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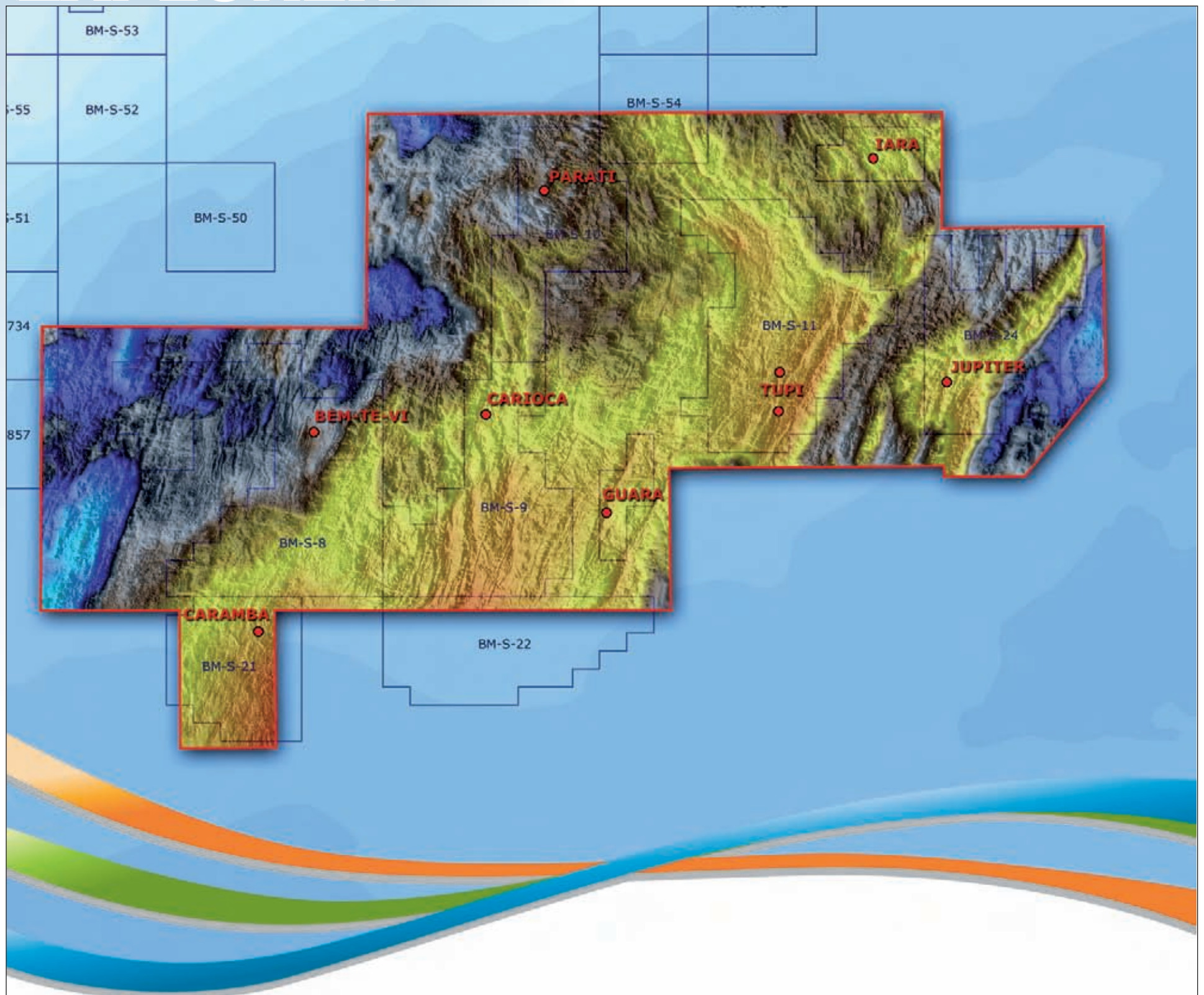
EXPLORER

JUNE 2010

Treasure Hunt

Are these clues to exploration success?

See page 8



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PRESIDENT'S COLUMN

Critical Thinking

By JOHN C. LORENZ

Students increasingly are learning via computers, and scientists are increasingly dependent on them. Computers allow us to work numerous problems quickly and accurately. However, Liz, my wife of many happy years, tells me the cautionary tale of her 10-year-old students who have discovered that they "solve" classroom problems on a computer by cycling quickly through all the answers until they stumble onto the correct one. Give them credit for superficial smarts, but they are obtaining answers without understanding, and circumventing valuable learning. Unfortunately, some teachers let the students get away with this because it's easier and, after all, the answers are correct. And before we get irate about the school systems, the same problem exists with most of today's mandatory corporate training.

One worries that scientists have also discovered this trick, using computers to obtain answers instead of understanding. Although there is plenty of room for critical thinking when using a computer, that step is sometimes omitted and no one seems to notice. Computers can provide strong support for both learning and scientific processes, but they can also be used to replace them. I stumbled into eminent AAPG member J. Nolan Wesson on the exhibit floor of NAPE recently, and amid the amazing array of booths selling answers we agreed that modelers still need to know which numbers to crunch and how to carefully assess the meaning of those numbers.

Larry Nation, AAPG communications director, found the accompanying chart that seems to show a strong correlation



LORENZ

A critical thinker gets information from multiple and diverse sources before taking sides in an issue.

between rock music and oil production. Technically one could conclude from this that the way to reverse the production decline in the United States is to write more good rock 'n' roll music, a solution to the world's energy problems with appeal at many levels. However, a critical

assessment of the graph should suggest that there is probably no relationship between factual production data and subjective opinions on songs. If the correlation itself is merely serendipitous, then conclusions derived from it are spurious. Similar scenarios occur in real

science, but they tend to be more subtle.

Critical thinking is difficult to teach and probably more difficult to learn, especially when answers that don't require it are easily available. Once learned, critical thinking takes constant effort. David Starr Jordan, writing well before gender-neutral styles were in fashion, noted that, "The world stands aside to let anyone pass who knows where he is going." Jordan should have added the unfortunate corollary that the world also often stands aside for someone who merely acts that way. People who talk loudly and frequently often achieve notoriety, which is easy to mistake for expertise. They can appear even more credible if they have the platform of a prestigious institution behind them, and a false aura of expertise becomes almost invincible as they gain public recognition.

The ability to make the distinction between expertise and loud talk is especially important for geologists given our realm of incomplete data sets and non-unique solutions, and because we often have our own money riding on a decision. So what makes an expert? Word of mouth and professional reputation count for a lot in our industry, and the AAPG Division of Professional Affairs works hard to maintain ethical standards that define professionalism. Professionals with established reputations in other fields have exploited their reputations in order to push less than professional geologic theories: consider Immanuel Velikovsky, a respected psychiatrist, who wrote the

Officers Announced for 2010-11

Paul Weimer, of the University of Colorado, has been voted president-elect by the AAPG membership for the 2010-11 term and will serve as AAPG president in 2011-12. Also elected were:

Vice President-Sections

☐ Marvin D. Brittenham, EnCana Oil & Gas (USA), Denver.

Treasurer

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

Editor

☐ Stephen E. Laubach, Bureau of Economic Geology, University of Texas at Austin.

Both the vice president-Sections and treasurer will serve for two years and the elected editor serves for three years.

The newly elected officers will begin their duties on July 1, serving on an Executive Committee headed by David G. Rensink, of Houston; vice president-Regions, Alfredo E. Guzmán, consultant, Veracruz, Mexico; and secretary William S. Houston, with PTTEP, Bangkok, Thailand.

Also new on the committee is David H. Hawk, a consultant in Boise, Idaho, who will assume the chairmanship of the House of Delegates.

See President, next page

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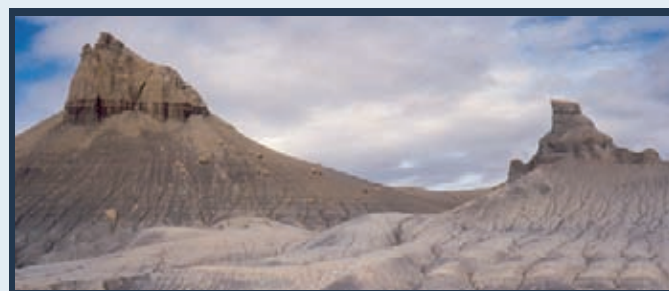
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The Mancos Shale: You can always count on Utah for spectacular geology and interesting exploration potential. See related story, page 14.

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ON THE COVER:

Portugal's scenic coastline will be the subject of scientific scrutiny when the second Central and North Atlantic Conjugate Margins Conference is held Sept. 29-Oct. 1 in Lisbon. The photo's limestones are calciclastic submarine fan packages, fed by the uplift of a carbonate platform developed on rift-shoulder (at the horizon, to the left). The Late Cretaceous and Tertiary inversion brought these Loer Jurassic layers to the surface, with intense carsification. See story, page 8. Photo by Nuno Pimentel.

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President
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pseudo-scientific yet popular apocalyptic geological reinterpretations "Worlds in Collision" and "Earth in Upheaval". These works had a veneer of authenticity and were accepted by many when they were originally written half a century ago, but the scientific community critically assessed them as lacking and they have been largely forgotten.

On the other hand, using more scientific processes, some non-geologists have made significant contributions to geology and their theories have withstood critical scientific assessment to become part of our scientific foundation. Consider Alfred Wegener, the meteorologist, and

his ideas of continental drift, or Luis Alvarez, an experimental physicist, whose theories of planetary impacts revolutionized not only the geological record but also many concepts of evolution.

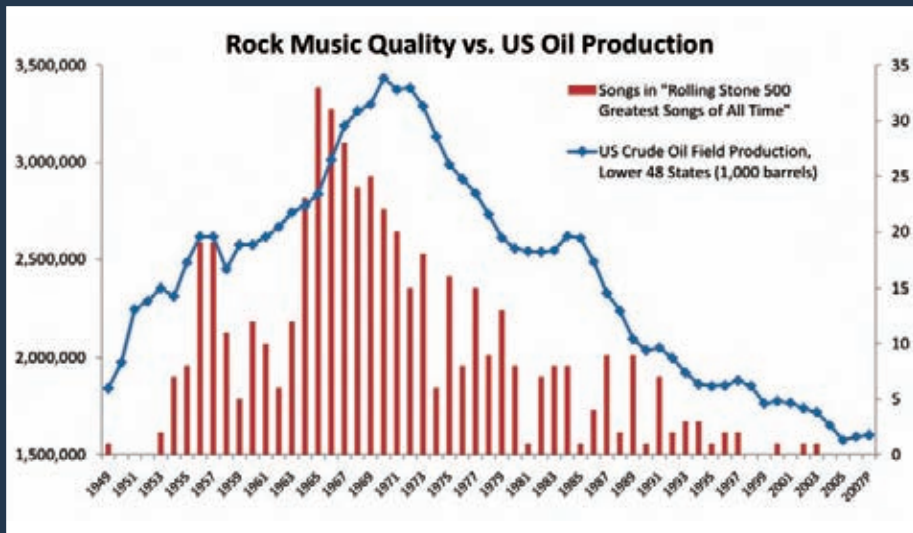
One of the differences between Alvarez and Velikovsky is that the first used defensible data synthesized into a plausible and testable theory whereas the other picked isolated facts out of context to spin a story. The more scientific approach of Alvarez is not immediately apparent to the non-critical thinker who looks only at an author's conclusions. Critical thinking requires listening to and assessing, but not necessarily accepting, opposing views. It requires the give and take of discussion, not just stone-wall contradiction. The difference between discussion and contradiction is humorously illustrated in Monty Python's "Argument" sketch (<http://vids.myspace.com/index.cfm?fuseaction=vids.individual&videoid=3284452>). There is much truth in humor. If someone believes too much in their side of an argument to laugh about it, be cautious. Likewise, learn to ask questions and beware of someone who doesn't consider them seriously. AAPG member and Piceance basin expert Steve Cumella notes that science would be stagnant if we all agreed on the issues and answers.

Other rules of thumb for the critical thinker include instant caution flags whenever someone throws the term "obviously" into a discussion. A critical thinker gets information from multiple and diverse sources before taking sides in an issue. One should consider not only someone's conclusions but also the logic and data that were used to come to those conclusions. Does the expert have personal experience in the area or is the argument theoretical? Calibrate your sources: Peer-reviewed literature is not infallible but it tends to be more reliable than not. Websites can be anyone's guess. Recognize that just because a person has a Ph.D. doesn't make them experts in all fields, or even in their own. Consider also whether a person drawing specific conclusions might have another, less apparent agenda that would be served by those conclusions.

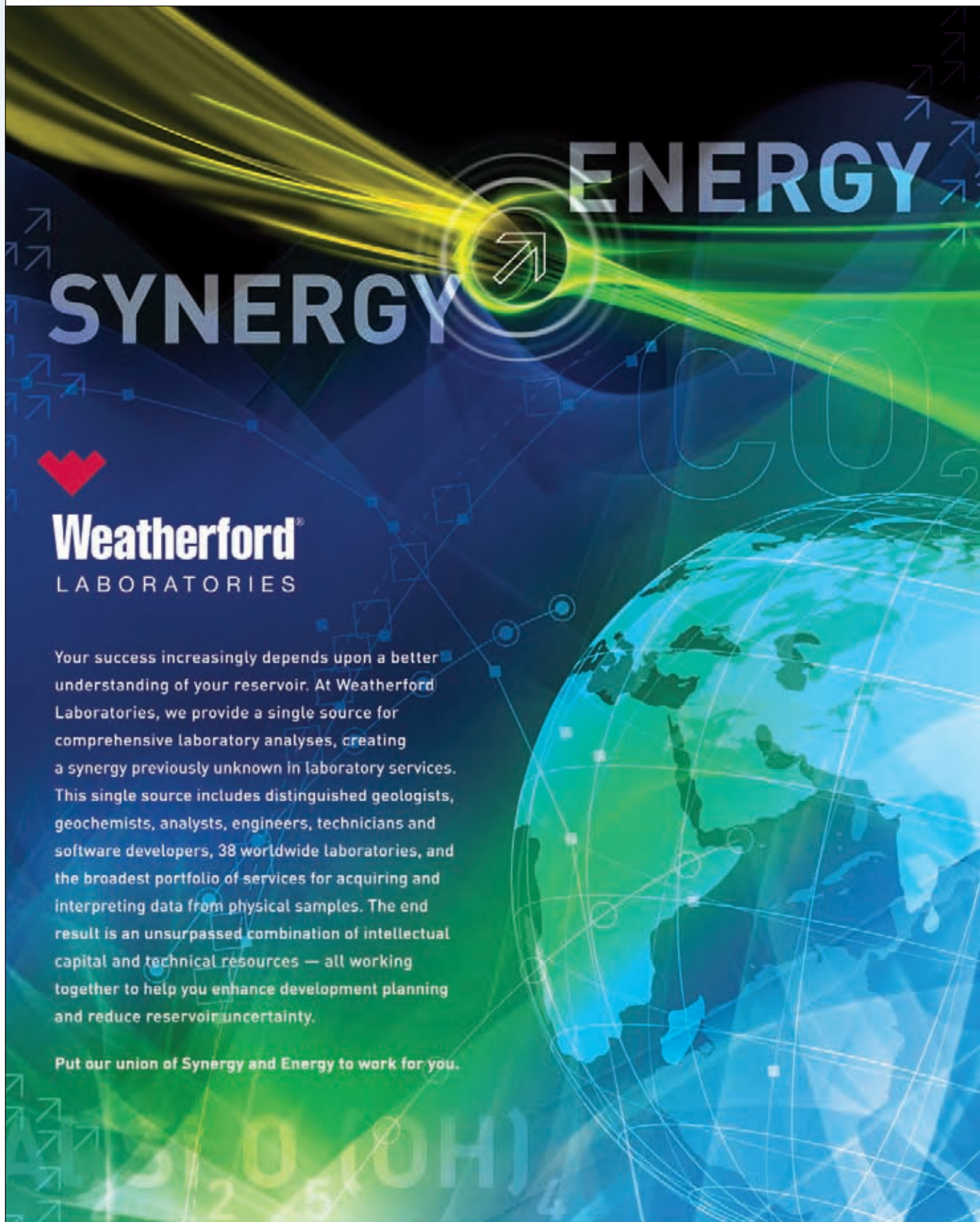
Many pressing issues in today's world would benefit from thoughtful reflection by geologists. We have a wide range of opportunity for exercising critical thinking in our science, and the numerous AAPG venues provide a wealth of data to assist critical thought.

* * *

This is my last opportunity as president to inflict a view of the world onto the AAPG membership. One year goes by quickly: that's either good in that it limits the opportunities to do damage, or bad because a year is not nearly enough time to effect significant change. Regardless, it has been an honor. My sincere thanks to Gretchen Gillis and Liz Lorenz who have edited these columns and kept me from making egregious errors.

"We should be careful to get out of an experience only the wisdom that is in it and stop there, lest we be like the cat that sits down on a hot stove lid. She will never sit on a hot stove lid again and that is well, but also she will never sit down on a cold one any more." Mark Twain



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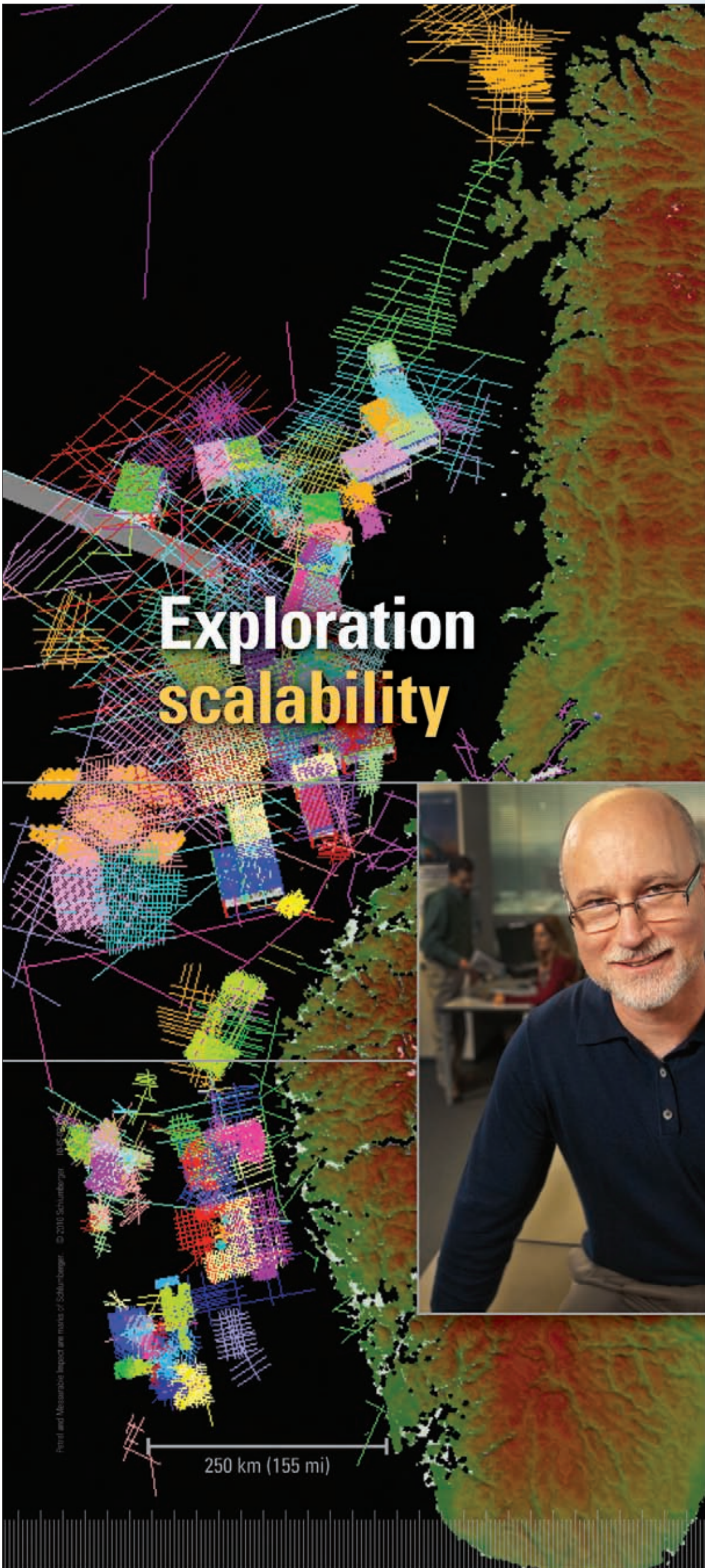
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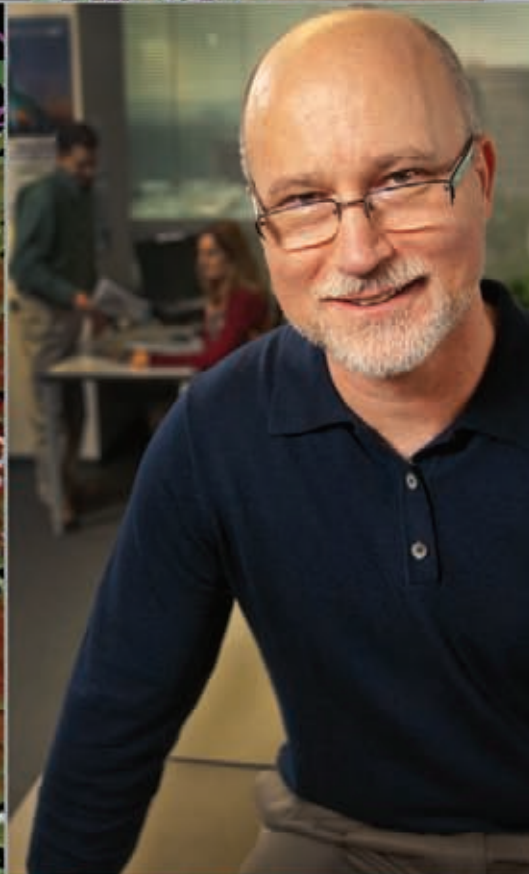
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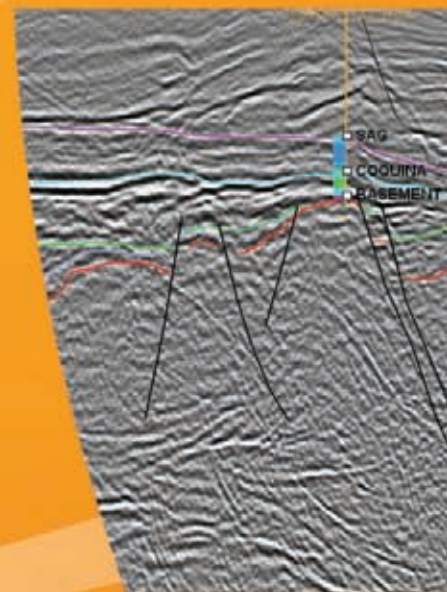
Hydrocarbon Potential Assessment of the Santos Cluster Area based on Oil Slick, Piston Core & Basin Analysis, Santos Basin.

Satellite Detection and Characterization of Natural Oil Seeps using RADARSAT-1 Data in Santos, Espírito Santo, Sergipe-Alagoas and Pernambuco-Paraíba Basins, Brazil.

Petroleum System Summary of Brazilian Onshore Basins

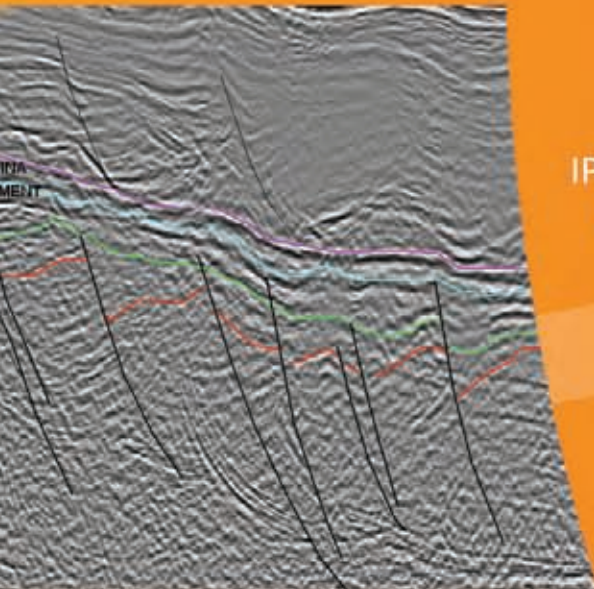
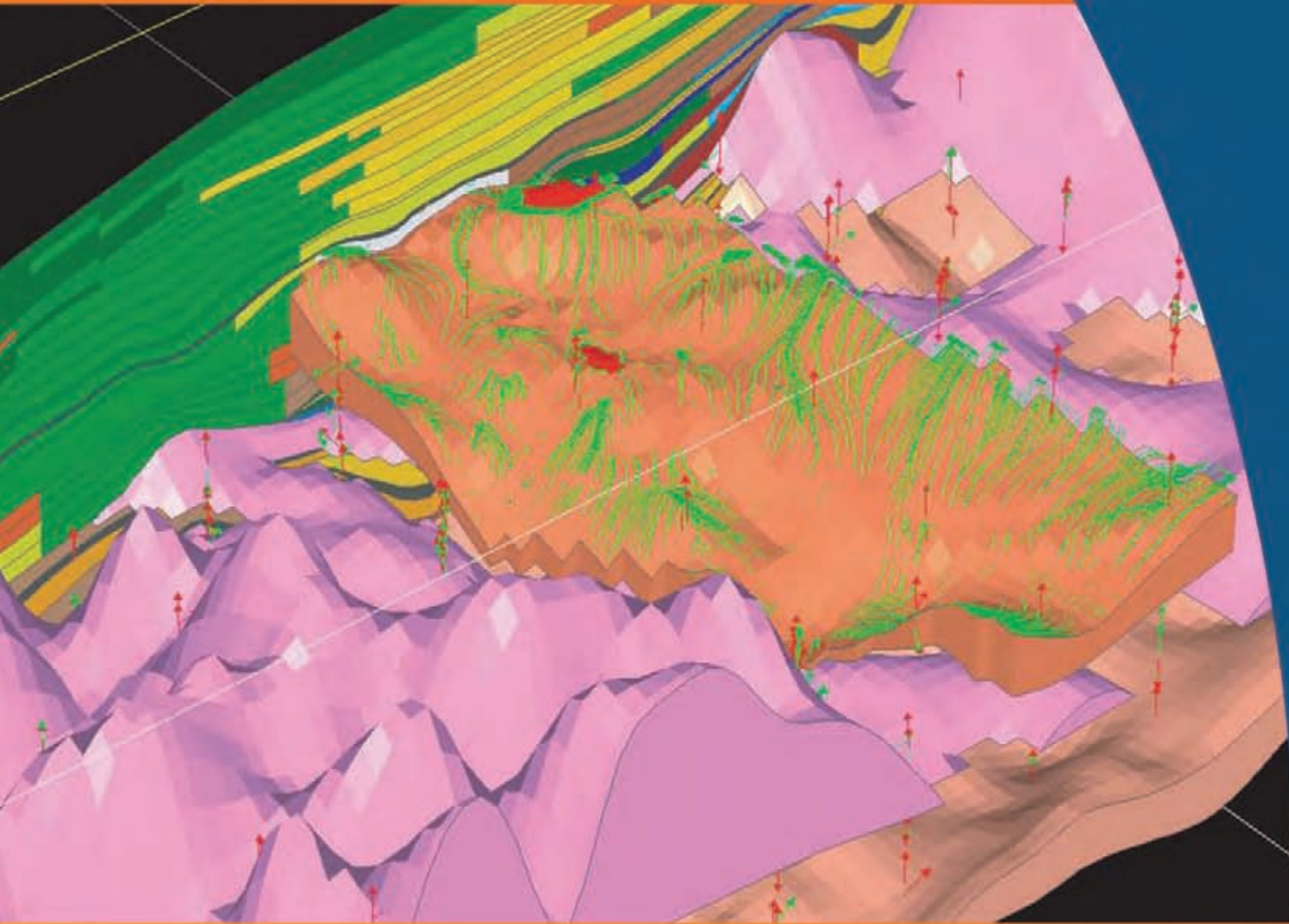
Petroleum System Summary of Brazilian Offshore Basins

Temperature of Petroleum Formation from Kinetic Properties of Oils from Santos, Campos and Espírito Santo Basins, Brazil.



