014

Hosted by the West  
Texas Geological Society



## Old Basins, New Ideas

### Exploiting the Resource, Reaping the Reward

Southwest Section AAPG is seeking submissions on a wide variety of topics related to the geology of the Permian Basin region of southeast New Mexico and West Texas. We are especially interested in papers and posters on emerging and established unconventional resources.

**Deadline for extended abstracts and poster proposals is 1 February 2014**

Topics of interest: case histories and development of the Wolfberry, Avalon, Bone Spring, and Cline Shale reservoirs; regional geologic models and new plays in the Permian Basin; horizontal well design, drilling, and completion and fracturing techniques; characterizing and evaluating shales as source and reservoir rocks.

**Student scholarships to be awarded for best oral/poster presentations!**

Paul H. Pausé  
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Meet the press: Yannis Maniatis, the Greek Minister of Environment, Energy and Climate Change, interviewed during the Regional APPEX Conference and Exhibition in Athens.

## Continued from previous page

exhibitors and getting on toward 1,000 delegates made the trip to London's Business Design Centre, where all the great and the good from the world of international E&P met to discuss and look at prospects and plays from around the world.

Delegates from 42 countries attended this year's Global APPEX, making this a truly international event.

A date for your diary: The next APPEX Global is 11-13 March, again at the Business Design Centre. Now with new much larger facilities let's see if we can achieve more than 1,000 attendees from the E&P industry.

► At the end of March we held the Regional finals of the AAPG-AAPG Foundation Imperial Barrel Awards, which is now a huge and global competition.

Within an eight-week window it gives geoscience graduate students the opportunity to analyze a dataset (comprising geology, geophysics, land, production infrastructure and other relevant materials). They present their findings to a very senior panel of industry professional in Prague, and a winner is chosen.

This year the winner was from Manchester University; they were then flown to the IBA finals in Pittsburgh in May.

The AAPG Europe Region has a competition with over 20 teams from European universities competing, the "cream" of the geoscience graduates – and a great opportunity for them to get some real industry experience and a chance for future employers to look at these students in an actual business environment.

(We hate to turn away universities, but the competition costs the Europe Region alone over \$200,000 – so if you want to see more universities taking part please contact the AAPG Europe office and donate a little money to help us make ends meet and give the students a helping hand on their first step into our industry. Typically it costs us around \$7,500 to pay for a university team to take part in the competition.)

► In April we ran our Europe Regional Conference and Exhibition in Barcelona, which attracted great support from the industry and proved to be a very successful event that covered exploration in basins within and around the Mediterranean Sea.

Exploration activity has increased – particularly in the eastern Mediterranean – over the past few years and significant oil and gas discoveries have been made in Tunisia, Libya, Egypt and Israel, thanks to improved seismic imaging and deepwater drilling

technology alongside new play concepts.

We re-evaluated the whole of the Mediterranean in the light of these new ideas and discoveries.

Over 420 delegates attended and 100 presentations were chosen from 289 abstracts submitted with more than 80 posters also on display.

The 2014 event will be held again in Barcelona, co-chaired by **Tomas Zapata** from Repsol and **Luis Cabrera** from the University of Barcelona. With support from CEPESA, the Spanish Association of Petroleum Geologists and Geophysicists. (AGGEP), the Spanish Society of Geologists (SG) and the University of Zaragoza, the theme for next years' event will be "New Developments in the Investigation of Conventional and Unconventional Petroleum Systems in European Basins." Topics will cover conventional and unconventional plays and basin analysis.

Please see the AAPG Europe website for further details and a call for abstracts.

Finally, our thanks to **Gabor Tari**, who has been closely involved with two of our very successful events this year, our Regional event in Barcelona as the technical chair and a very unique event he co-chaired with **Reinhard Sachsenhofer** in Tbilisi in September.

Thank you, Gabor. We are very grateful for all your hard work.

► Speaking of Tbilisi, we ran a very successful conference there in September on Petroleum Systems of the Paratethys, concentrating on hydrocarbon exploration from a geoscience perspective.

Many exploration topics unique to the Paratethys region were captured in the session themes. Partnering with the Ministry of Energy and Natural Resources of Georgia – and ably chaired by Tari and Sachsenhofer – the conference enjoyed 96 delegates, an excellent gala dinner and a very oversubscribed field trip to the Kartli region between Tbilisi and Gori (some 70 kilometers to the west). Thanks go to CanArgo Georgia for the great organization and supply of field trip guides.