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Photos courtesy of Nuno Pimentel

Big conference, spectacular setting

Conjugate Margins Are (Again) in the Spotlight

By SUSAN R. EATON, EXPLORER Correspondent

A comprehensive, multi-year geological study of the vital conjugate margins of the Atlantic Ocean continues this fall – this time in a spectacularly beautiful setting.

The second Central and North Atlantic Conjugate Margins Conference – co-sponsored by AAPG and AAPG's European Region, among others – will be held Sept. 29-Oct. 1 in Lisbon, Portugal.

Supplementing the science will be a unique opportunity for some hands-on experience.

In addition to participating in a three-day technical conference, short courses and a core workshop, attendees will have the opportunity to view some of Portugal's spectacular geological outcrops – rocks brought to the surface through a structural inversion – whose deeply buried analogs produce oil and gas in offshore Newfoundland.

In the Lusitanian Basin, for example, geologists will be able to touch Jurassic age salt diapirs that have pierced through overlying sediments, dragging them upwards and creating textbook-style traps for oil and gas.

Used in conjunction with seismic data and wireline logs, Portugal's outcrops illustrate the geodynamic and tectono-sedimentary history related to the opening and closing of the Atlantic and Tethys Oceans, respectively.

"The study of Portugal's outcropping stratigraphy, salt tectonics and associated oil shows allows a better understanding of the petroleum systems of the basin, and provides a better prediction of what may be expected in the deep offshore where intense exploration is going on at the moment," said AAPG member Nuno Pimentel, co-chair of Lisbon 2010.

According to Pimentel, an assistant professor of geology at the University of Lisbon, most of the dozens of wells drilled onshore have targeted Portugal's diapiric structures.

Although unsuccessful, many of the wells contained oil shows.

"Understanding the evolution of the Central and North Atlantic conjugate margins," Pimentel said, "is essential to defining the petroleum systems and the oil and gas potential of these promising regions."

Lisbon 2010's theme, "Rediscovering the Atlantic: New Winds for an Old Sea," has been designed to enhance the E&P industry's knowledge – and opportunities – in these passive margin basins.

"The oil and gas potential of Portugal's conjugate margin is virtually unexplored," Pimentel said. "Yet, we're facing



PIMENTEL

"The oil and gas potential of Portugal's conjugate margin is virtually unexplored. Yet, we're facing Newfoundland and Nova Scotia, so why not?"

Newfoundland and Nova Scotia, so why not? "We hope this conference will contribute to putting Portugal on the map of the oil and gas basins of the North Atlantic."

Building On Success

Although steeped in a long E&P history, Portugal's oil and gas industry is still in its infancy. During the 20th century, 50 wells were drilled onshore and a dozen offshore (primarily in the 1970s, in waters less than 200 meters), yielding several oil and gas shows but no commercial discoveries.

A recent regional multi-client seismic data program in Portugal's deep waters, however, precipitated a renewed interest in Portugal's offshore, leading to the signing of several exploration concessions.

Lisbon 2010 will provide an international forum for researchers and industry to share geoscience knowledge focusing on the

Central and North Atlantic passive margins via sessions built on three themes:

- ▶ Evolution of Atlantic Margins.
- ▶ Atlantic Petroleum Systems.
- ▶ Atlantic Margins E&P.

Two-day short courses will be offered by internationally renowned specialists Octavian Catuneanu (University of Alberta, Canada), who will present sequence stratigraphy and its application to petroleum exploration and production, and Mateu Estebán (Carbonates International, Spain), who will present a multi-scale approach to understanding carbonate reservoirs and related play types.

A post-conference field trip will head to Morocco to study Triassic to Cretaceous age outcrops of the Agadir and Essaouira basins – including some equivalents to the oil and gas producing reservoirs in offshore Nova Scotia.

Lisbon 2010 will be building on the

successes and momentum of two previous conjugate margin conferences co-sponsored by AAPG – a 2007 meeting in Marrakesh, Morocco and a 2008 session in Halifax, Nova Scotia (see January 2008 EXPLORER).

Highly successful, the Halifax "Central Atlantic Conjugate Margins Conference" boasted over 200 delegates from 17 nations, representing 48 companies and 26 government and academic institutions. More than 90 technical oral and poster papers were presented.

Dave Brown, the Halifax co-chair, was pleased to pass the baton across the Atlantic to Pimentel and Rui Pena dos Reis, the co-chairs of Lisbon 2010.

"A regional and thematic-focused conference benefits from the continuity of meeting on a scheduled basis," said Brown, an AAPG member and senior geologist with the Canada-Nova Scotia Offshore Petroleum Board. "Coming together every two to three years provides a reasonable period to collect new data and to develop new ideas, encouraging collaboration and facilitating joint projects and initiatives.

"Interestingly, exploration on opposing conjugate basins is imbalanced," Brown added. "Relatively speaking, there are a greater number of wells, seismic, discoveries and fields on the Brazilian, Nova Scotian and Newfoundland margins than their conjugates in Angola, Morocco and Iberia and Ireland, respectively.

"There are a number of varied reasons for this," he said, "many of which are not geological."

Jurassic Parkway?

Michael Enachescu, one of Lisbon 2010's keynote speakers, will deliver an address on "Late Jurassic Source Rock Super-Highway on Conjugate Margins of the North and Central Atlantic (offshore East Coast Canada, Ireland, Portugal, Spain and Morocco)." Mapping the distribution of the Kimmeridgian-age source rock, Enachescu, said, is the key to exploration success in the Atlantic passive margins.

"Find me the pre-rift, intra-continental system that was filled, from time to time, with a Jurassic sea," he said. "Map it, determine whether it survived and whether it's mature."

Enachescu, an AAPG member, is the chief geophysicist at Calgary-based MGM Energy Corporation, and an adjunct professor at Memorial University's Department of Earth Sciences in St. John's, Newfoundland.

Continued on next page



Top of page: Outcrop of Tithonian fluvio-deltaic deposits, 60 kilometers north of Lisbon, Portugal – one of the best reservoir-rocks of the Lusitanian Basin and a good analog to the North Sea's Statfjord Formation. Above, geoscientists studying coastal and deltaic Oxfordian marls and sandy clays, 80 kilometers north of Lisbon. These prograding siliciclastics underline the intense subsidence and infill related to the Late Jurassic rifting at the Lusitanian Basin, coeval with the conjugated Jeanne D'Arc Basin.

The Bond Remains Strong

By SUSAN R. EATON, EXPLORER Correspondent

Situated on opposite sides of the Atlantic Ocean, Portugal and Brazil are connected by more than 500 years of a common history, culture and language.

The two nations also are connected by a common economic interest in the oil and gas potential of their respective continental margins. Just as the Old World transported its culture and traditions to Brazil, today's New World Brazilian geologists travel to Portugal to study the evolution of the Central Atlantic's conjugate margin, a tectonic history illustrated by spectacular outcrops, ranging in age from Triassic to Cretaceous.

For several years, Nuno Pimentel and Pena dos Reis have led geological field trips for Petrobras, Brazil's state oil company, using Portugal's Lusitanian Basin outcrops as their Old World analogs.

Portugal's "Natural Oil Triangle," AAPG member Pimentel said, lies between two giants: Brazil and Angola. All three countries are linked by a common history, culture and language.

"There is a strong feeling of friendship between Brazil and Portugal," said AAPG member Mario Carminatti, Petrobras' executive manager of exploration. "The two countries feel like two close friends who have been separated for a while. In our case, the separation distance is defined exactly by the formation of the Atlantic Ocean and its marginal basins!

"Even though the timing and the details of Portuguese conjugate basins differ from those in Brazil," Carminatti added, "the general process of formation of marginal


basins shares many similarities."

Buoyed by offshore exploration successes in Brazil's conjugate margin – the Tupi field with eight billion barrels of oil equivalent in place – and encouraged by similar geological histories and mechanisms in the Lusitanian Basin, Petrobras recently picked up offshore exploration licenses in Portugal with commitments ranging from 2-D and 3-D seismic data acquisition to the drilling of exploratory wells.

"We consider these licenses as an important new frontier to be explored in the coming years," Carminatti said. "In spite of the natural geological risks, we consider that the prospectivity of these areas presents an enormous potential to be assessed."

"Portugal discovered Brazil 500 years ago, and now Brazil is helping Portugal discover oil in the 21st century," Pimentel said.

Recognizing significant value in these intimate, trans-Atlantic conjugate margin conferences, Petrobras sponsored Halifax 2008 and is a Diamond sponsor for Lisbon 2010. According to Carminatti, the conference format – there are no concurrent sessions, so attendees don't have to choose between talks – provides excellent opportunities to meet the top specialists on the studies of continental break-up, basin formation and ocean spreading, both from academia and oil companies.

"It's like having a crash course on some of the hottest topics in marginal basins with the best specialists, in person!" 



Uplifted Kimmeridgian sandy conglomerates, 50 kilometers north of Lisbon. These coarse siliciclastics are part of a submarine canyon-fill with incised into fine distal turbidites of the Abadia Formation, a good reservoir rock of the Lusitanian Basin. These canyons are related to the tectonic instability and subsidence during the Late Jurassic rifting phase.

Continued from previous page

He's dedicated the past 30 years of his career to evaluating the oil and gas potential Canada's East Coast frontiers, looking for "ponds where the source rock is preserved."

He's also promoting a three-step research program – to be undertaken by a coordinated international initiative – to accomplish the following tasks:

- ▶ Reconstruct the paleogeography of the intra-continental rifting in the north and oceanic rifting in the south.

- ▶ Identify and map, with regional seismic grids and geochemical well results, the Late Jurassic source rock super-highway.

- ▶ Characterize and connect source rocks to crude oil in discoveries and shows, correlating along and across the Atlantic margins.

Discrete portions of the three-step research program, he said, already have

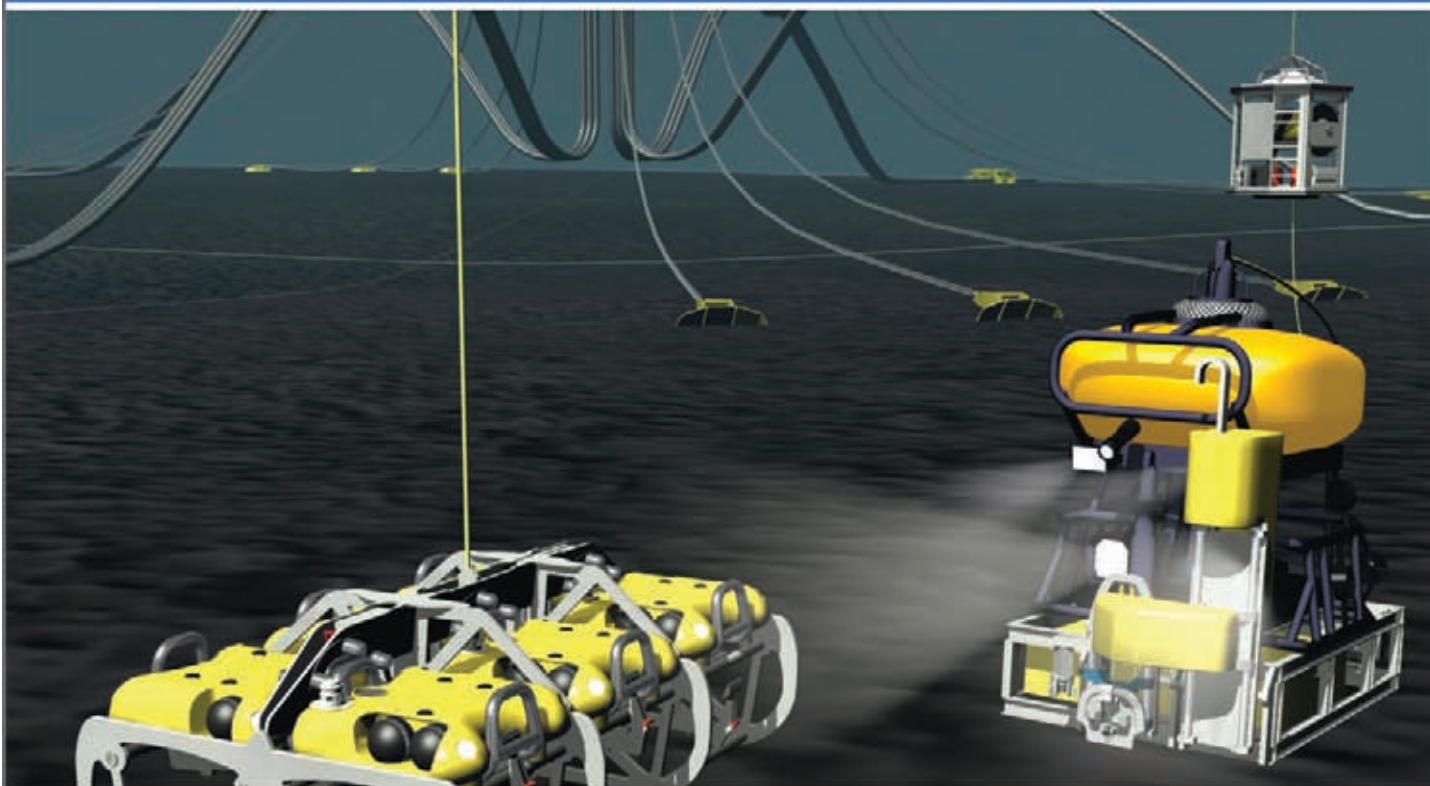
been kicked off by various international government agencies and consulting groups. The research results, he said, will enable geoscientists from Ireland, Spain, Portugal and Morocco to connect their data points to Canadian data points.

"These geoscientists are keen to collaborate and learn because, up to now, the Canadian side is the only successful North and Central Atlantic Conjugate Margins," he said.

Today, 350,000 barrels per day are produced from three oil fields in the Jeanne d'Arc Basin offshore Newfoundland, while 450 million cubic feet flow daily from five gas fields located in the Sable sub-basin, offshore Nova Scotia.

Additional developments are under construction in the Canadian frontiers: the giant Hebron oilfield offshore Newfoundland, and the large Deep Panuke gasfield offshore Nova Scotia. 

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RAISING THE STANDARD

'Crackle Frac' some chalk

Rockies' Niobrara Play Expanding

By LOUISE S. DURHAM, EXPLORER Correspondent

Gas was hot. Now it's not. Whiplash, anyone? Owing to the past couple of years when highly productive shale gas plays have sprouted like weeds in myriad locales in the United States, essentially in sync with cratering demand, oil is king – for now.

Given the current oil-gas price differential hovering around 15:1 or more, it comes as no surprise that a number of E&P folks, principally independents, are moving at near warp speed to stake their claim in oil plays, particularly oil shales and those rich in NGLs.

Meanwhile, some of the Big Guys, e.g., ExxonMobil, BP, Total and others, have bought into the shale gas plays via joint ventures and acquisitions, with the long term in mind.

In addition to these deals, some of the independents' positions in shale gas have begun to pay off, so these trailblazers in commercial shale gas have cash on hand to dig into something currently more lucrative.

This is good news for the Rocky Mountain region, which has been pummeled by low prices and sinking demand for natural gas.

There's oil in them thar' hills.

For example, operators have been working diligently the past couple of years to successfully wrest oil from the high profile Upper Devonian-Lower Mississippian Bakken shale play in



Niobrara Formation-Fort Hayes member: Vertical fractures in thick bedded limestones, east dipping outcrop, north of Boulder, Colo., along the Colorado Front Range.

Montana and North Dakota.

According to a U.S. Geological Survey assessment, the Bakken harbors an estimated 3.65 billion barrels of undiscovered, technically recoverable oil, 1.85 Tcf of associated/dissolved natural gas and 148 mbo of natural gas liquids.

Early attempts to produce the Bakken economically were an exercise in frustration for the operators, and it was usually looked on as a bailout zone. AAPG member and 2006 Explorer of the Year Dick Findley is credited with cracking the

code for the Bakken in 1995, ultimately leading to development of the giant Elm Coulee Field in the Bakken in eastern Montana.

Today, the prolific Bakken has some respectable competition.

For example, the underlying Three Forks formation – which now is considered to be separate from the Bakken – reportedly may contain as much recoverable oil as the Bakken, which has more oil overall.

The North Dakota Department of



Mineral Resources has released more conservative numbers than the USGS estimate. It reportedly credits the Bakken with a mere two billion barrels recoverable, but also forecasts two billion as well for the Three Forks, which contains about one-eighth the total oil of the Bakken.

Niobrara Potential

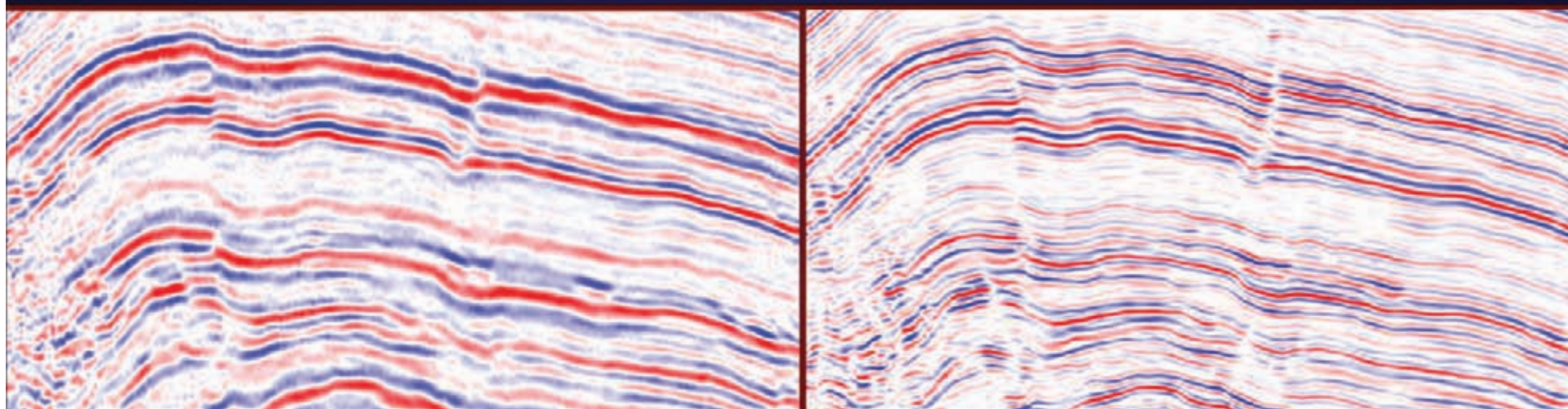
Higher up the geologic section in the Cretaceous, there's apparently a mother lode just waiting to be seriously exploited.

"When you ask what's happening in the Rockies, the answer is oil shale plays," said Denver-based AAPG member Randy Ray, "and the hot topic is the Niobrara."

"The Niobrara is part of the Cretaceous seaway that covered the whole middle of the U.S.," Ray noted. "We've had cycle after cycle of exploration for Niobrara fractures, mainly oil but some gas where it's buried deeper."

See **Rockies**, page 24

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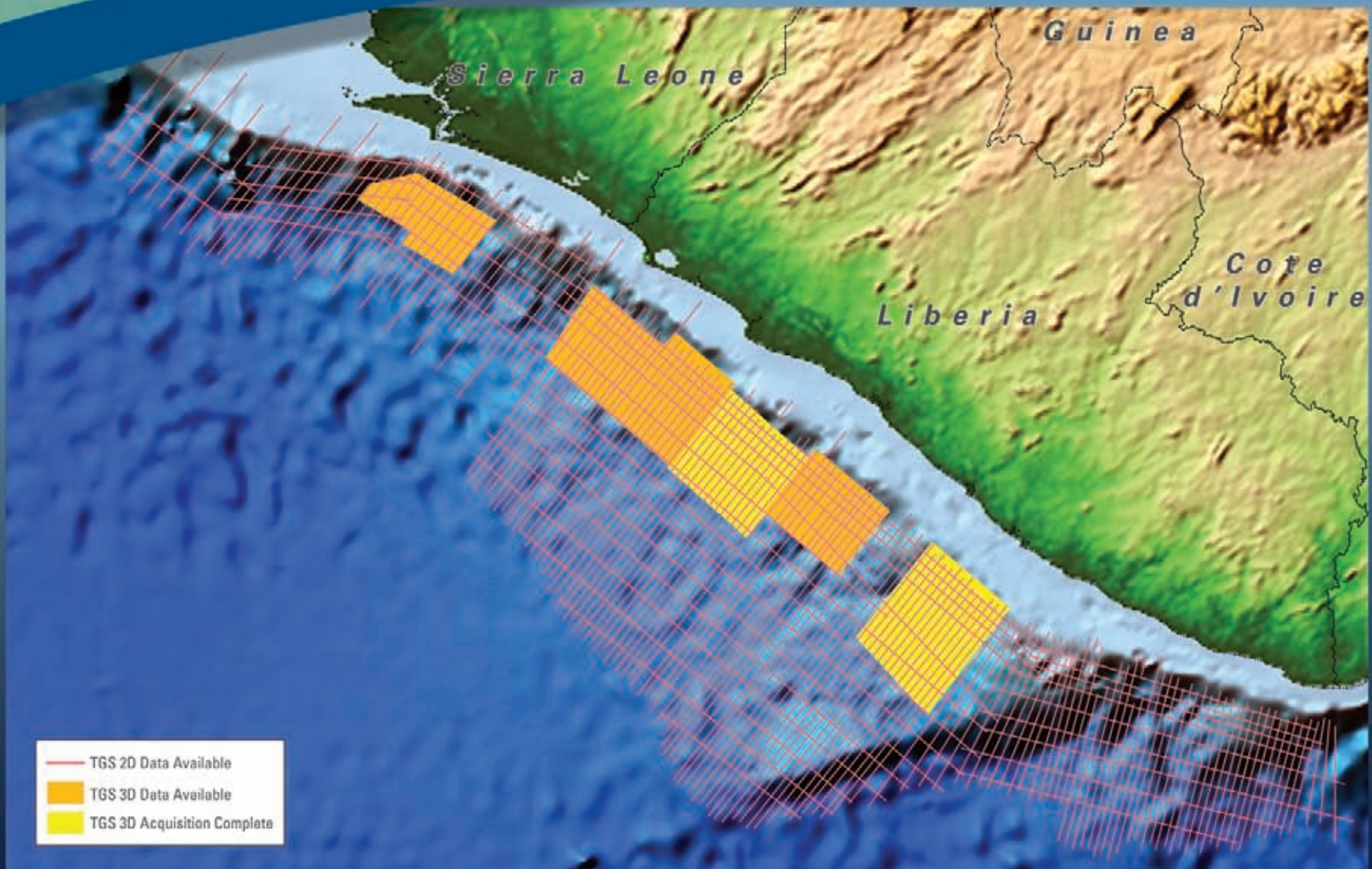
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Shale Gas Success Echoes Through Rockies

By LOUISE S. DURHAM, EXPLORER Correspondent

How strange to think it was not so long ago that North American gas supplies were tight and prices, while volatile, were hovering around \$13/Mcf.

Then along came the now-ubiquitous shale gas plays with their reported copious reserves and high volume IPs, accompanied by the worst recession since the 1930s and ...

Bang.

The ensuing decreased demand and increased production sent an all-time record 3,833 Bcf into storage by mid-November 2009, according to Steve Trammel, senior product manager at IHS in Denver. He noted

average U.S. spot gas price throughout 2009 was \$3.96/Mcf – and says to expect soft gas market conditions through most of 2010.

It's a particularly tough scene in the Rockies, where unconventional gas plays face stiff competition from the high volume, lower cost shale gas wells in other parts of the country.



TRAMMEL



"The Marcellus and Haynesville and some others are such high volume gas plays and producing so much gas," Trammel noted. "The Rockies wells producing maybe 3 MMcf

a day have a hard time competing with IPs of 13 to 15 MMcf."

It doesn't help that Rockies gas is the lowest priced gas in the United States. In fact the producers will be challenged to reduce costs to prevail with sub-\$5 gas and continuing negative basis differentials during the coming year, according to Trammel.

Energy policy access restrictions and new rules contribute their share of negative impact on cost.

The Rockies plays, for the most part, produce drier gas – in fact, the region yields 36 percent of total U.S. dry gas production, compared to 29 percent five years ago, according to information from FERC.

Dry gas is not a good thing today.

"When you have an oil-gas price differential of 15 to 1, or 20 to 1, people are leaving gas plays and going strictly to liquids and also to shale gas plays with NGLs associated with them," Trammel said. "The NGLs makes the economics wonderful.

"Lots of shale plays, especially the Marcellus and Eagle Ford, have liquids associated with them," he noted.

"A good example of someone moving off to chase oil and liquids is Pioneer (Natural Resources)," Trammel said. "They had a huge operation in the Raton Basin for coalbed and were going to drill the Pierre shale – now they've pretty much shut down a lot of that and gone to the West Texas Permian drilling for Spraberry oil.

"They just moved out of the Rockies for the time being," he said.

In the quest for cost improvement, Rockies players are applying technology such as pad drilling. This yields a smaller environmental footprint and enables the operator to move a fit-for-purpose rig onto the pad and drill a number of wells from it and then bring in the completion rig to complete all of them.

As for the thorny issue of demand, the best potential for gas demand growth for the Rockies lies in the power sector, according to Trammel. But the West is a coal-rich region, and much of the power hasn't been switched over to gas yet, so there's work to be done there.

Positive Signs

But don't despair – all is not gloom 'n' doom.

Trammel noted there are a number of plays that are still competitive, including:

► **Pinedale-Jonah** in southwest Wyoming, where drilling and completion costs are under control. A number of wells have been drilled there over many years – and the higher volume wells kick out as much as 5 MMcf/d.

► ExxonMobil operations in the **Piceance** remain competitive, aided by considerable pad drilling.

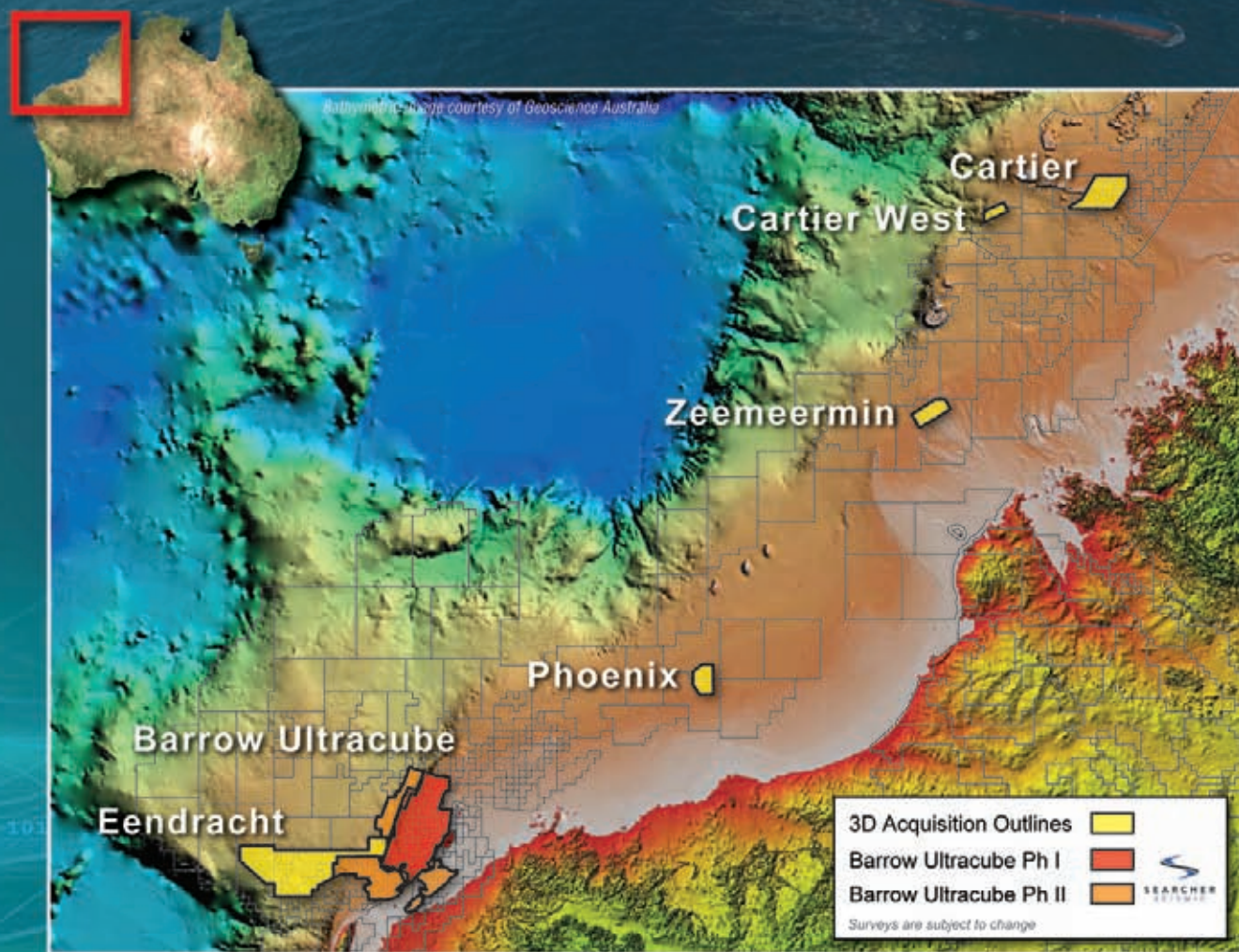
► The big **Wattenburg** gas field near Denver in the DJ Basin, with its NGLs, continues to rock 'n' roll successfully.

► **Coalbed** is important in the Rockies and marginally competitive. By and large, these are lower volume wells with higher cost because of de-watering and disposal of the water before the wells can come on.

"The great irony is in the innovative work

See **Shale Gas**, page 18

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Balancing oil AND gas activities

Activity Begins on Utah's Shale Gas Potential

By LOUISE S. DURHAM, EXPLORER Correspondent

Considering that natural gas prices are at bargain basement levels and storage facilities are brimful, it would be easy to assume natural gas exploration is headed for a major hiatus.



CHIDSEY

Think again. The always-optimistic explorers continue efforts to find new supplies that will be needed when demand once again soars, triggering prices to move upward and storage levels to decline.

Utah is one of many areas where the drill bits are turning to tap into more gas, yet not ignoring oil.

"Most of the drilling activity in Utah is in the Uinta Basin, especially the eastern area, for Cretaceous Mesaverde and Tertiary Wasatch tight gas sands," said AAPG member Tom Chidsey, petroleum section chief at the Utah Geological Survey (UGS).

"Tertiary Green River oil is the drilling target in the Monument Butte/Brundage Canyon area in the west-central part of the basin," Chidsey continued, "and there's activity in the Ninemile Canyon trend involving Tertiary, Cretaceous and older targets in the southern Uinta."

"Wolverine announced a second



The Mississippian Manning Canyon Shale, Soldier Canyon, Oquirrh Mountain, northern Utah.

Jurassic Navajo sandstone oil discovery, Providence Field, north of their 2004 Covenant Field discovery in the central Utah hingeline thrust belt," he added.

The 100-million-barrel Covenant Field find was a first in that it proved up oil in central Utah, which was a shocker to many industry veterans.

Shale Gas Potential

If it's shale gas that presses your buttons, not too worry – Utah has that too.

If you're not up to speed on the geological characteristics of the shale resources, there soon will be new info



available, at least in two promising areas.

"The Survey is involved in two shale gas projects funded by the Research Partnership to Secure Energy for America," Chidsey said.

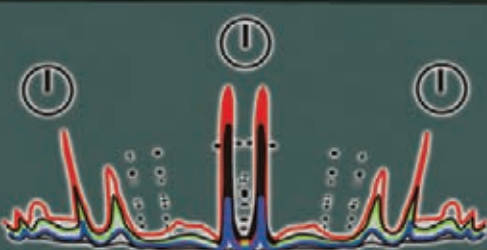
"We just got funded for the second one, which is the Cretaceous Mancos Shale in the Uinta Basin area," he said. "The other is emerging Paleozoic shale gas resources of the Colorado Plateau in central and southeast Utah."

The good news is the results of the two projects will be available to all.

Shale gas reservoirs in Utah have tremendous untapped frontier potential, according to Chidsey. For example, he noted that existing gas production in the Uinta Basin could be greatly enhanced by the addition of gas reserves in the Mancos Shale.

In line with a number of emerging shale gas plays, the geologic and engineering insights for the Mancos are preliminary in nature.

See Utah, page 16



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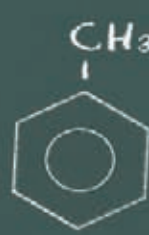
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Photo by Craig Morgan

The Gothic Shale of the Pennsylvanian Paradox Formation along the Honaker Trail, San Juan River Canyon, southeastern Utah.

Utah from page 14

In order to quantify these plays, however, accurate geologic and geophysical characterization must be integrated with reservoir specific engineering practices.

To achieve this, Chidsey noted the Mancos project will:

- ▶ Characterize the geology – including sedimentology, stratigraphy, organic, stable isotope and inorganic chemistry, natural fracture analysis, geophysical and 3-D seismic analysis – of the Mancos in the Uinta. The goal is to ID premium target zones and determine the resource potential.

- ▶ Define the geologic parameters that determine various geo-mechanical properties, i.e., brittleness and susceptibility to fracturing. Employ defined relevant geologic parameters to predict brittle areas along with Mancos shale gas prospectivity, from an engineering standpoint.

- ▶ Establish best drilling, completion and production techniques for specific target intervals, based on rock properties.

“The investigation will quantify and potentially lower the economic risk of exploration and development in the Mancos shale gas play,” Chidsey said, “encouraging larger scale commercial production.”

Project team members represent:

- ▶ The Utah Geological Survey.
- ▶ The University of Utah’s Energy and Geoscience Institute, departments of geology and geophysics, and chemical engineering.

- ▶ Halliburton Energy Services.

Chidsey noted that Questar E&P, Gasco Energy, Newfield, Wind River Resources and Pioneer Natural Resources will donate data. Many other Uinta Basin gas producers will participate as Advisory Board members, with some of these contributing data.

Unknowns and Objectives

In the Colorado Plateau and eastern Basin and Range provinces, Paleozoic shales are long recognized for their potential as source rocks for hydrocarbons that have migrated into other formations. Yet the shales haven’t been looked on as in-situ gas reservoirs, according to Chidsey.

These include the Manning Canyon/ Doughnut and Delle Phosphatic shales of Mississippian age in north-central and western Utah, respectively, and the Pennsylvanian Paradox formation in the Paradox Basin in the southeastern part of the state.

“Shale beds within these formations are widespread, thick, buried deep enough to generate dry gas and contain sufficient organic material and fractures to hold significant recoverable gas reserves,” Chidsey noted.

“Exploratory efforts are just beginning to target these frontier gas shales – many in environmentally sensitive areas,” he added.

There are many unknowns about these shales, including the basic rock mechanic data. The distribution and thickness of the rocks are inadequately mapped, and the vertical succession and regional correlation of the Manning Canyon and Delle Phosphatic hasn’t been interpreted in a sequence stratigraphic framework.

Chidsey itemized the overall objectives and/or benefits of the current study:

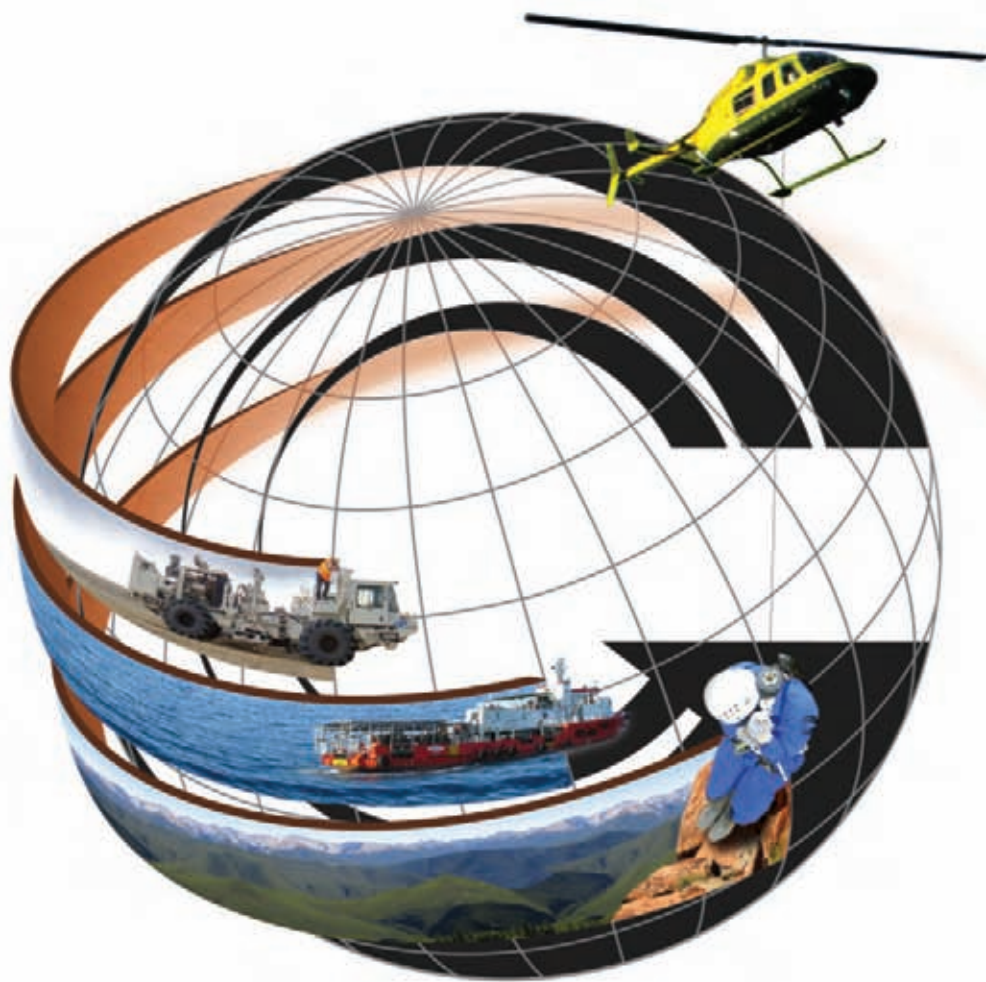
- ▶ Identify and map the major trends for target shale intervals and identify sweet spots with the greatest gas potential.

- ▶ Characterize the geologic, geochemical and petrophysical rock properties of those reservoirs.

- ▶ Reduce exploration costs and drilling risk – especially in environmental sensitive areas.

- ▶ Recommend best practices to complete and stimulate these frontier gas shales to reduce development costs and maximize gas recovery.

All project maps, data reports and results will be publicly available and provided to both small and large operators via a proven technology transfer plan, according to Chidsey. **E**



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Wyoming's Website Wows Explorationists

By BARRY FRIEDMAN, EXPLORER Correspondent

Wyoming has a number of firsts going for it: the first state that gave women the right to vote, for example, and the first to have a national park and monument (Yellowstone and Devil's Tower respectively).

But in at least one instance, being second is still a pretty good thing – the state is second only to Texas when it comes to the marketing of natural gas. In fact, it produces as much as the Gulf of Mexico.

That's the kind of message you want to get out. And behind every successful petroleum exploration-driven state, you might say, lies (or should lie) a successful, vibrant state geological website.

According to proponents, www.wogcc.state.wy.us is the first stop for any professional,

be it private or public, who wants or needs to find out more about what goes on in Wyoming.

The website, says AAPG member Fred Crockett, BLM-Wyoming Reservoir Management Group, "is a powerful source of information for oil and gas companies and consultants."

He's not alone in his praise.

According to the Interstate Oil and Gas Compact Commission, Wyoming has one of the country's most advanced and interactive web-based reporting systems.

The site offers Wyoming well coordinates, production data, permit approvals and



formation tops. Also, there are links to outside information, including federal leasing data from the Bureau of Land Management and programs, mapping ability from the University of Wyoming and tax

information.

"The WOGCC website is my primary source of data for working Wyoming," says AAPG member Lynette D.W. George, a consulting geologist in Casper who's also on the Wyoming Board of Professional Geologists.

Due to the site, she said, much of her work is faster and easier.

"Production data for wells can be

downloaded and fed into Petra and a variety of other analysis tools," she said. "I review completion reports and sundry notices online to further round out a data set."

She particularly values that the website facilitates collaboration among individual consultants because it establishes a common pool of data.

George adds that, along with the North Dakota Oil and Gas Division website, "I have found no other state website to be as valuable and as easy to use as the WOGCC website."

To read more about this subject, visit the AAPG website.

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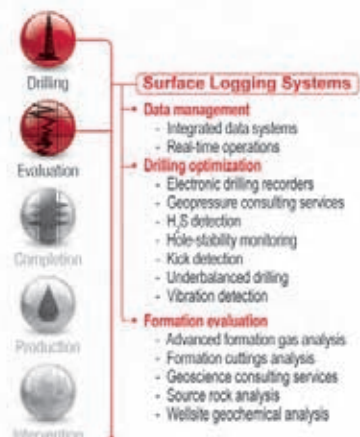
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Shale Gas from page 12

the Rockies producers did with drilling and how to make, especially, tight gas sands pay," Trammel said. "They started using slick water and staged frac jobs, and that boosted well volumes and such.

"This created a monster breakthrough elsewhere because people started applying tight gas sand work to wells in the Barnett, the Marcellus, Haynesville," Trammel said. "They were doing horizontal, which was key, and applying these big, slick water-staged frac jobs – that's why they're getting such huge volumes of gas out of shale plays elsewhere.

"Ironically, the Rockies developed an innovation that kind of came back to hurt," Trammel added.

The Marcellus alone poses enormous competition.

"The Marcellus by 2020 could supply all of the northeast gas demand and even send some back to the Midwest's mid-continent area," noted AAPG member Pete Stark, vice president for industry relations at IHS-CERA, in the IHS-CERA study dubbed "Cream of the Crop: Performance Analytics for North American Gas Resource Plays."

"The Rockies players must be creative with their markets," Trammel emphasized. "They must cut costs to the bone to compete with the higher volume plays that have NGLs associated with them."

He noted that Horace Greeley's advice from the mid-19th century to 'go west, young man' comes into play here.

"Rockies producers must look to the West Coast to see what kind of market they can do there," Trammel said. "There's existing pipelines to the West Coast, and also the planned Ruby pipeline will access significant Rockies supplies and make them available to consuming markets in California, Nevada and the Pacific Northwest.

"One of their big competitors for the West Coast gas market has been the Permian Basin, and now people in the Permian are focused on liquids, NGL," he said. "This helps the Rockies a little with competition for the West Coast gas market."

There's been a huge decline in the rig count in the Rockies since August 2009, according to Trammel – in fact, at one point it declined by more than 50 percent.

"Even so, production is still sustaining at close to 9.3 Bcf a day," he said. "That speaks to the amount of gas they've been able to find there.

"Reported increases in IP test volumes in the Piceance Basin are evidence that operators can boost the productivity side of the cost/Mcf equation," Trammel added. "Lower rig, supply and service fees should help on the cost side."

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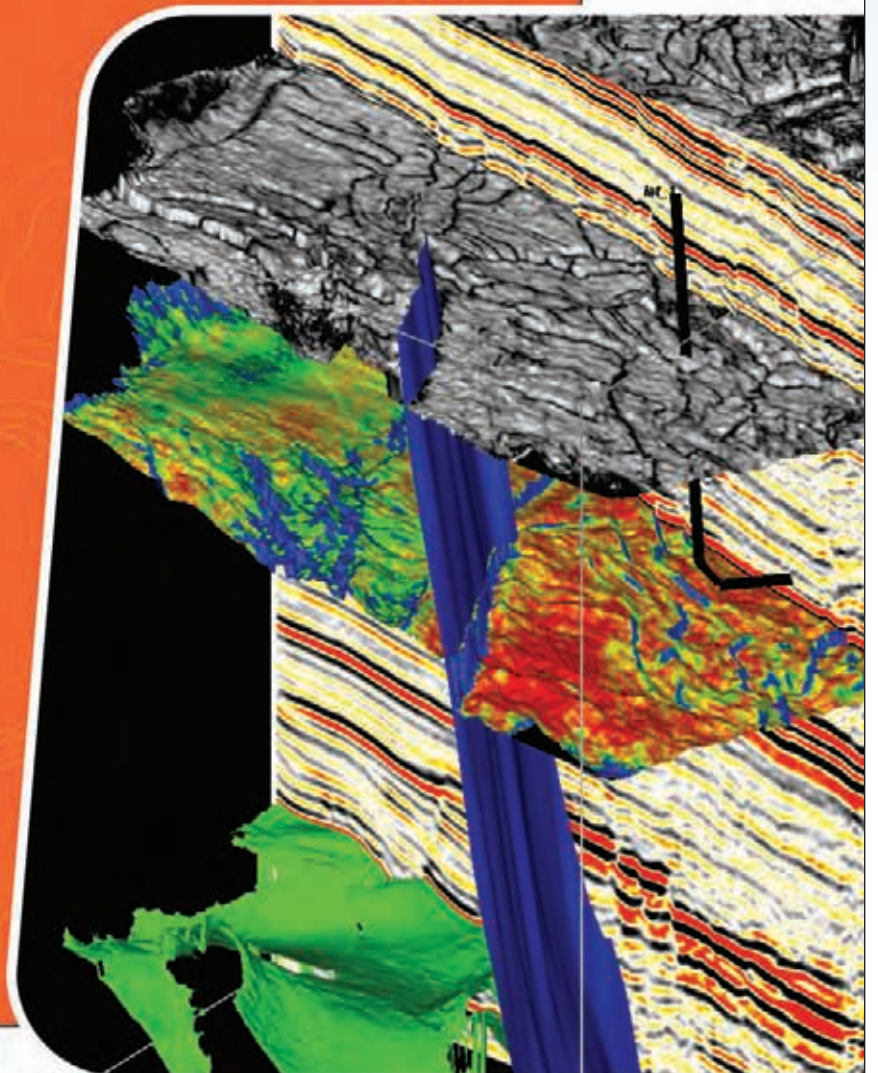
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New Media Puts Different Slant on Spill Info

By DAVID BROWN, EXPLORER Correspondent

As soon as the Deepwater Horizon offshore drilling rig sank in the Gulf of Mexico on April 22, information about the accident began to flow across the world's computer screens.

You could find a description of response efforts on Facebook, at /DeepwaterHorizonResponse, or through Twitter by following oil_spill_2010.

Dozens of industry sites were devoted to updates, including the official webpage at www.deepwaterhorizonresponse.com.

The world had its first cyberspill.

AAPG member Clint Moore of Houston, a longtime Gulf of Mexico geoscientist, joined thousands of others in the industry in searching for facts online.

"There's a huge thirst for information out here," Moore noted. "We keep having to hunt around to find good, detailed information."

BP, the well's operator, had learned from previous crises in the industry. It made top executives available to the media and put out as much information as it could gather.

But the force of social networking outlets and new media coverage showed how difficult it is now to track a flood of online information.

"The new media definitely makes for a different information environment," Moore said.

"Upstream Online seems to have good blow-by-blow reporting. That's been an important source of information for those of us in the industry," he added.

Moore also found helpful information and coverage on the website of *Offshore Magazine* – PennWell publishes the magazine and produces the site. And he

Statement by AAPG President John Lorenz

"The AAPG sends thoughts, prayers, and condolences to the injured and to the families of those who lost their lives in the recent Gulf of Mexico drilling platform disaster. Offshore drilling is a large-scale industrial operation with all of the challenges inherent in an industrial enterprise plus the added risk of working in an isolated environment surrounded by ocean. While recent offshore drilling has had an enviable safety record, that is of little consolation at the moment.

We all accept certain risks in our lives starting with the drive to the local grocery store, and we recognize that no undertaking can be made 100 percent

safe. Nevertheless, catastrophic accidents such as this have global impact, affecting the economy, the environment, our industry, our profession, and individual lives. While AAPG members understand better than most the risks of dealing with forces of nature and drilling for flammable liquids in high-pressure environments, there are always unknowns. In the long run, industry and its dedicated workers will continue the quest for the energy that society needs, searching in these difficult offshore environments because it has been and can be done with relative safety. In the meantime, AAPG mourns the loss of life and the environmental impact."

cited a source that for him was unexpected:

"There's been some interesting articles on the *New York Times* website," he said.

A challenge for Moore and other offshore professionals was to find sites with both accurate and technically meaningful content.

"This is a technical language that most people in the world don't have any reason to understand," Moore noted.

"The problem with the Deepwater Response website is that it's just a website that puts out what can be officially approved," he added.

Opponents of offshore drilling were just as quick to draw on new media resources.

Moore heard of an environmental group's plans to ask its members to photograph effects of the oil leak with their cell phones,

and to post the pictures online.

Reactions to the accident inside the industry included as much concern as curiosity.

"Everybody I know who's connected to the offshore industry is just devastated by the accident. Just everybody is devastated by the loss of the men and the damage that's likely to happen to the environment," Moore said.