► Two more major events rounded off our year:

✓ Stavanger, Norway, was the venue for this year's bi-annual 3P Arctic conference. Our thanks go to **Erik Lundin** from Statoil, who chaired the conference, and his excellent committee. The 3P Arctic 2013 technical program consisted of 17 sessions, over three days with about 700 attendees – a truly great success that challenged the Stavanger center's capacity.

✓ And finally for 2013, the second Regional APPEX Conference and

See Europe Region, page 63

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Colorado School of Mines invites applications for the Robert J. Weimer Distinguished Chair in Sedimentary and Petroleum Geology. The successful candidate is expected to conduct a vigorous, externally-funded research program that includes collaboration with researchers in the petroleum industry, direct graduate student research, and teach graduate courses in his/her specialty. Candidates must possess a doctoral degree in geosciences or a closely related discipline. The successful candidate will have proven high-quality research and scholarship. The purpose of this endowed position is to support innovative research in sedimentary geology and education that are broadly aligned with petroleum geosciences. These may include sedimentology, stratigraphy, and the integration of these disciplines with tectonics, paleontology or geochemistry. The research interests should complement and support existing campus programs (e.g., conventional and unconventional resource research). Applicants must demonstrate documented successful teaching experience and possess strong interpersonal and communication skills. We particularly seek candidates who both complement our current research program and integrate across geophysics and petroleum engineering. The position is expected to be filled at the tenured Full Professor level.

For the complete job announcement and directions on how to apply, visit:  
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# New Website Design Coming in January

By JANET BRISTER, AAPG Website Editor

As we told you last month, something very new – and very big – is coming soon to the AAPG website.

Our look will be noticeably different in January, and when it happens it will be sudden and fast – there will be no gradual move from the current [www.aapg.org](http://www.aapg.org) to the new.

And we're doing this, of course, so that all members have a better website experience. We want this to be the perfect place for you to begin finding, talking, collaborating and contributing more to your career, this Association and the petroleum geosciences.

AAPG does a lot of things – and we want to get the information about every single one of them into the hands of our membership and the world.

The number one thing that people use the Internet for is to find information.

These has been the driving force behind the redesign of the AAPG website.

However, your web team recognizes the things AAPG does and has available to its membership aren't the Association's only focus.

First and foremost, it is the science that inspired the forming of AAPG. It is the science that drives the work of its members. It is the science that their careers are all about.

The science is the star of the new website.

There will be a feature page specific to scientific disciplines. It will feature articles from not only the publicly



available EXPLORER but also from the scientific papers presented at meetings, articles published in books and the BULLETIN, and as the discussion forums develop, the content that is being shared there.

Protected, of course, but still pointing out its availability.

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

## Turn It On

For the most useful science to float to the top, users need to register for an account on the site.

Registration will activate features and accessibility.

One such feature is the ability to rank the information made available. Only Association members will be able to use this feature.

Ranking is a little easier to understand

in practice, but let me attempt to explain the importance of this critical feature.

You've seen the "Like" button on Facebook, right?

It simply tells other people that the comment posted caught your interest, made you think, made you laugh – frankly, "made you look."

When you "Like" something you are recommending to others it is worth their time to look, too.

It also keeps fresh the post you noted so it remains within the current feed longer.

Ranking in the new site will provide members the opportunity to do this on articles, lecturers, events and, yes, even in the discussion forums and searches.

However, unlike Facebook, it also allows you to vote if the information was unhelpful the information found was. A way to tell others they might not find what they were looking for within that content.

In other words, the ranking system goes both ways.

As more people weigh in about site content, the membership will begin to shape the site's content.

It will reflect what is most important and most useful to the membership all around the world – or at least to those who chose to register on the site.

Don't like being told what to look at? No problem.

**Continued on next page**



# AAPG CAREER CENTER

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**AAPG Career Center  
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- Discounted Test Prep Services Through The Princeton Review

[www.aapg.org/careers/careercenter.cfm](http://www.aapg.org/careers/careercenter.cfm)



## Foundation from page 58

on pertinent geoscience topics to universities and geological groups throughout the world, annually reaching more than 300 affiliated groups.

Distinguished Lecturers are unpaid volunteers who embark on two- or three-week tours. Being recognized as respected scientific leaders in their specialties is a requirement of selection for this honor.

Distinguished Lecturers dedicate themselves to spreading their knowledge and educating and promoting the geosciences to other geoscientists, students and the general public.

► **The Visiting Geoscientists Program** – this program has provided campus visits by active and experienced geoscientists for over 30 years, and it's still going strong today. Professional geoscientists are sharing their experiences and career insights with students throughout the United States, Canada and more than 30 other countries worldwide.

### Publications

► **Amoruso Special Publications** – Special publications provide geoscience industry professionals with focused and timely studies on critical scientific topics.