Historical Perspective

By its nature, the Gulf of Mexico leak posed special challenges for the offshore industry. A spill from a breached tanker might make headlines for three or four days. The relatively smaller but daily and persistent leak

from the BP well appeared in headlines for weeks.

And the complexity of the offshore operation was not a good fit with the nearly instantaneous, general information flow on the Web.

Moore noted that the National Transportation Safety Board typically takes a year to issue a report on an airline accident, after lengthy and detailed fact-finding studies.

Industry experts were pushed to answer questions about the rig disaster and leak response almost immediately, when a full understanding of events would be months away, at the least.


For Moore, putting the 2010 leak in perspective was an important step that also involved gathering information.

He recalled the blowout of the Pemex exploratory well Ixtoc I well in the Gulf of Mexico, about 500 miles south of the Texas coast, on June 3, 1979.

That began a nine-month effort to stem the resulting leak, which discharged 10,000 to 30,000 barrels of oil a day into Gulf waters. World War II also brought a significant discharge of oil and refined fuel into the Gulf.

"There was a book called 'Torpedoes in the Gulf,' which covers in great detail the many tankers that were blown apart in the Gulf of Mexico," Moore recalled.

Taken together, the sinking of so many U-boats and other ships – including American fuel tankers – constituted a major spill into Gulf waters, just as the Ixtoc blowout did more than 35 years later.

"The good news is, the Gulf came back," Moore said. 

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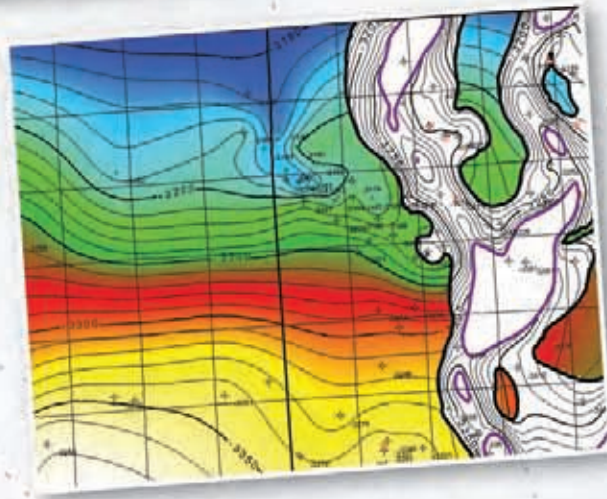
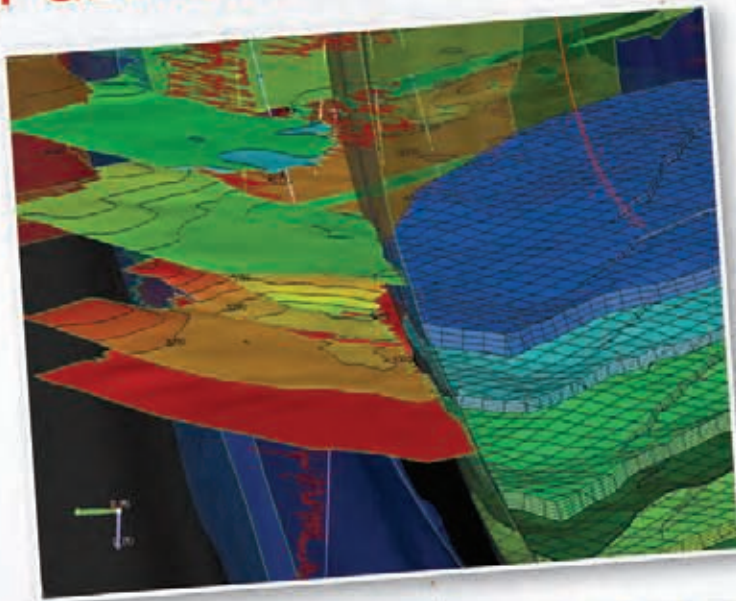
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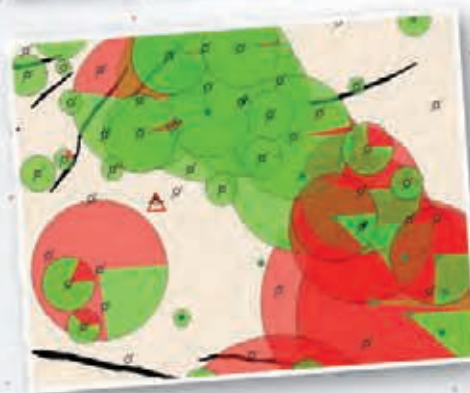
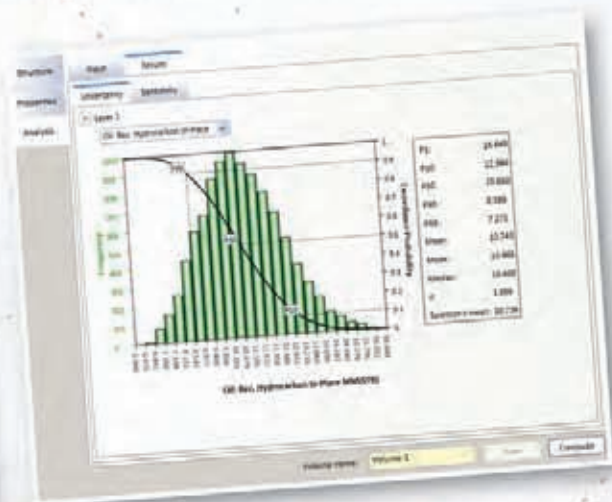


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Tragic, but not permanent

For the Record: The Top Ten Worst Spills

The following is a list of the 10 worst oil spills (volumes approximate), courtesy of Livescience.com.

Note that seven of the 10 worst oil spills were tanker accidents – and the worst spill was an intentional act.

Also, in each case the environment was not permanently harmed.

1. **Gulf War oil spill (1991)** – 10-11.4 million barrels (total).

The worst oil spill in history, the Gulf War oil spill spewed an estimated eight million barrels of oil into the Persian Gulf after Iraqi forces opened valves of oil

wells and pipelines as they retreated from Kuwait. The oil slick reached a maximum size of 101 miles by 42 miles and was five inches thick.

2. **Ixtoc I oil well (June 1979)** – 3.4 million barrels.

The Ixtoc I oil well exploded in the Gulf of Mexico and the oil platform caught fire and collapsed, rupturing valves and making it difficult for rescue personnel to control the damage. The spill continued for nine months.

3. **Atlantic Empress/Aegean Captain (July 1979)** – 2.14 million barrels.

A Greek oil tanker called the Atlantic Empress collided with another ship, the Aegean Captain, during a tropical storm off of the island of Tobago in the Caribbean Sea. The Atlantic Empress disaster killed 26 crewmembers and is the largest ship-based oil spill.

4. **Fergana Valley (1992)** – 2.11 million barrels.

The Fergana Valley, one of Central Asia's most densely populated agricultural and industrial areas, was the site of the largest inland oil spills in history.

5. **Nowruz oil field (February 1983)** – 1.92 million barrels.

During the first Gulf War, a tanker collided with a platform in the Persian Gulf on Feb. 10, 1983, spilling about 1,500 barrels a day, until the platform was attacked by Iraqi planes in March and the slick caught fire. The Nowruz oil field was not immediately capped, because the field was located in the middle of the Iran/Iraq war zone. The well was finally capped by Iran in September – an effort that resulted in the deaths of 11 people.

6. **ABT Summer (1991)** – 1.92 million barrels.

The ABT Summer tanker, traveling from Iran to Rotterdam, leaked oil and caught on fire about 700 miles off the Angolan coast in 1991. The disaster killed five of the 32 crewmembers on board.

7. **Castillo de Bellver (1983)** – 1.87 million barrels.

A fire aboard the Castillo de Bellver tanker led to an explosion that caused the vessel to break in two. Oil spilled into the sea 24 miles off the coast of Cape Town, South Africa. Luckily, the oil caused minimal environmental damage as the direction of the wind moved the oil slick offshore, where it dissipated naturally.

8. **The Amoco Cadiz (1978)** – 1.60 million barrels.

Stormy weather drove the Amoco Cadiz aground on the Portsall Rocks, a 90-foot deep outcrop off the coast of Brittany, France. The ship split in two and quickly sank before its oil load could be pumped from the wreck.


9. **The Amoco Haven (1991)** – 1.14 million barrels.


A violent explosion in the Mediterranean Sea near Genoa, Italy, aboard the Cyprus-based tanker the Haven killed six members of the crew and spilled 145,000 tons of oil off the coast of Italy. About 70 percent of the oil burned in the ensuing fire.

10. **The Odyssey (1988)** – 977,000 barrels.

The American-owned oil tanker Odyssey split in two 700 miles off the coast of Nova Scotia, spilling crude oil into the sea and catching fire as it sank, setting the spill aflame. Because of hazardous weather conditions the Canadian Coast Guard could not immediately reach the spill, and much of the oil burned.


Also: **Exxon Valdez (March 1989)** – 257,000 barrels

With a third mate at the helm, the loaded 986-foot vessel carrying 1,264,155 barrels of oil ran aground in Prince William Sound in Alaska. Exxon says it spent about \$2.1 billion on the cleanup effort. 



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API	Operator	Lease	Well	County	Top Depth (ft)	Bottom Depth (ft)
40110010000	NUBLE OIL & REFINING	DINSMORE, WELLS B	5-B	ATASCOSA	9630	1910
40110020000	HAZEL OIL & REFINING	HAZEL OIL & REFINING	1	ATASCOSA	9620	7091
40110030000	DEURHART, BURLEY T.	HENRY, B W	1	ATASCOSA	7914	1954
40110040000	SWANAM PETRO CORP	R R BIRDWELL	4	ATASCOSA	4323	7030
40110050000	SHIELLY OIL CO	WINKLER, BERTHA M	1	ATASCOSA	9640	9990
40110060000	THWELL OIL ET AL	WEAVER, J W	1	BEE	10490	13340
40110070000	SHWELL OIL	ROESSLER, A E	1	BEE	13380	19580
40110080000	TENAS EASTERN TRAVIS CORP	GARRE GAS UNIT	1	DE WITT	14000	17410
40110090000	THWELL OIL	BROWN, LORA S	1	DE WITT	12720	19880
40110100000	ARCOS OIL & GAS	ARCOS MOUNTAIN	1	DE WITT	14030	1470
40110110000	MSF OIL CORP	BEESER	1	FRIO	3560	4010
40110120000	THWELL OIL	THWELL, J P HARDY	1	FRIO	3530	7010
40110130000	FLAG-ROPER OIL CO	MUDD	1	FRIO	3340	7030

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The Neflex Geodynamics Module plate model is developed with the support of Prof Gerard Stampfli, the University of Lausanne, and Geospatial Research Limited, and is delivered in a format supported by the innovative PaleoGIS™ software from the Rothwell Group.

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Hydrocarbon 'footprints' detected

'Bio' Data Sweep Leads to 'Geo' Data

By LOUISE S. DURHAM, EXPLORER Correspondent

Regions of aspiring geologists have enjoyed (endured?) the challenge of summer field camps where they spend their days traipsing across rugged terrain – often in the Rocky Mountains – to map the territory.

Until fairly recently, any thought of someday trading alidades and plane tables for fixed wing aircraft to use remote sensing technology to handle mapping chores would have been only a fantasy.

But we've come a long way, baby.

Airborne LiDAR (Light Detection and Ranging) remote sensing technology is much in vogue in the industry today, largely because it continues to make integral contributions to the exploration game.

High-flying technology is an apt description given that LiDAR measures surface elevation via a laser scanner mounted on a fixed wing aircraft or helicopter.

It's particularly useful to provide an accurate high-resolution representation of the earth's surface in areas having steep terrain and coniferous canopy – so long as the light can penetrate.

"LiDAR mapping technology enables rapid collection and processing of datasets used to develop an accurate and detailed digital terrain model within three inches of elevation," said Jerry Boyd, project manager at Merrick & Company in Aurora, Colo.

He summarized some of the applications:

- ▶ Support well pad site selection.
 - ▶ Improve drilling permit application approval.
 - ▶ Hyperspectral imagery can be used to perform oil seep anomalous zone detection.
- "We map the entire area and the client gives us criteria, such as pad requirements they want to achieve, like distance to navigable roads, maximum acceptable slope, proximity to a water source for permitting requirements," Boyd said. "We run an analysis on the surface model after we process it and do initial probable pad identification for them – this lets them better focus on these areas to do field investigations



LiDAR-orthophoto composite of Coal Canyon, Piceance Basin, Colorado. The high-flying technology continues to make important contributions to the exploration game.

to decide which ones to use.

"For the drilling permit and approval process, they have this very accurate information and analysis they can show to the BLM," Boyd said.

"This validates why they want a permit at this specific location, based on these parameters."

Step by Step

Hyperspectral imagery is the arm of this technology that really gets into the intricacies of the land and the vegetation.

A regular color image has three bands of light – red, green and blue. Each band has 0-255 values of saturations of that color.

Hyperspectral imagery covers a much wider range of the light spectrum.

"The two main light spectrum ranges we use are visual near infrared (VNIR) and short wave infrared (SWIR)," Boyd said. "In the range of these, we have 359 bands of light we can analyze, and each of these bands has 255 values.

Other companies reported to be going after the grease in the Niobrara include Anadarko, MDU Resources, St. Mary Land & Exploration, Petroleum Development Corp., Noble Energy and committed shale gas devotee Chesapeake Energy.

Ray, who heads the annual (and highly successful) 3-D Seismic Symposium in Denver, noted the Niobrara is comprised of an interbedded rich source rock and brittle basically limestone beds that are usually referred to as chalk. It fractures naturally because the brittle facies is between more ductile shales.

"It's present all over New Mexico, Colorado, Wyoming, Kansas, Montana, North and South Dakota," Ray said. "It covers a gigantic area, so there's plenty of areas to prospect.

"We've always gotten oil shows out of the Niobrara all over the Rockies," Ray said. "It's a result of horizontal drilling and staged frac technologies that you can now make the play economic.

"The excitement is if you get a large area that's mature where the source rocks have generated the oil, then it becomes a big resource play," he noted. "You just drill all the locations using long laterals

and multi-stage fracs all along them so you can drain a large area."

'Crackle Frac'

Niobrara is one of the few formation names used in virtually every basin in the Rockies. In contrast, nomenclature varies for the shale associated with the Niobrara, e.g., Mancos, Cody, Steele, Baxter.

"Every state where there's an outcrop, that same marine shale deposited in the Cretaceous seaway has a different name yet the limestone in the middle is always called the Niobrara," Ray emphasized. He noted the Niobrara has a unique fault and fracture pattern principally because it's so brittle. He likened it to a brittle sandwich, with the limestone facies between two organically rich shale zones that source the chalk.

Ray coined "crackle frac" to describe the regional natural fractures.

"It's like a sheet of glass where you flex the glass and it shatters," he said. "It's brittle, and it crackle fracs – it fractures over a wide area having only a little bit of flexure.

"There's usually high TOC in the shale



there's oil seepage in the area," Boyd said. "We're rank ordering all these anomalies we're finding and coming up with a statistical analysis of the probability there's oil in the vicinity.

"Then we or the oil company go to the field with a (portable) spectrometer and go to the high probability sites to collect spectral signatures in a much more macro environment," Boyd added. "We do soil or liquid sampling and have lab analysis done to confirm the presence of hydrocarbons.

"When you're looking at big tracts of land, hyperspectral is a much lower cost alternative to more costly exploration processes," he noted.

A Costly Choice

LiDAR application has become almost routine for seismic data contractors in rugged areas like the Rockies.

For example, when implementing a data acquisition program using dynamite as the source, it's common to move the dynamite onto the location via a buggy or truck. However, this may be impossible without specific data for the rugged terrain – and a helicopter may be required to drop in and then retrieve a heliportable rig, which can eat up a bundle of greenbacks.

Using LiDAR-derived data the contractor can adjust the target points for drilling the shot holes such that they become accessible via drill buggy or vibrator, which is considerably less costly than the alternative. **E**

Rockies from page 10

"The big excitement here in Denver is the expansion of the Niobrara oil play between Denver along the Colorado-Wyoming state line," Ray said. "It's exploded in the last six months."

Fueling the excitement about the play is the successful Niobrara wildcat well completed recently by EOG Resources. Dubbed Jake, the well produced an average of 555 bopd during the first three months of production, according to the company.

Some industry experts say a typical new oil well in the DJ Basin might produce 100 to 150 bopd.

"When EOG released the information, I think everyone was shocked at the production being so big," Ray said. "We all knew the oil was there, but no one pursued it with the new horizontal drilling and staged fracs that were fine tuned in all the shale gas plays.

"This year the company announced a huge acreage position, and they recently announced they'll drill 40 wells in the play," Ray said.

sourcing zones, and when the shales heat up they generate oil," Ray said. "Because the brittle limestone member is in the middle of the sandwich, the oil migrates into the crackle fracs.

"The old Niobrara model was it had to be on a structural feature or next to a fault zone or some tectonic influence to get the fractures," he noted. "Now we know the formation naturally fractures – and it may have something to do with maturation of the source rocks.

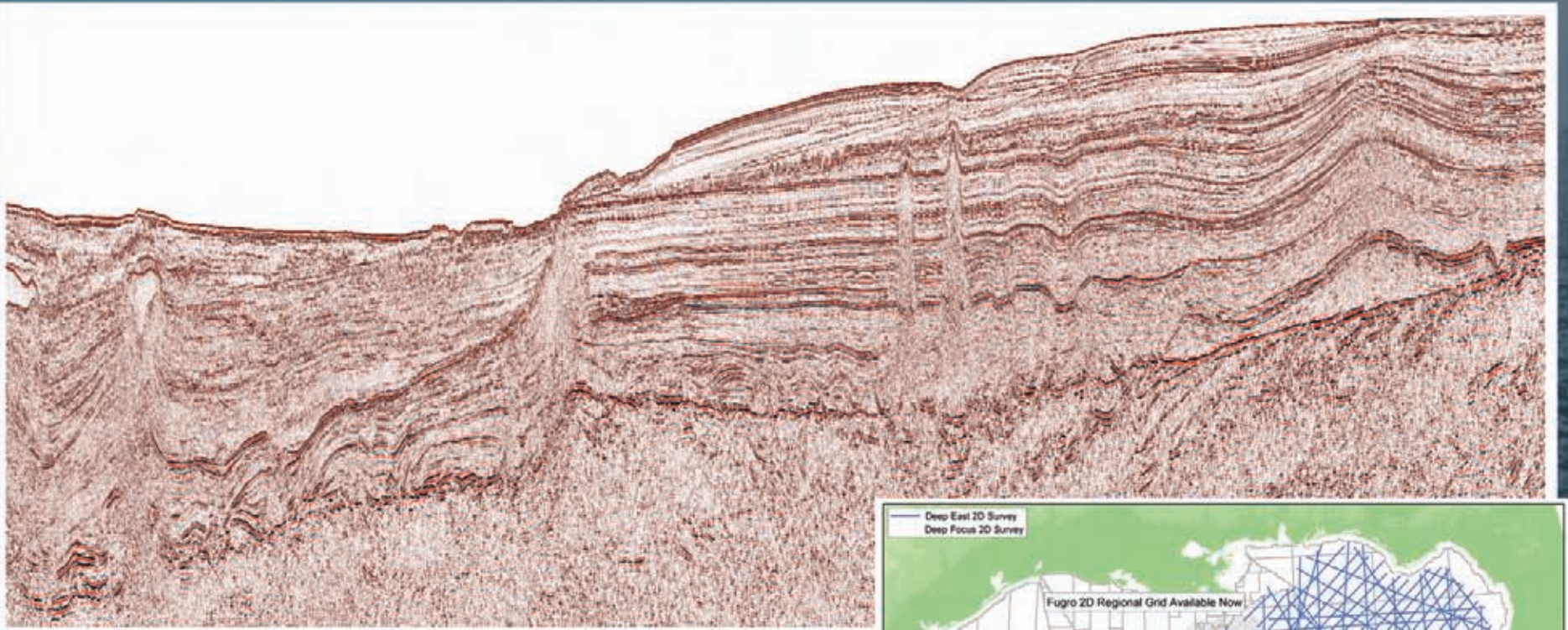
"When they're heated, there's expansion when the oil is generated," Ray said. "I think part of the sourcing creates the crackle fracturing.

"Also, because it's a very brittle bed between more ductile beds, any regional compression or slight fracturing will crack the limestone first – it's fairly thin and so much harder," he said.

"There's definitely something different about the fault and fracture pattern in the Niobrara that's not in units above or below," Ray emphasized. "You see evidence of this unique characteristic in surface outcrop exposures and on seismic lines.