► **Newly Released Publications Program-University Subscription** – Members can support students at their alma mater through the AAPG Foundation's Newly Released Publications Program-University Subscription. By establishing a named fund at the school, students can directly benefit with access to new geology publications.

Through your gift, a set of newly released publications is mailed annually to the university of your choosing; a one-time gift of \$13,250 will establish a Newly Released Publications Program-University Subscription in the name of your designated university.

Each publication will have a bookplate

attached in the front inside flap; you may choose to honor the donor, an esteemed colleague, family member or someone else worthy of your gift. The donor will receive a certificate to recognize their contribution.

A gift to the AAPG Foundation presents an amazing opportunity for future generations of geology students to have the best resources available, and your alma mater will continue to educate the leaders in our field.

### Digital Products – University Subscription


Through your contribution, students and faculty at your designated university receives online access to the entire AAPG digital library, which is comprised of over one million pages of map and geological information.

A one-time gift will establish a subscription in the name of your designated university. There are two contribution options:

✓ A gift of \$15,545 will initiate the subscription right away, with \$545 paying the first year's annual subscription fee to Datapages. The remaining \$15,000 will be placed in a permanently restricted fund, which will accrue earnings annually. Those earnings will pay the annual subscription fee.


✓ Your gift honors the donor, an esteemed colleague, a family member, a great teacher or someone of your choosing. The name of the honoree and/or the donor can be prominently mentioned on the university's access page. A certificate will be sent to the university for display.

To donate, you can contribute online at [foundation.aapg.org](http://foundation.aapg.org), or contact toll free by phone (855) 302-2743; fax (918) 560-2642; email [foundation@AAPG.org](mailto:foundation@AAPG.org); or mail, P.O. Box 979, Tulsa, Okla. 74101.

The AAPG Foundation continues to be a strong support to this and future generations of geoscientists, thanks to you. 

Acropolis Museum, kindly sponsored by Hellenic Petroleum, PGS and Energean. (Watch for a full report to follow in the next EXPLORER).

Please check out our website at [europe.aapg.org](http://europe.aapg.org), to see upcoming events – including the upcoming joint AAPG/EAGE workshop in Lisbon in November and the Naples, Italy, conference on Mesozoic and Cenozoic carbonates of the Neo-Tethys in March.

Thanks once again to the Europe Region Committee members for all their help, guidance and support over the year. We look forward to an even more successful 2014. 

on the information provided.

We hope your colleagues and peers will become jealous of this feature and make a decision to join the Association, so they too can benefit from the world perspective about the information available.

As you watch the evolution of the site you'll want to share with those around you about what you find, what you read, what you know because you have the AAPG website as a resource.

*Good browsing!*

## Continued from previous page

Simply turn this feature off in your profile.

### Bragging Rights

That non-member user who registers to use the site will not be able to rank the content, but they will benefit from the ranking. They even will be able to read comments and other feedback – they just won't be able to leave their own imprint

## Interpretation™

A journal of subsurface characterization



### Diffraction imaging

Understanding small-scale heterogeneities has gained importance recently, in particular for characterizing unconventional reservoirs. Predrilling knowledge of natural fractures and small-offset faults is often very important, as these geologic elements can influence the drilling and hydraulic-fracturing processes, as well as the production rate. Seismic resolution from conventional reflection imaging is generally not sufficient to resolve these small-scale features. Diffraction imaging is being investigated for its potential to address this issue, and for other usages such as reservoir delineation, 4D imaging, karst mapping etc.

The editors of *Interpretation* ([www.seg.org/interpretation](http://www.seg.org/interpretation)) invite papers on the topic **Diffraction imaging** for publication in a February 2015 special section to supplement the journal's regular technical papers on various subject areas.

We are seeking submissions on diffraction-related topics such as:

- diffraction imaging for natural fracture detection
- diffraction imaging for fault mapping
- diffraction imaging for karst feature mapping
- diffraction imaging for delineating reservoirs
- integration of diffractions and microseismic
- 4D diffraction imaging
- integrated studies using diffraction and more conventional attributes

Interested authors should submit for review no later than **15 April 2014** via the normal online submission system for *Interpretation* (<https://mc.manuscriptcentral.com/interpretation>) and select the **Diffraction imaging** manuscript type.

The special section editors would like to receive a provisional title and list of authors as soon as possible. The submitted papers will be subjected to the regular peer-review process, and the contributing authors also are expected to participate in the peer-review process.