"It definitely has a fractured personality," he said. **E**

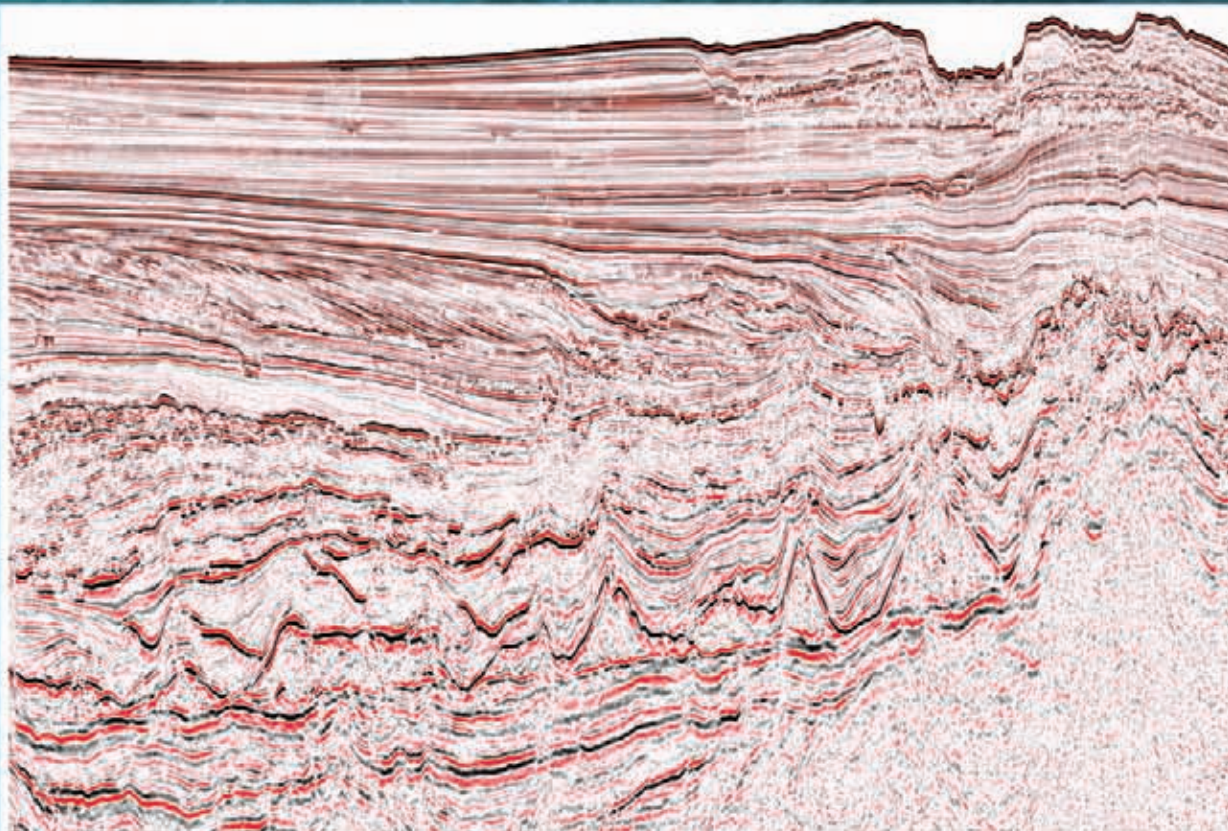
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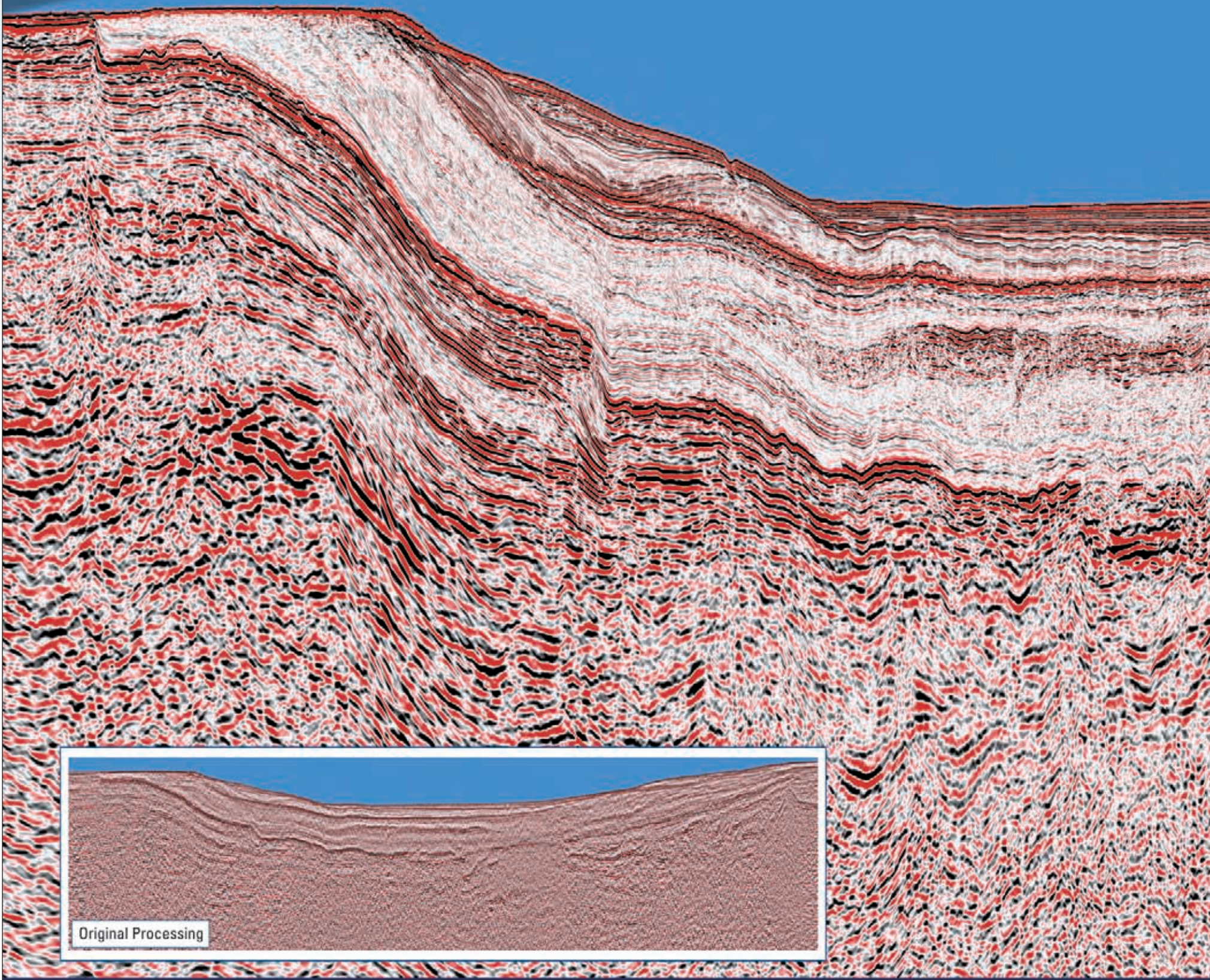
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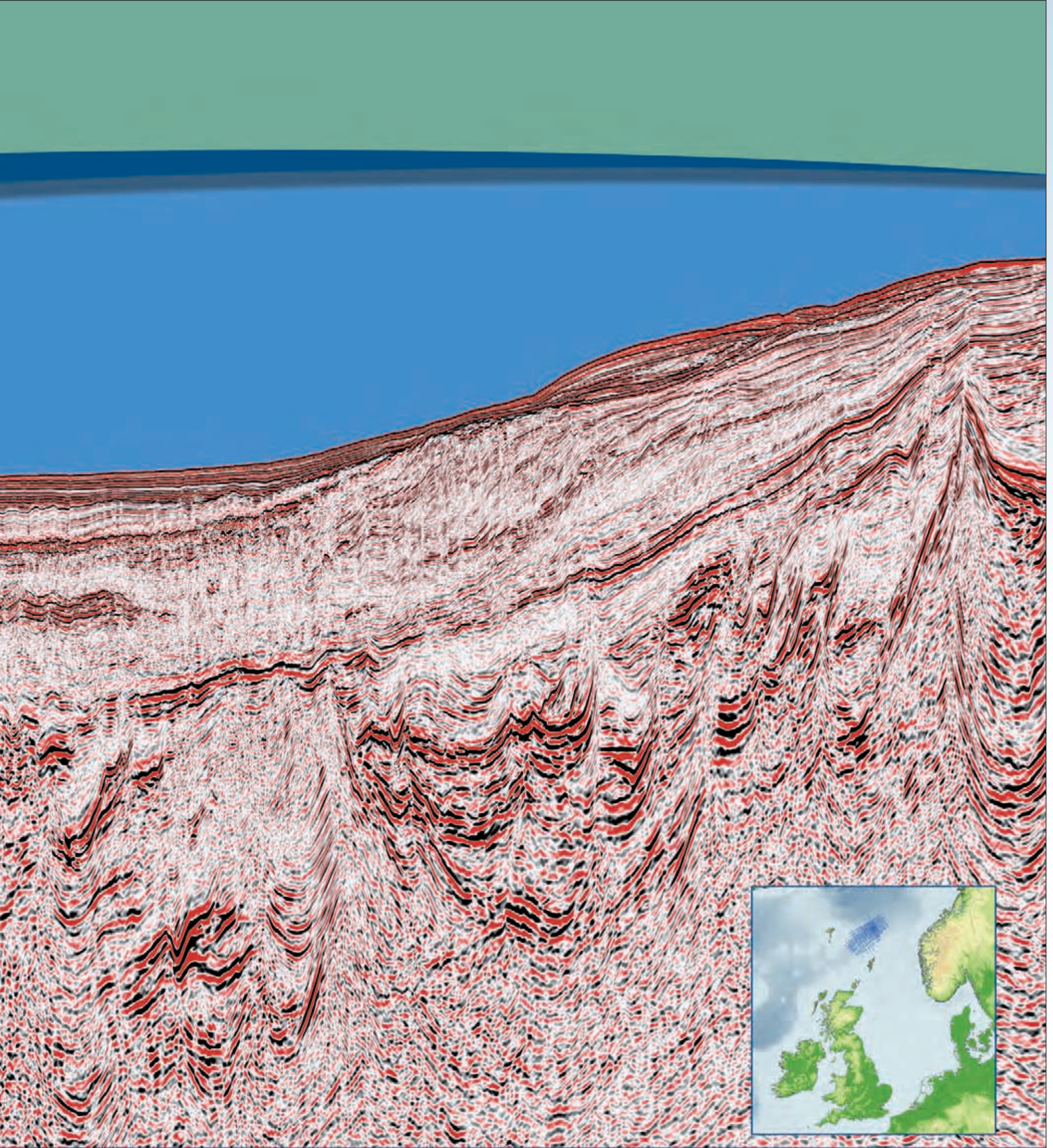
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New Orleans recap

Science Was the Star

By VERN STEFANIC, EXPLORER Managing Editor

In April, the good times were rolling again in New Orleans – there was plenty of music, food, exotic culture and a whole lot of fun.

But the key word for all was “science.”

The 2010 AAPG Annual Convention and Exhibition returned for the eighth time to New Orleans, attracting 5,970 attendees for a meeting built on the theme “Unmasking the Potential of Exploration and Production.”

The meeting boasted an abundance of excellent presentations, dazzling displays of cutting-edge technology and unforgettable moments.

But the meeting’s central theme and overall message came in the opening session, cited first by general chair Tom Hudson and then emphasized by AAPG President John Lorenz:

“AAPG is about the science,” he said at the very start of his presidential address. “We are a scientific organization.”

This matters, he continued, because “science is becoming critical and crucial to being able to extract from the subsurface the energy that we need to be able to run civilization.”

That’s important, Lorenz said, because the world’s growing population and technological development demanded an ongoing source for energy.

“AAPG is scientifically oriented,” Lorenz said. “We are supremely

poised to contribute to (solving) this global problem.”

Lorenz also documented and applauded AAPG’s contribution to maintaining and promoting the science that successful exploration demands.

“AAPG gives us the tools to do this,” he said. “It gives us Hedberg Conferences, where we advance the science. Publications where we disseminate the science. Conventions like this one, where we’re coming primarily to see the science.”

Other meeting highlights included:

- ▶ Scott Tinker’s introduction of Sidney Powers Memorial Award winner Frank Brown – reading the citation prepared by recently elected AAPG president-elect Paul Weimer, who was ill and unable to attend the meeting.

- ▶ The presentation of the L. Austin Weeks Memorial Medal to Larry Funkhouser, in recognition of “extraordinary philanthropy and service in advancing the mission of the AAPG Foundation.”

- ▶ Standing-room only crowds for several presentations and events, including Bobby Ryan’s talk at the All-Convention Luncheon, Aubrey McClendon’s Michel T. Halbouty lecture, the Discovery Thinking technical session and James R. Moffett’s paper on the recent Davy Jones discovery in the Gulf of Mexico.

The 2011 AAPG annual convention will be held April 10-13 in Houston.

French Team Takes Top Honors in 2010 IBA

Graduate students representing the Institut Français du Pétrole took the top prize in this year's Imperial Barrel Awards competition, beating out 11 other teams from geology and geophysical departments from around the world.

The finals were held in New Orleans right before the start of the AAPG Annual Convention and Exhibition.

The IFP win marked the second consecutive year that a team representing AAPG's European Region claimed first place in the global competition, which carries individual medals and a \$20,000 prize for their petroleum geoscience department.

Members of the IBA winning team are Matthieu Bregeaut, Jeanne Pelé, Francys Espaillet, Herman Rojas and Shiladitya Sengupta. The faculty adviser is Anne Duhem Jardin.

Finishing second (Selley Cup winners) was the team from the University of Calgary, representing the Canada Region, which earned individual medals and \$10,000 in scholarship funds for the department.

Finishing third (Stoneley Medal



winners) was King Fahd University, representing the Middle East Region, which earned individual medals and \$5,000 in scholarship funds for their department.

The remaining nine finalists each earned \$1,000 in scholarship funds for their respective schools plus individual medals for themselves as IBA finals participants. The finals teams were

(alphabetical order):

- ▶ Africa Region – Obafemi Awolowo University, Ile-Ife, Nigeria.
- ▶ Asia-Pacific Region – China University of Petroleum, Beijing.
- ▶ Latin America – EAFIT University, School of Geology, Medellín, Colombia.
- ▶ Eastern Section – West Virginia University, Morgantown, W.Va.
- ▶ Gulf Coast Section – University of

Louisiana-Lafayette.

- ▶ Mid-Continent Section – Oklahoma State University, Stillwater, Okla.
- ▶ Pacific Section – San Diego State University, San Diego.
- ▶ Rocky Mountain Section – Colorado School of Mines, Golden, Colo.
- ▶ Southwest Section – University of Texas-El Paso.

The IBA program gives teams of students the chance to evaluate the petroleum potential of a sedimentary basin and to test their creative geological interpretations. Their work must be completed in a six-to-eight week period, with results presented to – and judged by – an independent panel of petroleum industry experts.

A total of 57 teams from 18 countries competed in this year's IBA program.

Past IBA winners were teams from:

- ▶ 2009 – Moscow (Russia) State University, Moscow, Russia.
- ▶ 2008 – The University of Oklahoma, Norman, Okla.
- ▶ 2007 – The University of Aberdeen, Scotland.

For more information on the IBA program go online to www.aapg.org/iba.

Truths' turned upside down

Unconventional Thought: Get Out of the 'Zone'

By SUSAN R. EATON, EXPLORER Correspondent

Bobby Ryan, vice president of Global Exploration for Chevron Global Upstream Oil and Gas, challenged AAPG's members to choose the "unconventional" route forward, relying upon creativity – coupled with technological advances – to fundamentally change the way they view geological plays.

Ryan, an AAPG member and chairman of AAPG's Corporate Advisory Board, drew on his experience of more than 30 years in the oil and gas industry to deliver a thought-provoking presentation at the All-Convention Luncheon in New Orleans titled "Beyond Zone Six: The Imperative of Unconventional Thinking."

Citing the innovative design and construction of the Golden Gate Bridge – completed in 1937, it was the longest span bridge in the world and held that honor until 1964 – Ryan challenged AAPG's members to think the impossible, to "build the bridge that could not be built."

Ryan's presentation on the imperatives of unconventional thinking set the tone for the 2010 Annual Convention & Exhibition in New Orleans, and left many geologists saying: "What if?"

"As explorationists, we often get framed by things beyond our everyday control – conventional thinking in these areas holds us back," said Ryan, a petroleum geologist by training and career experience. Those things, he said, include technology, economics, the environment, and public and corporate policy.

"Many people view Zone Six as a depositional environment, a limit," he said. "Actually, one might say that Zone Six is a state of mind ... How do we



move beyond that?"

Defined in geological terms, Zone Six sits seaward of the continental shelf – in the lower slope to lower bathyal regions – in water depths ranging between 1,500 to 6,000 feet. In 1979 when Ryan started his career with Texaco in New Orleans, the commonly held industry belief was there were no commercial prospects in waters deeper than 600 feet, and there were no sands – thus no reservoirs – in Zone Six.

For decades, these hard-and-fast rules limited creativity, and, accordingly, oil and gas exploration.

"At Texaco, the term "deep water" used to be a four-letter word," Ryan said.

Earlier in his career Ryan was assigned to Texaco's deepwater team, and was told to "get us back into the deep water."

At the time, Ryan's skeptical response was: "What did I do wrong?"

Two decades later, Chevron is a world leader in the Gulf of Mexico's

deepwater exploration and production.

Say What?

In preparation for his address, Ryan polled exploration colleagues in Chevron, asking them to list sweeping changes that they had witnessed during the past 30 to 40 years – illustrating how many "truths" have been turned upside down by unconventional thinking and technological advances.

To name just a few:

- ▶ Big gas, discovered a long distance from market, has no value.
- ▶ There are no reservoirs in deep water.
- ▶ There are no thrust faults in the Gulf of Mexico.
- ▶ Color has no place in seismic displays.
- ▶ High angle wells (i.e., greater than 45 degrees) need special corporate permission.
- ▶ Shales are seals and sources, but not reservoirs.

▶ When you hit Zone Six, there is no sand, so shut the well down.

"There was a time deepwater exploration was called unconventional – drilling below salt was also called unconventional," Ryan said. "Now it's the 'thinking' that's being called unconventional."

Moving Beyond Zone Six

Acknowledging the obstacles to moving beyond Zone Six thinking, Ryan said, "How do you open the door to allow your teams to be creative and not stifled? It takes listening."

Companies, he explained, must find the unique balance between business drivers, the bottom line and the risks often associated with thinking unconventionally.

"When we come up with a new concept or idea, we need to try it," he said, and in citing the successful adoption of bright spot theory or measurement-while-drilling technology, he added, "Be bold, and give it a shot."

What quality does Ryan ascribe to successful outside-of-the-box thinkers?

"The one word that comes to mind," he said, "is persistence."

"Successful individuals continue to push their ideas, about why they're the right things to do. It can be a long process," he cautioned, "but when you're confronted by the perception that something is impossible, don't quit."

The world's oil and gas supplies will be "coming from the folks in this room," he said. "New plays are credited to the new ways that people think."

To read more about this subject, visit the AAPG website.

www.aapg.org

Note: beware of best customers

Straight-Talking McClendon Makes Case for Gas

By DAVID BROWN, EXPLORER Correspondent

Quoting a natural philosopher, Mark Twain once wrote: "You tell me whar a man gits his corn pone, 'en I'll tell you what his 'pinions is."

Aubrey McClendon famously gets his pone from unconventional gas plays. And as chairman and chief executive officer of Chesapeake Energy Corp. in Oklahoma City, his opinions about energy use are well known.

McClendon delivered the 2010 Michel T. Halbouty Lecture, "Shale Gas and America's Future," to a full house of about 750 at AAPG's annual meeting in New Orleans in April.

His message:

With an abundance of natural gas production and reserves, the United States should move toward using gas for energy as much as possible, and shift away from the use of polluting, more costly and imported energy sources.

Embracing natural gas might be an easy argument to make – but as McClendon acknowledged, it's not an easy sell.

"I was naïve in thinking it would happen over the course of a year. It will probably take place over five years," he said.

Also, it's a difficult argument to make from inside the industry.

When natural gas producers promote the increased use of gas, they're seen as expressing a corn pone opinion.

To increase public support for natural gas use, McClendon said, Chesapeake Energy helped found the group America's Natural Gas Alliance (ANGA).

According to its promotional material,



"ANGA exists to pursue a single mission: To increase appreciation for the environmental, economic and national security benefits of clean, abundant, dependable and cost-efficient American natural gas."

The group has raised \$80 million to \$90 million with image advertising as its largest single expenditure, according to McClendon.

"I think we're making progress – in the sense, it takes a long time to drill a well," he said. "We're building a foundation of people who are beginning to understand what we do."

"But remember," he added, "our best customers are our worst enemies."

Manufacturing a Cause

Large natural gas consumers in the United States have seen periods of supposed gas surplus alternate with

periods of supposed scarcity, and large price moves taking place as perceived conditions change.

"One of our problems is that they say, 'Not so fast.' They don't want us to find other uses for natural gas," McClendon noted.

Andrew Liveris, chairman and CEO of Dow Chemical Co., argued against broadening the demand for unconventional natural gas production in a recent newspaper opinion piece.

"Natural gas producers have suggested that this newfound gas be used preferentially as a transportation fuel and to displace coal in electricity generation. Some even propose government policy to lock in the increased demand that would come from these new sectors."

"But we have seen this move before, and it ends with wild swings in prices and the loss of well-paying

manufacturing jobs," Liveris wrote.

"A sound energy policy that helps direct natural gas to be utilized in manufacturing, versus being legislated into less efficient uses or in uses where there are alternatives, will help stabilize U.S. industry and lead to a resurgence of American manufacturing," he added.

Supporters of increased natural gas use promote it as a cleaner, more environmentally sound alternative to the use of coal, especially in generating electricity.

"We've always had a good product. Coal has had its problems. Over time, more and more people become uncomfortable defending that industry," McClendon noted.

He said 32 of 50 states have commercial natural gas production – more than the number of states producing coal – with gas use gaining in acceptance as coal use is increasingly challenged.

"You hear a lot about companies doing research trying to gasify coal. I can promise you, nobody is trying to coalify gas," he observed.

McClendon expressed confidence that natural gas will become an energy source of choice in the United States, displacing less desirable alternatives.

He compared it to a revolution in energy use.

"Like most revolutions," he said, "you don't understand the implications in the early days. It's only later, when things play out, that you can see it."

To read more about this subject, visit the AAPG website.

www.aapg.org



They made a difference: Discovery Session speakers (from left) Mike Forrest, Bill Zagorski, Marv Brittenham, Dan Smith, John Amoruso and Gregg Robertson.

HoD Takes Action in New Orleans

Seven bylaws proposals considered by the AAPG House of Delegates were passed at the annual meeting in New Orleans.

One of the action items included adding new language to enable Section presidents to appoint delegates to three-year terms when affiliated societies have not conducted elections. This change eliminates the chronic lack of delegate representation from delinquent Affiliated societies, according to HoD Chairman Steve Sonnenberg.

Delegates also approved new language that essentially limits how long someone can serve on an outside committee. This is being done

to encourage more membership participation on these outside committees, Sonnenberg said.

The other five proposals were of a legal housekeeping nature – largely to eliminate references to dates no longer necessary.

Of the 214 House delegates, 187 were present at the New Orleans meeting, where they elected Jeffrey W. Lund, Houston, as chairman-elect and Patrick J. Gooding, of the Kentucky Geological Survey, as secretary/editor.

They will assume office on July 1, when David H. Hawk, a Boise, Idaho, consultant, assumes the HoD chairman gavel.

Spotlight on Discoveries

It was an afternoon of standing for a lot of geologists as the 750 seats in the room were already packed for this year's Discovery Thinking session, featuring six invited speakers sharing their personal "trek of an oil (and gas) finder."

The session, chaired by Charles Sternbach and Ed Dolly, was the third presentation of the 100th Anniversary Committee giving the spotlight to veteran explorationists who have had an impact on the science and profession of petroleum geology.

► **John Amoruso**, past AAPG president and recipient of AAPG's inaugural Michel T. Halbouty Outstanding Leadership Award, told of his concept of a beach in East Texas' Cotton Valley Shelf – his concept was correct and the Amoruso Field producing from the Upper Jurassic Bossier formation was the result.

► **Marv Brittenham**, as new ventures team leader for EnCana Oil and Gas, used unconventional thinking to successfully tap the Haynesville shale

in north Louisiana.

► **Mike Forrest** spoke of his time working in collaboration with Marlan Downey and applying "bright spot" technology, which helped Shell discover many large oil and gas fields in the Gulf of Mexico during the late 1960s to the late 1980s.

► **Gregg Robertson** spoke on the ideas behind the opening of new horizons in south Texas with the Cretaceous Eagle Ford shale.

► New ideas have kept the Stella Salt Dome in Plaquemines Parish, La., in the sights of past AAPG president **Dan Smith**, speaking of the 70-year production ideas that has kept the area renewed.

► **Bill Zagorski** talked about his success in the Marcellus Shale.

The New Orleans' Discovery Session was taped and will be made available via *Search & Discovery*, AAPG's online journal.

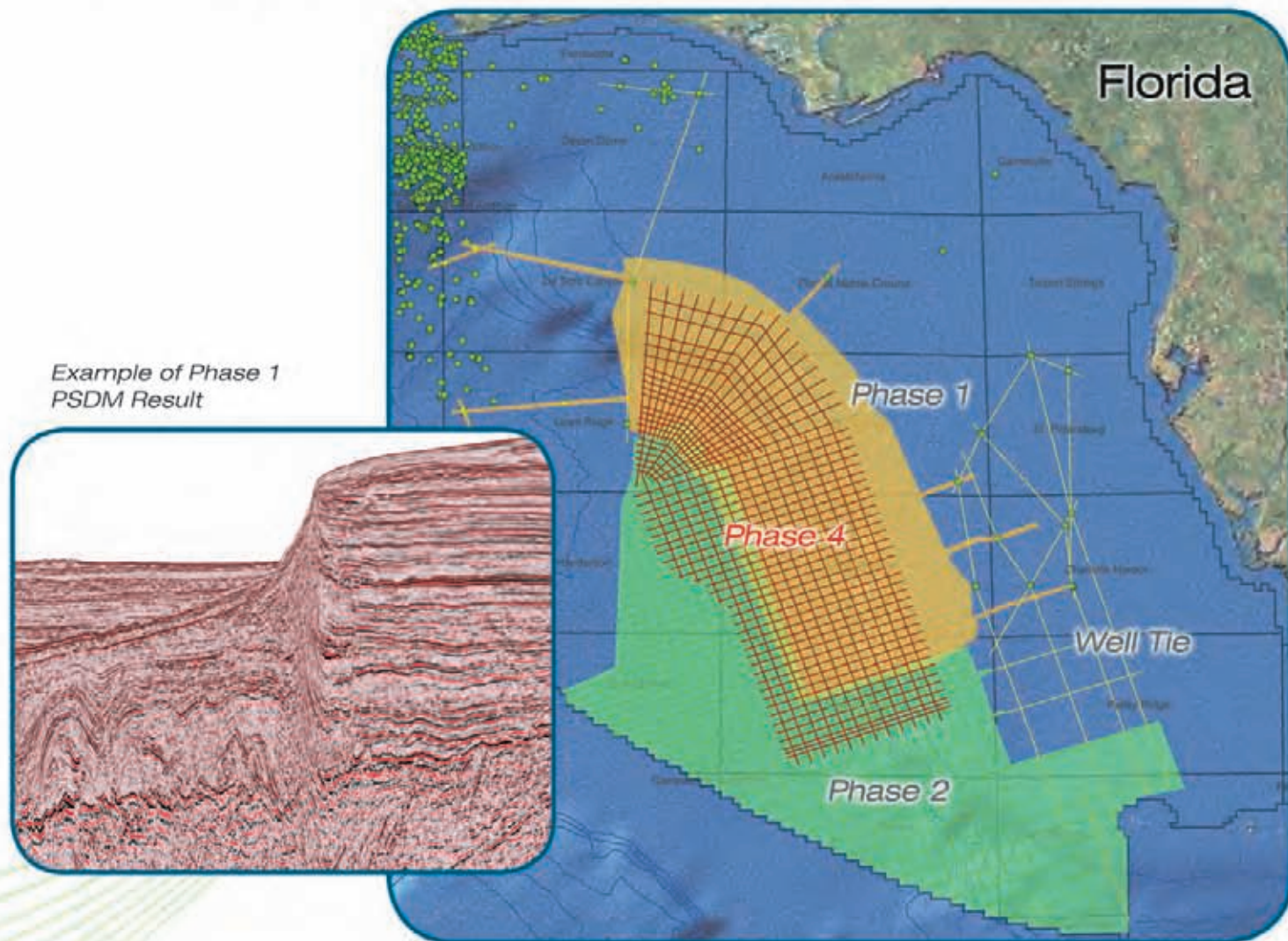


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WASHINGTON WATCH

ARPA-E – Not a Typical Research Effort

By DAVID CURTISS, GEO-DC Director

It should come as no surprise that here at GEO-DC we spend a lot of time talking about energy and the future of energy. Our basic objective is to help people understand that oil and natural gas, which currently comprise nearly 65 percent of U.S. energy, provide the fuel and power needed for economic growth and jobs.

But while fossil fuels are the foundation of global energy – and will remain so for many decades, perhaps longer – we can expect alternative and renewable energy sources will continue to grow in importance. And it is possible that a scientist or inventor will make a technological breakthrough in coming years that transforms the energy sector.

The Advanced Research Projects Agency – Energy (ARPA-E) is looking for that potentially “disruptive” energy technology.

* * *

ARPA-E was authorized as an agency within the U.S. Department of Energy in the America COMPETES Act of 2007. But, like many government programs, it was created and received no funding (see January Washington Watch) until passage of the American Recovery and Reinvestment Act of 2009.

The stimulus bill provided \$400 million to launch the agency, whose mission is “to fund projects that will develop transformational technologies that reduce America’s dependence on foreign energy imports; reduce U.S. energy-related emissions (including greenhouse gasses); improve



CURTISS

The benefit of ARPA-E funding over private capital at this stage is that they can focus on improving technology rather than raising additional money.

energy efficiency across all sectors of the U.S. economy and ensure that the U.S. maintains its leadership in developing and deploying advanced energy technologies.”

But ARPA-E is not meant to be a typical government research effort.

It’s modeled after DARPA, the Defense Advanced Research Projects Agency within the U.S. Department of Defense. DARPA was created in the late 1950s to respond to Soviet technical advances, such as the launch of Sputnik, at the onset of the Cold War.

According to Richard Van Atta of the Institute for Defense Analyses, DARPA has changed and evolved since its founding. It is a highly “agile” organization that is not risk averse, focused on “high-risk, high-reward” research. Its focus is “idea driven and outcome oriented.”