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

The submissions will be processed according to the following timeline:

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

#### Special section editors

Marianne Rauch-Davies <a href="mailto:marianne@geomage.com">marianne@geomage.com</a>	William Burnett <a href="mailto:william.a.burnett@exxonmobil.com">william.a.burnett@exxonmobil.com</a>
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Interpretation special section

# CALL FOR PAPERS



## UNIVERSITY of HOUSTON

UNIVERSITY of HOUSTON | EARTH AND ATMOSPHERIC SCIENCES

### Faculty Positions University of Houston

The Department of Earth and Atmospheric Sciences at the University of Houston invites applicants for the following tenure-track faculty positions. Candidates must have completed their PhD at the time of appointment. Successful candidates will be expected to build a vigorous externally-funded research program, and should be able to demonstrate productivity in peer-reviewed publication. Candidates will also be expected to teach at both the undergraduate and graduate levels and will be expected to mentor MS and PhD students. We expect to fill the positions by August, 2014. Candidate evaluation will begin on Dec 1, 2013, and continue until each position is filled.

### Exploration Geophysics

Assistant Professor to Professor in the field of Exploration Geophysics, specializing in rock physics or reflection seismic processing, imaging, and interpretation. We seek candidates of outstanding ability in seismic rock physics, signal processing, algorithm development, and seismic data analysis. Strength in subjects such as experimental rock physics, elastic-wave propagation, tomography, migration, and inversion will be especially valued. The successful candidate should have the ability to image, visualize, and interpret seismic data and will have use of our wide variety of seismic software packages, hardware systems, and geophysical data. The successful candidate will participate with an enthusiastic team of geophysics faculty and students in one of the leading energy communities in the world. Preference will be given to candidates with related industry experience.

### Sedimentary Geology

Assistant Professor to Professor with a strong background in Sedimentology and Stratigraphy. Applicants' expertise may be in process sedimentology, sedimentary petrography, sedimentary geochemistry, sequence stratigraphy, seismic stratigraphy, or in other areas related to the study of modern or ancient sedimentary systems for the purposes of understanding Earth's history, surficial processes, or hydrocarbon systems. Applicants who have synergies with current department strengths, in geophysics, structural geology, geochemistry, and in stratigraphic interpretation, are encouraged to apply. Additionally, the ability to teach field geology will be considered a strength.

### Geodynamics

Assistant to Associate Professor level in the broad field of Geodynamics. We seek applicants who address fundamental problems in geology and geophysics. Research interests may include, but not limited to, the fields of geodesy, geochemistry, geomorphology, seismology, potential fields, and petroleum systems. Preference will be given to individuals who take multidisciplinary problem-solving approaches and whose interests complement departmental areas of concentration.

### Information for Applicants

Candidates for each position should submit: 1) a letter of application including statements of teaching and research interests, 2) a curriculum vitae, 3) graduate student transcripts, and 4) names and contacts of at least three referees to:

Dr. Hua-Wei Zhou, Chair,  
Department of Earth and Atmospheric Sciences  
College of Natural Sciences and Mathematics  
Room 312 Science and Research 1  
University of Houston  
4800 Calhoun Rd.  
Houston, Texas 77204-5503

Further information can be obtained by viewing the departmental web page at <http://www.eas.uh.edu/> or by calling the department at (713) 743-3399.

The University of Houston is an Equal Opportunity/Affirmative Action Employer. Minorities, women, veterans, and persons with disabilities are encouraged to apply.



## CLASSIFIED ADS

### POSITION AVAILABLE

ASSISTANT/ASSOCIATE PROFESSOR IN GEOPHYSICS UNIVERSITY OF OKLAHOMA

The University of Oklahoma invites applications for a tenure track position in Geophysics at the Assistant or Associate Professor level. Departmental interests range from the deep lithosphere, through hydrocarbon exploration, to near surface geophysics. We search for a dynamic candidate to supervise students at all levels, and to conduct independent, externally funded research program in his/her field of expertise.

The candidate should hold a Ph.D. in Geophysics; have a demonstrated research record, and an interest in teaching undergraduate and mentoring graduate students in lithospheric and exploration geophysics. Salary, benefits, and start-up funds will be competitive and commensurate with experience. The ConocoPhillips School of Geology and Geophysics has a large, vibrant faculty with a broad range of research activities and strong ties to the petroleum industry. The student body includes about 150 undergraduates and 100 MS and PhD students. The Mewbourne College of Earth & Energy possesses extensive software and computing labs of PC and Linux platforms networked to our own Beowulf cluster and to the OU supercomputer center (OSCAR). It hosts numerous industrial consortia, a research institute focused on seismic monitoring, and a new field campus in Colorado for field courses in geology and geophysics. The geophysics group conducts active research projects on several continents that are funded by NSF, industry, and foreign national institutes. The College maintains a comprehensive pool of geophysical equipment including GPR, seismic (active and passive), magnetic, and gravity instruments as well as extensive rock physics characterization laboratories. Through collaboration with industry, we have a suite of 3D seismic and microseismic data volumes that are used for teaching, algorithm calibration, seismic geomorphological analysis, crustal imaging, and a range of open source software for lithospheric-scale research. Information about the School and College, the facilities and the entities that it houses can be found at <http://geology.ou.edu>.