DARPA’s investment strategies more closely resemble those of venture capitalists than traditional government R&D programs. And that is how Energy Secretary Steven Chu, himself a Nobel Prize-winning physicist, describes the goal of ARPA-E in funding high-risk, high-reward research.

affordable renewable energy storage device that could be used in both off-grid and on-grid installations.

Sunlight and the catalyst split water molecules into hydrogen and oxygen suitable for use in a fuel cell to generate electricity. It is an elegant way to “store” solar energy – if it works as intended and can be deployed as cheaply as expected.

* * *

But the path of any new technology is typically bumpy, leading through the dreaded “valley of death,” as it tries to move from successful lab bench prototype to commercially viable product. The benefit of ARPA-E funding over private capital at this stage, according to Sun Catalytix, is that they can focus on improving technology rather than raising additional money.

“Our nation’s history is replete with examples of pioneers and entrepreneurs who took risks, said ARPA-E Director Arun Majumdar. “These innovators often failed initially, but quickly learned from those failures, competed against each other and innovated in both technology and business to create the largest industrial base the world has ever seen.

“ARPA-E’s goal is to tap into this truly American ethos, and to identify and support the pioneers of the future.”

ARPA-E is engaged in a daring enterprise, and more information about the funded projects is available on the agency website (<http://arpa-e.energy.gov>).

Using a baseball analogy he says they’re asking scientists to swing from the heels. Some will strike out. But other scientists will hit home runs and some will hit grand slams.

The research portfolio is broad. Program topics that ARPA-E is funding range from conventional energy and carbon capture to vehicle technologies and biomass energy.

There have been two funding rounds since the agency launched. The first encompassed many forms of energy; the second is more focused. Competition in round one was fierce, with only 1 percent of proposals submitted selected for funding.

Affordable Power From Water and Sunlight is the title of one funded project being conducted by Sun Catalytix Corporation. The firm is using sunlight and a catalyst discovered at the Massachusetts Institute of Technology to separate hydrogen and oxygen from either tap water or clean seawater. The science is proven. But ARPA-E funding will enable them to improve performance and develop prototype devices with an eye on commercial deployment.

If successful, the project will deliver an

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- ◆ Exploration/Development Prospect Evaluation
- ◆ Data Room Analyses

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The Boot Camp begins with six weeks of selected training courses designed to provide essential career skills and prepare participants for the geological, geophysical and engineering challenges of the following, six week project phase.

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“Practical Interpretation of Open Hole Logs”
“Basics of the Petroleum Industry”

WEEK 2 - August 30 - September 3, 2010

“Applied Sequence Stratigraphy of Clastic Rock/Reservoirs”

WEEK 3 - September 7 - 10, 2010

“Structural Styles in Petroleum Exploration and Production”

WEEK 4 - September 13 - 17, 2010

“Applied Subsurface Geological Mapping”

WEEK 5 - September 20 - 24, 2010

“Practical Seismic Exploration and Development”

WEEK 6 - September 27 - October 2, 2010

“Seismic Interpretation Workshop”
“Basic Petroleum Engineering for Non-Engineers”
“Descriptive Lithology Analysis of Cuttings and Cores”

All courses* above are offered to the public with the exception of the two in yellow

Six (6) Week Project: October 4 - November 12, 2010

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“Structural / Sequence Stratigraphy” Hill Country, Texas



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'Hilbert Transform' Remains a Valuable Tool

By **BOB HARDAGE**

Geological interpretation of seismic data is commonly done by analyzing patterns of seismic amplitude, phase and frequency in map and section views across a prospect area. Although many seismic attributes have been utilized to emphasize geologic targets and to define critical rock and fluid properties, these three simple attributes – amplitude, phase and frequency – remain the mainstay of geological interpretation of seismic data.

Any procedure that extracts and displays any of these seismic parameters in a convenient and understandable manner is an invaluable interpretation tool.

A little more than 30 years ago, M.T. Taner and Robert E. Sheriff introduced the concept of using the Hilbert transform to calculate seismic amplitude, phase and frequency instantaneously – meaning a value for each parameter is calculated at each time sample of a seismic trace.

That Hilbert transform approach now forms the basis by which almost all amplitude, phase and frequency attributes are calculated by today's seismic interpretation software



HARDAGE

The Complex Seismic Trace

The action of the Hilbert transform is to convert a seismic trace $x(t)$ into what first appears to be a mysterious complex seismic trace $z(t)$ as shown on figure 1.

In this context, the term "complex" is used in its mathematical sense, meaning it refers to a number that has a real part and an imaginary part. The term does not imply that the data are difficult to understand.

This complex trace consists of the real seismic trace $x(t)$ and an imaginary seismic trace $y(t)$ that is the Hilbert transform of $x(t)$.

On figure 1 these two traces are shown in a three-dimensional data space (x, y, t) , where t is seismic time, x is the real-data plane, and y is the imaginary-data plane. The actual seismic trace is confined to the real-data plane; the Hilbert transform trace is restricted to the imaginary-data plane.

These two traces combine to form a complex trace $z(t)$, which appears as a helix that spirals around the time axis.

The projection of complex trace $z(t)$ onto the real plane is the actual seismic trace $x(t)$; the projection of $z(t)$ onto the imaginary plane is the Hilbert transform trace $y(t)$.

At any coordinate on the time axis, a vector $a(t)$ can be calculated that extends perpendicularly away from the time axis to intercept the helical complex trace $z(t)$ as shown on figure 2. The length of this vector is the amplitude of the complex trace at that particular instant in time – hence the term "instantaneous amplitude."

The amplitude value is calculated using the equation for $a(t)$ shown on the figure.

The orientation angle $\phi(t)$ that defines where vector $a(t)$ is pointing (figure 2) is defined as the seismic phase at time coordinate t – hence the term "instantaneous phase." Numerically, the phase angle is calculated using the middle equation listed on figure 2.

As time progresses, vector $a(t)$ moves down the time axis, constantly rotating about the time axis as it maintains contact with the spiraling helical trace $z(t)$.

Mathematically, frequency can be defined as the rate of change of phase. This fundamental definition allows instantaneous frequency $\omega(t)$ to be calculated from the time derivative of the phase function as shown by the bottom equation on figure 2.

* * *

The calculation of these three interpretation attributes – amplitude, phase and frequency – are illustrated on figures 3 and 4. Application of the three equations listed on figure 2 yields first the instantaneous amplitude for one seismic trace $x_1(t)$ (figure 3), and then instantaneous phase and frequency are shown on figure 4 for a different seismic trace $x_2(t)$.

Note that the instantaneous frequency function is occasionally negative – a concept that has great interpretation value, as has been discussed in a previous article (April 2008 Geophysical Corner).

For those of you who click on a menu choice to create a seismic attribute as you interpret seismic data, you now see what goes on behind the screen to create that attribute.

* * *

Next month – Part two in the two-part series on the role of reference surfaces in seismic interpretation: Defining reflection events and their polarities. **E**

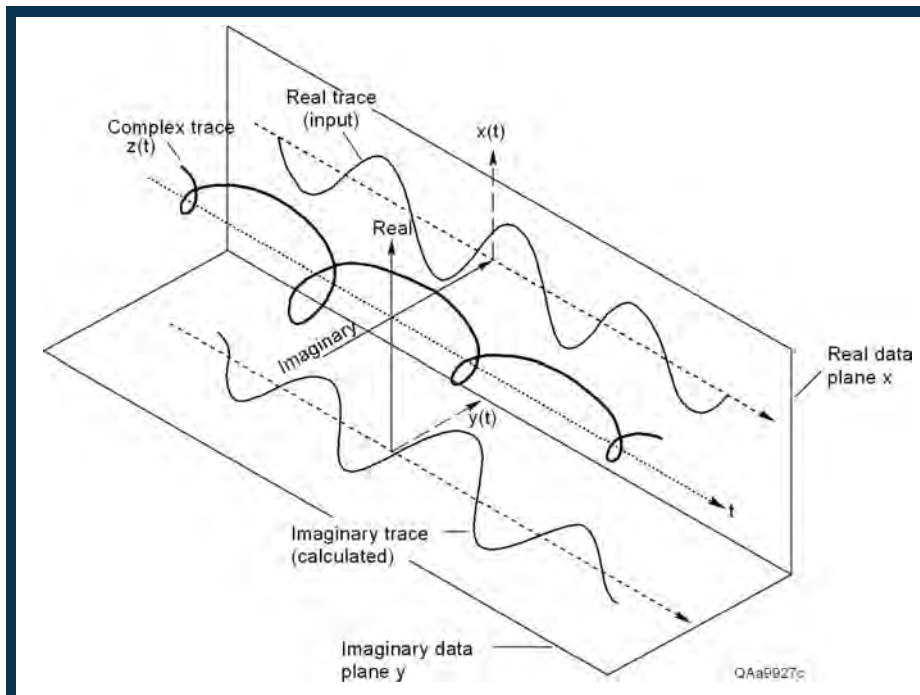


Figure 1 – A complex seismic trace consisting of a real part $x(t)$, which is the actual seismic trace, and an imaginary part $y(t)$, which is a mathematical function calculated from the real part by a Hilbert transform. When the real and imaginary parts are added in a vector sense, the result is a helical spiral centered on the seismic time axis (t). This helical trace is the complex seismic trace.

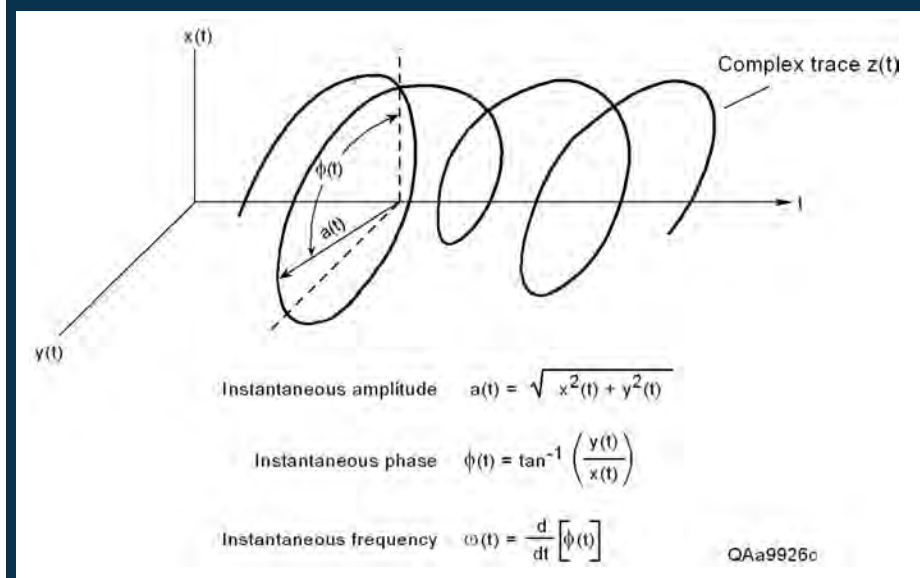


Figure 2 – Instantaneous seismic attributes – amplitude $a(t)$, phase $\phi(t)$ and frequency $\omega(t)$ – that can be calculated from a complex seismic trace using the listed equations.

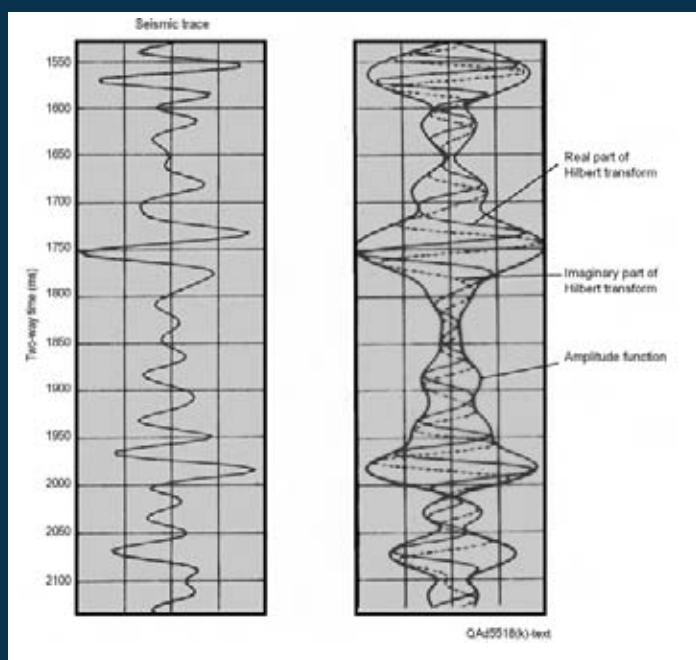
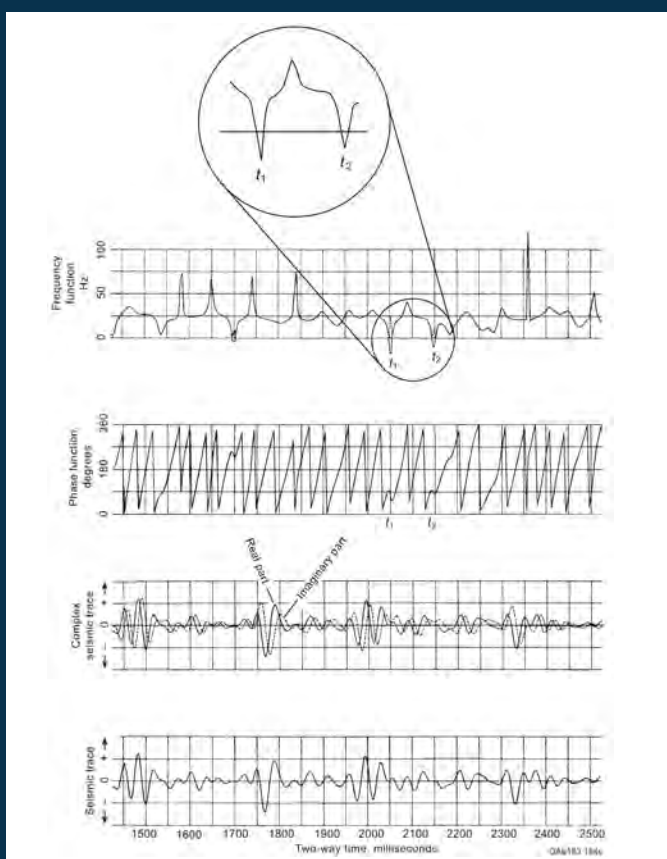
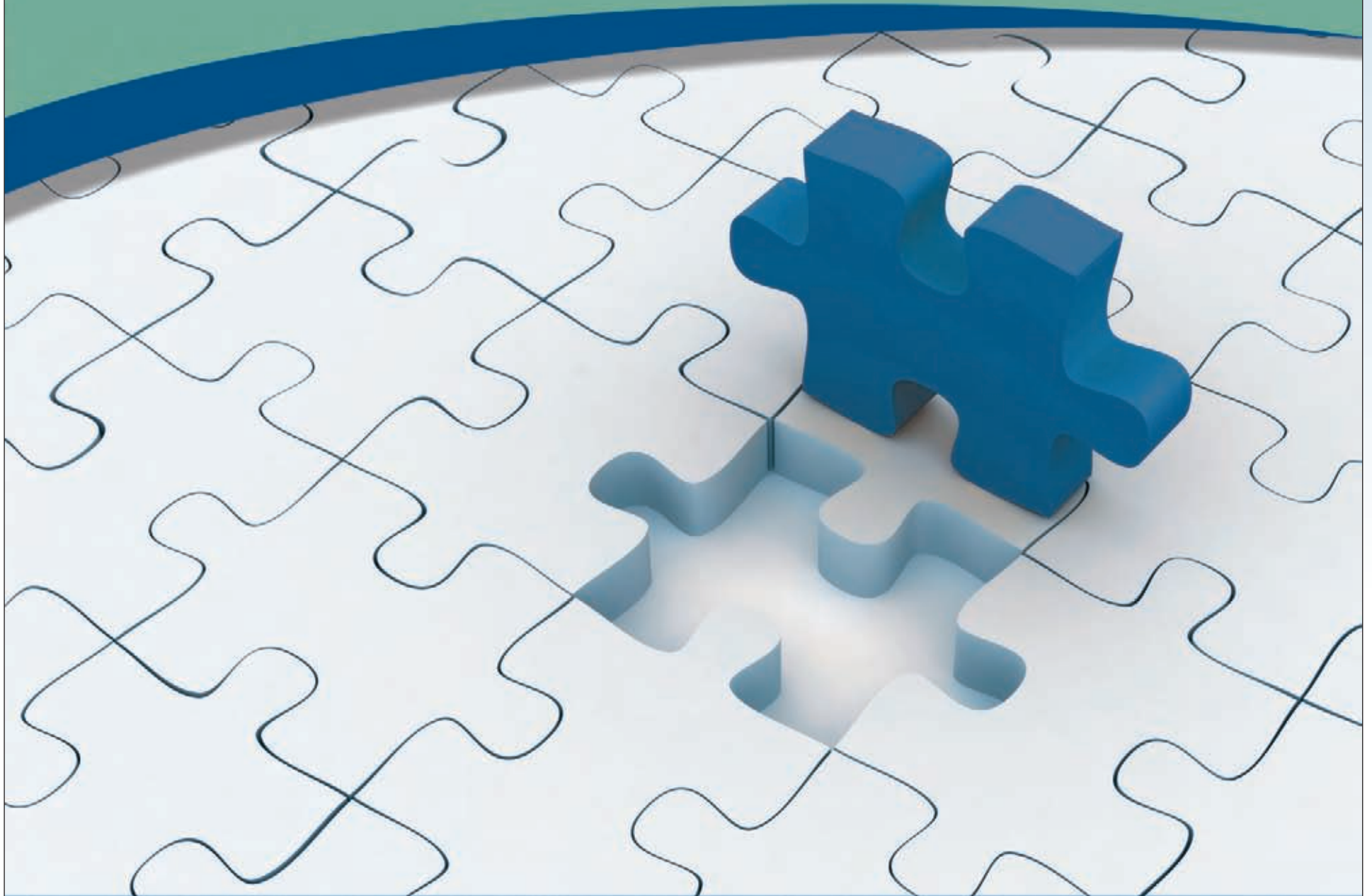


Figure 3 (above) – Instantaneous amplitude associated with seismic trace $x_1(t)$.

Figure 4 (right) – Instantaneous phase and frequency (top two panels) associated with the seismic trace displayed on the bottom panel. Note that negative frequencies are calculated at times t_1 and t_2 .



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Diversity Leveraged to Benefit the Bottom Line

By CAROL MCGOWEN, Regions and Sections Manager

It was like they saved the best for last. On the last day of the recent AAPG Annual Convention and Exhibition in New Orleans nearly 150 people attended the third Professional Women in Earth Sciences Diversity Seminar, this year focusing on "The Economics of Diversity – Competing For and Leveraging Employee Diversity in a Global Petroleum Industry."

The seminar featured six panelists, themselves from very diverse backgrounds – the three women and three men represented U.S.-based mid-to large-sized independents, an upstream major oil company, academia, government and a national oil company from the Middle East.

The bottom line: It was clear that the work forces of successful organizations are diverse by design. And that diversity – in age or generation, gender, technical experience and cultural background – provides the creativity of thought and approach to problem solving necessary to solve today's complex E&P challenges.

The Diversity Advantage

All panelists commented on their organization's approach to diversity and how diversity is leveraged to benefit the organization's bottom line.

► For large companies like ExxonMobil with a global operations presence, the company must be focused on global work force development.

"ExxonMobil's strategy is to bring

Diversity "caused us to re-address how we recruit, on-board, train, mentor, challenge and reward our employees."

in people from different backgrounds and train them to the same standards," said AAPG member **Kim Bates**, vice president of geoscience for ExxonMobil Development Company.

"ExxonMobil's large work force allows flexible work policies," she said, "which in turn enable the company to accommodate diverse employee needs."

► For **Allen Gilmer**, CEO of Drilling Info Companies in Austin, Texas, as a mid-sized, private, family-owned company, his company takes a "family first" approach.

At the same time, Gilmer said, he looks for "diversity of viewpoints" when hiring.

► **Hussain Al-Otaibi**, manager of Saudi Aramco's exploration technical services department and AAPG's Middle East Region president, explained that Aramco's operations are centralized from within the Kingdom of Saudi Arabia.

"While certain social constraints and customs are culturally mandated, the company's vast resources provide many opportunities to its employees," he said.

Al-Otaibi shared statistics of a work

force phenomenon common to many oil majors.

"Saudi Aramco, too, is undergoing the 'big crew change' with an aging work force," he said – but as a result of proactive recruiting, "almost a quarter of our work force now is in their twenties."

"Saudi Aramco's internal job mobility structure allows employees to move and change positions within the company, and provides these employees with interesting and challenging careers," Al-Otaibi added.

► Research associate **Lorena Moscardelli** counts herself among the diverse research staff at the Bureau of Economic Geology's Jackson School of Geosciences at the University of Texas at Austin, where 41 percent of the research staff represents 20 nationalities.

The Bureau conducts basic and applied research related to energy resources, mineral resources; coastal processes; Earth and environmental systems; hydrogeology; carbon sequestration; nanotechnology; energy economics; and geologic mapping.

In addition to its culturally diverse

research staff, Moscardelli pointed out that from the year 2000 to 2009, "the percentage of female researchers has increased from 14 percent to 21 percent."

► For AAPG member **Scott Sach**, geoscience vice president-Northern Division of Chesapeake Energy, "Chesapeake's growth has transformed our work force significantly and provided the opportunity to rethink how we approach our business."

In the past five years Chesapeake's employee count has grown from roughly 2,500 predominately experienced employees, to over 8,400 employees, approximately 50 percent of whom are under 35 years of age with less than five years experience.

This age-diverse and experience-diverse work force "created many new business challenges, which caused us to re-address how we recruit, on-board, train, mentor, challenge and reward our employees," he said.

► **Allyson Anderson** represented the perspective of government on the panel. A professional staff member with the U.S. Senate Committee on Energy and Natural Resources in Washington, D.C., Anderson sees her position as that of "translator," bridging the gap between scientific research and government policy making.

Anderson, an AAPG member, provides

See Diversity, page 40



Come Be Part Of The 'IN' Crowd! Participate in AAPG's Geoscience Technology Workshops (GTW's)



The Role of Fracture & Geomechanical Characterization in the Hydrocarbon Industry

June 28-30, 2010 • Rome, Italy

The impact of fractures and in-situ stresses on upstream operations has become more apparent with the advancement of technology and the shifting of frontiers to deeper and tighter reservoirs, in increasingly high temperature-high pressure environments. This has led to the emergence of a new concept to reservoir characterization: geomechanical characterization. This accounts for the stress-sensitivity of reservoirs manifested as changes in reservoir petrophysics (including both fractures and matrix properties), operational risks and seal integrity. The fracture and geomechanical characterization relies on the capability to detect, measure and predict rock fabric (fractures and the matrix) and the stress regime in-situ on rock mass bases (reservoir/field scale).

Carbon Capture and Sequestration: New Developments and Applications, Case Studies, Lessons Learned

August 10-12, 2010 • Denver, CO

There are many carbon capture and sequestration events, but very few where the lab meets the field, theory meets application, and all have an opportunity to discuss real cases, issues, and experiences.

We will begin with geological characterization and analogs, and will evaluate the relative capacity of different reservoir rocks to store CO₂. We will examine physical processes within reservoirs and in CO₂ storage, and examine models, with respect to calibration, validation, and prediction.

Storage of CO₂ will be addressed in presentations dealing with well integrity, storage sites, and injection wells. Geochemical and geomechanical concerns will be addressed in both storage and enhanced oil recovery projects.

Experiences using CO₂ flooding to increase hydrocarbon production, and to work with residual oil zones will be the focus of a full session. We will conclude with discussions of lessons learned from experiences in the field, lab, and with the regional consortia.

New Ways to Look at Old Data: New Pay Zones, Increased Production, Expanded Regional Plays

November 8-9, 2010 • Houston, TX

How are new ways to look at old data resulting in new pay zones, increased production, and even new regional plays? How can you find and determine the best way to produce oil that's been "left behind?"

Learn how to find new, overlooked plays, extend the limits of existing plays, enhance production, and improve operations. Discuss case studies and lessons learned. Network in a dynamic, discussion-based setting.

Session topics include new analytical techniques for reviewing geological, geophysical, petrophysical, and geochemical data; new technologies to use in old fields or overlooked zones.

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For information on these AAPG GTW's, please log on to our website at <http://www.aapg.org/gtw>.

AAPG Divisions Announce Officers for Coming Year

The three AAPG divisions have announced the results of the 2010 elections.

All new officer terms begin July 1.

Division of Environmental Geosciences

□ President-elect (2010-11; President 2011-12) – **Douglas C. Peters**, Peters Geosciences, Golden, Colo.

□ Vice president (2010-11) – **Robert Maric**, MTE Consultants, Kitchener, Ontario, Canada.

□ Editor (2010-12) – **Kristin Carter**, Pennsylvania Department of Conservation and Natural Resources,

Bureau of Topographic & Geologic Survey, Pittsburgh.

They will be joined by on the DEG Executive Committee by president **Mary K. Harris**, Savannah River National Laboratory, Aiken, S.C.; secretary-treasurer **Douglas Carlson**, Louisiana Geological Survey, Baton Rouge, La.; and past president **Michael Jacobs**, Pioneer Natural Resources USA, Midland, Texas.

Division of Professional Affairs

□ President-elect (2010-11; President 2011-12) – **Martin D. Hewitt**, Nexen Petroleum USA, Plano, Texas.

□ Vice president (2010-11) – **William T. Goff**, Cholla Production, Littleton, Colo.

□ Treasurer (2010-12) – **Daniel A. Billman**, Billman Geologic Consultants, Mars, Penn.

They will be joined on the DPA Executive Committee by president **Daniel J. Tearpock**, Subsurface Consultants & Associates, Houston; secretary **Paul Pause**, consultant, Midland, Texas; and past president **Paul Britt**, Texplore Inc., Houston.