Review of applications will begin December 1, 2013, and on-campus interviews will start early 2014. The search will continue until the position is filled. The anticipated starting date is August 16, 2014. Applicants are requested to submit a complete vita/resume, statement of research and

teaching interests, and a list of five references who can be contacted, including phone numbers, e-mail addresses, and mailing addresses. Questions or information requests may be addressed to Chair of the Geophysics Search Committee, at (405) 325-3253, or [ougeophysicsearch@ou.edu](mailto:ougeophysicsearch@ou.edu). Applications and nominations should be addressed to Geophysics Search Committee, University of Oklahoma, Sarkeys Energy Center, 100 E. Boyd Street, Room 710, Norman, OK 73019-1008.

The University of Oklahoma is an Affirmative Action, Equal Opportunity Employer. Women and minorities are encouraged to apply.

### MISCELLANEOUS

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# Faculty Positions

## Earth Sciences and Engineering Program

The Earth Sciences and Engineering (ErSE) Program at King Abdullah University of Science and Technology (KAUST) has two open faculty positions at Assistant, Associate, or Full Professor rank in the fields of:

- 1) Solid Earth Geophysics
- 2) Atmospheric Sciences

We are seeking exceptional scientists who use experimental and/or modeling approaches to address a wide range of Earth Science problems. The successful candidates should have an excellent internationally recognized scientific record, be able to lead a high impact research program, and have a strong commitment to teaching at the graduate level. The salary and research funding levels at KAUST are among the highest of any academic institution.

For more information and to apply for the position, please visit <http://apptrkr.com/407041> and click on the Employment tab. Applications received by **January 31, 2014** will receive full consideration and positions will remain open until filled.

### About KAUST

KAUST is an international, graduate research university dedicated to advancing science and technology through interdisciplinary research, education, and innovation. Located on the shores of the Red Sea in Saudi Arabia, KAUST offers superb research facilities, generous assured research funding, and internationally competitive salaries, attracting top international faculty, scientists, engineers, and students to conduct fundamental and goal-oriented research to address the world's pressing scientific and technological challenges related to the sustainability of water, food, energy, and the environment.

### About ErSE Program

The ErSE Program, within the Division of Physical Sciences and Engineering, currently has eight full time faculty members, about 30 post-docs and research scientists and more than 50 graduate students. Research areas include: applications of modern computational methods to study geophysical problems associated with the atmosphere and/or ocean circulation, earthquakes, oil exploration, reservoir modeling, and subsurface phenomena. These areas are enhanced through close collaboration with some of the best geophysical and meteorological centers in the world, and advanced central research facilities including supercomputing and scientific visualization. More information about the ErSE program and research activities is available at: <http://ese.kaust.edu.sa>



[www.kaust.edu.sa](http://www.kaust.edu.sa)



# One Last Look at a Successful AAPG Year

By DAVID K. CURTISS, AAPG Executive Director

In the northern hemisphere we are preparing for winter. Each day the sun sits lower in the sky, rising later and sinking earlier. Here in Oklahoma – where the wind famously comes sweepin' down the plain – the wind has a decided chill to it, and out come the sweaters, coats, hats and mittens.

For many of us, this season also is a time to spend with family and friends, enjoy crackling fires, offer good cheer and reflect on the year past and the year ahead.

At AAPG it's been a year of continued progress and growth. Our membership numbers at the beginning of November were just below 40,000. These are oil and gas professionals – geoscientists, engineers, and other interested folks – who are drawn to the products and services that AAPG offers.

And perhaps most importantly, they join the Association to associate with like-minded men and women who find and produce the oil and natural gas that fuels the world.

\*\*\*

Our mission at AAPG is to advance petroleum geoscience and to promote and encourage professionalism. And we've certainly worked to do just that.

This year we conducted two major AAPG conferences: ACE in Pittsburgh and ICE in Cartagena, Colombia. Both were successful events, providing an opportunity to learn through strong technical programs, educational courses, and opportunities to network with colleagues from across the globe.