Energy Minerals Division

□ President-Elect: (2010-2011);

President 2011-12) – **Stephen M. Testa**, Consultant, Mokelumne Hill, Calif.

□ Vice president (2010-11) – **Genevieve B. Young**, BG Energy Holdings, Denver.

□ Secretary (2010-12) – **Frances J. Hein**, Alberta Energy Research Conservation Board, Calgary, Canada.

They will be joined on the EMD Executive Committee by president **Michael D. Campbell**, 12M Associates, Houston; treasurer **Kent A. Bowker**, Bowker Petroleum, The Woodlands, Texas; and past president, **Frank E. Wallis**, Devon Energy, Houston.

IN MEMORY

- Larkin James Akers, 86
Youngsville, La., March 26, 2010
- Olen Columbus Allen (AC '69)
Edmond, Okla.
- George A. Angle (AC '55)
Wichita, Kan.
- Robert Ross Brillhart, 87
Lafayette, La., Oct. 31, 2009
- Donald Gail Carpenter, 75
Casper, Wyo., March 27, 2010
- James Warren Clark, 84
Abilene, Texas, Nov. 26, 2009
- Theo Hamilton Dinkins Jr. (Life '66)
Canton, Miss.
- Clifford G. Flittie, 86
San Francisco, April 16, 2010
- Arthur John Fritz, 92
Evansville, Ind., Dec. 13, 2009
- Neil Eugene Hanson (AC '56)
Houston
- Clarence Rex Hewitt, 88
Jackson, Miss., Jan. 23, 2010
- William Charles Krueger, 73
Tulsa, April 24, 2010
- Joe Alex Laird, 92
Dallas, Dec. 1, 2009
- William John Malin, 83
New Orleans, March 1, 2010
- Ettore Marcucci, 67
Austin, Texas, April 7, 2010
- Howard Stuart McColl, 82
Calgary, Canada, Feb. 19, 2010
- Ronald G. Mercer (AC '63)
Edmond, Okla.
- Richard Charles Oburn, 88
Plano, Texas, March 13, 2010
- Mark Thomas Owen (AC '74)
Midland, Texas
- Donald Alfred Parks, 79
Carefree, Ariz., Nov. 13, 2009
- John Leighton Read, 88
Palo Alto, Calif., Nov. 30, 2009
- Donald Frederick Reaser, 78
Waxahachie, Texas, Dec. 29, 2009
- James Warner Roach, 83
Houston, March 31, 2010
- Paul Eugene Schnurr, 82
Concord, Calif., Jan. 29, 2010
- Woodrow Wilson, 85
Missoula, Mont., Dec. 30, 2009
- Philip Patchin Wolcott, 96
Enfield, N.H., Jan. 6, 2010

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

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The prime vehicle for disseminating the science

BULLETIN a Valued Member Service

By GRETCHEN M. GILLIS, AAPG Elected Editor

Survey says: AAPG members value the AAPG BULLETIN as one of our most important member services – and it turns out that its value is even greater than we realized!



GILLIS

Many professional societies view publications as a “profit center,” but AAPG takes the view that publications better serve members with a goal to break even financially. The BULLETIN, now in its eleventh decade of publishing high-impact petroleum geoscience, is a fantastic bargain because of this approach. Making the BULLETIN available at as low a cost as possible also serves to further the AAPG strategic goal of advancing science.

The AAPG Publications Department is lean, mean and focused on cost control, and its high publication quality and low publication cost are even more impressive when compared with peer societies. For example, the switch to electronic delivery of the BULLETIN in 2005 decreased financial losses associated with publishing 17,000 copies. The 7,000 BULLETIN subscribers who still want hard copies pay a surcharge for print, postage or both, depending on their location and membership level.

Peer societies are similar to AAPG in offering a print publication like the EXPLORER with membership. However, they differ significantly from AAPG in how they make their peer-reviewed journals available to members. AAPG offers the BULLETIN in digital form free of charge to members. Peer societies charge an average of \$46 per year for digital journal delivery – and even more for hard copies.

The good news about the AAPG BULLETIN doesn't stop at its price: Its quality continues to increase.

Manuscript submissions climbed to 210 during 2009, the highest number since record keeping began in 1990. Increased submissions allow the BULLETIN to be more selective about what it accepts for publication; indeed, the acceptance rate has tended to decrease for the last few years as more authors decided that the prestige of the BULLETIN and the relatively short response and publication times made the BULLETIN the best journal in which to publish their work.

As the BULLETIN becomes an even stronger journal, potential contributors cannot rest. It is crucial that authors continue to submit manuscripts for consideration and that more reviewers come forward to help with the increased manuscript volume.

Readers also can help to identify potential authors for contributions to E&P Notes – papers that focus on current plays and field descriptions that help readers understand how to improve their exploration and production activities in analogous fields. These are among the most popular papers, so encouraging potential authors increases the likelihood of valuable science making its way to those who read and use it most!

The BULLETIN moves into its next stage with the recent election of new editor Stephen E. Laubach, who will start his term of service on July 1. Change is inevitable, but the quality of the science and the financial bargain it represents are likely only to increase.

Journal Charges to Societies' Members			
Society / Journal	Print	Online	Comments
American Association of Petroleum Geologists			
AAPG BULLETIN (monthly)	Included with membership	Included with membership	AAPG BULLETIN Archives available to AAPG Active and Associate Memberships.
EXPLORER (monthly)	Included with membership	Online version open to public	EXPLORER Archives available to all from 1999-current.
Environmental Geosciences (quarterly) DEG	Included with AAPG/DEG membership	NA	DEG's journal articles available for purchase via Pay-Per-View, 2001-current.
SEPM (Soc. for Sedimentary Geol.)			
Journal of Sedimentary Research (bimonthly)	\$115	\$90	Member benefit statement: Online access via GSW and year-end CD. \$25 per journal option for printed copies of your chosen journal(s).
Palaios (bimonthly)	\$115	\$90	Same as above
Sedimentary Record (quarterly)	Included with membership	Included with membership	Online via SEPM's web pages. Very short, magazine style, 16 pages.
Geological Society of America			
GSA Bulletin (bimonthly)	\$85	\$60	Member benefit statement: Discount offered on all journals.
Geology (monthly)	\$85	\$60	Same as above
Lithosphere (bimonthly)	\$60	\$40	Same as above
Geosphere (bimonthly)	NA	\$30	Same as above
GSA Today (monthly), April/May combined	Included with membership	Included with membership	Online via GSA's web page. Magazine style.
Society of Petroleum Engineers			
Journal of Petroleum Technology (monthly) Not peer-reviewed	Included with membership	Included with membership	Print subscriptions include online access.
SPE Drilling & Completion (quarterly)	\$70 (P & O)	\$45	Same as above
SPE Production & Operations (quarterly)	\$70 (P & O)	\$45	Same as above
SPE Reservoir Evaluation & Engineering (bimonthly)	\$105 (P & O)	\$70	Same as above
SPE Journal (quarterly)	\$105 (P & O)	\$70	Same as above
SPE Projects, Facilities & Construction (quarterly)	NA	\$45	
SPE Economics & Management (bi-annually)	NA	\$45	
Society of Exploration Geophysicists			
Geophysics (bimonthly)	\$45	Included with membership	Member benefit statement: Members receive online access via SEG Digital Library
TLE - The Leading Edge (monthly)	Included with membership	Included with membership	Same as above. Magazine style.
Geological Society of London			
Journal of the Geological Society (bimonthly)	>US\$72	>US\$56	Member benefit statement: GSL fellows receive one free subscription to a Society journal of choice, including online access, and can receive additional titles at reduced rates. All subscriptions are to electronic format, unless an additional \$16 (€10) are paid for each print title desired.
Quarterly Journal of Engineering Geology & Hydrogeology (quarterly)	>US\$72	>US\$56	Same as above
Petroleum Geoscience (quarterly) Co-published with EAGE	>US\$72	>US\$56	Same as above
Geochemistry: Exploration, Environment, Analysis (quarterly)	>US\$72	>US\$56	Same as above
European Association of Geoscientists & Engineers			
First Break (monthly) Not peer-reviewed	Included with membership	Included with membership	Member benefit statement: EAGE offers a free online subscription to one of its other scientific journals. Print copies available only in combination with online subscription for an additional €30.
Geophysical Prospecting (bimonthly)	>US\$86	>US\$36	Same as above
Petroleum Geoscience (quarterly) Co-published with GSL	>US\$86	>US\$36	Same as above
Near Surface Geophysics (bimonthly)	>US\$86	>US\$36	Same as above
Basin Research (bimonthly)	>US\$86	>US\$36	Same as above
Canadian Society of Petroleum Geologists			
Bulletin of Canadian Petroleum Geology (quarterly)	NA (as of 2010)	US\$58	Notice on web pages that CSPG members will now be able to access BULLETIN in digital format - hard copies will no longer be mailed out.
Reservoir (monthly) July/August issue combined	US\$68	NA	No price quote for digital version of Reservoir.

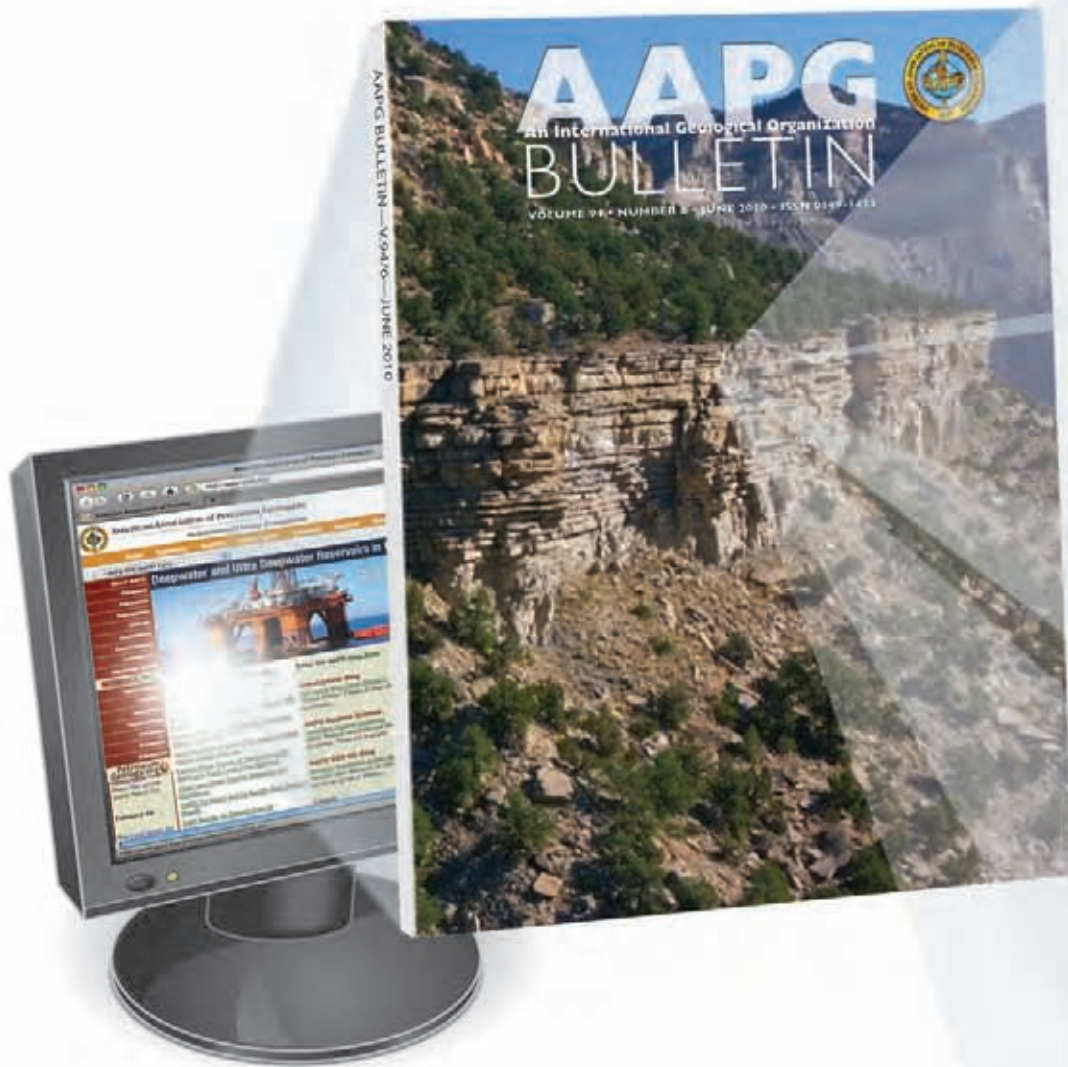
Compiled by Karen Piquere, AAPG Foundation Librarian

	27 print journal titles listed	28 online journal titles listed
Average subscription cost	\$50	\$40
Δ in average subscription costs	\$10	

Journal titles that appear in red were designated the principle, peer-reviewed journal for each society.

Average subscription cost for primary, peer-reviewed, journals	\$73	\$46
Δ in average subscription costs for primary, peer-reviewed, journals	\$27	

Download Your NEW June 2010 Bulletin Now!



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

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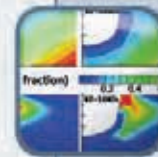


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Article highlights include:

Lateral variability and modeling implications

Cornel Olariu, Ronald J. Steel, and Andrew L. Petter



This study seeks to understand and quantify the geometry and dimensions of the river-generated turbidite beds that dominate the front of the Panther Tongue Delta, basinwards of the distributary channels, and to provide useful parameters for flow modeling of deltaic reservoirs.

Understanding the geological processes

Tobias Rudolph, Christian Melchers, Andreas Minke, and Wilhelm G. Coldewey



Extensive historic coal exploration data were combined with modeling to simulate permeability distributions in the Cretaceous and to assess the known fault system. This process led to a better understanding of surface gas seepages and identification of potential pathways of methane migration.

A modern-day turbidite analog

Yannick Callec, Eric Deville, Guy Desaubliaux, Roger Griboulard, Pascale Huyghe, Alain Mascle, Georges Mascle, Mark Noble, Crelia Padron de Carillo, and Julien Schmitz



Geophysical data and piston cores allow a better understanding of the deposition, erosion, and structure of the Orinoco turbidite system. The Barbados accretionary prism controlled sea floor morphology as well as turbidite sedimentation.

Modeling dolomitization reactions

Fiona F. Whitaker and Yitian Xiao



The process of dolomitization is a critical control on reservoir quality, and the prediction of the spatial distribution of dolomitization is important in reservoir characterization. Geothermal convection is examined as a mechanism for the formation of substantial dolomite bodies.

Foundation Selects Leadership

Four Members of the Corporation and two Trustees for the AAPG Foundation were re-elected to new terms during the group's recent meeting in New Orleans during the AAPG Annual Convention and Exhibition.

Re-elected to five-year terms as Members of the Corporation were:

- ☐ Robbie Rice Gries, Denver.
- ☐ Frank W. Harrison Jr., Lafayette, La.
- ☐ Paul M. Strunk, Corpus Christi, Texas.

Re-elected for three-year terms as Trustees were:

- ☐ Charles Weiner, Houston.
- ☐ William J. Barrett, Denver.



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☐ William L. Fisher, Austin, Texas. Fisher, as chairman of the Trustees, also announced the following funding approvals at the board's meeting in New Orleans:

- ▶ \$30,000 in support of AGI's Earth Science Week Program, "Exploring Energy."

▶ \$20,000 in support of providing framed U.S. Geological Survey "Tapestry of Time" maps to be distributed in collaboration with the More! Rocks in Your Head program.

- ▶ \$3,000 to the Northern California Geological Society, to supply geologic maps of California to San Francisco Bay

area teachers.

The next meeting of the Members of the Corporation is set for April 11 in Houston.

* * *

The AAPG Foundation was established to carry out scientific, educational objectives through the use of charitable, tax-deductible gifts and contributions from AAPG members and corporate entities.

Trustee Associates support the AAPG Foundation, provide counsel and leadership to the Trustees, lend support to fundraising efforts and provide guidance of the scientific and educational agenda that it underwrites.

Today there are 275 Trustee Associates, and they play a stellar role in the development of AAPG's financial resources, thereby dramatically accelerating its ability to support scientific educational programs.

Jim McGhay, Tulsa, and Walter S. Light Jr., Houston, are the newest members to join the group.

* * *

Foundation Trustee William E. Gipson recently established a new Named Grant to be awarded through the AAPG Grants-in-Aid Program.

The William E. Gipson Named Grant will be awarded beginning in 2011 to a Southern Methodist University graduate student studying petroleum geology.

The Named Grants-in-Aid Program is a specially endowed segment of the Foundation's Grants-in-Aid Program. It provides a gift that renews indefinitely while at the same time honors the donor or someone of his/her choosing.

Grants are awarded annually in amounts ranging from \$500 to \$3,000.

Support of the Grants-in-Aid Program is important – each year more students apply than can be funded.

For details on how to support the Grants-in-Aid Program contact Rebecca Griffin, at 918-560-2644.

Contributions to the AAPG Foundation are tax deductible for persons subject to U.S. income tax.

ROCKY MOUNTAIN Energy Epicenter 2010

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- Shale OIL Reservoirs
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Companies highlighting technical issues important to successful and responsible energy development include:

- Whiting Petroleum
- Questar
- Bill Barrett Petroleum
- Cirque Resources
- Encana Oil & Gas (USA) Inc.

KEYNOTE SPEAKERS include:

- Charles C. Davidson - CEO, Noble Energy
- Robert F. "Bobby" Kennedy, Jr. - International Environmental Advocate and Attorney



Field Trip 7/10/10

- Niobrara Outcrop and Quarry
E.R. "Gus" Gustason and Marshall Deacon

Course 7/06/10

- Risk Analysis for Resource Plays
Dr. Gary Citron, Rose & Assoc.



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www.energyepicenter.org

Anticipate More Than 2000 Attendees

Diversity from page 36

the Energy Committee with research on carbon sequestration and geothermal energy resources in addition to fossil energy research and development, upstream petroleum issues and other science-related policy areas.

"Diversity in our industry is key to representing the views of the general population," said Anderson, one of only eight geologists currently employed on Capitol Hill in Washington, D.C.

"More geoscientists are needed to work in government," she added.

In the end, the panelists' collective advice was for job seekers to build a solid foundation of technical skills; learn to communicate clearly; and have confidence in knowing that employers value diversity.

To read more about this subject, visit the AAPG website.

www.aapg.org



Think outside the computer screen.

Choose from over 50 exciting field seminars, short courses and online programs all designed with the goal of helping you explore and better understand the science of this industry. Please see the AAPG website for complete descriptions and registration information. Below are the highlights of courses coming up very soon. Make your plans now before seats get filled!

Short Courses:

SEPT
11-12

Creative Petroleum Exploration
Location: Calgary, AB, Canada, with the AAPG International Conference & Exhibition
Instructors: Edward Beaumont and Doug Strickland

SEPT
16-19

Folds, Faults and Hydrocarbons in the Southern Canadian Cordillera – Principles and Practices Combination Short Course/Field Trip
Location: Calgary, AB, Canada, with the AAPG International Conference & Exhibition
Instructor: Peter Jones

SEPT
11-12

Image Log Interpretation
Location: Calgary, AB, Canada, with the AAPG International Conference & Exhibition
Instructor: Laird Thompson

NEW!
OCT
4-8

FALL EDUCATION CONFERENCE 2010 – Theme: Unconventional Resources
Location: Houston, Texas
Instructor: Multiple experts!

NEW!
SEPT
11

Writing for the Bulletin – A Primer in Scientific Writing for Refereed Geoscience Journals
Location: Calgary, AB, Canada, with the AAPG International Conference & Exhibition
Instructor: Gretchen Gillis

NOV
8-12

Application of Structural Geology in Prospecting in Thrusted and Extensional Terrain
Location: Las Vegas, NV
Instructors: Chuck Kluth and Wayne Narr

Field Seminars:

NEW!
JUNE
21-25

Fractures and Tectonics of the Northern Appalachian Basin
Location: New York
Leader: Robert Jacobi

OCT
2-9

Modern Terrigenous Clastic Depositional Systems
Location: South Carolina
Leader: Walter Sexton

SEPT
23-30

Sedimentology and Sequence Stratigraphic Response of Paralic Deposits to Changes in Accommodation: Predicting Reservoir Architecture, Book Cliffs, Utah
Location: Colorado/Utah
Leaders: Keith Shanley, Michael Boyles

OCT
10-13

Applied Stratigraphy of Paleozoic Carbonate Platforms; Facies, Cycles, Sequences, Reefs, Reservoirs
Location: Nevada
Leader: John Warme

Online Courses:

LAUNCH DATE
JUN 1

Renewable & Non-Renewable Resources – Overview & Integration: A Renewable Energy Certificate Course
Instructor: Theresa Coffman

SEPT 13-
DEC 17

Introduction to Geological Reservoir Characterization
Instructor: Roger Slatt

Last Chance:

MAY
11-13

Essentials of Subsurface Mapping – Short Course
Location: Houston, TX
Instructor: Richard Banks

MAY 30-
JUNE 5

Complex Carbonates Reservoirs: The Role of Fracturing, Facies and Tectonics – Field Seminar
Location: Naples – Rome, Italy
Leaders: Raffaele Di Cuia, Davide Casabianca, Claudio Turrini

MAY
16-21

Play Concepts and Controls on Porosity in Carbonate Reservoir Analogs – Field Seminar
Location: Almeria, Spain
Leaders: Evan K. Franseen, Robert H. Goldstein, Mateu Esteban

JUNE
7-9

Exploring for Bypassed Pay in Old Wells – Short Course
Location: Wichita, KS
Leader: Hugh Reid

MAY
17-18

Reservoir Engineering for Petroleum Geologists – Short Course
Location: Houston, TX
Instructor: Richard Green

JUNE
7-11

Folding, Thrusting and Syntectonic Sedimentation: Perspectives from Classic Localities of the Central Pyrenees – Field Seminar
Location: Barcelona, Spain
Leaders: Antonio Teixell, Antonio Barnolas

MAY
19-21

Fundamentals of Petroleum Geology – Short Course
Location: Houston, TX
Instructor: Stephen Bend

JUNE
9-10

The Petroleum Industry: Upstream & Downstream – Short Course
Location: Dallas, TX
Instructor: Stephen Bend

More Science Than You Can Shake A Pick At.

For more information on any AAPG Education programs, call 918-560-2650 or toll-free 1-888-338-3387, or visit www.aapg.org/education.



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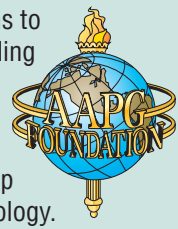
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With your gifts, the AAPG Foundation will continue its stewardship for the betterment of the science and the profession of petroleum geology.

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SEAPEX Gives Showcase For Students

By **TIANPAN AMPAIWAN** and **WILLIAM HOUSTON**

Students from Thailand's three major universities presented their research in both poster and oral formats at the first annual Thailand Student Paper Competition, which was held April 1 at the offices of Chevron in Bangkok, Thailand.

Judges from SEAPEX, SEG, SPE, Chevron and PTTEP determined the generous cash prizes for all participating students and their university departments, provided by Carnarvon Petroleum Ltd., Salamander Energy, P3 Global Energy and SEAPEX.

Student awardees (presenters in bold) included:

- ▶ First place – **Noppom Boonchuay** and **Sasinn Subsangtip**, from Mahidol University.
- ▶ Second place – **Watcharee Klainklom**, **Yanticha Namphet** and **Seranee Limrak**, from Chulalongkorn University.
- ▶ Third place – **Wisa Amchawong** and **Praiwan Uphatam**, from Khon Kaen University.

The Southeast Petroleum Exploration Society (SEAPEX) Bangkok Chapter organized this first in the region event. Fresh off the success of this event, the Bangkok Chapter of SEAPEX is making plans to make the 2011 event more like the AAPG Student Expo and include students from universities in the surrounding region.

For information on student participation or corporate sponsorship contact SEAPEX Bangkok chapter president Bob Shoup at RobertC@pttep.com.

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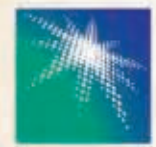
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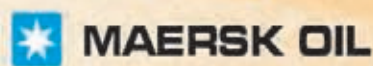
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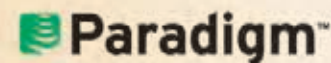
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"Professional News Briefs" includes items about members' career moves and the honors they receive. To be included, please send information in the above format to Professional News Briefs, c/o AAPG EXPLORER, P.O. Box 979, Tulsa, Okla. 74101; or fax,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



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PROFESSIONAL NEWS BRIEFS

Edith "Edie" Allison has retired as oil and gas exploration program manager, U.S. Department of Energy. She has opened a consultancy in Rockville, Md.

Timothy Berg, to geophysical adviser, Apache North Sea, Aberdeen, Scotland. Previously development geophysicist, BP, Houston.

Mark Cooper, to senior exploration adviser for Petromanas Energy, Vancouver, Canada. Cooper has his own consulting practice in Calgary, Canada.

Paul Crevello, to chief operating officer, BPC Limited, Paradise Island, The Bahamas. Previously chief operating officer, BPC Limited, Boulder, Colo.

Edward C. de la Peña has retired from Chevron after a 32-year-career of working in Texas, the Gulf of Mexico, California, West Africa and the Middle East.

Chip Feazel, to president, Feazel GeoConsulting, Katy, Texas. Previously principal carbonate stratigrapher, ConocoPhillips, Houston.

Richard B. Hill, to senior geologist-northern Rockies, Whiting Oil and Gas, Denver. Previously senior geologist-Permian exploration, Whiting Oil and Gas, Midland, Texas.

Terry Leyenberger, to senior geoscience adviser, Apache, Houston. Previously senior geological adviser, Devon Energy, Houston.

Ernest Mancini, director of the Berg-Hughes Center for Petroleum and Sedimentary Systems at Texas A&M University, has received the Burnum Distinguished Faculty Award from the University of Alabama, his recent former employer, for his outstanding contribution to higher education. The Burnum Award is among the highest honors UA bestows on its faculty.