In addition to these flagship AAPG events, we cooperated and participated in several other major conferences, including OTC, OTC Brasil, IPTC in Beijing, the Arctic



CURTISS

**Our mission is to advance petroleum geoscience and to promote and encourage professionalism. And we've certainly worked to do just that.**

Technology Conference, and 3P – Polar Petroleum Potential.

One notable addition to this line-up was the launch of URTEC, the Unconventional Resources Technology Conference, in cooperation with SPE and SEG. Building upon this initial success, we are now planning for the 2014 URTEC. And, in fact, the call for papers is currently open (see related story, page 4). I would encourage you to submit a paper and contribute to the momentum behind this multidisciplinary conference.

\*\*\*

In addition to these large events, AAPG participated in numerous smaller events.

Last month I told you about the joint research symposium on fine-grained sediments we conducted with SEPM, Petrochina RIPED and the China University of Petroleum in Beijing. The Europe Region held a Region conference in Barcelona. And we conducted nearly 30 Geoscience Technology Workshops and Forums in the eastern and western hemispheres.

There were two Hedberg research conferences in 2013. The first, held in Beijing, focused on fundamental controls on petroleum systems in lower Paleozoic and older strata. The second was titled "3-D

Structural Geologic Interpretation: Earth, Mind and Machine," conducted in Reno, Nev.

AAPG provided numerous opportunities to learn something new by offering our members and customers worldwide access to over 50 short courses and 14 field seminars.

And don't forget about AAPG publications – in 2013 the BULLETIN contained 83 peer-reviewed articles and we published seven books, ranging from the Great American Carbonate Bank to energy resources in the solar system.

A significant highlight this year is our partnership with SEG in launching the new quarterly peer-reviewed journal INTERPRETATION, focused on subsurface interpretation. The emphasis of this new periodical is the integration of tools and technology with scientific principles and insights.

This year also saw the formation of AAPG's fourth technical division, the Petroleum Structure and Geomechanics Division. And this group, which has existed informally for quite a few years, is now formally recognized within AAPG and is focused solely on advancing the petroleum geosciences in the tectonic, structural geology and geomechanics domain.

In addition, to better serve our members

and customers, we launched the AAPG Advisory and the Advisory Alert this summer. With these two monthly emails from AAPG we aim to keep you connected and informed with the many ways that you can engage with your fellow oil and gas professionals.

And we've added staff, based in Bogotá, Colombia, and Lagos, Nigeria, to create new opportunities for and better serve our members in Latin America and Africa.

There's a common thread that weaves throughout all of these activities: The engaged member or contributor who offers to share his or her scientific or professional knowledge and experience for the benefit of the profession. That's what makes professional societies unique – we teach each other what we know.

And it's how we collectively accomplish AAPG's mission.

\*\*\*

As 2013 draws to a close I invite you to reflect on what you gained in the past year from AAPG membership, and how you contributed. It is your involvement that propels the Association forward.

The demand for petroleum continues to grow. And while AAPG may be approaching its 100th birthday, I can assure you that in pursuing our goal of advancing the world of petroleum geoscience we're just getting started.

Happy Holidays!

*David K. Curtiss*

## DIVISIONS REPORT

# Stands to Reason: Let Data Speak For Itself

By DOUG WYATT, DEG President

Whether it is the economy, taxes, global climate, health care, spying, fracing or oil and gas energy in general, the media is saturated with opposing intellectual, political and philosophical positions.

Opposite opinions are usually highlighted to the public and seldom, if ever, is there a rational discussion of the issues that could result in middle ground or a compromise position.

We expect this from the political extremes, but unfortunately, we also are seeing it in the sciences as well.

Too often in the sciences, well-educated people take extreme, absolute stands, pro and con, when they (we) know that the data is constantly evolving and that new information, ideas and concepts are on the horizon.

As energy scientists, or as a professional science organization, how can we take a position that is well-reasoned, meaningful and effective?

Many of the major global environmental issues are associated with energy – therefore the DEG is anxious, and should be expected, to take a leadership role on behalf of the industry and the AAPG.

Even so, what do we say, how do we say it and to whom do we direct it?

These questions are being discussed,



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and we welcome all input, but it is worth giving even more thought to the concept of "taking a position" in a world of ever-changing discovery and science.

This is true for energy-environmental issues on a global scale as well as the well-pad scale.

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Do we (AAPG, DEG, each of us individually?) drive our own personal golden spike into the rock of whatever truth we want to discuss and defend our position against all who threaten it? Maybe.

Do we cast a sea anchor and drift with the strongest current and point our position in that direction? Maybe.

Do we target a specific group of people who are sympathetic with our position? Again, maybe.