Louis J. Mazzullo, president of Mazzullo Energy, has moved his operations from Golden, Colo., to Denver.

Ron McWhorter, to chief geophysicist, Porto Energy, Houston. Previously senior adviser-geophysical, Devon Energy, Houston.

Steve Meyer, to adviser-learning exploration, Shell International E&P, The Hague, Netherlands. Previously exploration communications manager, Shell International E&P, The Hague, Netherlands.

Patrick Rasavage, to geophysicist, H.L. Brown Operating, Midland, Texas. Previously geophysicist, ConocoPhillips, Midland, Texas.

Phil Salvador, to senior geologist, Qatar Petroleum, Doha, Qatar. Previously consultant, Austin, Texas.

Barry S. Smith, to vice president-geoscience, Three Rivers Operating, Austin, Texas. Previously with Texas American Resources Co., Austin, Texas.

John L. Sharp, to vice president-geoscience, southern division, Chesapeake Energy, Oklahoma City. Previously geoscience manager-Haynesville district, Chesapeake Energy, Oklahoma City.

Douglas K. Strickland, to executive vice president of exploration and geoscience, PostRock Energy, Oklahoma City. Strickland has his own consulting firm in Oklahoma City.

Bernie Vining, to vice president and chief geoscientist, Baker Hughes, Guildford, England. Previously regional director, Gaffney, Cline & Associates, Bentley Hall, England.

John F. White, to senior geophysical adviser-central division, Devon Energy, Oklahoma City. Previously senior geophysical adviser, deepwater production GOM, Devon Energy, Houston.

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The following candidates have submitted applications for membership in the Association and, below, certification by the Division of Professional Affairs. This does not constitute election nor certification, but places the names before the membership at large.

Any information bearing on the qualifications of these candidates should be sent promptly to the Executive Committee, P.O. Box 979, Tulsa, Okla. 74101.

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Fleenor, Robert, Energen Resources, Birmingham (D.D. Lehman, P.A. Ferguson, R.M. Tisdale)

Colorado

Givan, Ann V., iReservoir.com, Littleton (D.M. Cox, D.G. Neese, D.S. Anderson); **Rigg, Natasha Marie**, Anadarko Petroleum, Boulder (S.W. Tinker, S.A. Sonnenberg, W.C. Riese); **Thompson, Ryan Curtis**, EnCana Oil & Gas (USA), Denver (H.A. Illich, J.S. Wickham, D. Spancers)

Kansas

Youle, John Clinton, Sunflower Energy, Overland Park (S.W. Allen, D.R. Flinn, D.M. Allard)

Louisiana

Dunlap, John Bettes, retired, New Orleans (reinstate)

Oklahoma

Abbott, Ben Nicholas, Mid-Con Energy Corp., Tulsa (J.S. McGhay, L.F. Ingle, M.F. McGowan); **Adkins, Theodore H.**, Williams Companies, Tulsa (T.B. Marler, L.C. Burgess, M.K. Hyde); **Chandler, Joseph Franklin**, Chesapeake Energy, Oklahoma City (D.W. Combs, R.B. Rieser, A.A. Middleman); **Gilliland, Ellen**, Chesapeake Energy, Oklahoma City (V.L. Hebert, R.J. Sperandio, A.W. Vrbeneć)

Pennsylvania

Burr, Jonathan L., Sylvan Energy, Pittsburgh (reinstate)

Texas

Adesina, Kehinde Samuel, Halliburton Consulting, Houston (K.E. Williams, J.L. Gevirtz, T.J. Sheehy); **Allwardt, Patricia Fiore**, ConocoPhillips, Houston (P.H. Hennings, R.W. Krantz, P. D'Onfro); **Bhattacharya, Sweta**, Petrotel, Plano (S.J. Malecek, K.M. Willis, K.C. Voight); **Campbell, Cameron Denney**, ExxonMobil, Houston (M.D. Sullivan, M.S.

Long, N.R. Stewart); **Haire, Edgar Leo**, INEXS, Houston (C.S. Davis, D.J. Collins, C.H. Truss Jr.); **Keith-Asante, Jocelyn**, BG Group, Dallas (T.M. Gibson, D. Keith, D.M. Cassetta); **Leary, Barbara Rassmann**, ExxonMobil, The Woodlands (J.E. Neal, R.D. Stewart, R.S. Bishop); **LeMay, Philip William**, Enervest, Houston (W.J. LeMay, R.L. Hixon, D.T. Wagner); **Manaker, David M.**, BP Exploration and Production, Houston (J.J. Lelek, H.L. Harrison, P.G. Belvedere); **McElvain, Pete Russell**, Offenhauser Oil & Gas, Wichita Falls (B.S. Brister, J.W. Ritchie, R.M. Hough); **Mehlhop, Andrew L.**, Anadarko Petroleum, The Woodlands (D.E. Rice, W.A. Tedesco, P.J. Towle); **Oekerman, Mark R.**, HighMount Exploration & Production, Houston (L.M. Knox, A.J. Skeryanc, G.W. Van Swearngen); **Papesh, Kelly Ku**, ExxonMobil Exploration, Houston (reinstate); **Pollinger, Mark Lawrence**, Schlumberger, Katy (J.L. Bennett, T.A. Strutz, J.N. Vogt); **Walker, Donald**, ConocoPhillips, Houston (S.A. Sonnenberg, T.A. McClurg, J.D. McCullough); **Williams, Stephanie K.**, Terra

Dynamics, Austin (T.D. Moody, P.R. Grant, D.L. Bell); **Yip, Grant Y.**, ExxonMobil, Houston (J.E. Welton, J.M. Ajdukiewicz, J.R. Boles)

Washington

Lindsey, David S., retired, Spokane (reinstate)

West Virginia

Sholes, Adam Michael, Mountaineer Gas Services, Clendenin (E.M. Rothman, R.L. Snyder, M.M. Hileman)

Australia

Kuek, David, Apache Energy, Nedlands (D.W. Phelps, D.A. Pivnik, P.T. Bingaman)

Canada

Dawes, Ian Peter, Talisman Energy, Calgary (D.A. Dolph, J.R. Hogg, R.A. Clark); **Huff, Catherine**, Nexen, Calgary (F. Demangeat, M.B. Rogers, R.J. Galant); **Lazorek, Michael**, Chevron Canada Resources, Calgary (J.S. Mattson, S. McAllister, T.R. Carter)

Ghana

Akabzaa, Thomas MBA, University of Ghana, Accra (J.K. Agbenorto, I.A. Botchway, C.K. Fordjor); **Kutu, Jacob Mawuko**, University of Ghana, Accra (J.K. Agbenorto, I.A. Botchway, C.K. Fordjor); **Manu, Johnson**, University of Ghana, Accra (J.K. Agbenorto, I.A. Botchway, C.K. Fordjor); **Nude, Prosper**, University of Ghana, Accra (J.K. Agbenorto, I.A. Botchway, C.K. Fordjor)

Ivory Coast

Koutouan, Ange Didier, Petroci, Abidjan (D.J. Tearpock, J.G. Chapman, A.W. Cherry); **Ndri, Gerard Kre**, Petroci Holding, Abidjan (D.J.

Certification

The following are candidates for certification by the Division of Professional Affairs.

Petroleum Geologist

Louisiana

Quinn, Michael Joseph, Plains Exploration & Production, Lafayette (B.D. Sydboten Jr., T. Bennett, J. Heppermann)

Texas

Bellamy, Justin, Pioneer Natural Resources, Irving (D. Sander, L.L. Brooks, J.A. Breyer); **Champine, Arthur Lawrence**, ExxonMobil Production, Houston (S.D. Conner, R.K. McClure, T.J. Frantes)

Nigeria

Agbe-Davies, Victor F., Amni International/Emerald Energy, Lagos (O.A. Ojo, A.O. Akinpelu, R.S. Vormelker)

Continued on next page

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WWWUPDATE



A new design gives the AAPG website a specific look for all Regions of the world.

Regions Get New Focus on Website

By JANET BRISTER, AAPG Website Editor

Location, location, location. Depending on where in the world you're standing – or sitting, or whatever position you're in when you access www.aapg.org – your view of the AAPG website is different.

Your AAPG Web team has tapped into GeoIP technology and added a banner to the AAPG home page that will display a specific AAPG Region link to your computer.

If you're in the United States, nothing will change for your AAPG home page. But if you're in, say, India, you'll see a banner across the top of the home page that is focused on the Asia-Pacific region.

Simultaneously, members in, say, Italy see one that provides Europe region information, while in Brazil they are looking at one focused on Latin America.

Wherever you are in the world – Africa, Canada, the Middle East, etc. – your computer will have a banner linking your computer to that Region.

This feature allows for more obvious navigation to the Region areas on the site and gives a more prominent, local focus to member activities over the globe.

* * *

How is this possible?

This is based on your computer's address that is given to it by the Internet Service Provider (ISP) hosting the services you are using.

So if you are a world traveler and started your day in London, England, but

that evening was spent in New York City, the AAPG website you saw that morning will look different from what you see that evening.

It's pretty simple really. Just think of your telephone.

The telephone number consists of country codes and area codes and local exchanges. Similarly, the IP addresses are organized into sets within countries and geographic areas.

But here's where the technology changes. Telephones didn't usually travel, so the number was as stationary as the house address. Now, even though the phone travels, the number affiliated with that phone does not change.

When you are accessing the Internet, whatever device you are using is assigned an IP address managed through the local ISP. These are really long numbers (up to 12 digits) that reflect the geographic location of the ISP through which you are obtaining your services.

When you travel and use Internet services provided within that area, the IP reflects your location. These ISPs are very cooperative. They negotiate connections and verification in order to pass through e-mails and other data, using all kinds of different protocols.

Tapping into that organization is how AAPG now serves up this new area-specific version.

So wherever you are ...
Good browsing!

Continued from previous page

Tearpock, J.G. Chapman, A.W. Cherry)

Japan

Ito, Makoto, Chiba University, Chiba (S. Yoshida, M. Fujiwara, Y. Yaguchi)

Kuwait

Al-Shemali, Adnan Aiesh, Kuwait Oil Co., Ahmadi (R.M. Zereik, K. Ahmed, S.S. Thakur)

Netherlands

Herrero-Fernandez, Maria J., University Complutense Madrid, Delft (R.R. Gries, A. Moscariello, A. Permanyer)

Nigeria

Kelsch, Kenneth, Chevron, Lekki (H. Xiao,

C.F. Kluth, T.L. Heidrick); Tiamiyu, Abimbade Ishola, Mosunmolu Limited, Lagos (O.S. Adegoke, A.A. Adesida, O.A. Olawoki)

Norway

Moore, David John, self-employed, Oslo (N. Piggott, G.T. Himes, L.N. Kaye)

Pakistan

Rafi, Salma, University of Karachi, Karachi (T.S. Hasany, M.Z. Khan, N.K. Siddiqui)

Saudi Arabia

Ternes, David L., Saudi Aramco, Dhahran (S.R. Wharton, D.P. Taylor, G.E. Jahraus)

Scotland

Unger, Mike, Chevron Upstream Europe, Aberdeen (R.W. Blake, S.A. Haas, D. Morgan)

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READERS' FORUM

The Shale Gas Catch-22

After browsing through some recent job advertisements I was amazed at the number of ads that contained such phrases as "Must have shale gas experience," "Documented shale gas experience required" or, my personal favorite, "Ten years shale experience needed."

Besides some of the original folks in the Barnett play, who has 10 years working shales?

As geoscientists, I think all of us are able to learn and adapt to new plays, new basins and new ideas. This is just a normal part of our jobs. There is nothing magical about shale gas (or any unconventional play, for that matter). An experienced geoscientist has the tools to quickly climb the learning curve and begin making real contributions to these

emerging plays.

I'm willing to bet that some of our best and brightest talents are not applying for these jobs. They are thinking, "I would be a perfect fit at Company X. Too bad I don't have any shale experience."

Instead, Company X probably hires some guy who spent a year drilling Barnett wells, and thus thinks he is the world's leading expert in unconventional resource plays.

In conclusion, to all the hiring managers out there – please give us a break with your "shale gas expert" job descriptions.

Actually, don't give us a break. Give us a chance.

Brian Repke
Houston

Attention Deepwater Explorers

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Whether you are a geoscientist, engineer, and/or manager, if you are exploring in deepwater clastic systems we have a valuable tool for you. EGI is pleased to announce that through an exclusive arrangement with Cossey & Associates, Inc., the Turbidite Field and Reservoir Database is available to EGI's Corporate Associates.

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DEG from page 51

with education on the successful remediation of hydrocarbon impacts, new emerging technologies, best management practices and how to be more pro-active and preventative of accidental discharges to the environment and for mitigating the effect of greenhouse gases with carbon sequestration.

We also present research on hydrology and on water and natural resources sustainability related to hydrocarbon exploration and production.

* * *

All the statistics I have seen show that hydrocarbons are going to remain the dominant source of energy for some

time to come.

As emerging third world economies continue to grow there undoubtedly will be the need to find more hydrocarbons to meet these demands – and we will ultimately find ourselves exploring and operating in many new and different places and environments.

I think there also will be an increasing expectation, or demand, that we as an industry find and develop these resources in an environmentally and socially responsible manner. Both the exploration geoscientist and the environmental geoscientist will be working side by side to see that these expectations can be satisfied.

The DEG is, and will be, an important and integral part of the AAPG organization now and in the future.

I am excited for the future of the DEG and am proud to have shared my experience as the DEG president with many of you.



UPCOMING REGIONAL WORKSHOPS

JUNE 2010

- 6/2 **Texas/SE New Mexico:** Program for Induced Earthquake Research (PIER) – Houston, TX.
- 6/7-9 **Midcontinent:** Exploring for Bypassed Pay Using DST Data – Wichita, KS.
- 6/8 **Eastern:** Old-Style Elog Analysis and Analysis of Black (New Albany) Shale Logs, Grayville, IL.
- 6/11-13 **Eastern:** Marcellus Shale Core Workshop and Field Trip to Eastern West Virginia's Valley & Ridge.
- 6/13 **Rocky Mountain Core Workshop:** Source Rocks 101, What the Exploration Geologist, Geophysicist and Production Engineer Should Know About Petroleum Source Rocks (RMS-AAPG) – Durango, CO.
- 6/14-18 **Rocky Mountain:** Futures in Energy 2010 – Pinedale, WY.
- 6/29 **Rocky Mountain:** Petra Basics – Golden, CO.
- 6/30 **Rocky Mountain:** Petra Intermediate Mapping – Golden, CO.

JULY 2010

- 7/6 **Rocky Mountain:** Risk and Uncertainty Analysis for Unconventional Resource Plays (Energy Epicenter RMAG/COGA) – Denver, CO.
- 7/8-9 **Midcontinent:** Reserves Estimation in Unconventional Reservoirs – Tulsa, OK.
- 7/10 **Rocky Mountain field trip:** Niobrara Formation Field Trip, Northern Colorado Front Range: An Outcrop Analog for Shale Gas Resource Plays Throughout the U.S. (COGA/RMAG) – Denver, CO.

For further information, view PTTC's online calendar at www.pttc.org/national_calendar.htm

CLASSIFIED ADS

POSITION AVAILABLE

Petroleum Exploration Geologist Newfield Exploration Tulsa, OK

Seeking Geologist, responsible for conducting detailed prospect analysis and play fairway assessments within the Mid-Continent Region plus the generation and presentation of prospect ideas and leads to management. This position would be located in Tulsa, OK.

The successful applicant will generate and update maps, logs, cross-sections and corporate databases with new tops, correlations, shows and other pertinent geological data. Develop regional, multi-county stratigraphic framework and subsurface correlations.

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Just write out your ad and send it to us. We will call you with the word count and cost. You can then arrange prepayment. Ads received by the first of the month will appear in the subsequent edition.

DIRECTOR'S CORNER

Going to Calgary? It Should be Obvious

By RICK FRITZ, AAPG Executive Director

I recently read a list of questions supposedly asked of park rangers at U.S. national parks, which included these examples:

- ▶ At the Grand Canyon they have been asked, is the canyon "man made?"
- ▶ At Carlsbad Caverns a regular question is, "Is all of the cave underground?"
- ▶ At Yellowstone National Park, "Does Old Faithful erupt at night?" is often asked of rangers.
- ▶ The most common of all questions at the parks is, "When does the 5 p.m. bus leave?"

My favorite question comes from rangers at national parks in the eastern United States. Here tourists often ask, "Why are there so many Civil War battlefields in national parks?"

* * *

I have asked my share of dumb questions in my lifetime. Sometimes we just miss the obvious.

One thing I won't miss is the upcoming AAPG ICE meeting in Calgary, Sept. 12-15. ICE is AAPG's acronym for International Conference and Exhibition, and this will be the first time that ICE is held in Canada.

The conference theme is "Frontiers of Unconventional Thinking: Saddle Up for the Ride!" This is a great opportunity to experience a global technical program – including focus on unconventional reservoirs in Canada and worldwide.

The technical program will include 350 oral and posters on themes ranging from petroleum systems to environmental to reservoir management (refer to the official



FRITZ

This is a great opportunity to experience a global technical program – including focus on unconventional reservoirs in Canada and worldwide.

ICE announcement that was included with this month's EXPLORER for more details).

I am especially interested in the session on "Exotic Reservoirs of the World – Chalks, Cherts, Phosphates, Granites and Hydrates."

There will be a special focus on Tuesday on shale reservoirs.

Several special sessions and forums will be held. Notable is the forum on "E&P Challenges in Complex Environments: From Arctic to Deep Water." Also on Monday is a special lecture on "Burgess

Shale Tales" that should be interesting.

There also are great opportunities for continuing education. "Creative Petroleum Exploration" will be a highlight, plus courses from "Fault Seal Analysis" to "Geomechanics for Unconventional Reservoirs."

In addition, the Canadian Society of Petroleum Geologists is conducting one of its well-known core conferences. Participants will review up to 30 integrated core and poster displays. Focus is on unconventional, frontier and international

hydrocarbon systems.

AAPG's Energy Minerals Division also is conducting a core workshop on the Alberta oil sands.

Of course, when you are talking about September in the Canadian Rockies you are talking about great weather for great field trips. There are currently nine pre-conference and seven post-conference field trips planned. Trips are scheduled from the Fraser River of British Columbia to the southern plains of Alberta.

This is a tremendous opportunity to get back to the rocks and spend quality time in the field.

Finally, this will be a great opportunity to network with geoscientists from all parts of the globe and view the newest technologies on the exhibit floor.

The entire meeting will be held in the TELUS Convention Centre in downtown Calgary, so it will be a very convenient venue.

* * *

The most common answer by rangers to the question, "Why are there so many Civil War battlefields in National Parks" is: "Well, they fought here to be close to the parking lots, toilets and restaurant facilities."

Of course, that is obvious.

So ICE in the second week of September? This seems pretty obvious, too. We hope to see you there.



Calgary, site of this year's AAPG International Conference and Exhibition, set Sept. 12-15.

DIVISIONS' REPORT

An education and advocacy role

DEG Looks for E&P, Environment Balance

By MICHAEL A. JACOBS, DEG President

In this, my last article as president of the Division of Environmental Geology, I am going to take a few moments to express my thanks to all of the hard working DEG members who helped throughout the year to make this a tremendously successful year.

Thanks to all the DEG officers, Advisory Board members, EG Journal Editor, DEG committee members, AAPG staff members and all the other DEG volunteer members who did an exemplary job putting together programs and moving forward with many new initiatives.

DEG is making great headway in its efforts to grow more internationally, and members such as Peter Lloyd, Jeff Aldrich, Peter Kukla, David Cook and others are working toward a joint meeting with the Geological Society of London related to the geological sequestration of CO₂. DEG put on excellent programs at the annual meetings and in several Sectional meetings and formed an official affiliation with the Environmental and Engineering Geophysical Society.

And we aren't done yet. We all know that the reward for a job well done is the opportunity to do more.



JACOBS

Both the exploration geoscientist and the environmental geoscientist will be working side by side to see that these expectations can be satisfied.

* * *

That said, I think it is fair to say the recent events taking place in the Gulf of Mexico highlight some of the purposes behind the existence of the Division of "Environmental" Geosciences.

But first, I think we all need to take a moment for thoughtfulness and prayers for those families who lost their loved ones in this tragedy. We should always be reminded that no matter how smart we think we are, or how good of explorationists we claim to be, it is the rig hands and roughnecks that are tasked with the daunting and dangerous task of bringing these hydrocarbons to the surface. Whether it is on a huge multi-million dollar, deepwater rig in the Gulf

of Mexico or just a small rig running out in the dusty desert of the Permian Basin, where two roughnecks lost their lives in separate accidents just this week alone, it is a dangerous business we are in.

My respect and admiration goes out to these individuals.

It will be some time, perhaps years, before the full environmental impact of this incident is fully assessed. It will no doubt change the way that exploration and production goes on in the offshore environment – and as with all tragedies, after all the investigations are completed we will in the long run be better, and safer, at how we conduct our business in these environments.

I hope that DEG members will be able to put together some sessions and

papers on the environmental impact of this incident in future AAPG meetings.

To me, that is the primary job of the DEG – to be the voice and the advocate of this industry on all environmental matters related to E&P activities, and to educate AAPG members and the general public on how we can balance the search for and the production of hydrocarbons with protection of the environment.

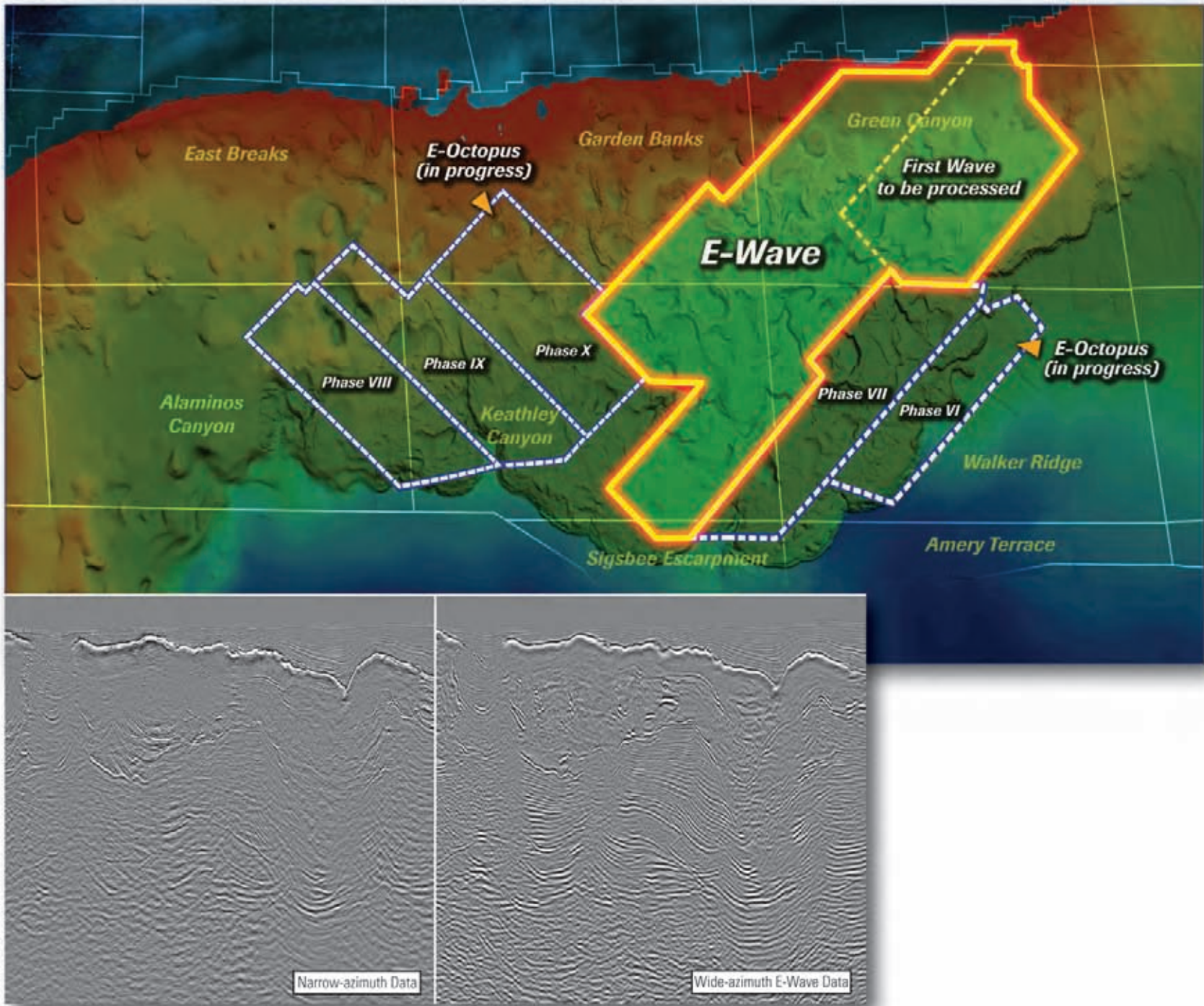
DEG puts on numerous sessions and talks on the impact of hydrocarbon releases and spills to the environment, but more importantly these talks present real solutions to these impacts

See DEG, page 50



E-Wave Advanced Imaging Project

Full-Waveform Inversion



E-Wave advanced imaging is now under way in the Gulf of Mexico.

The E-Wave* advanced imaging project will enhance the quality of approximately 30,800 km² of existing wide-azimuth data, covering phases I–V of the E-Octopus survey, by making full use of the latest WesternGeco preconditioning and imaging algorithms.

WesternGeco will apply the data-driven velocity modeling technique of full-waveform inversion plus tilted transverse isotropic reverse-time migration to produce improved images in and below areas of great structural and velocity complexity. The E-Wave project will also incorporate true 3D GSMP* general surface multiple prediction processing.

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