There are positives and negatives associated with each of these options, and there are even more available options to consider beyond these. As a reasoning body of scientists, we all

understand this conundrum.

I have given much thought to this, and my personal conclusion is that we should clearly, succinctly, and humbly present the data that our science and the earth reveals to us, with our conclusions rationally and simply explained, while being mindful of the range of data resolution and current understanding.

This may seem obvious, but it goes back to we "take our position." Too often, even distinguished scientific and technical venues present an op/ed cable news version of a position where anomalies or only specific information that supports a specific belief are used. I must admit that I have done this in the past but now hope that I am smarter and wiser than before.

Heraclitus, one of my favorite Greek philosophers, once said, "Nothing endures but change." I don't believe that driving a golden spike or flowing with the dominant current to support a position is wise, because change in information and knowledge is, hopefully, inevitable.

Heraclitus, who would have been a great geologist, also said, "Much learning does not teach understanding," again suggesting that just overwhelming the masses with select data to support a position does not provide a rational understanding.

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So what do we do in "taking a position" on whatever energy-environmentally related topic we choose? I will give my thoughts.

► First, we should concentrate on what we know as earth scientists and not venture in to other scientific disciplines. I fully understand that earth science is a very broad topic and that many disciplines support our studies, but feel we must stay within our common expertise.

► Second, all data should be used, presented and interpreted to remove as much bias as possible. Most extreme positions on any topic only use a narrow range of supporting data with singular biased interpretation.

► And finally, we should let the data speak without human emotion.

This is hard to do, but a rational-though-opinionated person will generally accept a preponderance of quality, well-reasoned data interpreted with accepted logical approaches – as long as human emotion does not interfere. ■



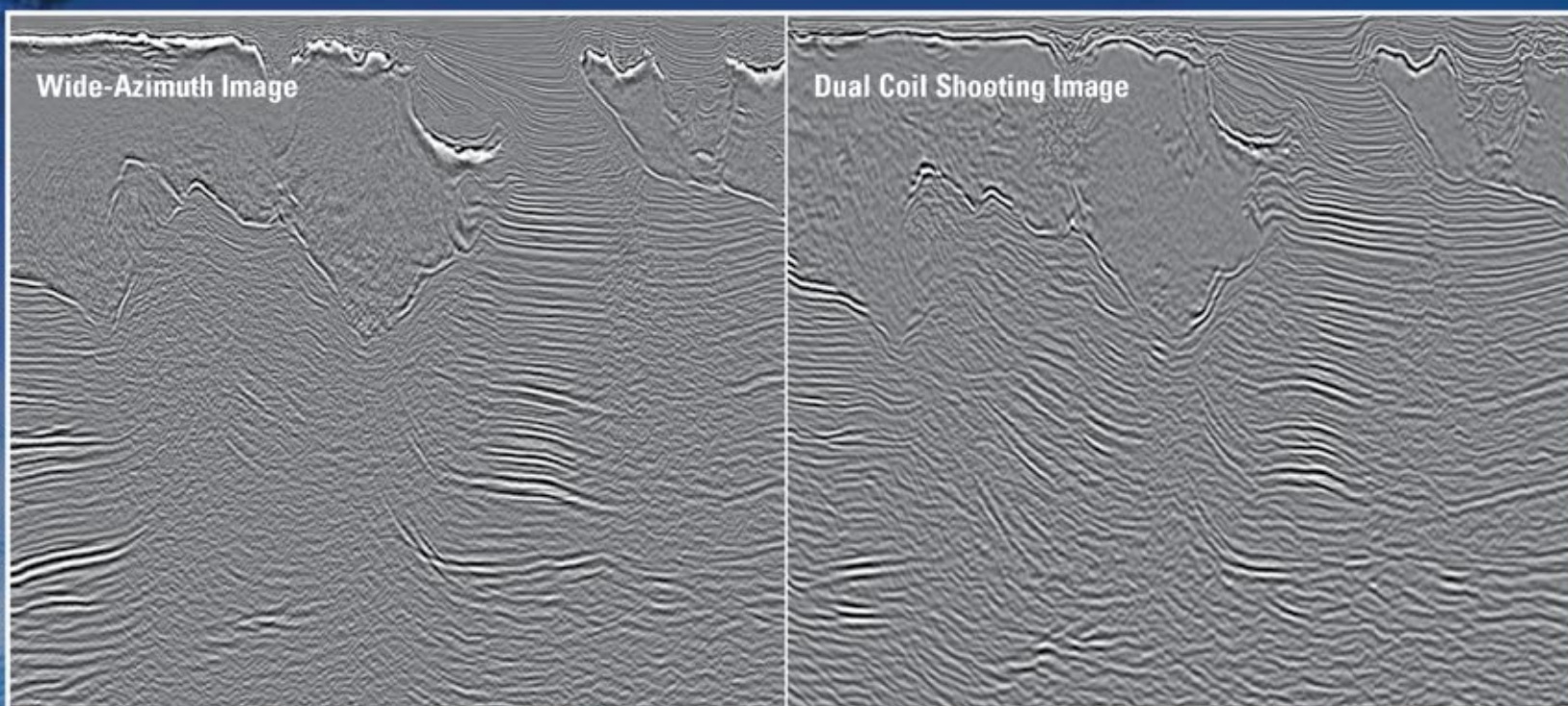
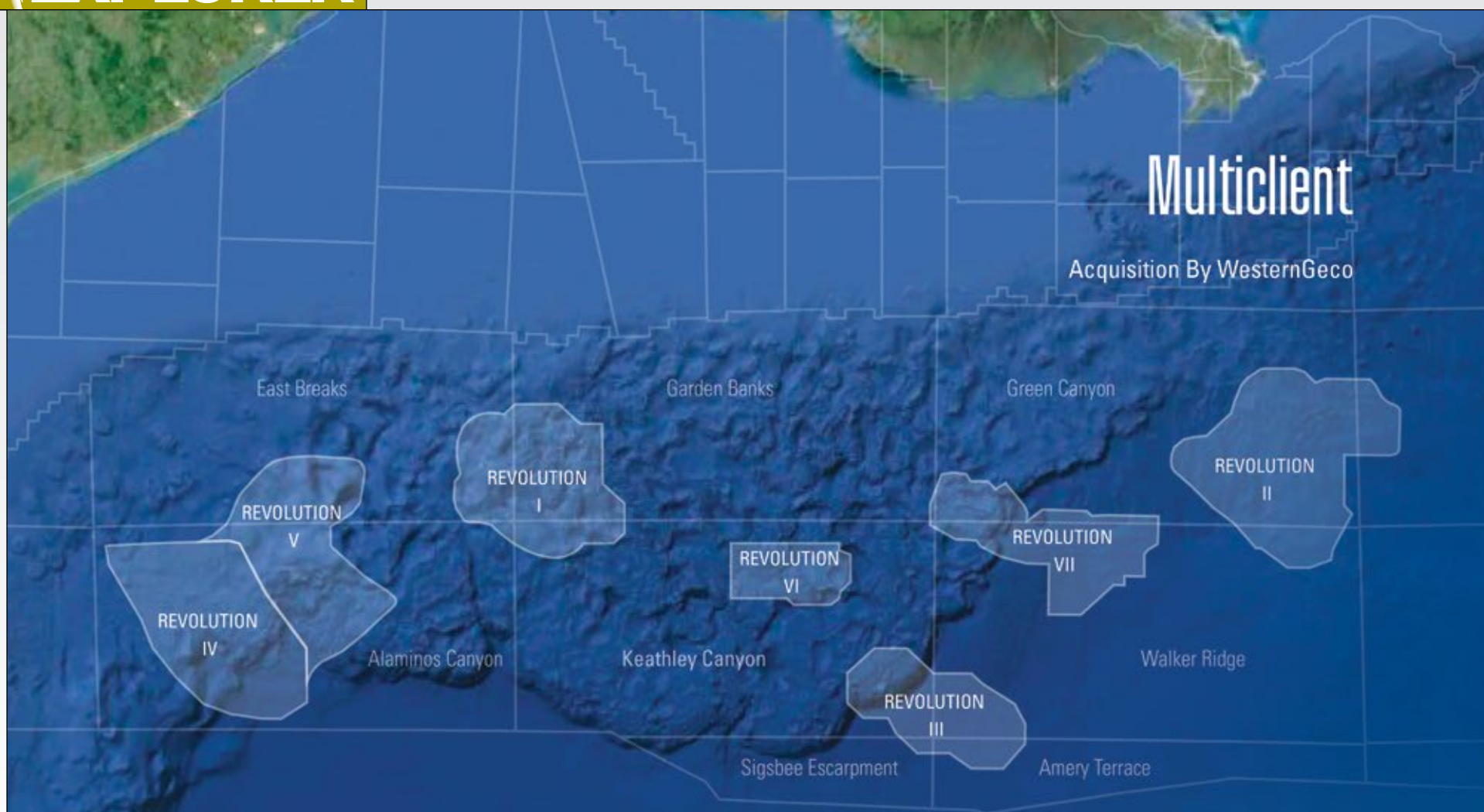


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